U.S. Department of Energy

Oakland Operations Office, Oakland, California

TECHNICAL MEMORANDUM: INVESTIGATION RESULTS FOR THE FORMER EASTERN DOG PENS

at the

LABORATORY FOR ENERGY-RELATED HEALTH RESEARCH (LEHR)
UNIVERSITY OF CALIFORNIA AT DAVIS, CALIFORNIA

Prepared for:

United States Department of Energy
Oakland Operations Office
1301 Clay Street
Oakland, California 95612-5208

Prepared by:

Weiss Associates
5801 Christie Avenue, Suite 600
Emeryville, CA 94608

September 24, 1999
Rev. 0

DOE Oakland Operations Contract DE-AC03-96SF20686

Weiss Associates
Environmental Science, Engineering and Management

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ACRONYMS

µCi	MicroCuries
µg/kg	micro grams per kilogram
µR	MicroRoentgen
AHAs	Activity Hazard Analyses
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
bgs	Below ground surface
CA	Contamination Area
COPC	Constituent of Potential Concern
CPGERP	Contingency Plan and General Emergency Response Procedures
cpm	Counts per minute
DAC	Derived Air Concentration
DOE	U.S. Department of Energy
DQO	Data Quality Objective
EDP	Eastern Dog Pens
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
GEL	General Engineering Laboratories, Inc.
GM	Geiger Müeller Detector
HSC	Health and Safety Coordinator
HSPs	Health and Safety Procedures
HWP	Hazardous Work Permit
ID	Identification
IDW	Investigation-Derived Waste
IRA	Interim Removal Action
K-40	Potassium-40
LEHR	Laboratory for Energy-Related Health Research

LFI	Limited Field Investigation
MCL	Maximum Contaminant Level
mCi	MilliCurie(s)
MDA	Minimum detectable activity
mg/kg	Milligrams per kilogram
MOA	Memorandum of Agreement
OSHA	Occupational Safety and Health Administration
pCi/g	PicoCurie(s) per gram
PHSP	Project Health and Safety Plan
PID	Photoionization Detector
PPE	Personal Protective Equipment
PRG	Preliminary Remedial Goal
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
Ra-226	Radium-226
RBAS	Risk-Based Action Standard
RCT	Radiological Control Technician
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
RNG	Random Number Generator
RPM	Remedial Project Manager
RPP	Radiation Protection Program
SC	Site Coordinator
SHSO	Site Health and Safety Officer
SOP	Standard Operating Procedure
SQP	Standard Quality Procedure
Sr-90	Strontium-90
Th-232	Thorium-232
TSM	Tailgate Safety Meeting
UC Davis	University of California, Davis

UCL	Upper Confidence Level
USA	Underground Services Alert
USCS	Unified Soil Classification System
VOC	Volatile Organic Compound
WA	Weiss Associates
WBH	Waste Burial Hole
WDP	Western Dog Pen
WRS	Wilcoxon Rank Sum

EXECUTIVE SUMMARY

This Technical Memorandum presents the results of the Eastern Dog Pens (EDP) Investigation conducted in March 1999 at the Laboratory for Energy-Related Health Research (LEHR) at the University of California at Davis, California (UC Davis). As specified in the Work Plan (Weiss Associates, 1998b), the main objectives of the EDP Investigation were to provide additional characterization data to:

- Serve as a baseline data set prior to the area's possible use by UC Davis for waste handling;
- Support negotiations between DOE and UC Davis on the long-term management/environmental cleanup of the EDP;
- Support future baseline risk assessment; and,
- Provide UC Davis with information to guide remedial decisions for Landfill No. 2.

In addition to these objectives, the data from the EDP investigation could also provide a conceptual model to be used for remedial decisions for the EDP.

Forty-three primary and four duplicate soil samples, six concrete curb samples, and 16 primary and one duplicate gravel samples were collected during the EDP Investigation. The curb and gravel samples were analyzed for radium-226 and strontium-90. All soil samples were analyzed for tritium and 37 were analyzed for additional radionuclides, selected metals, nitrate, and organochlorine pesticides. Eight soil samples were also analyzed for bulk density and moisture content. Significant findings of the EDP Investigation are:

1. Concrete Curb: Radium-226 was detected in all six samples ranging from 0.269 to 1.68 picoCuries/gram (pCi/g). No background levels for Ra-226 or Sr-90 have been established for concrete at the site, however based on a literature search Ra-226 activity in cement typically ranges from 0.973 pCi/g to 1.38 pCi/g (Ingersoll, 1983; Tso, 1994). Strontium-90 was detected in three of the six samples, ranging from 0.398 to 7.44 pCi/g. These activities are below the 10 pCi/g soil RBAS for Sr-90 developed for the LEHR site.
2. Gravel: No background levels for Ra-226 or Sr-90 have been established for the gravel at the site. However, we have included the RBAS and/or soil background levels for comparison. Radium-226 was detected in all 16 samples ranging from 0.196 to 0.396 pCi/g. All the Ra-226 results were below the calculated soil background level for Ra-226 of 0.752 pCi/g. Strontium-90 was detected in two of the 16 samples, and both results are well below the RBAS. Because no

gravel-specific background levels have been determined, the significance of these results has not been fully determined.

3. Soil to 2 ft depth (beneath the gravel): Alpha- and gamma-chlordane, dieldrin, and several other pesticides and PCBs were detected in one or more soil samples. Alpha-and gamma-chlordane were detected in 12 soil samples in concentrations up to 47.8 and 43.4 mg/kg, respectively. Dieldrin was detected in two samples above the 15 micro grams per kilogram (µg/kg) RBAS, with one sample containing 223 ug/kg. The only inorganic constituents analyzed in the EDP soil that are above background levels based on the Wilcoxon Rank Sum (WRS) test are Sr-90, total chromium, and hexavalent chromium. In addition the WRS test results for Cs-137, mercury and nitrate were inconclusive. The maximum result for each of these constituents was compared to the lowest RBAS established for that constituent. Only the maximum concentrations for dieldrin, Cs-137 and mercury were above the lowest RBAS. The reasonable maximum exposure (RME) levels, defined here as the 95% upper confidence level (UCL), for dieldrin, Cs-137 and mercury were compared to the lowest RBAS. The RMEs for all of these constituents are below the RBAS.

4. Comparison with Western Dog Pen (WDP) soil levels: Several pesticides were detected in both the EDP soil and the WDP soil, but the suite of pesticides detected in the EDP soil was slightly different from the pesticide suite detected in the WDP soil. The pesticides that were detected in both the EDP and the WDP soils are 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, and alpha- and gamma-chlordane. The metals and radionuclides detected in the EDP are similar to those detected in the WDP. Based on the statistical results, the EDP and the WDP soil levels are very similar with the exception of the pesticide dieldrin and slightly higher concentrations of mercury in the EDP.

5. Remedial Action: Because the EDP and the WDP have similar operation histories and apparent contamination patterns, it is likely that no remedial action will be recommended for EDP soil based on the recent findings presented in *Draft Technical Memorandum: Statistical Comparison of Western Dog Pens Soil Data with Risk-Based Target Levels* (WA, 1999d).

1. INTRODUCTION

1.1 Objectives

This Technical Memorandum presents the results of the Eastern Dog Pens (EDP) Investigation conducted in March 1999 at the Laboratory for Energy-Related Health Research (LEHR) at the University of California, Davis, California (UC Davis) (Figure 1). The main objectives of the EDP Investigation are to provide additional characterization data that will:

- Serve as a baseline data set prior to the area's possible use by UC Davis for waste handling;
- Support negotiations between DOE and UC Davis on the long-term management/environmental cleanup of the EDP;
- Support future baseline risk assessment;
- Provide UC Davis with information to guide remedial decisions for Landfill No. 2; and,
- Indicate whether remedial actions may be necessary for EDP soil.

1.2 Previous Eastern Dog Pens Investigations

1.2.1 Operational History

Between 1958 and the mid-1980's, the Western and Eastern Dog Pens were used to house dogs involved in radium-226 (Ra-226) and strontium-90 (Sr-90) research activities at the LEHR site. The dog pens were constructed in phases; the EDP, built between 1968 and 1970, are the most recently constructed set. The EDP contained 96 pens in three rows (K, L, and M), with each row containing 32 pens (Figure 2). The EDP overlays the UC Davis inactive Landfill No. 2.

The radionuclide-dosed dogs were kept indoors for a 30-day holding period, prior to moving them outside to the Western and Eastern pens (Goldman, 1997; DOE archived records), regardless of the dose level. Calculations by Rosa, Gielow and Peterson in the 1963 LEHR Annual Report (DOE archived records) indicate that dogs were eliminating up to 0.23 microCuries (μCi) per 48 hrs in feces and urine 28 days after Sr-90 exposure. Calculations by Goldman in a 1963 memorandum

(DOE archived records) estimated that about 500 µCi/yr Sr-90 and about 50 µCi/yr Ra-226 were eliminated in urine by the outdoor dogs at that time.

The dogs placed in the outside pens were paired by sex; two male or two female dogs were placed in each pen (Ballard, 1997; Goldman, 1997; Hinz, 1997). Dogs which had received high radionuclide doses were not placed next to control dogs (Goldman, 1997), but the dogs were not otherwise segregated by dose level (Ballard, 1997; Goldman, 1997; Hinz, 1997). In general, dogs remained in the same pen for the duration of their lifespan, typically 10 to 12 years (Ballard, 1997; Goldman, 1997; Hinz, 1997). Feces were removed from the pens daily, and urine percolated into the gravel (Ballard, 1997; Goldman, 1997; Hinz, 1997; DOE archived records).

Dogs were dipped in chlordane to control fleas from 1960 until 1968, when excess exposure to chlordane apparently impacted the health of the dogs (DOE archived records). The dipping was apparently performed near the western boundary of the Western pens (Goldman, 1997; Hinz, 1997). It is not clear where the pesticide was stored, whether it was kept in a liquid or powder form, or where the dipping fluid was disposed after use. Chlordane was also sprayed in and around the pens, particularly near the southern edge of the pens because flea-bearing rodents were believed to be more plentiful south of the dog pens than elsewhere due to the proximity of Putah Creek (Ballard, 1997). Annual usage of chlordane is estimated to be between 25 and 50 gallons (Dames & Moore, 1993).

1.2.2 Existing Data

Shallow soil samples were collected and analyzed from the EDP in 1990 (Dames & Moore, 1993) and 1996 (Figure 2); however, these data are not sufficient to meet the objectives stated in Section 1.1. These samples were not collected as part of the LEHR CERCLA investigation; therefore the quality assurance/quality control (QA/QC) procedures fall short of those required under CERCLA. Consequently, these previous data were considered qualitatively in planning this investigation. Field radiation survey data from the dog pen pedestals removed in 1996, anecdotal information about the dog pen operations (see Section 1.2.1), and results of the extensive Western Dog Pens (WDP) investigations conducted in 1997 and 1998 (Weiss Associates, 1998a) were also considered in planning this investigation.

In summary, previous data from the EDP (Figure 2) indicate:

- Chlordane was present in most surface soil samples and in one 1.5-ft below ground surface (bgs) sample at concentrations up to 0.48 milligrams per kilogram (mg/kg); and,
- Several radionuclides, including Ra-226, cesium-137 (Cs-137), thorium-232 (Th-232), and potassium-40 (K-40), were detected in one or more samples at levels slightly above 1998 background.

Based on similar operational histories and existing data, the contaminant nature and extent in the EDP is expected to be very similar to that in the WDP. In fact, contamination in the EDP may be lower because of the shorter operational history. Therefore, based on the WDP data (Weiss Associates, 1998a), contamination in the EDP most likely:

- Attenuates fairly sharply with depth in soil beneath the pen gravel;
- Includes mercury, chlordane, Ra-226, Cs-137, and other radionuclides at levels slightly above background; and,
- Shows no predictable lateral distribution pattern.

As stated above, this existing information and data for the EDP and WDP provided a conceptual framework for designing the EDP investigation described in this Technical Memorandum. The investigation design elements influenced by this existing information include:

- The analyte list was limited to selected radionuclides and metals, organochlorine pesticides, and nitrate. Based on all previous data from the EDP and WDP, this list covers all likely COPCs for the EDP.
- The soil sampling locations were chosen at random, based on the relatively small variability and unpredictable spatial distribution of contaminants expected in the EDP based on WDP data.
- The soil investigation was limited to the top 2 ft. This design element was necessary due to the potential presence of landfill waste at depths as shallow as 2 ft bgs, but was also supported by the steep attenuation of contaminants with depth that was observed in shallow WDP soils.

1.3 Technical Memorandum Organization

Section 2 of this Technical Memorandum presents the field procedures used for the Eastern Dog Pen Investigations. Section 3 summarizes analytical results, Section 4 presents the results of the statistical analysis, and Section 5 presents the conclusions. Cited references are listed in Section 6.

2. DESCRIPTION OF INVESTIGATION

This section describes the field activities for the EDP Investigation. Fieldwork began in early March 1999. All work was conducted in accordance with the *Final Work Plan for Eastern Dog Pens Investigation* (the Work Plan) (Weiss Associates, 1999b), the *Quality Assurance Project Plan* (QAPP) (Weiss Associates, 1998b), and all appropriate Standard Operating Procedures (SOPs) (Weiss Associates, 1998c) included in the Work Plan. The Work Plan was reviewed and accepted by the remedial project managers (RPMs) from the US Environmental Protection Agency (EPA), the Central Valley Regional Water Quality Control Board (RWQCB), the California EPA Department of Toxic Substances Control (DTSC), and the California Department of Health Services (DHS).

All laboratory analyses were performed using the methods specified in the Work Plan (Weiss Associates, 1999a) by General Engineering Laboratories (GEL) in Charleston, South Carolina.

Based on the investigation design presented in Section 2 of the Work Plan, the EDP investigation consisted of three phases:

1) A detailed gamma survey of the entire area;
2) Curb and gravel sampling at selected locations, with analysis for Ra-226 and Sr-90; and,
3) Soil sampling at 0 and 2 ft below ground surface at selected locations, with analysis for selected radionuclides, metals, nitrogen compounds, and pesticides (Figure 3).

Procedures, specifications, and equipment are presented below, and are described in detail in the Work Plan (Weiss Associates, 1998b).

Prior to any field activities in the EDP, underground utilities were cleared. This clearance included: 1) UC Davis personnel locating utilities and marking the ground surface indicating the type and orientation of utilities; 2) contacting Underground Services Alert (USA) 48-hours prior to beginning drilling; and, 3) contracting a private utility locator, NorCal, of Santa Rosa, California, to clear the proposed drilling locations.

Also, prior to any fieldwork, the EDP area was cleared of debris and vegetation to the extent necessary to allow the surface radiation survey and soil sampling to be efficiently performed. All Elderberry shrubs were protected.

2.1 Detailed Gamma/Beta Radiation Survey

Prior to soil sampling, a gamma radiation survey of the entire gravel surface of the EDP area was conducted on a 2 ft by 2 ft grid, and a gamma/beta/alpha surface radiation survey was conducted on the concrete curbs. The surface gamma radiation survey for the gravel was conducted over the entire EDP area using a Ludlum Model 2221 instrument with a Model 44-10 (2 inch by 2 inch) sodium-iodide scintillator. The instrument was held at a height and moved at a rate that provided reconnaissance readings representative of approximately 2 ft by 2 ft grid areas. The sensitivity of the instrument is approximately 900 counts per minute per microRoentgen per hour (cpm/μR/hr).

The concrete curb radiation survey was conducted within each pen in areas most likely to be contaminated (i.e. horizontal surfaces in the vicinity of former fence posts). The survey was conducted using a Ludlum 3 rate meter with a geiger-müeller (GM) probe for determining beta/gamma and a scintillation probe for determining alpha contamination.

Prior to conducting the survey, a background level for the gravels was established. Ten one-minute integrated counts were taken at each of the three on-site background locations (Figure 1). The background locations were selected based on: 1) the presence of gravel that looked similar to that in the EDP, 2) the presence of gravel on the surface with soil beneath it, and 3) lack of known environmental impact by site activities. Although the Work Plan specified defining background as the 98% upper confidence level (UCL, defined as the average of the thirty readings plus three standard deviations), the average was used instead. This more conservative approach was selected because most EDP readings were below the average background readings.

All gamma radiation survey readings were recorded on a detailed EDP map (Appendix A). No locations had readings exceeding two times background, therefore one-minute integrated counts were not taken.

2.2 Concrete Curb and Gravel Sampling

Concrete curb and gravel samples were collected from the EDP area and analyzed for only Ra-226 and Sr-90. The selected analytes are based on previous results from the WDP that indicate possible impact to some gravel by Sr-90 and/or Ra-226. Table 1 summarizes the sample identification, sample locations and analysis conducted on each sample.

Six curb samples were selected based on the radiation survey results, with three samples collected from areas with elevated gamma/beta and/or alpha readings and three collected from areas with background readings (Figure 4 and Appendix A). The purposes of the curb sampling was to determine if: 1) the two radionuclides known to have been used in the dog pens have impacted the curb; and, 2) field gamma readings can be used as an indicator of elevated gamma/beta emitters in the curb. The curb samples were collected using a concrete coring machine and the solid core sample was then placed in a plastic container and sent to the laboratory to be pulverized before being analyzed.

The gravel samples were collected from the 16 soil sampling locations where gravel was present, and a duplicate gravel sample was collected from one of the locations (Figure 4 and Table 1). The gravel samples were collected using a hand trowel and placing the gravel in plastic containers and sent to the laboratory to be pulverized before being analyzed.

2.3 Soil Sampling

Based on the relatively small variability and unpredictable spatial distribution of contaminants expected in the EDP based on WDP data, sampling locations were chosen using a Random Number Generator (RNG). First, 21 pens were chosen randomly (Figure 3). As shown on Figure 3, five of the 21 pens were designated as "contingency pens". Of the 21 randomly selected pens, these were the last five selected.

Each pen was divided into three areas (Figure 3). One of three areas within the 21 chosen pens was randomly selected for sampling (Table 2 of the Work Plan). Area 1 is the asphalt area at the front of each pen. This area has not been sampled in previous dog pen investigations, and field radiation surveys of the gates and fence posts that were in this area have shown some locations with above-background radiation. Area 2 is the area within the inner curb where the housing pedestal was located. Previous investigations have suggested slightly elevated radiation levels on and under the pedestals. Area 3 is the remainder of the pen area; previous investigations in the WDP showed no predictable pattern of radiation in this area. Within the particular area chosen, the actual sample location was randomly selected.

The EDP sampling was limited to shallow soil to minimize the risk of intercepting any underlying landfill waste. The actual depth to the top of the waste in the landfill is unknown. Furthermore, extensive sampling in the WDP suggests that constituents of potential concern (CPOCs) attenuate sharply with depth. Therefore, soil sampling was limited to the upper 3 ft. The surface samples were collected from 0 to 6 inches and the deeper samples were collected between 1.5 and 3 ft. For the ease of labeling and reporting, these sample intervals are referred to as "surface" and "2 ft bgs" samples.

Based on field conditions, the following changes were made to the sampling plan:

- Surface samples and those 2 ft bgs were collected from 19 locations instead of 21 locations as described in the Work Plan due to the presence of landfill waste just below the gravel in two locations, pen K2 and pen K10;
- Thirty seven soil samples were collected instead of 42 samples because landfill waste was encountered in two borings (K2 and K10) just below the gravel and at 1.5 ft in another boring (M27);
- Pen K4 was intended for sampling but K3 was inadvertently sampled instead;

- Three of the five contingency pens were replaced by pens with elevated gamma survey readings. Pen M19 was replaced with pen M12, pen L22 was replaced with pen M22 and pen K8 was replaced with pen K19; and,
- Pen K20 was to be sampled for tritium but the sample location was moved to pen K21 because a tree restricted access to the back portion of pen K20.

As shown on Table 1, all soil samples were analyzed for selected radionuclides, metals, pesticides and nitrogen compounds. At the request of UC Davis, four samples from the surface and four samples from 2 ft bgs were analyzed for bulk density and moisture content for use in guiding remedial decisions for Landfill No. 2. Surface soil samples from six other pens in the southernmost row (Figure 5) were also collected and analyzed for tritium only, to provide additional baseline data for this area prior to its use by UC Davis.

The surface soil samples were collected using a hand trowel from the first soil encountered immediately below the approximately one-foot thick layer of gravel. Surface soil samples were collected in glass jars. The deeper soil samples were collected in brass sleeves using a hand auger and split barrel sampler, starting 1.5 ft below the gravel/soil interface and extending to 3 ft. For these deeper samples, the first three inches of sample were for pesticide analysis, the second three inches were for metals and nitrogen analyses, and the remaining foot of sample was for radionuclide analyses.

Figure 5 shows the soil sample locations. Table 1 summarizes the sample locations including the tritium analysis sample locations and the physical parameter analysis sample locations, and QA/QC sample locations.

Soil sample collection was conducted in accordance with SOP 3.1, Surface and Shallow Subsurface Soil Sampling, and SOP 15.1, Lithologic Logging (Appendix A of the Work Plan). Chain-of-custody records were prepared in accordance with SOP 1.1, Chain-of-Custody (Appendix A of the Work Plan). Sample handling, packaging, and shipping was conducted in accordance with SOP 2.1, Sample Handling, Packaging and Shipping.

3. SUMMARY OF ANALYTICAL RESULTS

All the EDP investigation data are presented in tables in Appendix B, and are summarized on Tables 2 and 3. The significant findings of this investigation are summarized in this Section.

3.1 Curb Results

As mentioned in Section 2, the six curb sample locations were based on gamma/beta/alpha survey results. Three locations had background readings, which were less than 2,100 disintegrations per minute/100 centimeters^2 (dpm/100cm^2) beta/gamma and 150 dpm/100cm^2 for alpha. The other three locations had elevated readings of 13,000 dpm/100cm^2 beta/gamma and 1,300 dpm/100cm^2 alpha, 26,000 dpm/100cm^2 beta/gamma, and 52,000 dpm/100cm^2 beta/gamma.

Site background activities for Ra-226 and Sr-90 in concrete have not been established. Ra-226 activity levels in cement reported in the literature ranges from 0.973 pCi/g to 1.38 pCi/g (Ingersoll, 1983, Tso, 1994). WA currently has no information on the typical range of Sr-90 activity in soil concrete. However, since Sr-90 is not a naturally occurring radionuclide, it is expected that its background activity in concrete is well below 1 pCi/g.

The Ra-226 results from the locations with background survey results ranged from 0.269 to 0.96 pCi/g, and the Ra-226 results from the locations with elevated readings ranged from 0.354 to 1.68 pCi/g. Hence, the Ra-226 activity in the EDP curbs is similar to the background activity of 0.973 pCi/g to 1.38 pCi/g found during the literature search. The Sr-90 results from the locations with background survey results had activity up to 1.59 pCi/g and the Sr-90 results from the samples with elevated survey readings had Sr-90 activity up to 7.44 pCi/g. Only three of the six curb samples had measurable Sr-90 activity and all the results were below the 10 pCi/g 10^{-6} RBAS for Sr-90.

Based on these limited data it is not apparent that there is a significant difference between the background and elevated radiation survey readings, except that the survey reading which indicated the presence of alpha emitters had the highest Ra-226 result and the survey reading with the highest beta/gamma reading had the highest Sr-90 reading.

3.2 Gravel Results

Gravel samples were collected from 16 pens as shown in Figure 4 and analyzed for Ra-226 and Sr-90. Ra-226 activity in these samples ranged from 0.196 to 0.396 pCi/g. Two gravel samples contained Sr-90 activity at 0.032 and 0.201 pCi/g.

3.3 Soil Results

Soil samples were collected at 0 and 2 ft bgs from 19 locations (Figure 5 and Table 1). A total of 37 samples and four duplicate samples were collected. The following constituents were detected above background: total chromium, hexavalent chromium, mercury, cesium-137, gross alpha, gross beta, Sr-90, thorium-228 (Th-228), thorium-230 (Th-230), and thorium-232 (Th-232) (Table 3 and Appendix B). Background values have not been established for the LEHR site for the following constituents detected: total Kjeldahl nitrogen (TKN), 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha- and gamma-chlordane, dieldrin, endrin, endrin ketone, PCB-1254, and PCB-1260 (Table 3 and Appendix B).

3.3.1 General Chemistry

Nitrate (as N) was not detected at concentrations greater than background. A background value for TKN in soil has not been established for the LEHR area. However, TKN was detected in all 37 samples ranging in concentrations from 2.88 to 1,030 mg/kg. These concentrations are similar to those detected in shallow soil samples from the WDP (Weiss Associates, 1998a).

3.3.2 Metals

In the EDP, 36 soil samples contained concentrations of mercury up to 5.99 mg/kg and one sample contained up to 10.8 mg/kg mercury. Mercury was detected in four samples above background, and only one sample contained mercury at two times greater than background. The surface mercury concentrations at the LEHR site and the surrounding area vary, and range between 0.04 and 5.2 mg/kg as reported in previous investigations. The regional background surface mercury concentrations in the San Joaquin Valley range from 0.02 to 9.4 mg/kg (Wilson et al., 1990).

3.3.3 Pesticides

Dieldrin was detected in thirteen samples, but only two samples were above the 10^{-6} RBAS of 15 ug/kg. The maximum dieldrin concentration was 223 ug/kg in sample SSDP0338. This sample was reanalyzed and confirmed to contain dieldrin. Dieldrin, an insecticide, is typically used in agriculture for soil and seed treatment and to control disease vectors such as mosquitoes and tsetse flies. Although there is no record of dieldrin use at the LEHR site, it has been detected in ground water monitoring wells UCD1-12, UCD1-13, UCD2-14 and UCD2-15 and in Putah creek sample locations upstream and downstream of LEHR, and in the sewage treatment plant outfall (Figure 6). Ground water concentrations for dieldrin ranged from 0.003 to 0.094 ug/l from 1991 through 1993. Since 1993, dieldrin has only been detected in well UCD1-13 at concentrations ranging from 0.013 to 0.03 ug/l. The ~~maximum contaminant~~ CA action level (MCL) for dieldrin is 0.05 ug/l. It appears dieldrin

was only detected in Putah Creek during one sampling event in 1991, at concentrations ranging from 0.006 to 0.043 ug/l.

Other pesticides including 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, alpha- and gamma-chlordane, endrin, endrin ketone, PCB-1254 and PCB-1260 were all detected in the EDP soil but are all well below their respective RBAS (Table 3).

3.3.4 Radionuclides

Of the 11 radionuclides detected, only Sr-90, Th-228, and Th-232 were detected in activities exceeding two times background.

Sr-90 was detected in six samples, four of which contained Sr-90 two times greater than background. However, none of the samples were above the Sr-90 RBAS of 10 pCi/g.

Th-228 was detected in four samples above background, but only one was two times greater than background.

Th-232 was detected in three samples above background, but only one sample was two times greater than background.

Six additional samples were collected in the southern most row of the EDP. These samples were analyzed only for tritium. Tritium was not detected in any of the six samples.

3.3.5 Physical Parameters

A total of eight samples four each from the surface and 2 ft depth were collected and analyzed for bulk density, porosity and moisture content. This data will be used by UC Davis to guide remedial decisions for Landfill No. 2.

The dry and wet bulk density for the surface samples ranged from 1.5 to 1.69 g/cm^3 and 1.73 and 1.96 g/cm^3, respectively. The dry and wet bulk density for the 2 ft samples ranged from 1.49 to 1.72 g/cm^3 and 1.68 and 2.03 g/cm^3, respectively.

The porosity of the surface samples ranged from 36.1 to 43.5% and from 35.0 to 43.6% for the 2 ft samples.

The gravimetric moisture content for the surface and 2 ft samples ranged from 14.3 to 20.1% and 5.8 to 18.0%, respectively. The volumetric moisture content for the surface and 2 ft samples ranged from 21.6 to 30.1% and 9.2 and 30.9%, respectively.

3.3.6 Results based on Sample Area

As described above and shown on Figure 5, three different sample areas were defined within a dog pen: Area 1 - asphalt in front part of the dog pen, Area 2 - gravel and soil within the inner curb of the dog pen, and Area 3 - the gravel and soil between the inner and outer curb of the dog pen. Twelve soil samples and one duplicate sample were collected from Area 1, 16 soil samples and two duplicate samples were collected from Area 2, and 15 soil samples and one duplicate sample were collected from Area 3.

Of the 25 constituents detected above background, Area 1 contained eight of the constituents, Area 2 contained seven constituents, and Area 3 contained 10 constituents (Table 3).

In Area 1, the maximum concentrations for alpha- and gamma-chlordane, dieldrin and endrin ketone were detected from the surface soil samples just below the asphalt, and the maximum Th-228, Th-230, Th-232 and 4,4'-DDE concentrations were detected in the 2 ft bgs soil samples.

In Area 2, the maximum concentrations for 4,4'-DDT, PCB-1254, PCB-1260, Sr-90, and mercury were detected from the surface soil samples just below the gravel and, the maximum hexavalent chromium and Cs-137 concentrations were detected in the 2 ft bgs soil samples.

In Area 3, the maximum concentrations for Tl-208, Th-234, 4,4'-DDD, gross alpha, gross beta, and total chromium were detected from the surface soil samples just below the gravel and the maximum endrin, gross beta, and total chromium concentrations were detected in the 2 ft bgs soil samples.

3.3.7 Results Based on Depth

All constituents identified as above background (see Section 4.3) were used in evaluating the data for trends related to vertical attenuation. These constituents include the pesticides and PCBs detected, strontium-90, and total and hexavalent chromium. Of these, alpha- and gamma-chlordane and dieldrin show clear decreasing concentration trends with depth. Alpha- and gamma-chlordane were detected in 7 and 8 sample sets, respectively, where a sample set is defined as a surface sample and 2 ft bgs sample from the same dog pen location. Alpha-chlordane concentrations decreased with depth in six sample sets and increased in one sample set. Gamma-chlordane concentrations decreased with depth in six sample sets and increased in two sample sets.

The other pesticides and PCBs were only detected in a few samples at trace concentrations. The strontium-90 and total/hexavalent chromium concentrations detected are only slightly above background and fall within limited concentration ranges, so trends with depth (if any) are difficult to ascertain.

3.4 Data Quality Summary

Samples collected for this investigation were analyzed by General Engineering Laboratories, Inc. (GEL) in Charleston, South Carolina. Quality Control (QC) samples collected include: (1) one gravel field duplicate pair (Sample ID GSDP0011/012); (2) four soil field duplicate pairs (SSDP0318/319, 332/333, 338/339 and 344/345); and (3) one equipment rinsate sample.

Chemical and radiological data were reviewed by qualified chemists from Weiss Associates (WA), in accordance with LEHR Standard Operating Procedure No. 21.1 (Data Validation). Sample results and associated QA/QC results that were reviewed included (as applicable): holding times, field and laboratory blank results, LCS spike results, MS/MSD results, laboratory matrix duplicate results, surrogate recoveries and internal standard performance. All sample results were identified as usable (no qualifier), estimated and usable (with J or UJ qualifier), or rejected and unusable (with R qualifier).

Overall quality of the chemical and radiological data, including precision, accuracy, representativeness, comparability and completeness (PARCC) parameters, is discussed below.

3.4.1 Precision

Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Primary indicators of precision are sample/sample duplicate, MS/MSD and field duplicates. Sample/sample duplicates and MS/MSD precision for most analyses were good, indicating that these analytical methods were consistently precise. Due to laboratory duplicate imprecision, results for strontium-90, chromium and mercury were qualified as estimated (J or UJ) for some samples. Mercury for SSDP0332/333; cesium-137, thorium-234 and dieldrin for SSDP0338/339; and gross alpha and gross beta for SSDP0344/345 were qualified as estimated (J or UJ) due to field duplicate imprecision.

3.4.2 Accuracy

Accuracy is the degree of agreement of a measurement (or an average of measurements of the same thing) with an accepted reference or true value. Primary indicators of accuracy are recoveries of surrogate spikes, LCS spikes and MS. Surrogate spike, LCS spike and MS recoveries for most analyses were within QC limits, indicating that these analytical methods were consistently accurate. Chromium (VI) and mercury for some samples were qualified as estimated (J) due to MS/MSD recovery failure.

3.4.3 Representativeness

Representativeness is a qualitative parameter which expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Determinants of representativeness include sampling locations, frequency, collection procedures and compromises to sample integrity (for example, cross contamination) that occur during collection, transport, and analysis. Representativeness is evaluated by the results of field blanks, laboratory method blanks, laboratory duplicates and field duplicates. The evaluation of laboratory and field duplicates was presented in Section 3.4.1 (Precision). For the equipment rinsate blank and laboratory method blanks, analytes were not detected above the reporting limits.

3.4.4 Comparability

Comparability is a qualitative parameter which expresses the confidence with which one data set can be compared to another. Important determinants of comparability include uniformity of sampling activities, analytical procedures, data reporting and data review. Sampling, analytical, data reporting and data review procedures were very consistent during this investigation. Use of specific EPA analyses and standardized process of data review have lent a high degree of comparability to the data.

3.4.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct normal conditions. Completeness is defined as the percentage of valid data relative to the total number of analytes. For this investigation, 100% of the analytical data are considered valid. All samples were analyzed within technical holding times. No data were rejected; only few data points were qualified as estimated (J or UJ). This level of completeness is considered very high and is an indication of high quality data.

3.4.6 Conclusion

Very few qualifiers were applied to the analytical data for this investigation. No significant problems occurred in the collection and analysis of samples that would compromise the data quality. Based on the QC data provided, the analytical data are considered valid and are usable for the purpose intended.

4. STATISTICAL COMPARISONS

Statistical methods were selected for comparing EDP soil data with background soil levels and/or the lowest RBAS. The statistical approach used for the EDP soil is described in the *Draft Technical Memorandum: Statistical Comparison of Western Dog Pens Soil Data with Risk-Based Target Levels* Weiss Associates, 1999b). The statistical approach was based on *Statistical Methods for Evaluating the Attainment of Cleanup Standards, Volume 3: Reference Based Standards for Soils and Solid Media* (USEPA, 1994) and is the same approach described in Appendix A of *The Sampling and Analysis Plan for Removal Actions in Southwest Trenches, Ra/Sr Treatment Systems, and Domestic Septic Tanks* (Weiss Associates, 1998d). This approach was suggested and approved by the LEHR RPMs for confirmation that cleanup standards had been reached following removal actions in the Southwest Trenches (USEPA, 1998).

The overall approach for the statistical comparisons is shown in Figure 7. As shown in this figure, the approach entails first determining which COPCs in soil are at levels statistically above background levels. All COPCs identified as potentially above background are then compared with the lowest RBAS values. Each step of the process is described in detail in the following sections.

4.1 Selection of COPCs for Statistical Tests

In general, all constituents with validated concentrations above the reporting limit in one or more EDP soil samples were included in the statistical analyses. Only two general inorganic parameters, nitrate (as N) and TKN were analyzed in the EDP soil. TKN was not included in the statistical analyses because a background level has not been established. In addition, short-lived (i.e., 30 hours or less) radionuclide daughter products (actinium-228, Bi-212, Bi-214, lead-212, lead-214, Tl-208 and Th-234) were not included. Table 4 shows all the constituents statistically evaluated for the EDP. Although USEPA guidance (USEPA, 1990) allows for exclusion of COPCs detected at a frequency of less than 5%, all COPCs with one or more detection were retained to be conservative (see Table 4).

The use of qualified data followed the procedures outlined in *Risk Assessment Guidance for Superfund Part A* (USEPA, 1989), as described in *Draft Final Determination of Risk-Based Action Standards for DOE Areas* (Weiss Associates, 1997).

4.2 Adequacy of Number of COPC Data Points for EDP and Background

As recommended in *Statistical Methods for Evaluating the Attainment of Cleanup Standards* (USEPA, 1994), the Wilcoxon Rank Sum (WRS) test is the primary method to determine whether residual contaminant levels meet the cleanup criteria. Because the WRS test requires a minimum number of samples to be statistically valid, data sufficiency was evaluated using the formula developed by Noether (1987). For given decision errors α and β and given minimum detectable relative difference(Δ), the minimum number of samples depends primarily on the variances of the COPC background and EDP distributions. The results of the Noether calculation indicated sufficient data to conduct the WRS test for most COPCs. Those with either insufficient EDP or background data are listed in Table 4.

4.3 Results of Statistical Comparisons

Based on the WRS test results, all COPCs are at or below background levels except strontium-90, total chromium and hexavalent chromium. In addition, the WRS test results for Cs-137, mercury and nitrate were inconclusive (Table 4).

Following the WRS test, the maximum detected EDP soil levels were compared to the corresponding lowest RBAS (Weiss Associates, 1997) for those EDP COPCs that:

1. do not have sufficient data for a definitive comparison between background and EDP soil levels based on the Noether calculation;
2. exceed background levels based on the WRS test; or,
3. do not have an established background level.

For those COPCs with maximum EDP soil levels that exceed the lowest RBAS, the reasonable maximum exposure (RME) level, defined as the 95% upper confidence limit (UCL) on the mean (USEPA, 1992), was calculated and compared to the RBAS. As shown on Table 4, the results of these comparisons with lowest RBAS are:

- No RBASs are available for endrin, endrin ketone, PCB-1254 and nitrate; and,
- Maximum EDP soil levels for mercury, Cs-137 and dieldrin exceeded the lowest RBAS; however, the RME levels for these COPCs in the EDP soil are all below the lowest RBAS.

Based on these statistical analyses, no COPC in the EDP soil exceeds the risk-based target levels for LEHR soil.

4.4 Comparison with Preliminary Remedial Goals

As requested by the US EPA Region IX for the WDP, all COPCs identified in the EDP soil as being at levels potentially above background were compared with the US EPA Region IX PRGs for residential soil (See Table 4).

For those COPCs identified as potentially above background or above background, the maximum concentration detected in the EDP soil was compared to the residential PRG. The COPCs identified as being above background are Sr-90, total chromium, hexavalent chromium, chlordane, and the other pesticides detected in low levels in the EDP soil. In addition, mercury and Cs-137 are potentially above background.

With the exception of cesium-137 which has a PRG significantly less than local background (0.02 pCi/g versus 0.102 pCi/g) and total chromium, the maximum levels detected in EDP soil samples for all of these constituents are below their respective PRGs (see Table 4). For total chromium, the RME level of 168 mg/kg is well below its PRG of 210 mg/kg.

4.5 Eastern Dog Pens Results Compared to the Western Dog Pens Results

There are 20 COPCs for the EDP soil and 26 COPCs for the WDP; 9 of the COPCs (Cs-137, Ra-226, Sr-90, total chromium, hexavalent chromium, mercury, alpha- and gamma-chlordane, and nitrate) are present both in the EDP and WDP.

In the EDP, all COPCs are at or below background levels except for Sr-90, total chromium, and hexavalent chromium. Cs-137, mercury and nitrate were at or below background but "qualified" due to insufficient data above the reporting limit. Therefore, these EDP COPCs may actually be present at levels representative of background. In the WDP, all COPCs similar to the EDP are at or below background levels except Sr-90. Hexavalent chromium and nitrate were at or below background but "qualified" due to insufficient data above the reporting limit.

The maximum concentrations of the constituents that were above background, along with alpha- and gamma-chlordane that do not have established background levels, were compared to the corresponding lowest RBAS (WA, 1997). In the EDP, the maximum concentrations for only Cs-137 and mercury were above the lowest RBAS, and in the WDP the maximum concentrations for alpha- and gamma-chlordane were above the lowest RBAS.

For the constituents which had maximum concentrations above the lowest RBAS, an RME level defined as the 95% UCL (USEPA, 1992), was calculated. The RME level was compared to the lowest RBAS. In both the EDP and the WDP, the RME for every constituent was below its respective RBAS.

Therefore, all COPCs that are common to both the EDP and the WDP passed the overall comparison with target levels. Besides slightly higher concentrations of mercury and dieldrin in the EDP, the contaminant nature in the EDP is very similar to the contaminant nature in the WDP.

5. CONCLUSIONS

All work was conducted in accordance with the *Final Work Plan for Eastern Dog Pens Investigation* (Weiss Associates, 1999b), the *Quality Assurance Project Plan* (QAPP) (Weiss Associates, 1998b), and all appropriate Standard Operating Procedures (SOPs) (Weiss Associates, 1998c) included in the Work Plan. We used the statistical approach, which was suggested and approved by the LEHR RPMs, for confirmation that cleanup standards had been reached following removal actions in the Southwest Trenches.

Based on our statistical evaluation of the EDP soil data, all COPCs are at or below the appropriate soil target levels, defined as the lowest appropriate RBAS, or background for those COPCs with background levels higher than the lowest RBAS (Weiss Associates, 1997).

In comparing the data from the EDP investigation with the WDP investigation, the contamination in the EDP is similar to that of the WDP with the exception of dieldrin and mercury. Although mercury is detected in the WDP, the mercury concentrations in the EDP are slightly higher. Dieldrin was detected in the EDP and not detected in the WDP.

The four objectives identified in the Work Plan were successfully met. We collected all the data specified in the Work Plan, which establishes a baseline data set for the EDP. The data set has been validated and statistically evaluated and can be used in negotiations between DOE and UC Davis on the long term management/environmental cleanup of the EDP and future baseline risk assessments. Physical parameter samples were collected for bulk density, moisture content and porosity and will be used by UC Davis to guide remedial decisions for Landfill No. 2.

Because the EDP and the WDP have similar operation histories and apparent contamination patterns, it is likely that no remedial action will be recommended for EDP soil based on the recent findings presented in *Draft Technical Memorandum: Statistical Comparison of Western Dog Pens Soil Data with Risk-Based Target Levels* (WA, 1999d).

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7. ACKNOWLEDGEMENTS

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Name and Position	Responsibility
Michael Dresen DOE-Oakland Programs Manager, WA	Senior guidance and review, and quality assurance
Robert Devany LEHR Project Manager, WA	Project management, guidance and review
Salem Attiga Principal, EMS	Senior review
Mary Stallard LEHR Project Quality Assurance Manager, WA	Technical guidance and review, quality assurance
Joyce Adams Task Manager, WA	Project coordination, report writing
Udit Minocha Database Technician, WA	Database management
Craig Adams Graphics, WA	Graphics
Nerissa J. de Jesus Project Administrator, WA	Word processing and report coordination
Ted Trammel Production Personnel, WA	Graphics and report production

FIGURES

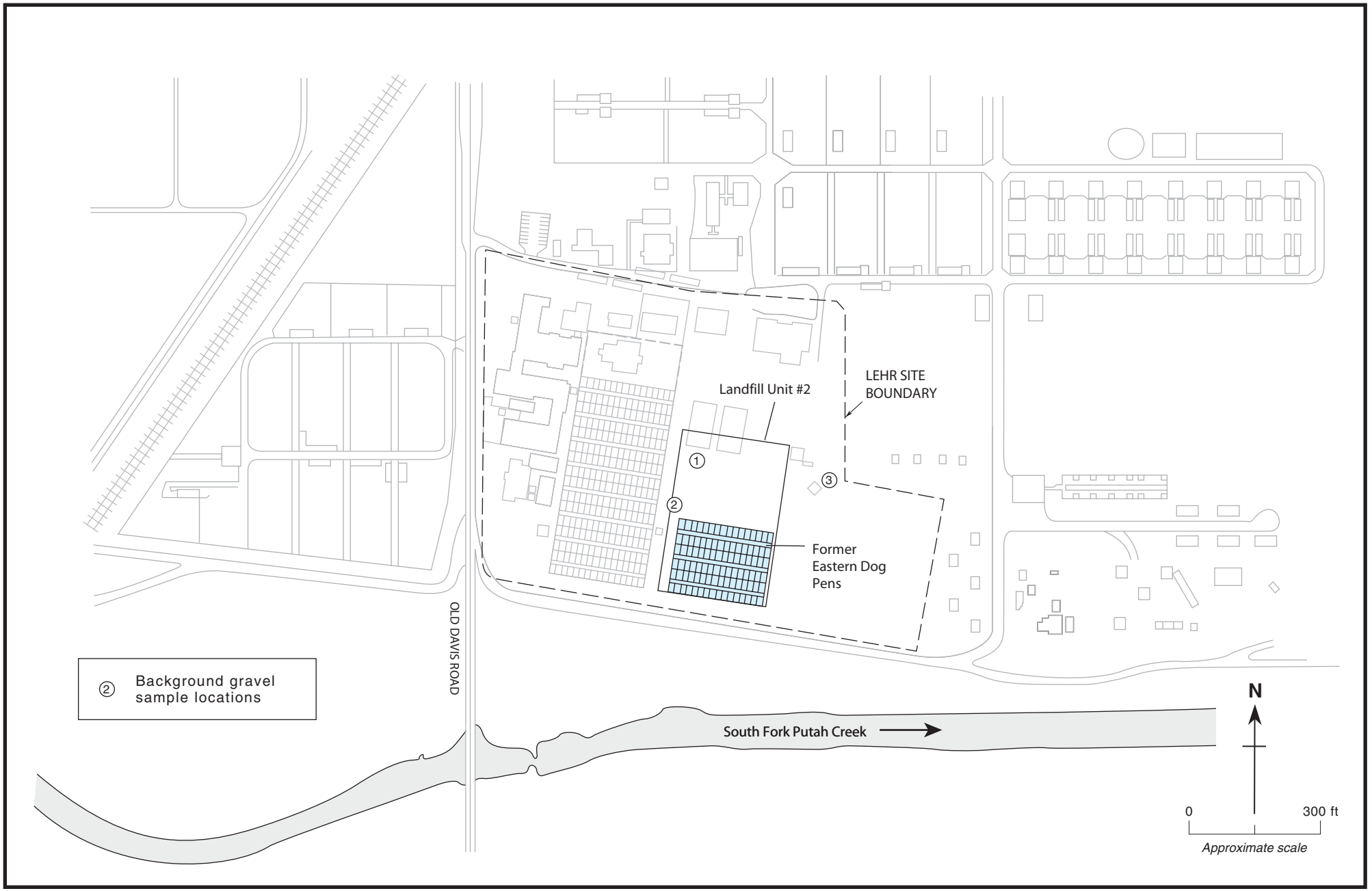


Figure 1. Former Eastern Dog Pens and Background Gravel Radiation Survey Locations, LEHR Site, UC Davis, California

Weiss Associates

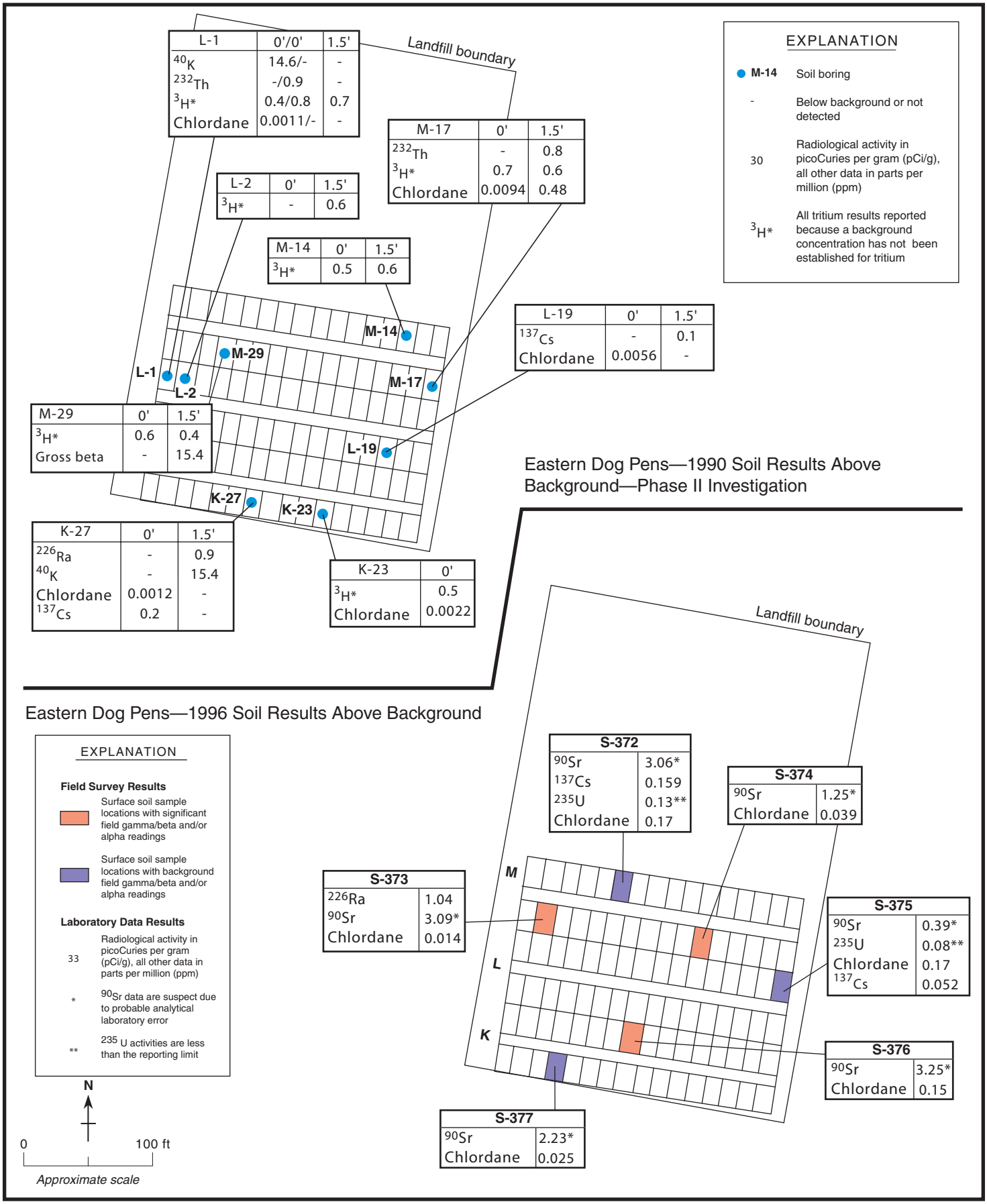


Figure 2. Analytical Results Above Background from Previous Investigations in the Former Eastern Dog Pens, LEHR Site, UC Davis, California

Weiss Associates

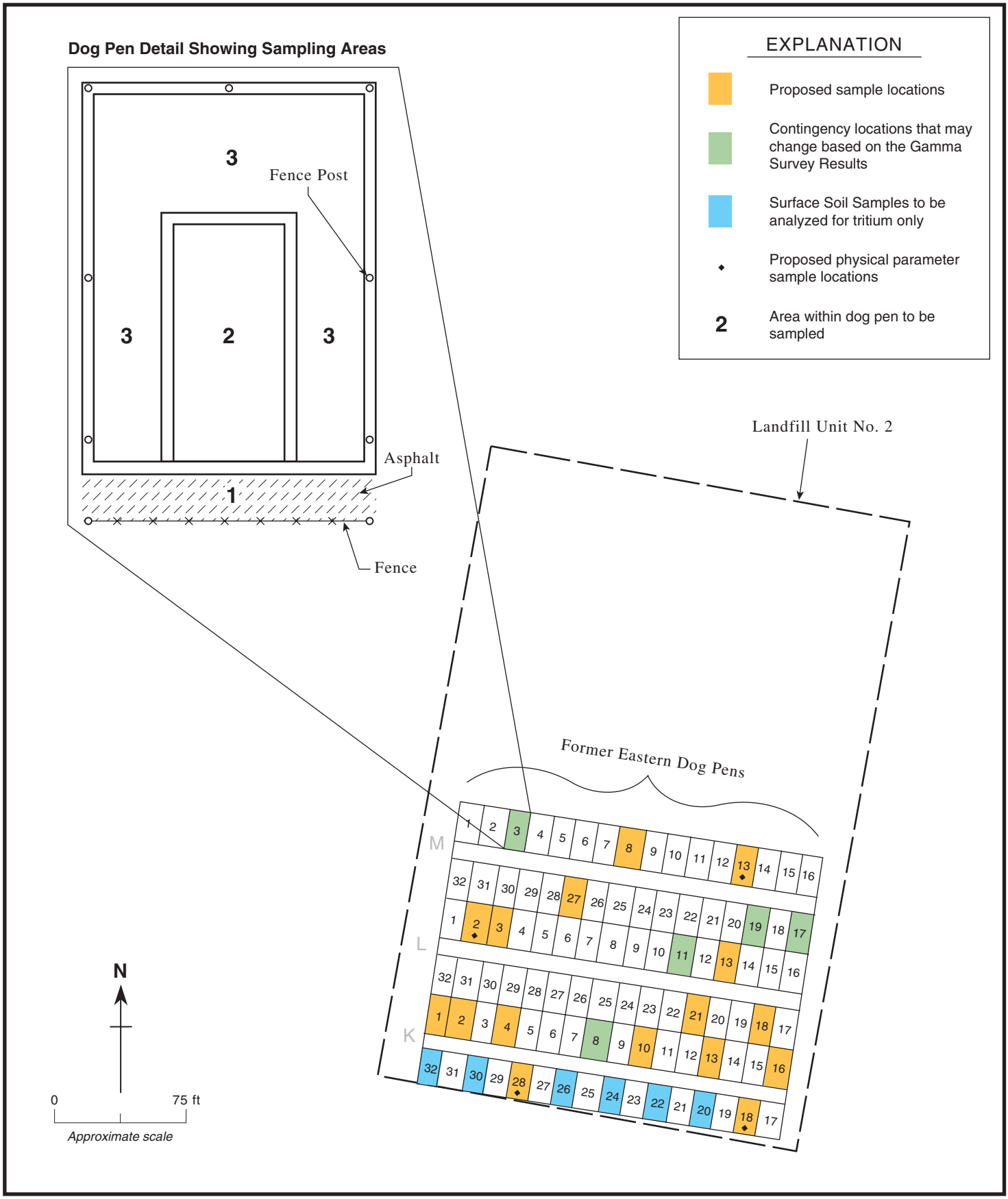


Figure 3. Proposed Shallow Soil Sample Locations in the Former Eastern Dog Pens

Weiss Associates

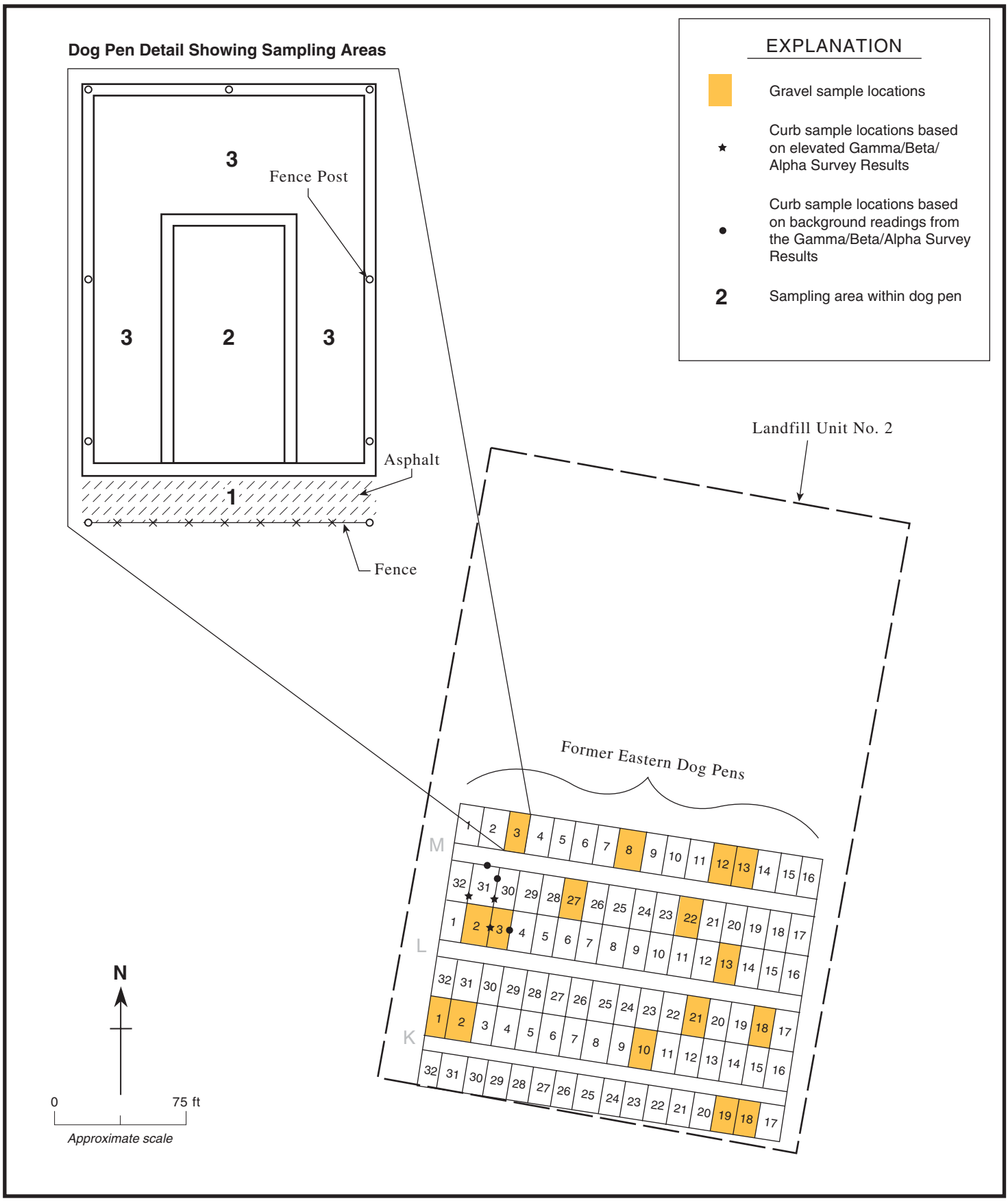


Figure 4. Concrete Curbing and Gravel Sample Locations in the Former Eastern Dog Pens, LEHR Site, UC Davis, California

Weiss Associates

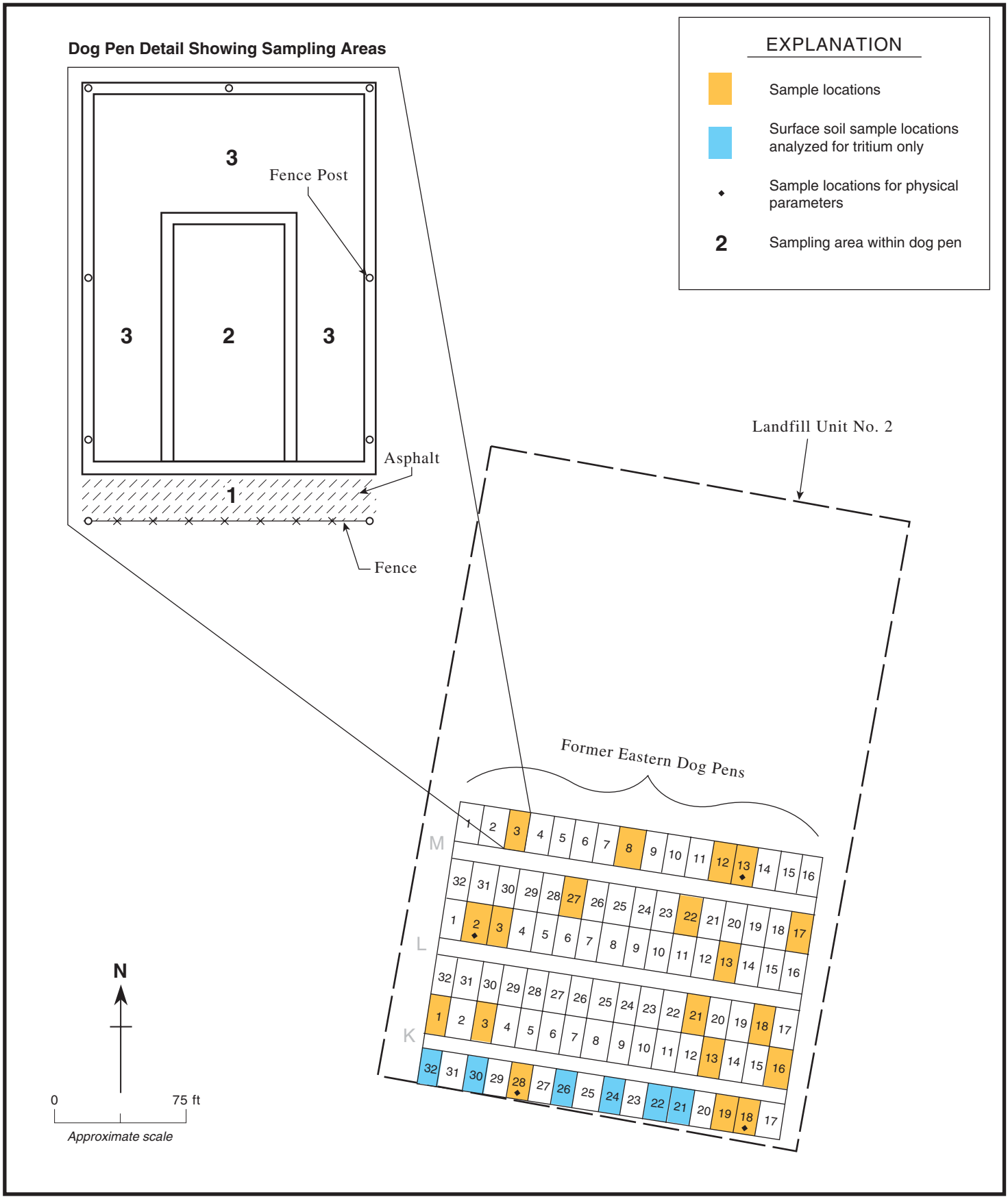


Figure 5. Shallow Soil Sample Locations in the Former Eastern Dog Pens, LEHR Site, UC Davis, California

Weiss Associates

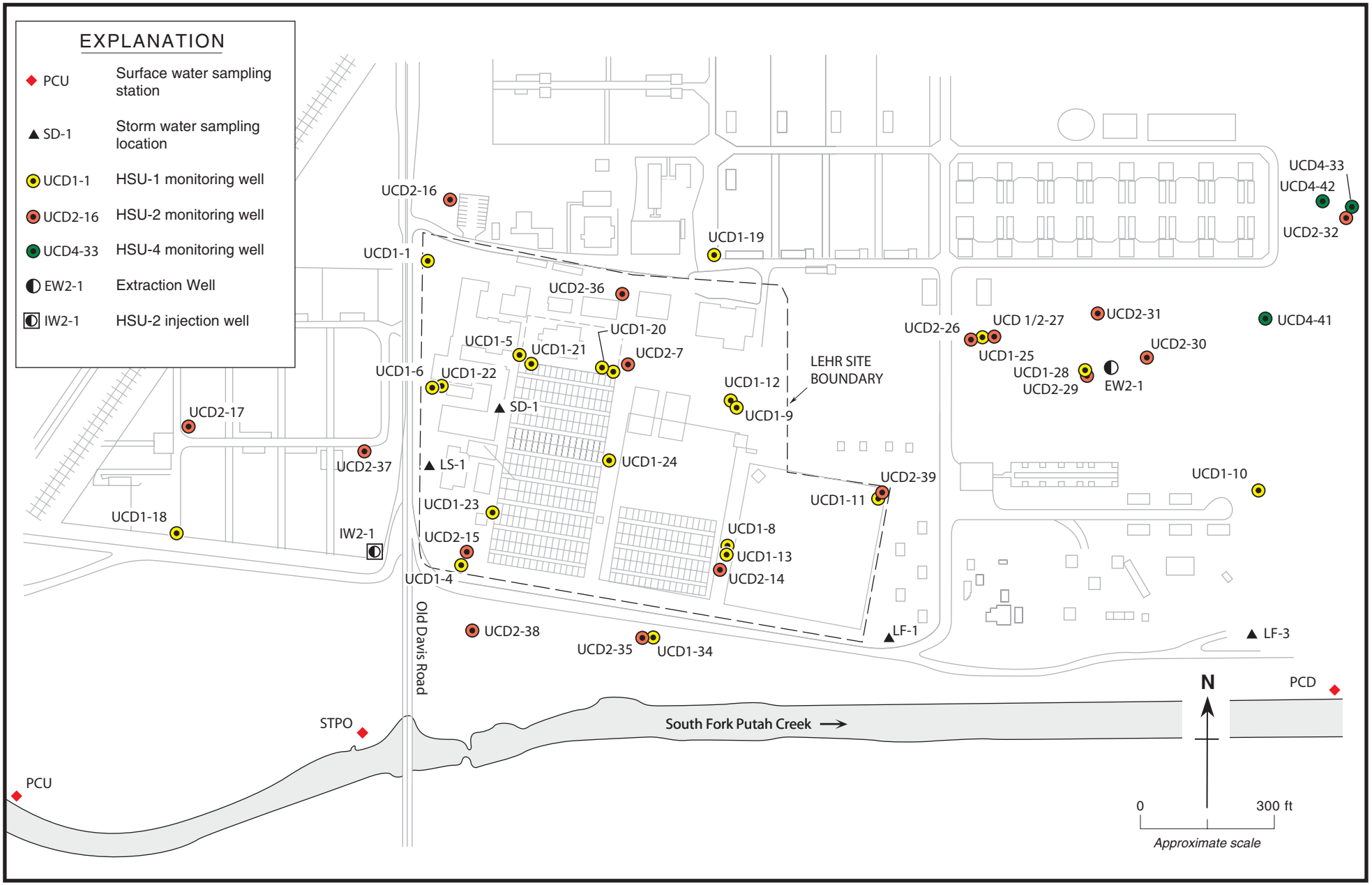


Figure 6. Monitoring Well, Storm Water and Surface Water Monitoring Locations, LEHR Site, UC Davis, California

Weiss Associates

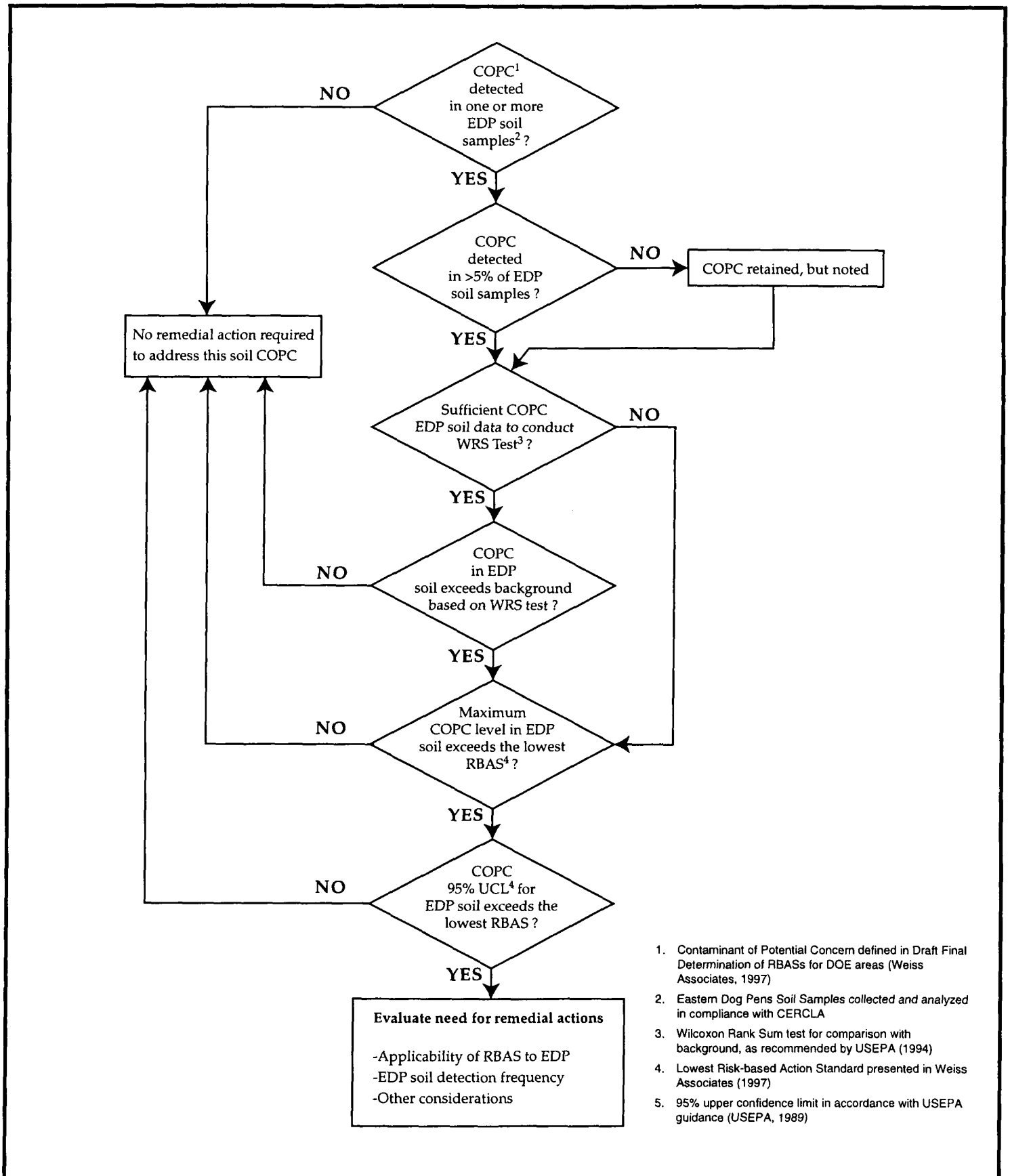


Figure 7. Data Evaluation Process for Eastern Dog Pens Soil, LEHR Site, UC Davis, California

Weiss Associates

TABLES

Table 1. Summary of Sampling Plan for the Former Eastern Dog Pen Investigation

Sample ID	Dog Pen	Sample Area	Sample Depth (ft)	Gamma Survey Results	Analyses	Notes
CURB SAMPLES						
CSDP0001	M30/31	N/A	0	BKG	Ra-226 and Sr-90	
CSDP0002	M30/31	N/A	0	Elevated	Ra-226 and Sr-90	
CSDP0003	M31/32	N/A	0	Elevated	Ra-226 and Sr-90	
CSDP0004	M31	N/A	0	BKG	Ra-226 and Sr-90	
CSDP0005	L2/3	N/A	0	Elevated	Ra-226 and Sr-90	
CSDP0006	L3/4	N/A	0	BKG	Ra-226 and Sr-90	
GRAVEL SAMPLES						
GSDP0001	M8	2	0	---	Ra-226 and Sr-90	
GSDP0002	M13	2	0	---	Ra-226 and Sr-90	
GSDP0003	M27	2	0	---	Ra-226 and Sr-90	
GSDP0004	L2	2	0	---	Ra-226 and Sr-90	
GSDP0005	L3	2	0	---	Ra-226 and Sr-90	
GSDP0006	L13	2	0	---	Ra-226 and Sr-90	
GSDP0007	L18	3	0	---	Ra-226 and Sr-90	
GSDP0008	L21	3	0	---	Ra-226 and Sr-90	
GSDP0009	K1	2	0	---	Ra-226 and Sr-90	
GSDP0010	K2	2	0	---	Ra-226 and Sr-90	
GSDP0011	K10	2	0	---	Ra-226 and Sr-90	
GSDP0012	K10	2	0	---	Ra-226 and Sr-90	Field Duplicate
GSDP0013	K18	2	0	---	Ra-226 and Sr-90	
GSDP0014	M3	3	0	---	Ra-226 and Sr-90	
GSDP0015	M12	3	0	---	Ra-226 and Sr-90	
GSDP0016	M22	3	0	---	Ra-226 and Sr-90	
GSDP0017	K19	1	0	---	Ra-226 and Sr-90	
SOIL SAMPLES						
SSDP0302	M8	2	0	---	1	
SSDP0303	M8	2	2	---	1	
SSDP0304	M13	2	0	---	1, 2	
SSDP0305	M13	2	2	---	1, 2	
SSDP0306	M27	2	0	---	1	
SSDP0307	M27	2	2	---	1	
SSDP0308	L2	2	0	---	1, 2	
SSDP0309	L2	2	2	---	1, 2	
SSDP0310	L3	2	0	---	1	
SSDP0311	L3	2	2	---	1	
SSDP0312	L13	2	0	---	1	
SSDP0313	L13	2	2	---	1	
SSDP0314	L18	3	0	---	1	
SSDP0315	L18	3	2	---	1	
SSDP0316	L21	3	0	---	1	
SSDP0318	K1	2	0	---	1	
SSDP0319	K1	2	0	---	1	Field Duplicate

Table 1. Summary of Sampling Plan for the Former Eastern Dog Pen Investigation (continued)

Sample ID	Dog Pen	Sample Area	Sample Depth (ft)	Gamma Survey Results	Analyses	Notes
SSDP0320	K1	2	2	---	1	
SSDP0323	K3	1	0	---	1	
SSDP0324	K3	1	2	---	1	
SSDP0327	K13	1	0	---	1	
SSDP0328	K13	1	2	---	1	
SSDP0329	K16	1	0	---	1	
SSDP0330	K16	1	2	---	1	
SSDP0331	K18	2	0	---	1, 2	
SSDP0332	K18	2	2	---	1, 2	
SSDP0333	K18	2	2	---	1	Field Duplicate
SSDP0334	K28	1	0	---	1, 2	
SSDP0335	K28	1	2	---	1, 2	
SSDP0336	M3	3	0	---	1	
SSDP0337	M3	3	2	---	1	
SSDP0338	M17	1	0	---	1	
SSDP0339	M17	1	0	---	1	Field Duplicate
SSDP0340	M17	1	2	---	1	
SSDP0341	M12	3	0	---	1	
SSDP0342	M12	3	2	---	1	
SSDP0343	M22	3	0	---	1	
SSDP0344	M22	3	2	---	1	
SSDP0345	M22	3	2	---	1	Field Duplicate
SSDP0346	K19	1	0	---	1	
SSDP0347	K19	1	2	---	1	
SSDP0348	K21	3	0	---	1	
SSDP0349	K22	3	0	---	1	
SSDP0350	K24	3	0	---	3	
SSDP0351	K26	3	0	---	3	
SSDP0352	K30	3	0	---	3	
SSDP0353	K32	3	0	---	3	

Abbreviations:
BKG= Background Readings

Footnotes:
Sample area inside dog pen:
1 = Asphalt Area in the front of the dog pen
2 = Pedestal area
3 = Area outside pedestal area

Analyses:
1 = Rads, Total Chromium, Cr VI, Mercury, Nitrate as Nitrogen, TKN, Pesticides
2 = Bulk Density/Moisture Content
3 = Tritium only

Table 2. Summary of the Analytic Results for the Concrete Curb and Gravel Samples from the Former Eastern Dog Pens Investigation

Constituent	Radiation Survey Results	Units	No. of Samples Analyzed	No. of Samples with Detections	Min. Activity	Max. Activity	Sample ID – Max. Concentration	RBAS	No. above RBAS	Min. Activity Above RBAS	Max. Activity Above RBAS	Dog Pen No. Max. Concentration
Curb Samples												
Radium-226	Bkgd.	pCi/g	3	3	0.269	0.96	CSDP0001	**0.0042**	3	0.269	0.96	M30/31
Radium-226	Elevated	pCi/g	3	3	0.354	1.68	CSDP0002	**0.0042**	3	0.354	1.68	M30/31
Strontium-90	Bkgd.	pCi/g	3	1	<0.05	1.59*	CSDP0006	**10**	0	NA	NA	L3/4
Strontium-90	Elevated	pCi/g	3	2	0.398*	7.44*	CSDP0005	**10**	0	NA	NA	L3/3
Gravel Samples												
Radium-226	NA	pCi/g	16	16	0.196	0.396	GSDP0016	**0.0042**	16	0.196	0.396	M22 (Area 3)
Strontium-90	NA	pCi/g	16	2	0.0324	0.201	GSDP0004	**10**	0	NA	NA	L2 (Area 2)

Abbreviations:
Bkgd. = Background
Min. = Minimum
Max. = Maximum
No. = Number
NA = Not applicable
RBAS = Risk Based Action Standard (Weiss Associates, 1997)

Notes:
* = Average of two analytic results for the same sample

Table 3. Summary of the Analytic Results for the Shallow Soil Samples from the Former Eastern Dog Pens Investigation

Constituent	UNITS	No. of Samples Analyzed	Bkgd.	No. of Detections above Bkgd.	Min. Detection above Bkgd.	Max. Detection above Bkgd.	RBAS	No. of Detections above RBAS	Min. Detection above RBAS	Max. Detection above RBAS	Sample ID for Maximum Detection	Dog Pen/Area within Pen	Sample Depth (ft)
General Chemistry													
Nitrate (as N)	mg/kg	37	**36**	0	NA	NA	**NE**	0	NA	NA	NA	NA	NA
Nitrogen, Total Kjeldahl	mg/kg	37	**NE**	NA	2.88	1,030	**NE**	0	NA	NA	SSDP0342	M12/3	2
Metals													
Chromium	mg/kg	37	**199**	3	203	251	**721**	0	NA	NA	SSDP0336	M3/A3	0
Chromium, Hexavalent	mg/kg	37	**0.054**	36	0.077	0.673	**3.8**	0	NA	NA	SSDP0320	K1/A2	2
Mercury	mg/kg	37	**3.94**	4	4.3	10.8*	**0.22**	34	0.23	10.8*	SSDP0302	M8/A2	0
Pesticides													
4,4'-DDD	ug/kg	37	**ND**	7	0.82	3.3	**7948**	0	NA	NA	SSDP0343	M22/A3	0
4,4'-DDE	ug/kg	37	**ND**	3	0.3	3.6	**5610**	0	NA	NA	SSDP0330	K16/A1	2
4,4'-DDT	ug/kg	37	**ND**	5	0.48	5.8	**5610**	0	NA	NA	SSDP0318	K1/A2	0
alpha-Chlordane	ug/kg	37	**ND**	12	0.38	47.8	**800**	0	NA	NA	SSDP0346DL1	K19/A1	0
Dieldrin	ug/kg	37	**ND**	13	0.76	223	**15.25**	2	41.4	223	SSDP0338DL1	M17/A1	0
Endrin	ug/kg	37	**ND**	1	6.2	6.2	**NE**	0	NA	NA	SSDP0345	M22/A3	2
Endrin Ketone	ug/kg	37	**ND**	1	2.7	2.7	**NE**	0	NA	NA	SSDP0338	M17/A1	0
gamma-Chlordane	ug/kg	37	**ND**	12	0.4	43.4	**810**	0	NA	NA	SSDP0346DL1	K19/A1	0
PCB-1254	ug/kg	37	**ND**	2	24.3	54.9	**NE**	0	NA	NA	SSDP0319	K1/A2	0
PCB-1260	ug/kg	37	**ND**	1	6.9	6.9	**247**	0	NA	NA	SSDP0318	K1/A2	0
Radionuclides													
Actinium-228	pCi/g	37	**0.633**	0	NA	NA	**NE**	0	NA	NA	NA	NA	NA
Bismuth-212	pCi/g	37	**0.388**	0 [1]	0.415	0.415	**NE**	0	NA	NA	SSDP0314	L18/A3	0
Bismuth-214	pCi/g	37	**0.54**	0 [1]	0.572	0.572	**NE**	0	NA	NA	SSDP0314	L18/A3	0
Carbon-14	pCi/g	37	**<0.13**	0	NA	NA	**4200**	0	NA	NA	NA	NA	NA
Cesium-137	pCi/g	37	**0.102**	4	0.129	0.191	**0.1**	5	0.101	0.191	SSDP0320	K1/A2	2
Gross Alpha	pCi/g	37	**7.42**	11	7.72	10.47*	**NE**	0	NA	NA	SSDP0343	M22/A3	0
Lead-210	pCi/g	37	**1.6**	0	NA	NA	**9.6**	0	NA	NA	NA	NA	NA

Table 3. Summary of the Analytic Results for the Shallow Soil Samples from the Former Eastern Dog Pens Investigation (continued)

Constituent	UNITS	No. of Samples Analyzed	Bkgd.	No. of Detections above Bkgd.	Min. Detection above Bkgd.	Max. Detection above Bkgd.	RBAS	No. of Detections above RBAS	Min. Detection above RBAS	Max. Detection above RBAS	Sample ID for Maximum Detection	Dog Pen/Area within Pen	Sample Depth (ft)
Lead-212	pCi/g	37	**0.691**	0	NA	NA	**NE**	0	NA	NA	NA	NA	NA
Lead-214	pCi/g	37	**0.682**	0	NA	NA	**NE**	0	NA	NA	NA	NA	NA
Nonvolatile Beta	pCi/g	37	**15**	12	15.1	28.3*	**NE**	0	NA	NA	SSDP0344	M22/A3	2
Potassium-40	pCi/g	37	**14**	0	NA	NA	**NE**	0	NA	NA	NA	NA	NA
Radium-226	pCi/g	37	**0.752**	0	NA	NA	**0.0042**	37	0.355	0.734	SSDP0302	M8/A2	0
Radium-228	pCi/g	37	**0.63**	0	NA	NA	**NE**	0	NA	NA	NA	NA	NA
Strontium-90	pCi/g	37	**0.056**	6	0.0741	0.164	**10**	0	NA	NA	SSDP0319	K1/A2	0
Thallium-208	pCi/g	37	**0.204**	0 [1]	0.219	0.219	**NE**	0	NA	NA	SSDP0314	L18/A3	0
Thorium-228	pCi/g	37	**0.627**	4	0.632	1.54	**0.0032**	37	0.225	1.54	SSDP0328	K13/A1	2
Thorium-230	pCi/g	37	**1.04**	1	1.26	1.26	**NE**	0	NA	NA	SSDP0328	K13/A1	2
Thorium-232	pCi/g	37	**0.63**	3	0.637	1.39	**0.0022**	37	0.234	1.39	SSDP0328	K13/A1	2
Thorium-234	pCi/g	37	**0.78**	0 [1]	0.796	0.89	**3.2**	0	NA	NA	SSDP0341	M12/A3	0
Tritium	pCi/g	43	**<1.2**	0	NA	NA	**5.4**	0	NA	NA	NA	NA	NA
Uranium-233/234	pCi/g	37	**0.559**	0	NA	NA	**NE**	0	NA	NA	NA	NA	NA
Uranium-235	pCi/g	37	**0.0638**	0	NA	NA	**150**	0	NA	NA	NA	NA	NA
Uranium-238	pCi/g	37	**0.565**	0	NA	NA	**NE**	0	NA	NA	NA	NA	NA

Abbreviations:
NE = None established
ND = Not detected
NA = Not applicable
No. = Number
Min. = Minimum
Max. = Maximum
RBAS=Risk Based Action Standard (Weiss Associates, 1997)

Notes:
*Average of analytic results
[1] One or more sample results exceeded background by less than 20%. However, the isotope is naturally occurring and has a half-life of less than 30 days. The background exceedance is likely a result of laboratory error, variability of natural background, or a combination of these two factors.

Table 4. Statistical Comparison of Soil Data Collected from the Former Eastern Dog Pens

Constituent	Total No. of Samples	No. above Reporting Limit	Range of Reporting Limits	Min. and Max. of Detections	Bkgd. [1]	Statistical Comparison with Bkgd.[2]	Lowest RBAS[3]	Max. Detection Below Lowest RBAS[4]	RME[5]	RME below Lowest RBAS[6]	Overall Comparison with Target Levels	PRG[7]
Radionuclides			**pCi/g**	**pCi/g**	**pCi/g**		**pCi/g**					**pCi/g**
Cesium-137	37	31	0.004-0.007	0.0048-0.191	0.102	Pass (Q)	BG [8]	Fail	0.05	**Pass**	**Pass**	0.02
Radium-226	37	37	0.024-0.058	0.355-0.734	0.752	**Pass**	BG	---	---	---	**Pass**	0.0062
Strontium-90	37	12	0.0145-0.0491	0.023-0.164	0.056	Fail (Q)	10	**Pass**	---	---	**Pass**	14
Thorium-228	37	37	0.158-0.37	0.225-1.54	0.627	**Pass**	BG	---	---	---	**Pass**	0.041
Thorium-230	37	37	0.0319-0.17	0.288-1.26	1.04	**Pass**	NE	---	---	---	**Pass**	20
Thorium-232	37	37	0.0267-0.153	0.234-1.39	0.63	**Pass**	BG	---	---	---	**Pass**	24
Thorium-234	37	37	0.0804-0.34	0.357-0.89	0.78	**Pass**	3.2 [9]	---	---	---	**Pass**	0.69 [9]
Metals			**mg/kg**	**mg/kg**	**mg/kg**		**mg/kg**					**mg/kg**
Total Chromium	37	37	2-2.4	90.7-251	199	Fail	722	**Pass**	---	---	**Pass**	210
Hex. Chromium	37	36	0.0347-0.0432	0.077-0.673	0.054	Fail (Q)	3.8	**Pass**	---	---	**Pass**	30 (0.2)
Mercury	37	37	0.029-0.38	0.09-10.8	3.94	Pass (Q)	BG	Fail	1.95	**Pass**	**Pass**	22
Pesticides			**ug/kg**	**ug/kg**	**ug/kg**		**ug/kg**					**ug/kg**
4,4'-DDD	37	7	3.4-3.9	0.82-3.3 [10]	NA	NA	7948	**Pass**	---	---	**Pass**	2400
4,4'-DDE	37	3	3.4-3.9	0.3-3.6 [10]	NA	NA	5610	**Pass**	---	---	**Pass**	1700
4,4'-DDT	37	5	3.4-3.9	0.48-5.8 [10]	NA	NA	5610	**Pass**	---	---	**Pass**	1700
Chlordane-alpha	37	12	1.78-3.7	0.38-47.8 [10]	NA	NA	800	**Pass**	---	---	**Pass**	1600
Chlordane-gamma	37	12	1.7-3.7	0.4-43.4	NA	NA	810	**Pass**	---	---	**Pass**	420
Dieldrin	37	13	3.4-18.1	0.76-223 [10]	NA	NA	15.25	Fail	5.65	**Pass**	**Pass**	28
Endrin	37	1 (<5%)	3.7	6.2	NA	NA	NE	(NE)		(NE)		16
Endrin Ketone	37	1 (<5%)	3.6	2.7 [10]	NA	NA	NE	(NE)		(NE)		NE

Table 4. Statistical Comparison of Soil Data Collected from the Former Eastern Dog Pens (continued)

Constituent	Total No. of Samples	No. above Reporting Limit	Range of Reporting Limits	Min. and Max. of Detections	Bkgd. [1]	Statistical Comparison with Bkgd.[2]	Lowest RBAS[3]	Max. Detection Below Lowest RBAS[4]	RME[5]	RME below Lowest RBAS[6]	Overall Comparison with Target Levels	PRG[7]
PCB-1254	37	2	39.2	24.3-54.9 [10]	NA	NA	NE	(NE)		(NE)		97
PCB-1260	37	1 (<5%)	38.8	6.9 [10]	NA	NA	247.74	**Pass**	---	---	**Pass**	200
Inorganics			**mg/kg**	**mg/kg**	**mg/kg**		**mg/kg**					**mg/kg**
Nitrate	37	31	0.126-0.156	0.351-10.1	36	Pass (Q)	NE	(NE)		(NE)	Pass (Q)	NE

Notes:

[1] Site-specific background levels, as presented in Appendix C from "Sampling and Analysis Plan for Removal Actions..." (Weiss Associates, 1999b); "NA" indicates not available.

[2] Using Wilcoxon Rank Sum Test (WRS) with previously approved parameters; "Pass" indicates Eastern Dog Pens distribution statistically does not exceed the background distribution; "Q" indicates result is qualified due to insufficient data for WRS test based on Noether calculation.

[3] Lowest RBAS from "Draft Final Determination of Risk-Based Action Standards for DOE Areas" (Weiss Associates, 1997b); "NE" indicates none established.

[4] "Pass" indicates maximum Eastern Dog Pens level is lower than lowest RBAS; "---" indicates comparison not made because constituent passes comparison with background.

[5] RME = reasonable maximum exposure level, defined as the 95% upper confidence level (UCL) on the mean.

[6] "Pass" indicates 95% upper confidence limit (UCL) on the mean of Eastern Dog Pens data is lower than lowest RBAS; "---" indicates comparison not made because constituent passed previous comparison.

[7] USEPA Region IX Preliminary Remediation Goals, August and December, 1996, at 10-6 Risk for residential scenario; California Modified Preliminary

[8] "BG" indicates the lowest calculated RBAS is less than the background level. Therefore, the lowest RBAS is defined as background.

[9] RBAS and PRG for U-238 + Th-234.

[10] Any values below reporting limits are estimated values (Most of the concentrations for pesticides are below reporting limits).

Additional Abbreviations:
Min. = Minimum
Max. = Maximum
No. = Number
Bkgd. = Background

APPENDIX A

RADIATION FIELD SURVEY DATA

APPENDIX A-1 - BACKGROUND READINGS FOR EASTERN DOG PENS

Background Readings for Eastern Dog Pens Gamma Walk-over Survey

Location #1 (CPM)	Location #2 (CPM)	Location #3 (CPM)
1265	1020	1321
1273	982	1261
1005	1064	1315
1083	1005	1318
1138	979	1292
1239	1036	1305
1193	1110	1336
1227	1092	1304
1206	1000	1319
1175	1048	1310

Average Count Rate: 1174 cpm

Observed Standard Deviation (σ_O) : 126.4 ($3\ \sigma_O = 379.2$)

Theoretical Standard Deviation (σ_T): 34.3 ($3\ \sigma_T = 103$)

Average +/- 3 σ_O = 795 - 1553

Average +/- 3 σ_T = 1071 - 1277

2 X Background = 2348 cpm

APPENDIX A-2 - CONCRETE CURBING SURVEY RESULTS

Informational contamination survey of concrete curbing in support of WA sampling in Eastern Dog Pens - March 1, 1999

Location	*Contamination Level (dpm/100cm²)*	*Remarks*
K 8/9	13K β,γ	Horizontal surface of curbing seperating pens. No detectable alpha contamination.
L 3/2	52K β,γ	Horizontal surface of curbing seperating pens. No detectable alpha contamination.
L 3/4	13 K β,γ	Horizontal surface of curbing seperating pens. No detectable alpha contamination.
L 26/27	9.75K β,γ	Horizontal surface of curbing seperating pens. No detectable alpha contamination.
M 23/24	19.5K β,γ	Horizontal surface of curbing seperating pens. No detectable alpha contamination.
M 30/31	13K β,γ 1.3K α	Horizontal surface of curbing seperating pens.
M 31/32	26K β,γ	Horizontal surface of curbing seperating pens. No detectable alpha contamination.

Note: All of the dog pen curbs were surveyed in areas where contamination was likely to be present (in the vicinity of former fence posts). Where contamination on the curbing was observed, the extent was determined and marked. If contamination was not detected in the areas with the greatest potential within each pen area, no further scanning was performed in the pen. Furthermore, the purpose of this survey was intended to guide sampling activities, not to perform a 100% characterization survey of all dog pen curbing surfaces.

APPENDIX A-3 - GAMMA RADIATION SURVEY READINGS FOR EACH DOG PEN

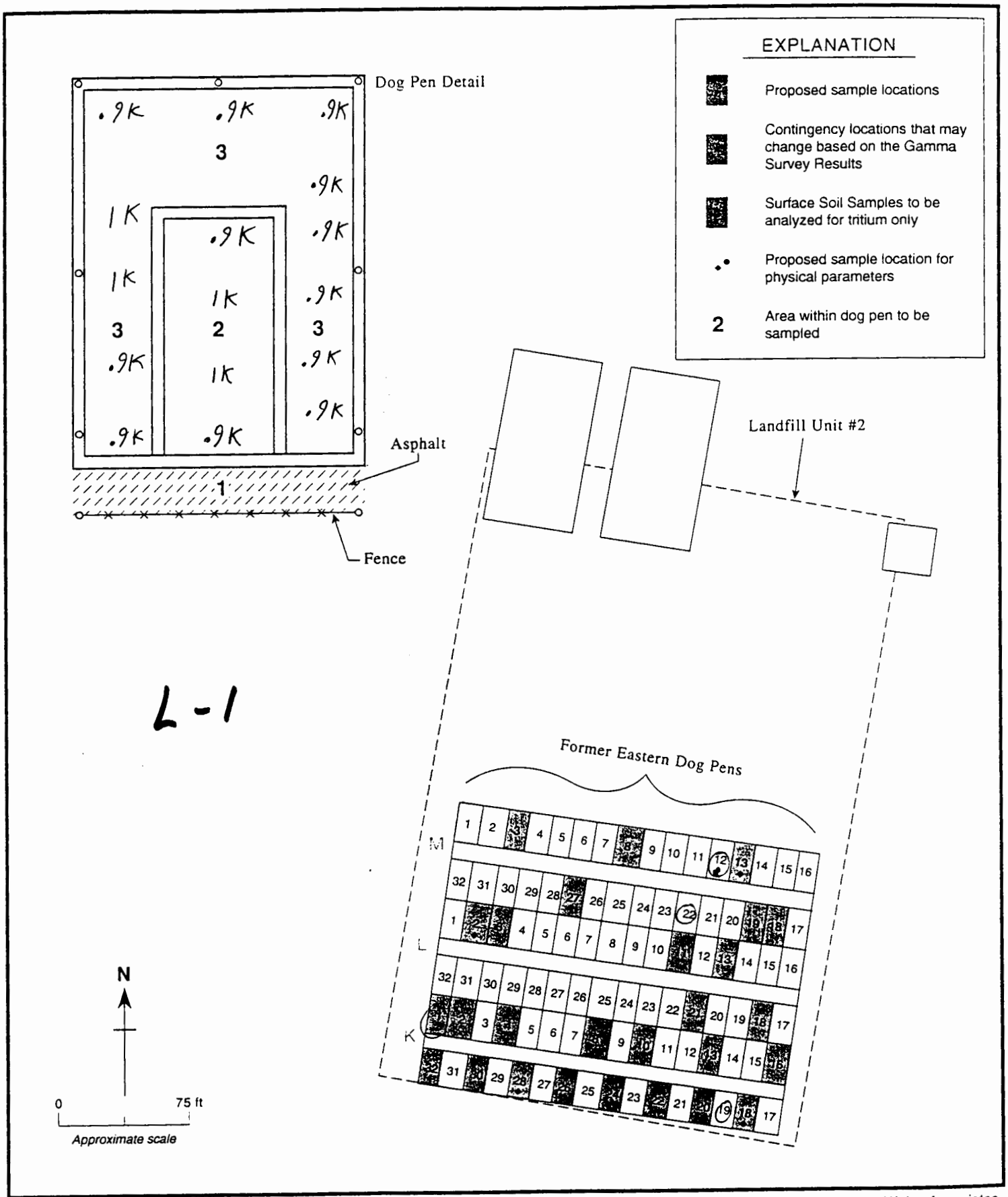
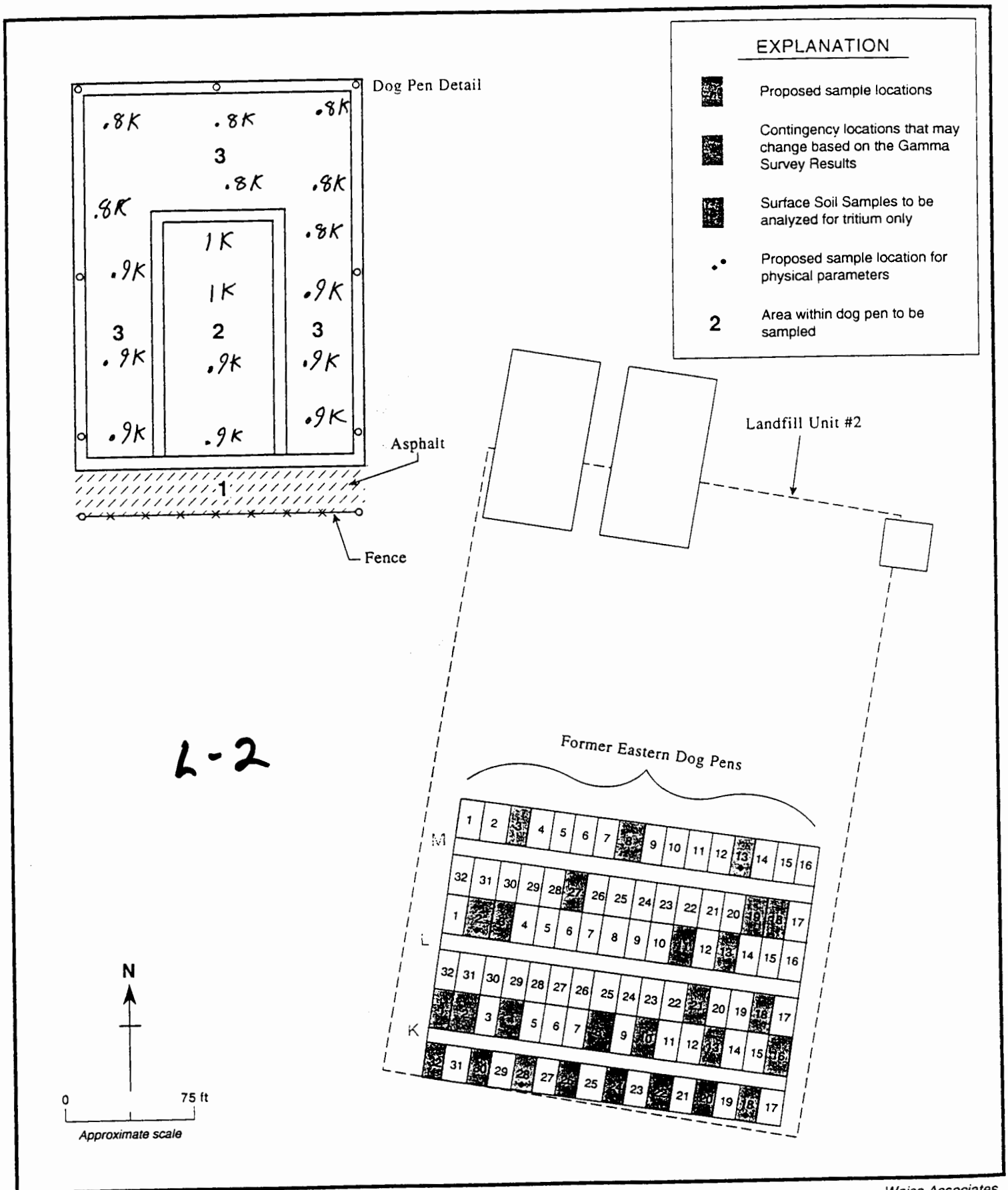


Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates

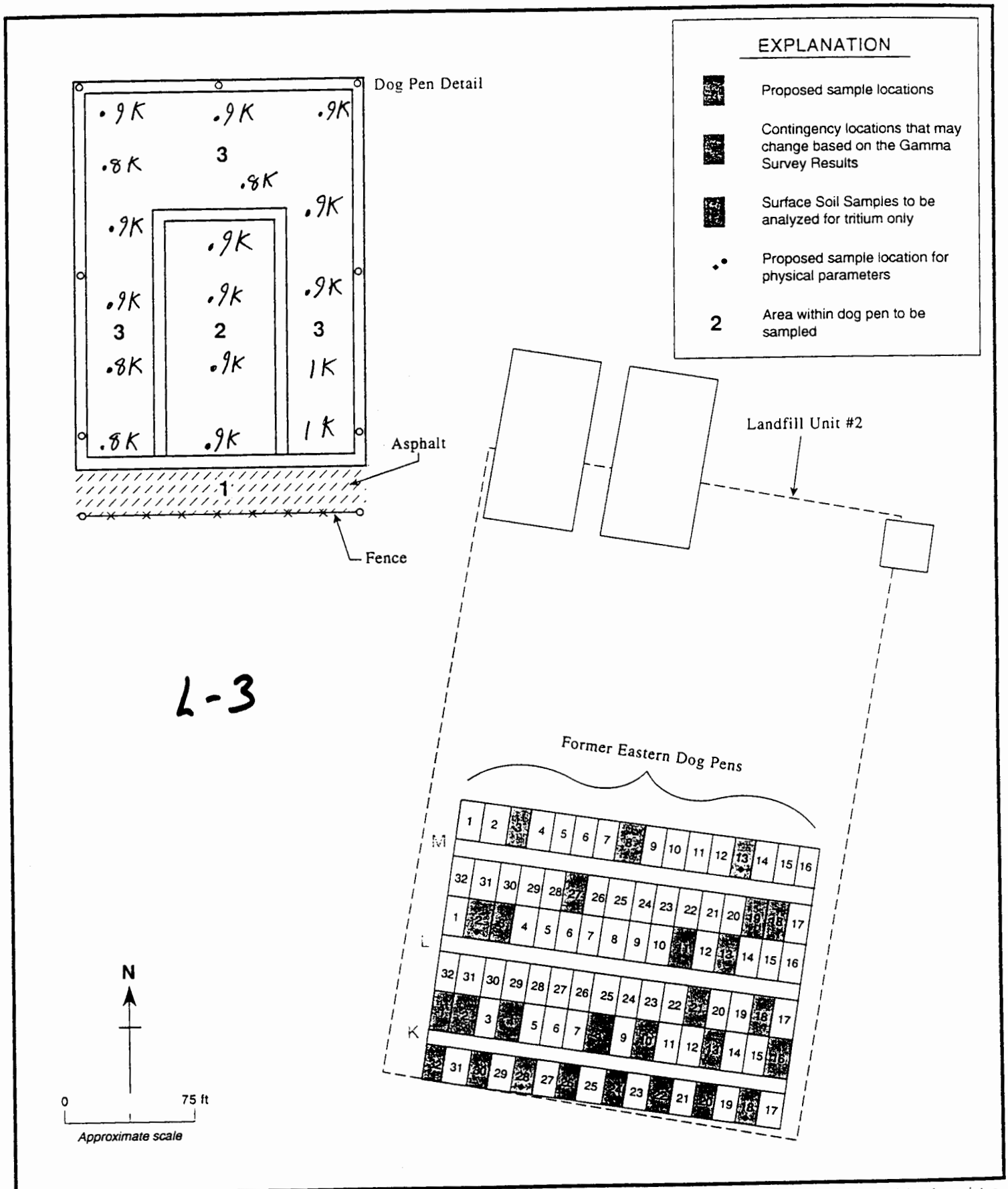


L-2

Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates

01/25/99



L-3

Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates

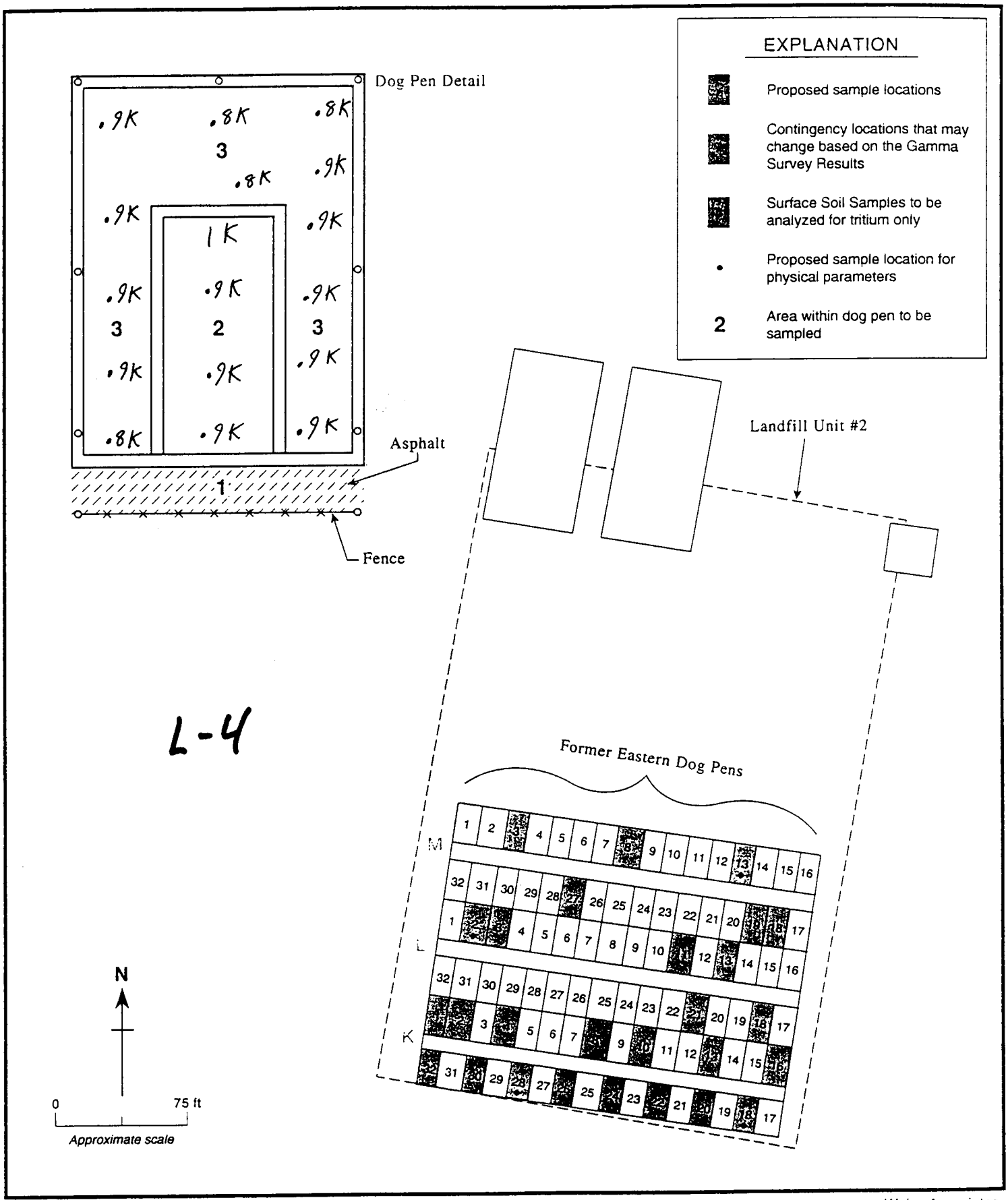
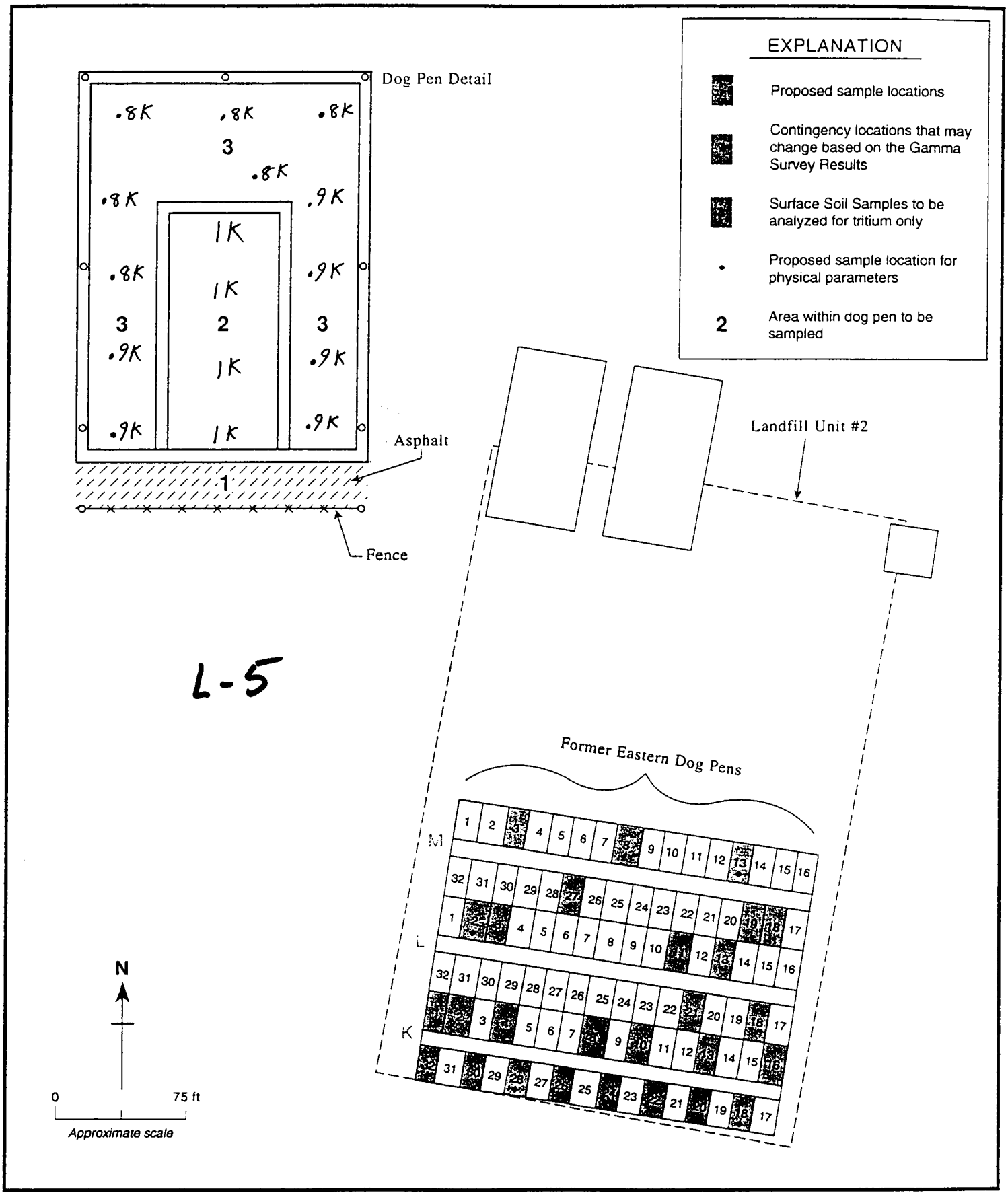


Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates



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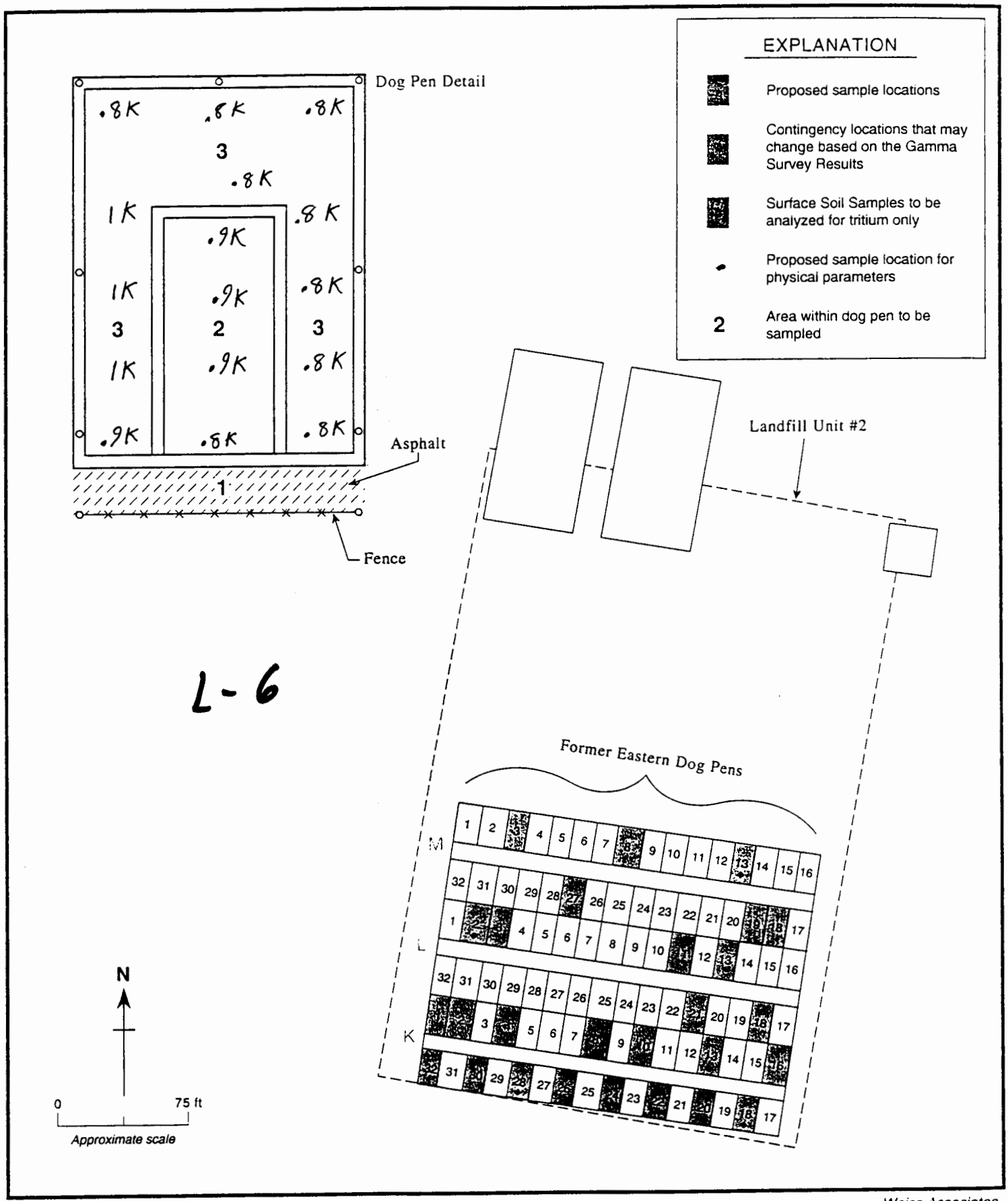
Weiss Associates



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Weiss Associates

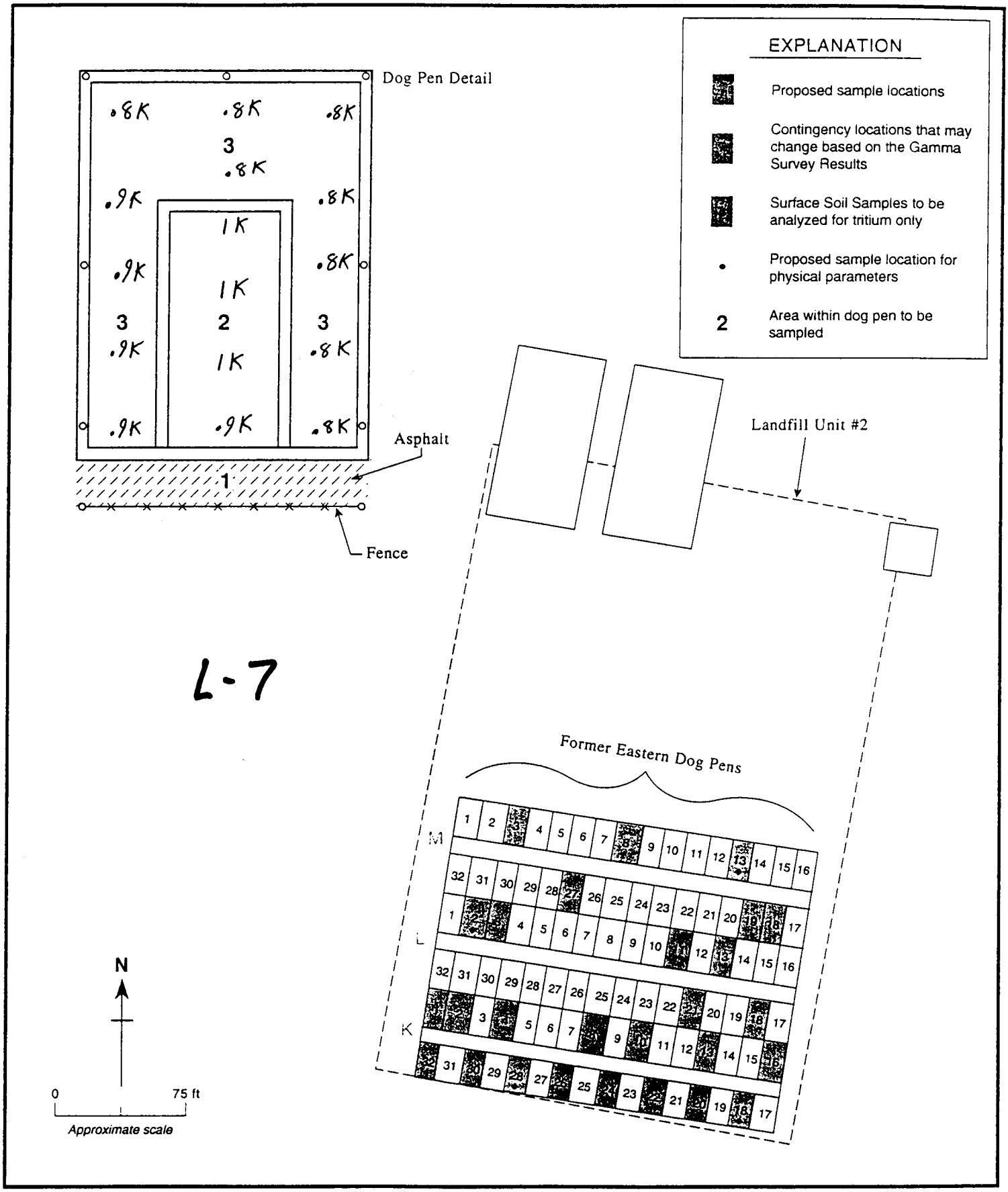
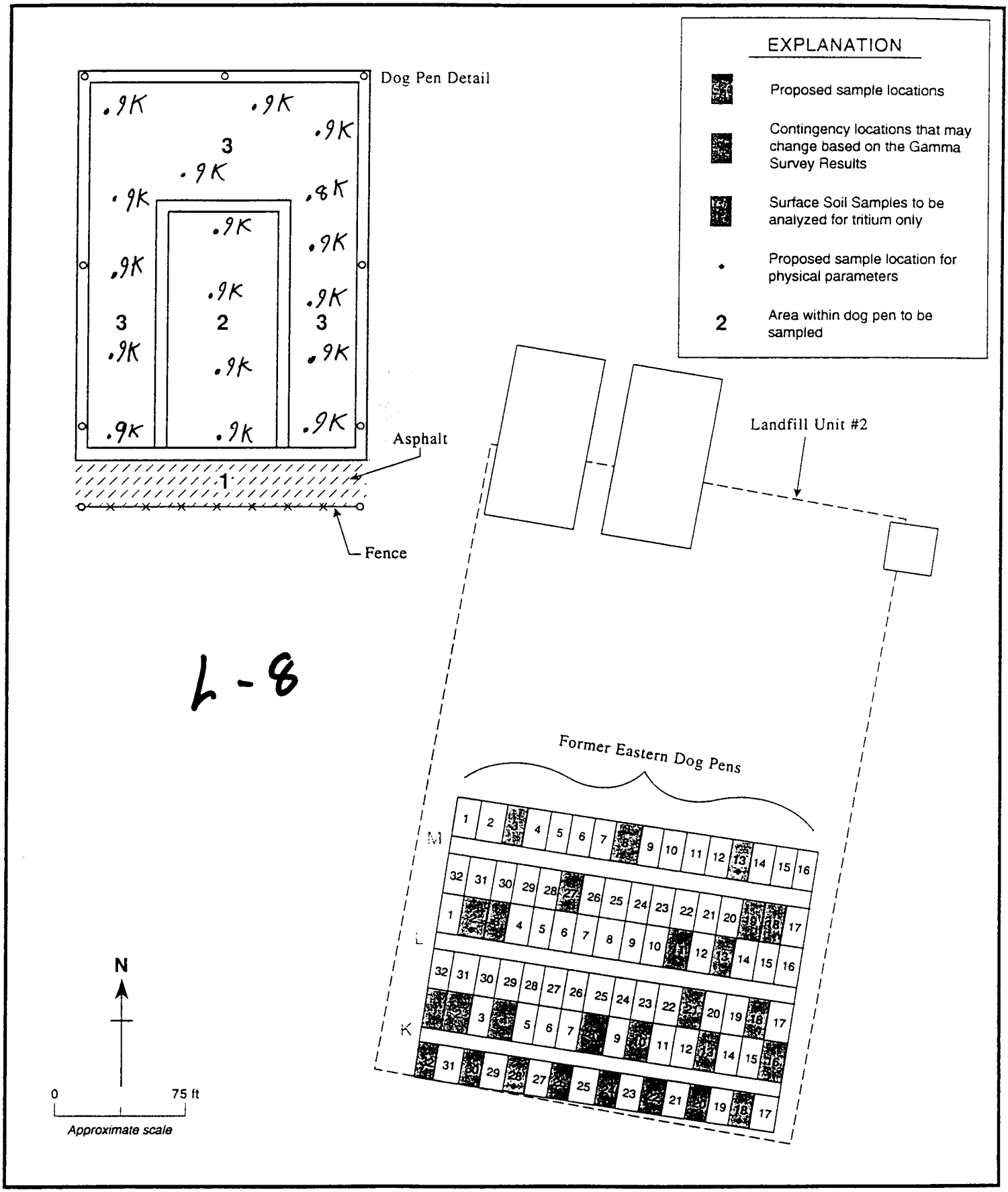


Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates



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Weiss Associates

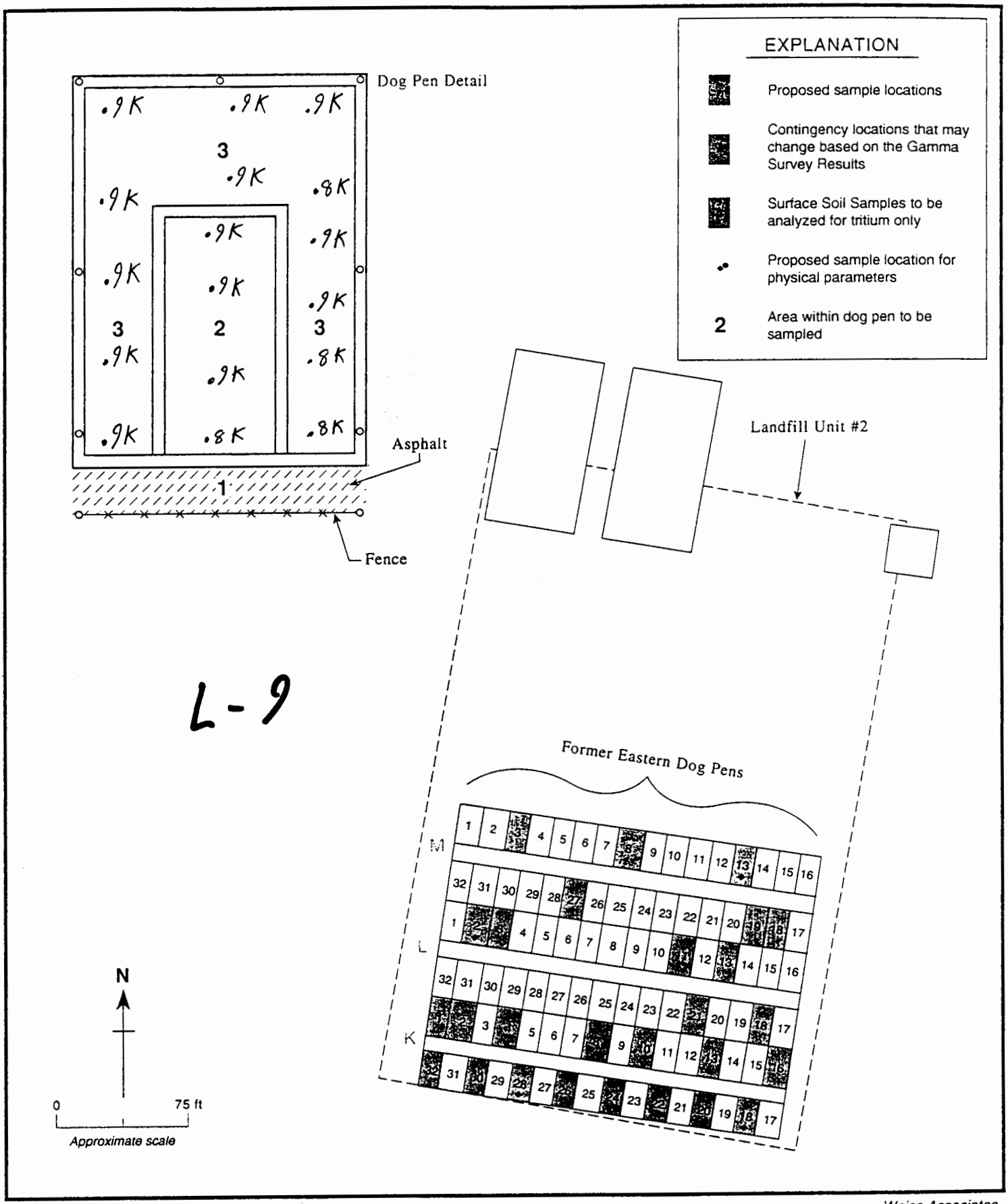


Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates

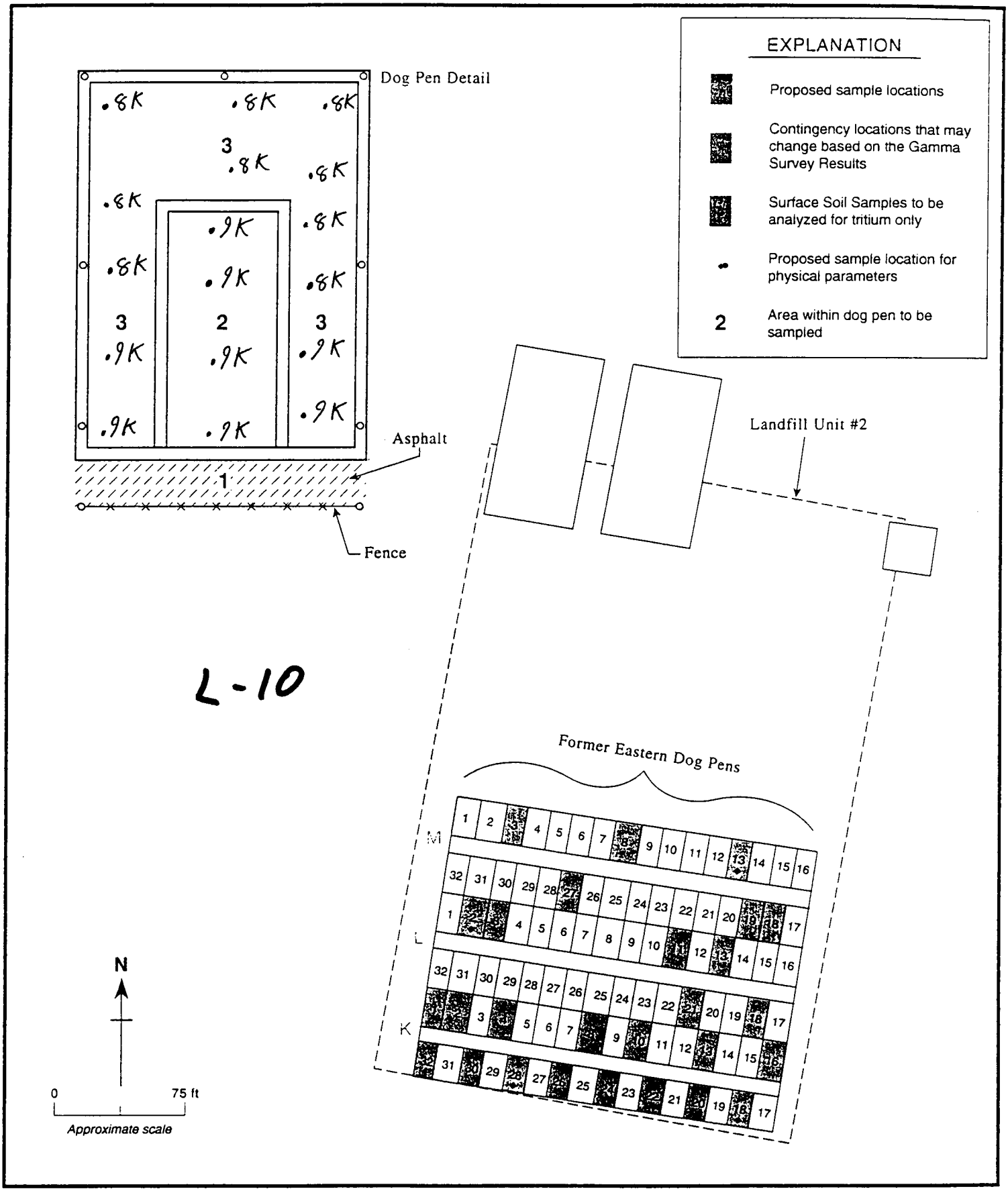
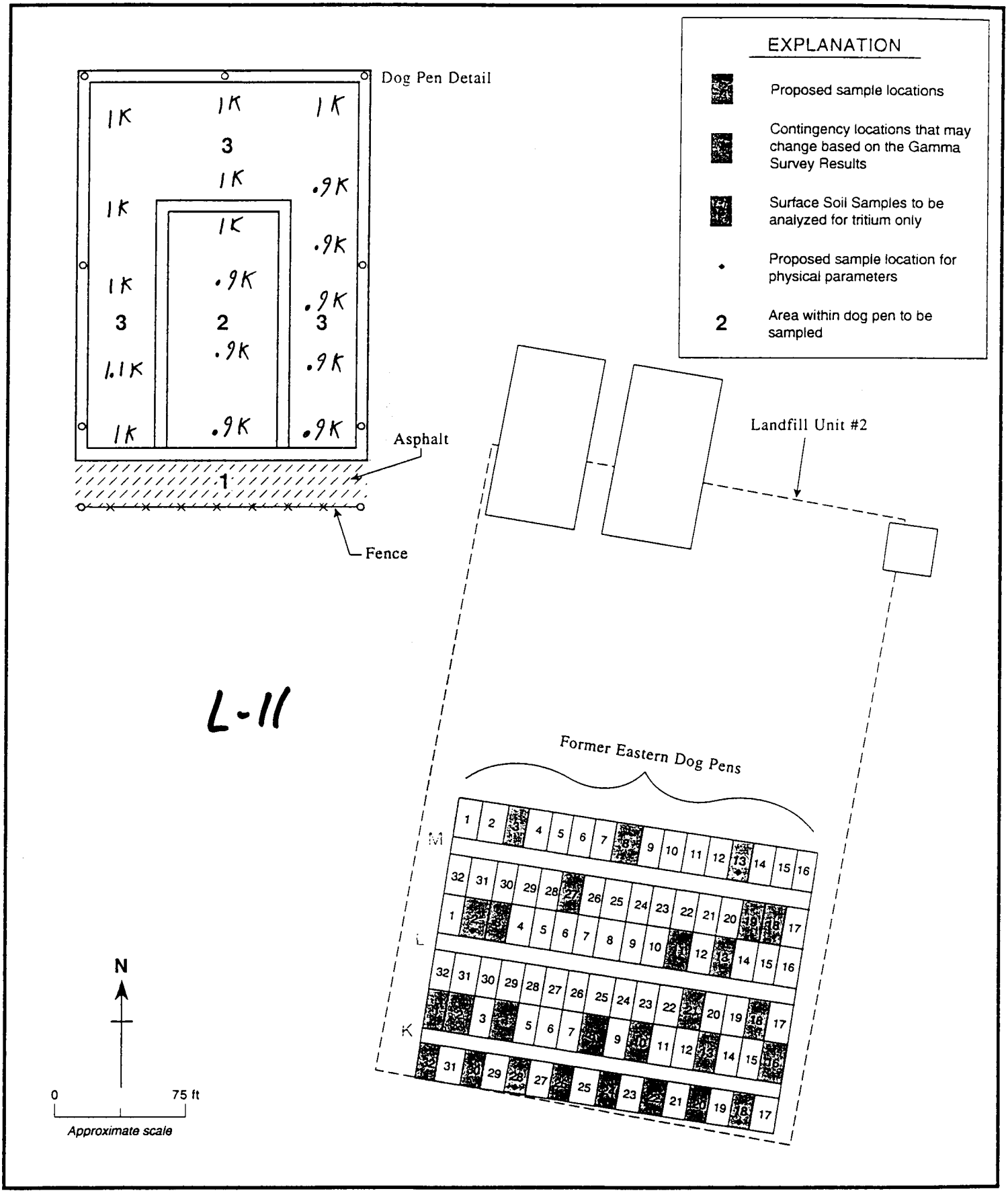


Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates



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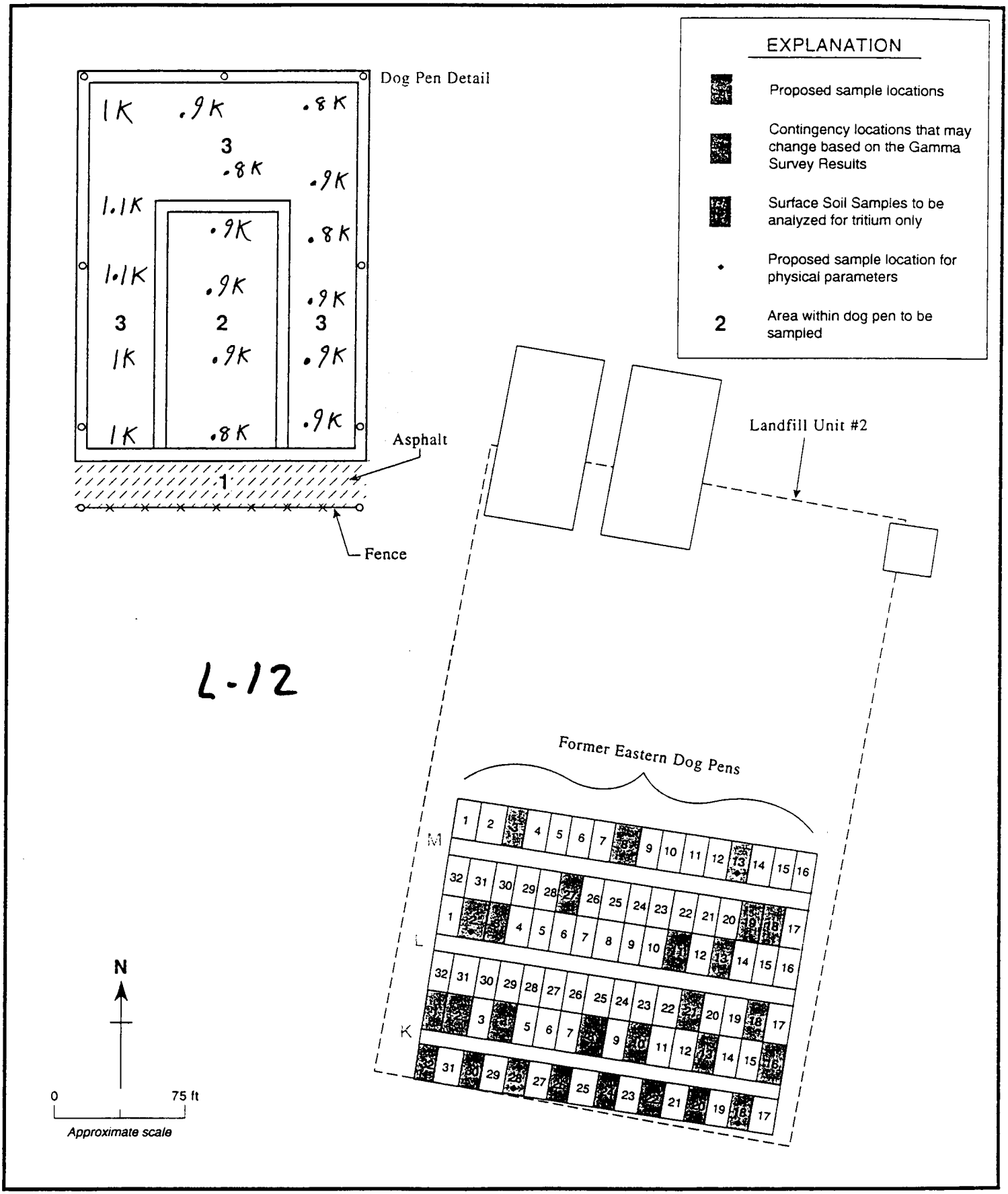
Weiss Associates



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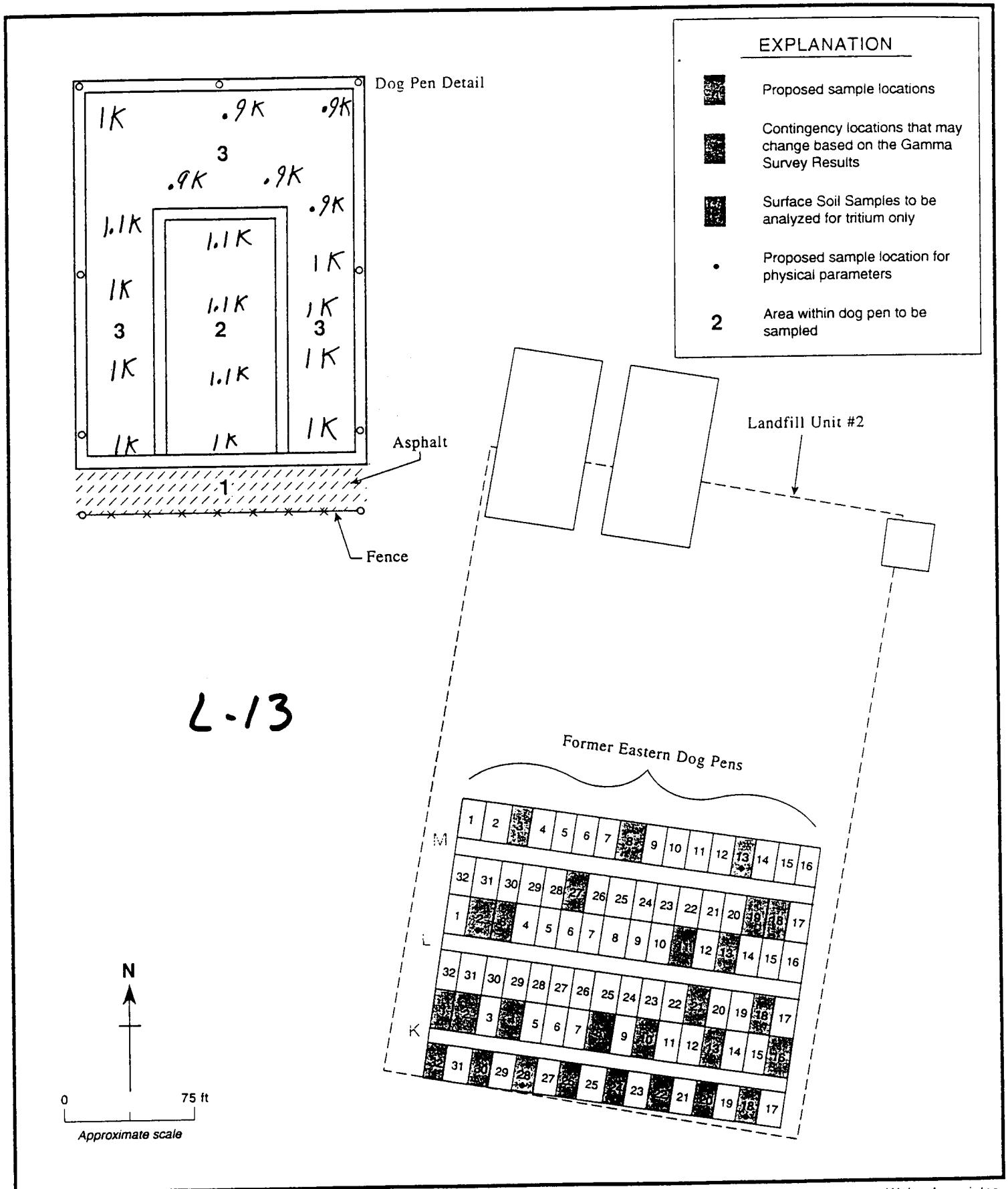
Weiss Associates



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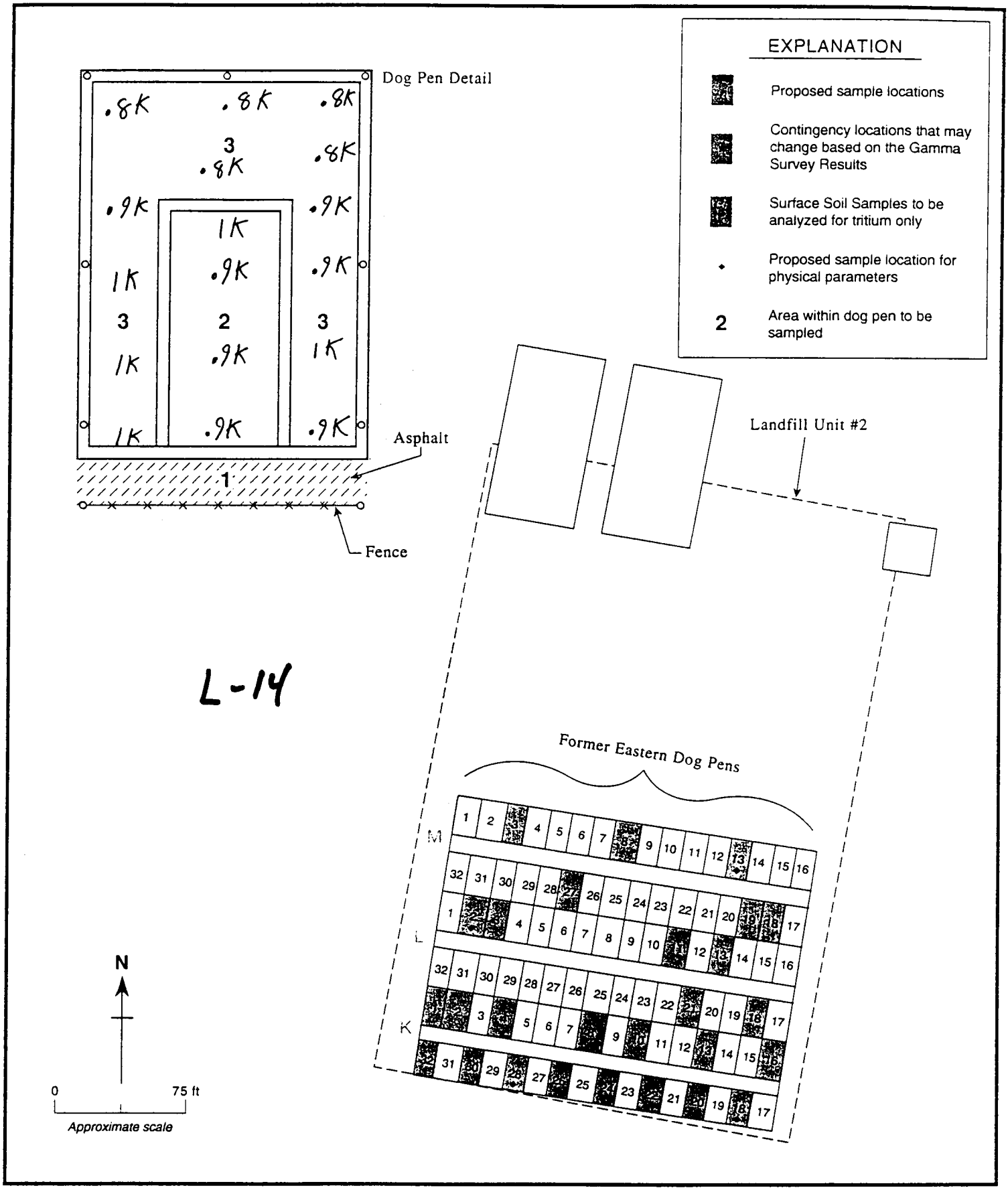
Weiss Associates



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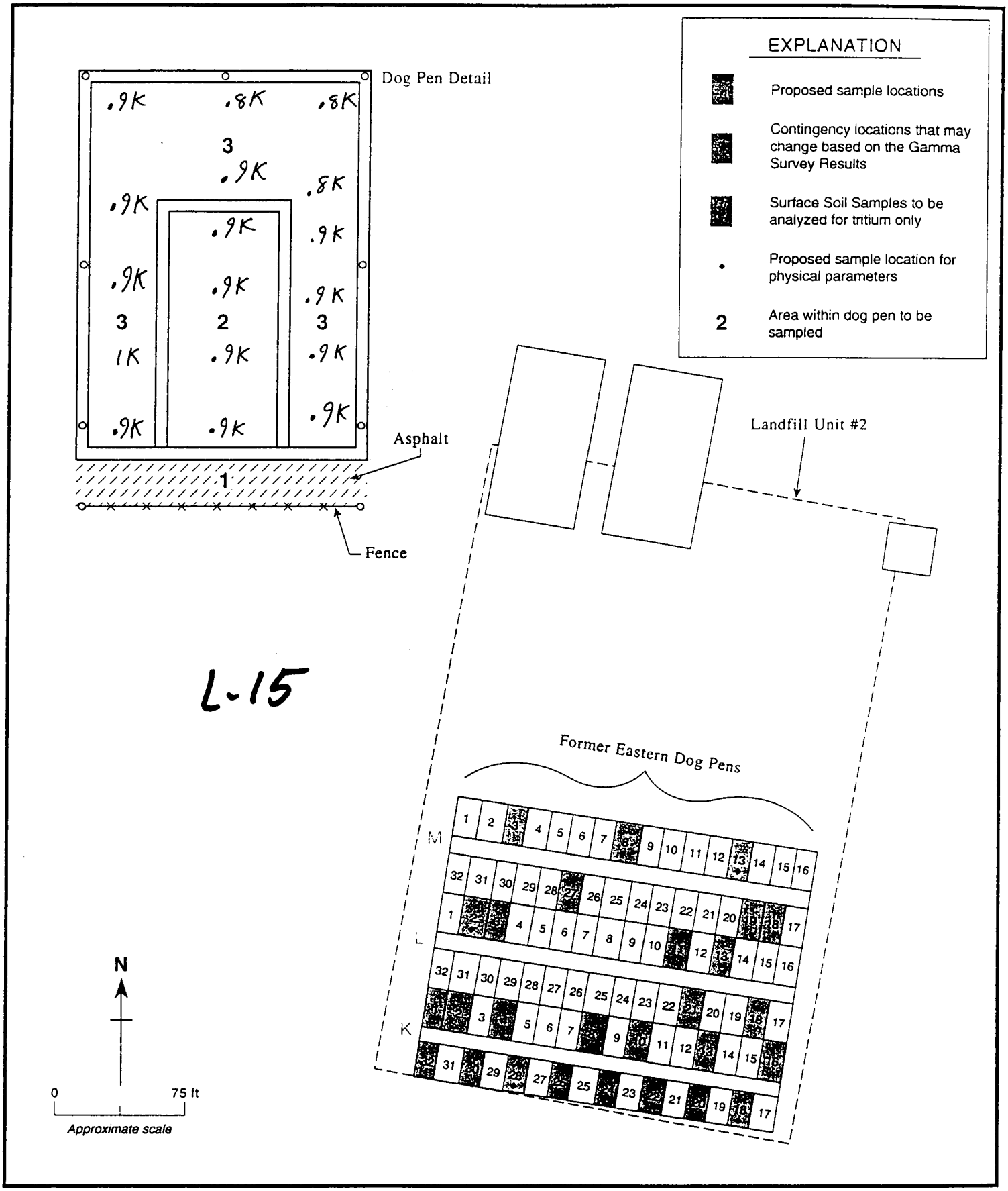
Weiss Associates



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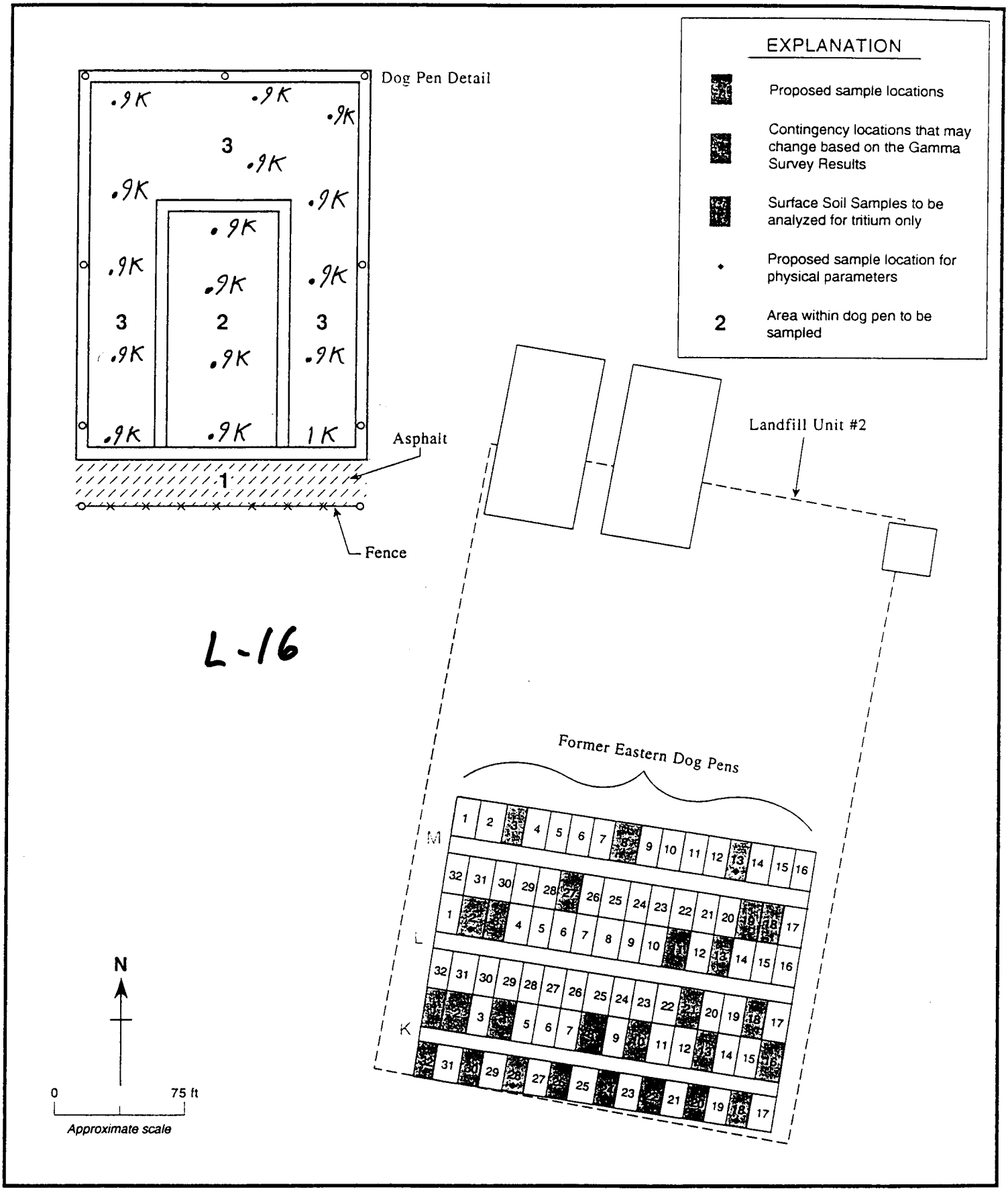
Weiss Associates



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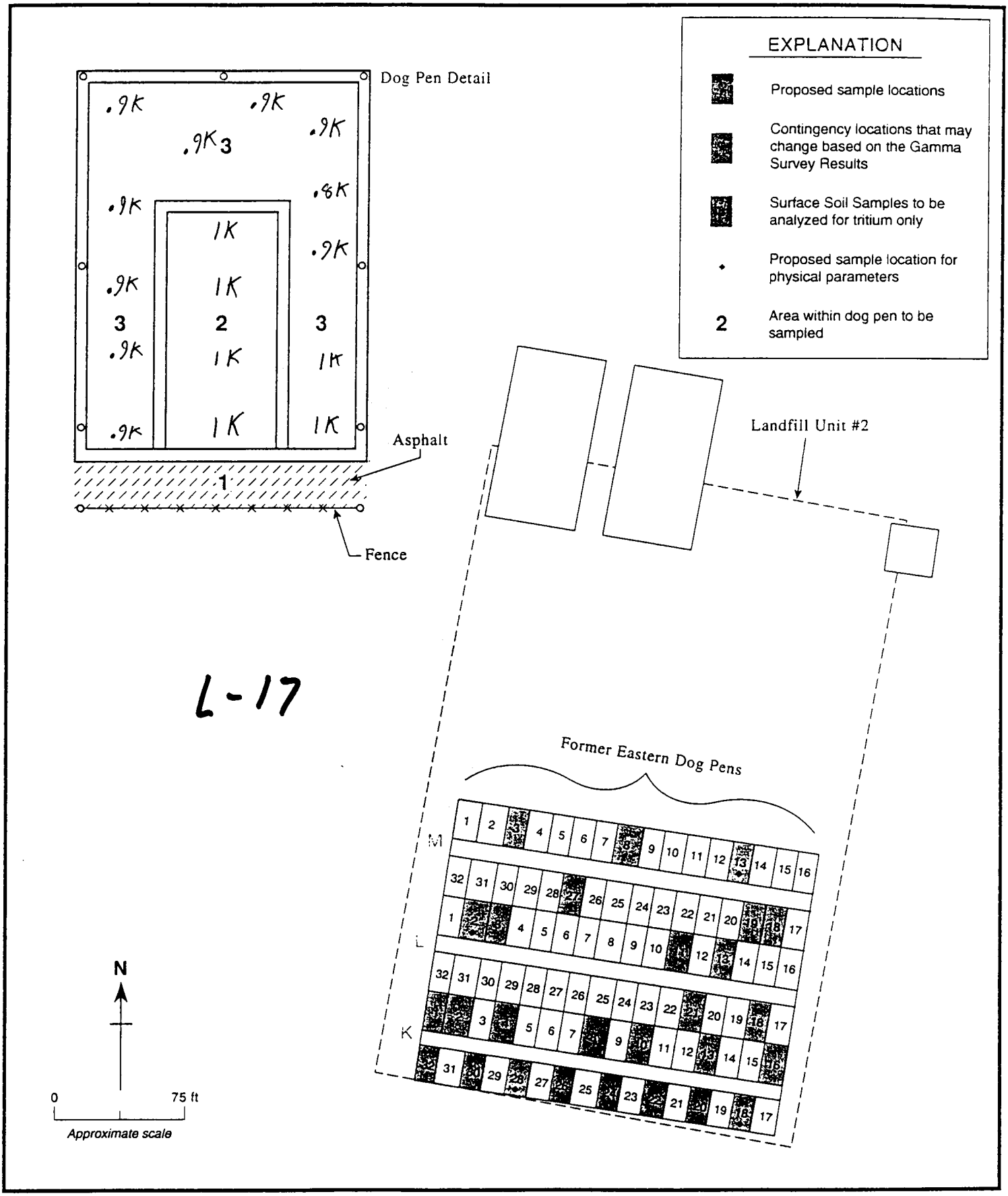
Weiss Associates



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Weiss Associates

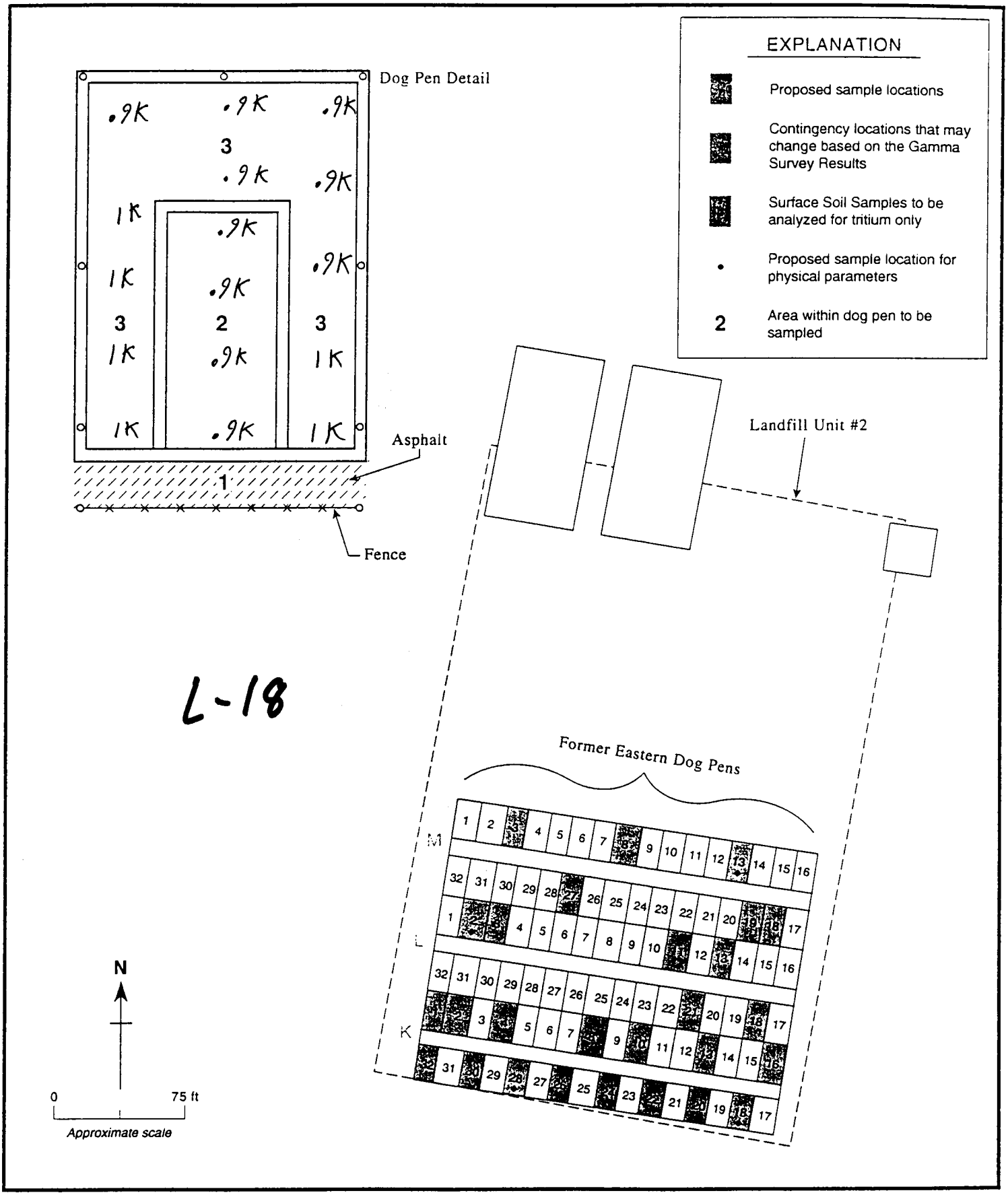
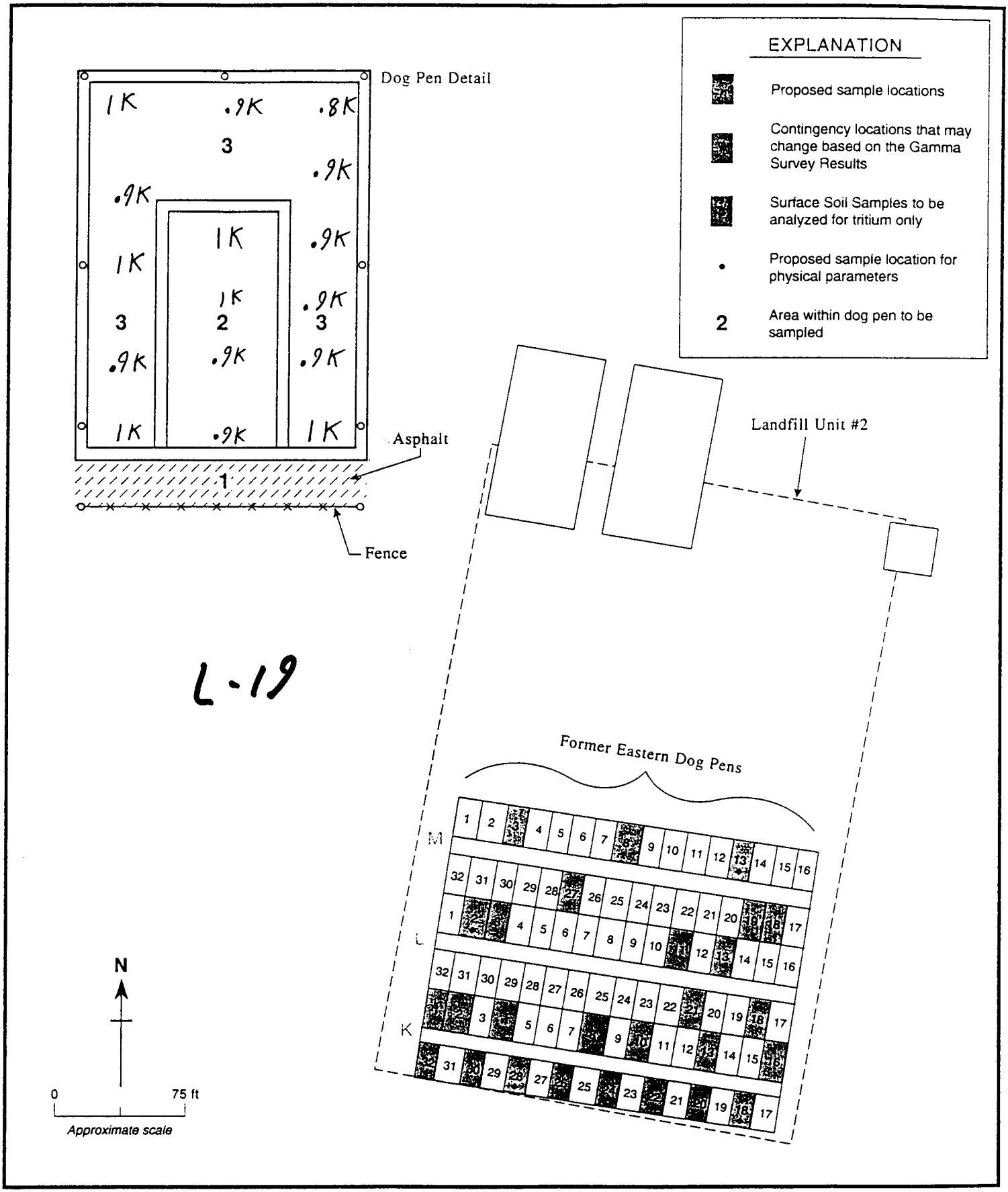


Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates



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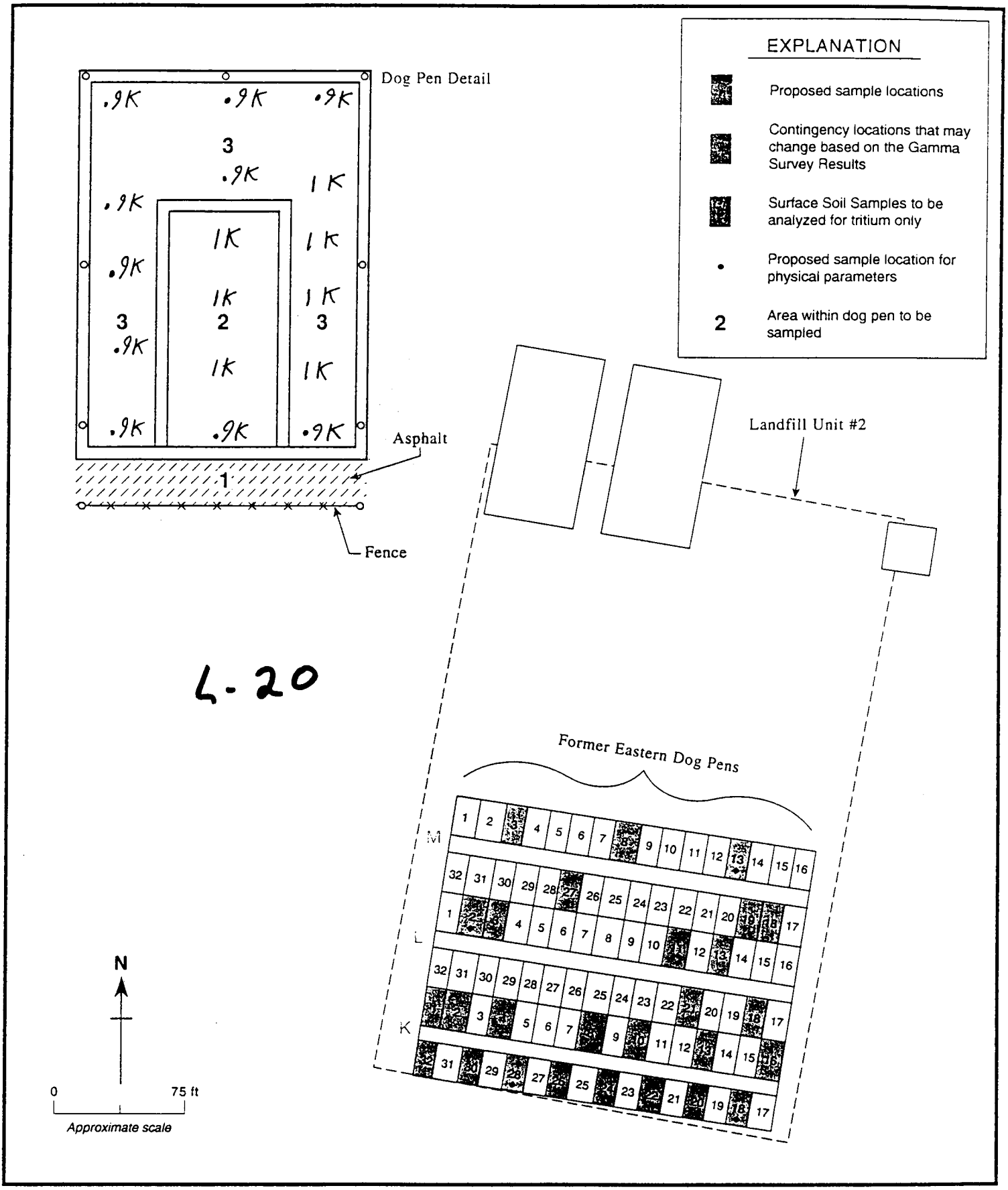
Weiss Associates



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Weiss Associates

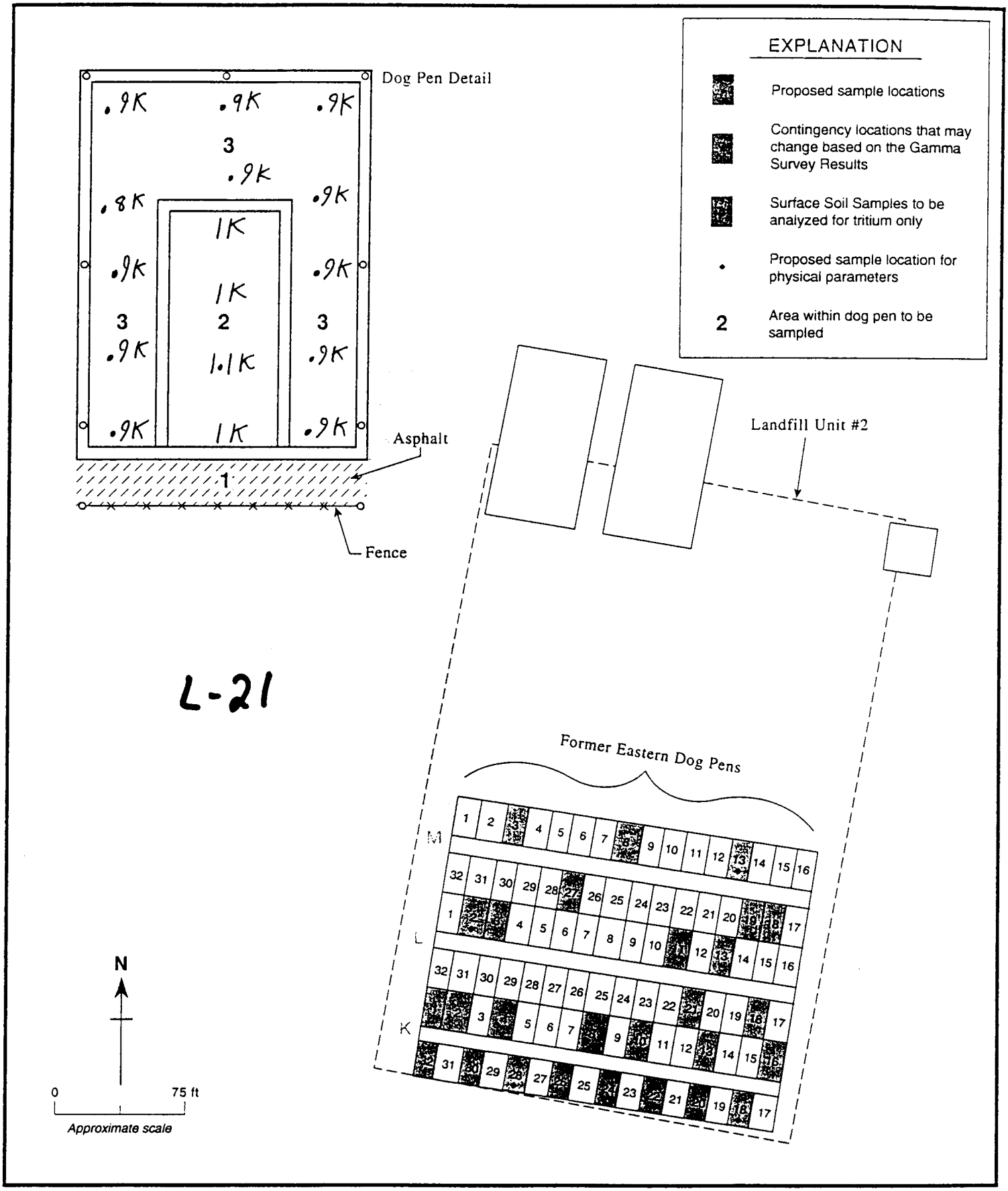
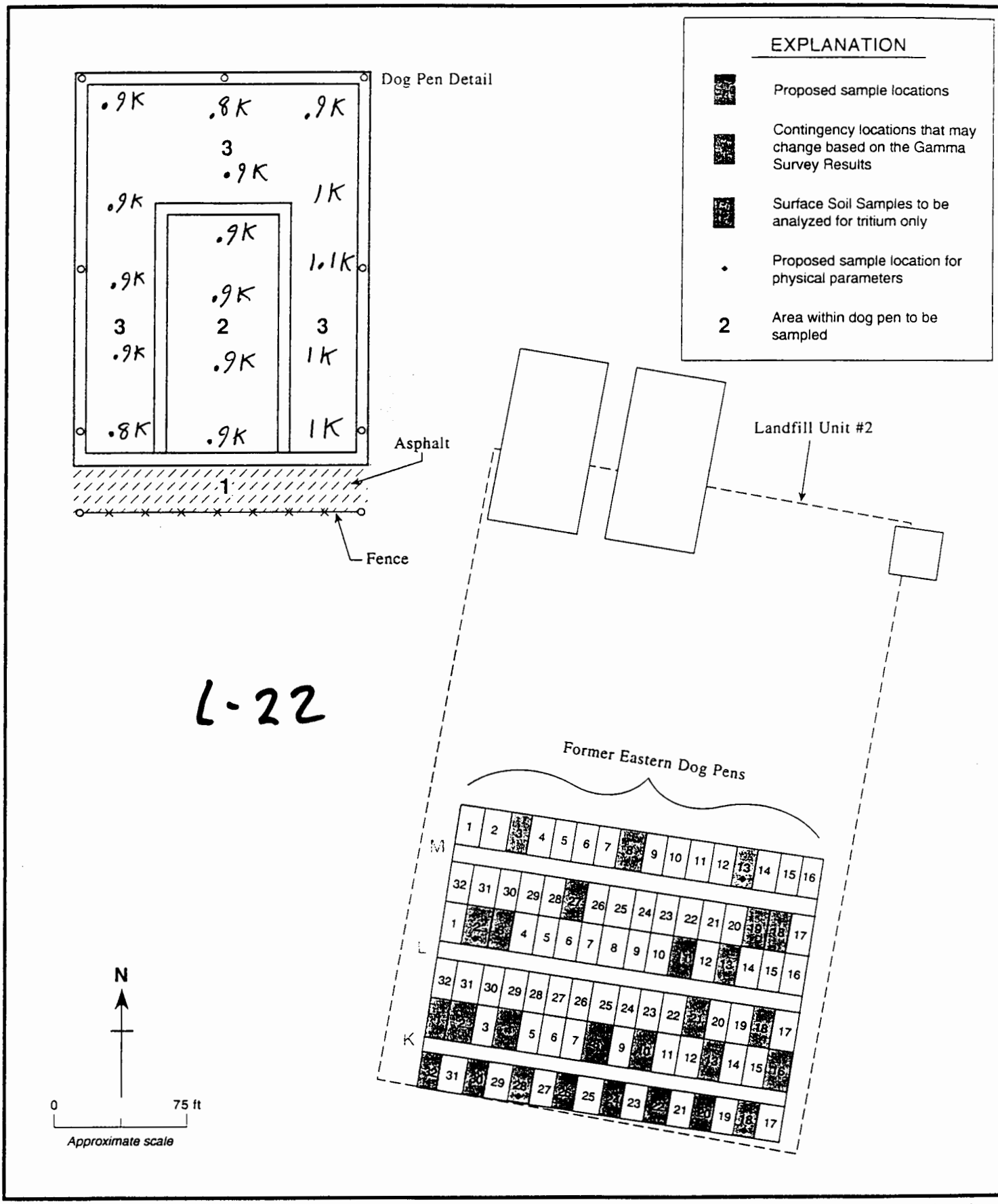


Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates



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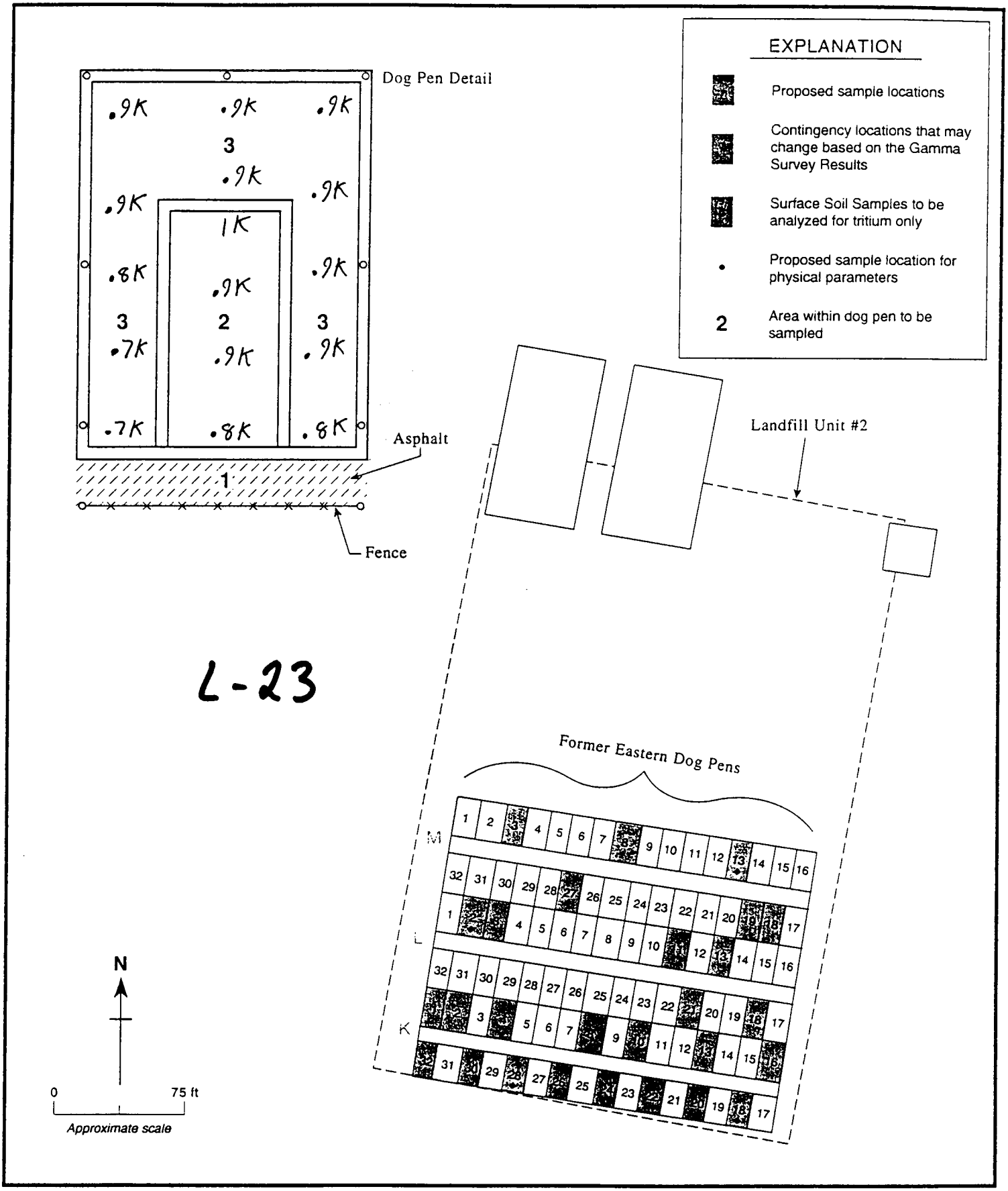

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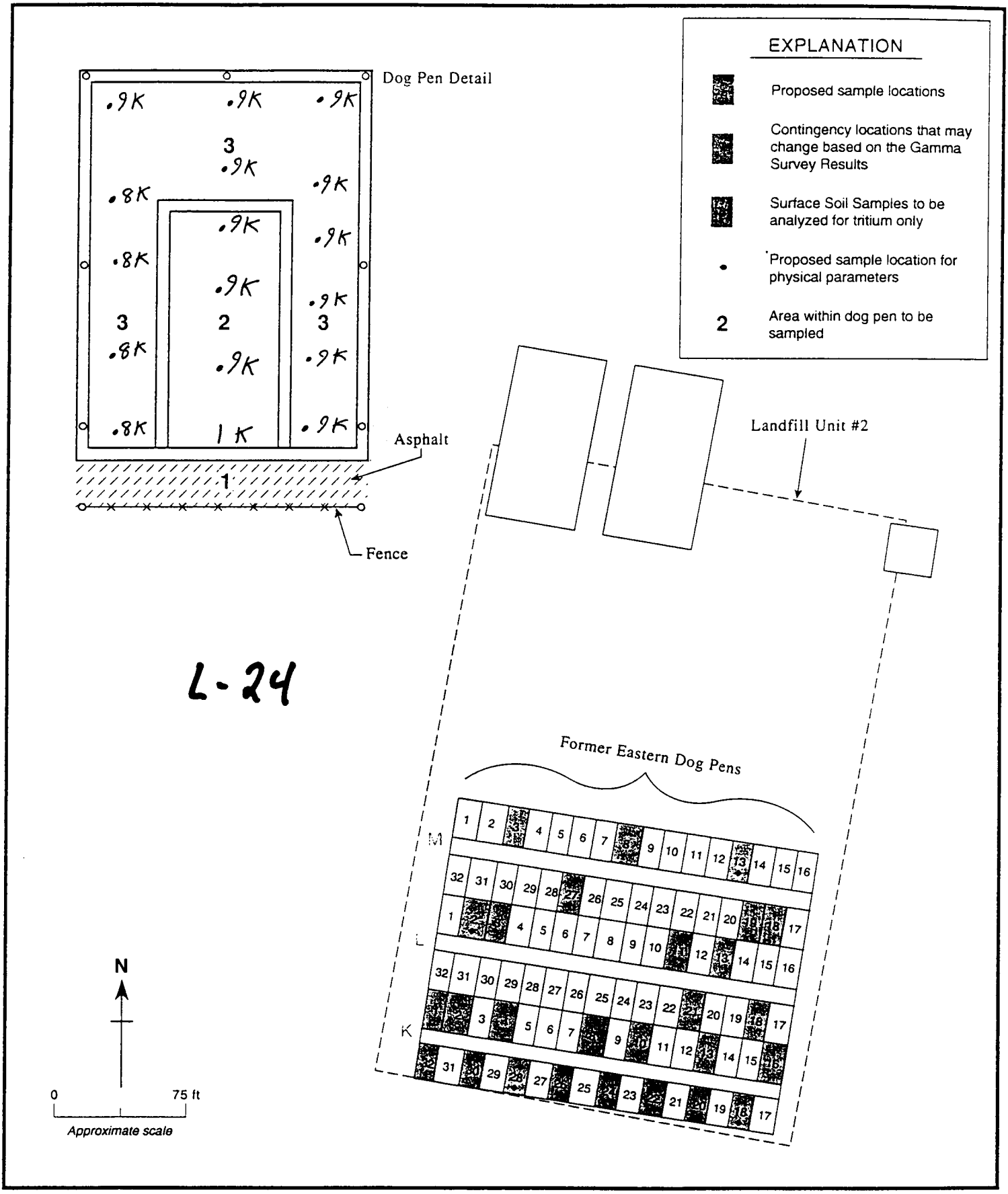

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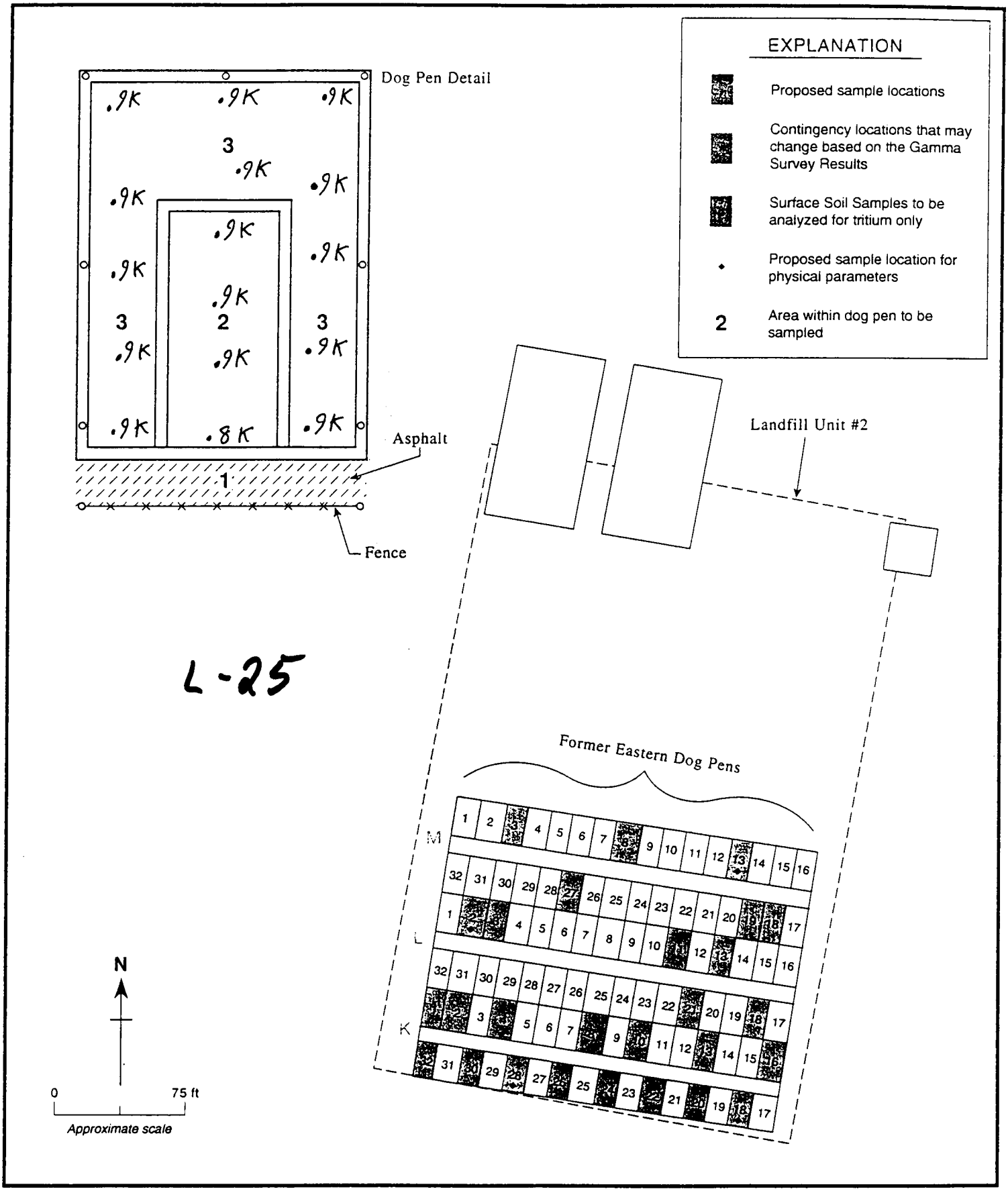

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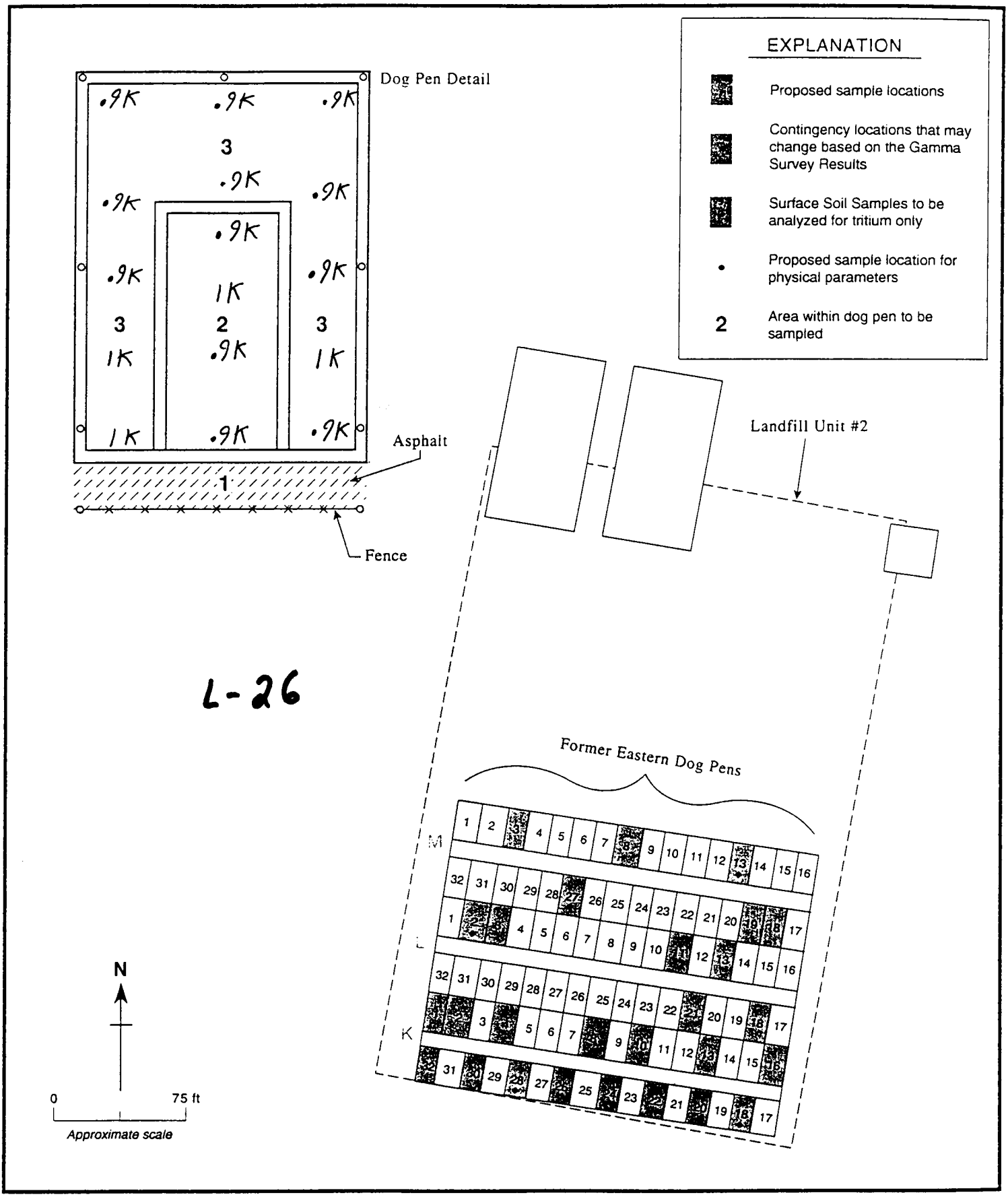

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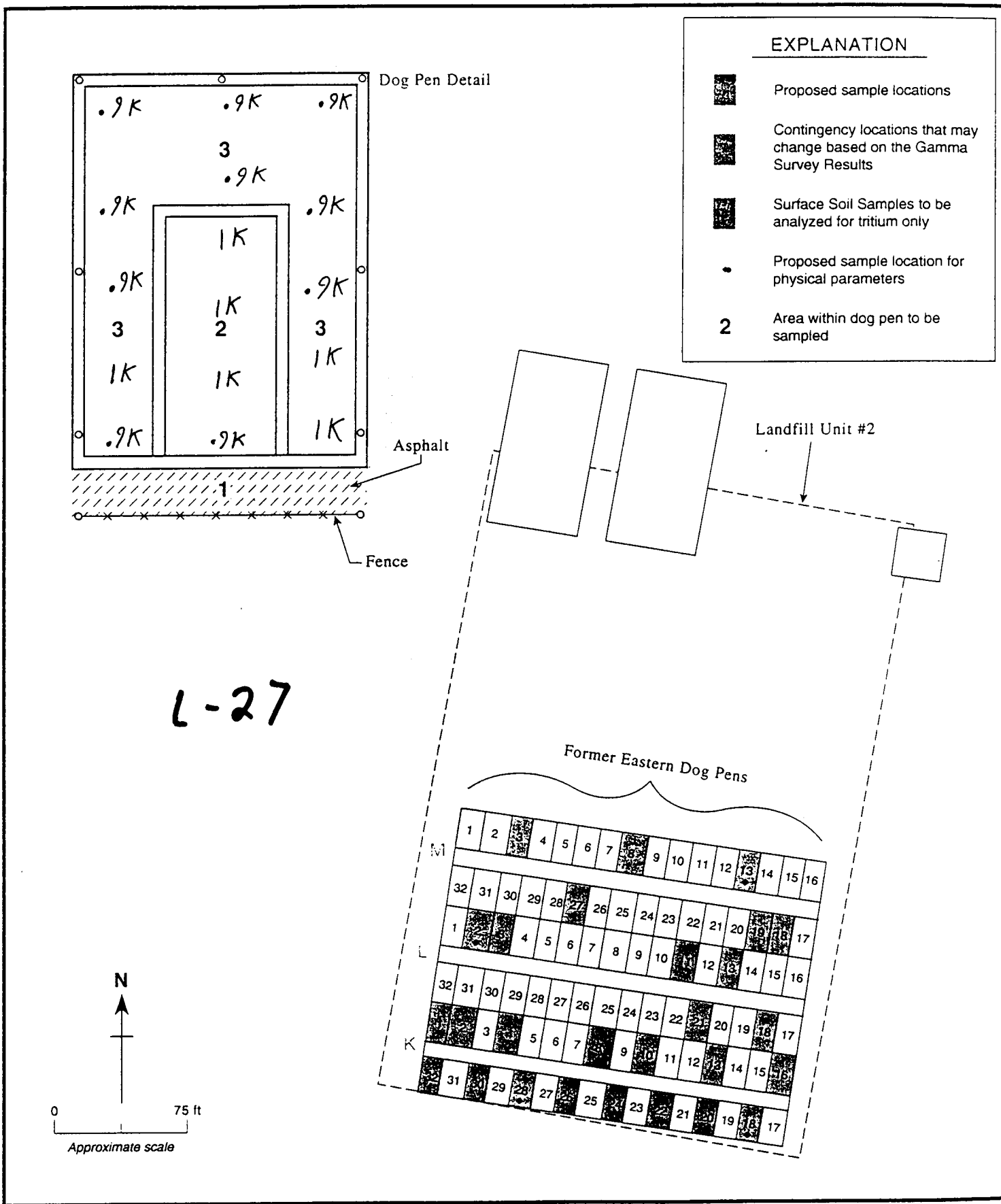

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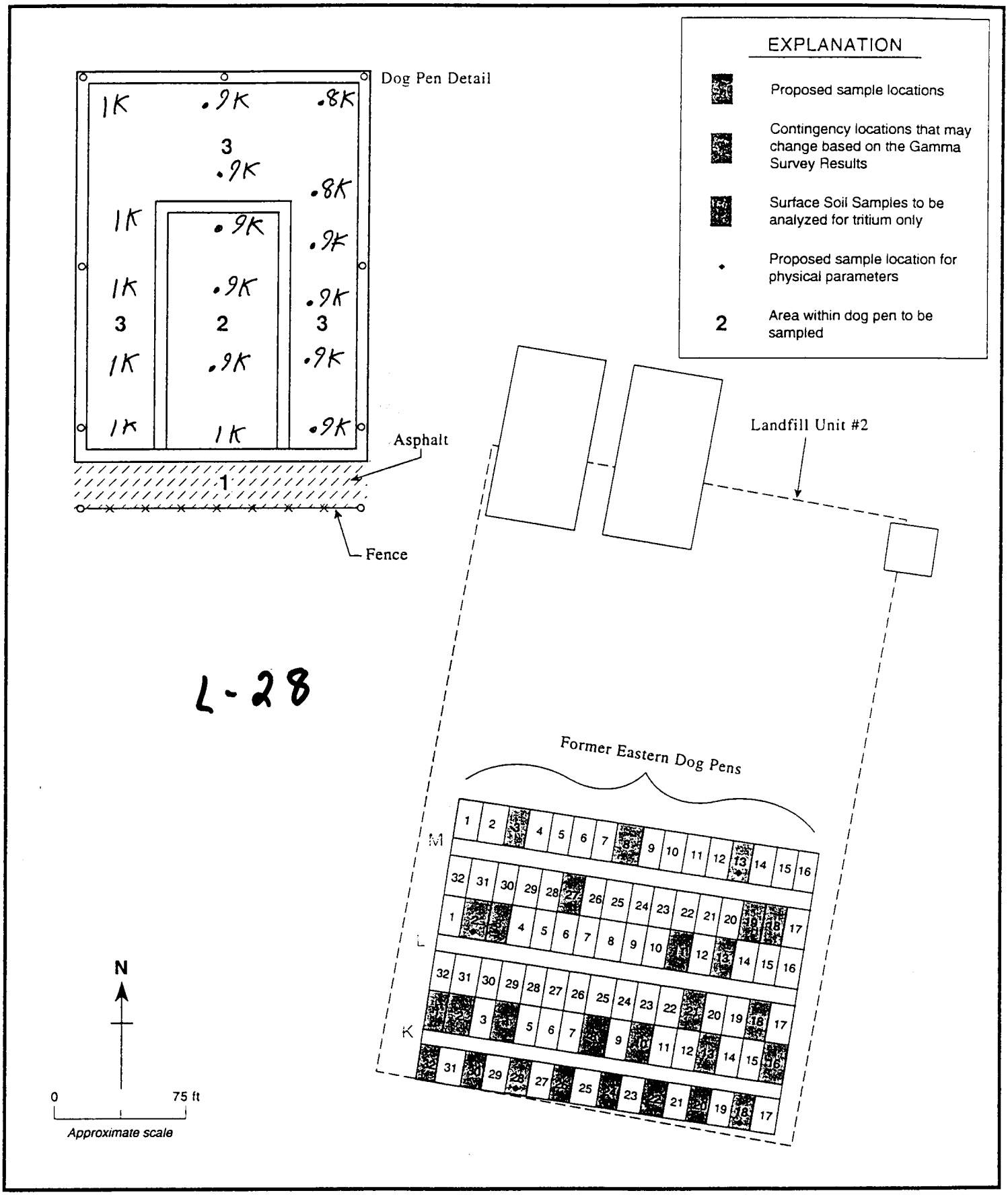

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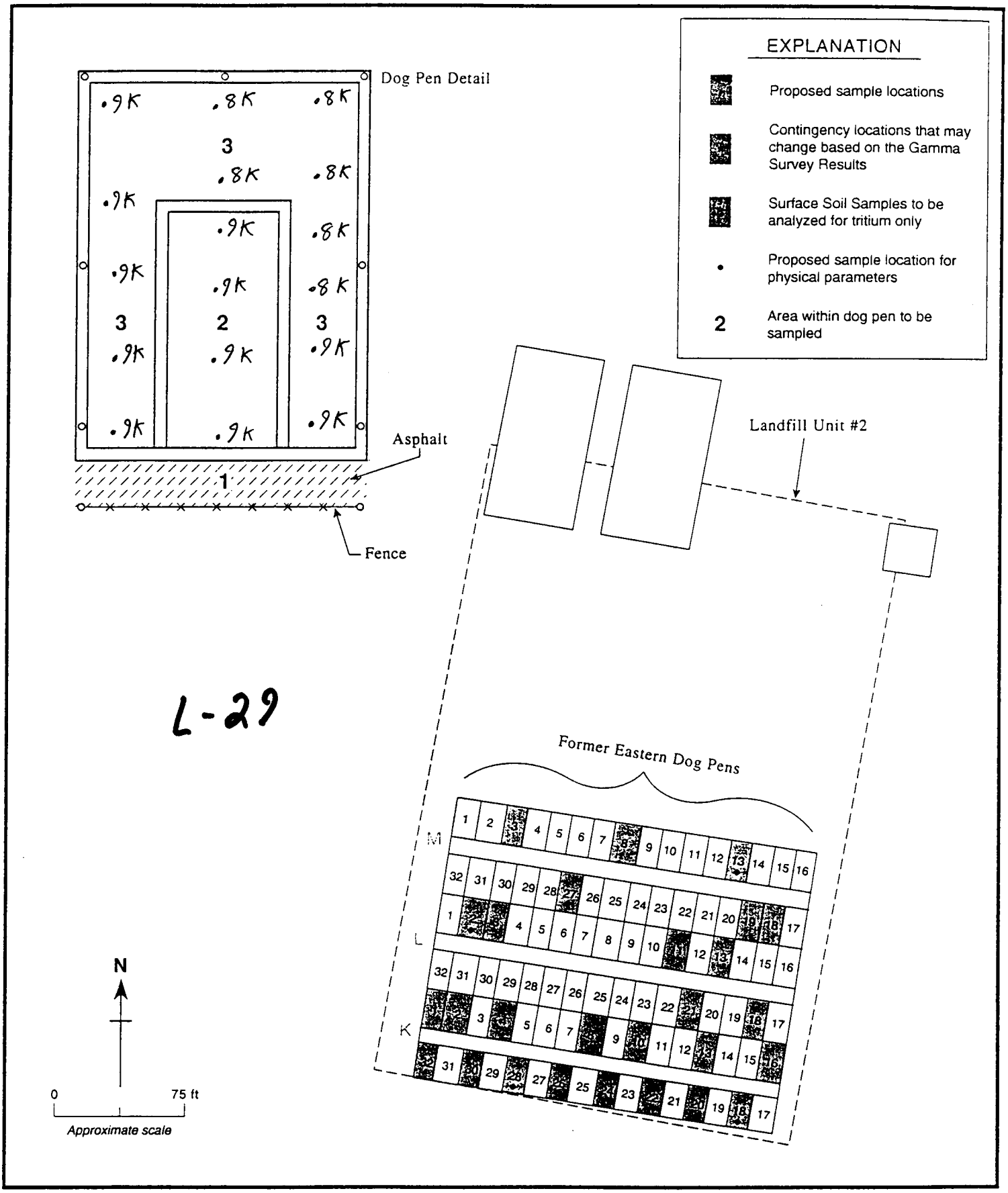

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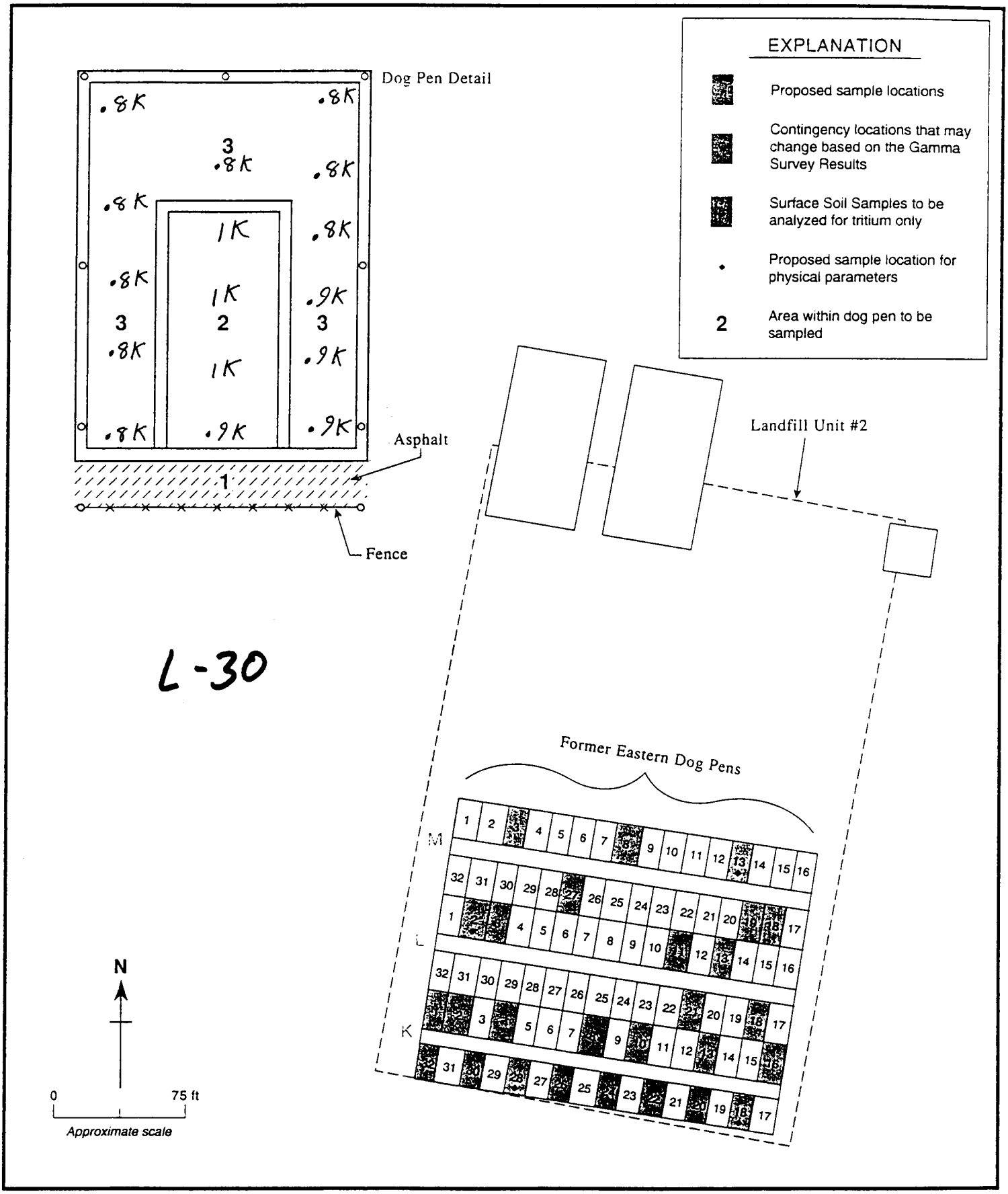

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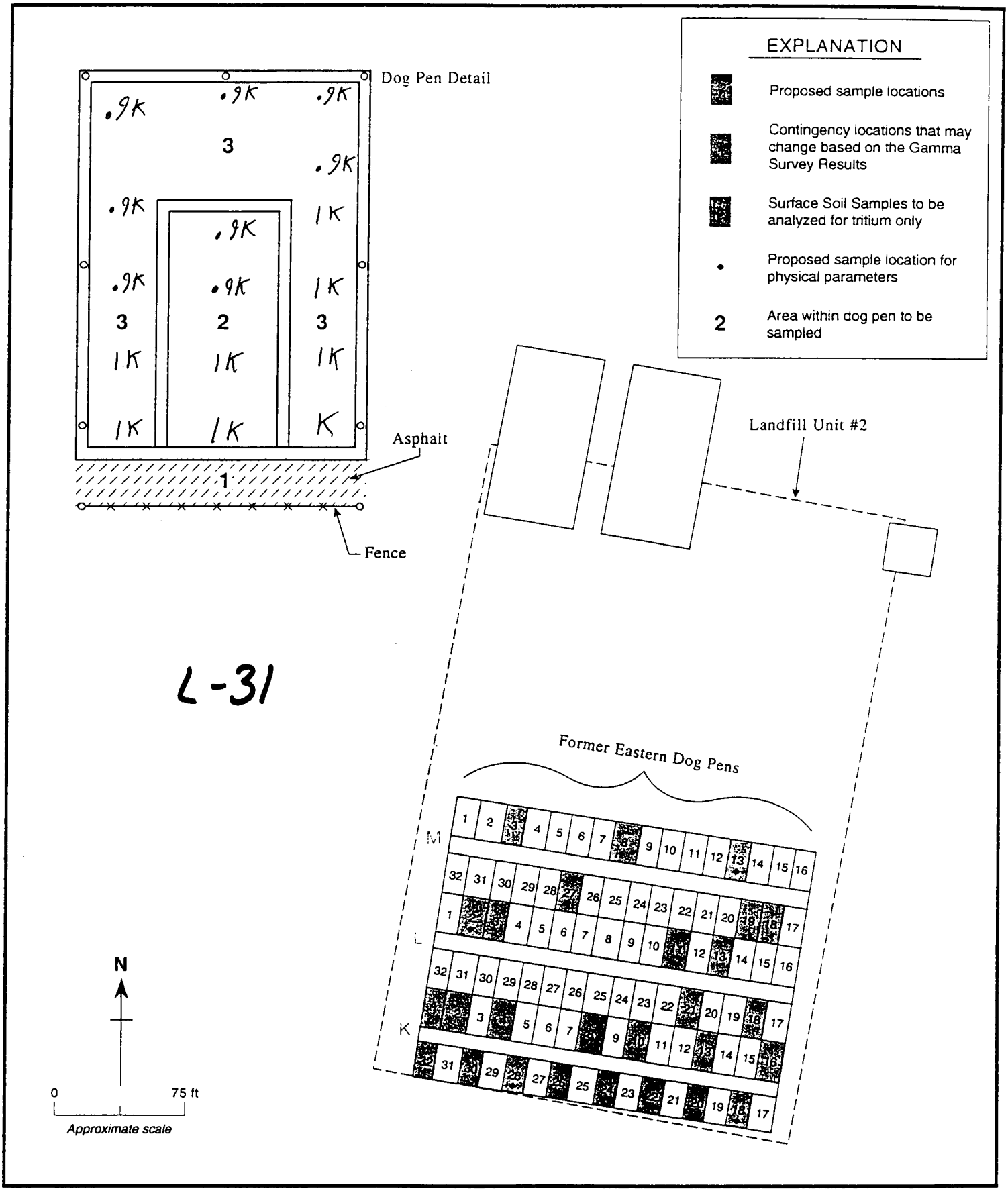

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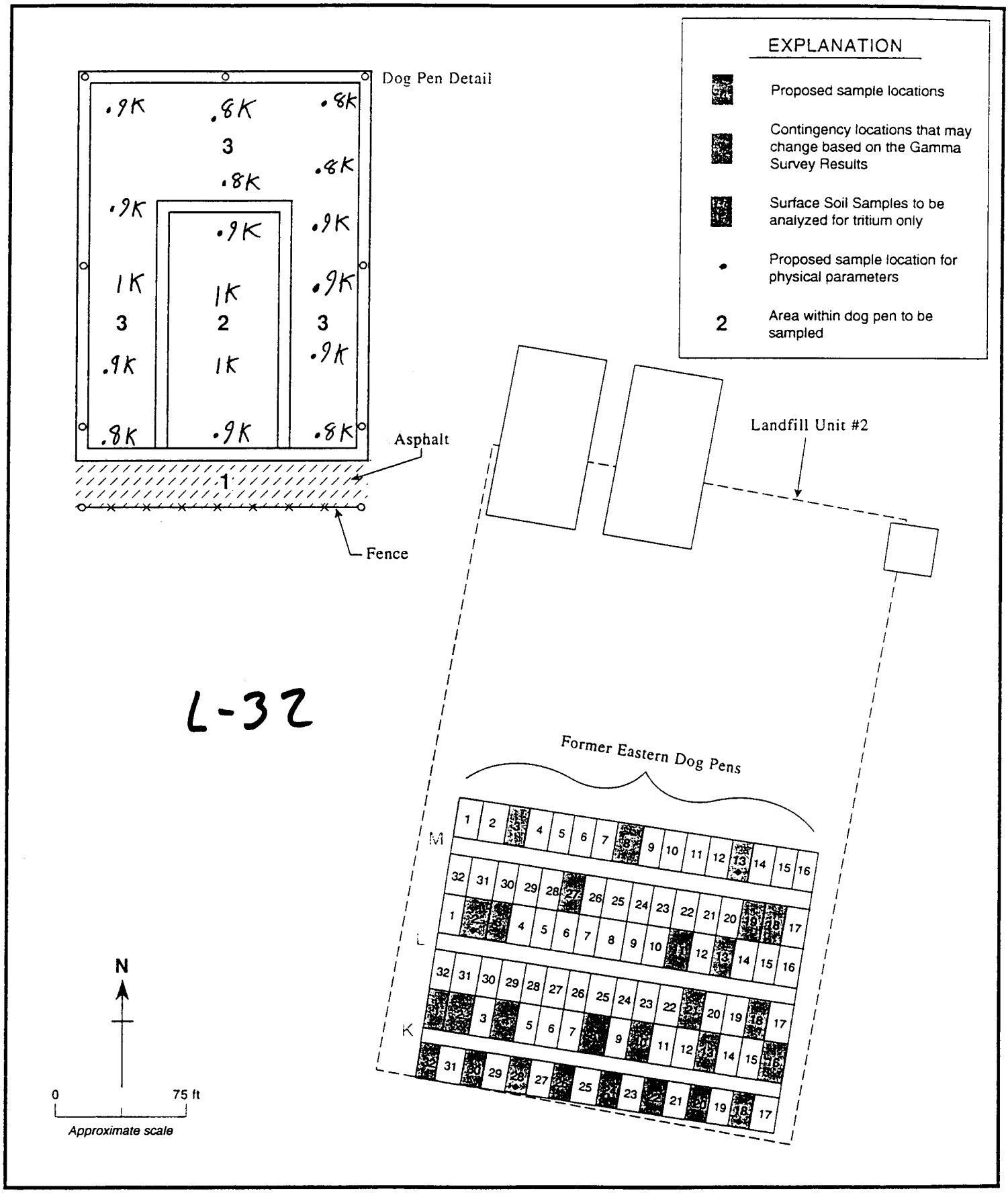

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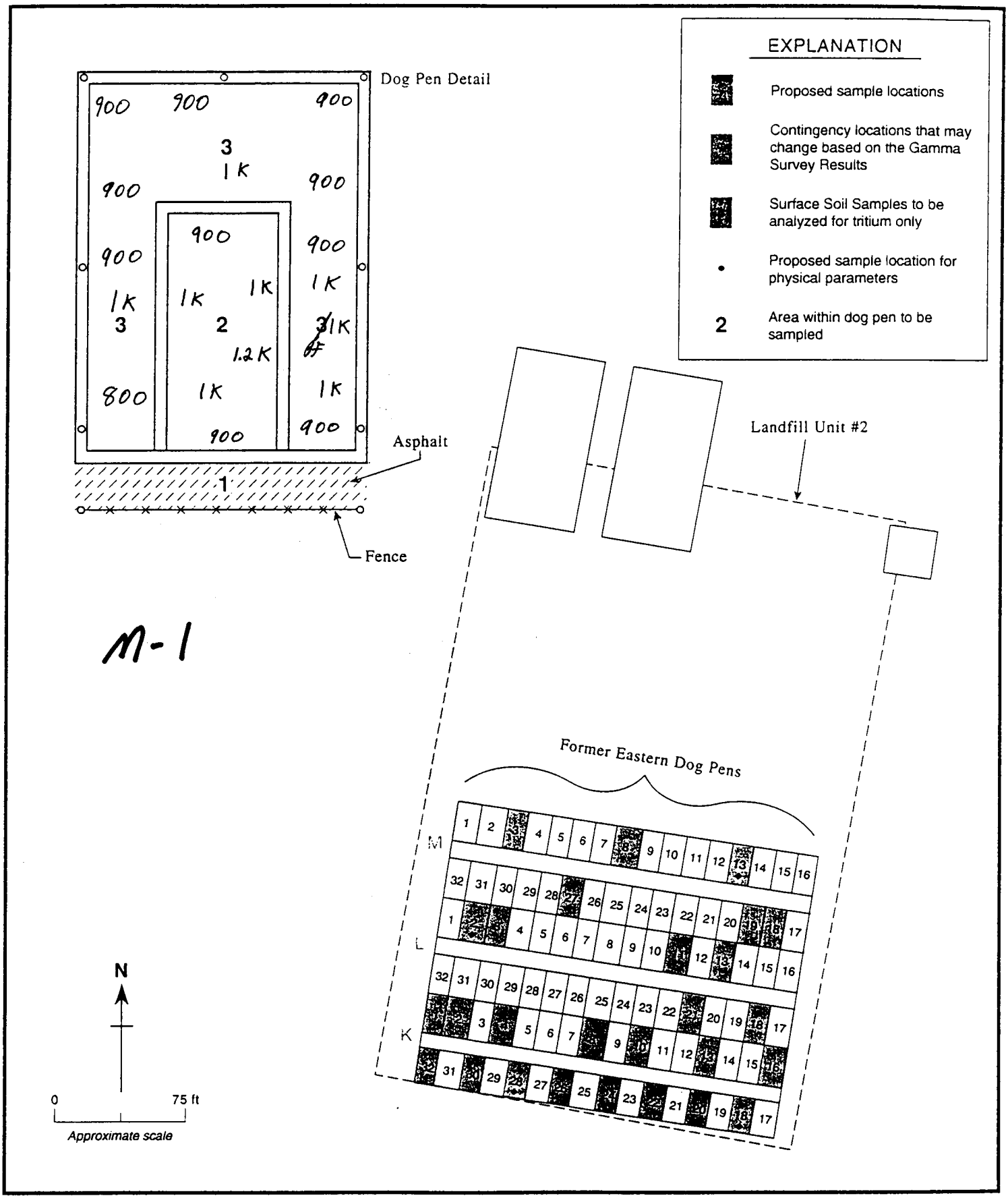

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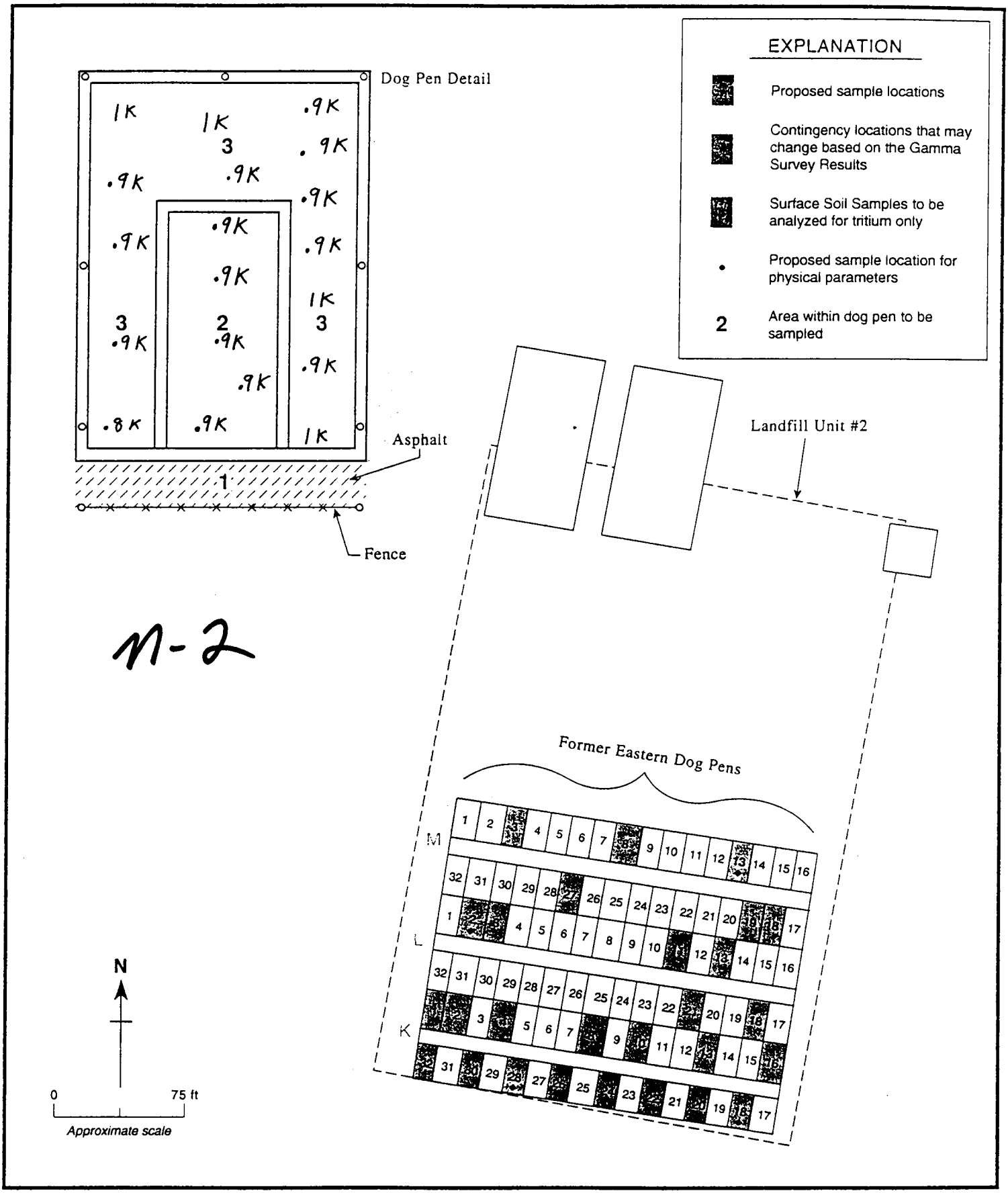

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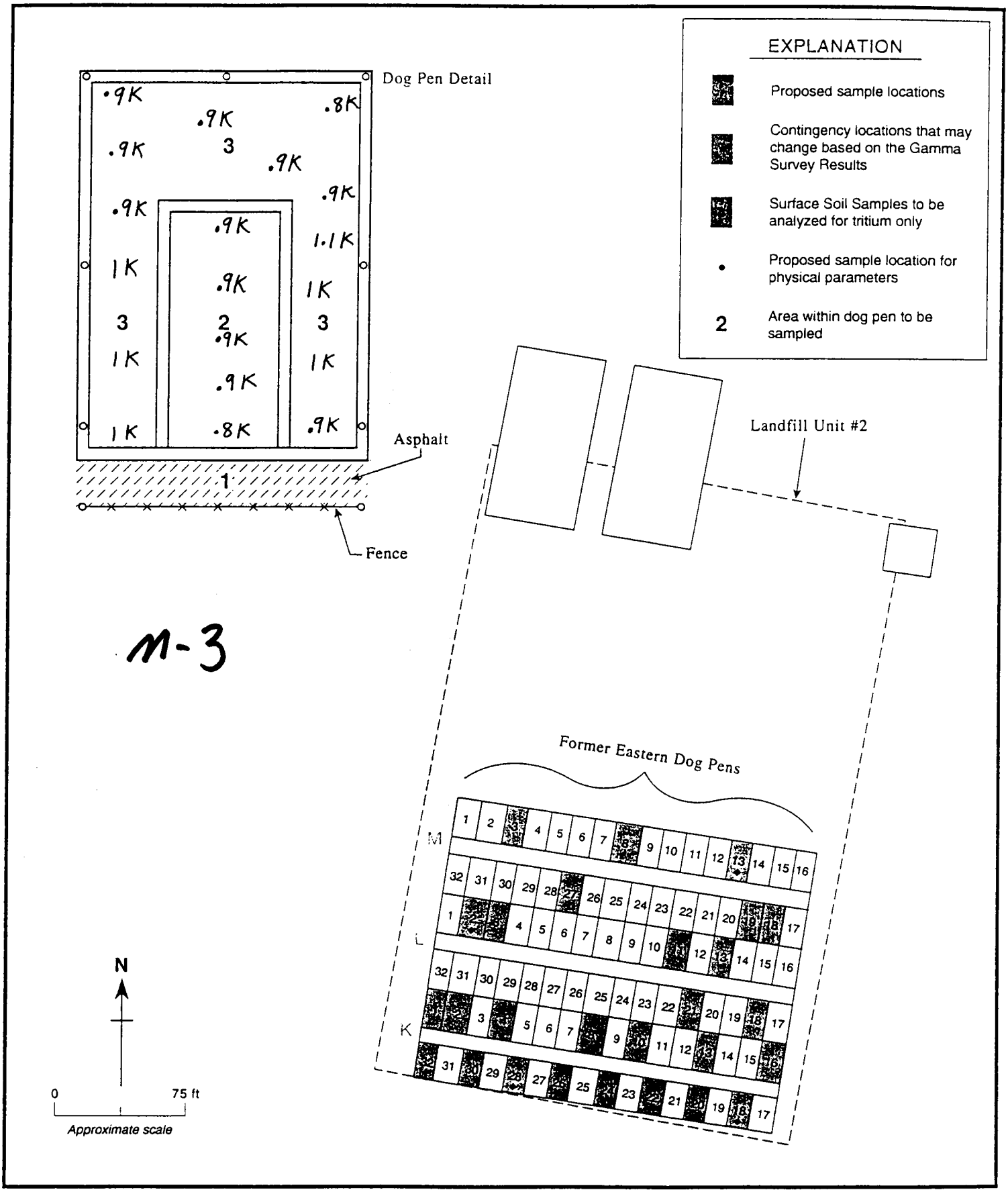

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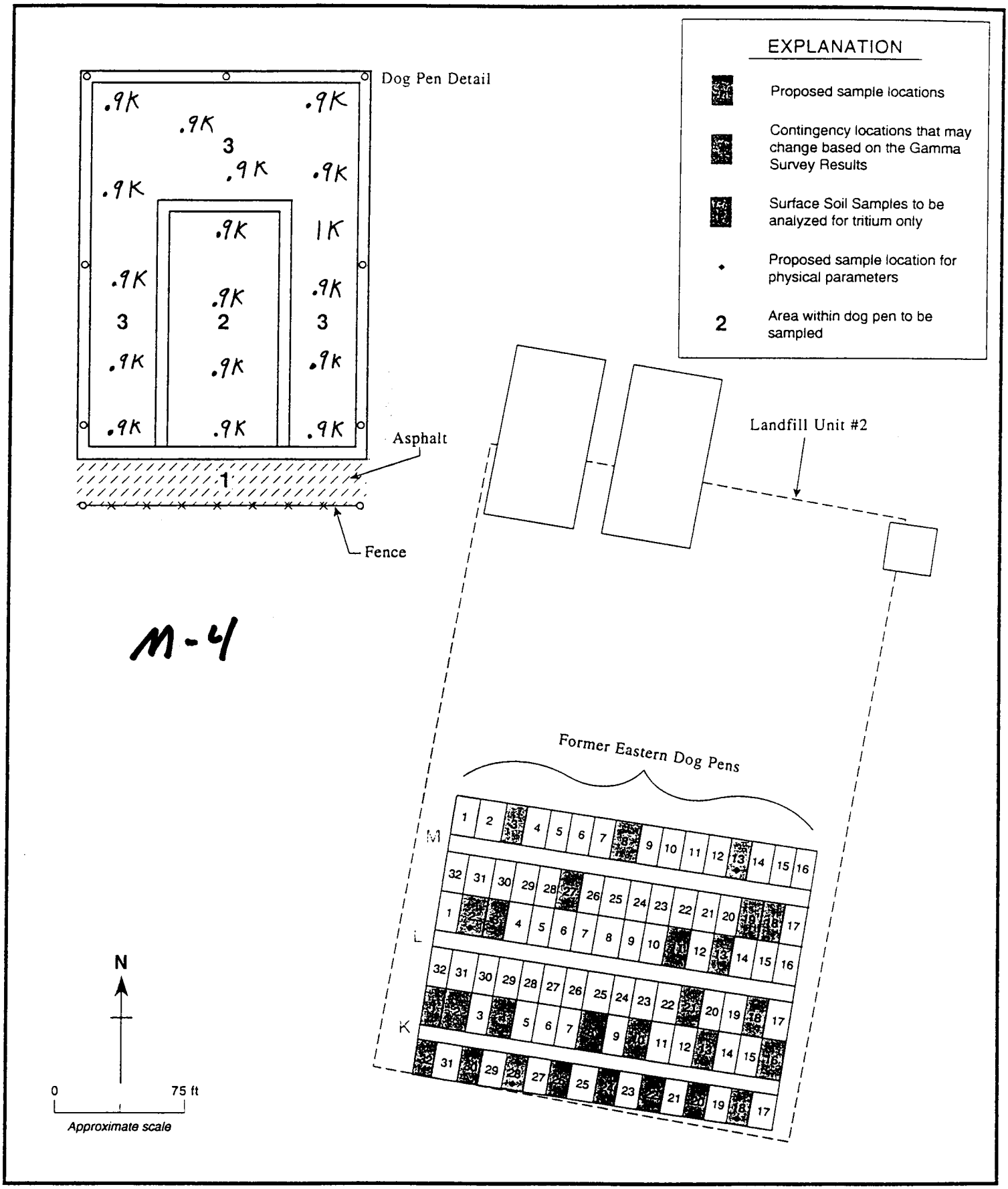

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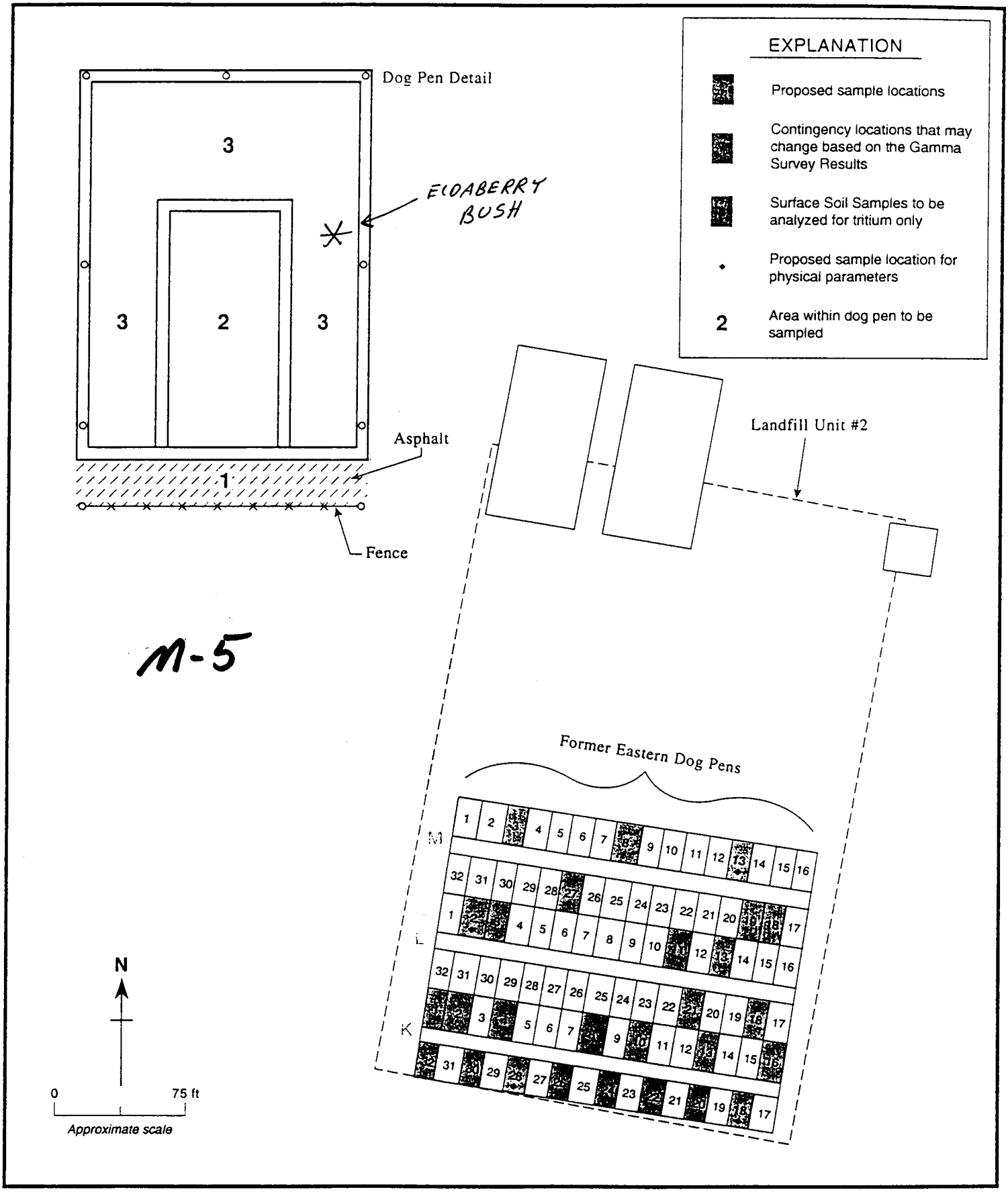

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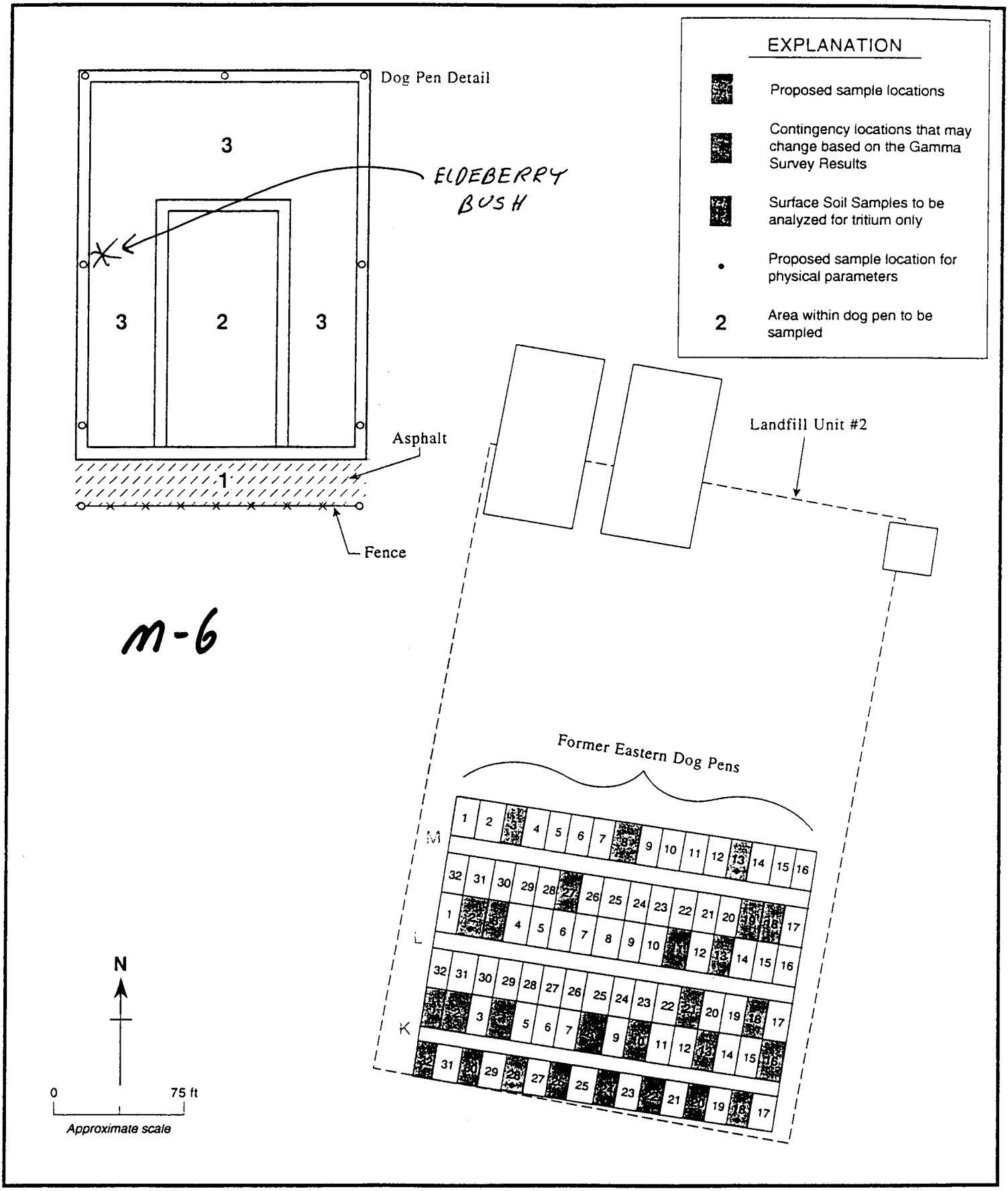

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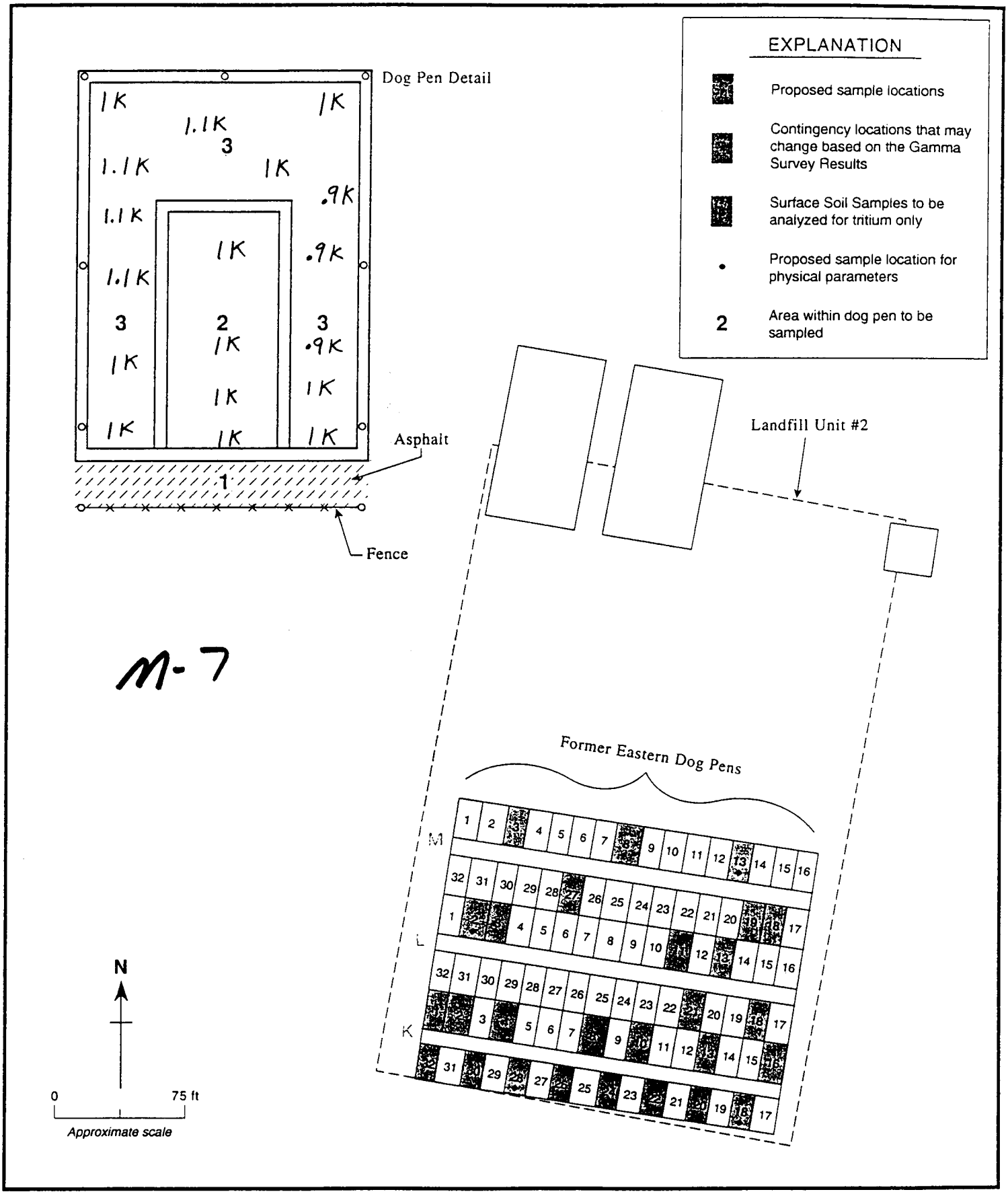

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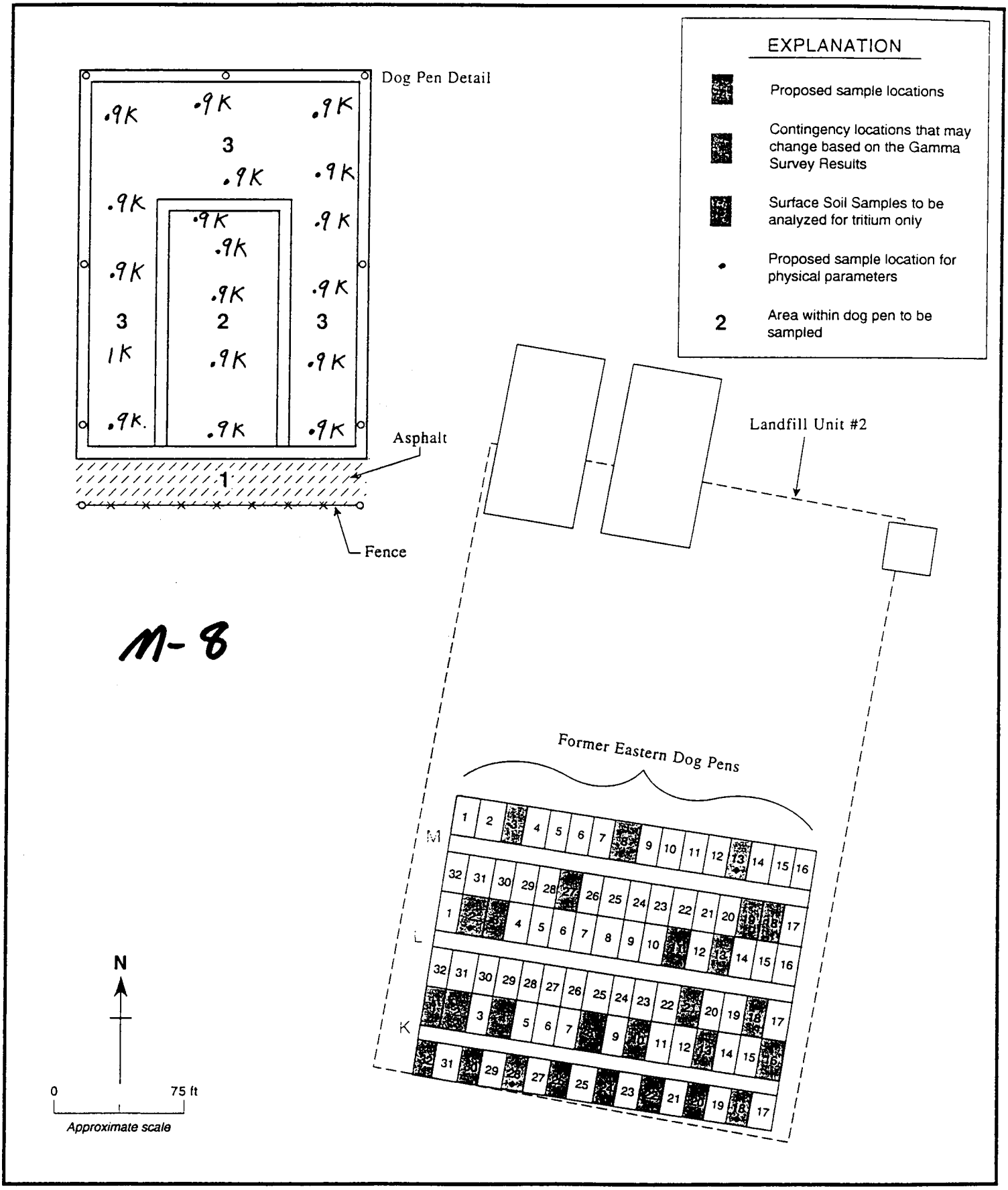

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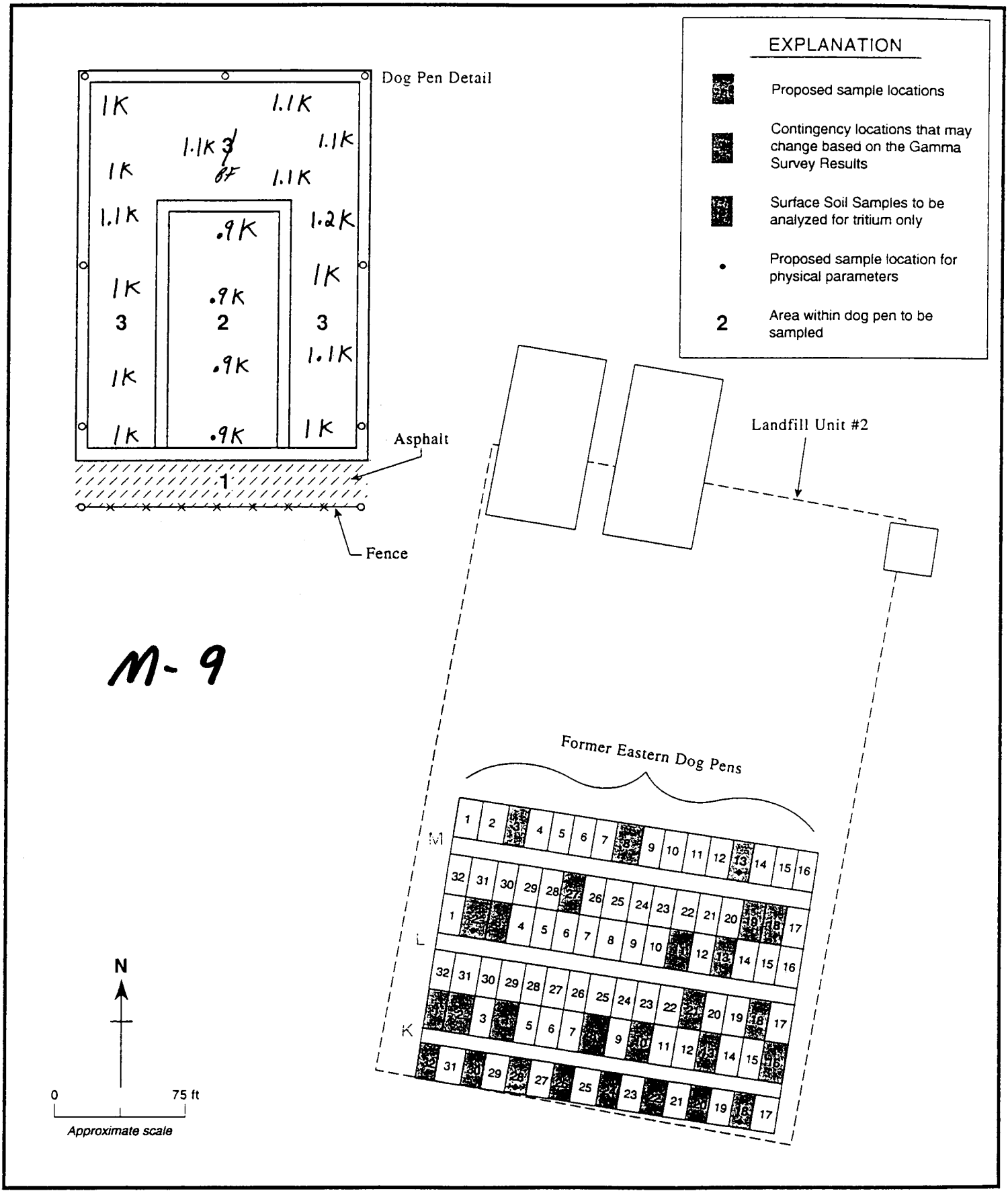

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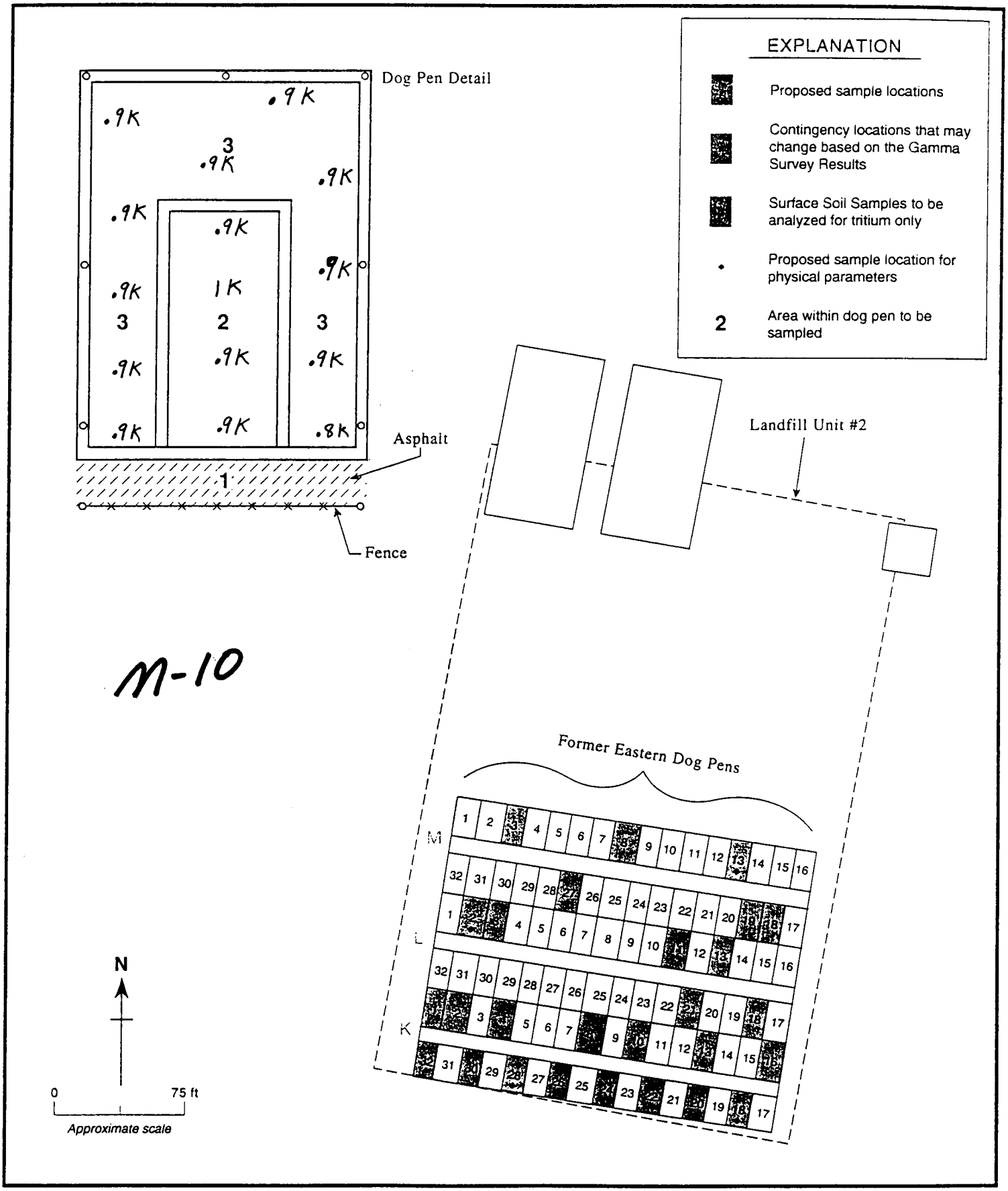

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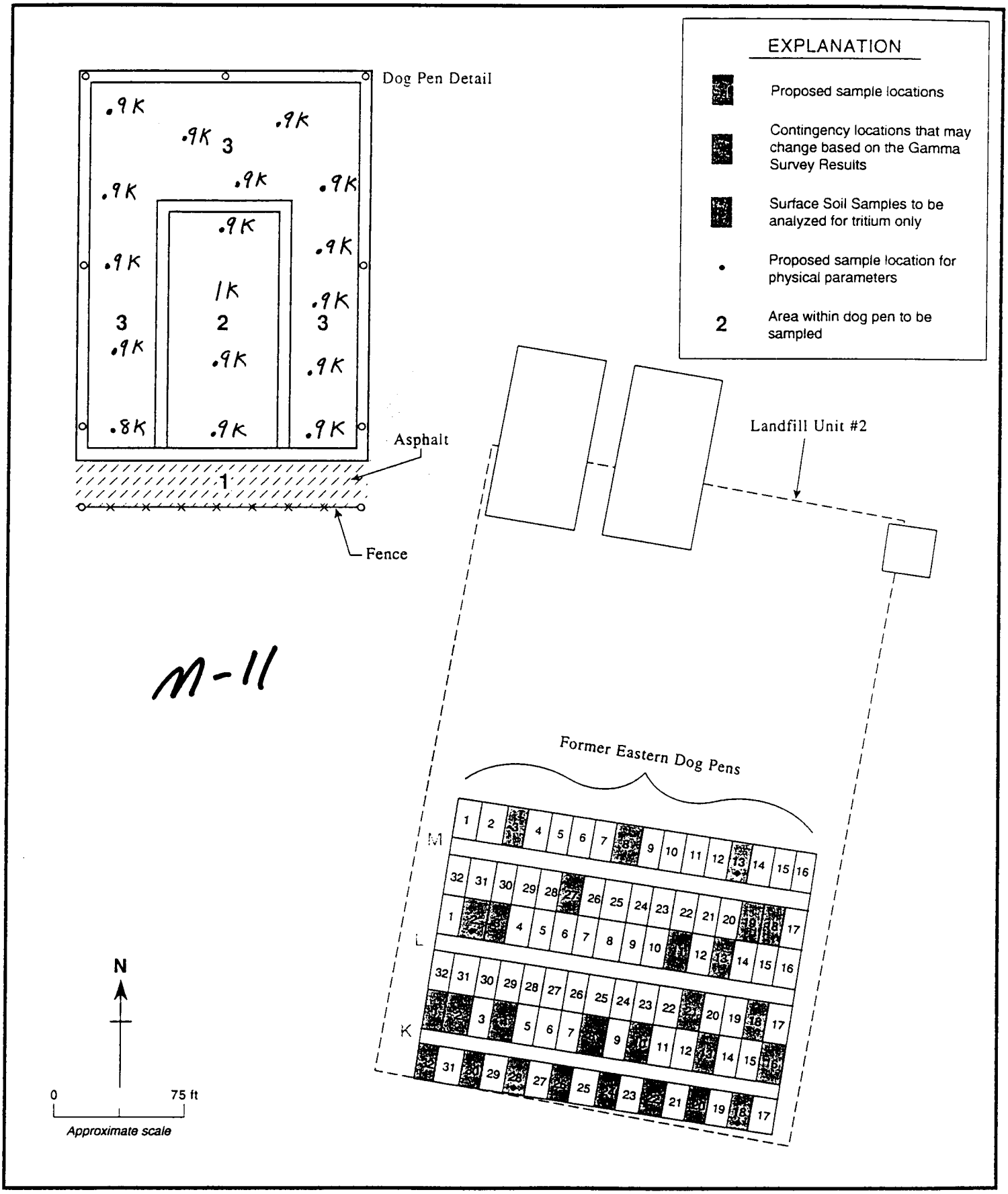

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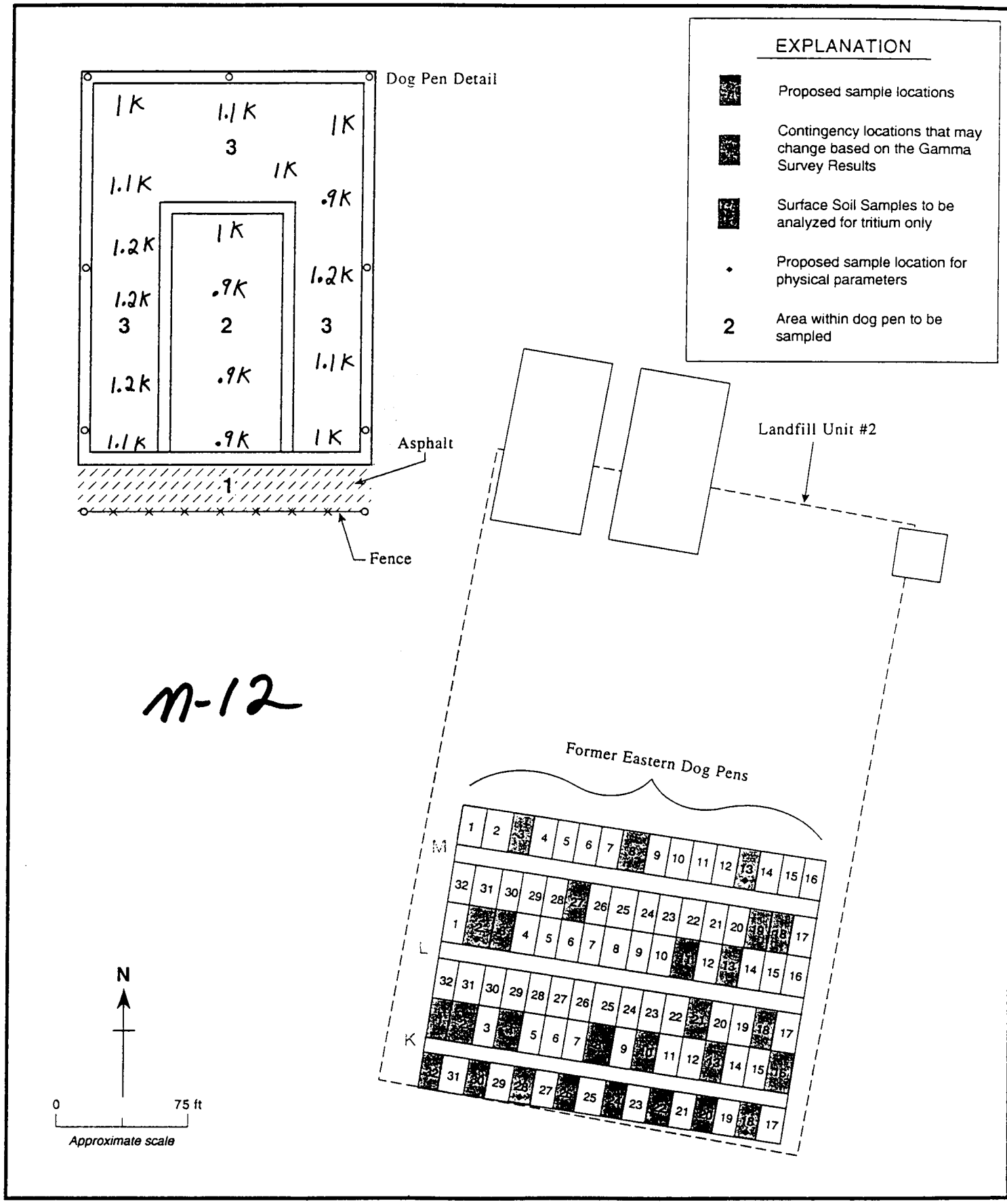

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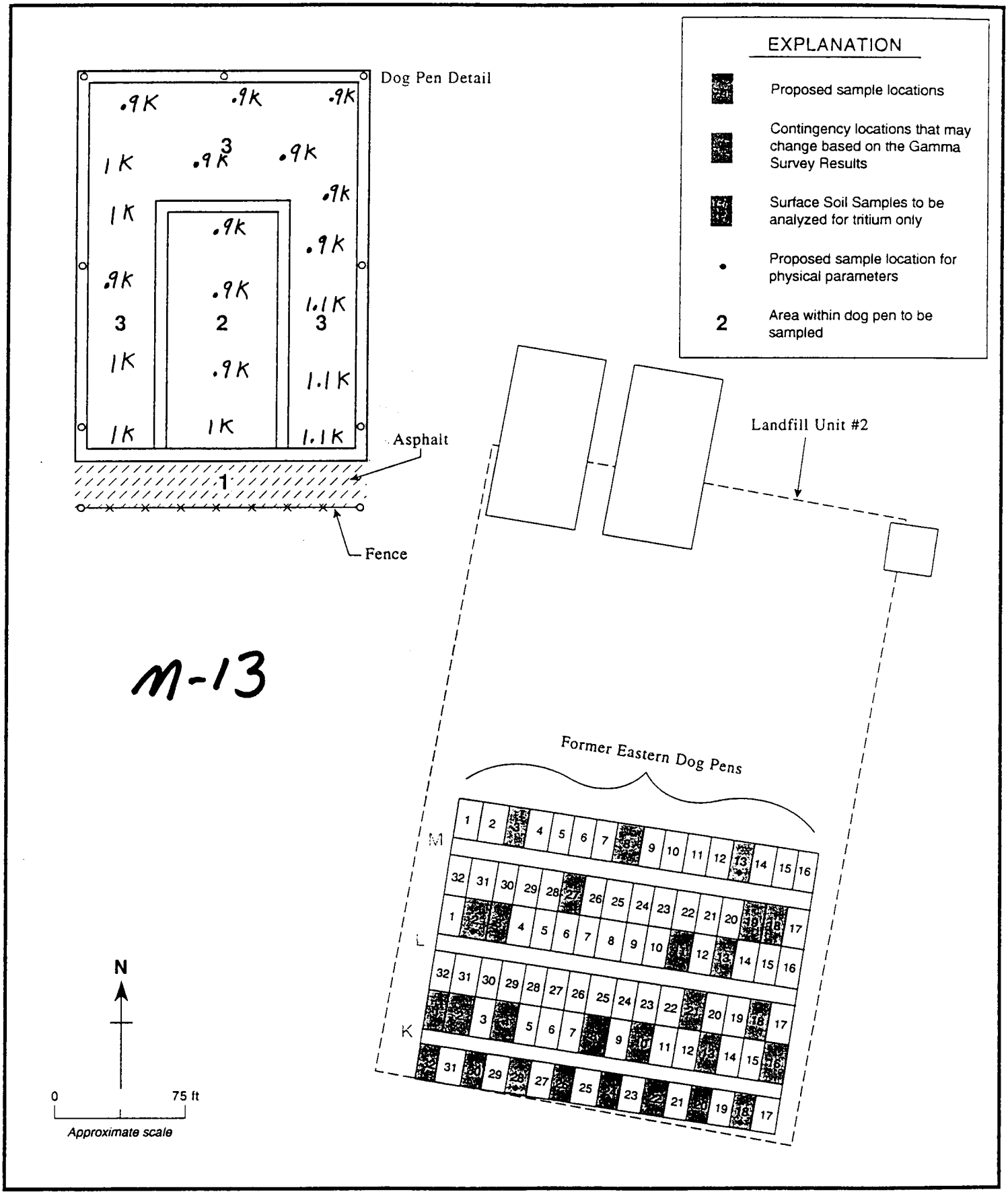

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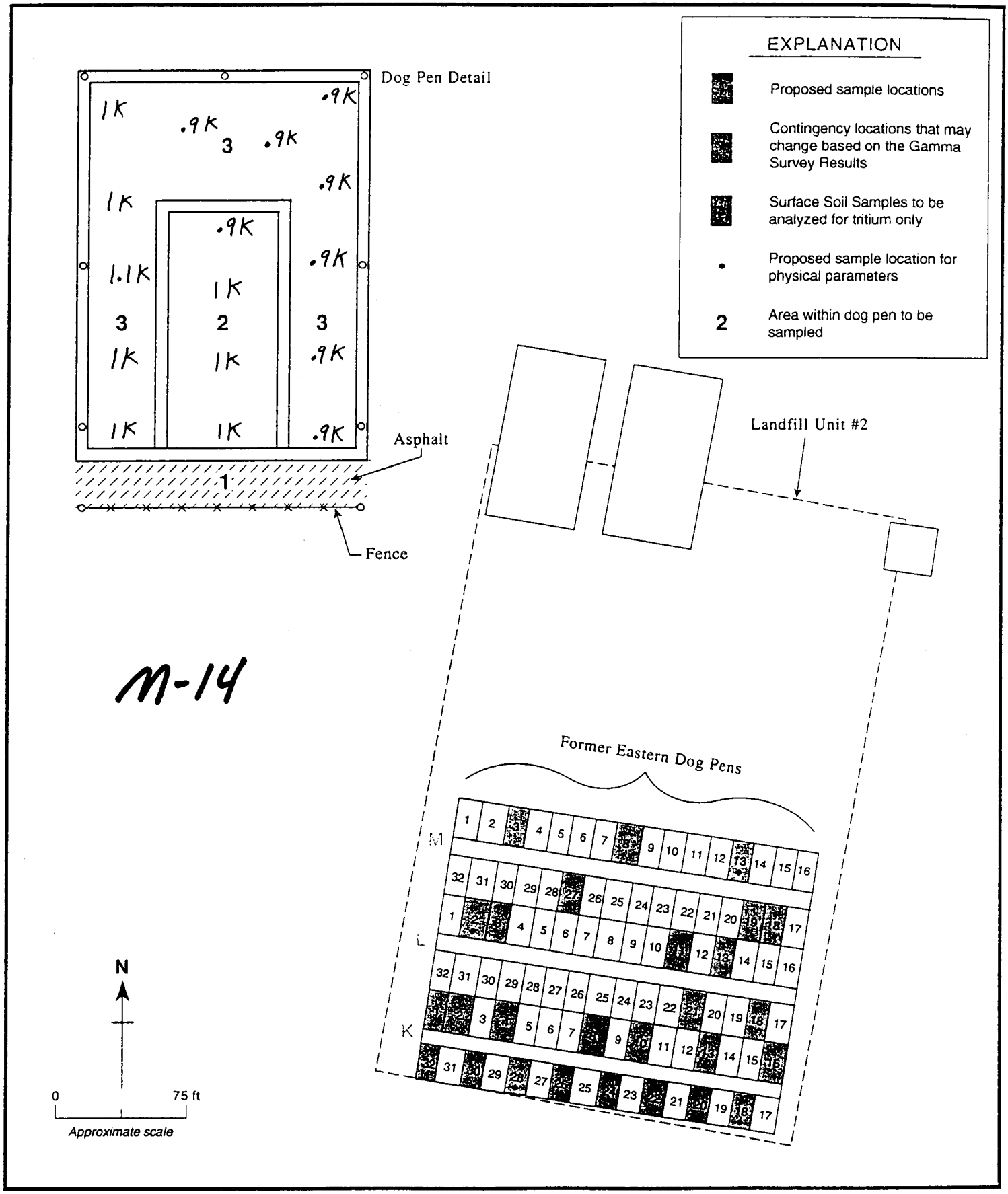

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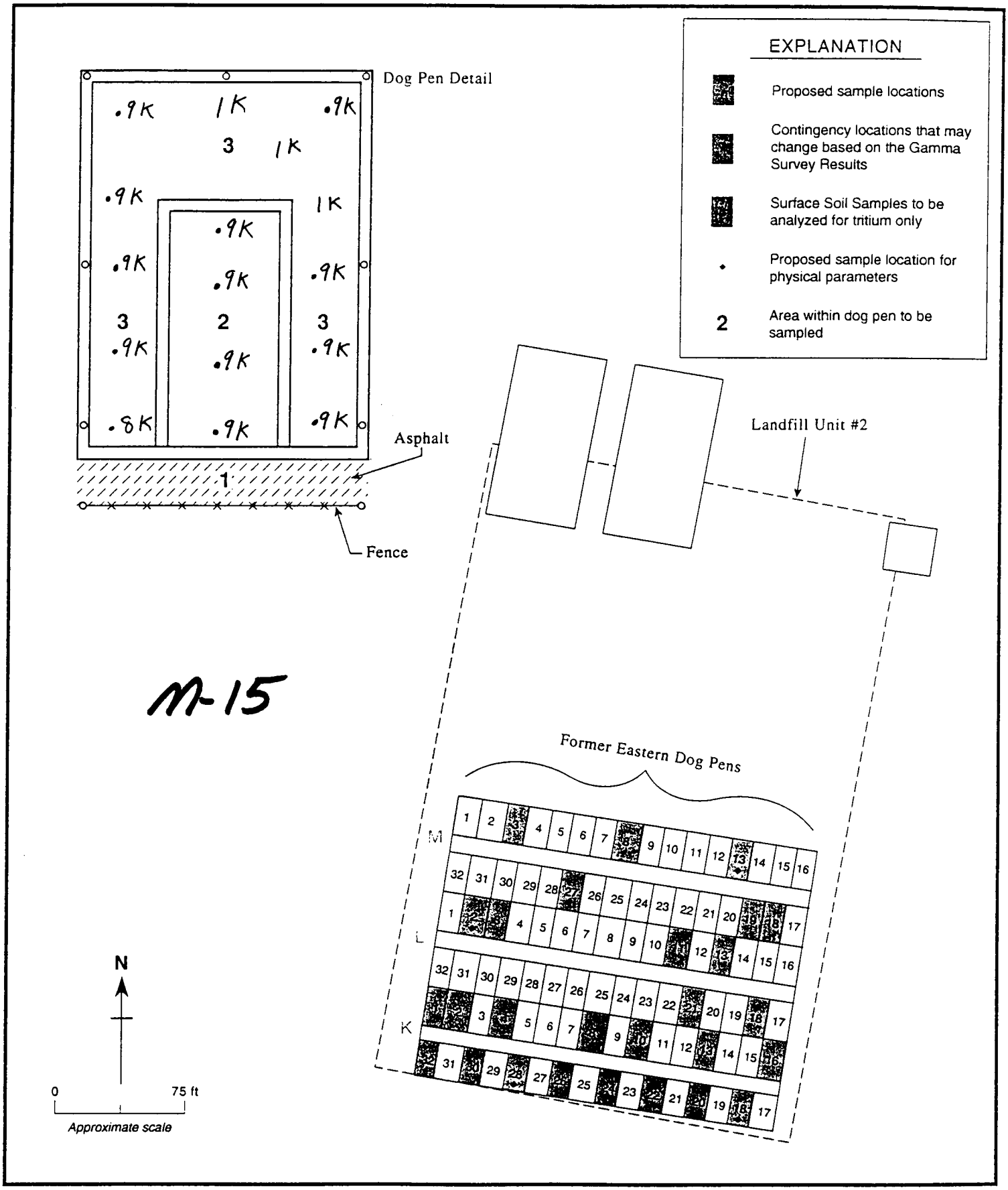

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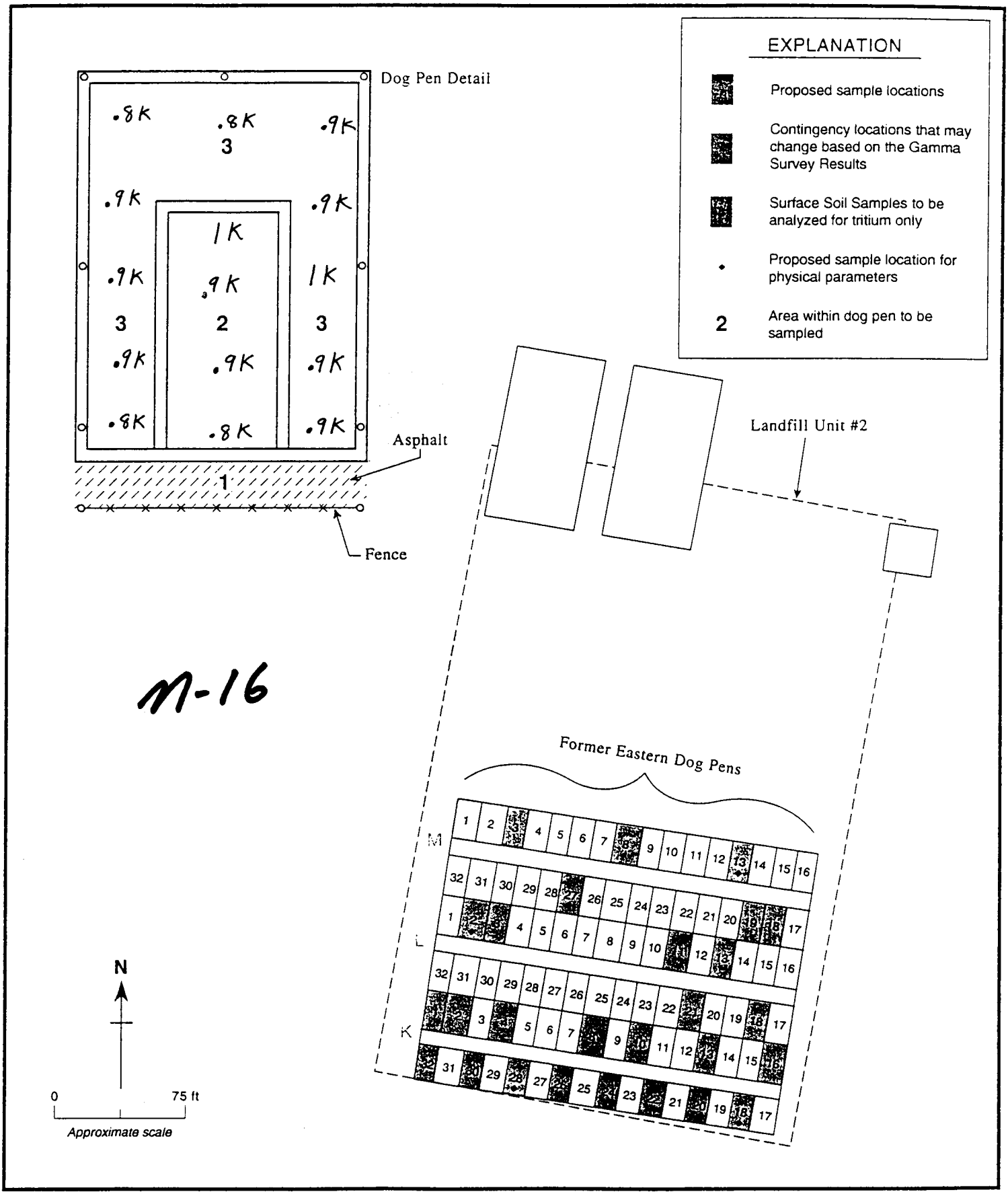

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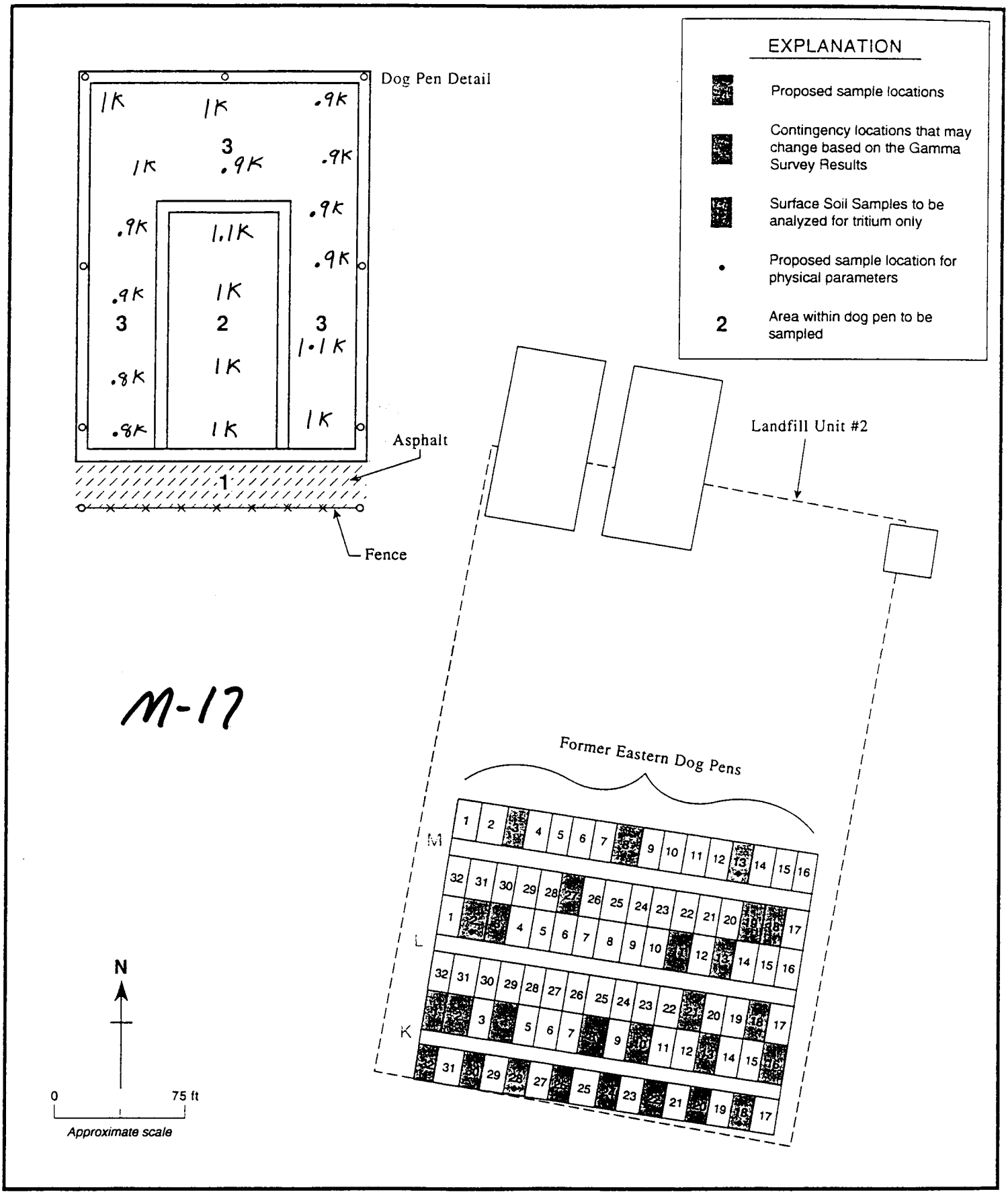

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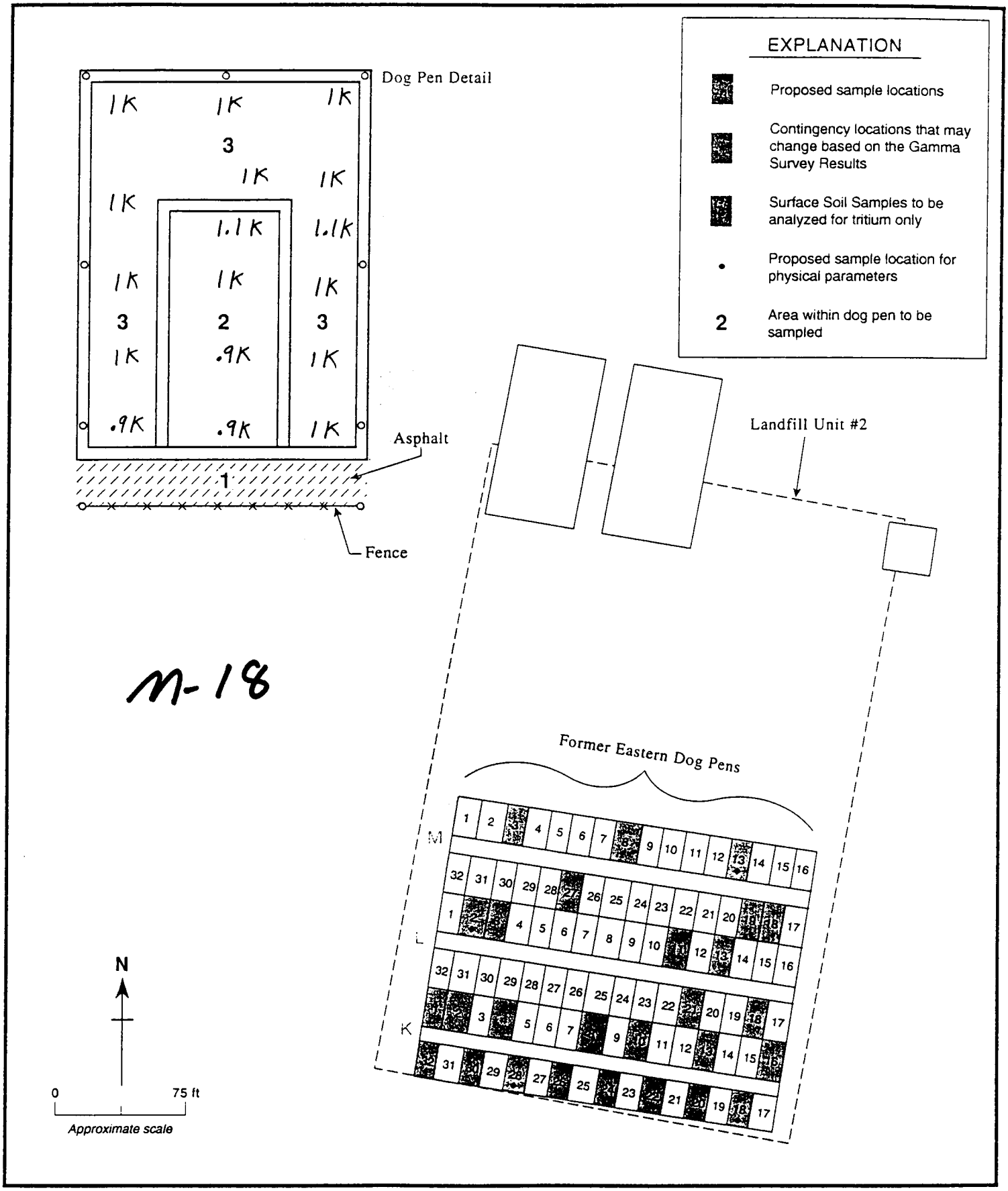

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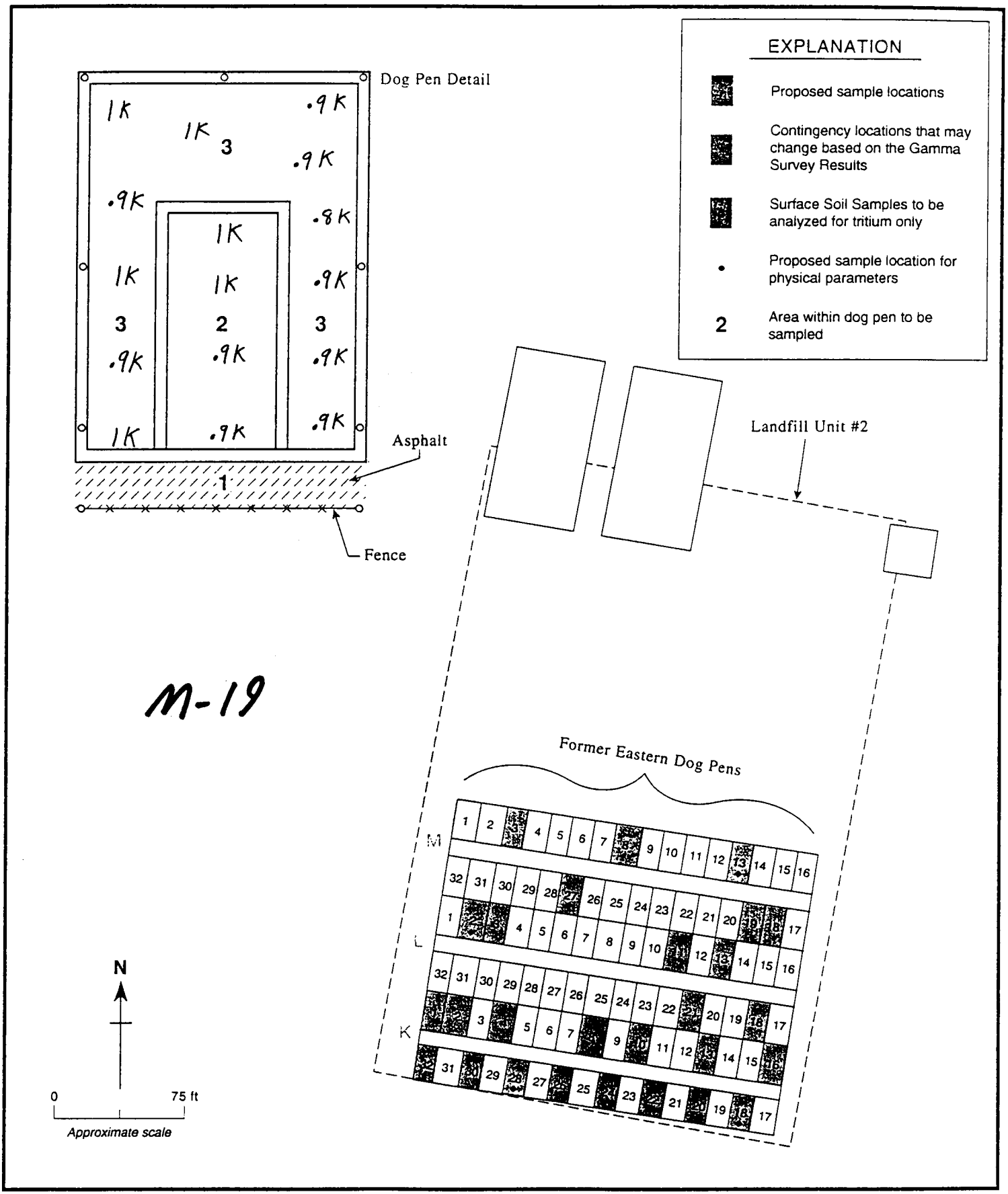

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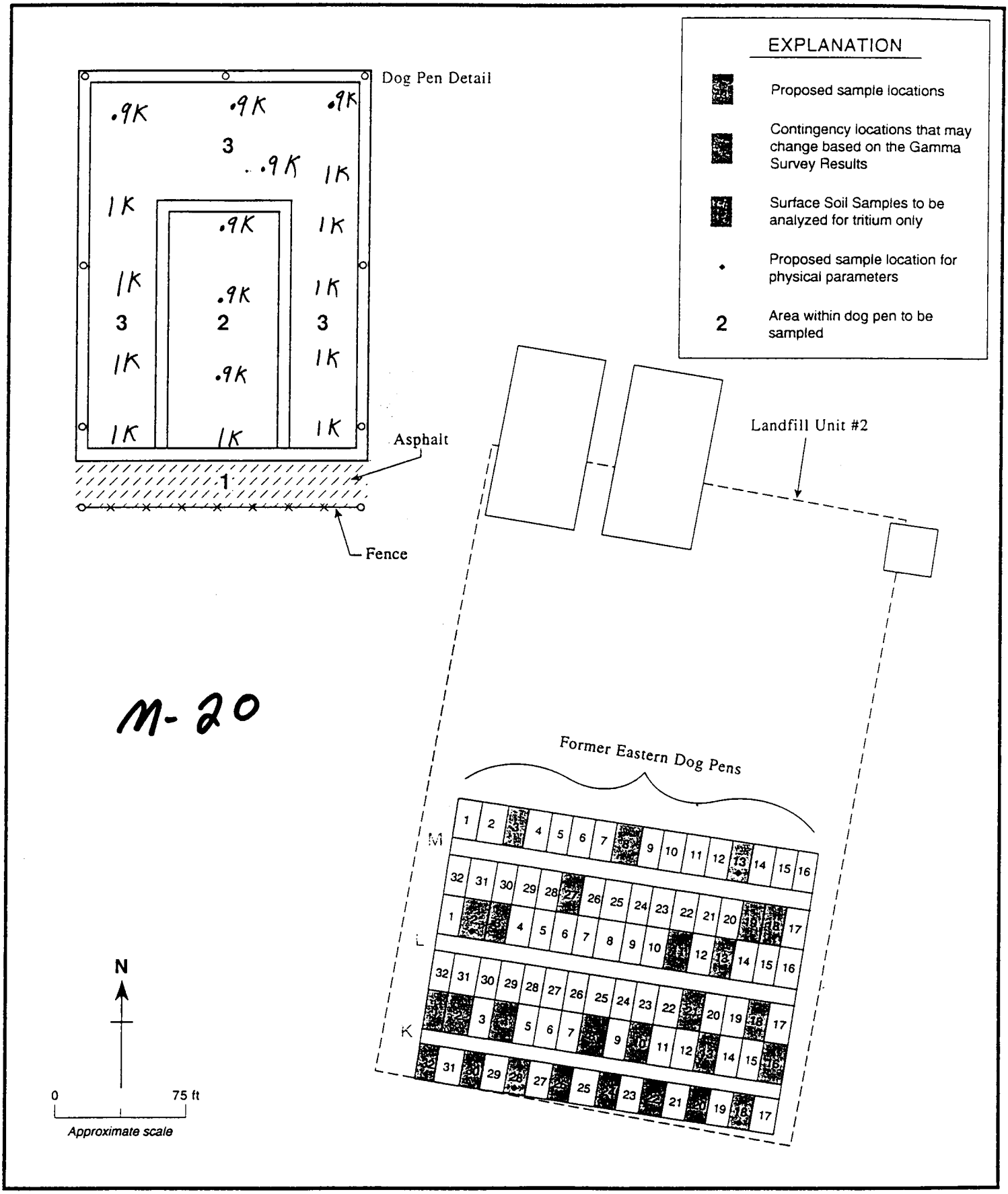

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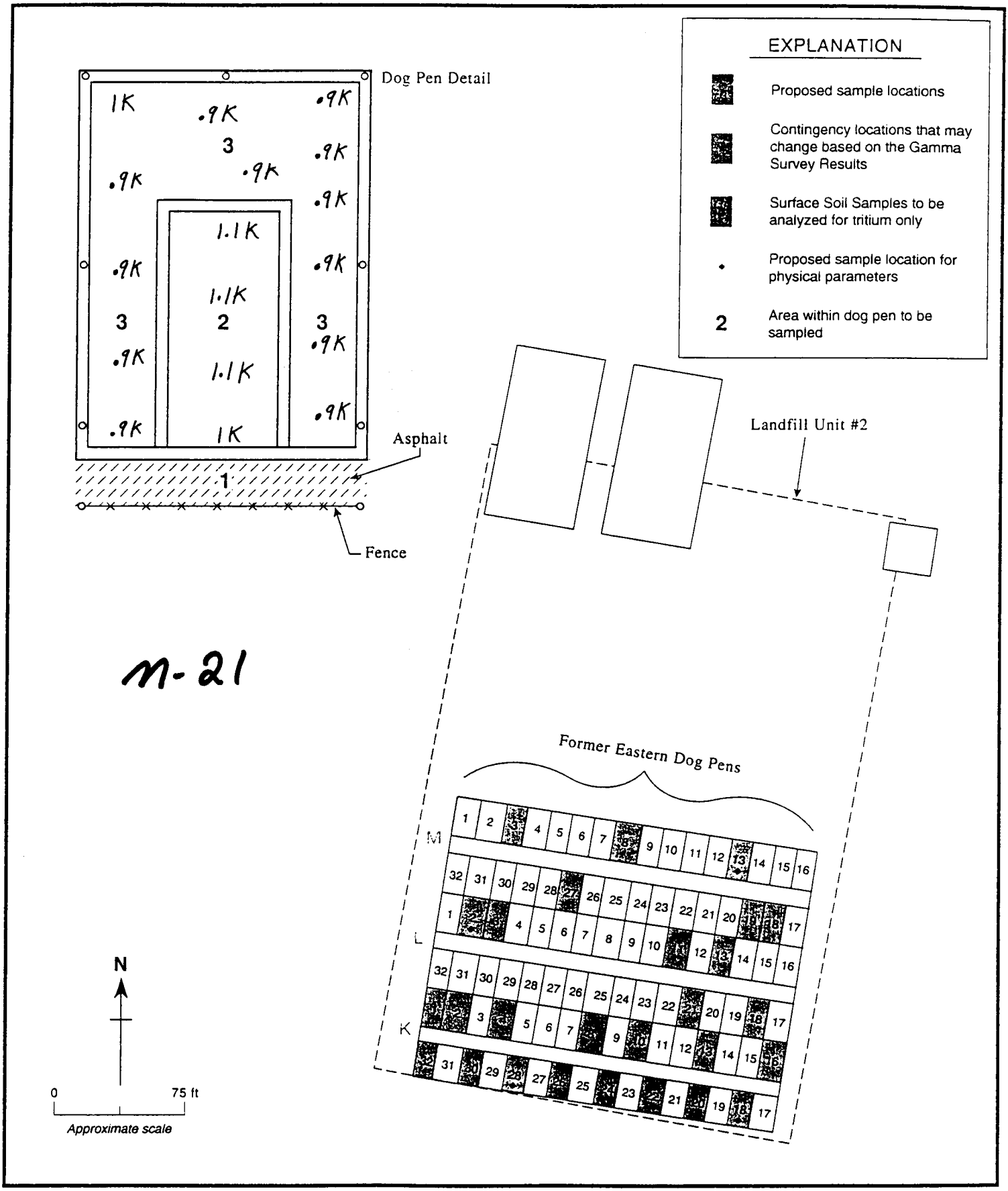

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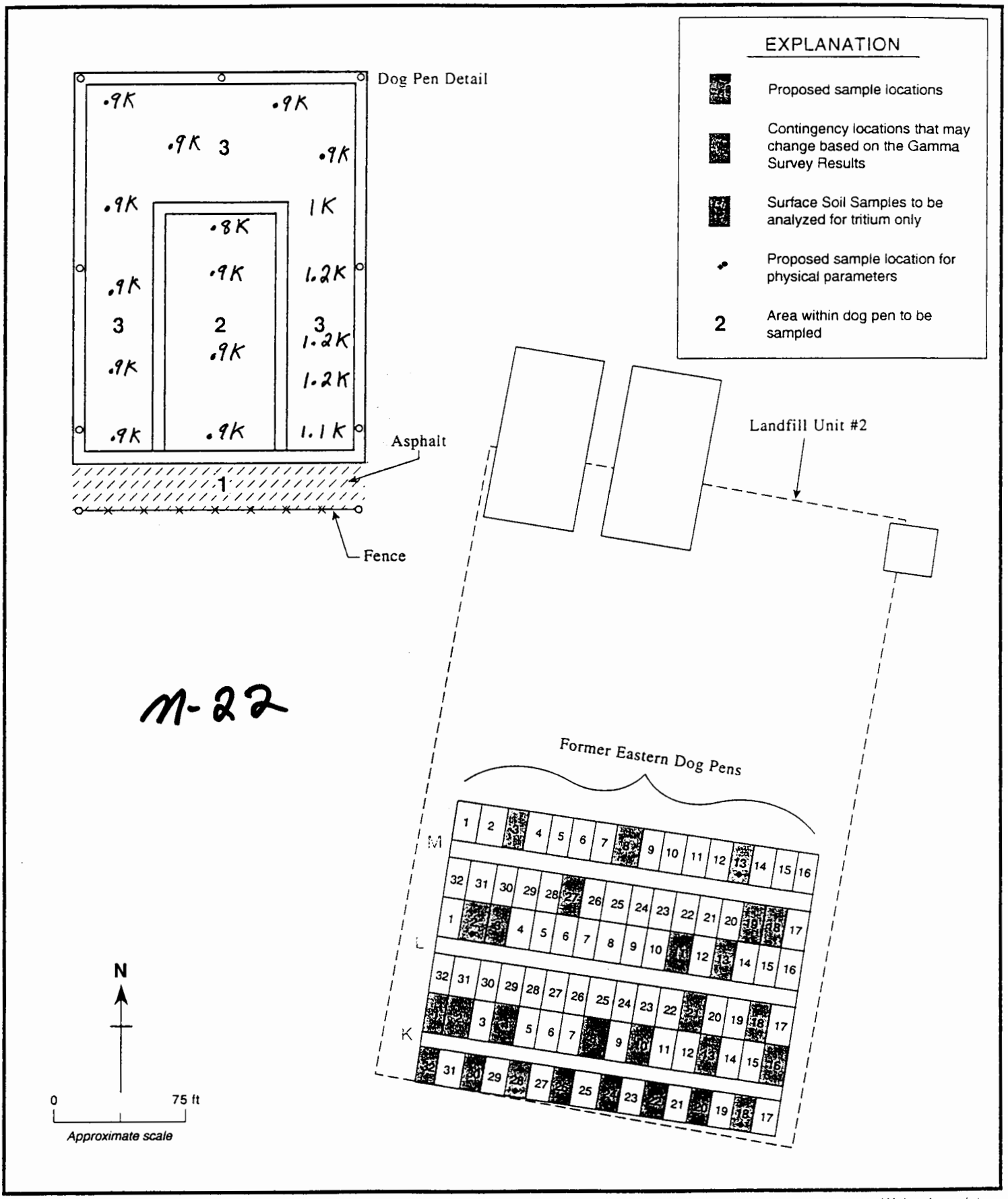

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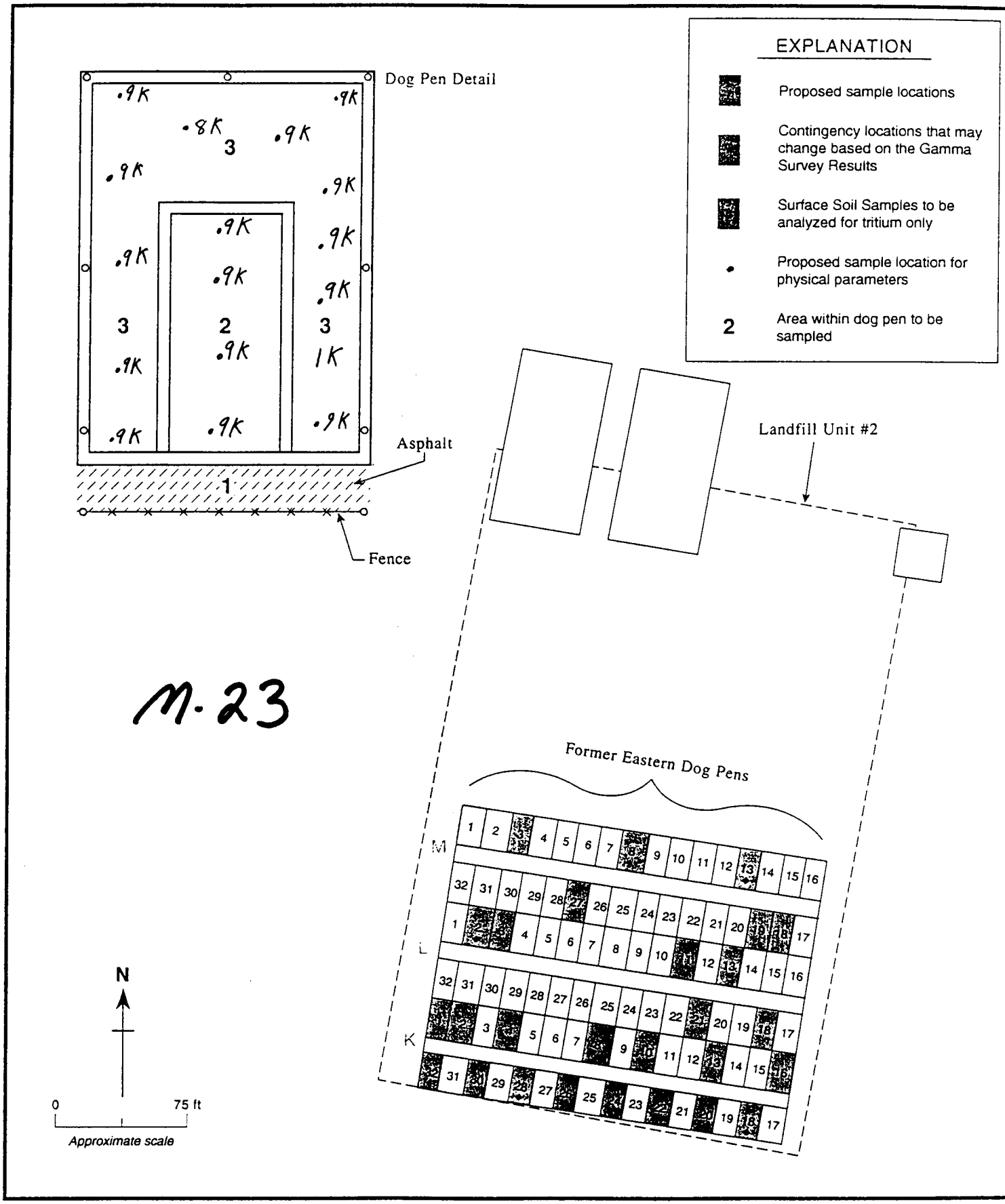

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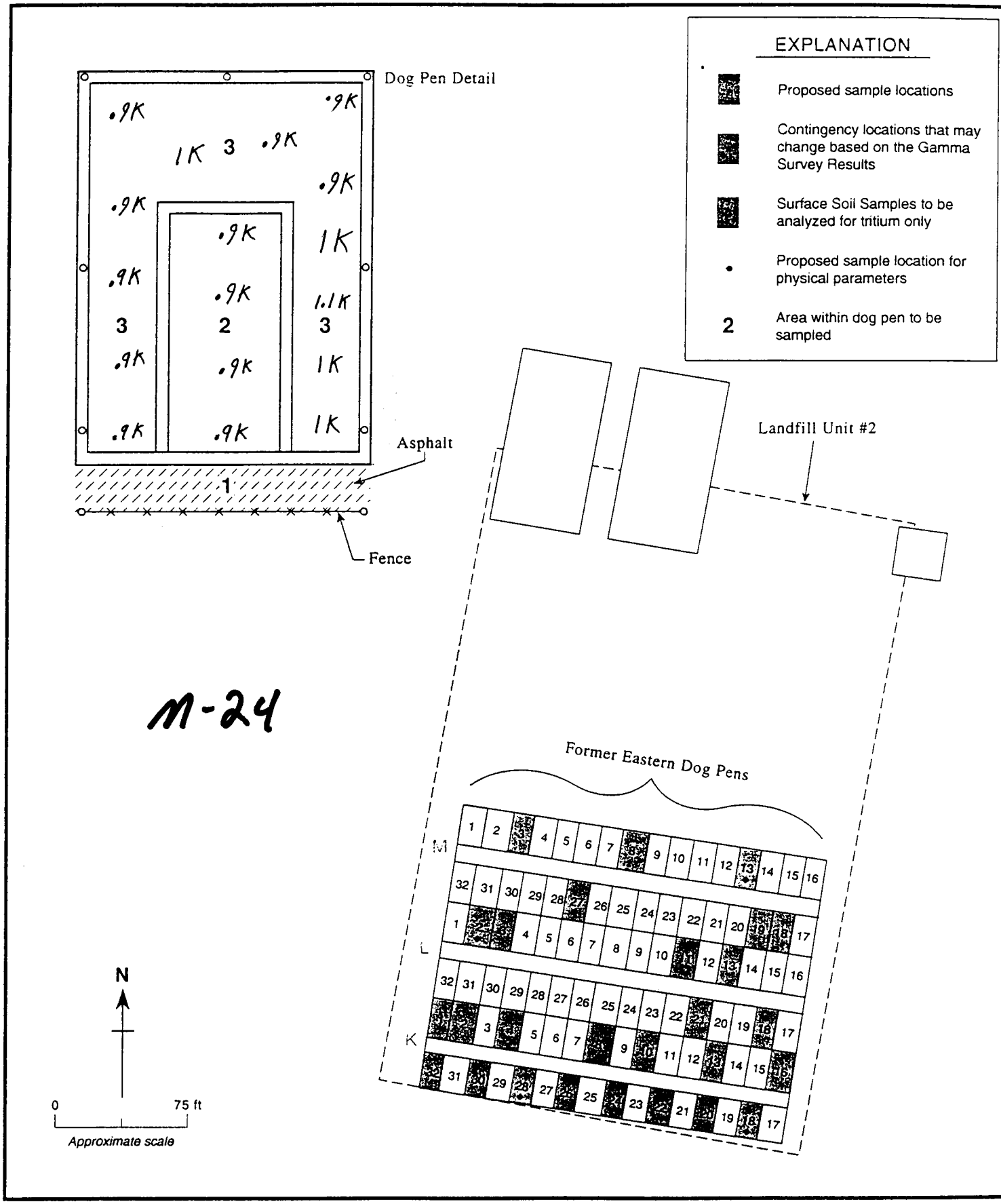

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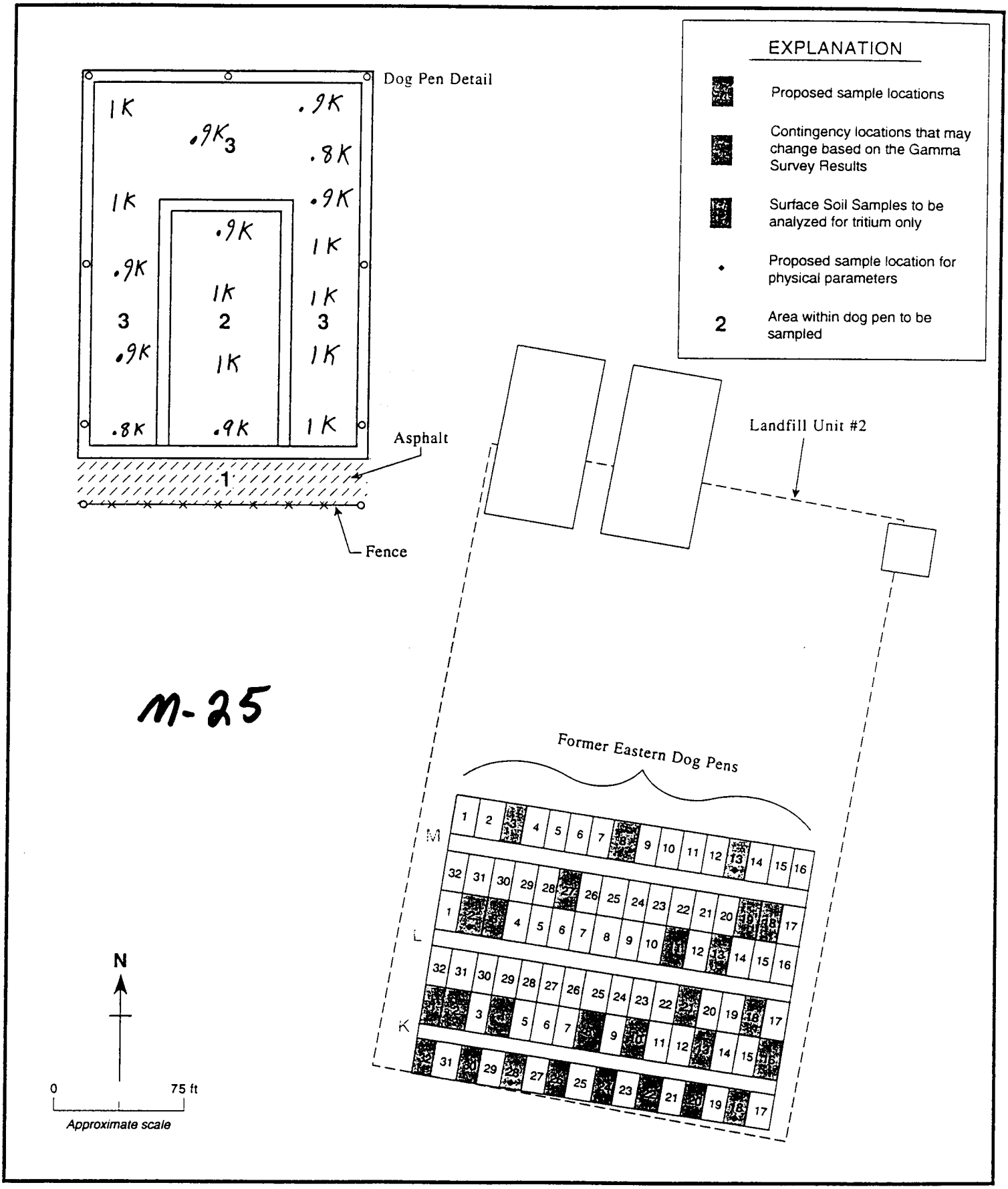

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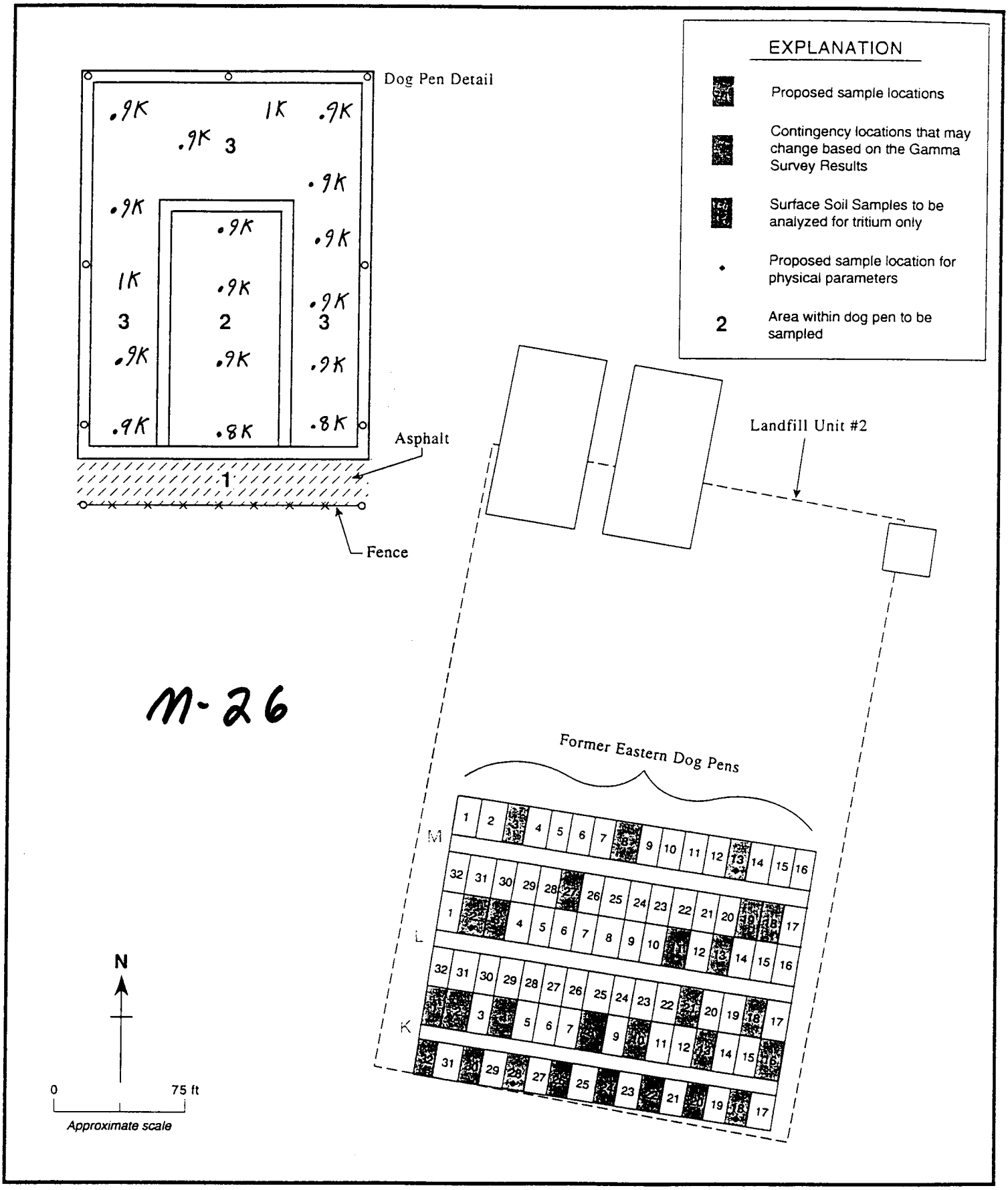

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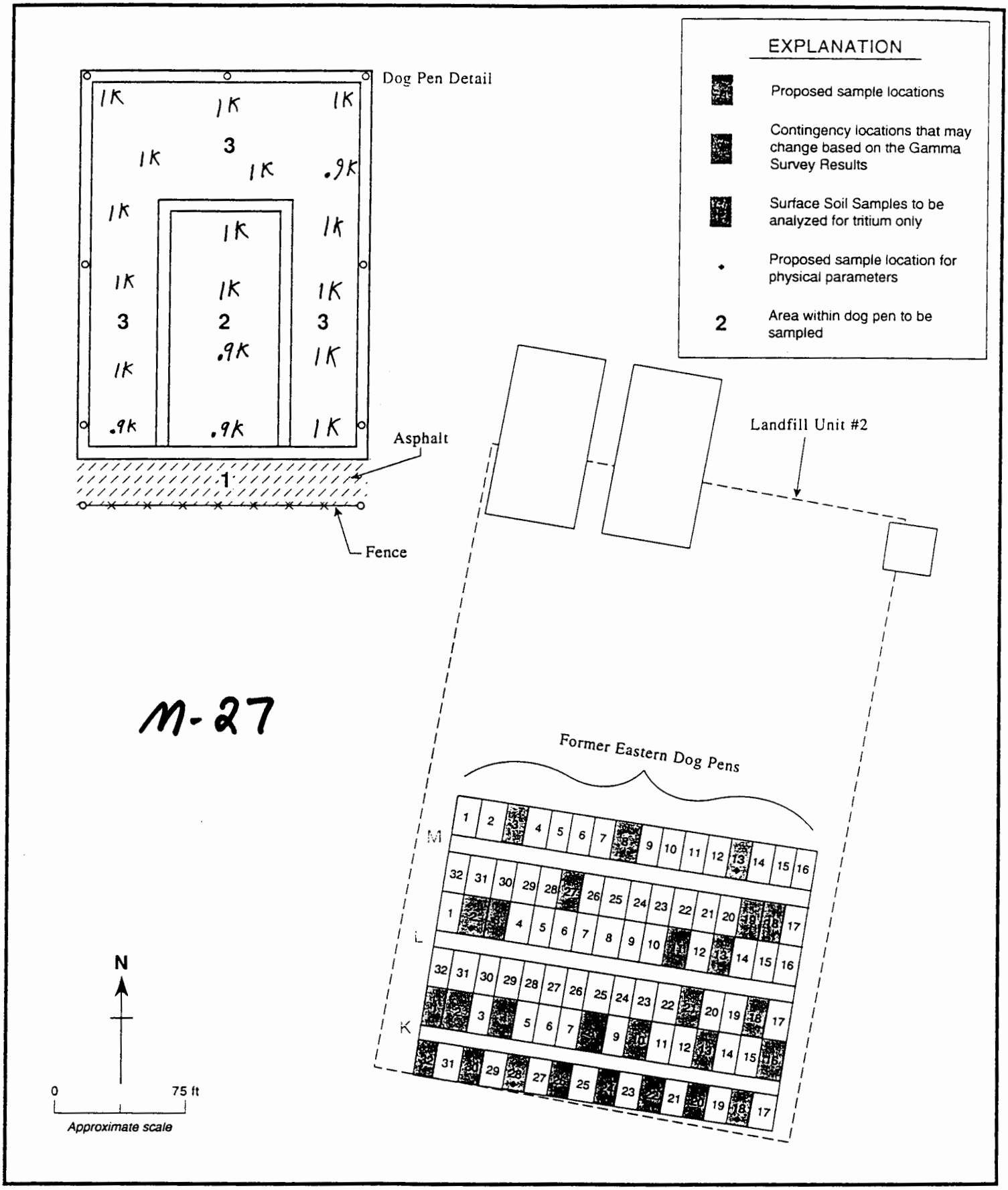

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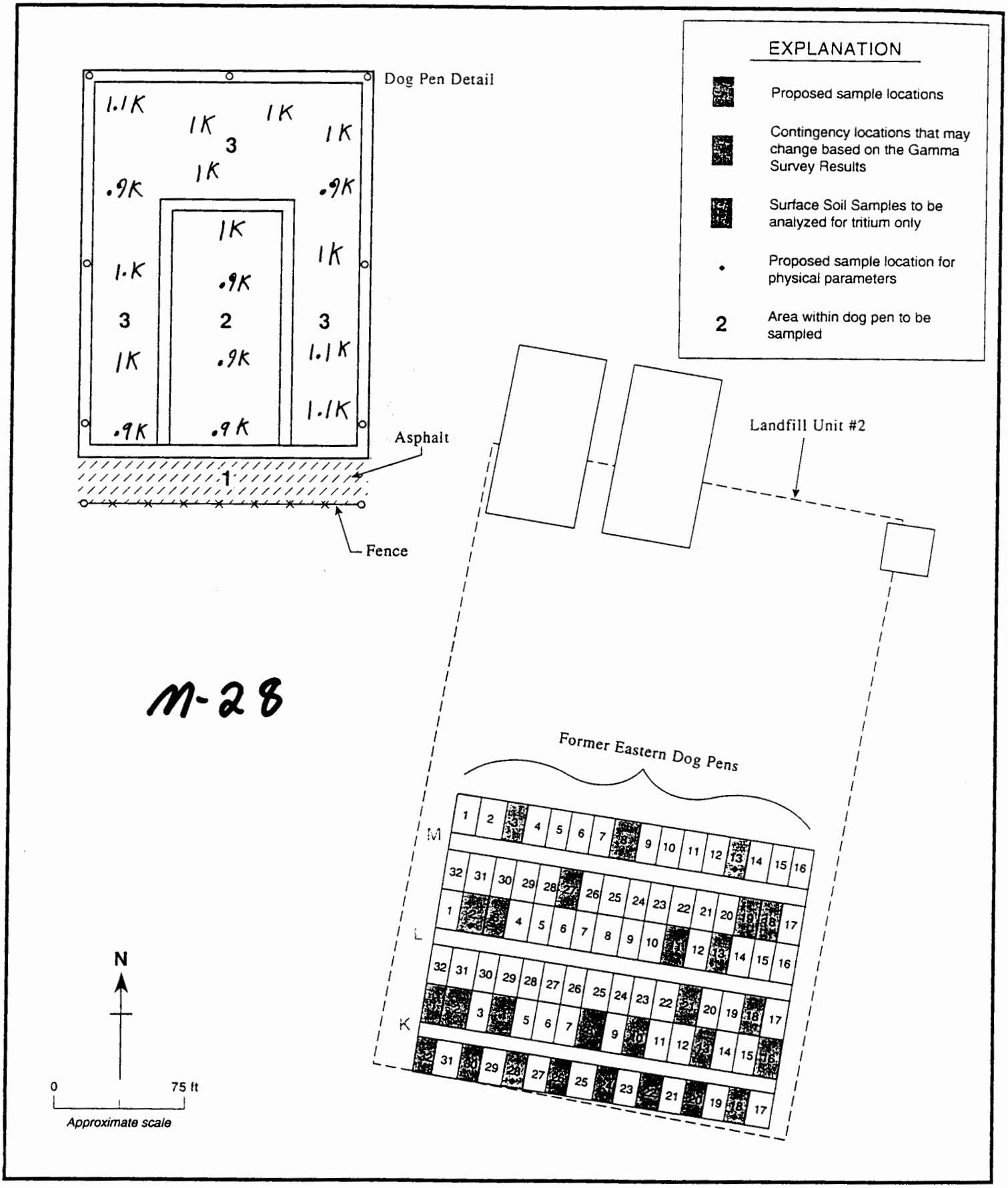

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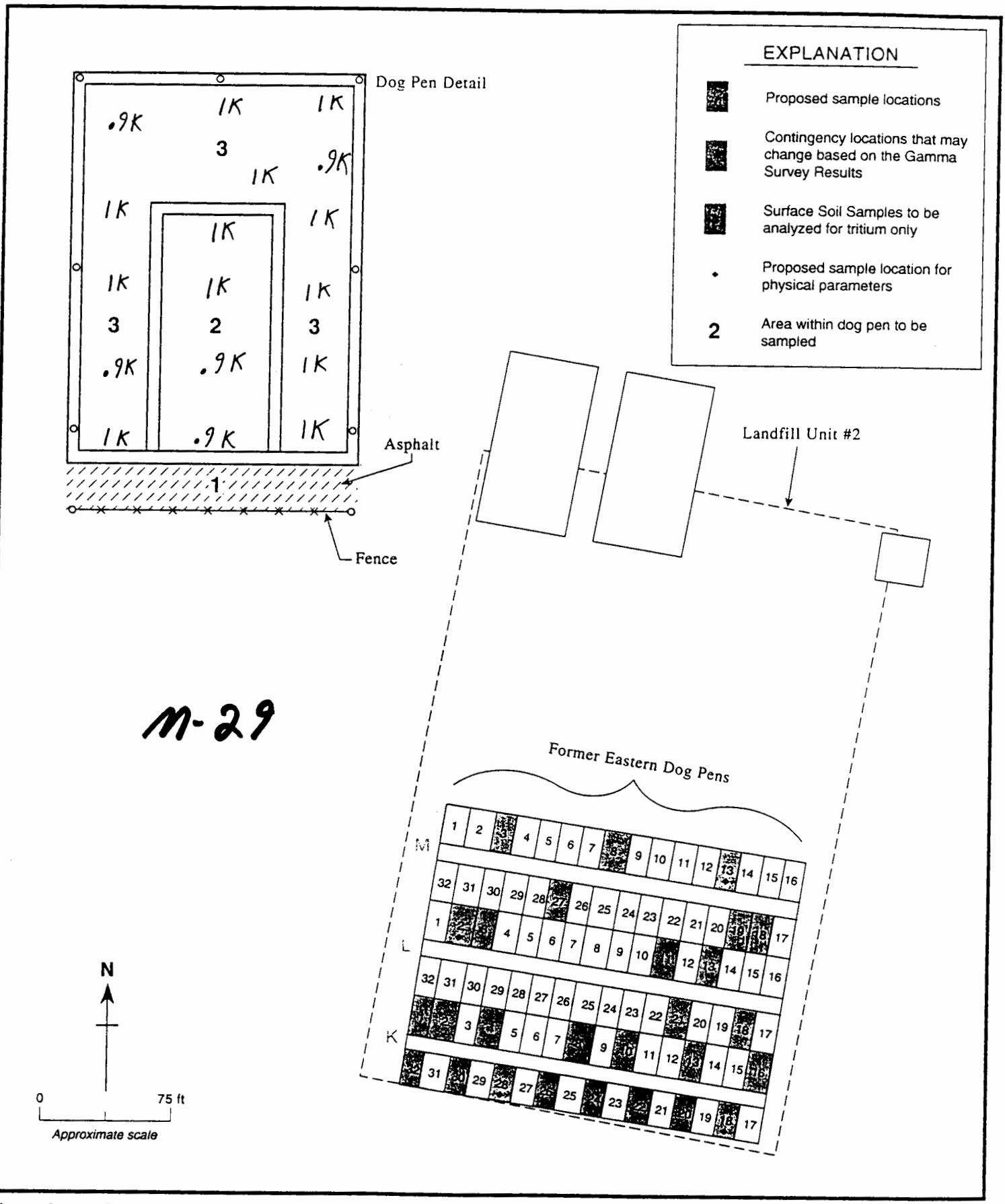

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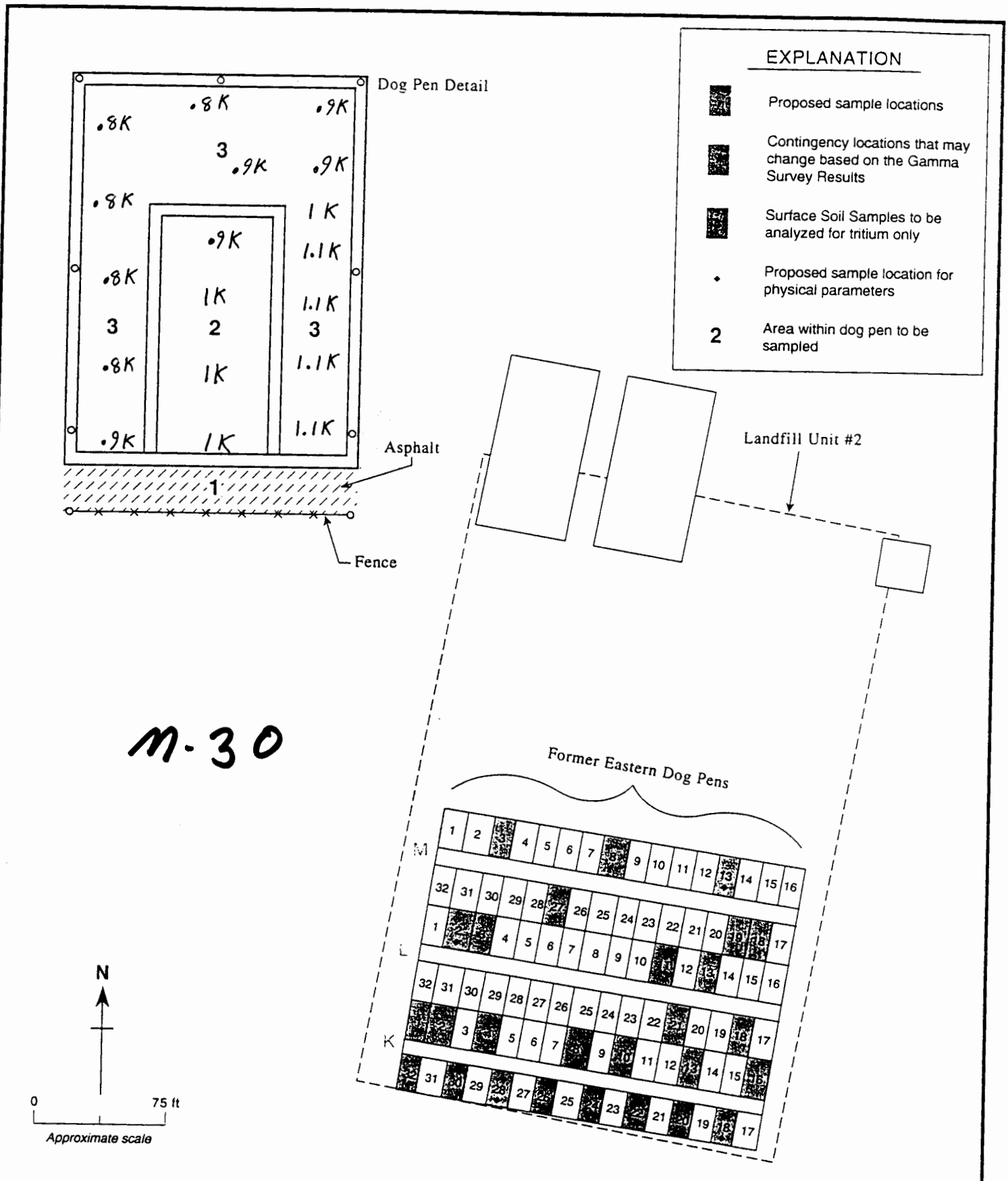

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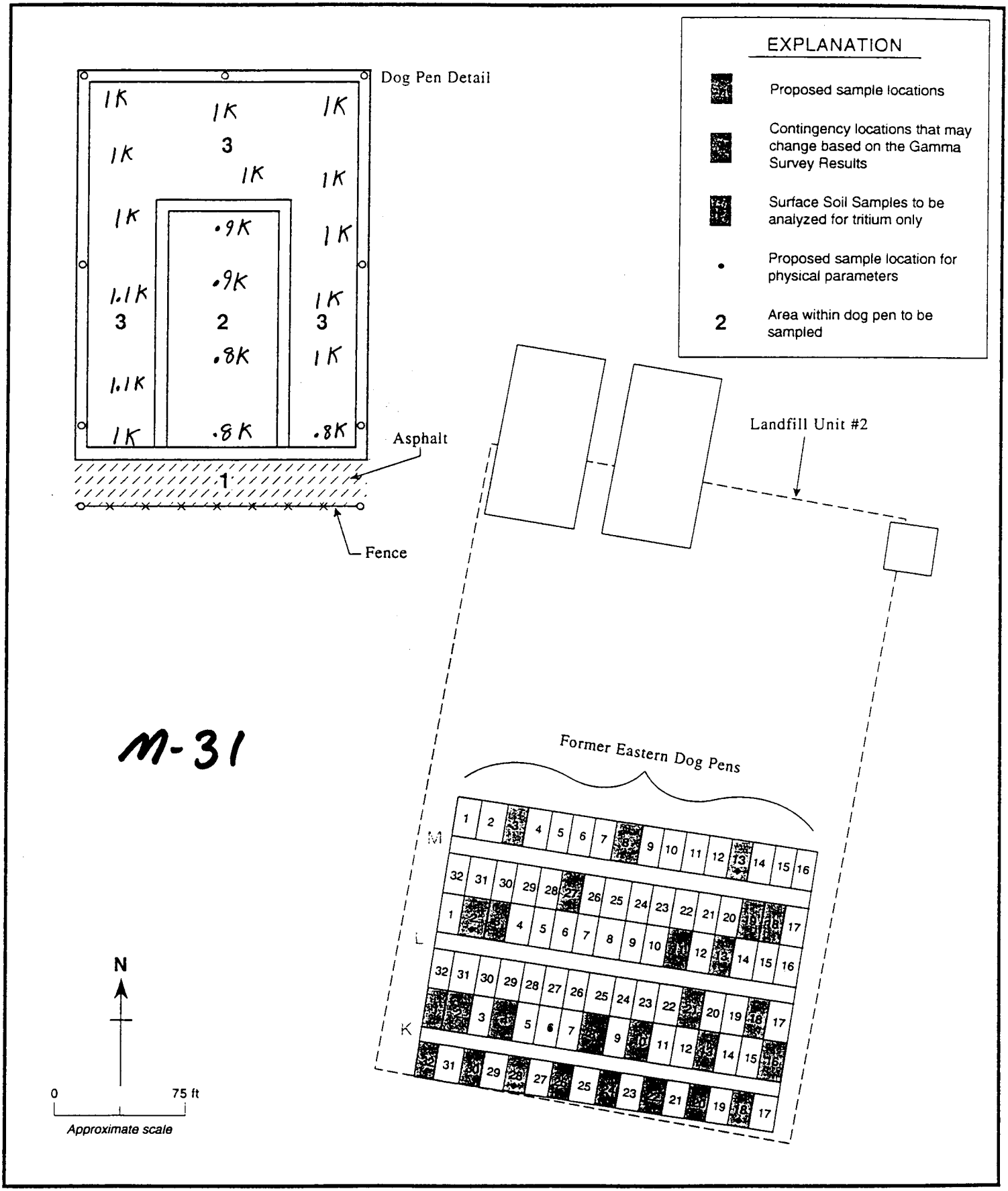

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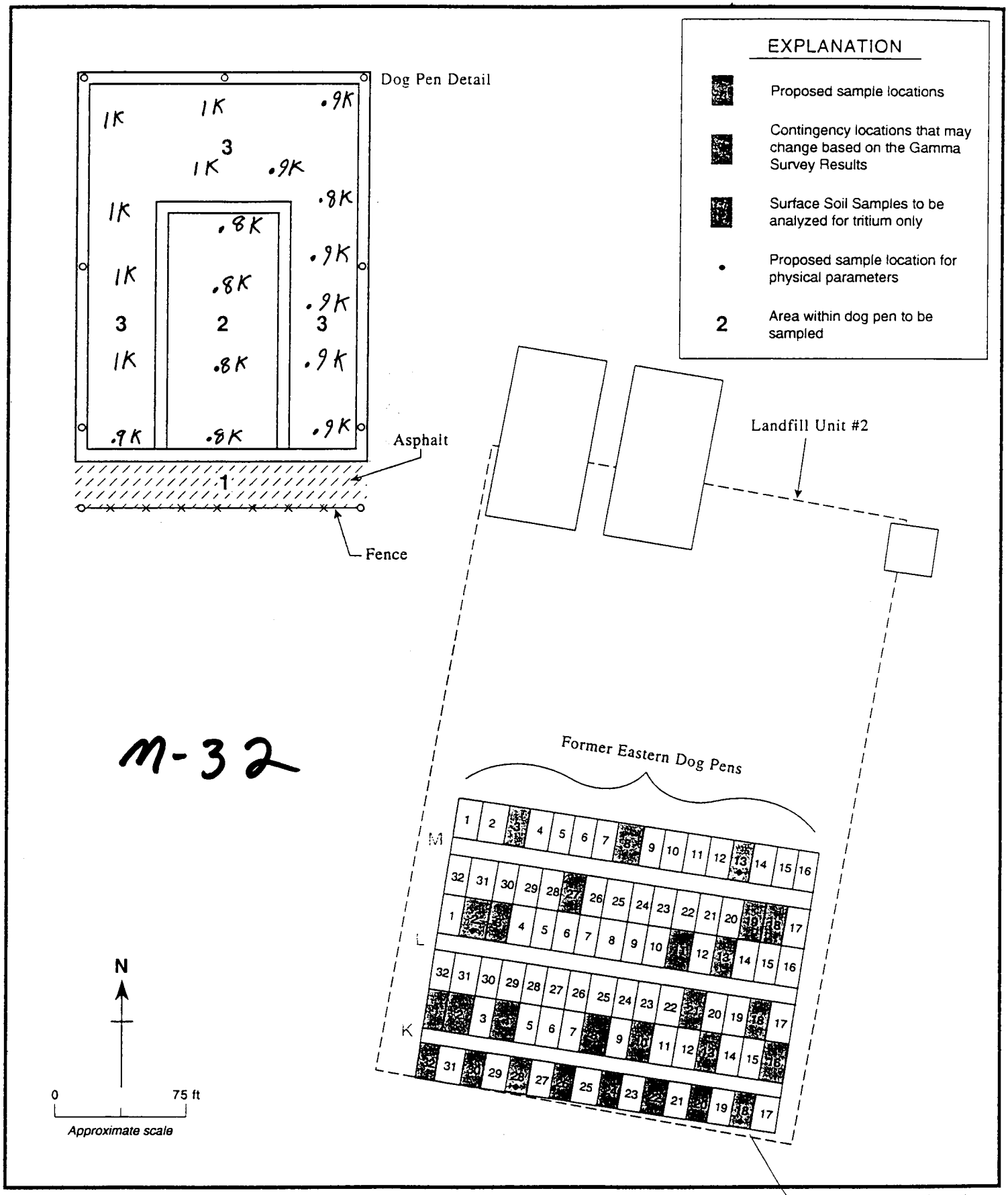

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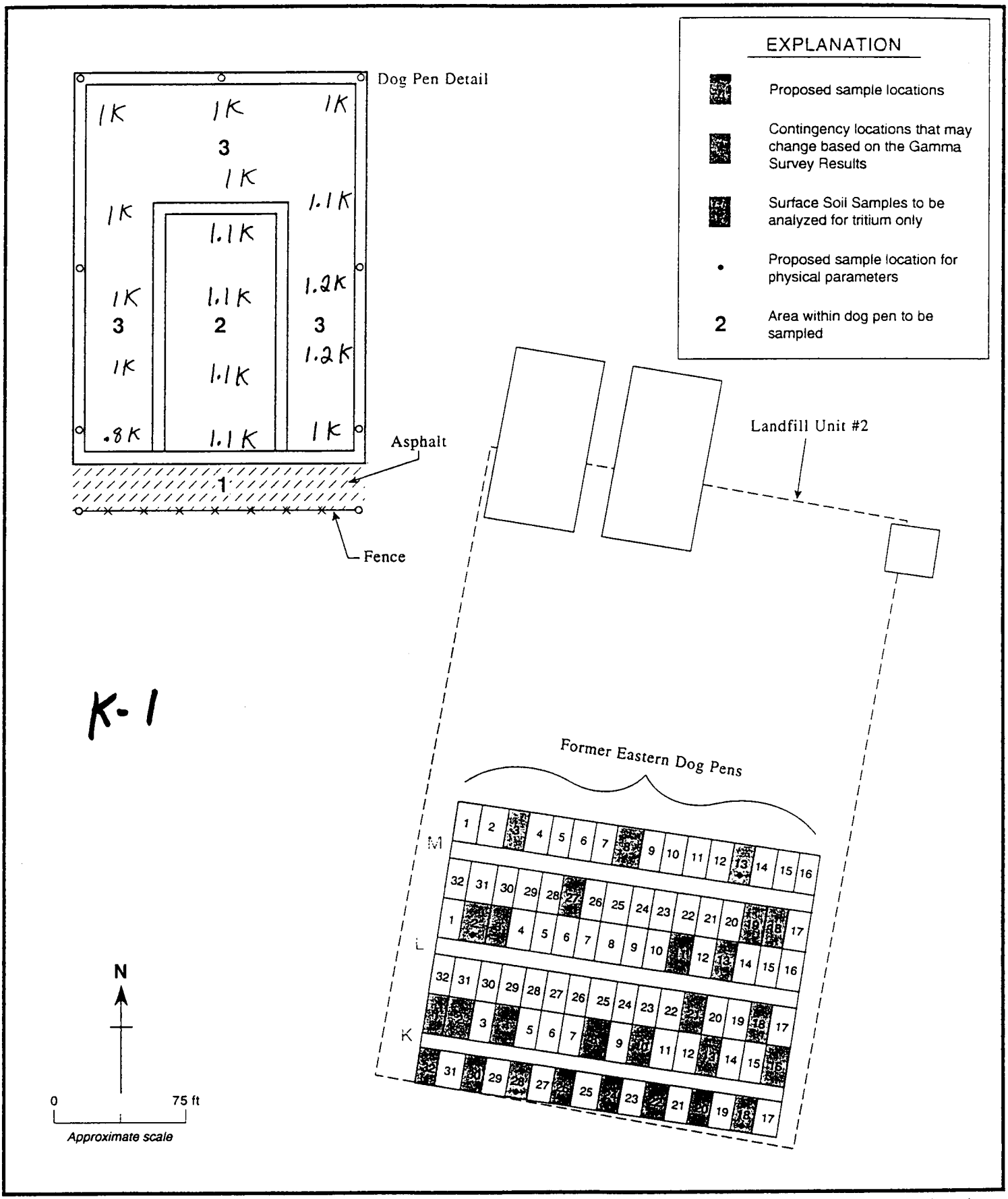

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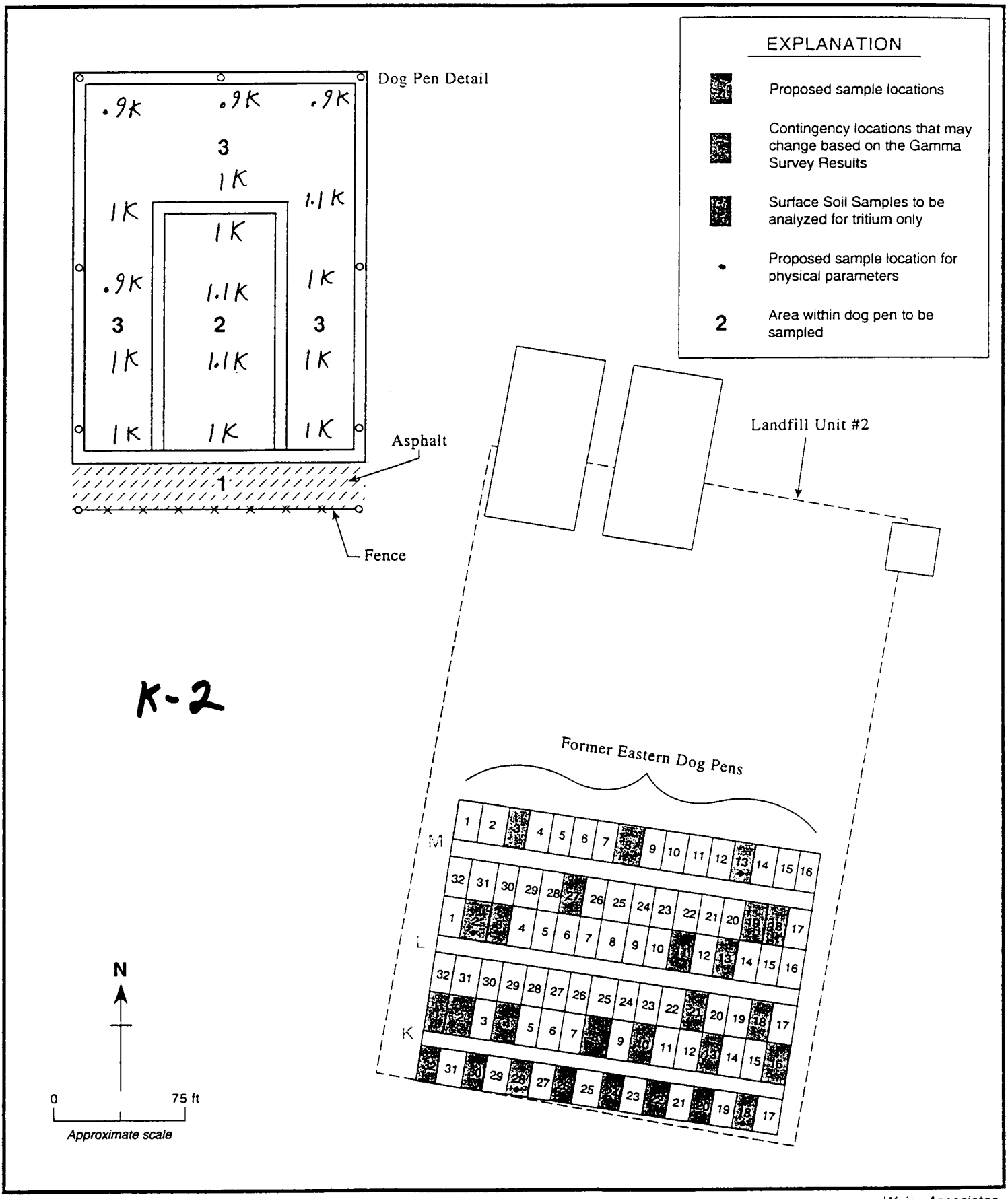

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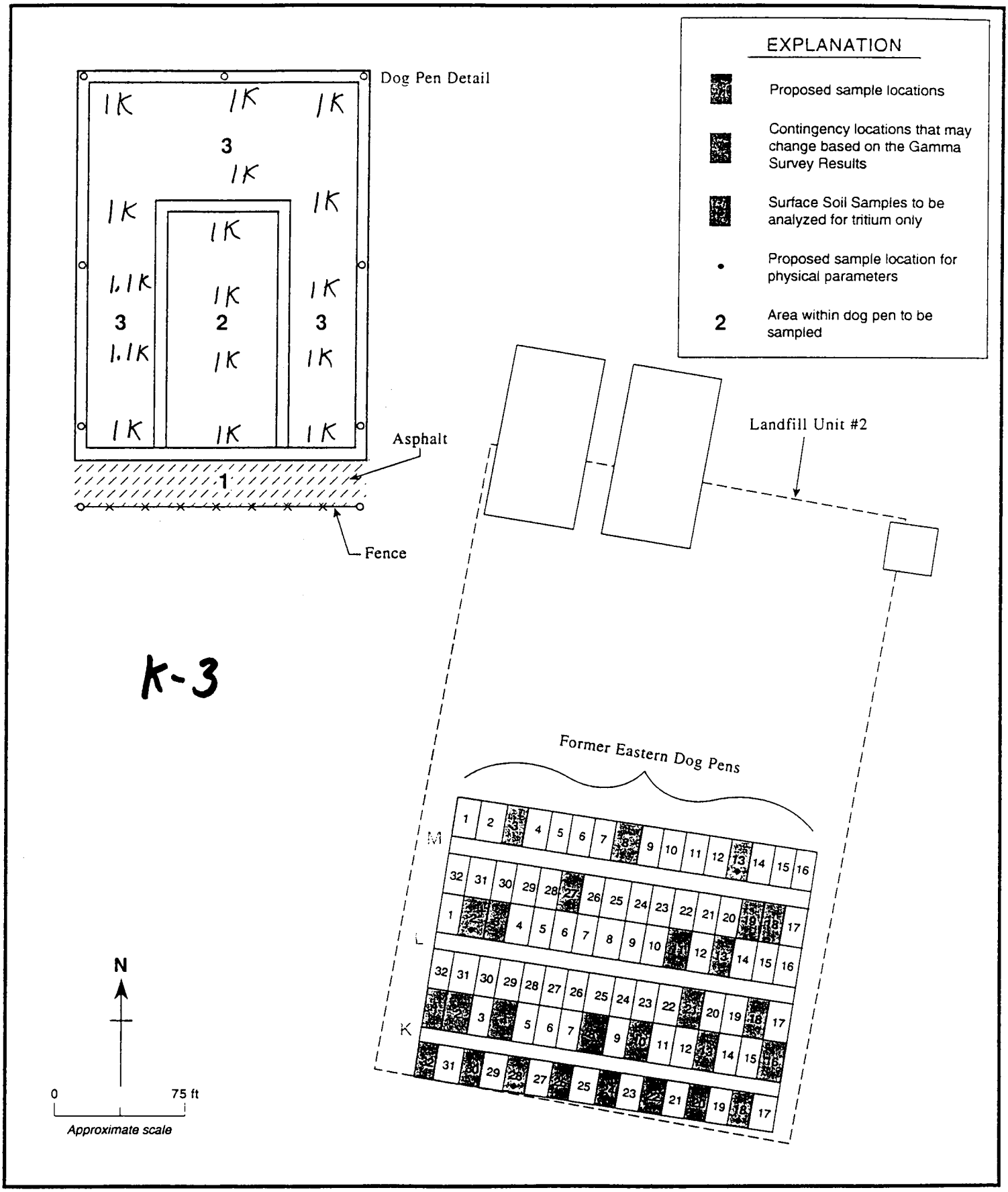

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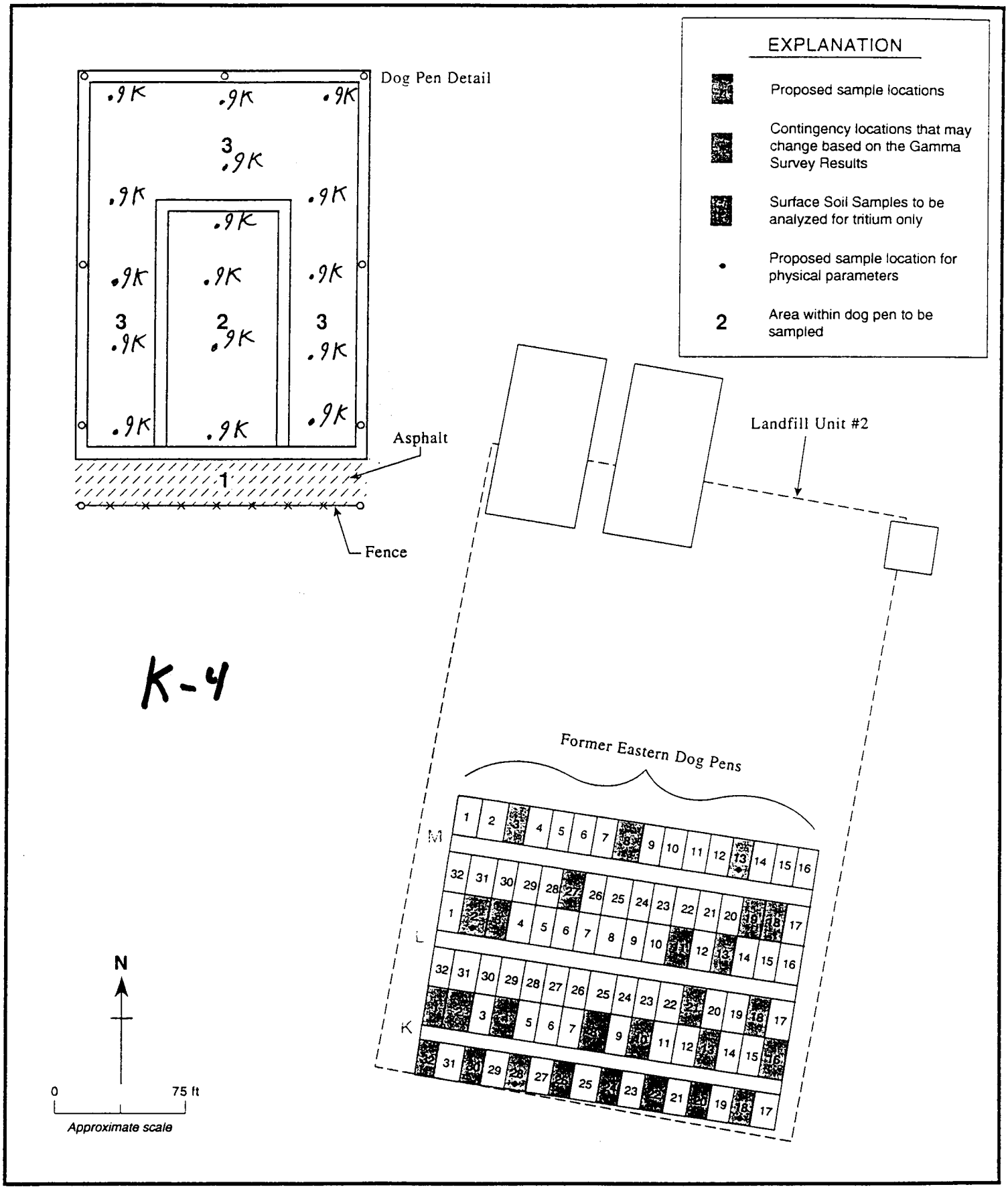

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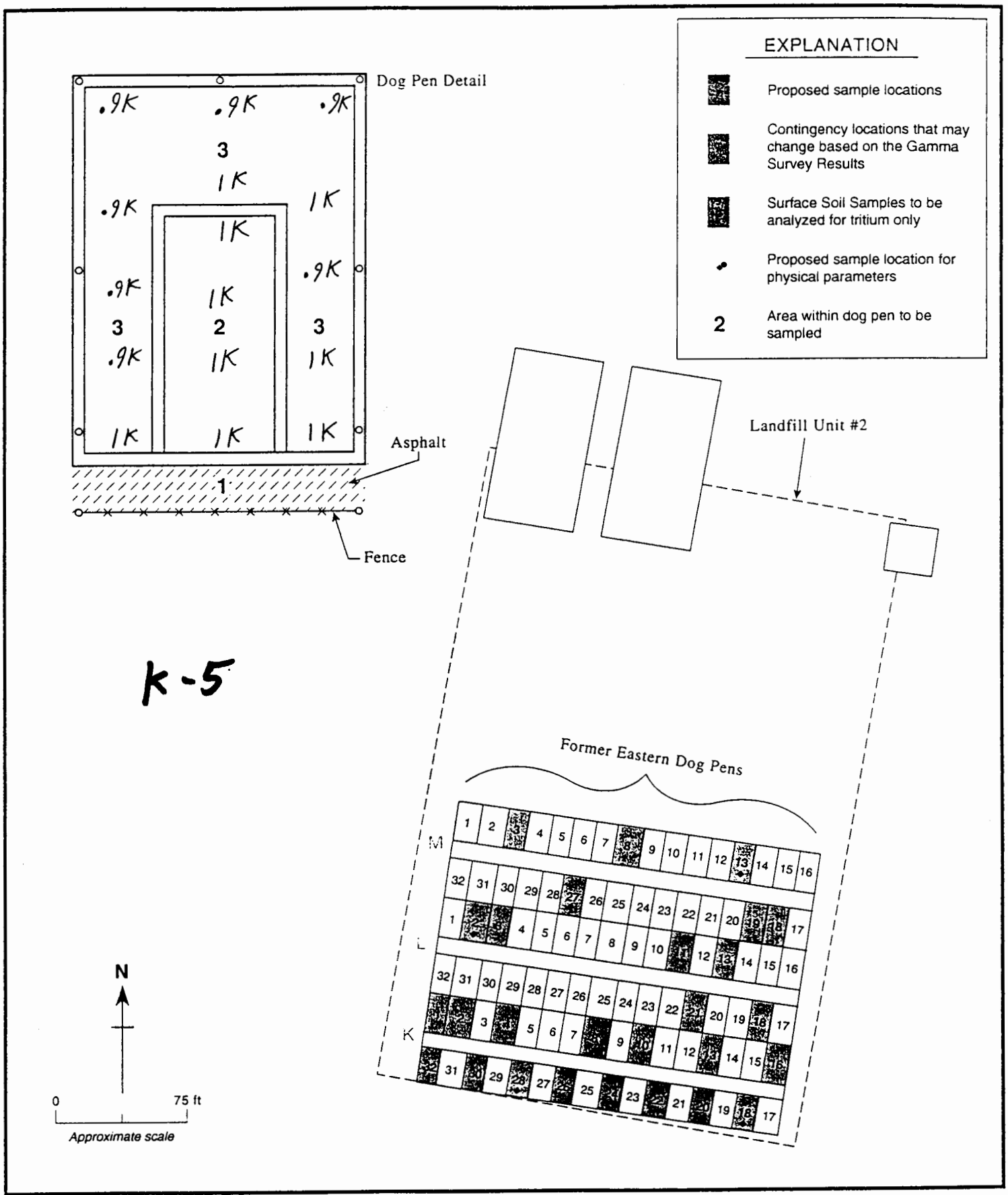

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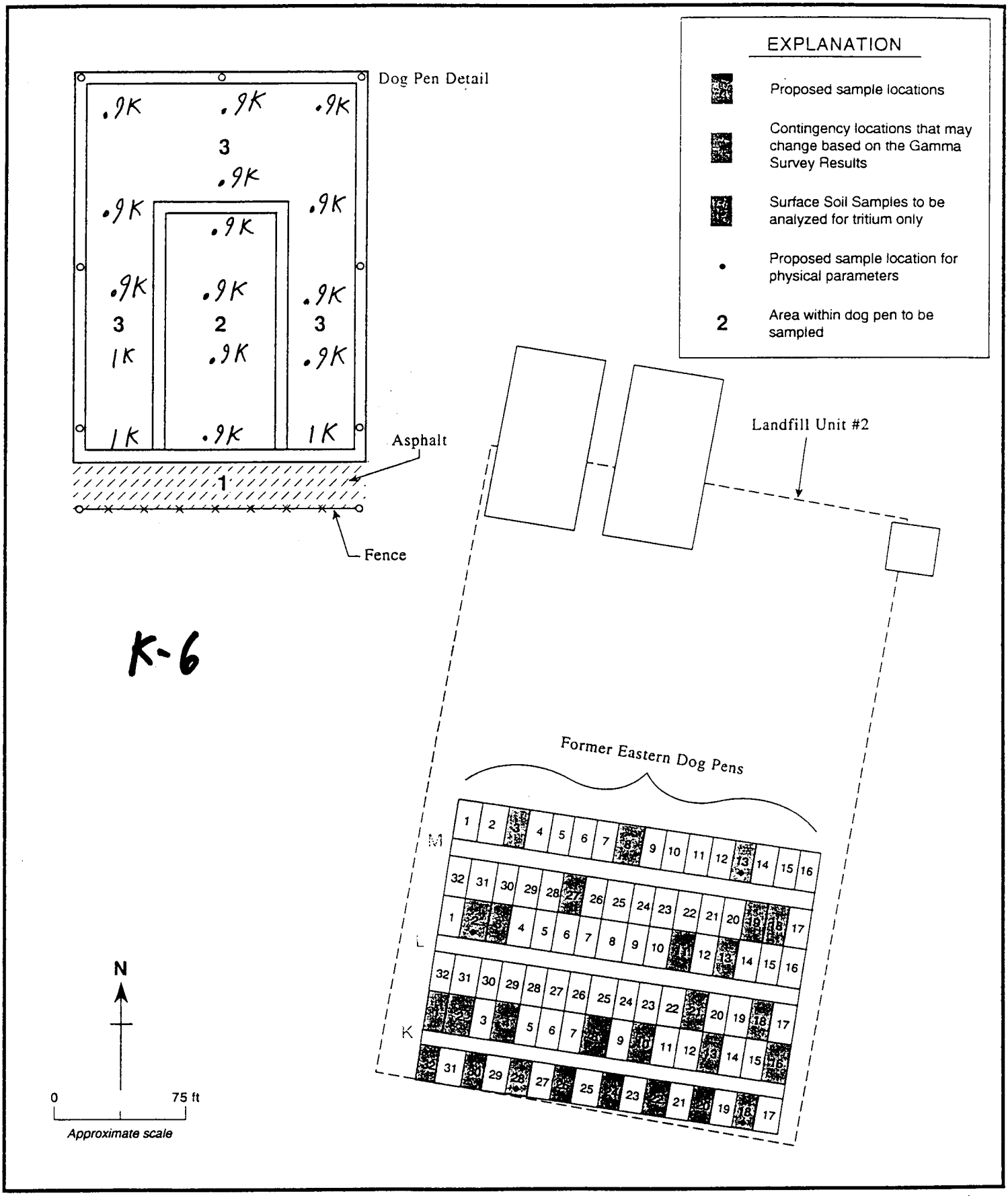

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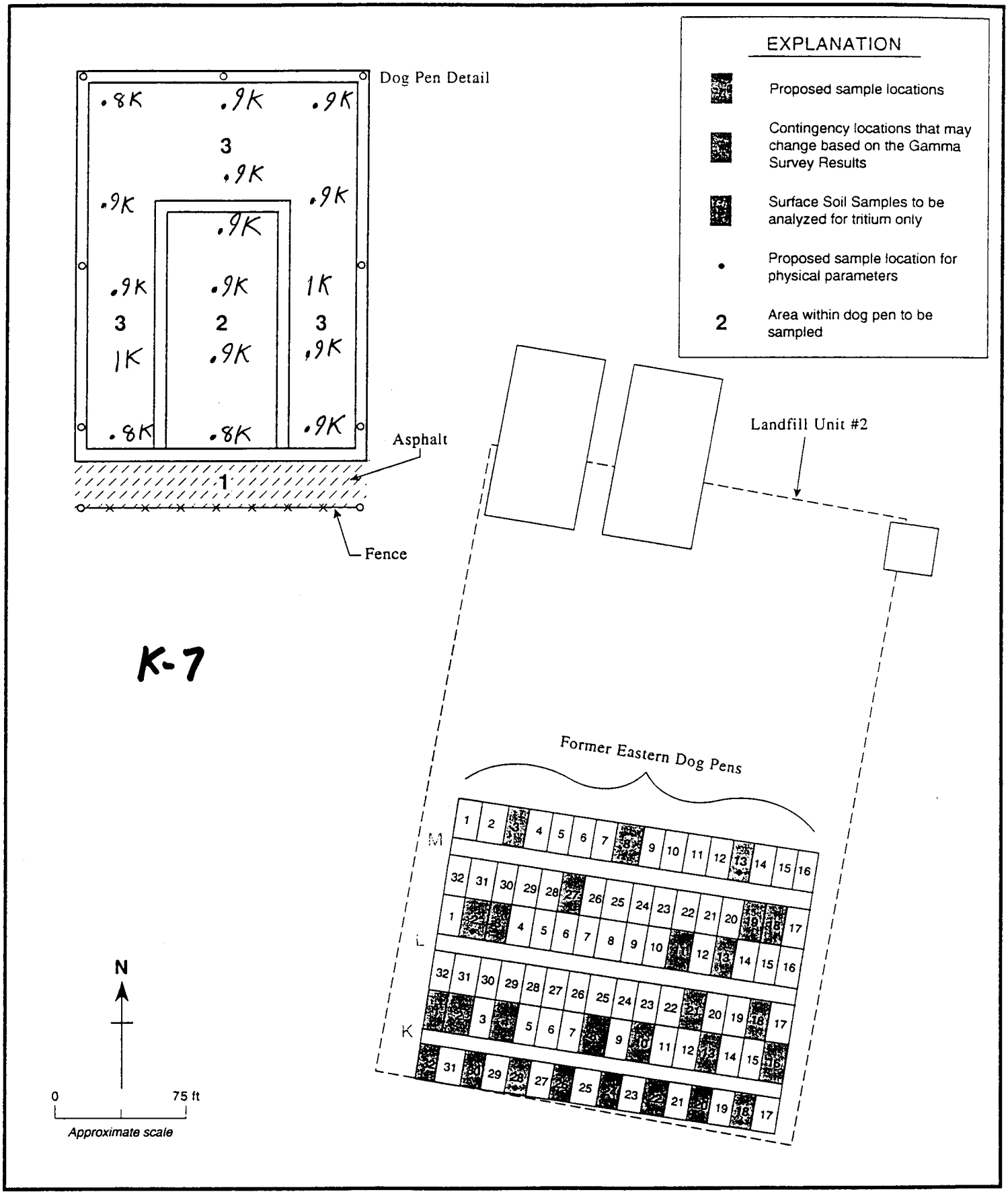

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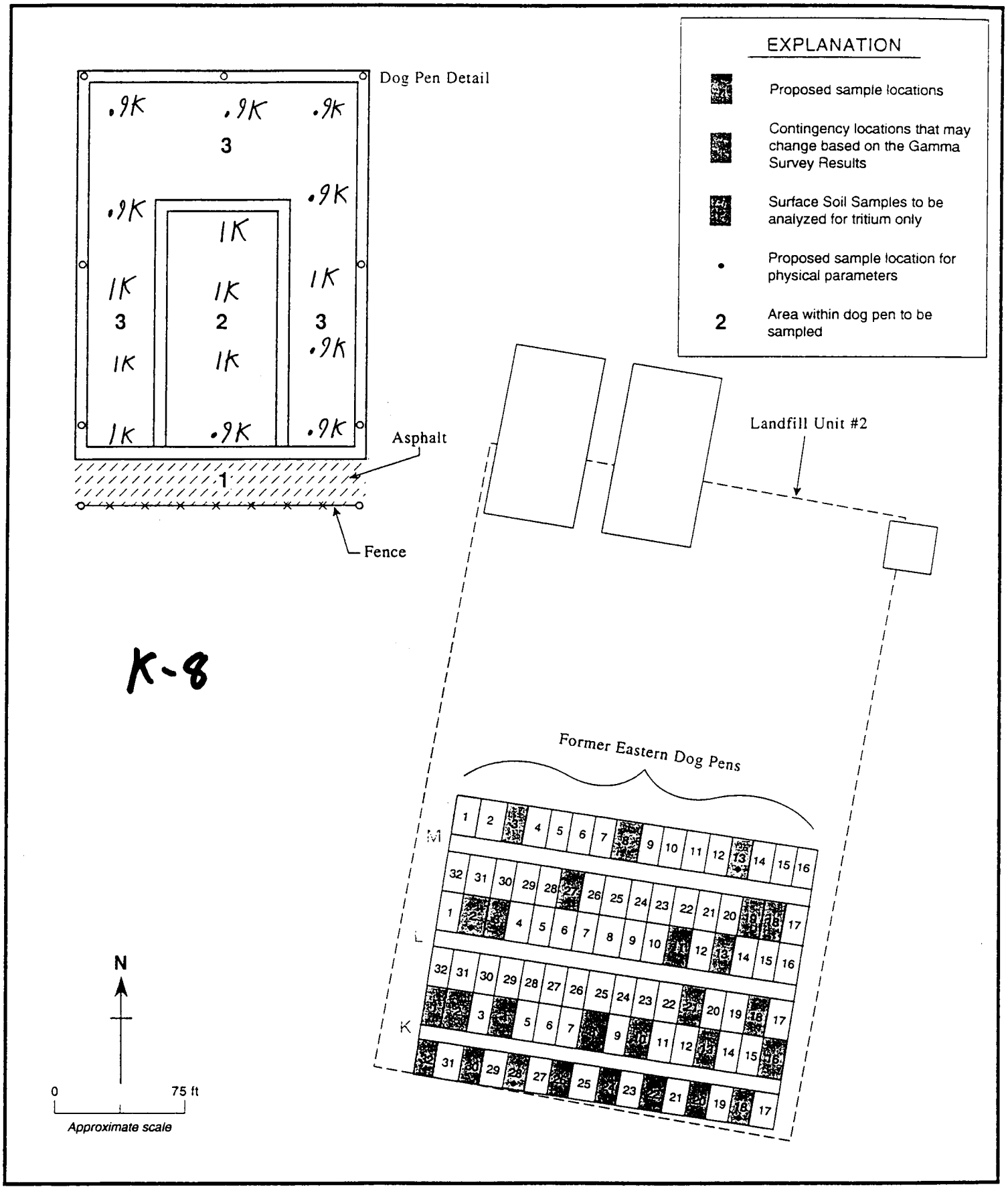

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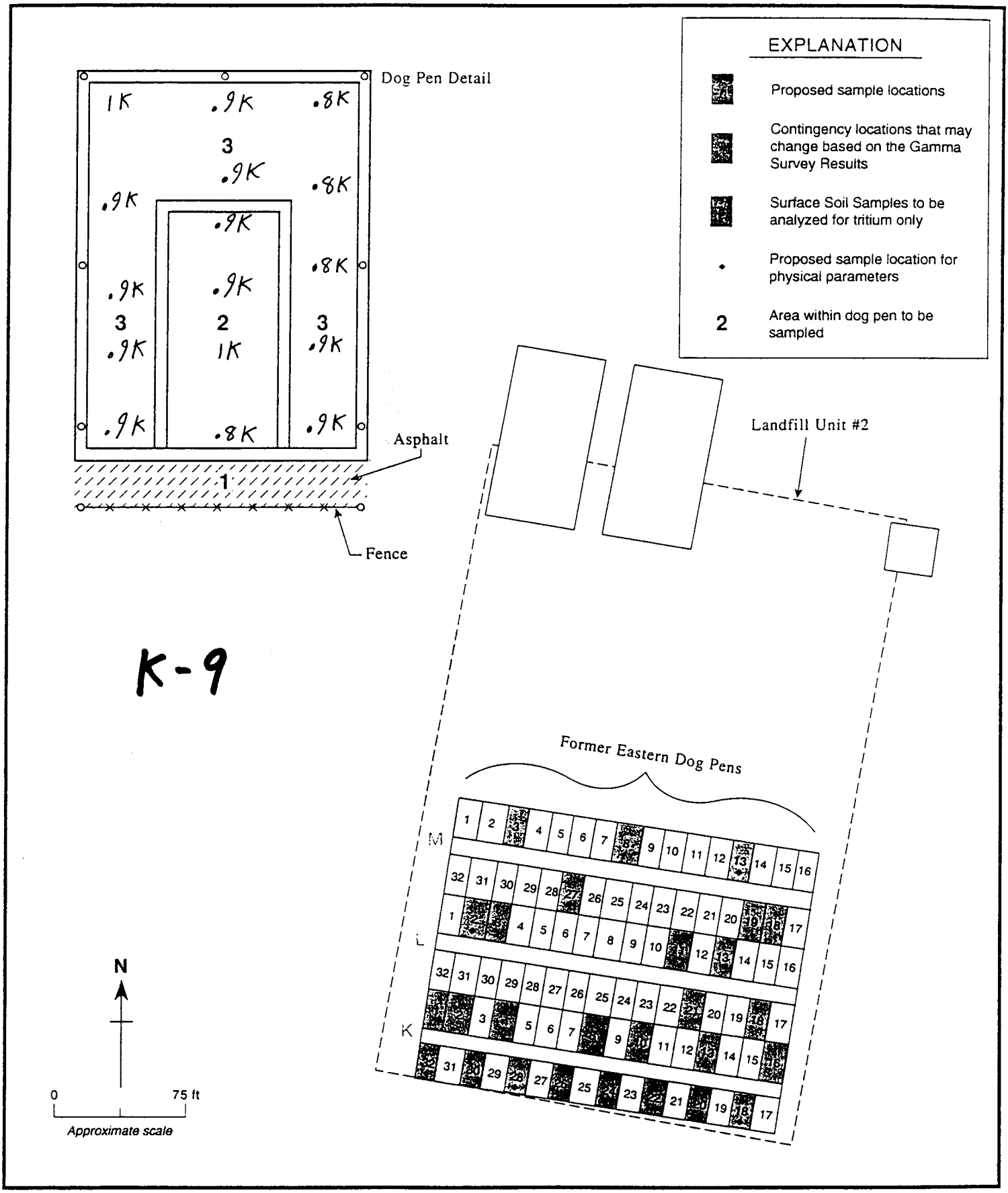

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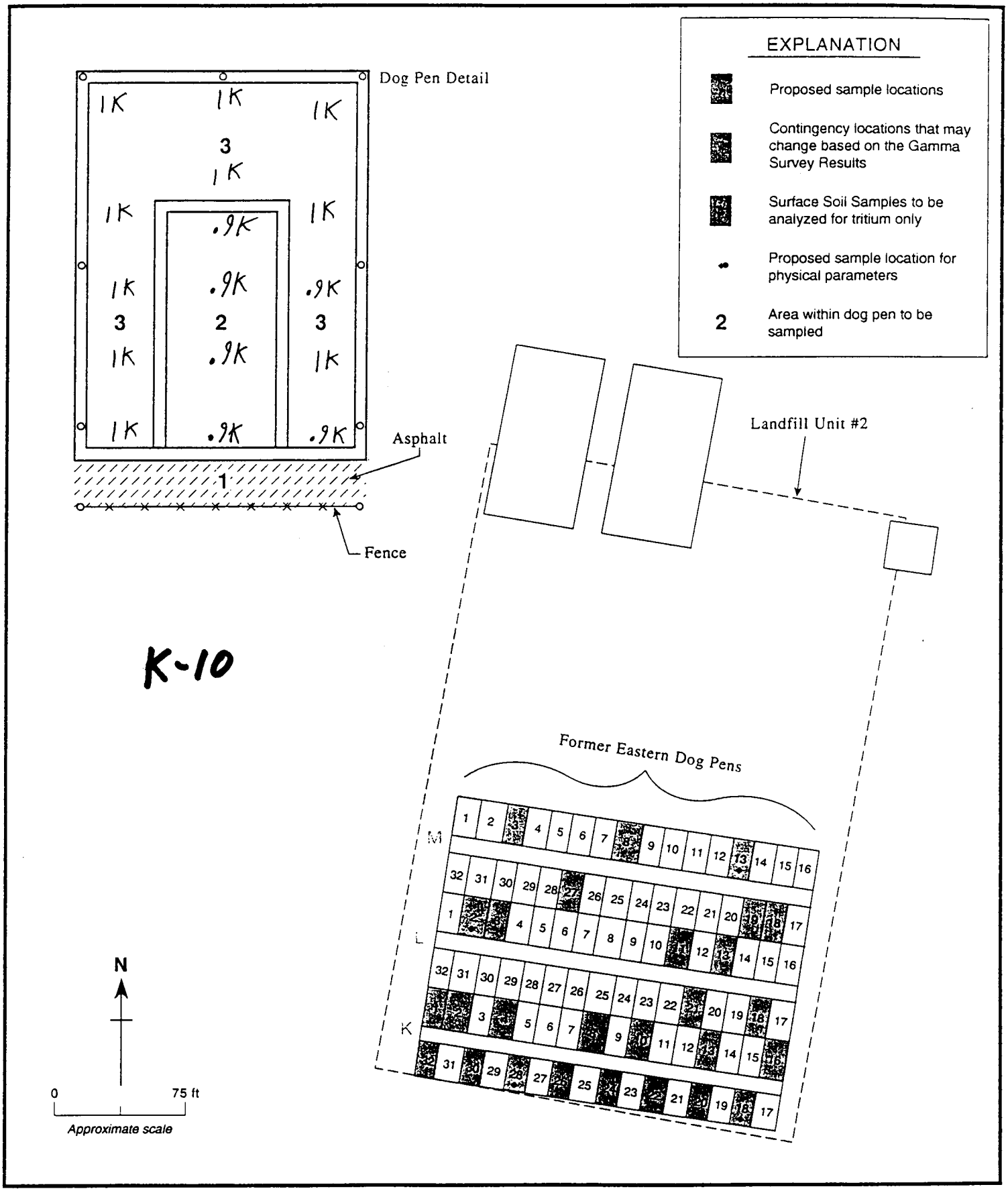

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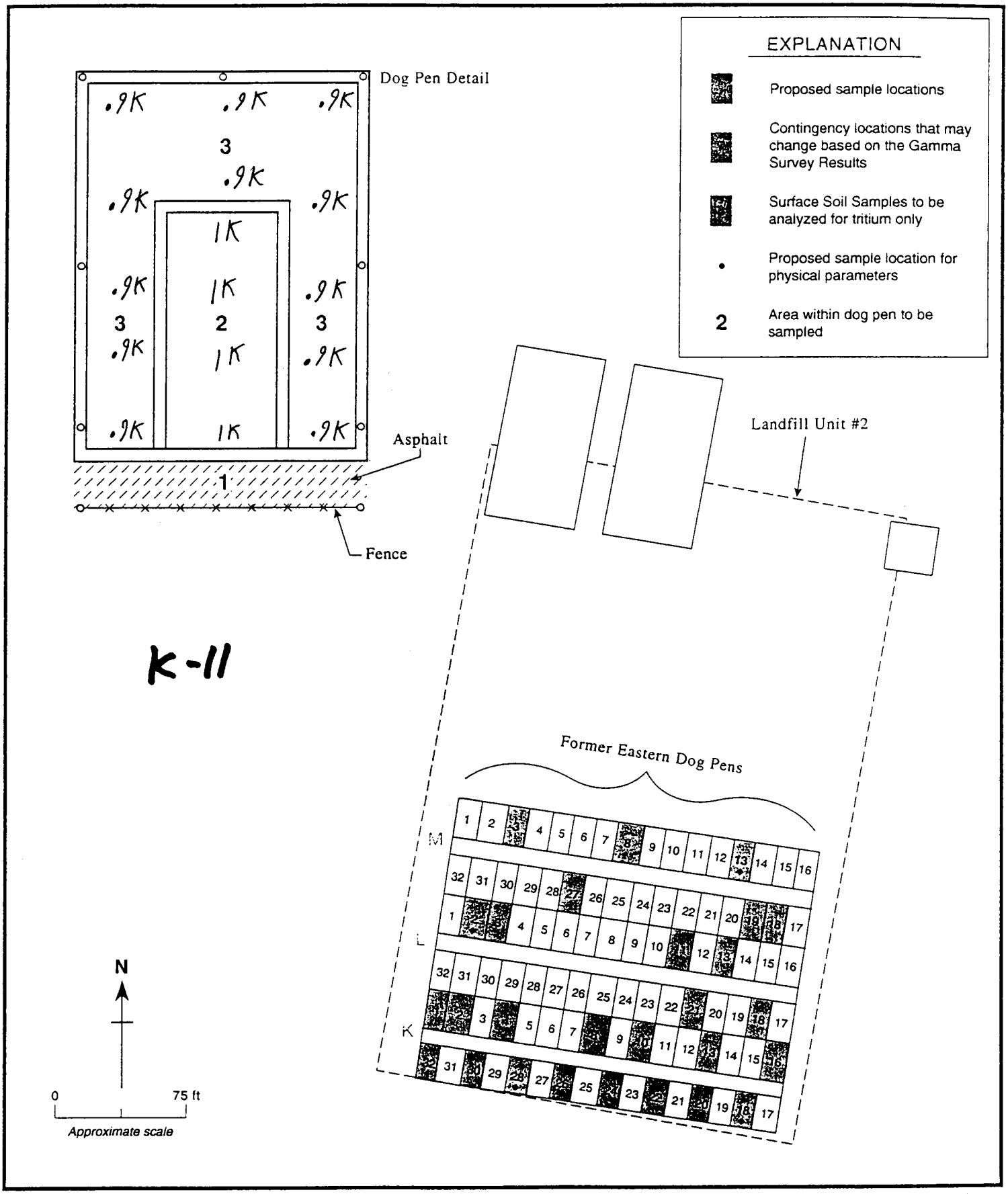
Weiss Associates



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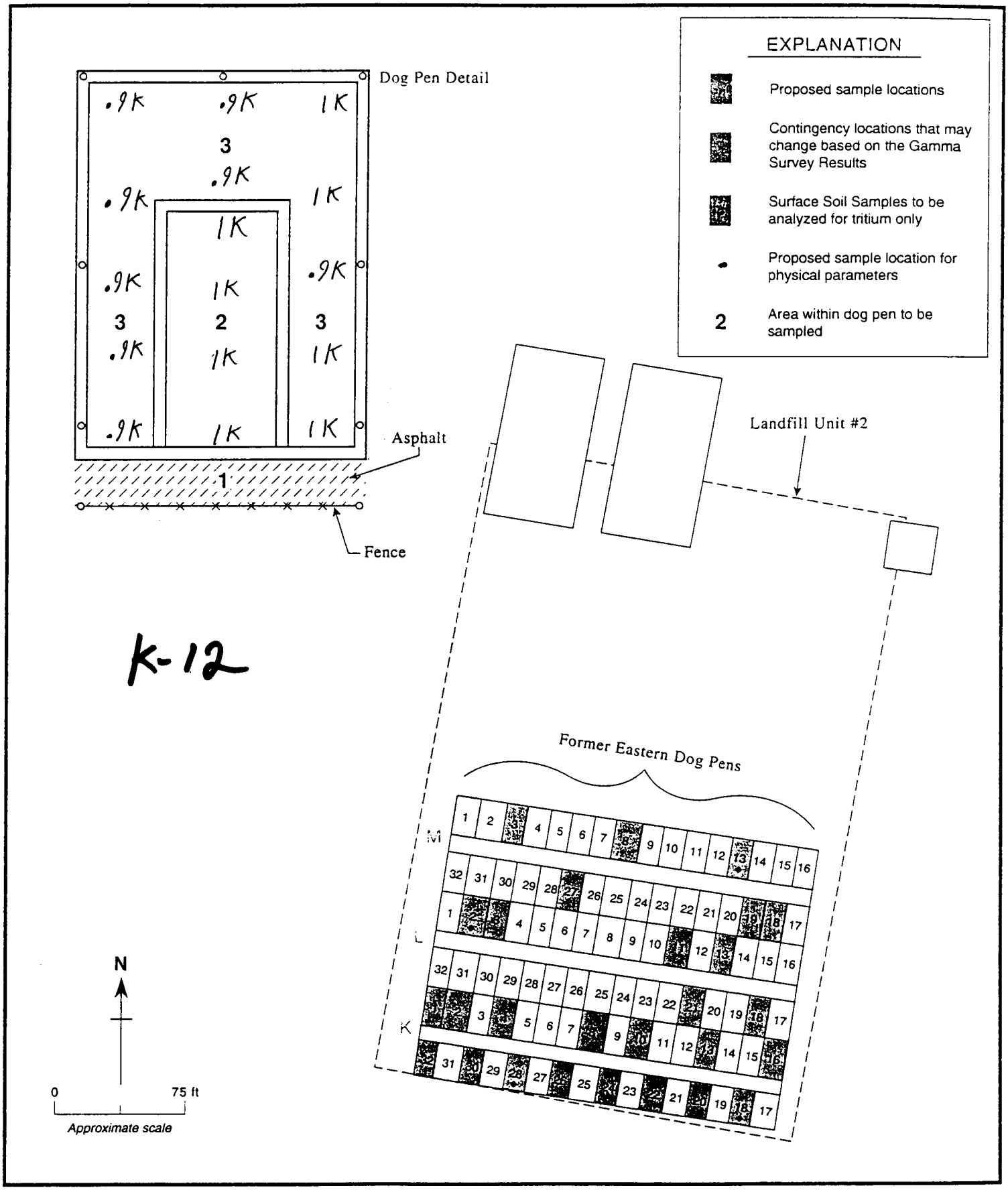

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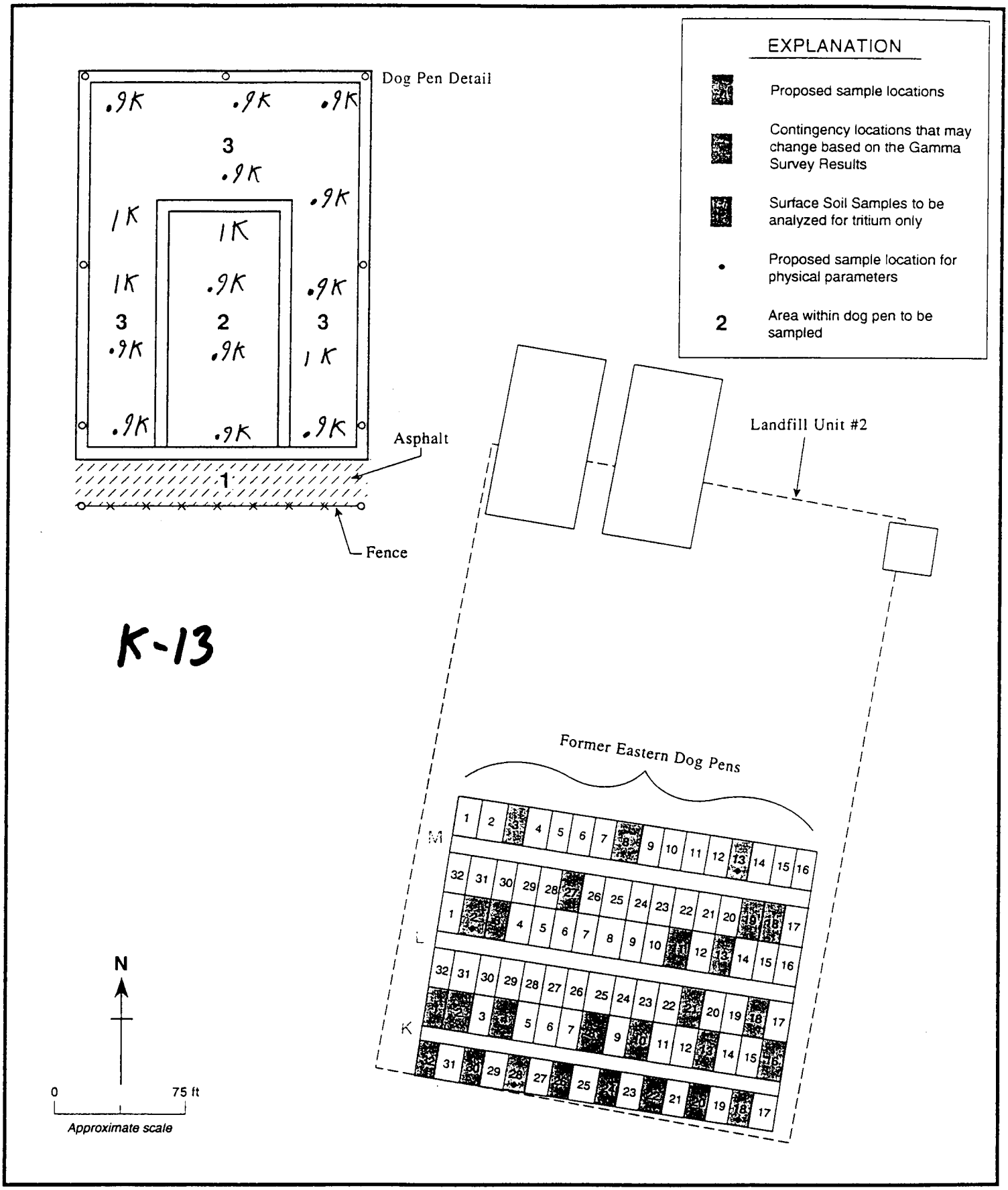

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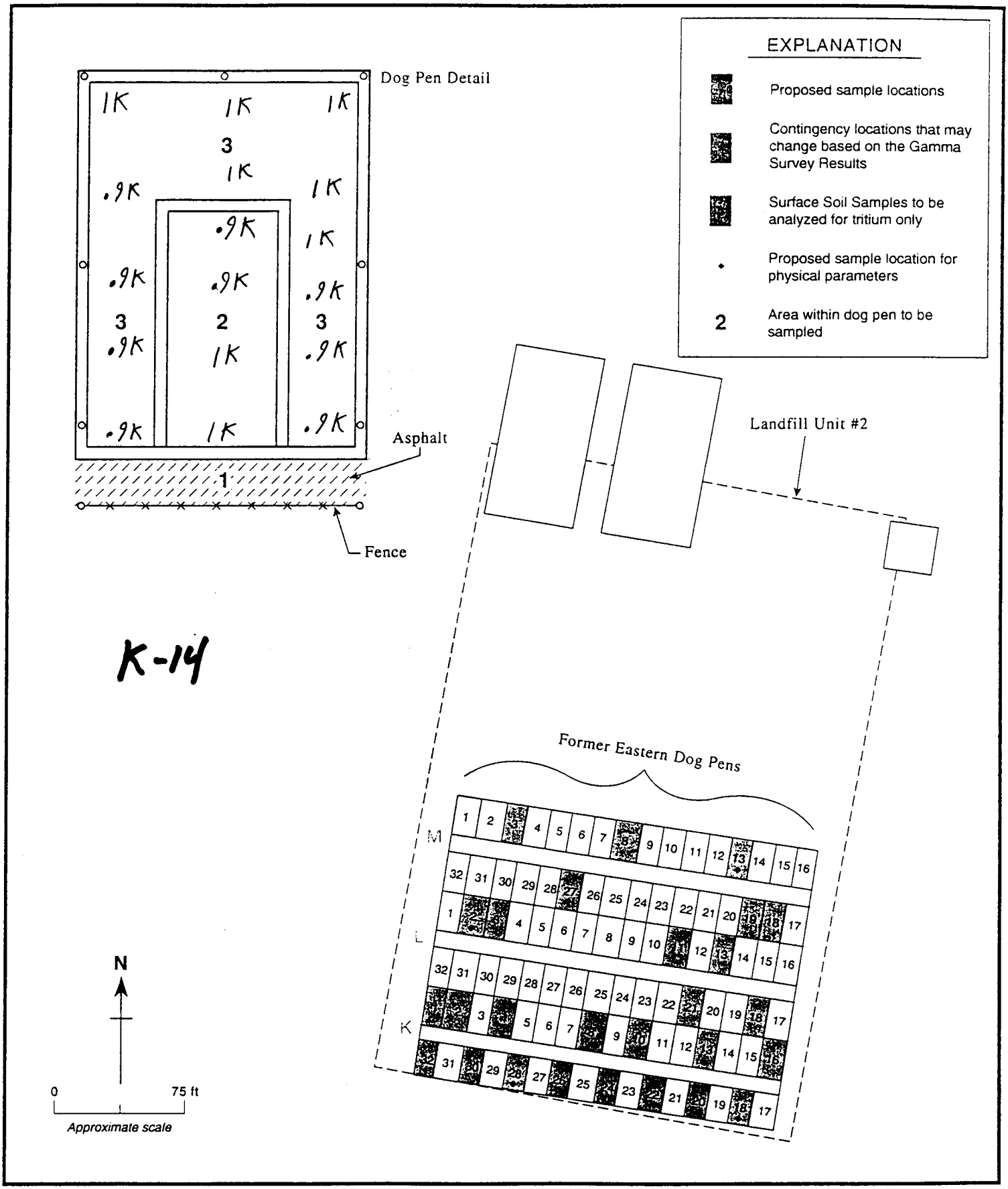

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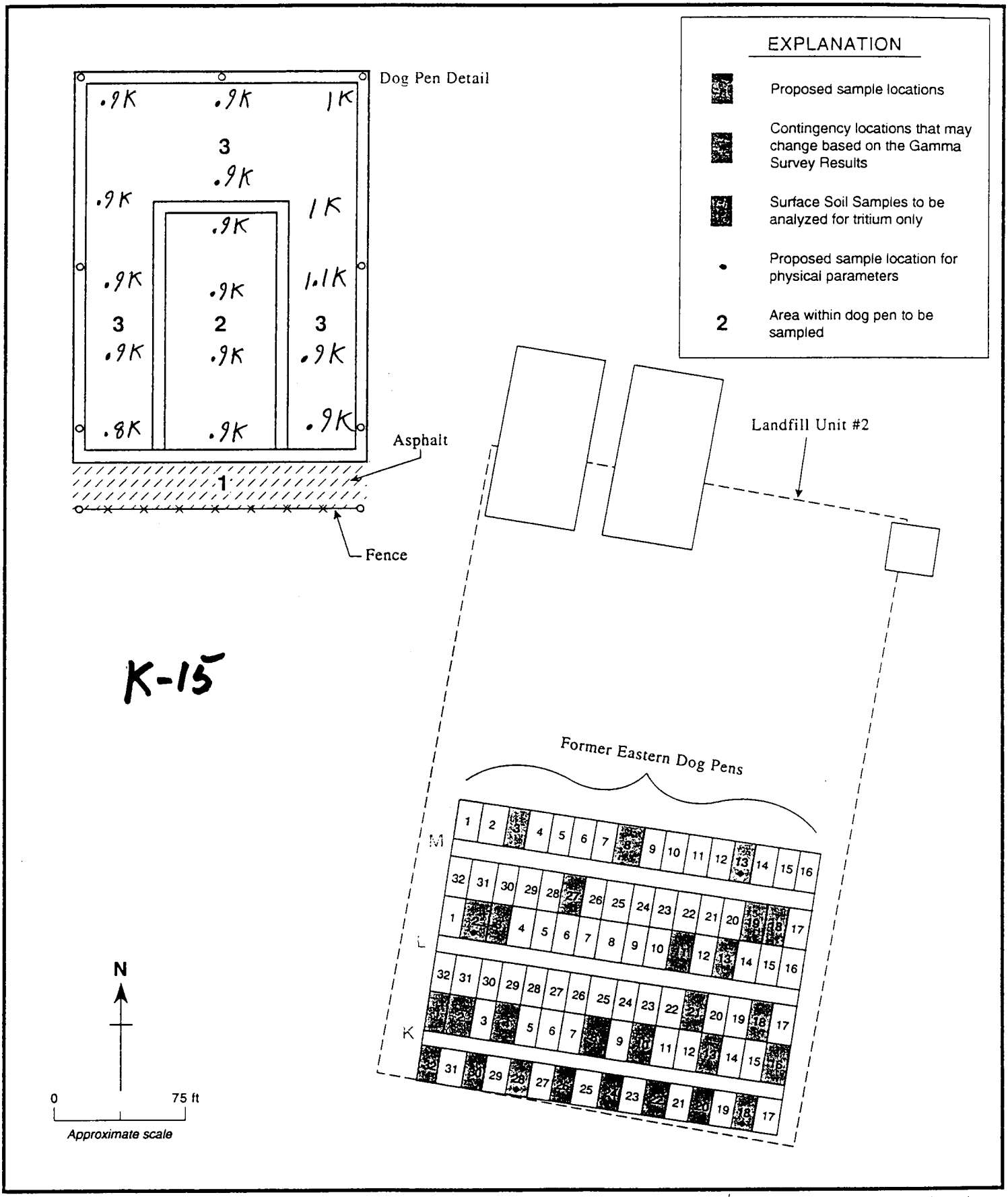
Weiss Associates



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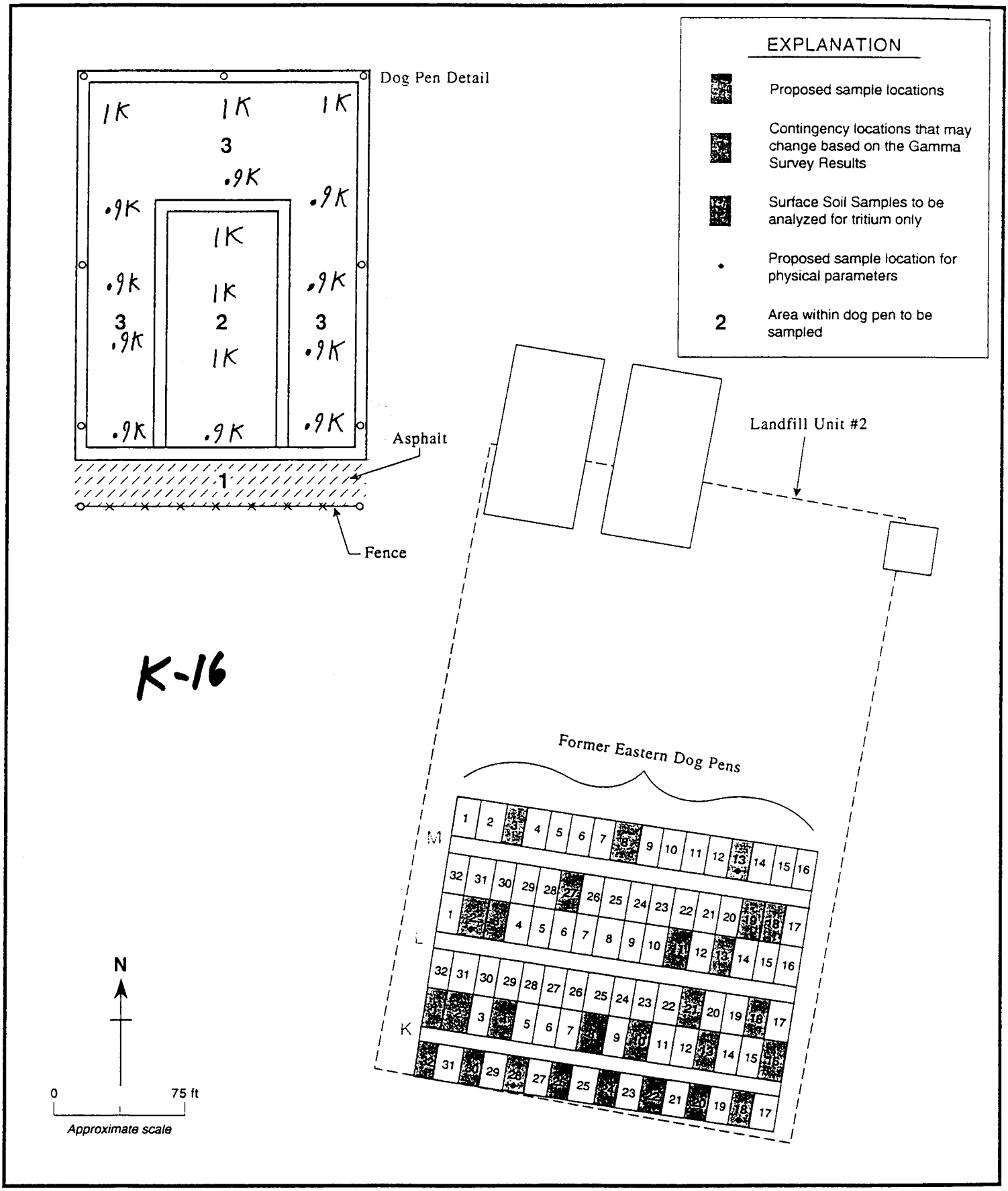

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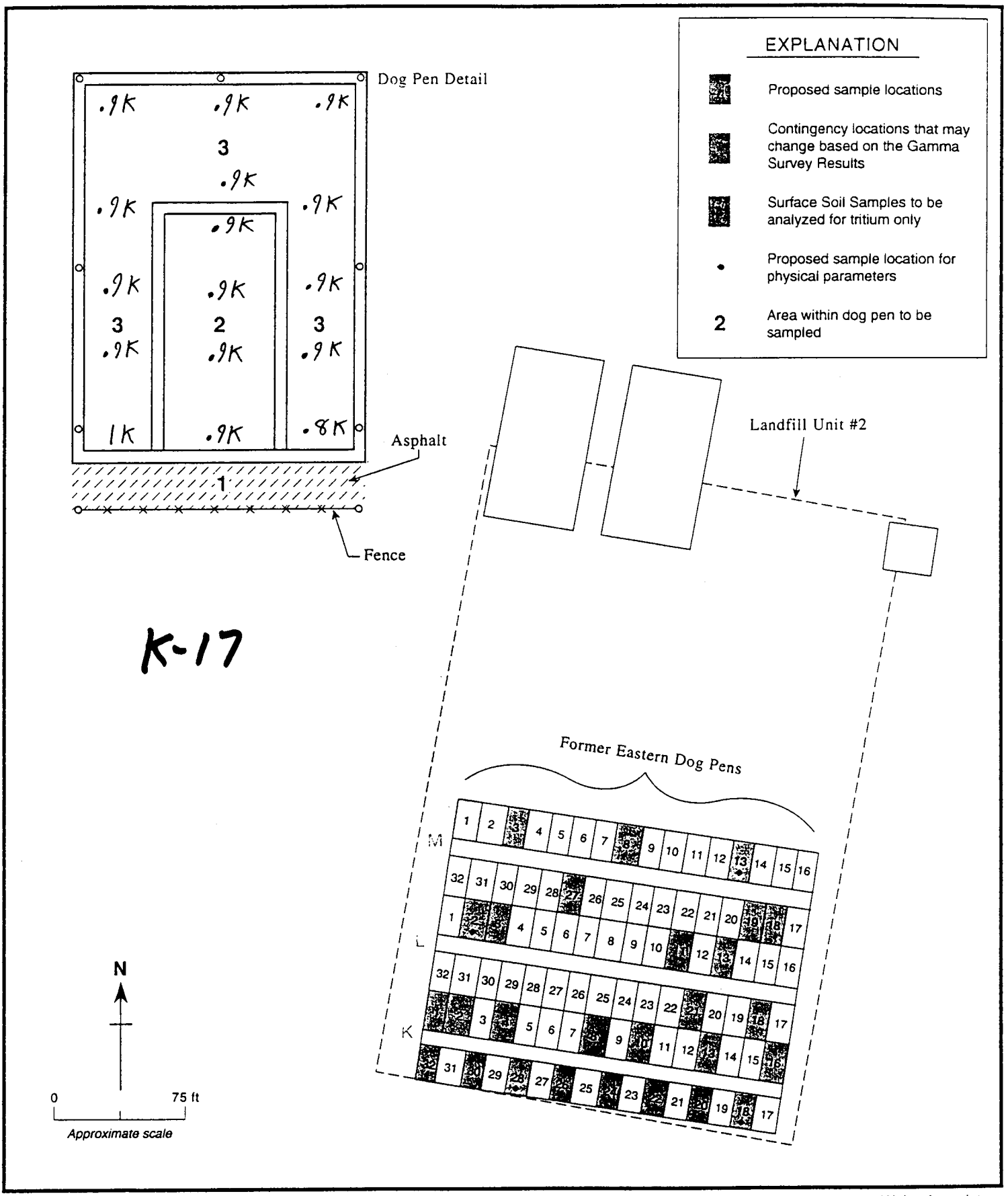

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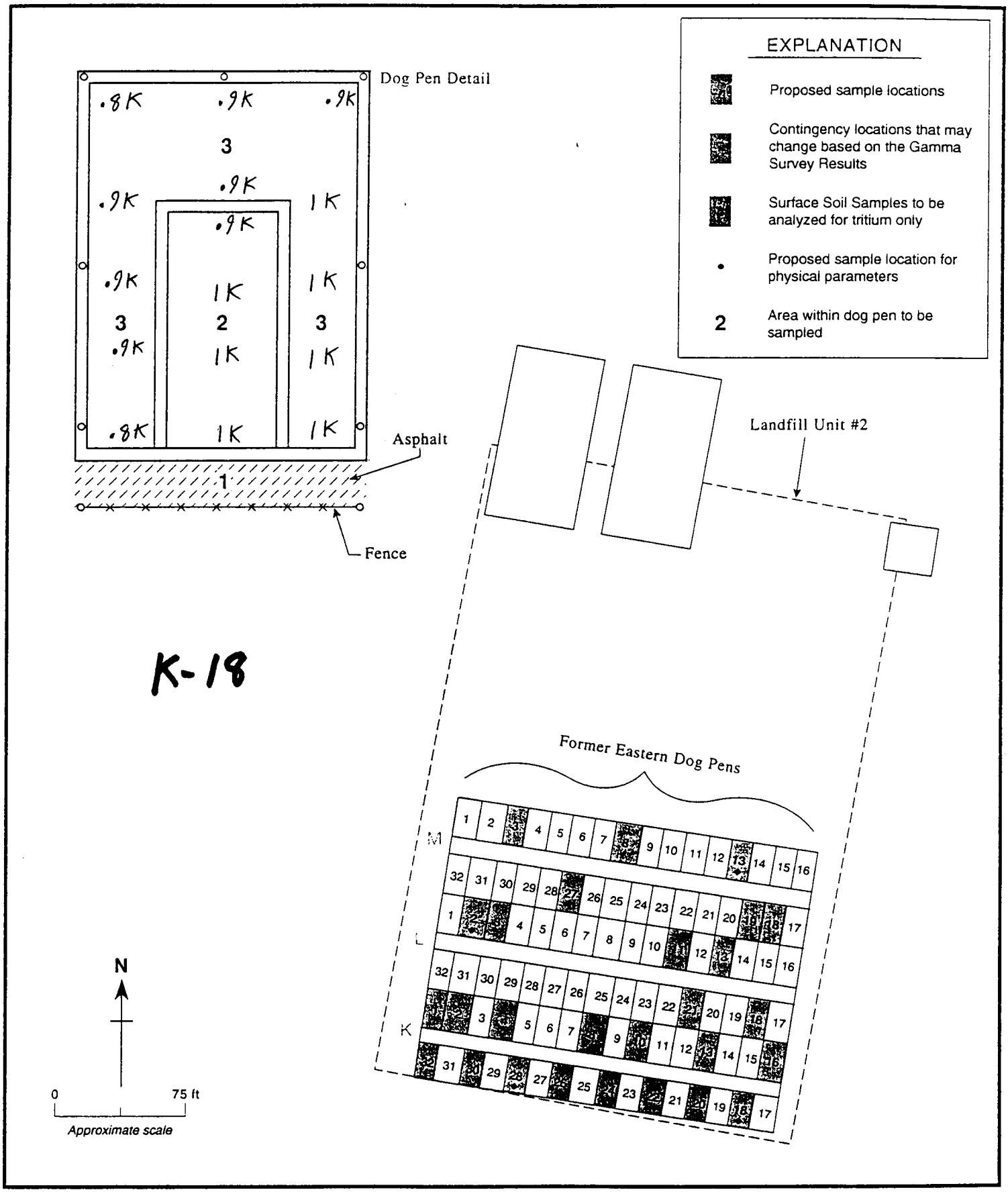

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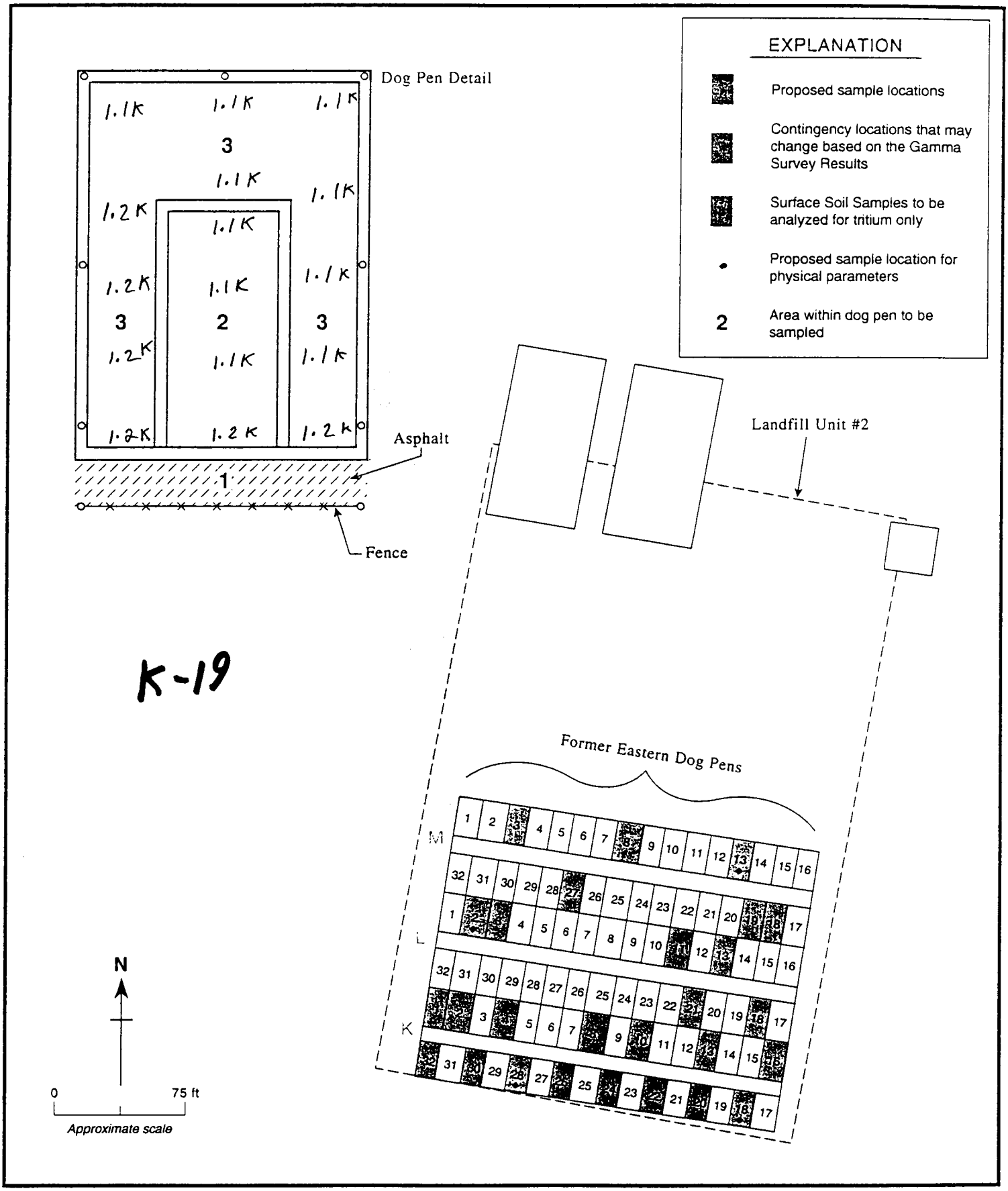
Weiss Associates



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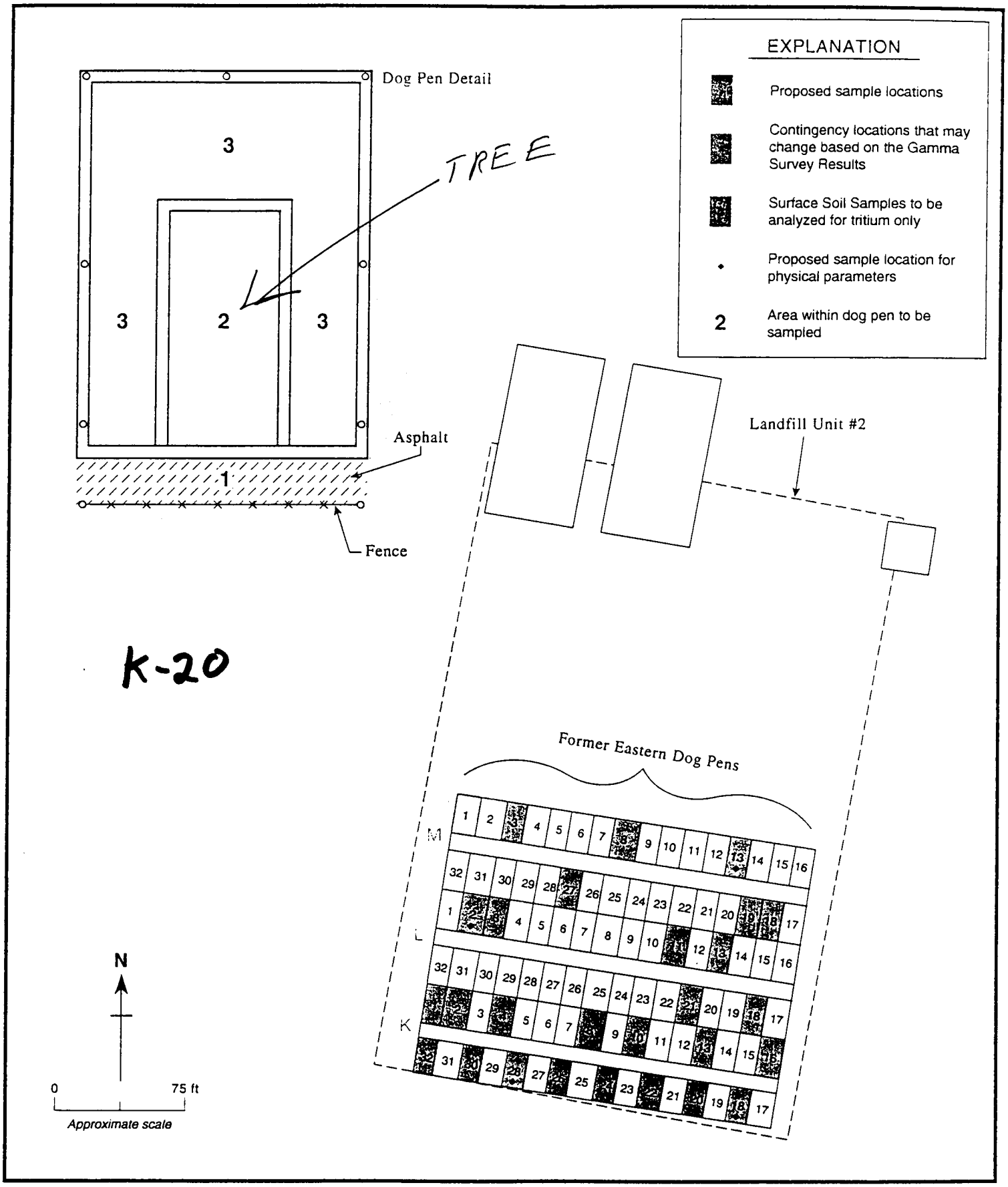

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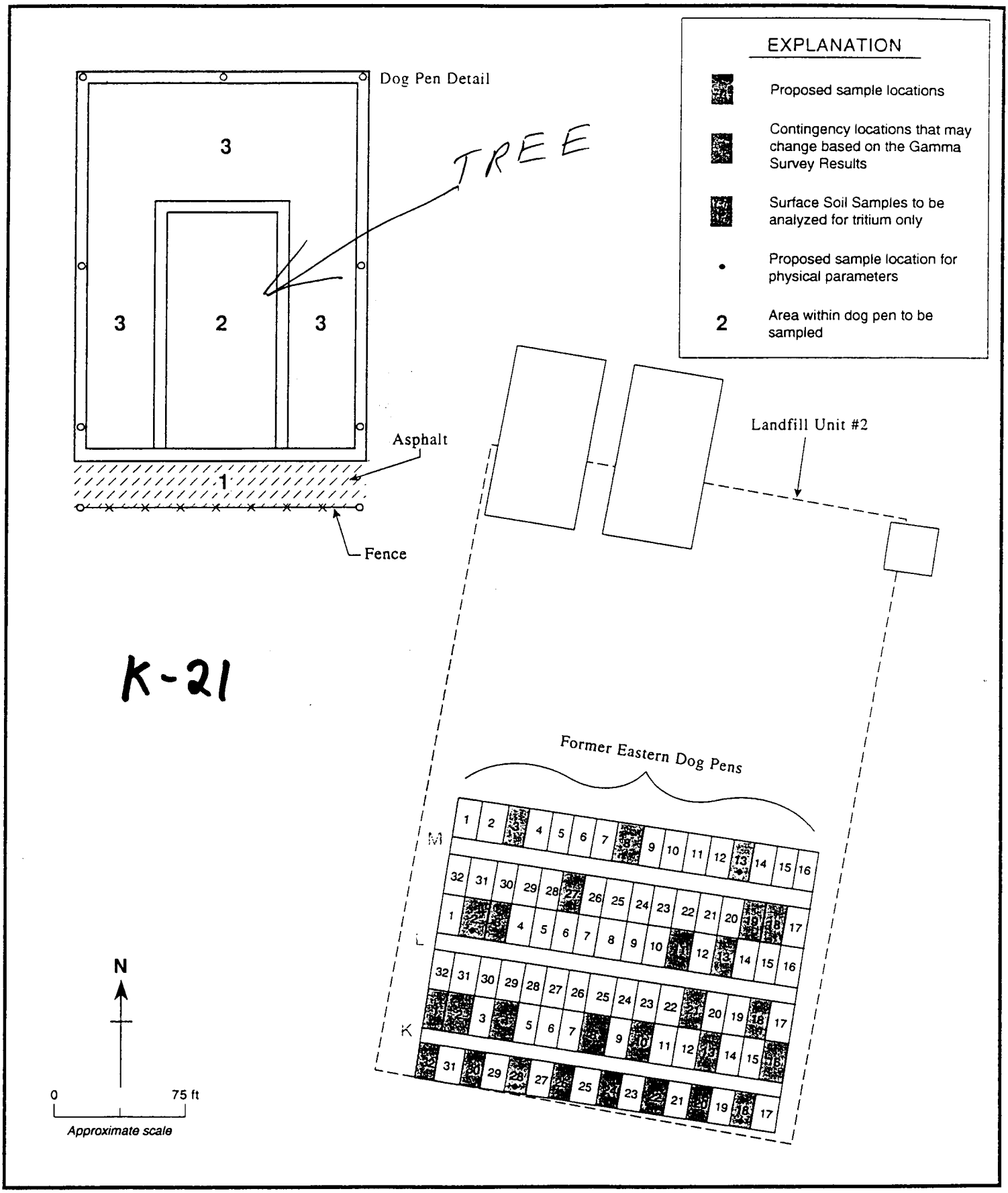

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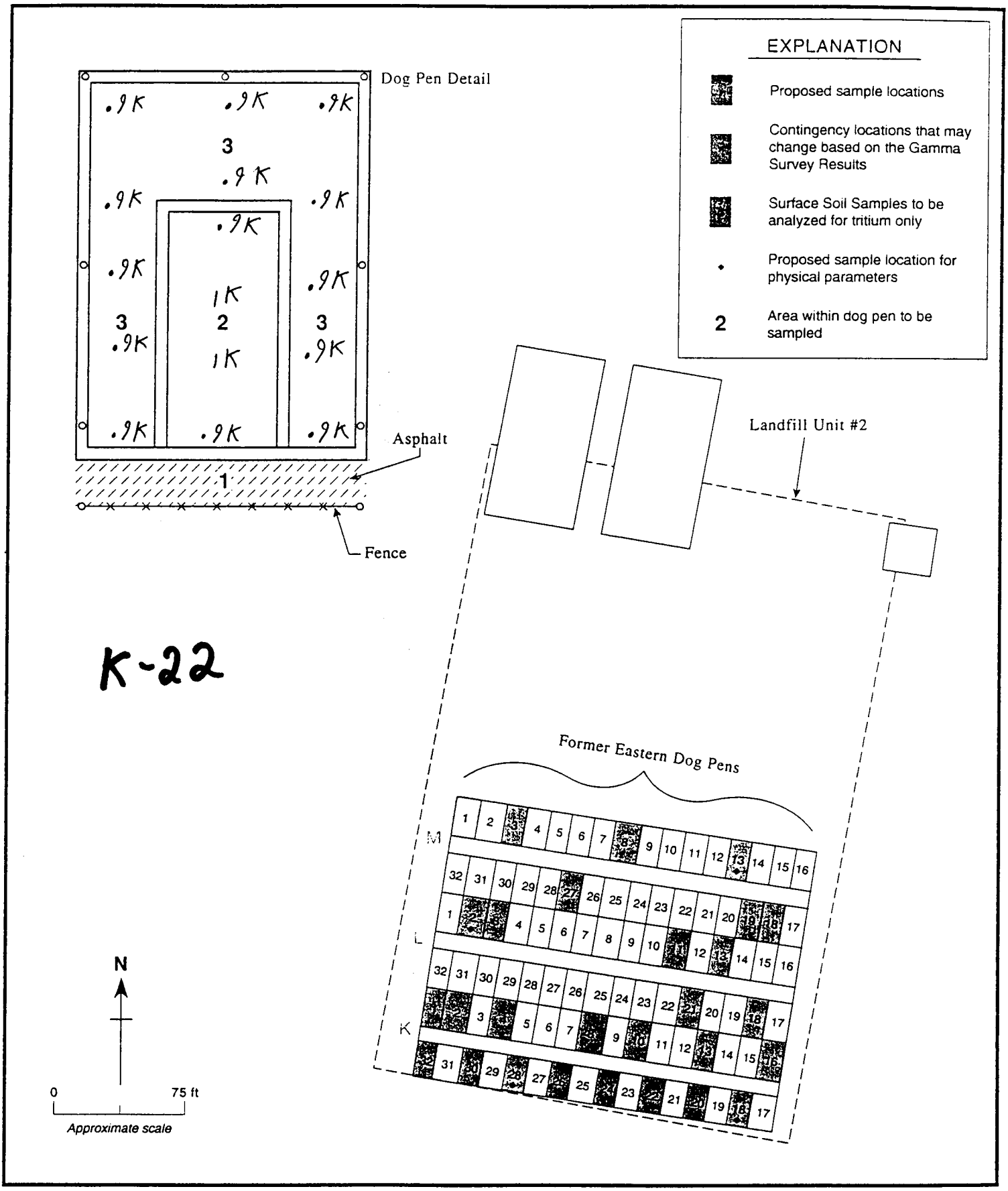

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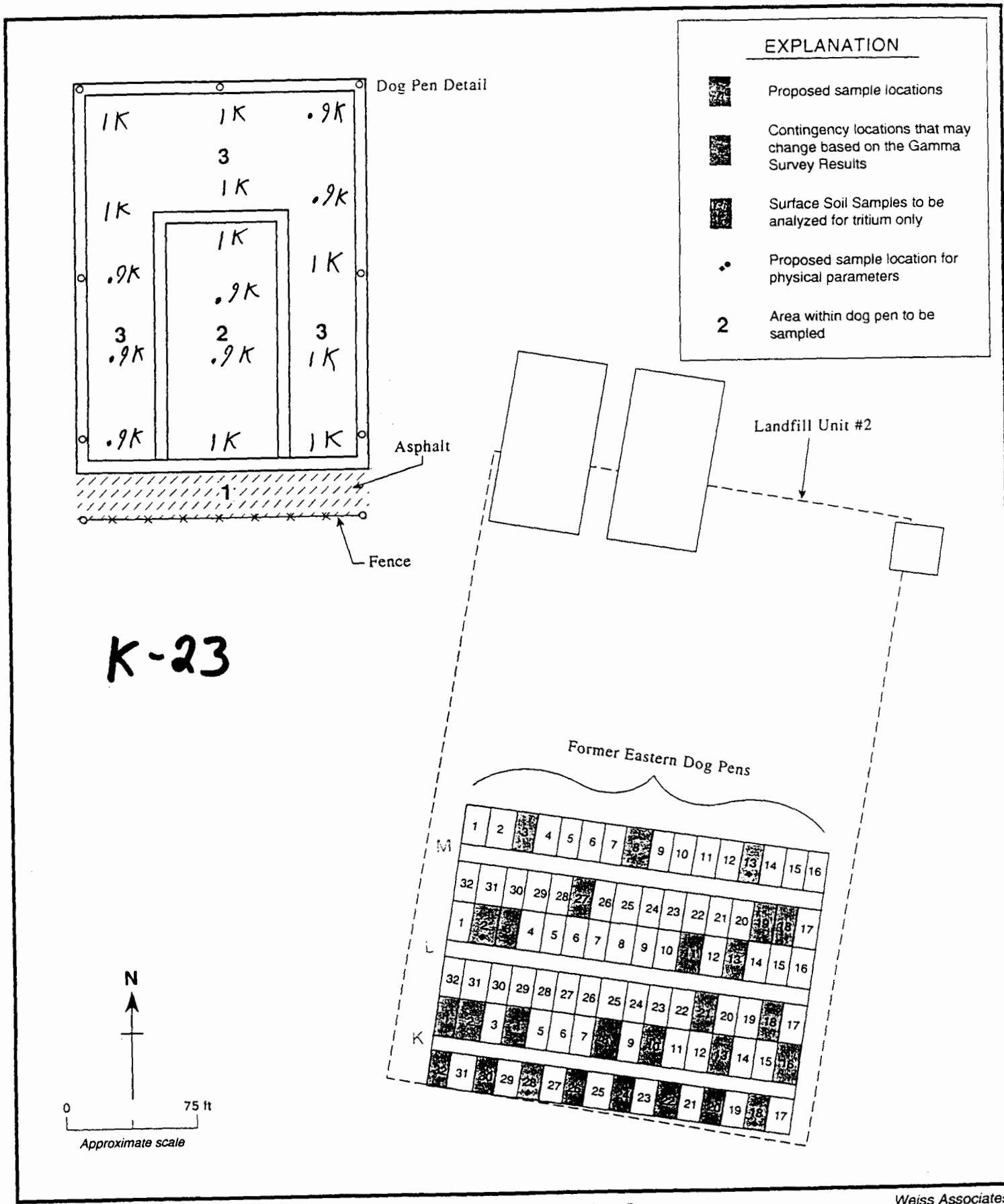
Weiss Associates



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Weiss Associates

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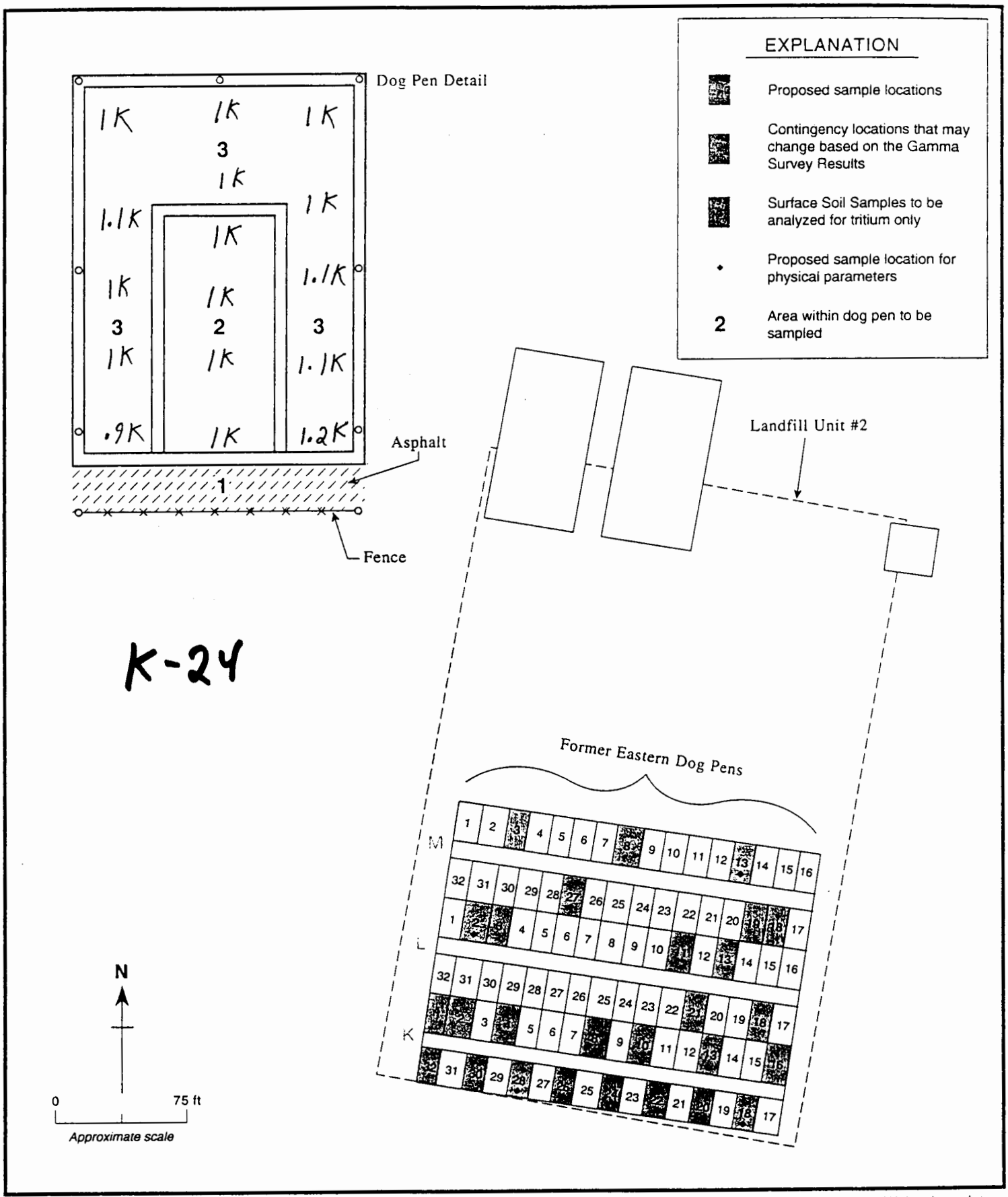

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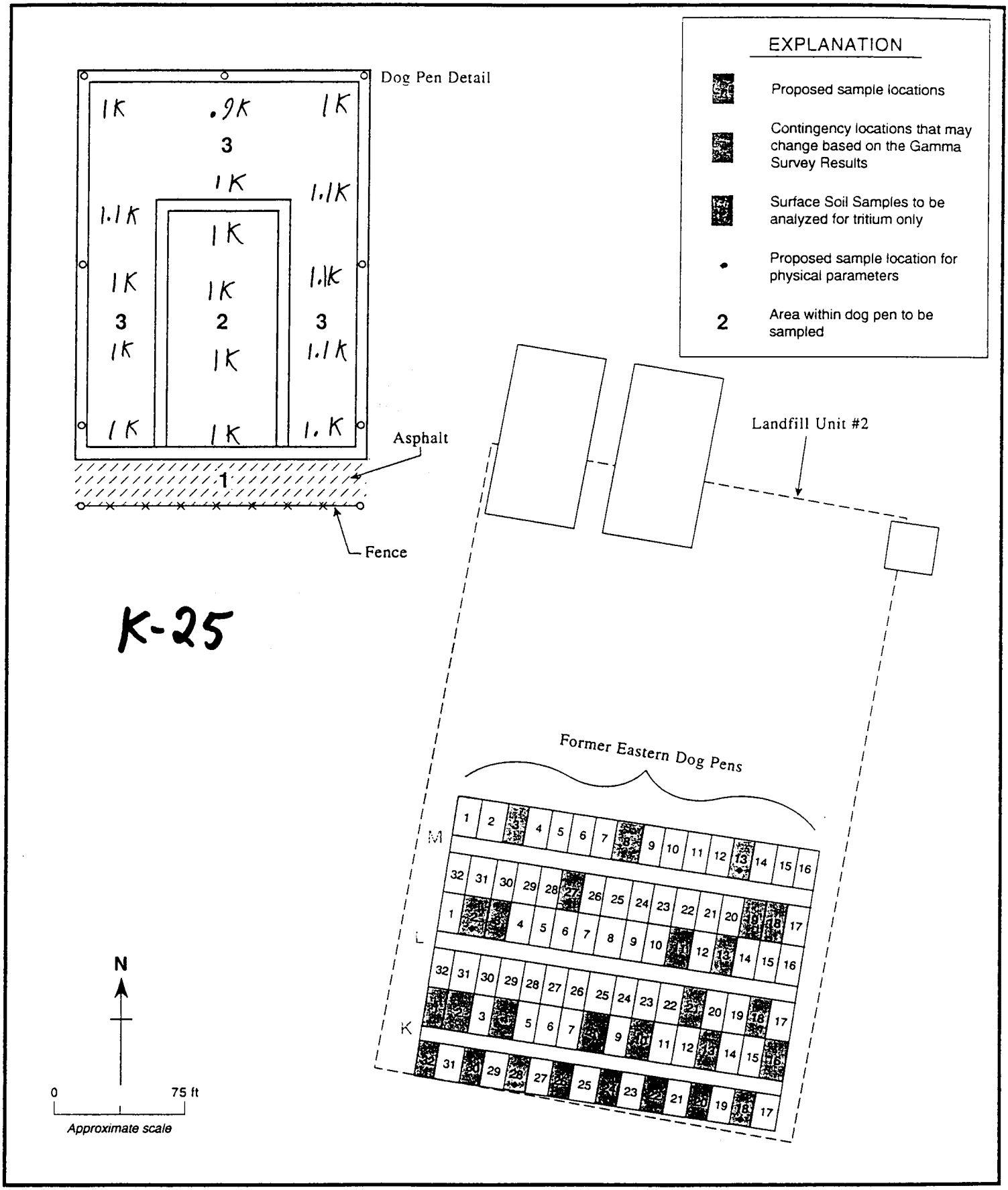

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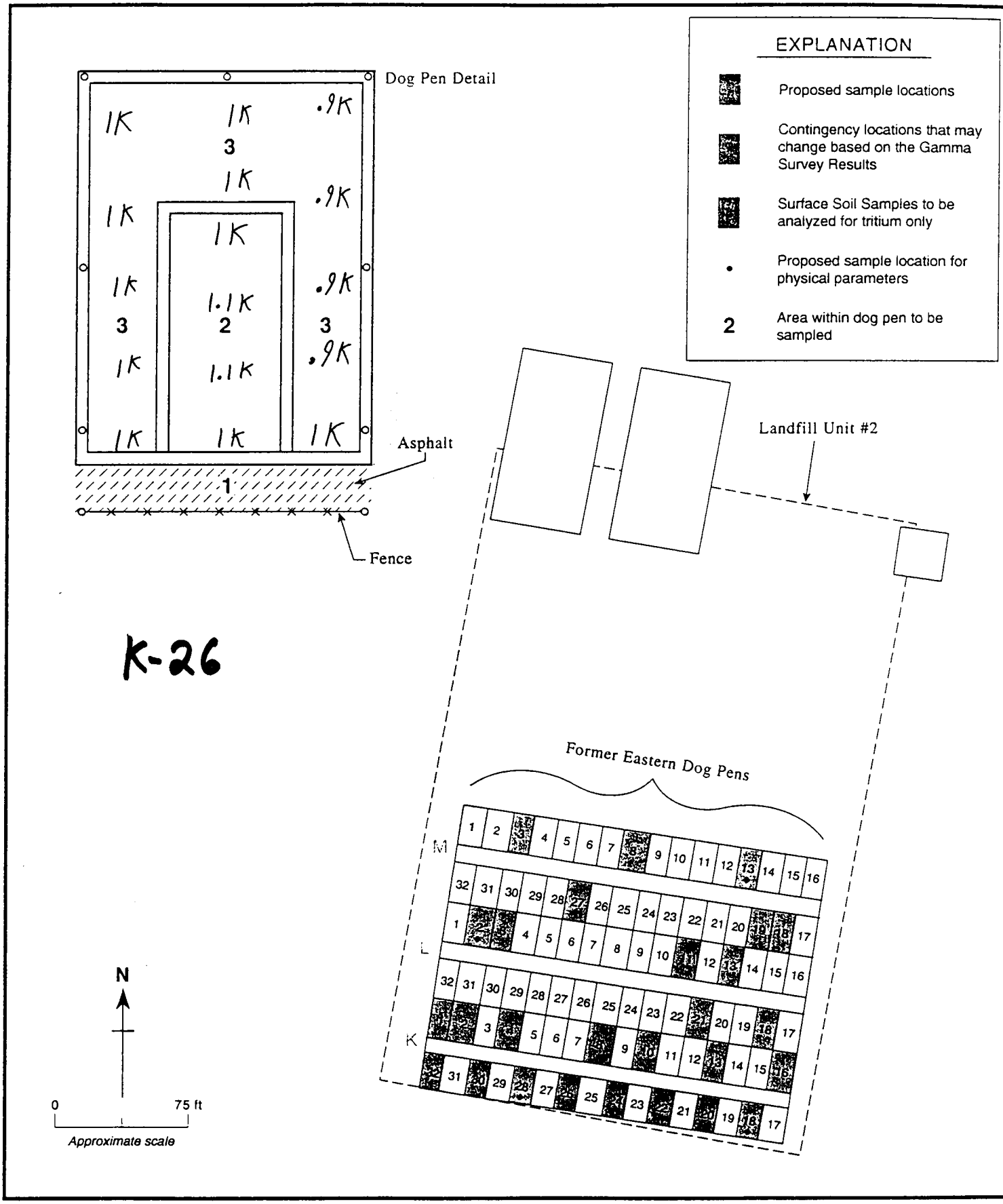

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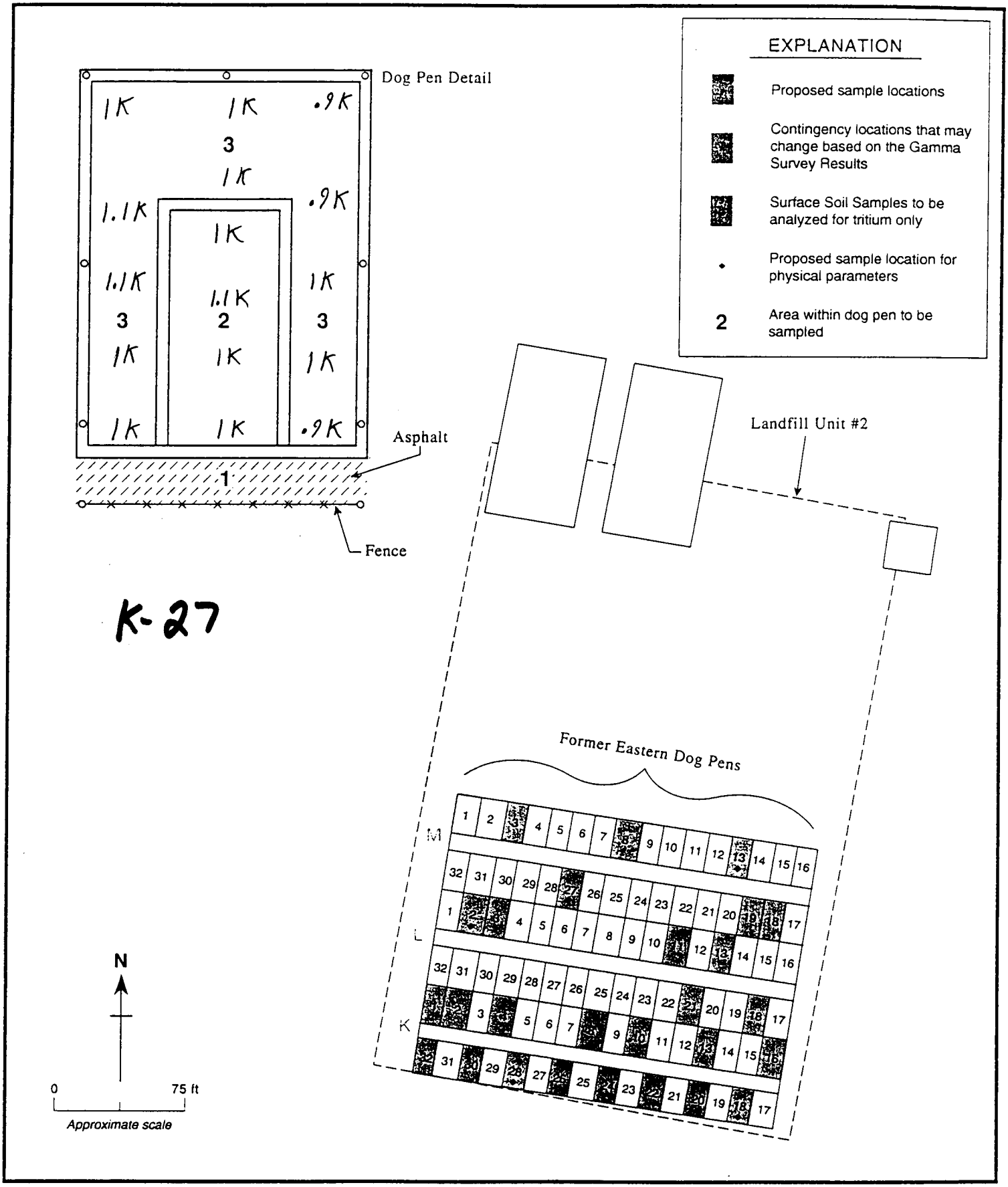

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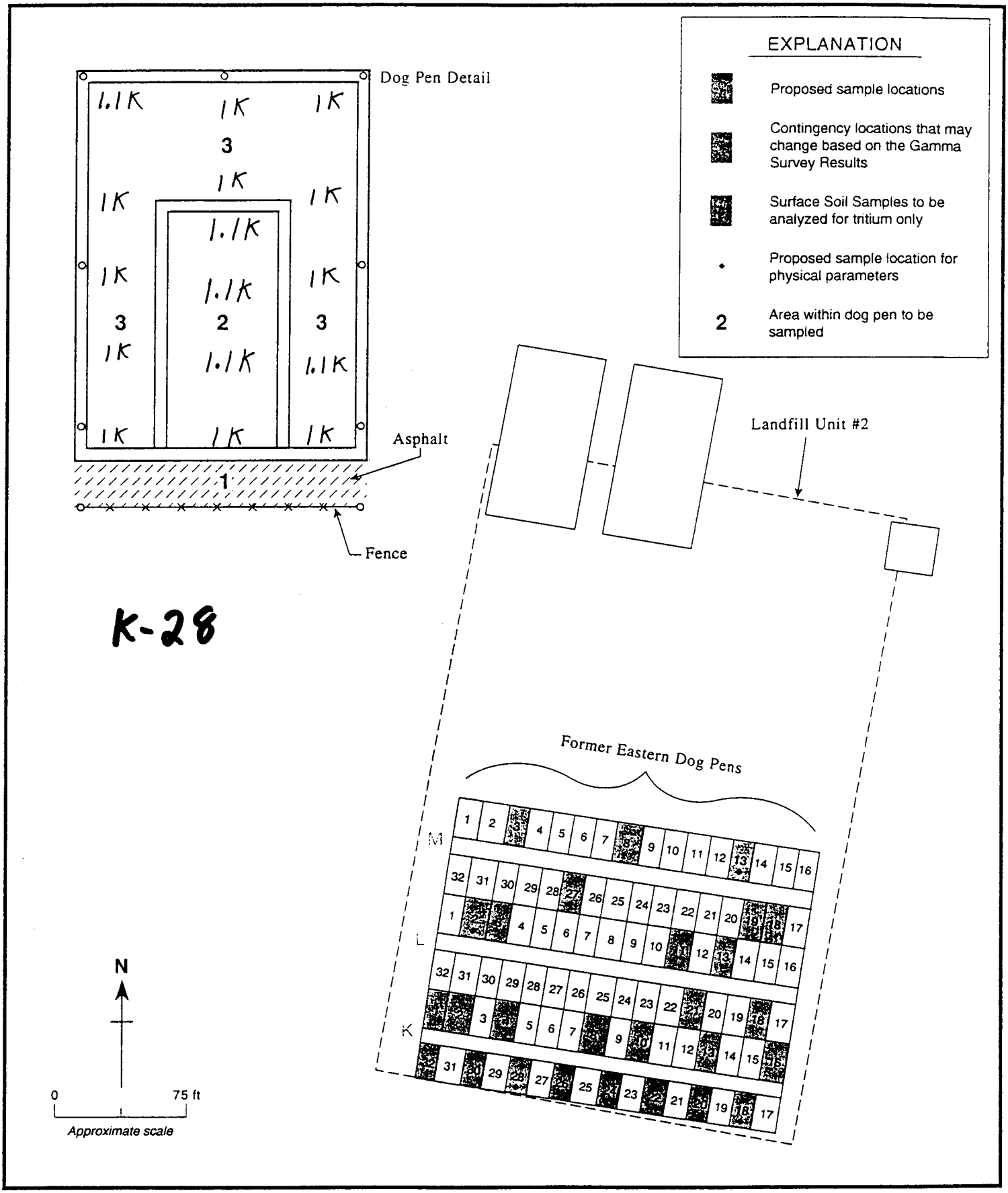
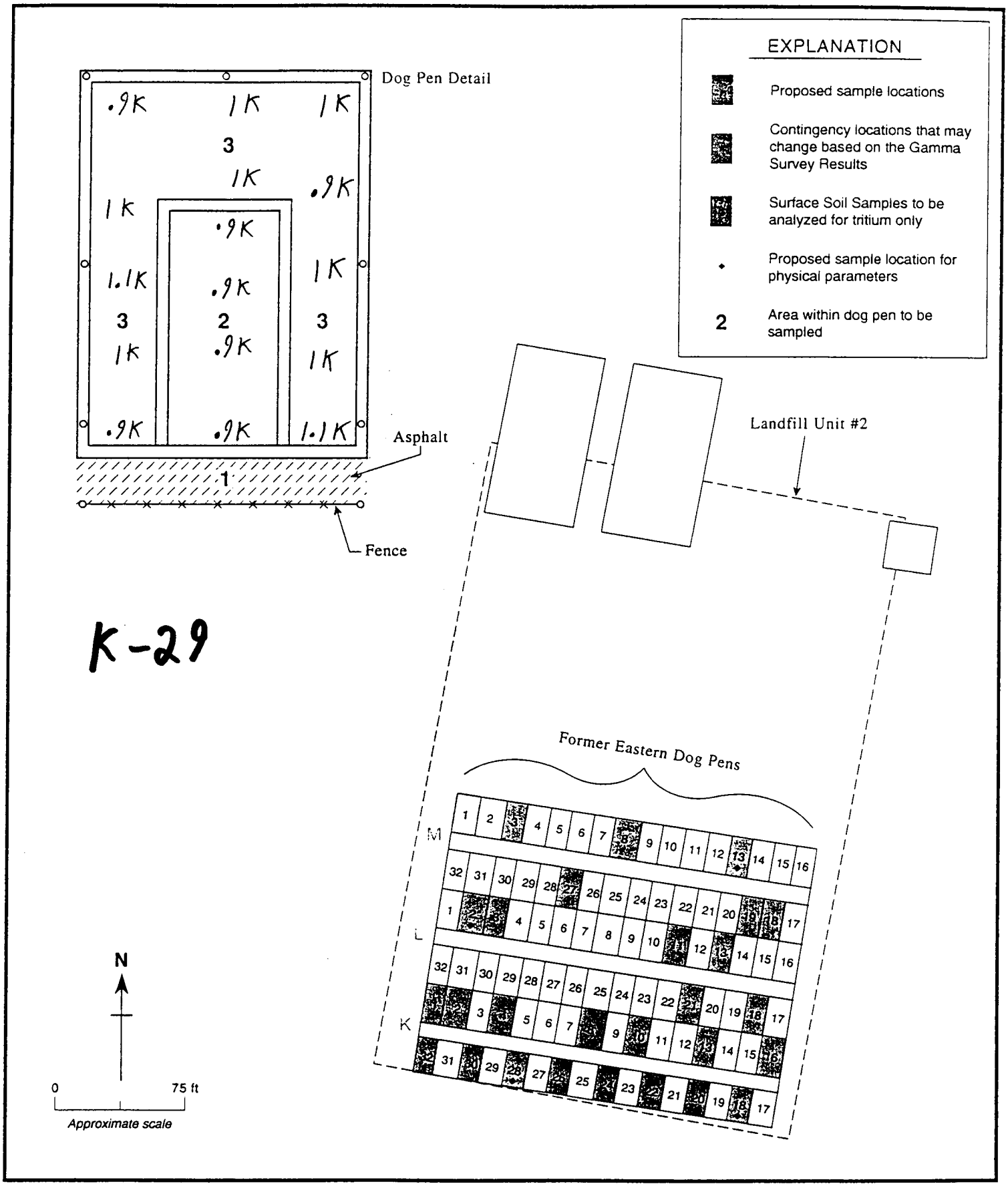


Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

Weiss Associates



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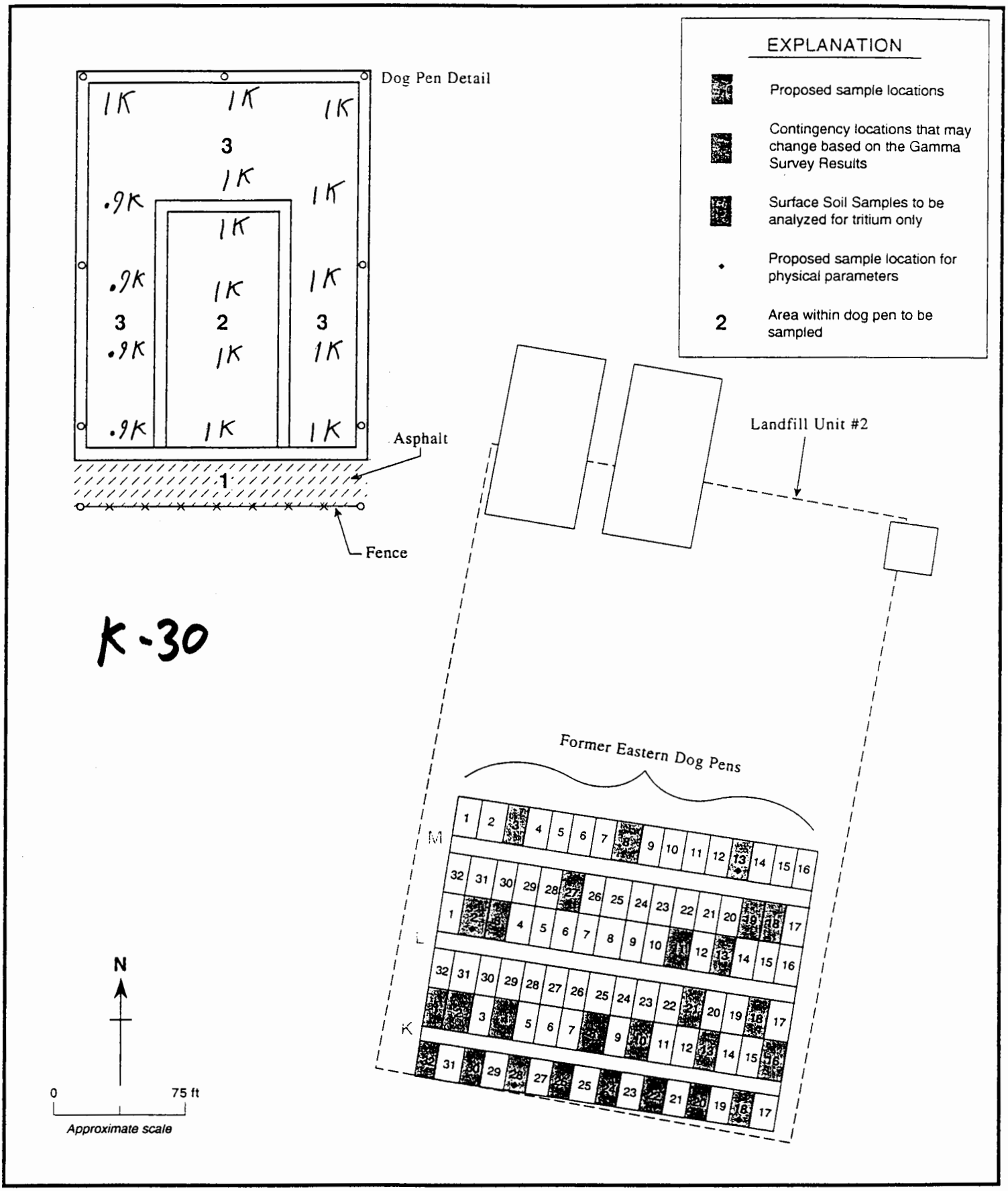
Weiss Associates



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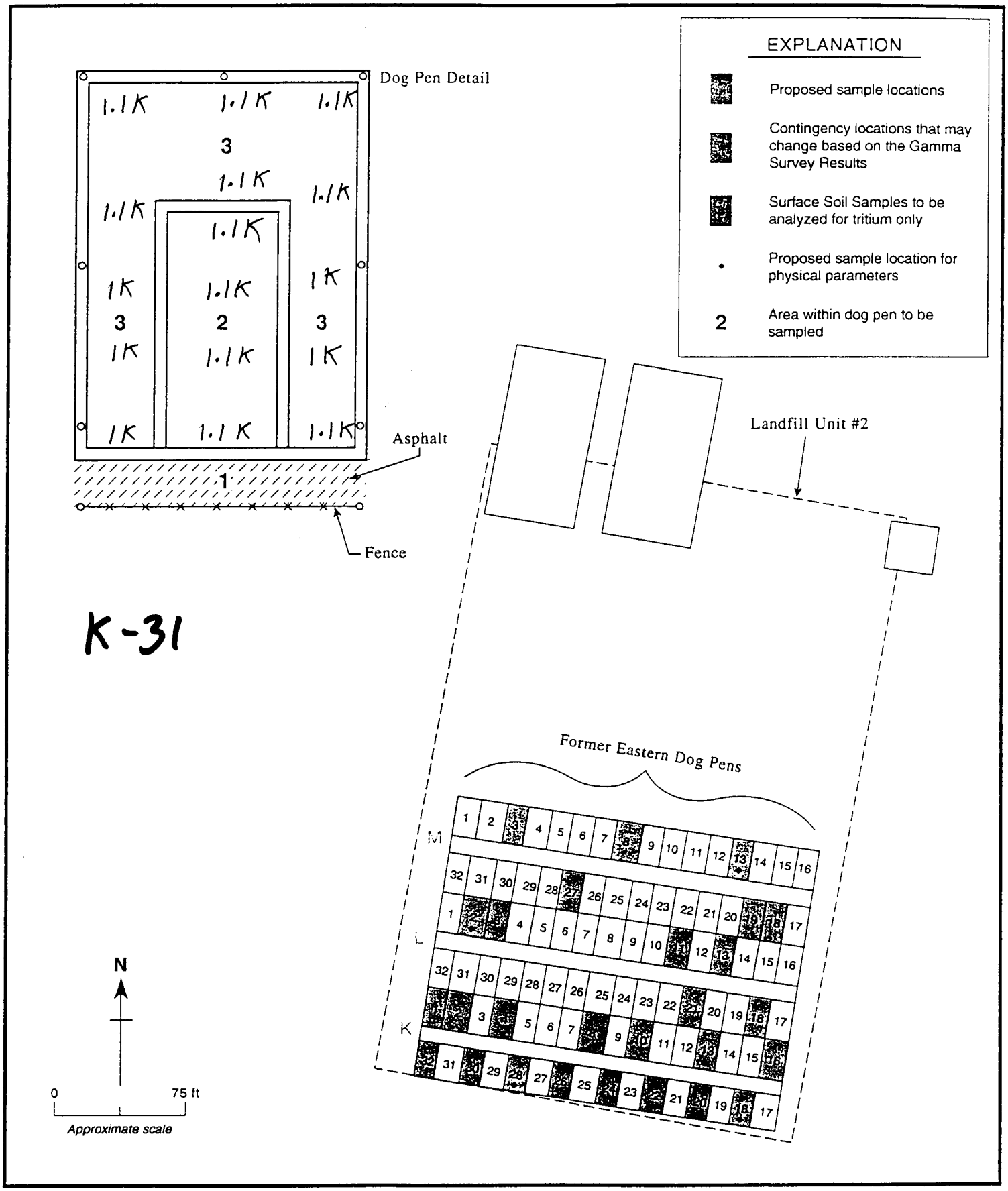
Weiss Associates



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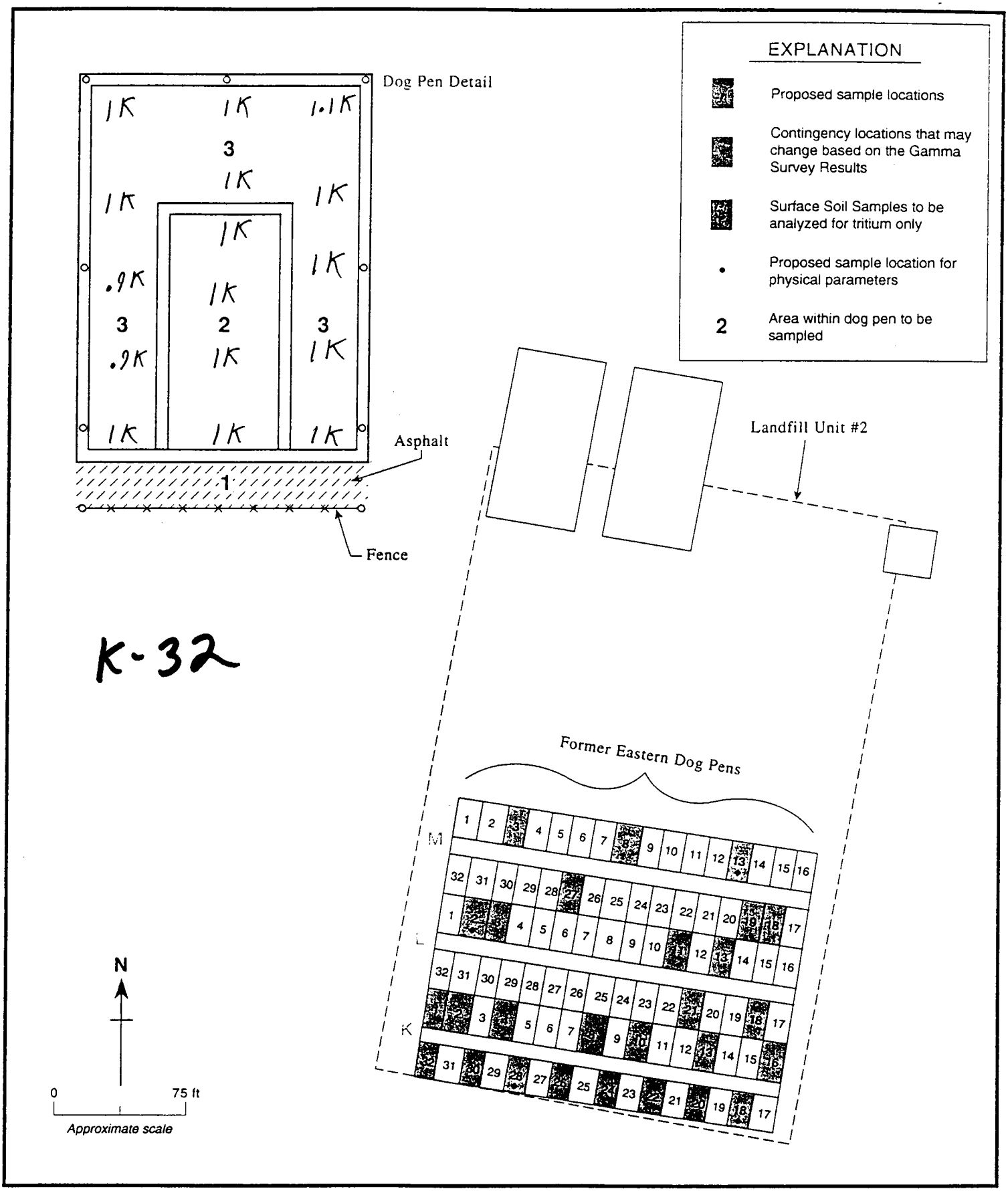

Figure 3. Proposed Shallow Soil Sample Locations in the Eastern Dog Pens

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APPENDIX B

ANALYTIC RESULTS OF EASTERN DOG PENS

Table B1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Data Validation Qualifier Definitions:

The following definitions provide brief explanations of the data validation qualifiers assigned to results in the data review process.

U = The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J = The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
N = The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".
NJ = The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
UJ = The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R = The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Data Validation Reason Code Definitions:

The following descriptions provide brief explanation of the cause for qualification of the results determined in the data review process. These reason codes are used in combination with data qualifier, i.e. "Uz" indicated the analyte is non-detect due to method blank contamination.

c = Calibration failure; poor or unstable response.
d = Matrix duplicate imprecision or matrix spike/matrix spike duplicate imprecision.
f = Field replicate or duplicate imprecision.
h = Holding time violation.
i = Internal standard failure.
l = Laboratory control sample (LCS) recovery failure.
m = Matrix spike/matrix spike duplicate (MS/MSD) recovery failure.
s = Surrogate spike recovery failure.
z = Method blank contamination.
/ = Validation Qualifier / Lab Qualifier.

Table B1.1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Metals by CLP

	Background Level	UNITS	SSDP0302 M8, 0'		SSDP0302R M8, 0'	SSDP0303 M8, 2'		SSDP0304 M13, 0'		SSDP0305 M13, 2'		SSDP0306 M27, 0'	
Chromium	199	MG/KG	98.4	Jd/*	NA	173	Jd/*	133	Jd/*	152	Jd/*	137	Jd/*
Mercury	3.94	MG/KG	[redacted]	Jm/N	[redacted]	[redacted]	Jm/N	1.1	Jm/N	0.59	Jm/N	1.2	Jm/N

Table B1.1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Metals by CLP

	Background Level	UNITS	SSDP0307 M27, 2'		SSDP0308 L2, 0'		SSDP0309 L2, 2'		SSDP0310 L3, 0'		SSDP0311 L3, 2'		SSDP0312 L13, 0'	
Chromium	199	MG/KG	139	Jd/*	133	Jd/*	132	Jd/*	166	Jd/*	167	Jd/*	175	
Mercury	3.94	MG/KG	0.65	Jm/N	0.47	Jm/N	0.23	Jm/N	1.4	Jm/N	0.92	Jm/N	3.8	Jd/ *

Table B1.1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Metals by CLP

	Background Level	UNITS	SSDP0313 L13, 2'		SSDP0314 L18, 0'		SSDP0315 L18, 2'		SSDP0316 L21, 0'		SSDP0318 K1, 0'		SSDP0319 K1, 0'	
Chromium	199	MG/KG	142		133		221		139		176		155	
Mercury	3.94	MG/KG	1	Jd/ *	0.09	Jd/ *	0.54	Jd/ *	0.09	Jd/ *	0.9	Jd/ *	0.65	Jd/ *

Table B1.1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Metals by CLP

	Background Level	UNITS	SSDP0320 K1, 2'		SSDP0323 K3, 0'		SSDP0324 K3, 2'		SSDP0327 K13, 0'		SSDP0328 K13, 2'		SSDP0329 K16, 0'	
Chromium	199	MG/KG	168		146		170		161		191		140	
Mercury	3.94	MG/KG	0.43	Jd/*	0.51	Jd/*	0.82	Jd/*	0.48	Jd/*	0.9	Jd/*	0.26	Jd/*

Table B1.1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Metals by CLP

	Background Level	UNITS	SSDP0330 K16, 2'	SSDP0331 K18, 0'	SSDP0332 K18, 2'	SSDP0332R K18, 2'	SSDP0333 K18, 2'	SSDP0333R K18, 2'
Chromium	199	MG/KG	155	186	156	NA	118	NA
Mercury	3.94	MG/KG	0.29 Jd/ *	[redacted] Jd/ *	[redacted] Jd/ *	0.98	3.4 Jdf/*	2.3

Table B1.1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Metals by CLP

	Background Level	UNITS	SSDP0334 K28, 0'		SSDP0335 K28, 2'		SSDP0336 M3, 0'		SSDP0337 M3, 2'		SSDP0338 M17, 0'		SSDP0338D L1 M17, 0'
Chromium	199	MG/KG	183		186		[redacted]	Jd/*	[redacted]	Jd/*	121	Jd/*	NA
Mercury	3.94	MG/KG	0.56	Jd/*	1.2	Jd/*	1.3	Jm/N	0.81	Jm/N	0.39	Jm/N	NA

Table B1.1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Metals by CLP

	Background Level	UNITS	SSDP0339 M17, 0'		SSDP0340 M17, 2'		SSDP0341 M12, 0'		SSDP0342 M12, 2'		SSDP0343 M22, 0'		SSDP0344 M22, 2'	
Chromium	199	MG/KG	181	Jd/*	124	Jd/*	130	Jd/*	90.7	Jd/*	134	Jd/*	153	Jd/*
Mercury	3.94	MG/KG	0.6	Jm/N	0.89	Jm/N	0.21	Jm/N	0.79	Jm/N	0.27	Jm/N	1.3	Jm/N

Table B1.1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Metals by CLP

Location Date	Background Level	UNITS	SSDP0345 M22, 2 '		SSDP0346 K19, 0'		SSDP0346DL1 K19, 0'
Chromium	199	MG/KG	196	Jd/*	173		NA
Mercury	3.94	MG/KG	0.52	Jm/N	0.45	Jd/ *	NA

Table B1.1
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Metals by CLP

	Background Level	UNITS	SSDP0347 K19, 2'	
Chromium	199	MG/KG	153	
Mercury	3.94	MG/KG	0.85	Jd/ *

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0302 M8, 0'		SSDP0302R M8, 0'	SSDP0303 M8, 2'		SSDP0304 M13, 0'		SSDP0305 M13, 2'		SSDP0306 M27, 0'	
4,4'-DDD		UG/KG	<4	/U	NA	<3.8	/U	0.82	Jq/JP	<3.9	/U	1.6	Jq/JP
4,4'-DDE		UG/KG	<4	/U	NA	<3.8	/U	<3.9	/U	<3.9	/U	<3.8	/U
4,4'-DDT		UG/KG	<4	/U	NA	<3.8	/U	2.2	Jq/JP	<3.9	/U	<3.8	/U
Aldrin		UG/KG	<2	/U	NA	<1.9	/U	<1.9	/U	<2	/U	<1.9	/U
alpha-BHC		UG/KG	<2	/U	NA	<1.9	/U	<1.9	/U	<2	/U	<1.9	/U
alpha-Chlordane		UG/KG	<2	/U	NA	<1.9	/U	1.2	Jq/JP	0.48	Jq/JP	<1.9	/U
beta-BHC		UG/KG	<2	/U	NA	<1.9	/U	<1.9	/U	<2	/U	<1.9	/U
delta-BHC		UG/KG	<2	/U	NA	<1.9	/U	<1.9	/U	<2	/U	<1.9	/U
Dieldrin		UG/KG	<4	/U	NA	<3.8	/U	1.4	Jq/J	<3.9	/U	<3.8	/U
Endosulfan I		UG/KG	<2	/U	NA	<1.9	/U	<1.9	/U	<2	/U	<1.9	/U
Endosulfan II		UG/KG	<4	/U	NA	<3.8	/U	<3.9	/U	<3.9	/U	<3.8	/U
Endosulfan Sulfate		UG/KG	<4	/U	NA	<3.8	/U	<3.9	/U	<3.9	/U	<3.8	/U
Endrin		UG/KG	<4	/U	NA	<3.8	/U	<3.9	/U	<3.9	/U	<3.8	/U
Endrin Aldehyde		UG/KG	<4	/U	NA	<3.8	/U	<3.9	/U	<3.9	/U	<3.8	/U
Endrin Ketone		UG/KG	<4	/U	NA	<3.8	/U	<3.9	/U	<3.9	/U	<3.8	/U
Gamma-BHC		UG/KG	<2	/U	NA	<1.9	/U	<1.9	/U	<2	/U	<1.9	/U
gamma-Chlordane		UG/KG	<2	/U	NA	<1.9	/U	1.3	Jq/J	0.58	Jq/J	<1.9	/U
Heptachlor		UG/KG	<2	/U	NA	<1.9	/U	<1.9	/U	<2	/U	<1.9	/U
Heptachlor Epoxide		UG/KG	<2	/U	NA	<1.9	/U	<1.9	/U	<2	/U	<1.9	/U
Methoxychlor		UG/KG	<20.1	/U	NA	<19.2	/U	<19.4	/U	<19.6	/U	<19.2	/U
PCB-1016		UG/KG	<40.2	/U	NA	<38.3	/U	<38.8	/U	<39.2	/U	<38.3	/U
PCB-1221		UG/KG	<80.3	/U	NA	<76.6	/U	<77.5	/U	<78.4	/U	<76.6	/U
PCB-1232		UG/KG	<40.2	/U	NA	<38.3	/U	<38.8	/U	<39.2	/U	<38.3	/U
PCB-1242		UG/KG	<40.2	/U	NA	<38.3	/U	<38.8	/U	<39.2	/U	<38.3	/U
PCB-1248		UG/KG	<40.2	/U	NA	<38.3	/U	<38.8	/U	<39.2	/U	<38.3	/U
PCB-1254		UG/KG	<40.2	/U	NA	<38.3	/U	<38.8	/U	<39.2	/U	<38.3	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0302 M8, 0'		SSDP0302R M8, 0'	SSDP0303 M8, 2'		SSDP0304 M13, 0'		SSDP0305 M13, 2'		SSDP0306 M27, 0'	
PCB-1260		UG/KG	<40.2	/U	NA	<38.3	/U	<38.8	/U	<39.2	/U	<38.3	/U
Toxaphene		UG/KG	<201	/U	NA	<192	/U	<194	/U	<196	/U	<192	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0307 M27, 2'		SSDP0308 L2, 0'		SSDP0309 L2, 2'		SSDP0310 L3, 0'		SSDP0311 L3, 2'		SSDP0312 L13, 0'	
4,4'-DDD		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.8	/U	<3.8	/U	<3.8	/U
4,4'-DDE		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.8	/U	<3.8	/U	<3.8	/U
4,4'-DDT		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.8	/U	<3.8	/U	<3.8	/U
Aldrin		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
alpha-BHC		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
alpha-Chlordane		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
beta-BHC		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
delta-BHC		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
Dieldrin		UG/KG	2.1	Jq/J	4.4		4.2		<3.8	/U	<3.8	/U	3.1	Jq/J
Endosulfan I		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
Endosulfan II		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.8	/U	<3.8	/U	<3.8	/U
Endosulfan Sulfate		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.8	/U	<3.8	/U	<3.8	/U
Endrin		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.8	/U	<3.8	/U	<3.8	/U
Endrin Aldehyde		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.8	/U	<3.8	/U	<3.8	/U
Endrin Ketone		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.8	/U	<3.8	/U	<3.8	/U
Gamma-BHC		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
gamma-Chlordane		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
Heptachlor		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
Heptachlor Epoxide		UG/KG	<1.9	/U	<2	/U	<2	/U	<1.9	/U	<1.9	/U	<1.9	/U
Methoxychlor		UG/KG	<19.2	/U	<19.8	/U	<19.6	/U	<19.2	/U	<19.2	/U	<18.9	/U
PCB-1016		UG/KG	<38.3	/U	<39.7	/U	<39.2	/U	<38.3	/U	<38.3	/U	<37.9	/U
PCB-1221		UG/KG	<76.6	/U	<79.4	/U	<78.4	/U	<76.6	/U	<76.6	/U	<75.8	/U
PCB-1232		UG/KG	<38.3	/U	<39.7	/U	<39.2	/U	<38.3	/U	<38.3	/U	<37.9	/U
PCB-1242		UG/KG	<38.3	/U	<39.7	/U	<39.2	/U	<38.3	/U	<38.3	/U	<37.9	/U
PCB-1248		UG/KG	<38.3	/U	<39.7	/U	<39.2	/U	<38.3	/U	<38.3	/U	<37.9	/U
PCB-1254		UG/KG	<38.3	/U	<39.7	/U	<39.2	/U	<38.3	/U	<38.3	/U	<37.9	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0307 M27, 2 '		SSDP0308 L2, 0'		SSDP0309 L2, 2'		SSDP0310 L3, 0'		SSDP0311 L3, 2'		SSDP0312 L13, 0'	
PCB-1260		UG/KG	<38.3	/U	<39.7	/U	<39.2	/U	<38.3	/U	<38.3	/U	<37.9	/U
Toxaphene		UG/KG	<192	/U	<198	/U	<196	/U	<192	/U	<192	/U	<189	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0313 L13, 2'		SSDP0314 L18, 0'		SSDP0315 L18, 2'		SSDP0316 L21, 0'		SSDP0318 K1, 0'		SSDP0319 K1, 0'	
4,4'-DDD		UG/KG	<3.7	/U	<4	/U	2.8	Jq/J	<4.1	/U	<3.9	/U	<3.9	/U
4,4'-DDE		UG/KG	<3.7	/U	<4	/U	<3.9	/U	<4.1	/U	2.9	Jq/JP	<3.9	/U
4,4'-DDT		UG/KG	<3.7	/U	<4	/U	<3.9	/U	<4.1	/U	5.8		<3.9	/U
Aldrin		UG/KG	<1.8	/U	<2	/U	<2	/U	<2	/U	<1.9	/U	<2	/U
alpha-BHC		UG/KG	<1.8	/U	<2	/U	<2	/U	<2	/U	<1.9	/U	<2	/U
alpha-Chlordane		UG/KG	0.4	Jq/JP	<2	/U	<2	/U	<2	/U	15.1		12.1	J/P
beta-BHC		UG/KG	<1.8	/U	<2	/U	<2	/U	<2	/U	<1.9	/U	<2	/U
delta-BHC		UG/KG	<1.8	/U	<2	/U	<2	/U	<2	/U	<1.9	/U	<2	/U
Dieldrin		UG/KG	3.3	Jq/J	<4	/U	<3.9	/U	<4.1	/U	<3.9	/U	<3.9	/U
Endosulfan I		UG/KG	<1.8	/U	<2	/U	<2	/U	<2	/U	<1.9	/U	<2	/U
Endosulfan II		UG/KG	<3.7	/U	<4	/U	<3.9	/U	<4.1	/U	<3.9	/U	<3.9	/U
Endosulfan Sulfate		UG/KG	<3.7	/U	<4	/U	<3.9	/U	<4.1	/U	<3.9	/U	<3.9	/U
Endrin		UG/KG	<3.7	/U	<4	/U	<3.9	/U	<4.1	/U	<3.9	/U	<3.9	/U
Endrin Aldehyde		UG/KG	<3.7	/U	<4	/U	<3.9	/U	<4.1	/U	<3.9	/U	<3.9	/U
Endrin Ketone		UG/KG	<3.7	/U	<4	/U	<3.9	/U	<4.1	/U	<3.9	/U	<3.9	/U
Gamma-BHC		UG/KG	<1.8	/U	<2	/U	<2	/U	<2	/U	<1.9	/U	<2	/U
gamma-Chlordane		UG/KG	0.6	Jq/JP	<2	/U	<2	/U	<2	/U	11.5		10.5	
Heptachlor		UG/KG	<1.8	/U	<2	/U	<2	/U	<2	/U	<1.9	/U	<2	/U
Heptachlor Epoxide		UG/KG	<1.8	/U	<2	/U	<2	/U	<2	/U	<1.9	/U	<2	/U
Methoxychlor		UG/KG	<18.5	/U	<20.1	/U	<19.6	/U	<20.3	/U	<19.4	/U	<19.6	/U
PCB-1016		UG/KG	<37	/U	<40.2	/U	<39.2	/U	<40.6	/U	<38.8	/U	<39.2	/U
PCB-1221		UG/KG	<74.1	/U	<80.3	/U	<78.4	/U	<81.3	/U	<77.5	/U	<78.4	/U
PCB-1232		UG/KG	<37	/U	<40.2	/U	<39.2	/U	<40.6	/U	<38.8	/U	<39.2	/U
PCB-1242		UG/KG	<37	/U	<40.2	/U	<39.2	/U	<40.6	/U	<38.8	/U	<39.2	/U
PCB-1248		UG/KG	<37	/U	<40.2	/U	<39.2	/U	<40.6	/U	<38.8	/U	<39.2	/U
PCB-1254		UG/KG	<37	/U	<40.2	/U	<39.2	/U	<40.6	/U	7.9	Jqf/J	54.9	Jf/

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0313 L13, 2'		SSDP0314 L18, 0'		SSDP0315 L18, 2'		SSDP0316 L21, 0'		SSDP0318 K1, 0'		SSDP0319 K1, 0'	
PCB-1260		UG/KG	<37	/U	<40.2	/U	<39.2	/U	<40.6	/U	6.9	Jq/J	<39.2	/U
Toxaphene		UG/KG	<185	/U	<201	/U	<196	/U	<203	/U	<194	/U	<196	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0320 K1, 2'		SSDP0323 K3, 0'		SSDP0324 K3, 2'		SSDP0327 K13, 0'		SSDP0328 K13, 2'		SSDP0329 K16, 0'	
4,4'-DDD		UG/KG	<3.9	/U	<3.7	/U	<3.7	/U	<3.9	/U	<3.8	/U	<4.1	/U
4,4'-DDE		UG/KG	<3.9	/U	<3.7	/U	<3.7	/U	0.3	Jq/J	<3.8	/U	<4.1	/U
4,4'-DDT		UG/KG	<3.9	/U	<3.7	/U	<3.7	/U	0.48	Jq/JP	<3.8	/U	<4.1	/U
Aldrin		UG/KG	<2	/U	<1.8	/U	<1.8	/U	<1.9	/U	<1.9	/U	<2	/U
alpha-BHC		UG/KG	<2	/U	<1.8	/U	<1.8	/U	<1.9	/U	<1.9	/U	<2	/U
alpha-Chlordane		UG/KG	11.1	J/P	1.2	Jq/JP	<1.8	/U	0.38	Jq/J	<1.9	/U	<2	/U
beta-BHC		UG/KG	<2	/U	<1.8	/U	<1.8	/U	<1.9	/U	<1.9	/U	<2	/U
delta-BHC		UG/KG	<2	/U	<1.8	/U	<1.8	/U	<1.9	/U	<1.9	/U	<2	/U
Dieldrin		UG/KG	<3.9	/U	<3.7	/U	<3.7	/U	0.76	Jq/J	<3.8	/U	2.6	Jq/J
Endosulfan I		UG/KG	<2	/U	<1.8	/U	<1.8	/U	<1.9	/U	<1.9	/U	<2	/U
Endosulfan II		UG/KG	<3.9	/U	<3.7	/U	<3.7	/U	<3.9	/U	<3.8	/U	<4.1	/U
Endosulfan Sulfate		UG/KG	<3.9	/U	<3.7	/U	<3.7	/U	<3.9	/U	<3.8	/U	<4.1	/U
Endrin		UG/KG	<3.9	/U	<3.7	/U	<3.7	/U	<3.9	/U	<3.8	/U	<4.1	/U
Endrin Aldehyde		UG/KG	<3.9	/U	<3.7	/U	<3.7	/U	<3.9	/U	<3.8	/U	<4.1	/U
Endrin Ketone		UG/KG	<3.9	/U	<3.7	/U	<3.7	/U	<3.9	/U	<3.8	/U	<4.1	/U
Gamma-BHC		UG/KG	<2	/U	<1.8	/U	<1.8	/U	<1.9	/U	<1.9	/U	<2	/U
gamma-Chlordane		UG/KG	9.5		1.1	Jq/JP	<1.8	/U	0.4	Jq/J	<1.9	/U	<2	/U
Heptachlor		UG/KG	<2	/U	<1.8	/U	<1.8	/U	<1.9	/U	<1.9	/U	<2	/U
Heptachlor Epoxide		UG/KG	<2	/U	<1.8	/U	<1.8	/U	<1.9	/U	<1.9	/U	<2	/U
Methoxychlor		UG/KG	<19.6	/U	<18.5	/U	<18.5	/U	<19.4	/U	<19.2	/U	<20.3	/U
PCB-1016		UG/KG	<39.2	/U	<37	/U	<37	/U	<38.8	/U	<38.3	/U	<40.6	/U
PCB-1221		UG/KG	<78.4	/U	<74.1	/U	<74.1	/U	<77.5	/U	<76.6	/U	<81.3	/U
PCB-1232		UG/KG	<39.2	/U	<37	/U	<37	/U	<38.8	/U	<38.3	/U	<40.6	/U
PCB-1242		UG/KG	<39.2	/U	<37	/U	<37	/U	<38.8	/U	<38.3	/U	<40.6	/U
PCB-1248		UG/KG	<39.2	/U	<37	/U	<37	/U	<38.8	/U	<38.3	/U	<40.6	/U
PCB-1254		UG/KG	24.3	Jq/J	<37	/U	<37	/U	<38.8	/U	<38.3	/U	<40.6	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0320 K1, 2'		SSDP0323 K3, 0'		SSDP0324 K3, 2'		SSDP0327 K13, 0'		SSDP0328 K13, 2'		SSDP0329 K16, 0'	
PCB-1260		UG/KG	<39.2	/U	<37	/U	<37	/U	<38.8	/U	<38.3	/U	<40.6	/U
Toxaphene		UG/KG	<196	/U	<185	/U	<185	/U	<194	/U	<192	/U	<203	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0330 K16, 2'		SSDP0331 K18, 0'		SSDP0332 K18, 2'		SSDP0332R K18, 2'	SSDP0333 K18, 2'		SSDP0333R K18, 2'
4,4'-DDD		UG/KG	1.1	Jq/JP	<3.9	/U	<4.2	/U	NA	<4	/U	NA
4,4'-DDE		UG/KG	3.6		<3.9	/U	<4.2	/U	NA	<4	/U	NA
4,4'-DDT		UG/KG	2.4	Jq/JP	<3.9	/U	<4.2	/U	NA	<4	/U	NA
Aldrin		UG/KG	<1.7	/U	<2	/U	<2.1	/U	NA	<2	/U	NA
alpha-BHC		UG/KG	<1.7	/U	<2	/U	<2.1	/U	NA	<2	/U	NA
alpha-Chlordane		UG/KG	<1.7	/U	3		<2.1	/U	NA	0.76	Jq/J	NA
beta-BHC		UG/KG	<1.7	/U	<2	/U	<2.1	/U	NA	<2	/U	NA
delta-BHC		UG/KG	<1.7	/U	<2	/U	<2.1	/U	NA	<2	/U	NA
Dieldrin		UG/KG	1.1	Jq/J	<3.9	/U	<4.2	/U	NA	<4	/U	NA
Endosulfan I		UG/KG	<1.7	/U	<2	/U	<2.1	/U	NA	<2	/U	NA
Endosulfan II		UG/KG	<3.4	/U	<3.9	/U	<4.2	/U	NA	<4	/U	NA
Endosulfan Sulfate		UG/KG	<3.4	/U	<3.9	/U	<4.2	/U	NA	<4	/U	NA
Endrin		UG/KG	<3.4	/U	<3.9	/U	<4.2	/U	NA	<4	/U	NA
Endrin Aldehyde		UG/KG	<3.4	/U	<3.9	/U	<4.2	/U	NA	<4	/U	NA
Endrin Ketone		UG/KG	<3.4	/U	<3.9	/U	<4.2	/U	NA	<4	/U	NA
Gamma-BHC		UG/KG	<1.7	/U	<2	/U	<2.1	/U	NA	<2	/U	NA
gamma-Chlordane		UG/KG	<1.7	/U	2.5		<2.1	/U	NA	0.58	Jq/J	NA
Heptachlor		UG/KG	<1.7	/U	<2	/U	<2.1	/U	NA	<2	/U	NA
Heptachlor Epoxide		UG/KG	<1.7	/U	<2	/U	<2.1	/U	NA	<2	/U	NA
Methoxychlor		UG/KG	<17	/U	<19.6	/U	<21.1	/U	NA	<20.1	/U	NA
PCB-1016		UG/KG	<34	/U	<39.2	/U	<42.2	/U	NA	<40.2	/U	NA
PCB-1221		UG/KG	<68	/U	<78.4	/U	<84.4	/U	NA	<80.3	/U	NA
PCB-1232		UG/KG	<34	/U	<39.2	/U	<42.2	/U	NA	<40.2	/U	NA
PCB-1242		UG/KG	<34	/U	<39.2	/U	<42.2	/U	NA	<40.2	/U	NA
PCB-1248		UG/KG	<34	/U	<39.2	/U	<42.2	/U	NA	<40.2	/U	NA
PCB-1254		UG/KG	<34	/U	<39.2	/U	<42.2	/U	NA	<40.2	/U	NA

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0330 K16, 2'		SSDP0331 K18, 0'		SSDP0332 K18, 2'		SSDP0332R K18, 2'	SSDP0333 K18, 2'		SSDP0333R K18, 2'
PCB-1260		UG/KG	<34	/U	<39.2	/U	<42.2	/U	NA	<40.2	/U	NA
Toxaphene		UG/KG	<170	/U	<196	/U	<211	/U	NA	<201	/U	NA

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0334 K28, 0'		SSDP0335 K28, 2'		SSDP0336 M3, 0'		SSDP0337 M3, 2'		SSDP0338 M17, 0'		SSDP0338D L1 M17, 0'	
4,4'-DDD		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.6	/U	NA		<18.1	/U
4,4'-DDE		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.6	/U	NA		6.4	Jq/J
4,4'-DDT		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.6	/U	NA		9.2	Jq/JP
Aldrin		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	NA		<9	/U
alpha-BHC		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	NA		<9	/U
alpha-Chlordane		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	NA		7.4	Jq/J
beta-BHC		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	<1.8	/U	<9	/U
delta-BHC		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	<1.8	/U	<9	/U
Dieldrin		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.6	/U	200	Jq/E	223	
Endosulfan I		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	<1.8	/U	<9	/U
Endosulfan II		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.6	/U	<3.6	/U	<18.1	/U
Endosulfan Sulfate		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.6	/U	<3.6	/U	<18.1	/U
Endrin		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.6	/U	NA		11.7	Jq/JP
Endrin Aldehyde		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.6	/U	<3.6	/U	<18.1	/U
Endrin Ketone		UG/KG	<3.8	/U	<4	/U	<3.9	/U	<3.6	/U	2.7	/J	3.5	Jq/J
Gamma-BHC		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	<1.8	/U	<9	/U
gamma-Chlordane		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	NA		6.4	Jq/J
Heptachlor		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	<1.8	/U	<9	/U
Heptachlor Epoxide		UG/KG	<1.9	/U	<2	/U	<1.9	/U	<1.8	/U	<1.8	/U	<9	/U
Methoxychlor		UG/KG	<19.2	/U	<19.8	/U	<19.4	/U	<17.9	/U	<18.1	/U	<90.6	/U
PCB-1016		UG/KG	<38.3	/U	<39.7	/U	<38.8	/U	<35.8	/U	<36.2	/U	<181	/U
PCB-1221		UG/KG	<76.6	/U	<79.4	/U	<77.5	/U	<71.7	/U	<72.5	/U	<362	/U
PCB-1232		UG/KG	<38.3	/U	<39.7	/U	<38.8	/U	<35.8	/U	<36.2	/U	<181	/U
PCB-1242		UG/KG	<38.3	/U	<39.7	/U	<38.8	/U	<35.8	/U	<36.2	/U	<181	/U
PCB-1248		UG/KG	<38.3	/U	<39.7	/U	<38.8	/U	<35.8	/U	<36.2	/U	<181	/U
PCB-1254		UG/KG	<38.3	/U	<39.7	/U	<38.8	/U	<35.8	/U	<36.2	/U	<181	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0334 K28, 0'		SSDP0335 K28, 2'		SSDP0336 M3, 0'		SSDP0337 M3, 2'		SSDP0338 M17, 0'		SSDP0338D L1 M17, 0'	
PCB-1260		UG/KG	<38.3	/U	<39.7	/U	<38.8	/U	<35.8	/U	<36.2	/U	<181	/U
Toxaphene		UG/KG	<192	/U	<198	/U	<194	/U	<179	/U	<181	/U	<906	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0339 M17, 0'		SSDP0340 M17, 2'		SSDP0341 M12, 0'		SSDP0342 M12, 2'		SSDP0343 M22, 0'		SSDP0344 M22, 2'	
4,4'-DDD		UG/KG	<3.8	/U	<3.7	/U	<3.9	/U	1.6	Jq/JP	3.3	Jq/J	1.5	Jq/JP
4,4'-DDE		UG/KG	<3.8	/U	<3.7	/U	<3.9	/U	<3.9	/U	<3.9	/U	<4	/U
4,4'-DDT		UG/KG	<3.8	/U	<3.7	/U	<3.9	/U	<3.9	/U	<3.9	/U	<4	/U
Aldrin		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	<2	/U
alpha-BHC		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	<2	/U
alpha-Chlordane		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	0.74	Jq/J
beta-BHC		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	<2	/U
delta-BHC		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	<2	/U
Dieldrin		UG/KG	<3.8	UJf/U	<3.7	/U	0.98	Jq/JP	<3.9	/U	2.2	Jq/J	2.7	Jq/J
Endosulfan I		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	<2	/U
Endosulfan II		UG/KG	<3.8	/U	<3.7	/U	<3.9	/U	<3.9	/U	<3.9	/U	<4	/U
Endosulfan Sulfate		UG/KG	<3.8	/U	<3.7	/U	<3.9	/U	<3.9	/U	<3.9	/U	<4	/U
Endrin		UG/KG	<3.8	/U	<3.7	/U	<3.9	/U	<3.9	/U	<3.9	/U	1.7	Jq/JP
Endrin Aldehyde		UG/KG	<3.8	/U	<3.7	/U	<3.9	/U	<3.9	/U	<3.9	/U	<4	/U
Endrin Ketone		UG/KG	<3.8	/U	<3.7	/U	<3.9	/U	<3.9	/U	<3.9	/U	<4	/U
Gamma-BHC		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	<2	/U
gamma-Chlordane		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	0.64	Jq/J
Heptachlor		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	<2	/U
Heptachlor Epoxide		UG/KG	<1.9	/U	<1.8	/U	<2	/U	<2	/U	<2	/U	<2	/U
Methoxychlor		UG/KG	<18.9	/U	<18.3	/U	<19.6	/U	<19.6	/U	<19.6	/U	<19.8	/U
PCB-1016		UG/KG	<37.9	/U	<36.6	/U	<39.2	/U	<39.2	/U	<39.2	/U	<39.7	/U
PCB-1221		UG/KG	<75.8	/U	<73.3	/U	<78.4	/U	<78.4	/U	<78.4	/U	<79.4	/U
PCB-1232		UG/KG	<37.9	/U	<36.6	/U	<39.2	/U	<39.2	/U	<39.2	/U	<39.7	/U
PCB-1242		UG/KG	<37.9	/U	<36.6	/U	<39.2	/U	<39.2	/U	<39.2	/U	<39.7	/U
PCB-1248		UG/KG	<37.9	/U	<36.6	/U	<39.2	/U	<39.2	/U	<39.2	/U	<39.7	/U
PCB-1254		UG/KG	<37.9	/U	<36.6	/U	<39.2	/U	<39.2	/U	<39.2	/U	<39.7	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0339 M17, 0'		SSDP0340 M17, 2'		SSDP0341 M12, 0'		SSDP0342 M12, 2'		SSDP0343 M22, 0'		SSDP0344 M22, 2'	
PCB-1260		UG/KG	<37.9	/U	<36.6	/U	<39.2	/U	<39.2	/U	<39.2	/U	<39.7	/U
Toxaphene		UG/KG	<189	/U	<183	/U	<196	/U	<196	/U	<196	/U	<198	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

Location Date	Background Level	UNITS	SSDP0345 M22, 2'		SSDP0346 K19, 0'		SSDP0346DL1 K19, 0'	
4,4'-DDD		UG/KG	1.8	Jq/JP	<3.7	/U	<7.5	/U
4,4'-DDE		UG/KG	<3.7	/U	<3.7	/U	<7.5	/U
4,4'-DDT		UG/KG	3.9	J/P	<3.7	/U	<7.5	/U
Aldrin		UG/KG	<1.9	/U	<1.9	/U	<3.7	/U
alpha-BHC		UG/KG	<1.9	/U	<1.9	/U	<3.7	/U
alpha-Chlordane		UG/KG	1.8	Jq/J	47.2	Jq/E	47.8	
beta-BHC		UG/KG	<1.9	/U	<1.9	/U	<3.7	/U
delta-BHC		UG/KG	<1.9	/U	<1.9	/U	<3.7	/U
Dieldrin		UG/KG	41.4		<3.7	/U	<7.5	/U
Endosulfan I		UG/KG	<1.9	/U	<1.9	/U	<3.7	/U
Endosulfan II		UG/KG	<3.7	/U	<3.7	/U	<7.5	/U
Endosulfan Sulfate		UG/KG	<3.7	/U	<3.7	/U	<7.5	/U
Endrin		UG/KG	6.2		<3.7	/U	<7.5	/U
Endrin Aldehyde		UG/KG	<3.7	/U	<3.7	/U	<7.5	/U
Endrin Ketone		UG/KG	<3.7	/U	<3.7	/U	<7.5	/U
Gamma-BHC		UG/KG	<1.9	/U	<1.9	/U	<3.7	/U
gamma-Chlordane		UG/KG	1.9		42.7	Jq/E	43.4	
Heptachlor		UG/KG	<1.9	/U	<1.9	/U	<3.7	/U
Heptachlor Epoxide		UG/KG	<1.9	/U	<1.9	/U	<3.7	/U
Methoxychlor		UG/KG	<18.7	/U	<18.7	/U	<37.4	/U
PCB-1016		UG/KG	<37.4	/U	<37.4	/U	<74.9	/U
PCB-1221		UG/KG	<74.9	/U	<74.9	/U	<150	/U
PCB-1232		UG/KG	<37.4	/U	<37.4	/U	<74.9	/U
PCB-1242		UG/KG	<37.4	/U	<37.4	/U	<74.9	/U
PCB-1248		UG/KG	<37.4	/U	<37.4	/U	<74.9	/U
PCB-1254		UG/KG	<37.4	/U	<37.4	/U	<74.9	/U
PCB-1260		UG/KG	<37.4	/U	<37.4	/U	<74.9	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

Location Date	Background Level	UNITS	SSDP0345 M22, 2 '		SSDP0346 K19, 0'		SSDP0346DL1 K19, 0'	
Toxaphene		UG/KG	<187	/U	<187	/U	<374	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0347 K19, 2'	
4,4'-DDD		UG/KG	<3.4	/U
4,4'-DDE		UG/KG	<3.4	/U
4,4'-DDT		UG/KG	<3.4	/U
Aldrin		UG/KG	<1.7	/U
alpha-BHC		UG/KG	<1.7	/U
alpha-Chlordane		UG/KG	3.5	
beta-BHC		UG/KG	<1.7	/U
delta-BHC		UG/KG	<1.7	/U
Dieldrin		UG/KG	<3.4	/U
Endosulfan I		UG/KG	<1.7	/U
Endosulfan II		UG/KG	<3.4	/U
Endosulfan Sulfate		UG/KG	<3.4	/U
Endrin		UG/KG	<3.4	/U
Endrin Aldehyde		UG/KG	<3.4	/U
Endrin Ketone		UG/KG	<3.4	/U
Gamma-BHC		UG/KG	<1.7	/U
gamma-Chlordane		UG/KG	3.4	
Heptachlor		UG/KG	<1.7	/U
Heptachlor Epoxide		UG/KG	<1.7	/U
Methoxychlor		UG/KG	<17.2	/U
PCB-1016		UG/KG	<34.4	/U
PCB-1221		UG/KG	<68.7	/U
PCB-1232		UG/KG	<34.4	/U
PCB-1242		UG/KG	<34.4	/U
PCB-1248		UG/KG	<34.4	/U
PCB-1254		UG/KG	<34.4	/U
PCB-1260		UG/KG	<34.4	/U

Table B1.2
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Pesticides by CLP

	Background Level	UNITS	SSDP0347 K19, 2'	
Toxaphene		UG/KG	<172	/U

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	CSDP0001 M30/31, 0 '			CSDP0002 M30/31, 0 '			CSDP0003 M31/32, 0 '			CSDP0003R , '		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Radium-226	0.752	PCI/G	[redacted]	0.125	0.0215	[redacted]	0.247	0.049	0.581	0.0794	0.0234	---	---	---
Strontium-90	0.056	PCI/G	0.0139 /U	0.0336	0.0545	0.0044 UJd/U	0.0359	0.05	[redacted] Jd/	0.0367	0.0425	[redacted]	0.0312	0.0336

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	CSDP0004 M31, 0 '			CSDP0005 L3/2, 0 '			CSDP0005R , '			CSDP0006 L3/4, 0 '		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Radium-226	0.752	PCI/G	0.269	0.0489	0.0238	0.354	0.0635	0.0312	---	---	---	0.327	0.0491	0.0214
Strontium-90	0.056	PCI/G	-0.0053 /U	0.0284	0.0468	[redacted] Jd/	0.102	0.0492	[redacted]	0.148	0.054	[redacted] Jd/	0.0415	0.0338

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	CSDP0006R , '			GSDP0001 M8, 0 '			GSDP0002 M13, 0 '			GSDP0003 M27, 0 '		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Radium-226	0.752	PCI/G	---	---	---	0.225	0.0365	0.0198	0.291	0.0442	0.0196	0.303	0.0473	0.021
Strontium-90	0.056	PCI/G	[redacted]	0.0812	0.0587	-0.0128 /U	0.0164	0.0274	-0.024 /U	0.0228	0.0349	-0.016 /U	0.0231	0.0351

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	GSDP0004 L2, 0'			GSDP0005 L3, 0'			GSDP0006 L13, 0'			GSDP0007 L18, 0'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Radium-226	0.752	PCI/G	0.338	0.0521	0.0223	0.273	0.0415	0.0185	0.246	0.0435	0.019	0.309	0.0476	0.0196
Strontium-90	0.056	PCI/G	[redacted]	0.0201	0.025	0.0145 /U	0.0187	0.0299	0.0043 /U	0.0149	0.0241	0.0024 /U	0.0211	0.0315

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	GSDP0008 L21, 0'			GSDP0009 K1, 0'			GSDP0010 K10, 0'			GSDP0011 K10, 0'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Radium-226	0.752	PCI/G	0.316	0.048	0.0194	0.272	0.0442	0.0187	0.345	0.0479	0.0204	0.255	0.0517	0.0216
Strontium-90	0.056	PCI/G	0.0009 /U	0.0161	0.0299	-0.0076 /U	0.0185	0.0307	0.0031 /U	0.0187	0.0304	0.016 /U	0.0196	0.0289

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	GSDP0012 K10, 0'			GSDP0013 K18, 0'			GSDP0014 M3, 0'			GSDP0015 M12, 0'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Radium-226	0.752	PCI/G	0.298	0.0555	0.0262	0.251	0.0405	0.0176	0.281	0.0467	0.0185	0.36	0.0502	0.021
Strontium-90	0.056	PCI/G	0.0242 /U	0.0195	0.0345	0.0324 /J	0.0171	0.0264	-0.0076 /U	0.0204	0.0337	-0.0034 /U	0.019	0.0313

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	GSDP0016 M22, 0'			GSDP0017 K19, 0'			SSDP0302 M8, 0'			SSDP0303 M8, 2'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Actinium-228	0.633	PCI/G	---	---	---	---	---	---	0.482	0.0698	0.0171	0.464	0.0675	0.0178
Bismuth-212	0.388	PCI/G	---	---	---	---	---	---	0.309	0.057	0.034	0.285	0.0537	0.0375
Bismuth-214	0.54	PCI/G	---	---	---	---	---	---	0.394	0.0443	0.008	0.376	0.0436	0.0083
Carbon-14	0.13	PCI/G	---	---	---	---	---	---	-0.0045 /U	0.0381	0.0648	-0.0043 /U	0.0413	0.0704
Cesium-137	0.102	PCI/G	---	---	---	---	---	---	0.0705	0.0083	0.0045	0.0178	0.0057	0.0047
Cobalt-60	0.006	PCI/G	---	---	---	---	---	---	-0.0001 /U	0.0029	0.0051	0.0022 /U	0.0036	0.0056
Gross Alpha	7.42	PCI/G	---	---	---	---	---	---	[redacted]	2.57	1.62	6.08	2.08	1.61
Lead-210	1.6	PCI/G	---	---	---	---	---	---	0.0737 /U	0.663	0.701	0.451 /U	0.593	0.675
Lead-212	0.691	PCI/G	---	---	---	---	---	---	0.511	0.0543	0.0073	0.465	0.0486	0.0076
Lead-214	0.682	PCI/G	---	---	---	---	---	---	0.456	0.0506	0.0085	0.414	0.0462	0.009
Nonvolatile Beta	15	PCI/G	---	---	---	---	---	---	[redacted]	2.08	2.59	13.3	1.87	2.23
Potassium-40	14	PCI/G	---	---	---	---	---	---	12.3	1.27	0.0369	10.6	1.11	0.0465
Radium-223		PCI/G	---	---	---	---	---	---	0.011 /U	0.0543	0.0842	-0.006 /U	0.0538	0.0859
Radium-226	0.752	PCI/G	0.396	0.0631	0.0242	0.196	0.0317	0.0153	0.734	0.105	0.0354	0.437	0.0723	0.0308
Radium-228	0.63	PCI/G	---	---	---	---	---	---	0.482	0.0698	0.0171	0.464	0.0675	0.0178
Strontium-90	0.056	PCI/G	-0.0212 UJd/U	0.0325	0.046	-0.125 UJd/U	0.0313	0.0464	-0.0044 /U	0.025	0.0411	-0.0023 /U	0.0268	0.044
Thallium-208	0.204	PCI/G	---	---	---	---	---	---	0.156	0.0172	0.0043	0.147	0.0171	0.0046
Thorium-228	0.627	PCI/G	---	---	---	---	---	---	0.325	0.198	0.3	0.313	0.188	0.28
Thorium-230	1.04	PCI/G	---	---	---	---	---	---	0.979	0.285	0.17	0.544	0.195	0.128
Thorium-232	0.63	PCI/G	---	---	---	---	---	---	0.469	0.176	0.0414	[redacted]	0.253	0.116
Thorium-234	0.78	PCI/G	---	---	---	---	---	---	0.448 /J	0.264	0.212	0.625	0.25	0.206
Tritium	1.2	PCI/G	---	---	---	---	---	---	0.0 /U	0.48	1.01	[redacted]	0.545	0.997
Uranium-233/234	0.559	PCI/G	---	---	---	---	---	---	0.513	0.0668	0.0087	0.441	0.0605	0.0133
Uranium-235	0.0638	PCI/G	---	---	---	---	---	---	0.0212	0.0122	0.0144	0.021	0.0104	0.009
Uranium-238	0.565	PCI/G	---	---	---	---	---	---	0.529	0.0686	0.0129	0.439	0.06	0.009

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0303R M8, 2'			SSDP0304 M13, 0'			SSDP0305 M13, 2'			SSDP0306 M27, 0'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Actinium-228	0.633	PCI/G	---	---	---	0.443	0.0637	0.0151	0.424	0.0606	0.017	0.53	0.0794	0.0168
Bismuth-212	0.388	PCI/G	---	---	---	0.263	0.0467	0.033	0.257	0.0636	0.0368	0.353	0.0619	0.0338
Bismuth-214	0.54	PCI/G	---	---	---	0.364	0.042	0.0077	0.391	0.0712	0.0089	0.412	0.0462	0.008
Carbon-14	0.13	PCI/G	---	---	---	0.0049 /U	0.0474	0.0804	-0.0005 /U	0.0385	0.0656	0.0017 /U	0.0433	0.0736
Cesium-137	0.102	PCI/G	---	---	---	[redacted]	0.0138	0.0043	0.0245	0.0062	0.0046	0.0124	0.0046	0.0046
Cobalt-60	0.006	PCI/G	---	---	---	0.0001 /U	0.0027	0.0048	0.0001 /U	0.0029	0.005	-0.0014 /U	0.0033	0.005
Gross Alpha	7.42	PCI/G	---	---	---	6.66	2.3	2.46	6.03	2.07	1.34	7.06	2.35	2.33
Lead-210	1.6	PCI/G	---	---	---	0.847	0.602	0.695	0.536 /U	0.635	0.656	0.37 /U	1.21	2
Lead-212	0.691	PCI/G	---	---	---	0.478	0.0498	0.0074	0.444	0.0536	0.0071	0.563	0.062	0.0079
Lead-214	0.682	PCI/G	---	---	---	0.436	0.048	0.0085	0.428	0.0567	0.009	0.475	0.0533	0.0085
Nonvolatile Beta	15	PCI/G	---	---	---	15	2.07	2.62	[redacted]	2.02	2.25	14.7	2.08	2.7
Potassium-40	14	PCI/G	---	---	---	11.2	1.15	0.0376	10.6	1.23	0.0392	12.3	1.39	0.0407
Radium-223		PCI/G	---	---	---	-0.0158 /U	0.0528	0.0821	0.0124 /U	0.0504	0.0859	-0.027 /U	0.0564	0.086
Radium-226	0.752	PCI/G	---	---	---	0.483	0.0711	0.0314	0.424	0.0705	0.029	0.511	0.0767	0.0305
Radium-228	0.63	PCI/G	---	---	---	0.443	0.0637	0.0151	0.424	0.0606	0.017	0.53	0.0794	0.0168
Strontium-90	0.056	PCI/G	---	---	---	0.0473 /J	0.0181	0.0274	-0.0002 /U	0.0301	0.0493	0.016 /U	0.02	0.032
Thallium-208	0.204	PCI/G	---	---	---	0.143	0.0162	0.0042	0.154	0.027	0.0049	0.174	0.0187	0.0043
Thorium-228	0.627	PCI/G	---	---	---	0.379	0.183	0.244	0.518	0.212	0.225	0.514	0.204	0.244
Thorium-230	1.04	PCI/G	---	---	---	0.345	0.144	0.114	0.891	0.262	0.0871	0.585	0.178	0.0722
Thorium-232	0.63	PCI/G	---	---	---	0.357	0.144	0.0914	0.311	0.141	0.0871	[redacted]	0.187	0.0722
Thorium-234	0.78	PCI/G	---	---	---	0.566	0.236	0.209	0.774	0.325	0.23	0.563	0.359	0.317
Tritium	1.2	PCI/G	-0.241 /U	0.5	0.884	0.134 /U	0.493	0.993	-0.142 /U	0.504	1.05	-0.256 /U	0.461	0.951
Uranium-233/234	0.559	PCI/G	---	---	---	0.386	0.0554	0.0033	0.388	0.0522	0.0028	0.422	0.0594	0.0153
Uranium-235	0.0638	PCI/G	---	---	---	0.0096 /J	0.0077	0.0094	0.0323	0.0113	0.0028	0.0325	0.013	0.0093
Uranium-238	0.565	PCI/G	---	---	---	0.41	0.0582	0.0138	0.406	0.0541	0.0078	0.484	0.0652	0.0093

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0307 M27, 2'			SSDP0308 L2, 0'			SSDP0309 L2, 2'			SSDP0310 L3, 0'		
			Value		Uncert	MDA	Value		Uncert	MDA	Value		Uncert	MDA	Value		Uncert	MDA
Actinium-228	0.633	PCI/G	0.585		0.086	0.0173	0.476		0.0692	0.0153	0.527		0.0793	0.0177	0.502		0.0653	0.0194
Bismuth-212	0.388	PCI/G	0.369		0.0605	0.0372	0.311		0.0503	0.0315	0.341		0.063	0.0374	0.342		0.0636	0.0405
Bismuth-214	0.54	PCI/G	0.444		0.0503	0.0083	0.36		0.0411	0.0077	0.424		0.0487	0.009	0.413		0.0532	0.0092
Carbon-14	0.13	PCI/G	0.0482	/U	0.0495	0.0831	-0.0098	/U	0.0375	0.0641	0.0066	/U	0.039	0.0661	-0.0246	/U	0.047	0.0806
Cesium-137	0.102	PCI/G	0.0079	/J	0.0046	0.0048	0.008	/J	0.0035	0.0041	0.0225		0.0051	0.0047	0.0029	/U	0.0036	0.0056
Cobalt-60	0.006	PCI/G	0.0013	/U	0.0031	0.0055	-0.0002	/U	0.0027	0.0047	0.0014	/U	0.0032	0.0058	-0.0006	/U	0.0033	0.0057
Gross Alpha	7.42	PCI/G	[redacted]		2.68	3.08	[redacted]		2.68	2.47	5.2		2.16	2.51	6.78		2.26	1.91
Lead-210	1.6	PCI/G	0.709	/U	0.709	0.72	0.167	/U	0.91	0.921	0.562	/U	0.7	1.13	0.356	/J	0.112	0.0941
Lead-212	0.691	PCI/G	0.601		0.0629	0.0079	0.523		0.0579	0.0074	0.574		0.0599	0.0079	0.516		0.0561	0.0077
Lead-214	0.682	PCI/G	0.501		0.0555	0.0094	0.419		0.0463	0.0081	0.496		0.0558	0.0093	0.451		0.0504	0.0093
Nonvolatile Beta	15	PCI/G	15		2.11	2.68	14.9		2.02	2.4	14.1		2.15	2.75	14.1		2.09	2.44
Potassium-40	14	PCI/G	12.5		1.33	0.0416	11.4		1.26	0.0356	11.9		1.37	0.0416	12.4		1.22	0.0403
Radium-223		PCI/G	0.0019	/U	0.0584	0.0897	-0.0054	/U	0.0525	0.0806	-0.0061	/U	0.0582	0.0893	0.026	/U	0.0601	0.0908
Radium-226	0.752	PCI/G	0.517		0.0872	0.0362	0.553		0.0926	0.0401	0.563		0.091	0.0311	0.48		0.0705	0.031
Radium-228	0.63	PCI/G	0.585		0.086	0.0173	0.476		0.0692	0.0153	0.527		0.0793	0.0177	0.502		0.0653	0.0194
Strontium-90	0.056	PCI/G	0.0037	/U	0.0145	0.0236	[redacted]		0.0249	0.0341	[redacted]		0.024	0.0343	[redacted]		0.0333	0.0491
Thallium-208	0.204	PCI/G	0.182		0.0196	0.0048	0.156		0.0168	0.004	0.172		0.0187	0.0048	0.169		0.021	0.005
Thorium-228	0.627	PCI/G	0.55		0.196	0.208	0.543		0.236	0.297	0.48		0.182	0.19	0.339		0.174	0.241
Thorium-230	1.04	PCI/G	0.428		0.149	0.0983	0.621		0.204	0.123	0.754		0.214	0.131	0.465		0.154	0.0713
Thorium-232	0.63	PCI/G	0.393		0.139	0.0694	0.422		0.165	0.123	0.597		0.181	0.089	0.375		0.138	0.0881
Thorium-234	0.78	PCI/G	0.577		0.288	0.221	0.634		0.259	0.219	0.506		0.271	0.271	0.559		0.162	0.106
Tritium	1.2	PCI/G	-0.528	/U	0.462	0.979	-0.268	/U	0.465	0.995	0.0	/U	0.476	0.981	-0.132	/U	0.481	0.98
Uranium-233/234	0.559	PCI/G	0.482		0.0607	0.0074	0.441		0.0611	0.0095	0.506		0.0694	0.0102	0.417		0.0584	0.0117
Uranium-235	0.0638	PCI/G	0.0225		0.0097	0.0074	0.0325		0.0125	0.0034	0.0375		0.0139	0.0036	0.0274		0.0113	0.0033
Uranium-238	0.565	PCI/G	0.436		0.0563	0.0074	0.438		0.0613	0.0155	0.462		0.0647	0.0036	0.394		0.0561	0.0117

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0311 L3, 2'			SSDP0312 L13, 0'			SSDP0313 L13, 2'			SSDP0314 L18, 0'		
			Value		Uncert MDA	Value		Uncert MDA	Value		Uncert MDA	Value		Uncert MDA
Actinium-228	0.633	PCI/G	0.466		0.0728 0.0155	0.425		0.0618 0.0156	0.508		0.0731 0.017	0.594		0.0807 0.0269
Bismuth-212	0.388	PCI/G	0.283		0.0496 0.0319	0.303		0.0484 0.0315	0.326		0.0567 0.0355	[illegible]		0.086 0.0589
Bismuth-214	0.54	PCI/G	0.393		0.0446 0.0074	0.411		0.0464 0.0074	0.449		0.0507 0.0081	[illegible]		0.0846 0.0137
Carbon-14	0.13	PCI/G	-0.0196	/U	0.0374 0.0641	0.0837	/J	0.039 0.0643	0.0606	/U	0.0372 0.0619	0.0496	/U	0.0377 0.063
Cesium-137	0.102	PCI/G	0.0071	/J	0.0048 0.0042	0.0307		0.0052 0.0041	0.0058	/J	0.0045 0.0046	0.0135		0.0062 0.0074
Cobalt-60	0.006	PCI/G	-0.0031	/U	0.0028 0.0047	-0.0006	/U	0.0031 0.0047	-0.0018	/U	0.0031 0.0053	-0.0017	/U	0.0045 0.0077
Gross Alpha	7.42	PCI/G	6.82		2.44 2.84	5.03		1.93 1.73	[illegible]		2.52 2.36	[illegible]		2.83 2.75
Lead-210	1.6	PCI/G	0.901	/U	1.22 1.15	0.653	/U	0.801 0.89	0.492	/U	0.72 0.721	0.704	/U	0.728 0.828
Lead-212	0.691	PCI/G	0.483		0.0511 0.0073	0.471		0.0524 0.0071	0.54		0.0559 0.0075	0.639		0.0696 0.0114
Lead-214	0.682	PCI/G	0.451		0.0502 0.0079	0.484		0.0531 0.0081	0.511		0.0563 0.0088	0.607		0.0739 0.014
Nonvolatile Beta	15	PCI/G	13.5		2.2 3.11	[illegible]		2.09 2.69	[illegible]		2.18 2.91	[illegible]		2.23 2.96
Potassium-40	14	PCI/G	12.2		1.42 0.0356	11.2		1.24 0.0345	11.8		1.21 0.0386	12.6		1.35 0.0637
Radium-223		PCI/G	0.0556	/U	0.0555 0.0766	-0.0461	/U	0.0477 0.0799	-0.0145	/U	0.0559 0.0841	-0.22	/U	0.0906 0.132
Radium-226	0.752	PCI/G	0.55		0.0918 0.0369	0.428		0.0669 0.0286	0.574		0.0925 0.0468	0.588		0.0944 0.0347
Radium-228	0.63	PCI/G	0.466		0.0728 0.0155	0.425		0.0618 0.0156	0.508		0.0731 0.017	0.594		0.0807 0.0269
Strontium-90	0.056	PCI/G	[illegible]		0.0284 0.0449	0.0093	/U	0.0103 0.0165	0.023	/J	0.0095 0.0145	0.0299	/J	0.0129 0.0198
Thallium-208	0.204	PCI/G	0.151		0.0166 0.004	0.141		0.0156 0.004	0.171		0.0187 0.0044	[illegible]		0.0316 0.0075
Thorium-228	0.627	PCI/G	0.284		0.16 0.228	0.471		0.171 0.184	0.225		0.135 0.196	[illegible]		0.24 0.271
Thorium-230	1.04	PCI/G	0.441		0.154 0.117	0.536		0.16 0.0626	0.492		0.155 0.0654	0.601		0.197 0.153
Thorium-232	0.63	PCI/G	0.33		0.125 0.0689	0.343		0.125 0.0769	0.44		0.144 0.0293	0.567		0.18 0.034
Thorium-234	0.78	PCI/G	0.378	/J	0.257 0.248	0.497	/J	0.239 0.214	0.568		0.258 0.219	0.714		0.453 0.34
Tritium	1.2	PCI/G	-0.129	/U	0.471 0.96	-0.838	/U	0.52 1.1	-0.549	/U	0.536 1.09	-0.878	/U	0.514 1.16
Uranium-233/234	0.559	PCI/G	0.366		0.0521 0.0087	0.397		0.0509 0.0083	0.5		0.0629 0.0111	0.487		0.0608 0.0092
Uranium-235	0.0638	PCI/G	0.0383		0.0131 0.0031	0.021		0.0083 0.0023	0.0193		0.0091 0.0076	0.0299		0.0118 0.0107
Uranium-238	0.565	PCI/G	0.354		0.0507 0.0031	0.405		0.0515 0.0023	0.502		0.0629 0.0027	0.486		0.0607 0.0073

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0315 L18, 2'			SSDP0316 L21, 0'			SSDP0318 K1, 0'			SSDP0319 K1, 0'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Actinium-228	0.633	PCI/G	0.505	0.0772	0.0167	0.618	0.0884	0.0192	0.503	0.071	0.017	0.458	0.068	0.0159
Bismuth-212	0.388	PCI/G	0.281	0.0536	0.0355	0.341	0.0613	0.0396	0.307	0.0672	0.0365	0.301	0.0508	0.0338
Bismuth-214	0.54	PCI/G	0.438	0.0485	0.0081	0.493	0.056	0.0091	0.465	0.0841	0.0087	0.431	0.0489	0.0079
Carbon-14	0.13	PCI/G	0.0367 /U	0.0364	0.061	0.0849 /J	0.0393	0.0648	0.0655 /J	0.0387	0.0642	0.101	0.0441	0.0726
Cesium-137	0.102	PCI/G	0.0048 /J	0.0043	0.0046	0.0087 /J	0.0042	0.0054	[redacted]	0.0332	0.005	[redacted]	0.0152	0.0043
Cobalt-60	0.006	PCI/G	-0.0024 /U	0.003	0.0052	-0.0005 /U	0.0034	0.0059	-0.0011 /U	0.0027	0.0047	0.0036 /U	0.0072	0.0049
Gross Alpha	7.42	PCI/G	6.63	2.15	1.63	6.85	2.33	2.33	7.3	2.3	1.89	6.65	2.17	1.69
Lead-210	1.6	PCI/G	-0.713 /U	1.15	1.79	0.785 /U	0.702	0.809	0.35 /U	0.416	0.67	0.403 /U	0.622	0.672
Lead-212	0.691	PCI/G	0.518	0.0571	0.009	0.648	0.0671	0.0086	0.48	0.0579	0.0077	0.512	0.0538	0.0075
Lead-214	0.682	PCI/G	0.504	0.056	0.0097	0.579	0.0628	0.0099	0.515	0.0676	0.0089	0.484	0.0536	0.0087
Nonvolatile Beta	15	PCI/G	11.9	1.94	2.75	[redacted]	2.21	2.85	12.9	1.97	2.67	13.9	2.04	2.7
Potassium-40	14	PCI/G	12.6	1.51	0.0432	13.9	1.43	0.0435	11.5	1.33	0.037	11.5	1.22	0.0378
Radium-223		PCI/G	0.0031 /U	0.0505	0.0865	0.0324 /U	0.0633	0.0978	0.0023 /U	0.0569	0.0868	-0.0558 /U	0.0547	0.0816
Radium-226	0.752	PCI/G	0.403	0.066	0.0281	0.653	0.107	0.0398	0.544	0.0815	0.0359	0.476	0.0785	0.0388
Radium-228	0.63	PCI/G	0.505	0.0772	0.0167	0.618	0.0884	0.0192	0.503	0.071	0.017	0.458	0.068	0.0159
Strontium-90	0.056	PCI/G	0.0113 /U	0.0128	0.0204	0.0133 /U	0.0123	0.0196	0.0276 /J	0.0104	0.0158	[redacted]	0.014	0.0161
Thallium-208	0.204	PCI/G	0.15	0.0164	0.0043	0.198	0.0217	0.0048	0.167	0.0291	0.0053	0.155	0.0168	0.0045
Thorium-228	0.627	PCI/G	0.365	0.17	0.227	[redacted]	0.234	0.236	[redacted]	0.21	0.193	0.358	0.176	0.241
Thorium-230	1.04	PCI/G	0.464	0.154	0.102	0.614	0.187	0.109	0.498	0.171	0.122	0.595	0.181	0.0977
Thorium-232	0.63	PCI/G	0.333	0.128	0.0919	0.553	0.174	0.0863	0.321	0.139	0.138	0.452	0.152	0.0696
Thorium-234	0.78	PCI/G	0.6	0.355	0.299	0.727	0.282	0.249	0.681	0.3	0.23	0.559	0.267	0.204
Tritium	1.2	PCI/G	-1.02 /U	0.519	1.15	-0.583 /U	0.518	1.15	-0.698 /U	0.514	1.1	-0.872 /U	0.523	1.15
Uranium-233/234	0.559	PCI/G	0.389	0.0478	0.002	0.512	0.0614	0.0023	0.422	0.0525	0.008	0.442	0.0519	0.0101
Uranium-235	0.0638	PCI/G	0.03	0.0095	0.0021	0.0272	0.0095	0.0023	0.0184	0.0081	0.0063	0.0243	0.0087	0.0066
Uranium-238	0.565	PCI/G	0.408	0.0496	0.002	0.549	0.065	0.0083	0.413	0.0515	0.0063	0.372	0.0453	0.0086

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0320 K1, 2'			SSDP0323 K3, 0'			SSDP0324 K3, 2'			SSDP0327 K13, 0'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Actinium-228	0.633	PCI/G	0.431	0.066	0.0209	0.53	0.076	0.0159	0.473	0.0732	0.0181	0.426	0.0563	0.0162
Bismuth-212	0.388	PCI/G	0.271	0.0579	0.0422	0.316	0.0554	0.0347	0.297	0.0545	0.0396	0.281	0.0501	0.0348
Bismuth-214	0.54	PCI/G	0.391	0.0459	0.0103	0.46	0.0517	0.0082	0.443	0.0508	0.009	0.408	0.0527	0.008
Carbon-14	0.13	PCI/G	0.0872 /J	0.0381	0.0627	0.029 /U	0.0363	0.0611	0.0895 /J	0.0379	0.0623	0.0199 /U	0.0366	0.0619
Cesium-137	0.102	PCI/G	[redacted]	0.0204	0.006	0.0358	0.0054	0.0045	0.0685	0.0085	0.0051	0.0391	0.0069	0.0045
Cobalt-60	0.006	PCI/G	-0.0024 /U	0.0037	0.0061	-0.0014 /U	0.0029	0.005	0.0017 /U	0.003	0.0058	-0.0014 /U	0.0028	0.005
Gross Alpha	7.42	PCI/G	4.02	1.96	2.67	7.27	2.47	2.39	6.72	2.41	2.53	[redacted]	2.47	2.29
Lead-210	1.6	PCI/G	0.132 /U	0.785	0.75	0.753	0.712	0.727	0.882 /U	0.94	1.11	0.364 /J	0.106	0.0862
Lead-212	0.691	PCI/G	0.44	0.0465	0.0086	0.563	0.0597	0.0075	0.487	0.0512	0.0083	0.465	0.0506	0.0071
Lead-214	0.682	PCI/G	0.463	0.0521	0.0103	0.532	0.0585	0.0087	0.494	0.0556	0.0098	0.46	0.0513	0.0084
Nonvolatile Beta	15	PCI/G	14.9	2.15	2.9	[redacted]	2.1	2.55	[redacted]	2.14	2.69	12.7	2.02	2.85
Potassium-40	14	PCI/G	11.3	1.19	0.0548	12.1	1.25	0.0384	12.2	1.41	0.0416	9.74	0.955	0.0365
Radium-223		PCI/G	-0.11 /U	0.0611	0.0992	-0.0798 /U	0.0528	0.0857	0.0627 /U	0.0784	0.0949	0.0316 /U	0.0528	0.0815
Radium-226	0.752	PCI/G	0.422	0.0721	0.0377	0.484	0.0763	0.0316	0.439	0.0771	0.0392	0.44	0.0699	0.0287
Radium-228	0.63	PCI/G	0.431	0.066	0.0209	0.53	0.076	0.0159	0.473	0.0732	0.0181	0.426	0.0563	0.0162
Strontium-90	0.056	PCI/G	0.0521	0.012	0.0172	0.0163 /U	0.0113	0.0176	-0.0133 /U	0.0208	0.0317	0.0412 /J	0.0116	0.017
Thallium-208	0.204	PCI/G	0.14	0.0167	0.0056	0.172	0.0184	0.0045	0.159	0.0185	0.0047	0.156	0.0192	0.0044
Thorium-228	0.627	PCI/G	0.357	0.147	0.158	0.584	0.205	0.195	0.405	0.166	0.199	0.52	0.178	0.162
Thorium-230	1.04	PCI/G	0.442	0.149	0.0917	0.698	0.207	0.0928	0.494	0.155	0.0784	0.538	0.167	0.0821
Thorium-232	0.63	PCI/G	0.294	0.115	0.0294	0.441	0.155	0.0339	0.389	0.135	0.0784	0.404	0.14	0.0669
Thorium-234	0.78	PCI/G	0.612	0.25	0.227	0.523	0.277	0.216	0.741	0.345	0.269	0.499 /J	0.154	0.097
Tritium	1.2	PCI/G	-1.01 /U	0.515	1.15	-0.547 /U	0.533	1.08	-0.691 /U	0.533	1.09	-0.998 /U	0.513	1.13
Uranium-233/234	0.559	PCI/G	0.397	0.0482	0.0116	0.365	0.046	0.0135	0.43	0.0511	0.0069	0.427	0.0513	0.012
Uranium-235	0.0638	PCI/G	0.0188	0.0081	0.0078	0.0219	0.0083	0.0057	0.0205	0.0085	0.008	0.0182	0.0082	0.0081
Uranium-238	0.565	PCI/G	0.415	0.0496	0.0067	0.378	0.0467	0.0072	0.438	0.0517	0.0019	0.443	0.0523	0.007

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0328 K13, 2'			SSDP0329 K16, 0'			SSDP0330 K16, 2'			SSDP0331 K18, 0'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Actinium-228	0.633	PCI/G	0.421	0.0672	0.0147	0.482	0.0656	0.0152	0.44	0.0688	0.0162	0.489	0.0672	0.0236
Bismuth-212	0.388	PCI/G	0.232	0.047	0.0321	0.303	0.0611	0.0327	0.255	0.0506	0.0345	0.36	0.0795	0.0513
Bismuth-214	0.54	PCI/G	0.383	0.0434	0.0076	0.461	0.0626	0.0077	0.405	0.0452	0.0082	0.463	0.0686	0.0119
Carbon-14	0.13	PCI/G	0.0075 /U	0.0364	0.0618	0.0494 /U	0.0379	0.0634	-0.0122 /U	0.0356	0.0609	0.02 /U	0.0379	0.0639
Cesium-137	0.102	PCI/G	0.101	0.0114	0.0047	0.0305	0.007	0.005	0.0072 /J	0.0046	0.0045	0.0001 /U	0.0045	0.0067
Cobalt-60	0.006	PCI/G	0.0018 /U	0.0027	0.0048	-0.0026 /U	0.0028	0.0048	0.0013 /U	0.003	0.0053	0.0004 /U	0.004	0.0071
Gross Alpha	7.42	PCI/G	6.14	2.17	1.96	6.64	2.23	1.78	5.65	2.27	2.74	6.33	2.26	2.34
Lead-210	1.6	PCI/G	0.234 /U	0.985	1.14	0.43 /J	0.0824	0.0659	-0.238 /U	1.15	1.8	0.442 /U	0.442	0.739
Lead-212	0.691	PCI/G	0.447	0.0474	0.0073	0.499	0.0541	0.0068	0.449	0.0498	0.0076	0.493	0.0542	0.0101
Lead-214	0.682	PCI/G	0.463	0.0512	0.0081	0.522	0.0571	0.0074	0.473	0.0534	0.0085	0.488	0.0597	0.0124
Nonvolatile Beta	15	PCI/G	13.7	2.05	2.75	12.3	1.97	2.73	11.5	2.01	2.95	14.3	2.11	2.92
Potassium-40	14	PCI/G	11.2	1.3	0.0341	10.8	1.05	0.035	11.1	1.34	0.044	10.8	1.16	0.0572
Radium-223		PCI/G	-0.0061 /U	0.0459	0.0795	-0.003 /U	0.0417	0.0724	-0.0097 /U	0.0488	0.0827	0.0499 /U	0.0779	0.118
Radium-226	0.752	PCI/G	0.458	0.0808	0.0367	0.507	0.0784	0.031	0.397	0.0682	0.0392	0.457	0.0752	0.0322
Radium-228	0.63	PCI/G	0.421	0.0672	0.0147	0.482	0.0656	0.0152	0.44	0.0688	0.0162	0.489	0.0672	0.0236
Strontium-90	0.056	PCI/G	-0.0321 /U	0.0142	0.0232	-0.0151 /U	0.013	0.0209	0.0083 /U	0.0179	0.0277	0.0158 /U	0.0142	0.0216
Thallium-208	0.204	PCI/G	0.132	0.0149	0.004	0.159	0.0206	0.004	0.134	0.0145	0.0046	0.165	0.0241	0.0066
Thorium-228	0.627	PCI/G	[redacted]	0.393	0.27	0.468	0.223	0.277	0.557	0.273	0.358	0.464	0.189	0.198
Thorium-230	1.04	PCI/G	[redacted]	0.323	0.0847	0.347	0.163	0.135	0.569	0.227	0.153	0.451	0.173	0.139
Thorium-232	0.63	PCI/G	[redacted]	0.346	0.0847	0.44	0.181	0.0974	0.411	0.19	0.153	0.364	0.149	0.0963
Thorium-234	0.78	PCI/G	0.568	0.263	0.236	0.503	0.141	0.0812	0.437 /J	0.362	0.293	0.584	0.348	0.306
Tritium	1.2	PCI/G	-0.279 /U	0.538	1.1	-0.747 /U	0.525	1.18	-0.126 /U	0.554	0.999	-0.14 /U	0.485	1.01
Uranium-233/234	0.559	PCI/G	0.402	0.0487	0.007	0.412	0.0506	0.0088	0.387	0.0473	0.0091	0.461	0.055	0.0074
Uranium-235	0.0638	PCI/G	0.0302	0.0102	0.0082	0.0247	0.0086	0.0021	0.0188	0.0083	0.0081	0.0233	0.0097	0.0097
Uranium-238	0.565	PCI/G	0.409	0.0494	0.007	0.41	0.0503	0.006	0.419	0.0501	0.0055	0.426	0.0517	0.0059

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0332 K18, 2'			SSDP0333 K18, 2'			SSDP0334 K28, 0'			SSDP0335 K28, 2'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Actinium-228	0.633	PCI/G	0.396	0.0569	0.015	0.457	0.0661	0.0173	0.531	0.0775	0.0176	0.415	0.0619	0.0173
Bismuth-212	0.388	PCI/G	0.243	0.0627	0.0355	0.304	0.0539	0.0375	0.323	0.0632	0.0366	0.276	0.0534	0.0357
Bismuth-214	0.54	PCI/G	0.366	0.0668	0.0084	0.437	0.0496	0.0087	0.456	0.0513	0.0084	0.377	0.0432	0.0084
Carbon-14	0.13	PCI/G	0.0214 /U	0.0376	0.0634	0.0661 /U	0.0516	0.0863	0.04 /U	0.0377	0.0631	-0.012 /U	0.0364	0.0622
Cesium-137	0.102	PCI/G	0.0053 /J	0.0032	0.0047	0.0006 /U	0.0031	0.0047	0.0132	0.0047	0.0048	[redacted]	0.0166	0.0046
Cobalt-60	0.006	PCI/G	0.0024 /U	0.0027	0.0047	-0.0007 /U	0.0033	0.0056	-0.0017 /U	0.0031	0.0053	0.0004 /U	0.0031	0.0054
Gross Alpha	7.42	PCI/G	5.37	1.97	1.66	[redacted]	2.72	2.13	[redacted]	2.71	2.32	7.15	2.48	2.55
Lead-210	1.6	PCI/G	0.386 /U	0.576	0.626	0.0868 /U	0.592	0.728	1.33	0.878	0.725	0.961	0.898	0.931
Lead-212	0.691	PCI/G	0.397	0.048	0.0069	0.486	0.0505	0.0088	0.537	0.057	0.008	0.447	0.0499	0.008
Lead-214	0.682	PCI/G	0.396	0.0529	0.0086	0.5	0.0555	0.0089	0.524	0.0577	0.0089	0.45	0.0501	0.009
Nonvolatile Beta	15	PCI/G	12.9	2.01	2.79	11.8	2.06	2.71	13.4	1.96	2.47	12	1.97	2.72
Potassium-40	14	PCI/G	7.75	0.9	0.0375	11.2	1.15	0.0414	12.4	1.28	0.0387	10.9	1.2	0.0388
Radium-223		PCI/G	-0.0074 /U	0.0489	0.0824	0.0206 /U	0.0587	0.0886	0.0322 /U	0.0655	0.087	-0.0586 /U	0.0592	0.0849
Radium-226	0.752	PCI/G	0.444	0.0741	0.037	0.48	0.0755	0.0387	0.459	0.0824	0.0352	0.377	0.0676	0.0329
Radium-228	0.63	PCI/G	0.396	0.0569	0.015	0.457	0.0661	0.0173	0.531	0.0775	0.0176	0.415	0.0619	0.0173
Strontium-90	0.056	PCI/G	0.0087 /U	0.0156	0.0241	0.0149 /U	0.0157	0.0239	0.0069 /U	0.0093	0.0143	[redacted]	0.0158	0.0201
Thallium-208	0.204	PCI/G	0.126	0.0224	0.0047	0.143	0.0161	0.0046	0.167	0.018	0.0046	0.136	0.0154	0.0045
Thorium-228	0.627	PCI/G	0.297	0.173	0.227	0.346	0.169	0.229	0.479	0.24	0.318	0.467	0.261	0.37
Thorium-230	1.04	PCI/G	0.343	0.157	0.0962	0.391	0.136	0.0678	0.442	0.194	0.167	0.606	0.232	0.111
Thorium-232	0.63	PCI/G	0.412	0.175	0.117	0.226	0.101	0.0678	0.378	0.17	0.102	0.448	0.195	0.111
Thorium-234	0.78	PCI/G	0.472 /J	0.241	0.215	0.435 /J	0.245	0.219	0.632	0.267	0.22	0.419 /J	0.283	0.237
Tritium	1.2	PCI/G	0.153 /U	0.505	1.11	-0.143 /U	0.484	1.03	0.418 /U	0.519	1.01	-0.142 /U	0.486	1.03
Uranium-233/234	0.559	PCI/G	0.408	0.0495	0.01	0.384	0.0767	0.0276	0.425	0.0529	0.0023	0.488	0.0562	0.0087
Uranium-235	0.0638	PCI/G	0.0243	0.0102	0.0108	0.0103	0.0104	0.0077	0.0314	0.0113	0.0096	0.0322	0.01	0.0067
Uranium-238	0.565	PCI/G	0.394	0.0481	0.0092	0.407	0.0784	0.0077	0.445	0.0551	0.0095	0.462	0.0536	0.0053

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0336 M3, 0'				SSDP0337 M3, 2'				SSDP0338 M17, 0'				SSDP0339 M17, 0'			
			Value		Uncert	MDA	Value		Uncert	MDA	Value		Uncert	MDA	Value		Uncert	MDA
Actinium-228	0.633	PCI/G	0.41		0.0581	0.0234	0.445		0.069	0.0185	0.53		0.0829	0.0164	0.484		0.0649	0.0153
Bismuth-212	0.388	PCI/G	0.291		0.0651	0.0486	0.272		0.0529	0.0376	0.323		0.0547	0.0332	0.321		0.0541	0.0309
Bismuth-214	0.54	PCI/G	0.382		0.0576	0.0115	0.382		0.0432	0.0091	0.411		0.0466	0.0081	0.407		0.0555	0.0074
Carbon-14	0.13	PCI/G	0.0155	/U	0.0389	0.0657	0.0223	/U	0.0386	0.0651	0.0271	/U	0.0405	0.0683	-0.0494	/U	0.039	0.0674
Cesium-137	0.102	PCI/G	0.0066	/U	0.0044	0.0068	-0.0024	/U	0.003	0.0051	0.0481	Jf/	0.0069	0.0045	0.0039	UJf/U	0.0043	0.0046
Cobalt-60	0.006	PCI/G	-0.0049	/U	0.0038	0.0063	0.0007	/U	0.0039	0.0059	-0.0021	/U	0.0029	0.005	0.0029	/U	0.0027	0.0049
Gross Alpha	7.42	PCI/G	3.48		1.83	2.39	6.37		2.31	2.1	5.23		2.23	2.83	3.79		1.97	2.73
Lead-210	1.6	PCI/G	0.414	/U	0.599	0.701	1.62	/U	1.68	2.09	0.989	/U	1.27	1.22	0.42	/J	0.0883	0.0656
Lead-212	0.691	PCI/G	0.443		0.0487	0.0096	0.468		0.0522	0.0083	0.558		0.0589	0.0076	0.506		0.0549	0.0063
Lead-214	0.682	PCI/G	0.422		0.0521	0.0122	0.419		0.0478	0.0097	0.492		0.0545	0.0086	0.456		0.0499	0.0072
Nonvolatile Beta	15	PCI/G	13.4		2.12	2.7	11.1		1.97	2.64	13.3		2.1	2.67	11.1		1.98	2.71
Potassium-40	14	PCI/G	10.9		1.17	0.0524	11.8		1.34	0.0473	12.2		1.42	0.04	11.7		1.13	0.032
Radium-223		PCI/G	0.0342	/U	0.0756	0.114	0.0036	/U	0.056	0.0945	-0.0213	/U	0.0556	0.0844	0.0076	/U	0.0416	0.0727
Radium-226	0.752	PCI/G	0.412		0.0912	0.0587	0.355		0.052	0.024	0.398		0.0583	0.0281	0.545		0.0935	0.0294
Radium-228	0.63	PCI/G	0.41		0.0581	0.0234	0.445		0.069	0.0185	0.53		0.0829	0.0164	0.484		0.0649	0.0153
Strontium-90	0.056	PCI/G	-0.0009	/U	0.013	0.0203	-0.0046	/U	0.0168	0.0265	0.0261	/U	0.0175	0.0263	-0.0142	/U	0.0204	0.0326
Thallium-208	0.204	PCI/G	0.149		0.0219	0.0062	0.139		0.0158	0.0046	0.162		0.0176	0.0045	0.16		0.0206	0.004
Thorium-228	0.627	PCI/G	0.303		0.178	0.26	0.424		0.173	0.189	0.556		0.198	0.203	0.349		0.13	0.102
Thorium-230	1.04	PCI/G	0.288		0.12	0.0734	0.521		0.166	0.0319	0.483		0.159	0.071	0.46		0.146	0.0781
Thorium-232	0.63	PCI/G	0.436		0.152	0.0734	0.234		0.105	0.0319	0.565		0.174	0.071	0.319		0.116	0.0273
Thorium-234	0.78	PCI/G	[redacted]		0.367	0.28	0.503		0.367	0.325	0.244	UJf/U	0.293	0.268	0.553	Jf/	0.136	0.0804
Tritium	1.2	PCI/G	-0.395	/U	0.462	0.977	0.0	/U	0.482	0.908	-0.121	/U	0.466	0.899	-0.253	/U	0.459	0.937
Uranium-233/234	0.559	PCI/G	0.362		0.0546	0.0148	0.368		0.0528	0.009	0.452		0.0681	0.0177	0.375		0.0625	0.0238
Uranium-235	0.0638	PCI/G	0.0334		0.013	0.0036	0.0267		0.011	0.0032	0.0203		0.0132	0.0153	0.0267		0.0132	0.0047
Uranium-238	0.565	PCI/G	0.377		0.0556	0.0036	0.373		0.0531	0.0032	0.447		0.0673	0.0153	0.395		0.0636	0.0132

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0340 M17, 2'			SSDP0341 M12, 0'			SSDP0342 M12, 2'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Actinium-228	0.633	PCI/G	0.48	0.0744	0.0162	0.561	0.0772	0.0272	0.479	0.0741	0.0189
Bismuth-212	0.388	PCI/G	0.295	0.0523	0.034	0.33	0.0789	0.0591	0.284	0.0597	0.0412
Bismuth-214	0.54	PCI/G	0.386	0.0433	0.008	0.48	0.0715	0.0139	0.426	0.0493	0.0096
Carbon-14	0.13	PCI/G	-0.0017 /U	0.0429	0.0729	-0.0136 /U	0.0373	0.0638	-0.0206 /U	0.0564	0.0964
Cesium-137	0.102	PCI/G	0.0014 /U	0.0047	0.0044	0.0 /U	0.0121	0.0077	0.0456	0.0067	0.0048
Cobalt-60	0.006	PCI/G	0.0006 /U	0.003	0.0052	-0.0044 /U	0.0045	0.0076	0.0001 /U	0.0034	0.006
Gross Alpha	7.42	PCI/G	5.89	2.33	2.74	6.36	2.42	2.74	7.39	2.5	2.51
Lead-210	1.6	PCI/G	0.781 /U	1.76	1.72	0.265 /U	0.661	0.806	1.15 /U	0.806	1.16
Lead-212	0.691	PCI/G	0.498	0.0549	0.0085	0.579	0.0632	0.0111	0.5	0.0527	0.0088
Lead-214	0.682	PCI/G	0.455	0.0515	0.0086	0.538	0.0659	0.0135	0.499	0.0562	0.0102
Nonvolatile Beta	15	PCI/G	11.2	2.04	2.91	14	2.28	3.22	[redacted]	2.46	2.74
Potassium-40	14	PCI/G	12.2	1.46	0.0435	12.6	1.35	0.0667	12.4	1.44	0.0463
Radium-223		PCI/G	0.0299 /U	0.0557	0.0854	-0.0523 /U	0.127	0.131	0.0089 /U	0.0643	0.0971
Radium-226	0.752	PCI/G	0.476	0.0653	0.0252	0.487	0.0699	0.0331	0.515	0.0861	0.0366
Radium-228	0.63	PCI/G	0.48	0.0744	0.0162	0.561	0.0772	0.0272	0.479	0.0741	0.0189
Strontium-90	0.056	PCI/G	-0.0518 /U	0.0284	0.0463	-0.0068 /U	0.0293	0.046	0.0107 /U	0.0207	0.032
Thallium-208	0.204	PCI/G	0.149	0.0161	0.0043	0.192	0.0281	0.0075	0.155	0.0174	0.005
Thorium-228	0.627	PCI/G	0.408	0.173	0.203	0.415	0.167	0.18	0.39	0.163	0.199
Thorium-230	1.04	PCI/G	0.468	0.158	0.1	0.534	0.168	0.0871	0.363	0.132	0.106
Thorium-232	0.63	PCI/G	0.35	0.131	0.071	0.358	0.133	0.0705	0.368	0.125	0.0269
Thorium-234	0.78	PCI/G	0.436 /J	0.298	0.297	[redacted]	0.415	0.334	0.547	0.316	0.29
Tritium	1.2	PCI/G	-0.242 /U	0.454	0.896	0.0 /U	0.488	1.01	-0.129 /U	0.46	0.96
Uranium-233/234	0.559	PCI/G	0.395	0.0535	0.0151	0.462	0.0581	0.0152	0.409	0.057	0.0205
Uranium-235	0.0638	PCI/G	0.0335	0.0125	0.0099	0.0205	0.0099	0.0103	0.0209	0.0101	0.0086
Uranium-238	0.565	PCI/G	0.399	0.0537	0.0128	0.492	0.0606	0.0088	0.419	0.0571	0.0108

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0343 M22, 0'			SSDP0343R1 M22, 0'			SSDP0343R2 M22, 0'			SSDP0344 M22, 2'		
			Value		Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value		Uncert	MDA
Actinium-228	0.633	PCI/G	0.525		0.0675	0.0186	---	---	---	---	---	---	0.556		0.0861	0.0171
Bismuth-212	0.388	PCI/G	0.333		0.062	0.0395	---	---	---	---	---	---	0.339		0.0603	0.0383
Bismuth-214	0.54	PCI/G	0.427		0.0548	0.0094	---	---	---	---	---	---	0.463		0.052	0.0086
Carbon-14	0.13	PCI/G	0.0094	/U	0.0519	0.088	---	---	---	---	---	---	-0.0472	/U	0.0492	0.0848
Cesium-137	0.102	PCI/G	0.0063	/J	0.005	0.0051	---	---	---	---	---	---	0.0137		0.0052	0.0049
Cobalt-60	0.006	PCI/G	0.0009	/U	0.0032	0.0056	---	---	---	---	---	---	0.0014	/U	0.0031	0.0056
Gross Alpha	7.42	PCI/G	[redacted]		9.91	1.95	[redacted]	2.74	2.79	[redacted]	2.1	1.31	[redacted]	Jf/	16.8	2.58
Lead-210	1.6	PCI/G	0.387	/J	0.123	0.0918	---	---	---	---	---	---	1.01	/U	0.857	1.36
Lead-212	0.691	PCI/G	0.547		0.0594	0.0078	---	---	---	---	---	---	0.593		0.0625	0.0083
Lead-214	0.682	PCI/G	0.485		0.0542	0.0093	---	---	---	---	---	---	0.549		0.0605	0.009
Nonvolatile Beta	15	PCI/G	[redacted]		2.81	2.39	13.9	2.04	2.6	14.7	1.42	1.56	[redacted]	Jf/	4.78	2.78
Potassium-40	14	PCI/G	11.6		1.13	0.0382	---	---	---	---	---	---	13.1		1.53	0.0405
Radium-223		PCI/G	0.0282	/U	0.059	0.0896	---	---	---	---	---	---	-0.0279	/U	0.0593	0.0891
Radium-226	0.752	PCI/G	0.571		0.112	0.0587	---	---	---	---	---	---	0.458		0.0766	0.0366
Radium-228	0.63	PCI/G	0.525		0.0675	0.0186	---	---	---	---	---	---	0.556		0.0861	0.0171
Strontium-90	0.056	PCI/G	0.001	/U	0.0223	0.0349	---	---	---	---	---	---	-0.0083	/U	0.017	0.0268
Thallium-208	0.204	PCI/G	0.178		0.022	0.0048	---	---	---	---	---	---	0.177		0.0192	0.0047
Thorium-228	0.627	PCI/G	0.555		0.189	0.199	---	---	---	---	---	---	0.621		0.199	0.205
Thorium-230	1.04	PCI/G	0.447		0.151	0.123	---	---	---	---	---	---	0.634		0.174	0.0618
Thorium-232	0.63	PCI/G	0.542		0.16	0.0635	---	---	---	---	---	---	0.596		0.166	0.0267
Thorium-234	0.78	PCI/G	0.571		0.164	0.107	---	---	---	---	---	---	0.518		0.287	0.279
Tritium	1.2	PCI/G	-0.132	/U	0.469	0.979	---	---	---	---	---	---	-0.409	/U	0.467	1.01
Uranium-233/234	0.559	PCI/G	0.427		0.0514	0.0072	---	---	---	---	---	---	0.458		0.0554	0.013
Uranium-235	0.0638	PCI/G	0.0301		0.0103	0.0084	---	---	---	---	---	---	0.024		0.0096	0.0088
Uranium-238	0.565	PCI/G	0.476		0.0558	0.002	---	---	---	---	---	---	0.465		0.0557	0.0076

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0344R1 M22, 2'			SSDP0344R2 M22, 2'			SSDP0345 M22, 2'				SSDP0346 K19, 0'			
			Value	Uncert	MDA	Value	Uncert	MDA	Value		Uncert	MDA	Value		Uncert	MDA
Actinium-228	0.633	PCI/G	---	---	---	---	---	---	0.519		0.0673	0.0217	0.458		0.0688	0.0152
Bismuth-212	0.388	PCI/G	---	---	---	---	---	---	0.332		0.0649	0.0453	0.269		0.0484	0.0313
Bismuth-214	0.54	PCI/G	---	---	---	---	---	---	0.428		0.0553	0.0102	0.394		0.0441	0.0072
Carbon-14	0.13	PCI/G	---	---	---	---	---	---	0.0237	/U	0.0438	0.0739	0.0255	/U	0.0362	0.0609
Cesium-137	0.102	PCI/G	---	---	---	---	---	---	0.0156		0.0057	0.0059	0.0195		0.0039	0.004
Cobalt-60	0.006	PCI/G	---	---	---	---	---	---	0.0007	/U	0.0037	0.0065	-0.0004	/U	0.0026	0.0046
Gross Alpha	7.42	PCI/G	[redacted]	2.46	1.8	[redacted]	1.76	1.35	6.9	Jf/	2.39	2.1	5.7		2.26	2.65
Lead-210	1.6	PCI/G	---	---	---	---	---	---	0.47	/J	0.129	0.104	0.453	/U	1.42	1.8
Lead-212	0.691	PCI/G	---	---	---	---	---	---	0.532		0.058	0.0086	0.473		0.0523	0.007
Lead-214	0.682	PCI/G	---	---	---	---	---	---	0.484		0.0545	0.0106	0.458		0.0512	0.0079
Nonvolatile Beta	15	PCI/G	[redacted]	2.12	2.6	12.2	1.47	1.99	12.7	Jf/	2.09	2.67	12.3		2.06	2.71
Potassium-40	14	PCI/G	---	---	---	---	---	---	12.2		1.2	0.0465	9.99		1.13	0.0358
Radium-223		PCI/G	---	---	---	---	---	---	0.0581	/U	0.0672	0.0997	-0.0072	/U	0.0489	0.0764
Radium-226	0.752	PCI/G	---	---	---	---	---	---	0.467		0.0745	0.0308	0.435		0.069	0.0289
Radium-228	0.63	PCI/G	---	---	---	---	---	---	0.519		0.0673	0.0217	0.458		0.0688	0.0152
Strontium-90	0.056	PCI/G	---	---	---	---	---	---	0.0043	/U	0.0183	0.0284	0.0106	/U	0.015	0.0231
Thallium-208	0.204	PCI/G	---	---	---	---	---	---	0.17		0.0214	0.0056	0.141		0.0154	0.0039
Thorium-228	0.627	PCI/G	---	---	---	---	---	---	0.298		0.153	0.218	0.351		0.181	0.223
Thorium-230	1.04	PCI/G	---	---	---	---	---	---	0.469		0.141	0.0699	0.48		0.183	0.0436
Thorium-232	0.63	PCI/G	---	---	---	---	---	---	0.304		0.109	0.0566	0.436		0.173	0.0436
Thorium-234	0.78	PCI/G	---	---	---	---	---	---	0.459	/J	0.153	0.117	0.357	/J	0.332	0.288
Tritium	1.2	PCI/G	---	---	---	---	---	---	-0.236	/U	0.433	0.874	-0.136	/U	0.494	0.986
Uranium-233/234	0.559	PCI/G	---	---	---	---	---	---	0.416		0.0524	0.0083	0.444		0.0532	0.0103
Uranium-235	0.0638	PCI/G	---	---	---	---	---	---	0.0116		0.0078	0.0097	0.0278		0.0106	0.0103
Uranium-238	0.565	PCI/G	---	---	---	---	---	---	0.405		0.0513	0.0083	0.415		0.0504	0.0103

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0347 K19, 2'			SSDP0348 K20, 0'			SSDP0349 K22, 0'			SSDP0350 K24, 0'		
			Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA	Value	Uncert	MDA
Actinium-228	0.633	PCI/G	0.419	0.0652	0.0165	---	---	---	---	---	---	---	---	---
Bismuth-212	0.388	PCI/G	0.247	0.0504	0.0338	---	---	---	---	---	---	---	---	---
Bismuth-214	0.54	PCI/G	0.387	0.0434	0.0078	---	---	---	---	---	---	---	---	---
Carbon-14	0.13	PCI/G	0.0336 /U	0.0366	0.0614	---	---	---	---	---	---	---	---	---
Cesium-137	0.102	PCI/G	0.0133	0.0048	0.0046	---	---	---	---	---	---	---	---	---
Cobalt-60	0.006	PCI/G	0.0022 /U	0.0028	0.0051	---	---	---	---	---	---	---	---	---
Gross Alpha	7.42	PCI/G	[redacted]	2.81	2.57	---	---	---	---	---	---	---	---	---
Lead-210	1.6	PCI/G	0.188 /U	1.11	1.76	---	---	---	---	---	---	---	---	---
Lead-212	0.691	PCI/G	0.464	0.0513	0.0088	---	---	---	---	---	---	---	---	---
Lead-214	0.682	PCI/G	0.452	0.0512	0.0085	---	---	---	---	---	---	---	---	---
Nonvolatile Beta	15	PCI/G	[redacted]	2.3	3	---	---	---	---	---	---	---	---	---
Potassium-40	14	PCI/G	9.79	1.18	0.041	---	---	---	---	---	---	---	---	---
Radium-223		PCI/G	-0.0008 /U	0.0485	0.0828	---	---	---	---	---	---	---	---	---
Radium-226	0.752	PCI/G	0.494	0.0778	0.0335	---	---	---	---	---	---	---	---	---
Radium-228	0.63	PCI/G	0.419	0.0652	0.0165	---	---	---	---	---	---	---	---	---
Strontium-90	0.056	PCI/G	0.0296 /J	0.0167	0.0249	---	---	---	---	---	---	---	---	---
Thallium-208	0.204	PCI/G	0.147	0.016	0.0041	---	---	---	---	---	---	---	---	---
Thorium-228	0.627	PCI/G	0.564	0.212	0.216	---	---	---	---	---	---	---	---	---
Thorium-230	1.04	PCI/G	0.397	0.155	0.0795	---	---	---	---	---	---	---	---	---
Thorium-232	0.63	PCI/G	0.523	0.181	0.0795	---	---	---	---	---	---	---	---	---
Thorium-234	0.78	PCI/G	0.416 /J	0.306	0.292	---	---	---	---	---	---	---	---	---
Tritium	1.2	PCI/G	0.0 /U	0.486	0.879	-0.37 /U	0.54	0.975	-0.494 /U	0.535	0.976	-0.362 /U	0.529	0.955
Uranium-233/234	0.559	PCI/G	0.448	0.0543	0.01	---	---	---	---	---	---	---	---	---
Uranium-235	0.0638	PCI/G	0.0337	0.0103	0.0022	---	---	---	---	---	---	---	---	---
Uranium-238	0.565	PCI/G	0.444	0.0537	0.0021	---	---	---	---	---	---	---	---	---

Table B1.3
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

Radiochemical Analyses

Lab_chem	Background Levels	Units	SSDP0351 K26, 0'				SSDP0352 K30, 0'				SSDP0353 K32, 0'			
			Value		Uncert	MDA	Value		Uncert	MDA	Value		Uncert	MDA
Tritium	1.2	PCI/G	-0.78	/U	0.466	0.881	-0.368	/U	0.538	0.971	-0.7	/U	0.494	0.923

Table B1.4
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

General Chemistry

	Background Level	UNITS	SSDP0302 M8, 0'	SSDP0302R M8, 0'	SSDP0303 M8, 2'	SSDP0304 M13, 0'	SSDP0305 M13, 2'	SSDP0306 M27, 0'
Chromium, Hexavalent	0.054	MG/KG	0.192 Jm/J	NA	0.515 Jm/J	0.22 Jm/J	0.118 Jm/J	0.288 Jm/
Evaporative Loss @ 105 C		WT%	17	NA	13	14	15	13
Nitrogen, Nitrate	36	MG/KG	1.09	NA	0.796	<1 /U	1.57	1.03
Nitrogen, Total Kjeldahl		MG/KG	2.88	NA	247	336	348	319

Table B1.4
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

General Chemistry

	Background Level	UNITS	SSDP0307 M27, 2'	SSDP0308 L2, 0'	SSDP0309 L2, 2'	SSDP0310 L3, 0'	SSDP0311 L3, 2'	SSDP0312 L13, 0'
Chromium, Hexavalent	0.054	MG/KG	0.219 Jm/J	0.131 Jm/J	0.0944 Jm/J	0.265 Jm/	0.268 Jm/	0.182 /J
Evaporative Loss @ 105 C		WT%	13	16	15	13	13	12
Nitrogen, Nitrate	36	MG/KG	1.09	0.581 /J	1.23	0.855 /J	0.791 /J	0.509 /J
Nitrogen, Total Kjeldahl		MG/KG	239	143	209	319	253	234

Table B1.4
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

General Chemistry

	Background Level	UNITS	SSDP0313 L13, 2'	SSDP0314 L18, 0'	SSDP0315 L18, 2'	SSDP0316 L21, 0'	SSDP0318 K1, 0'	SSDP0319 K1, 0'
Chromium, Hexavalent	0.054	MG/KG	[redacted] /J	[redacted]	[redacted] /J	[redacted]	[redacted] /J	[redacted] /J
Evaporative Loss @ 105 C		WT%	10	17	15	18	14	15
Nitrogen, Nitrate	36	MG/KG	0.432 /J	<1 /U	<1 /U	<1 /U	5.74	2.09
Nitrogen, Total Kjeldahl		MG/KG	344	192	286	540	452	466

Table B1.4
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

General Chemistry

	Background Level	UNITS	SSDP0320 K1, 2'	SSDP0323 K3, 0'	SSDP0324 K3, 2'	SSDP0327 K13, 0'	SSDP0328 K13, 2'	SSDP0329 K16, 0'
Chromium, Hexavalent	0.054	MG/KG	0.573	<0.222 /U	0.222	0.209 /J	0.0803 /J	0.256
Evaporative Loss @ 105 C		WT%	15	10	10	14	13	18
Nitrogen, Nitrate	36	MG/KG	10.1	1.05	0.832 /J	<1 /U	0.351 /J	0.775 /J
Nitrogen, Total Kjeldahl		MG/KG	472	233	178	374	305	183

Table B1.4
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

General Chemistry

	Background Level	UNITS	SSDP0330 K16, 2'	SSDP0331 K18, 0'	SSDP0332 K18, 2'	SSDP0332R K18, 2'	SSDP0333 K18, 2'	SSDP0333R K18, 2'
Chromium, Hexavalent	0.054	MG/KG	0.163 /J	0.212 /J	0.254	NA	0.169 /J	NA
Evaporative Loss @ 105 C		WT%	2	15	21	NA	17	NA
Nitrogen, Nitrate	36	MG/KG	<1 /U	0.614	<1 /U	NA	0.636 /J	NA
Nitrogen, Total Kjeldahl		MG/KG	247	183	267	NA	171	NA

Table B1.4
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

General Chemistry

	Background Level	UNITS	SSDP0334 K28, 0'	SSDP0335 K28, 2'	SSDP0336 M3, 0'	SSDP0337 M3, 2'	SSDP0338 M17, 0'	SSDP0338D L1 M17, 0'
Chromium, Hexavalent	0.054	MG/KG	0.311	0.214 /J	0.186 Jm/J	0.15 Jm/J	0.24 Jm/	NA
Evaporative Loss @ 105 C		WT%	13	16	14	7	8	NA
Nitrogen, Nitrate	36	MG/KG	0.475 /J	0.531 /J	1.4	0.706 /J	0.286 /J	NA
Nitrogen, Total Kjeldahl		MG/KG	101	161	319	127	204	NA

Table B1.4
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

General Chemistry

	Background Level	UNITS	SSDP0339 M17, 0'		SSDP0340 M17, 2'		SSDP0341 M12, 0'		SSDP0342 M12, 2'		SSDP0343 M22, 0'		SSDP0344 M22, 2'	
Chromium, Hexavalent	0.054	MG/KG	0.26	Jm/	0.077	Jm/J	0.295	Jm/	0.26	Jm/	0.201	Jm/J	0.19	Jm/J
Evaporative Loss @ 105 C		WT%	12		9		15		15		15		16	
Nitrogen, Nitrate	36	MG/KG	0.874	/J	0.657	/J	0.492	/J	1.13		1.3		2.99	
Nitrogen, Total Kjeldahl		MG/KG	222		325		153		1,030		195		199	

Table B1.4
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

General Chemistry

Location Date	Background Level	UNITS	SSDP0345 M22, 2'	SSDP0346 K19, 0'	SSDP0346DL1 K19, 0'
Chromium, Hexavalent	0.054	MG/KG	0.248 Jm/	0.179 /J	NA
Evaporative Loss @ 105 C		WT%	11	11	NA
Nitrogen, Nitrate	36	MG/KG	1.76	0.98	NA
Nitrogen, Total Kjeldahl		MG/KG	356	165	NA

Table B1.4
LEHR Environmental Restoration
Analytical Results For Eastern Dog Pen Investigation

General Chemistry

	Background Level	UNITS	SSDP0347 K19, 2'
Chromium, Hexavalent	0.054	MG/KG	[redacted] /J
Evaporative Loss @ 105 C		WT%	3
Nitrogen, Nitrate	36	MG/KG	1.03
Nitrogen, Total Kjeldahl		MG/KG	131