SURPLUS FACILITIES MANAGEMENT PROGRAM

INTERIM POST REMEDIAL ACTION SURVEY REPORT FOR SYSTEMS FOR NUCLEAR AUXILIARY POWER-8 (SNAP-8) EXPERIMENTAL REACTOR FACILITY (BUILDING 010) SANTA SUSANA FIELD LABORATORY ROCKWELL INTERNATIONAL CANOGA PARK, CALIFORNIA

OCCUPATIONAL HEALTH AND SAFETY DIVISION
Health Physics Section
ARGONNE NATIONAL LABORATORY, ARGONNE, ILLINOIS

Prepared for the U. S. DEPARTMENT OF ENERGY
under Contract W-31-109-Eng-38

ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue
Argonne, Illinois 60439

SURPLUS FACILITIES
MANAGEMENT PROGRAM

INTERIM POST REMEDIAL ACTION SURVEY REPORT FOR SNAP-8 EXPERIMENTAL REACTOR FACILITY BUILDING 010 SITE SANTA SUSANA FIELD LABORATORY ROCKWELL INTERNATIONAL

November 1979
October 1981

Prepared by

R. A. Wynveen	Associate Division Director, OHS
W. H. Smith	Senior Health Physicist
C. M. Sholeen	Health Physicist
A. L. Justus	Health Physicist
K. F. Flynn	Health Physicist

Radiological Survey Group
Health Physics Section
Occupational Health and Safety Division

May 1983

Work Performed under

Budget Activity DOE HA-01-07-05-2
and ANL 73706

INTERIM RADIOLOGICAL SURVEY REPORT
SNAP-8 EXPERIMENTAL REACTOR FACILITY (BUILDING 010)
SANTA SUSANA FIELD LABORATORY
ROCKWELL INTERNATIONAL

INTRODUCTION

The Argonne National Laboratory (ANL) Radiological Survey Group conducted a series of radiological measurements and analyses at the site of the former System for Nuclear Auxilliary Power-8 (SNAP-8) Experimental Reactor Facility for the purpose of post remedial assessment (certification). The assessment was conducted at the request of the Department of Energy (DOE), Office of Operational Safety (OOS) and in accordance with the programmatic post remedial action responsibilities of the Office of Operational Safety. Radiological measurements were conducted initially during November 1979 and again during October and November 1981.

The SNAP-8 Experimental Reactor Facility site is located in the Santa Susana Mountains at Rockwell International's Santa Susana Field Laboratory (see Fig. 1). The SNAP-8 site, as found in 1979 and again in 1981, consisted of an asphalt-paved parking area (see Fig. 2). All reactor components, equipment, structures, and appurtenances thereto, had been removed and disposed of, with the exception of an unidentified quantity of nonradioactive reinforced concrete, used as backfill, and a previously abandoned sanitary leach field. The septic tank, a part of the sanitary leach field, had been removed when the facility was connected to the central sewer system.

The SNAP-8 facility, also known as Building 010, was built for testing small or space-type reactors. Originally constructed in 1959 for the testing of the 50 kW SNAP-2 Experimental Reactor, the testing of which was completed in 1960, the facility was modified and improved for a similar testing program that involved the higher power level SNAP-8 Experimental Reactor. The program involving the SNAP-8 Experimental Reactor was completed in 1965.

Building 010 was a rigid steel frame structure with corrugated metal siding and roofing. The foundation and floors were constructed of steel-reinforced concrete. Subsurface structures included three steel-reinforced concrete vaults,

two of which were steel-lined, that extended to a maximum depth of 14 ft below grade. The reactors were operated in a below grade, concrete shielded, containment vessel. The shielded containment vessel consisted of a 4-ft diameter by 14-ft deep, carbon steel pressure vessel embedded in concrete.

The facility and its components were owned by the U.S. Government under the responsibility of the Atomic Energy Commission and its predecessor organizations. The land is owned by Rockwell International and is under a long-term lease/option to the U.S. Government.

Decontamination and decommissioning (D&D) was completed by Rockwell International in 1978, converting the site to its present status, an asphalt-paved parking area. The D&D activity was performed while the facility was under U.S. Government ownership and subject to DOE requirements. It was reported that guidelines for decontamination included the As Low As Practicable (ALAP) concept and in all cases, less than the limits listed as follows:

Surface Contamination

	Total	Removable
Beta-gamma emitters	0.1 mrad at 1 cm with 7 mg/cm^2 absorber	100 dis/min-100 cm^2
Alpha emitters	100 dis/min-100 cm^2	20 dis/min-100 cm^2

Soil Concentrations

100 pCi/g gross detectable beta activity.

Gross detectable beta activity background readings at the site ranged from 20 to 30 pCi/g of soil.

The initial post remedial action radiological assessment conducted by the ANL Radiological Survey Group during November 1979 included surface surveys, background measurements, subsurface investigation that include 1-ft continuous split-spoon soil sampling and bore-hole logging, and 1-ft peripheral environmental soil corings. Two background soil corings were collected at the Rockwell International site in Canoga Park, California.

Since the ANL Radiological Survey Group was not in any way involved in an initial radiological assessment or a concurrent radiological assessment (overview) during the D&D operations, it is not feasible to comment on the radiological status and disposition of the structures and equipment.

Survey Results

All surface surveys and background measurements were somewhat compromised by a variable low-level gamma background (shine) emanating from radioactive material stored in the Radioactive Materials Disposal Facility (RMDF) Buildings 021 and 022 (see Fig. 3). This, in effect, made the subsurface investigation the primary mode of assessment for the site remains, i.e., backfill and concrete. The RMDF is located approximately 700 to 800 ft northeast of the Building 010 site.

Natural background readings at the Santa Susana Facility, in general, range from 9 to 10 μR/h three feet above the surface. Gamma levels taken with a Reuter-Stokes RSS-111 at the Building 010 site, that were attributable to both natural background and apparent shine from the RMDF, ranged from 15 to 30 μR/h at three feet above the surface (see Fig. 4).

Subsurface investigation in 1979 included bore-hole sampling and bore-hole logging at eight locations, six of which were in the vicinity of where the former reactor vessel and fuel storage vaults had been located (see Fig. 5). The bore-holes ranged in depth from 3 ft,2 in to 31 ft. Soil samples were taken during each bore-hole operation by means of a split-spoon sampler. This is accomplished in 1 ft continuous increments to the full depth of the bore hole.

Four environmental soil corings were taken about the periphery of the Building 010 site (see Fig. 2). In addition, two environmental corings were taken in the Canoga Park site, Rockwell International, Atomics International Division (see Fig. 6). These corings were for the purpose of identifying the area background soil concentrations. Environmental corings are the ANL standard four segment samples that include three 2-in deep by 4-in diameter sections followed by a 6-in deep by 4-in diameter section for a total of 1 ft. depth.

Soil sample analyses of the peripherial corings, which included gamma spectral, as well as uranium flurometric analysis, indicated background results for all samples except one. This was the soil core taken at location 10-S9-D (the 6-in to 12-in level [see Fig. 2]). Results indicated a ^{60}Co concentration of 30.2± 27.2 femto curies (10^{-15}) per gram of soil. This level is well below the recommended criteria of 100 pCi/g. Background soil concentrations were established from the soil corings taken at the Canoga Park site.

Soil sample analyses of the bore-hole sampling and the bore-hole logging during the 1979 assessment indicated ^{60}Co contamination in bore holes 10-S1, 10-S3, 10-S6 and 10-S17A (see Fig. 5). The depth at which ^{60}Co was detected

ranged from the 1-ft to the 15-ft level and the activity levels ranged from background to 7.3 pCi/g. Although these levels were well within the soil contamination criteria established for this site, the detection of the radionuclide ^{60}Co raised some concern that a "hot" spot could be the cause of the contamination e.g., previously irradiated stainless steel rods, bolts or stellite material. ^{60}Co is an activation product produced by a ^{60}Ni η-ρ reaction or a ^{59}Co η-γ reaction.

Since it was reported that clean imported material had been used as backfill and since the source of the ^{60}Co could not be explained, it was decided to drill additional bore holes in the area of concern in order to resolve the question of whether or not there might be "hot" items in the backfill causing the soil contamination.

Thirteen additional bore holes were drilled, sampled, and logged during the Fall of 1981 (see Fig. 7). Results of logging and soil analyses of these additional bore holes revealed the presence of ^{60}Co in the soil but no evidence of "hot" spots. The maximum level of ^{60}Co as reported from soil sample analyses, indicated 48.0 pCi/g from bore hole number 10-S71 at the 11-ft level. Bore holes that exhibited ^{60}Co anomalies included 10-S70, 10-S71, 10-S74 and 10-S75. All are in the general area previously found to contain ^{60}Co anomalies (see Fig. 8).

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the radiological assessment, the following conclusions are stated:

1. Soil, contaminated with the radionuclide ^{60}Co, was detected in the southwest quadrant of the building site and in one environmental sample taken from an area northwest of the site. The levels encountered were well below the criteria set by DOE for this site.

2. The gamma background readings at the surface of the site were probably the result of natural radiation (terrestrial and celestial) as well as shine from the RMDF. There was no evidence that the ^{60}Co contaminated soil contributed detectable levels to the total background readings.

Based on the results of radiological assessment, the following recommendations are made:

1. Since the subsurface soil contamination is below the criteria as set by the Department of Energy and the surface gamma levels do not reveal any enhancement from this contamination, it is recommended that this site be given an unrestricted use release.

Robert A. Wynveen
Associate Division Director, OHS

Walter H. Smith
Senior Health Physicist, OHS

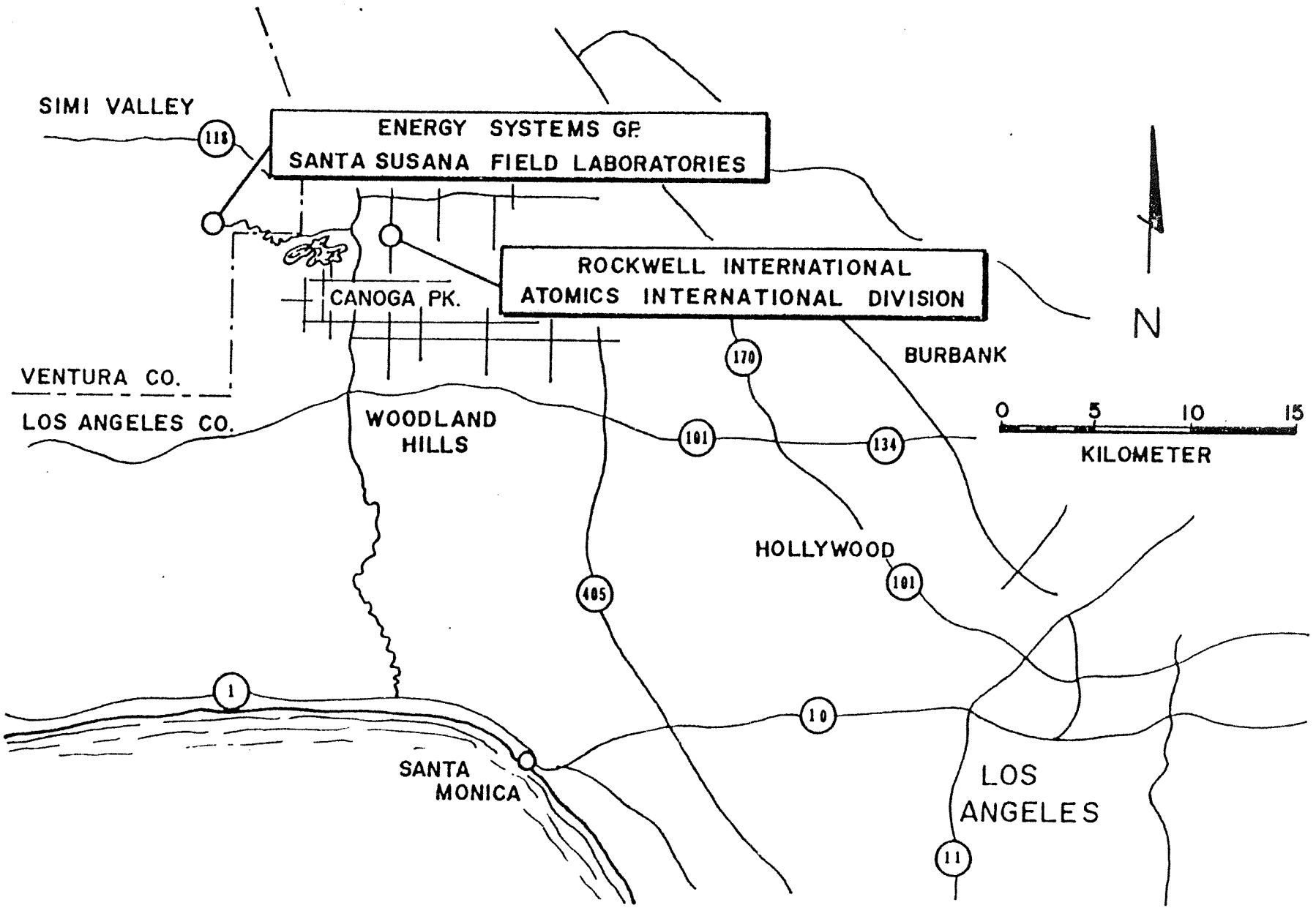
ANL-HP DWG. NO. 80-71
SIMI VALLEY
118
ENERGY SYSTEMS GP.
SANTA SUSANA FIELD LABORATORIES
ROCKWELL INTERNATIONAL
ATOMICS INTERNATIONAL DIVISION
CANOGA PK.
VENTURA CO.
LOS ANGELES CO.
WOODLAND HILLS
170
BURBANK
N
0 5 10 15
KILOMETER
101
134
HOLLYWOOD
101
405
1
10
SANTA MONICA
LOS ANGELES
11

Figure 1

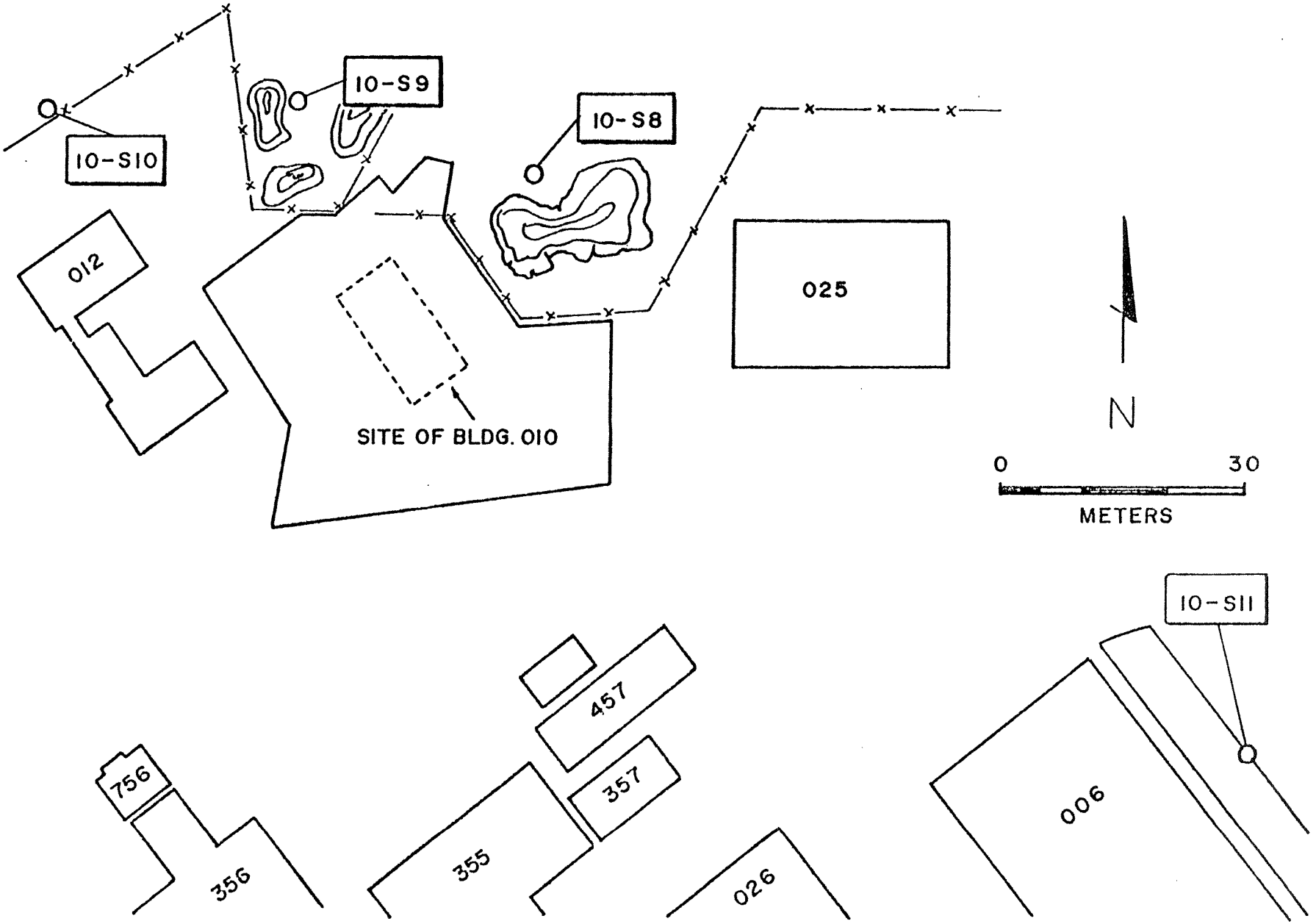
ANL-HP DWG.NO. 80-73
10-S9
10-S8
10-S10
012
025
SITE OF BLDG. 010
N
0
30
METERS
10-S11
457
357
756
356
355
026
006

Figure 2

ANL-HP DWG. NO. 83-20

ENERGY SYSTEMS GROUP
SANTA SUSANA FIELD LABORATORIES

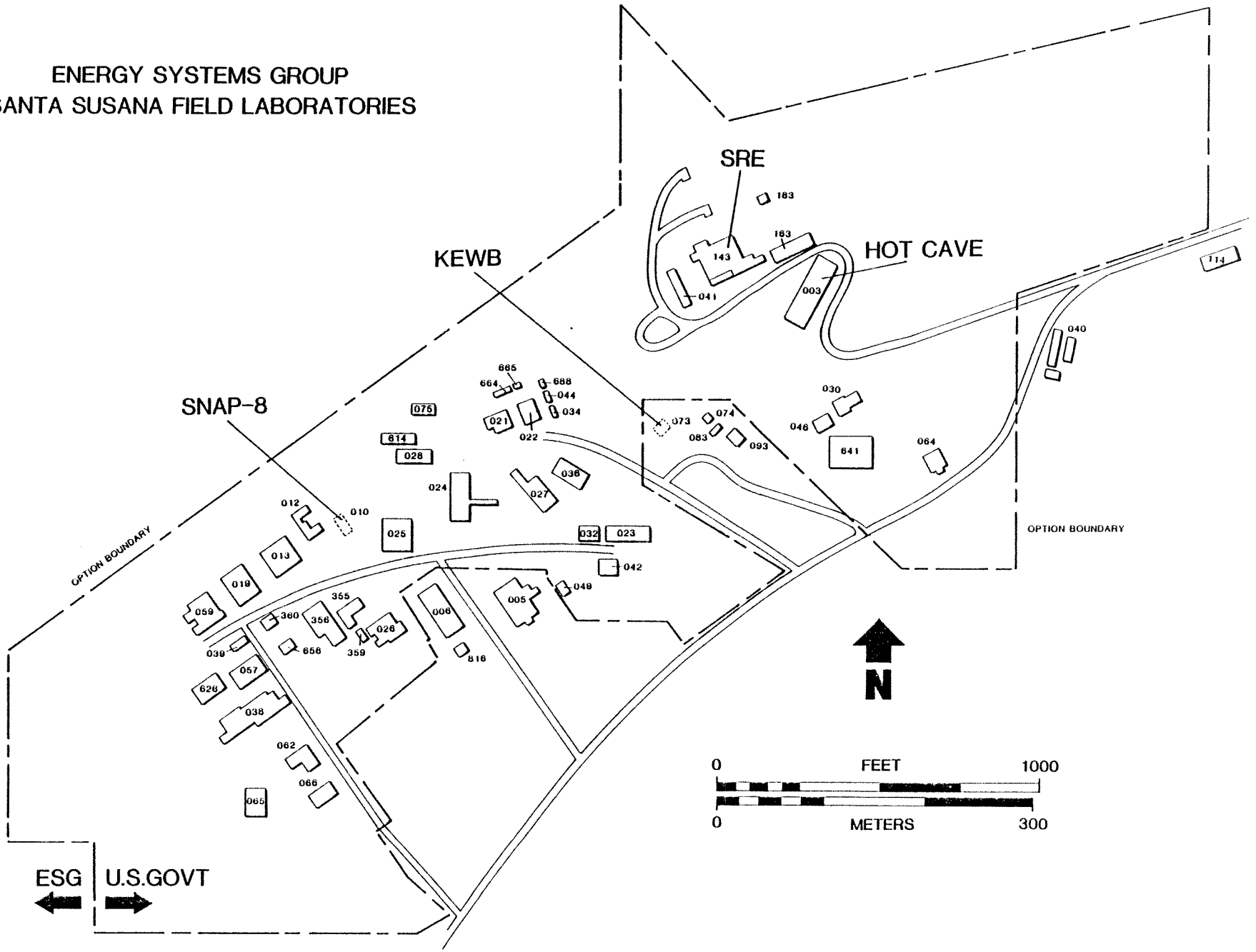

Figure 3

ANL-HP DWG. NO. 80-75

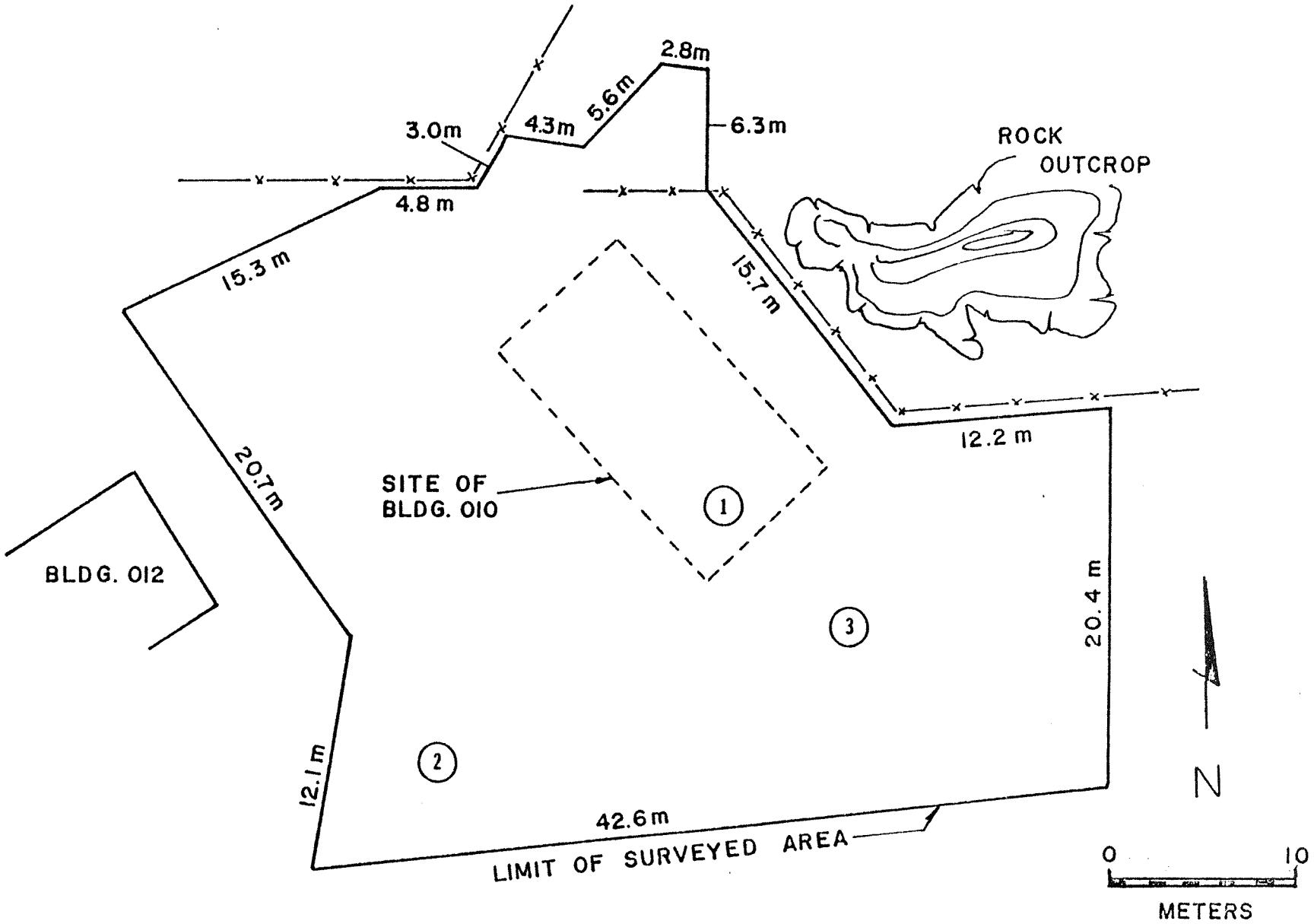

Figure 4

ANL-HP DWG. NO. 80-72

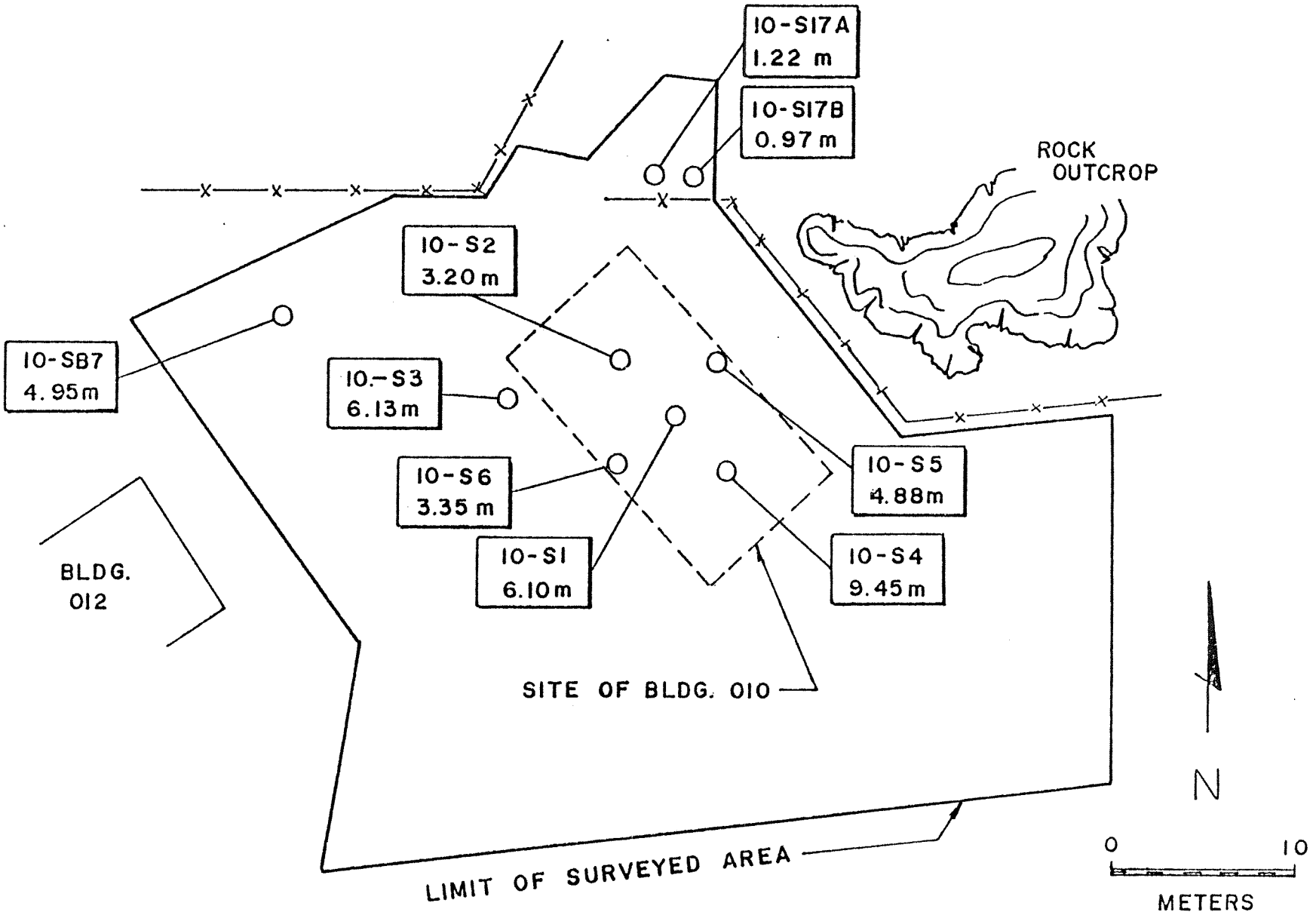

Figure 5

ANL-HP DWG. NO. 80-76

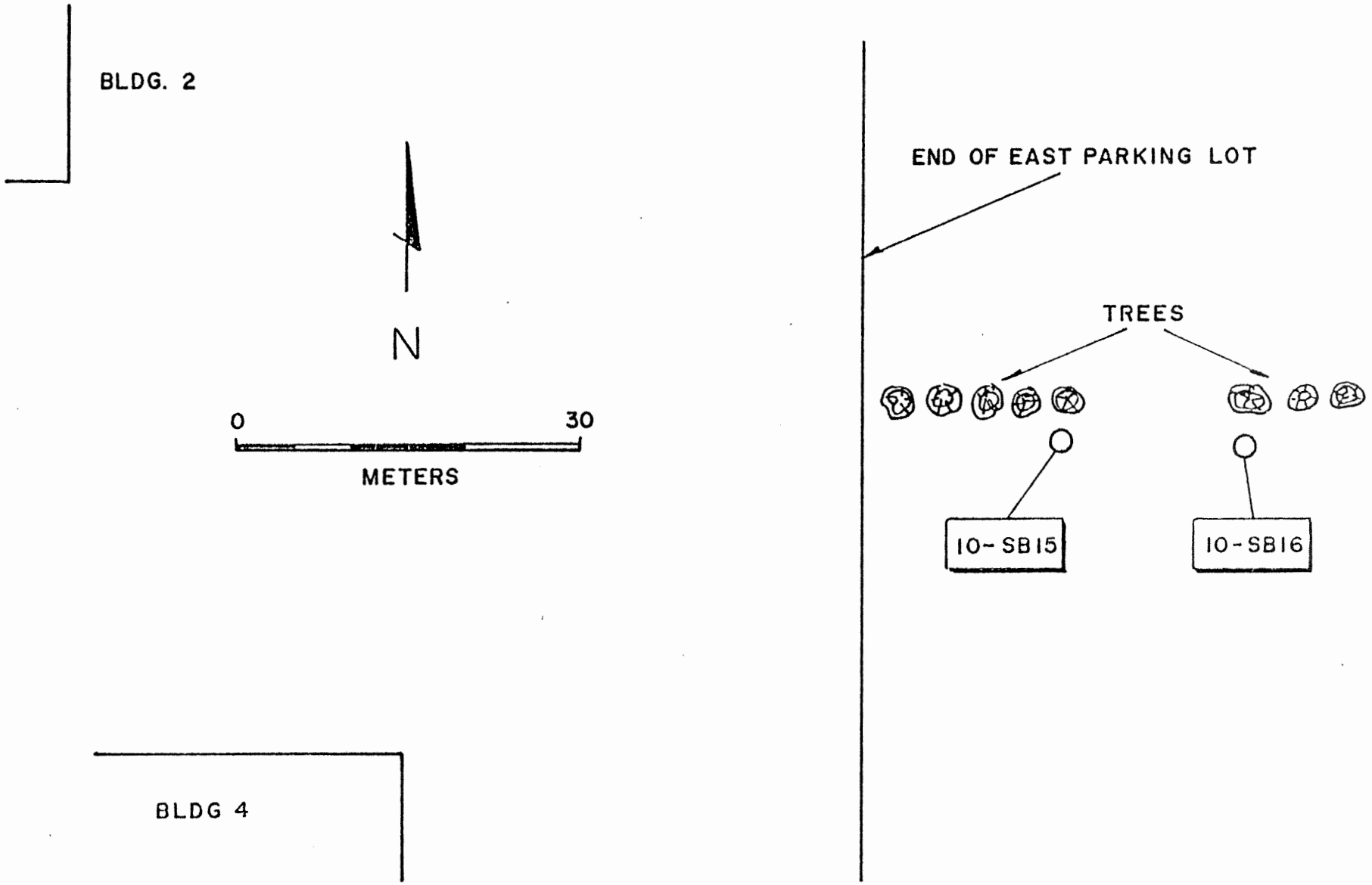

Figure 6

ANL-HP DWG. NO. 82-2

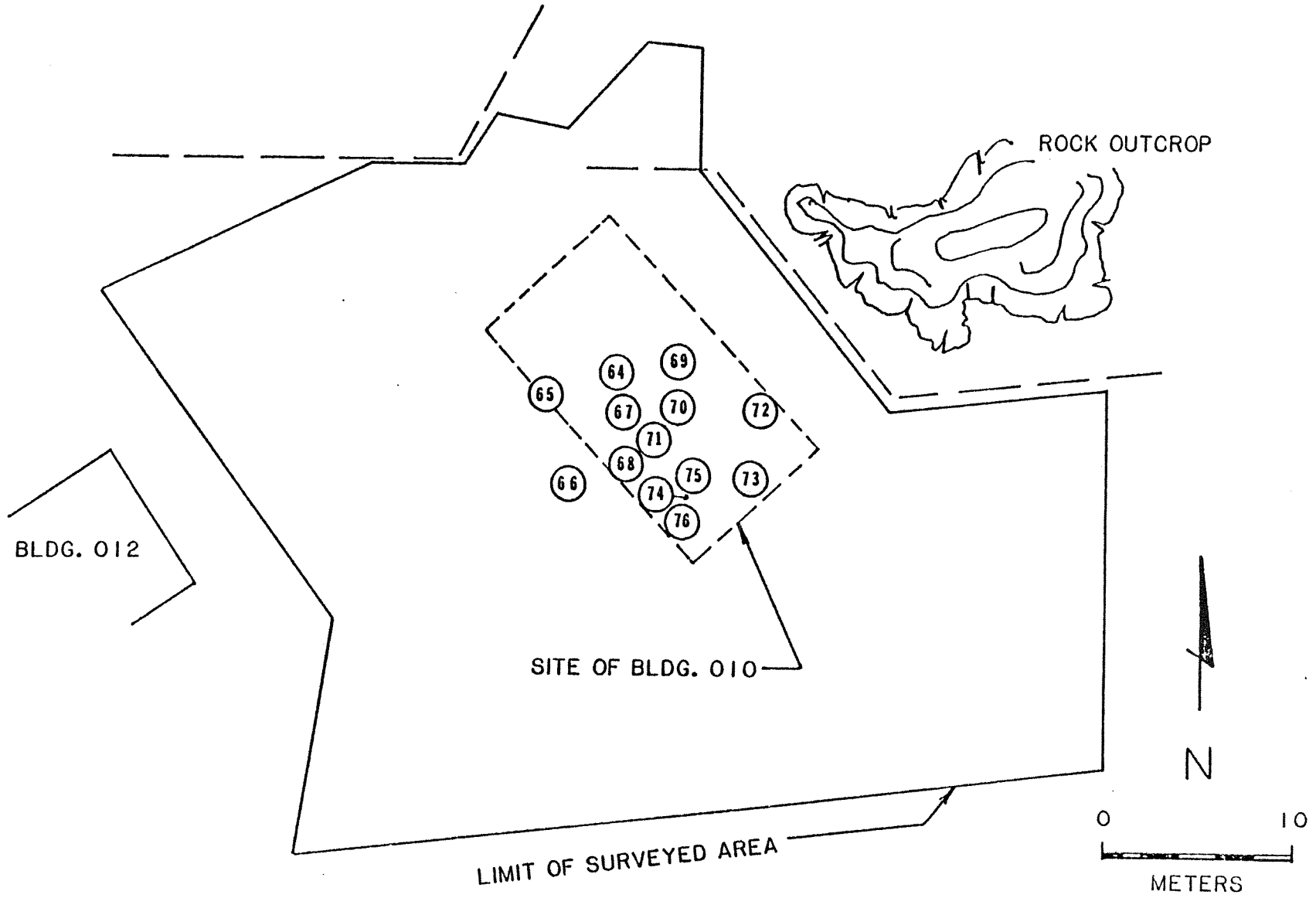

Figure 7

ANL-HP DWG.NO. 82-1

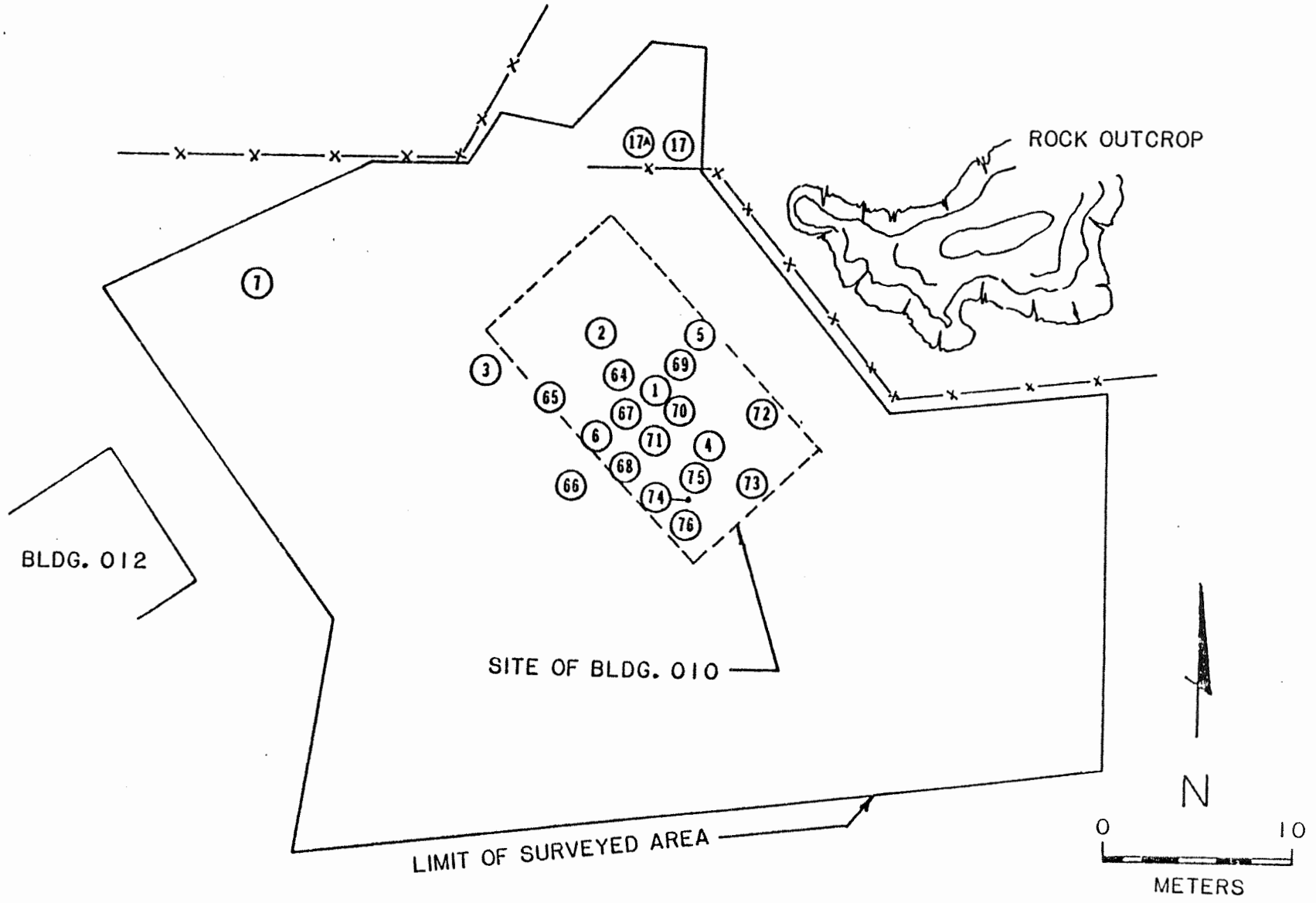

Figure 8