File Doolittle

United States Department of Agriculture | Soil Conservation Service | Federal Building, Room 345
160 East 7th Street
Chester, PA 19013

Subject: Ground-penetrating radar (GPR) survey of Governor Flores Beach Park at Ypao, Tumon Bay, Guam

Date: 18 May 1993

To: Joan Perry
Director
Pacific Basin Office
USDA-Soil Conservation Service
Suite 602, GCIC Bldg.
414 W. Soledad Avenue
Agana, Guam 96910

Enclosed find five copies of a draft report discussing the GPR survey of Governor Flores Beach Park. Also enclosed are enlargements and .dxf files for these plots. I have attempted to limit distribution of this report at this time. I would like for your office to make the formal presentation to the Department of Parks and Recreation. I have sent a copy of this report to all the addressees listed on page 15 of the report. Richard Olmo of International Archaeological Research Institute has been sent a copy of this report in order to prepare his summary of the field activities. He has been asked not to discuss this report with the Department of Parks and Recreation prior to your presentation.

Following your review of the report, if you feel the report is satisfactory, please delivery the report to Richard Davis, State Historic Preservation Officer with the Department of Parks and Recreation. If you wish corrections made to this report, I will gladly comply with your recommendations. I will forward all copies of the radar profiles from the park under a separate cover letter.

I truly enjoyed the opportunity to work on Guam and with members of your fine staff. Please let me known how I can be of further assistance. Thanks again.

With kind regards.

Jim Doolittle

James A. Doolittle
Soil Specialist

cc:
A. Dornbusch, Jr. Director, MWNTC, SCS, Lincoln, NE
J. Culver, National Leader, SSQAS, NSSC, SCS, Lincoln, NE
C. Holzhey, Ass't. Director, NSSC, SCS, Lincoln, NE

GROUND-PENETRATING RADAR SURVEY OF GOVERNOR JOSEPH FLORES BEACH PARK AT YPAO, TUMON BAY, GUAM

James A. Doolittle

May 1993

United States Department of Agriculture
Soil Conservation Service
National Soil Survey Center
Lincoln, Nebraska

Prepared for the
Department of Parks and Recreation
Government of Guam
490 Chalan Palasyo Road
Agana Heights, Guam 96919

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2. GROUND-PENETRATING RADAR

System Description:
Ground-penetrating radar (GPR) techniques have been used to aid reconnaissance and pre-excavation surveys of archaeological sites. A non-invasive, geophysical tool, GPR can provide continuous, high resolution graphic profiles of the subsurface. Interpretations of radar profiles have been used to increase confidence in site assessments, facilitate excavation strategies, minimize the number of unsuccessful exploratory excavations, and reduce unnecessary or unproductive expenditures of time and effort.

The radar units used in the survey of the beach park at Ypao was the Subsurface Interface Radar (SIR) System-8 manufactured by Geophysical Survey Systems, Inc. [1]. The SIR System-8 consists of the Model 4800 control unit, the ADTEK SR 8004H graphic recorder, the Model 38 video display unit with a SONY model TCD-D3 digital tape-corder, a power distribution unit, a 30 meter (m) transmission cable and antennas. The Model 3110 (120 mHz (megahertz)) and the Model 3102 (500 mHz) antennas were used in this survey. The system was powered by a 12-volt vehicular battery. The use and operation of GPR have been discussed by Morey (1974), Doolittle (1987), and Daniels and others (1988).

Ground-penetrating radar is an impulse radar system designed for shallow, subsurface investigations. This system operates by transmitting short pulses of electromagnetic energy into the ground from an antenna. Each pulse consists of a spectrum of frequencies distributed around the center frequency of the transmitting antenna. Whenever a pulse contacts an interface separating layers of differing electromagnetic properties, a portion of the energy is reflected back to the receiving antenna. The receiving unit amplifies and samples the reflected energy and converts it into a similarly shaped waveform in a lower frequency range. The processed reflected waveforms are displayed on a graphic recorder or are recorded on magnetic tape for future playback and/or processing.

The GPR is a time scaled system. This system measures the time that it takes for electromagnetic energy to travel from the antenna to an interface (e.g. buried cultural feature, soil horizon) and back. In order to convert the travel time into a depth scale, either the velocity of pulse propagation or the depth to a reflector must be known. The relationship among depth (d), two-way, pulse travel time (t), and velocity of propagation (v) are described by the following relationship:

$$v = 2d/t$$

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1. Use of trade names in this report is for identification purposes only and does not constitute endorsement by the authors or their institutions.

3. GPR SURVEY OF GOVERNOR FLORES BEACH PARK

Survey Area

The beach park is located along the northwest coast of Guam on Tumon Bay. The Philippine Sea borders Tumon Bay to the north and northwest.

The survey was restricted to the grassed, nearly level to gently sloping (0 to 5 percent slopes) central portion of the park immediately south of the beach area. The dimensions of the survey area were 210 by 180 meters (3.78 hectares). Several portions of the park were excluded from this survey. These sections included the beach, roadways, vehicle parking areas, and steeply sloping or densely vegetated areas. Areas with enclosed structures and above-ground recreational features such as swings, slides, and climbing apparatuses were also excluded from the survey. The survey area contained a number of picnic shelters, volley ball courts, and underground utility and water lines. Figure 1 is a topographic map of the survey area. Relief is about 4.0 m.

The beach park is located in an area of Shioya loamy sands, 0 to 5 percent slopes (Young, 1988). Shioya is a member of the carbonatic, isohyperthermic Typic Ustipsamments family. These very deep (> 1.5 m), excessively drained, coarse-textured soils have formed in stabilized coral deposits. Typically, these soils develop on long, narrow area that parallel shorelines. Areas of Shioya soils are not extensive on Guam. According to Young (1988), Shioya soils occur on about 199 hectares of Guam (1 percent of total area).

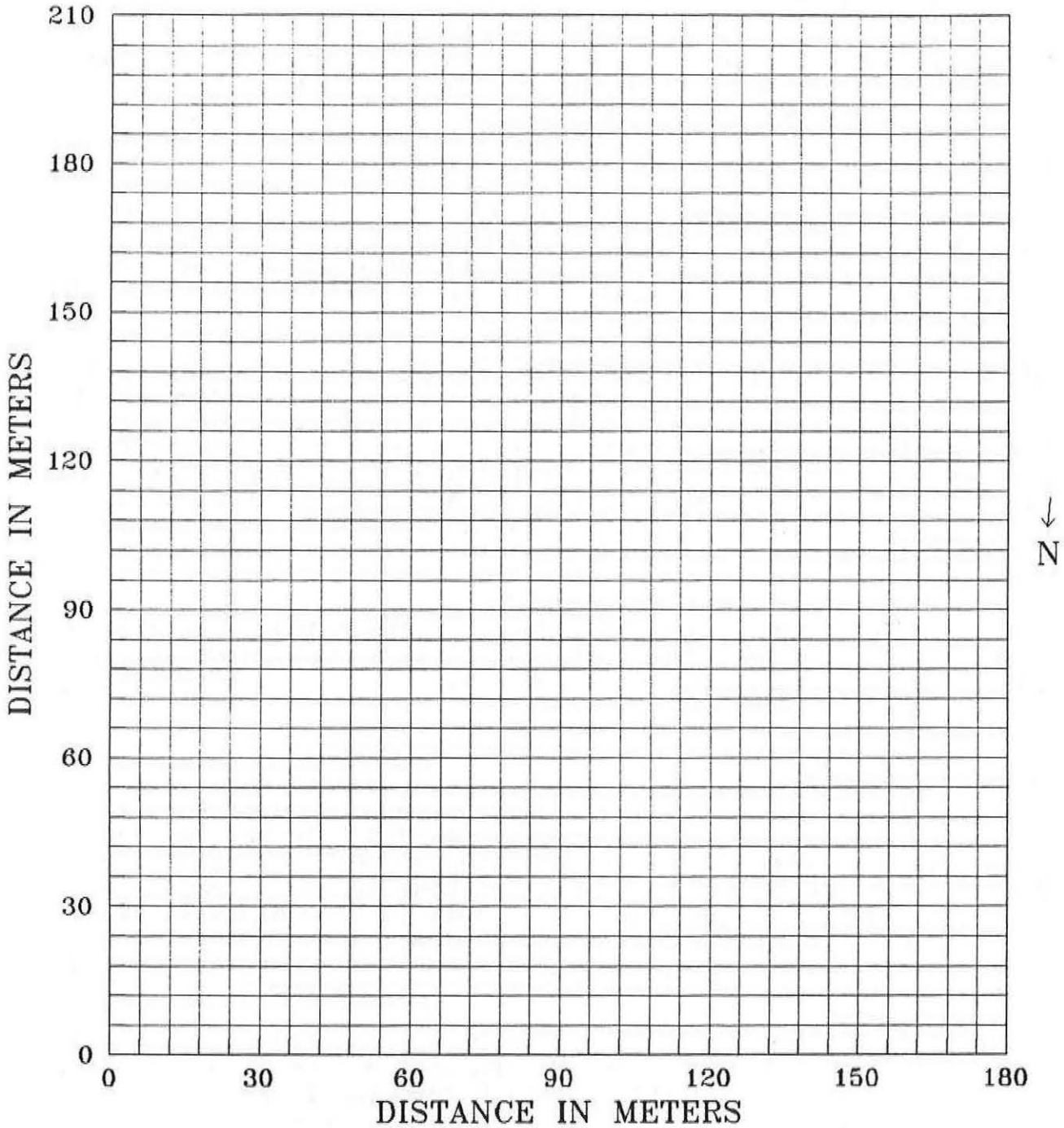
Most areas of Shioya soils are highly suited to the use GPR techniques. Earlier studies (Doolittle, 1991) had indicated the utility of using GPR techniques for archaeological investigations in these soils. In these soils, rates of signal attenuation are generally low and depths of observation are usually greater than 2 m. However, not all areas of Shioya soils are suitable for GPR investigations. Beach areas, which are influenced by tides or shallow water tables, are poorly suited to GPR applications because of the high concentrations of soluble salts.

Survey Procedures

The most accepted and perhaps efficient procedure to detect and chart the location of buried cultural features with GPR is to establish a grid across the survey area. A grid was established across the survey area. The grid interval was 6 m. The basic grid pattern used in this survey is shown in Figure 2. In this figure, all grid lines and intersects are shown.

The survey area was subdivided into seven, 5400 square m cells. Generally the dimensions of these cells were 60 by 90 m. Cells represented the area that could be surveyed in one day with the

GRID FOR GROUND-PENETRATING RADAR SURVEY
YPAO BEACH PARK, TUMON BAY, GUAM



Two-dimensional plots and contour maps were prepared by kriging data using SURFER software. [1]

After the completion of the survey, the locations of structures, picnic shelters, and volley ball courts were approximated using existing photography and maps of the survey area and triangulation techniques. On the enclosed plots (figures 1 through 4), the size and placement of these features should be considered only as close approximations. These features have been drawn on the enclosed plots to provide general reference. These plots can be used to assess the spatial distribution of subsurface anomalies.

Prior to the completion of the radar survey, a prescribed number (5) of 1-by-1 m excavations were completed in the field. Archaeologists from IARII performed these excavations using standard archaeological techniques. The purpose of these excavations was to verify radar interpretations.

4. DISCUSSION AND RESULTS

Discussion:

The detection and identification of buried cultural features with the GPR is never guaranteed. Ground-penetrating radar detects but does not identify subsurface anomalies. The identification of a subsurface anomaly is based on knowledge, experience, and interpretations. The detection of buried cultural features depends on local soil conditions, the depth, geometry, and composition of the features and the presence of scattering bodies within the soil (Mellett, 1992; Vickers et al., 1976).

The amount of energy reflected back to an antenna from a subsurface anomaly is a function of the dielectric gradient existing between the anomaly and the surrounding soil matrix. The greater or more abrupt the difference in dielectric properties, the greater the amount of energy reflected back to the antenna, and the more intense will be the amplitude of the image recorded on the radar profile. Generally, within the beach park, buried cultural features and coral fragments produced intermediate, irregularly shaped reflections. Tree roots produced shallow, intermediate, hyperbolic reflections which occurred in clusters. Buried metallic objects produced exceptionally strong reflection. Some anomalies appeared to have dielectric properties similar to the surrounding soil matrix, were poor reflectors of electromagnetic energy, and produced low amplitude reflections. These anomalies were often difficult to discern on radar profiles and some were overlooked.

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Figure 3 is a two-dimensional plot showing the locations of the anomalies detected within the survey area. The data were compiled from radar traverses spaced at 6 m intervals and conducted along orthogonal grid lines. Some of the more closely-spaced anomalies probably represent the same feature. Frequently on orthogonal traverses, an anomaly located near a grid intersect will be detected on two radar traverses and will be plotted at two slightly different positions.

In Figure 3, the locations of the non-metallic anomalies are indicated with circles. The locations of metallic reflectors are indicated with darken circles. Metallic objects were identified by their strong and multiple reflections. The alignment of several of these metallic anomalies suggests buried utility and pipe lines. In Figure 3, the presence of several utility lines are implied by linear patterns of darken circles. One especially long and prominent line extends from the public rest rooms to the northwest corner of the survey area. Measurement errors and non-uniform speeds of antenna advance have resulted in the apparent non-alignment of some of the anomalies representing utility lines.

The grid coordinates and depth to each of the anomalies shown in Figure 3 are listed in Addendum 2. Most anomalies are buried within the upper 1.0 m of the soil profile. Table 1 summarizes the number of anomalies detected within various depth classes. Seventy-three percent of the detected anomalies are buried within the upper 60 cm of the soil profile. Only five percent of the detected anomalies are buried below depths of 100 cm.

Table 1

Anomalies Detected with GPR by Depth Classes (depths in cm)

Depth	Number	Frequency
0 - 20	736	28%
20 - 40	606	23%
40 - 60	589	22%
60 - 80	374	14%
80 - 100	212	8%
100 - 120	112	4%
120 - 140	32	1%
140 - 160	10	0%
160 - 180	2	0%

Based on field interpretations of radar profiles, IARII archaeologists conducted excavations at five locations. The purpose of these excavations was to verify radar interpretations. Table 2 summarizes the results of these investigations. As predicted, anomalies were observed in four of the five

excavations. One excavation (pit #2) was located at a point where radar interpretations had projected that there would be no subsurface feature or artifact. No cultural features were found in this excavation. In the other four excavations, the observed anomalies were verified as buried cultural features. These features were observed within 0 to 20 cm of the depths estimated from the radar profiles.

Table 2
Ground-Verification of GPR Interpretations

	Grid Coordinates (m)		Depth (cm)		
Excavation	X	Y	Interpreted GPR	Verified Pit	Feature
1	12	160	48 to 57	48	cultural layer
2	108	93	0	0	no feature
3	78	126	42	35	hearth
4	74	206	78	68	post hole
5	76	168	50	30	old trench

Because of the large number of anomalies, the presence of numerous scattering bodies in the soil, and the lack of distinguishing radar signatures, radar interpretations are of limited value for the identification of burials and latte sets. Bruzewicz and others (1986) noted that in soils having numerous scattering bodies, results from GPR survey often provide little meaningful information to supplement random sampling procedures. However, information concerning the large number of subsurface anomalies within the park was not know prior to this survey.

The utility of this survey, as a planning tool, lies in the recognition of patterns in the spatial distribution of subsurface anomalies. Anomalies are distributed throughout the park. While no area can be considered virtually free of subsurface features, some areas contain a higher or lower concentration of anomalies than other areas.

For planning purposes, a plot (Figure 4) was developed to show the relative distribution of subsurface anomalies detected with GPR. This plot is based on the interpretation of radar profiles collected with the 500 mHz antenna along orthongonal grid lines spaced at 6 m intervals.

Figure 4 was prepared by dividing the survey area into 1050, 6-m square cells. The number of anomalies detected with GPR along the grid line segments forming the perimeter of each cell was recorded and assigned to each cell. These numbers were assumed to be proportional to the number of anomalies occurring within each cells. Three frequencies were recognized: low (0 to 4 anomalies), moderate (4 to 8 anomalies), and high (greater than 8 anomalies).

It is obvious from Figure 4, that no portion of the survey area is devoid of subsurface anomalies. As GPR detects but does not identify anomalies, the archaeological significance of these features remains uncertain. The radar survey has documented the continuing and essential need for archaeological site investigations prior to the construction of any facility within the beach park.

5. CONCLUSIONS

1. Ground-penetrating radar techniques can be used to facilitate excavation strategies, to provide greater areal coverage per unit time and cost, to minimize the number of unsuccessful exploratory excavations, and to reduce unnecessary or unproductive expenditures of time and effort. Under suitable soil conditions (dry, coarse-textured soils), GPR can provide highly resolved reflective images of the subsurface to the desired depths of most archaeological investigations. Ground-penetrating radar is an imperfect geophysical technique that compliment but does not replace traditional archaeological methods. Results from GPR investigations are often tentative and incomplete until interpretations are confirmed by traditional archaeological methods.

2. No large subsurface feature or buried structure was identified with GPR in the survey area. In the course of this reconnaissance survey, a very large number (2673) of unidentified point anomalies were detected using a relatively coarse grid interval.

3. As limited ground truth excavations (5 pits) revealed archaeologically significant anomalies, many of the anomalies detected in this survey must be presumed to be significant as well.

4. The utility of GPR as a planning tool lies in its capacity to summarize the relative amount and spatial distribution of anomalies. Some areas of the beach park appear to have a greater concentration of subsurface anomalies than others. Areas having high concentrations of subsurface features are assumed to be generally unfavorable sites for the construction of park facilities. These areas are assumed to contain more anomalies. However, some of the detected anomalies have little archaeological significance. These anomalies represent modern cultural debris, utility lines, or natural features (rock fragments, roots, segmented soil horizons).

5. Burials could not be inferred directly from radar interpretations. Interpretations of burials were complicated by the lack of a characteristic and differentiating graphic signatures for grave sites, and the presences of rock fragments,

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Young, Fred J. 1988. Soil Survey of Territory of Guam. United States Department of Agriculture - Soil Conservation Service. U. S. Government Printing Office, Washington, D.C. p. 166.

ADDENDUM 1

Interpretation of Radar Profiles

The ADTEK SR 8004H graphic recorder uses a variable gray scale to display the reflected waveforms. A graphic profile is developed as electrosensitive paper is moved under the revolving styli of the graphic recorder. The intensity of an image is dependent upon the amplitude of the reflected signals.

Figure 5 is an example of a graphic profile. The horizontal scale represents units of distance traveled along the ground surface. This scale is dependent upon the speed of antenna advance along a traverse line and the rate of paper advance through the graphic recorder. The vertical scale is a time or depth scale which is based on the velocity of signal propagation. The evenly spaced horizontal lines are scale lines. Scale lines provide reference lines for relative depth measurements. In Figure 5, the dashed vertical lines are reference markers inserted on the graphic profile by the operator to indicate known antenna positions or observation points along traverses.

The four basic components of a radar profile have been identified in Figure 5. These components are the start of scan pulse (A), inherent system noise (B), surface image (C), and subsurface interface images (D). Each of these components, with the exception of the start of scan pulse, is generally displayed as a group of dark bands. The number of bands can be limited by high rates of signal attenuation or superposed signals. These bands limit the ability of GPR to discriminate closely spaced interfaces. The dark bands occur at both positive and negative signal amplitudes. The narrow white band(s) separating the darker bands represent the neutral or zero crossing between positive and negative signal amplitudes.

The start of scan image (see A in Fig. 5) results from direct feed-through of transmitted pulses into the receiver section of the antenna. Though a source of unwanted clutter, the start of scan pulse is often used as a time reference line.

Reflections unique to each of the system's antennas are the first series of multiple bands on graphic profiles. Generally the width of these bands increases with decreasing antenna frequency or signal filtration. These reflection (see B in Fig. 5) are a source of unwanted noise on graphic profiles.

The surface image (see C in Fig. 5) represents the ground surface. Below the image of the surface reflection are images from subsurface interfaces (see D in Fig. 5). Interfaces can be categorized as being either plane or point reflectors. Most soil horizons, buried cultural layers, geologic strata appear as a series of continuous, parallel bands similar to those appearing in the left-hand portion of Figure 5. Features that produce

these reflections are referred to as "plane reflectors." Small objects such as rocks, roots, or buried cultural features will produce a hyperbolic pattern similar to those appearing in the right-hand portion of Figure 5. Features that produce these reflections are referred to as "point reflectors." In this paper, point reflectors are referred to as "anomalies."

ADDENDUM 2

ANOMALIES DETECTED WITH GROUND-PENETRATING RADAR

YPAO BEACH PARK, TUMON BAY, GUAM

(Coordinates and depths for anomalies detected using a 6 meter grid interval and the 500 mHz antenna)

X (meter)	Y (meter)	DEPTH (cm)	X (meter)	Y (meter)	DEPTH (cm)
2.46	0.30	40	7.00	132.30	45
11.07	0.30	99	8.40	132.30	55
16.30	0.30	35	14.70	132.30	43
16.50	0.30	100	22.80	132.30	23
17.80	0.30	66	24.60	132.30	22
21.00	0.30	71	26.90	132.30	14
21.70	0.30	15	28.90	132.30	29
26.60	0.30	138	43.20	132.30	14
28.80	0.30	74	45.20	132.30	62
30.80	0.30	83	49.80	132.30	14
35.20	0.30	79	52.90	132.30	17
49.90	0.30	20	56.20	132.30	51
52.10	0.30	10	5.10	138.30	23
55.40	0.30	84	6.00	138.30	69
57.50	0.30	77	6.60	138.30	17
4.90	6.30	88	8.20	138.30	57
6.70	6.30	117	10.60	138.30	66
10.50	6.30	71	10.70	138.30	15
15.90	6.30	88	12.00	138.30	18
19.60	6.30	105	17.00	138.30	16
21.20	6.30	57	19.90	138.30	42
24.20	6.30	115	21.80	138.30	38
25.70	6.30	83	23.00	138.30	17
27.80	6.30	90	27.90	138.30	15
31.10	6.30	92	37.60	138.30	25
34.90	6.30	45	40.10	138.30	92
41.50	6.30	79	43.40	138.30	17
44.20	6.30	83	46.40	138.30	63
52.90	6.30	38	47.30	138.30	15
58.10	6.30	62	48.60	138.30	23
60.00	6.30	32	54.00	138.30	42
1.50	12.30	57	11.10	144.30	29
9.10	12.30	74	12.20	144.30	18
12.00	12.30	83	14.20	144.30	52
19.20	12.30	49	22.70	144.30	57
20.20	12.30	62	25.00	144.30	18
28.20	12.30	24	28.30	144.30	20
30.20	12.30	49	32.80	144.30	49
31.60	12.30	42	39.80	144.30	28
39.40	12.30	82	40.90	144.30	28
45.00	12.30	97	48.00	144.30	11
47.40	12.30	72	51.50	144.30	33
50.60	12.30	66	54.20	144.30	7
52.80	12.30	17	26.80	144.30	109
3.60	18.30	48	6.00	150.30	12
4.50	18.30	69	7.90	150.30	52
4.80	18.30	32	18.90	150.30	18
7.00	18.30	68	20.50	150.30	109
9.00	18.30	48	22.20	150.30	20

X (meter)	Y (meter)	DEPTH (cm)
44.50	42.30	22
45.70	42.30	18
52.80	42.30	17
55.50	42.30	17
2.10	48.30	49
6.90	48.30	68
25.40	48.30	15
26.50	48.30	38
38.60	48.30	63
40.20	48.30	53
50.80	48.30	51
52.10	48.30	66
54.30	48.30	79
58.10	48.30	24
2.40	54.30	52
3.00	54.30	21
7.40	54.30	76
22.30	54.30	18
24.70	54.30	29
25.00	54.30	30
27.70	54.30	20
29.00	54.30	22
30.40	54.30	26
31.80	54.30	26
33.60	54.30	26
41.70	54.30	20
44.70	54.30	76
50.10	54.30	76
51.20	54.30	92
2.20	60.30	55
4.80	60.30	35
6.80	60.30	86
8.40	60.30	32
24.50	60.30	58
35.00	60.30	18
37.50	60.30	25
38.40	60.30	20
39.80	60.30	18
45.80	60.30	73
49.90	60.30	89
50.80	60.30	18
53.70	60.30	72
54.50	60.30	69
57.40	60.30	18
59.20	60.30	20
43.80	66.30	34
46.20	66.30	57
46.80	66.30	18
54.50	66.30	25
55.70	66.30	31
59.00	66.30	73
34.10	72.30	18
38.90	72.30	89
40.00	72.30	22

X (meter)	Y (meter)	DEPTH (cm)
41.60	174.30	15
2.40	180.30	58
3.60	180.30	14
21.00	180.30	98
30.90	180.30	28
34.70	180.30	86
37.10	180.30	15
41.20	180.30	112
50.20	180.30	35
0.30	135.80	77
0.30	141.90	51
0.30	147.40	91
0.30	160.20	77
0.30	161.80	79
0.30	176.30	25
0.30	175.80	156
6.30	135.90	71
6.30	138.30	60
6.30	141.10	46
6.30	147.90	74
6.30	151.00	60
6.30	162.80	12
6.30	174.70	156
12.30	152.50	8
12.30	159.50	48
12.30	162.20	72
12.30	169.40	18
12.30	176.40	157
12.30	179.80	54
18.30	132.70	32
18.30	137.80	38
18.30	139.60	10
18.30	142.80	32
18.30	145.20	92
18.30	146.90	80
18.30	147.60	100
24.30	132.50	46
24.30	140.20	17
24.30	143.80	11
30.30	90.80	26
30.30	91.80	139
30.30	96.80	22
30.30	99.60	74
30.30	103.90	26
30.30	104.60	18
30.30	129.00	51
30.30	137.60	94
30.30	167.20	42
30.30	173.60	65
30.30	179.10	65
36.30	90.60	138
36.30	92.00	91
36.30	96.00	122
36.30	97.60	17

X (meter)	Y (meter)	DEPTH (cm)
60.30	1.90	70
54.30	82.30	87
54.30	81.10	64
54.30	76.90	43
54.30	74.60	62
54.30	69.50	22
54.30	68.70	63
54.30	67.40	18
54.30	65.20	82
54.30	64.20	20
54.30	62.90	63
54.30	60.50	73
54.30	48.20	55
54.30	45.60	18
54.30	44.40	24
54.30	42.50	32
54.30	33.90	15
54.30	32.40	52
54.30	28.30	57
54.30	26.30	64
54.30	24.80	62
54.30	22.20	84
54.30	13.80	63
54.30	10.10	72
54.30	7.10	43
54.30	3.30	66
54.30	1.50	62
54.30	0.80	77
48.30	87.80	91
48.30	78.60	15
48.30	75.20	31
48.30	72.90	17
48.30	72.00	50
48.30	70.80	35
48.30	69.00	29
48.30	66.70	72
48.30	55.80	18
48.30	50.90	52
48.30	46.60	46
48.30	43.10	18
48.30	40.60	20
48.30	33.10	18
48.30	24.80	20
48.30	3.10	77
42.30	89.20	49
42.30	89.00	92
42.30	86.80	54
42.30	82.10	28
42.30	76.30	12
42.30	73.10	74
42.30	65.10	34
42.30	55.80	14
42.30	46.90	48
42.30	39.00	85

X (meter)	Y (meter)	DEPTH (cm)
54.30	90.60	57
54.30	91.70	58
54.30	108.90	58
54.30	109.50	60
54.30	115.60	72
54.30	117.50	119
54.30	124.40	46
54.30	132.50	49
54.30	136.80	48
54.30	139.30	14
54.30	139.90	79
54.30	140.60	65
54.30	141.20	52
54.30	144.50	63
54.30	146.40	35
54.30	155.40	12
54.30	159.40	17
54.30	166.60	49
54.30	173.10	37
54.30	177.00	48
54.30	178.40	32
54.30	178.80	9
54.30	173.20	66
60.30	96.90	34
60.30	102.60	15
60.30	104.60	26
60.30	107.70	114
60.30	111.10	69
60.30	112.60	82
60.30	122.40	18
60.30	131.00	91
60.30	135.00	96
60.30	141.20	11
60.30	148.20	15
60.30	149.10	54
60.30	152.20	60
60.30	153.20	42
60.30	152.50	15
60.30	156.60	12
60.30	161.40	17
60.30	164.70	26
60.30	167.10	25
60.30	171.70	55
60.30	172.70	43
60.30	174.00	17
60.30	177.30	48
73.60	96.30	91
74.20	96.30	18
75.50	96.30	77
78.50	96.30	17
80.50	96.30	15
85.20	96.30	54
94.30	96.30	109
100.40	96.30	49

X (meter)	Y (meter)	DEPTH (cm)
18.30	54.70	48
18.30	47.10	62
18.30	41.10	18
18.30	38.30	22
18.30	24.80	18
18.30	19.50	18
18.30	17.40	40
18.30	4.40	43
18.30	3.50	75
18.30	2.90	72
18.30	2.00	82
12.30	59.20	65
12.30	57.00	23
12.30	54.30	66
12.30	35.60	40
12.30	33.40	62
12.30	31.60	34
12.30	30.50	51
12.30	24.80	36
12.30	21.00	21
12.30	15.00	84
12.30	3.60	94
6.30	56.50	14
6.30	56.10	42
6.30	55.00	18
6.30	52.40	30
6.30	46.30	138
6.30	42.70	18
6.30	37.70	20
6.30	34.70	57
6.30	28.90	58
6.30	27.10	48
6.30	25.90	42
6.30	16.40	43
6.30	15.10	51
6.30	14.20	80
6.30	12.80	46
6.30	10.90	112
6.30	3.60	79
6.30	2.30	48
0.30	38.30	77
0.30	35.00	38
0.30	33.10	86
0.30	31.80	34
0.30	31.20	94
0.30	28.30	54
0.30	27.10	52
0.30	25.70	41
0.30	7.40	62
0.30	5.00	43
0.30	3.30	48
98.30	0.30	62
100.30	0.30	74
104.60	0.30	60

X (meter)	Y (meter)	DEPTH (cm)
66.40	126.30	94
66.50	126.30	28
77.60	126.30	91
81.70	126.30	79
96.00	126.30	17
97.20	126.30	35
100.50	126.30	14
102.00	126.30	32
103.20	126.30	79
103.80	126.30	18
108.00	126.30	14
110.10	126.30	109
111.30	126.30	51
115.30	126.30	15
119.00	126.30	29
119.70	126.30	54
61.30	132.30	89
69.20	132.30	28
70.00	132.30	23
71.70	132.30	17
83.70	132.30	17
94.20	132.30	17
94.60	132.30	15
97.10	132.30	30
108.00	132.30	40
109.20	132.30	37
109.50	132.30	68
112.50	132.30	57
114.80	132.30	57
115.70	132.30	66
119.10	132.30	71
61.80	138.30	18
83.60	138.30	51
90.80	138.30	58
105.00	138.30	40
106.70	138.30	37
107.30	138.30	17
110.10	138.30	105
113.60	138.30	20
115.70	138.30	83
117.00	138.30	38
119.00	138.30	120
74.00	138.30	74
67.50	144.30	22
69.80	144.30	128
76.50	144.30	57
96.00	144.30	80
97.10	144.30	15
103.50	144.30	60
108.00	144.30	69
118.40	144.30	14
61.10	150.30	46
63.80	150.30	31
72.00	150.30	15

X (meter)	Y (meter)	DEPTH (cm)
87.60	30.30	17
88.80	30.30	18
93.20	30.30	42
106.60	30.30	20
108.00	30.30	7
109.90	30.30	20
112.00	30.30	57
114.40	30.30	17
119.80	30.30	49
60.40	36.30	22
60.90	36.30	17
63.30	36.30	15
66.00	36.30	28
71.30	36.30	35
72.20	36.30	15
72.70	36.30	26
76.20	36.30	35
80.50	36.30	67
84.00	36.30	57
86.40	36.30	66
88.70	36.30	12
96.40	36.30	51
107.50	36.30	20
108.00	36.30	18
109.90	36.30	20
110.50	36.30	18
61.20	42.30	15
61.80	42.30	18
62.40	42.30	14
63.00	42.30	17
66.70	42.30	26
67.90	42.30	35
79.80	42.30	32
82.60	42.30	37
88.40	42.30	38
89.40	42.30	15
93.80	42.30	41
98.70	42.30	34
99.90	42.30	46
102.00	42.30	69
118.00	42.30	52
120.00	42.30	17
63.50	48.30	20
66.00	48.30	77
67.30	48.30	109
81.60	48.30	31
84.00	48.30	29
85.40	48.30	20
86.20	48.30	28
89.30	48.30	17
91.80	48.30	18
92.80	48.30	49
103.00	48.30	54
106.10	48.30	15

X (meter)	Y (meter)	DEPTH (cm)
62.20	174.30	34
72.00	174.30	12
75.20	174.30	52
77.60	174.30	20
83.30	174.30	60
95.30	174.30	55
101.70	174.30	38
103.20	174.30	20
104.40	174.30	25
105.60	174.30	20
110.80	174.30	15
63.30	180.30	26
87.50	180.30	66
93.50	180.30	8
95.40	180.30	48
96.70	180.30	38
101.30	180.30	17
104.50	180.30	109
107.00	180.30	55
110.30	180.30	92
113.00	180.30	31
116.50	180.30	18
118.50	180.30	72
66.30	110.60	116
66.30	111.80	82
66.30	126.00	123
66.30	134.80	26
66.30	136.60	48
66.30	137.60	35
66.30	147.50	12
66.30	148.60	37
66.30	153.80	14
66.30	154.10	55
66.30	155.20	17
66.30	160.90	15
66.30	165.00	15
66.30	165.80	17
66.30	170.20	91
66.30	171.40	58
66.30	177.80	63
72.30	94.90	91
72.30	99.90	46
72.30	100.20	51
72.30	100.90	26
72.30	107.60	6
72.30	119.30	102
72.30	137.80	97
72.30	138.90	65
72.30	147.60	17
72.30	148.40	15
72.30	151.90	85
72.30	158.60	43
72.30	160.50	66
72.30	162.00	66

X (meter)	Y (meter)	DEPTH (cm)
89.70	78.30	37
91.50	78.30	17
93.30	78.30	18
93.80	78.30	62
94.80	78.30	12
99.60	78.30	29
100.90	78.30	17
106.90	78.30	52
112.80	78.30	109
116.70	78.30	49
119.60	78.30	31
61.40	84.30	92
63.60	84.30	62
66.00	84.30	38
75.10	84.30	18
82.10	84.30	18
86.60	84.30	20
96.00	84.30	55
100.20	84.30	35
101.50	84.30	29
106.20	84.30	112
110.00	84.30	51
116.20	84.30	80
67.40	90.30	97
68.50	90.30	126
80.50	90.30	32
83.20	90.30	60
92.50	90.30	34
94.70	90.30	26
98.20	90.30	28
99.20	90.30	43
102.60	90.30	12
106.10	90.30	32
109.90	90.30	12
110.50	90.30	65
66.30	18.80	53
66.30	20.70	106
66.30	21.00	20
66.30	22.80	46
66.30	28.90	46
66.30	33.30	15
66.30	33.80	8
66.30	36.20	25
66.30	38.90	45
66.30	48.80	58
66.30	51.60	69
66.30	63.60	74
66.30	66.00	43
66.30	70.30	69
66.30	73.20	14
66.30	74.40	15
66.30	75.50	20
66.30	86.30	71
66.30	87.10	96

X (meter)	Y (meter)	DEPTH (cm)
90.30	176.00	57
96.30	91.70	35
96.30	94.30	89
96.30	97.30	29
96.30	99.30	23
96.30	112.20	18
96.30	119.30	89
96.30	146.50	65
96.30	147.50	15
96.30	149.30	14
96.30	157.50	42
96.30	159.00	66
96.30	162.40	18
96.30	168.00	48
96.30	176.10	46
102.30	90.00	62
102.30	95.20	64
102.30	110.30	15
102.30	112.00	26
102.30	115.50	18
102.30	117.30	22
102.30	121.30	57
102.30	125.40	79
102.30	128.10	29
102.30	129.90	29
102.30	133.80	18
102.30	141.30	18
102.30	145.00	37
102.30	145.80	26
102.30	153.40	82
102.30	158.00	128
102.30	162.20	18
102.30	161.40	18
102.30	162.70	18
102.30	165.00	18
102.30	167.00	60
102.30	174.40	65
108.30	94.00	12
108.30	113.30	11
108.30	114.70	15
108.30	131.30	65
108.30	135.00	17
108.30	138.00	34
108.30	140.10	97
108.30	144.00	46
108.30	148.50	17
108.30	159.50	17
108.30	160.60	15
108.30	162.00	18
108.30	166.80	72
108.30	172.20	65
108.30	173.30	17
108.30	179.30	132
114.30	124.10	54

X (meter)	Y (meter)	DEPTH (cm)
84.30	82.20	107
84.30	82.40	18
84.30	87.00	112
90.30	19.50	20
90.30	21.00	20
90.30	21.60	17
90.30	22.20	65
90.30	24.30	125
90.30	24.90	28
90.30	26.20	18
90.30	27.80	42
90.30	27.90	46
90.30	30.00	52
90.30	31.10	35
90.30	33.20	54
90.30	34.10	18
90.30	36.50	48
90.30	40.00	46
90.30	41.00	18
90.30	44.40	42
90.30	46.80	15
90.30	51.50	60
90.30	55.30	68
90.30	74.50	15
90.30	75.90	18
90.30	76.60	35
90.30	81.20	128
90.30	81.70	42
90.30	90.00	66
96.30	22.90	55
96.30	24.00	66
96.30	25.90	82
96.30	28.20	74
96.30	37.60	32
96.30	38.30	14
96.30	39.10	100
96.30	39.70	18
96.30	46.90	15
96.30	52.90	49
96.30	72.90	23
96.30	74.50	23
96.30	76.20	14
96.30	77.20	15
96.30	79.90	82
96.30	80.60	119
96.30	81.60	17
102.30	0.30	52
102.30	2.00	108
102.30	3.80	46
102.30	6.80	77
102.30	7.50	63
102.30	9.30	49
102.30	13.30	20
102.30	18.40	14

X (meter)	Y (meter)	DEPTH (cm)
160.70	102.30	45
163.00	102.30	17
164.50	102.30	17
165.50	102.30	18
166.90	102.30	15
168.70	102.30	40
172.00	102.30	20
176.10	102.30	23
178.70	102.30	20
179.70	102.30	18
122.00	108.30	18
125.00	108.30	18
126.70	108.30	54
128.80	108.30	12
133.10	108.30	54
134.60	108.30	31
142.20	108.30	14
149.30	108.30	96
150.70	108.30	17
158.70	108.30	31
165.20	108.30	66
165.60	108.30	46
167.30	108.30	34
173.60	108.30	12
175.10	108.30	15
176.60	108.30	14
120.20	114.30	71
131.30	114.30	18
132.30	114.30	76
133.60	114.30	15
135.20	114.30	17
135.80	114.30	18
137.40	114.30	20
137.70	114.30	49
140.70	114.30	28
142.70	114.30	20
156.00	114.30	14
169.80	114.30	20
170.00	114.30	77
126.00	120.30	23
128.70	120.30	26
135.00	120.30	12
140.80	120.30	15
142.00	120.30	17
144.30	120.30	15
156.20	120.30	15
166.00	120.30	14
170.10	120.30	14
171.20	120.30	11
177.30	120.30	15
128.10	126.30	12
150.90	126.30	20
153.50	126.30	18
154.10	126.30	18

X (meter)	Y (meter)	DEPTH (cm)
114.30	50.60	15
114.30	54.00	66
114.30	56.30	29
114.30	57.30	34
114.30	59.30	17
114.30	60.40	38
114.30	61.00	37
114.30	63.20	42
114.30	64.30	57
114.30	66.70	20
114.30	72.40	43
114.30	74.10	43
114.30	75.40	43
114.30	79.60	54
114.30	85.00	31
114.30	87.50	52
114.30	8.30	101
120.30	6.00	40
120.30	9.40	29
120.30	11.00	49
120.30	14.10	17
120.30	15.60	102
120.30	17.10	20
120.30	128.60	80
120.30	29.30	62
120.30	30.30	60
120.30	37.00	20
120.30	37.60	15
120.30	38.30	28
120.30	40.00	54
120.30	45.60	31
120.30	49.00	86
120.30	50.30	62
120.30	51.00	34
120.30	52.30	42
120.30	55.00	31
120.30	56.30	15
120.30	60.30	16
120.30	62.70	15
120.30	63.70	43
120.30	64.00	38
120.30	65.70	18
120.30	66.70	95
120.30	71.60	54
120.30	73.00	50
120.30	74.70	12
120.30	75.60	74
120.30	77.80	28
120.30	79.80	57
120.30	81.60	37
120.30	83.40	72
120.30	84.80	25
120.30	86.20	58
120.30	87.40	14

X (meter)	Y (meter)	DEPTH (cm)
171.30	138.30	29
172.50	138.30	79
137.70	144.30	60
140.20	144.30	35
141.70	144.30	85
143.40	144.30	15
145.70	144.30	14
150.00	144.30	20
152.40	144.30	14
153.90	144.30	14
157.40	144.30	18
165.30	144.30	43
166.30	144.30	49
171.80	144.30	86
172.60	144.30	86
127.00	150.30	57
130.90	150.30	18
135.00	150.30	57
137.00	150.30	97
140.20	150.30	17
141.70	150.30	22
142.40	150.30	20
146.60	150.30	18
151.30	150.30	66
152.70	150.30	29
154.70	150.30	55
156.00	150.30	46
168.00	150.30	17
169.70	150.30	27
172.00	150.30	17
173.00	150.30	20
174.70	150.30	24
124.30	156.30	29
124.80	156.30	62
125.70	156.30	80
125.90	156.30	20
128.50	156.30	12
131.10	156.30	20
133.40	156.30	51
139.80	156.30	62
140.40	156.30	85
148.00	156.30	69
150.00	156.30	17
151.20	156.30	31
153.80	156.30	15
156.90	156.30	26
160.20	156.30	20
172.90	156.30	23
169.60	156.30	18
170.40	156.30	22
171.60	156.30	23
172.40	156.30	18
175.80	156.30	14
180.00	156.30	6

X (meter)	Y (meter)	DEPTH (cm)
149.10	24.30	49
121.40	30.30	23
123.70	30.30	86
133.80	30.30	79
134.80	30.30	23
143.30	30.30	29
143.70	30.30	32
145.40	30.30	72
148.20	30.30	14
153.00	30.30	37
156.40	30.30	26
157.50	30.30	85
159.80	30.30	71
164.00	30.30	34
165.30	30.30	119
166.40	30.30	49
173.60	30.30	43
174.20	30.30	32
175.00	30.30	29
175.90	30.30	28
179.00	30.30	69
120.50	36.30	13
121.50	36.30	14
122.30	36.30	79
122.50	36.30	18
124.20	36.30	15
125.20	36.30	17
126.60	36.30	31
126.90	36.30	28
127.50	36.30	65
130.30	36.30	17
131.40	36.30	23
132.60	36.30	25
133.50	36.30	15
134.00	36.30	46
134.60	36.30	51
150.00	36.30	57
150.40	36.30	117
152.60	36.30	112
156.70	36.30	49
160.90	36.30	40
161.80	36.30	43
163.90	36.30	43
170.40	36.30	63
133.70	42.30	28
137.10	42.30	20
140.70	42.30	20
142.60	42.30	69
146.50	42.30	76
148.60	42.30	88
152.40	42.30	54
153.10	42.30	14
154.30	42.30	12
155.10	42.30	65

X (meter)	Y (meter)	DEPTH (cm)
126.30	128.70	31
126.30	129.60	22
126.30	131.10	52
126.30	132.00	60
126.30	132.90	42
126.30	134.40	20
126.30	137.70	15
126.30	139.50	37
126.30	141.60	82
126.30	149.60	57
126.30	152.30	14
126.30	153.70	29
126.30	154.30	23
126.30	156.80	18
126.30	157.30	17
126.30	160.40	35
126.30	163.10	43
126.30	164.30	63
126.30	172.00	12
126.30	178.20	80
126.30	179.40	25
138.30	90.30	17
138.30	92.60	43
138.30	94.40	15
138.30	106.40	17
138.30	107.40	15
138.30	108.80	38
138.30	110.20	18
138.30	112.00	29
138.30	115.10	14
138.30	116.80	52
138.30	117.70	22
138.30	119.40	44
138.30	124.50	32
138.30	126.00	18
138.30	131.70	71
138.30	132.00	26
138.30	134.00	17
138.30	134.30	46
138.30	136.00	120
138.30	136.20	69
138.30	138.20	9
138.30	141.40	66
138.30	146.80	62
138.30	149.40	15
138.30	152.10	23
138.30	153.80	31
138.30	154.70	18
138.30	157.20	15
138.30	159.80	80
138.30	164.30	37
138.30	164.60	96
144.30	99.30	69
144.30	100.60	88

X (meter)	Y (meter)	DEPTH (cm)
169.80	54.30	88
170.40	54.30	18
171.60	54.30	22
172.40	54.30	26
175.90	54.30	72
179.00	54.30	59
120.70	60.30	15
121.10	60.30	18
122.60	60.30	17
123.20	60.30	15
125.30	60.30	34
126.00	60.30	29
129.00	60.30	42
131.40	60.30	29
132.20	60.30	28
135.10	60.30	15
141.10	60.30	54
141.80	60.30	128
144.70	60.30	38
145.90	60.30	88
152.40	60.30	51
154.20	60.30	58
159.80	60.30	43
163.80	60.30	44
167.00	60.30	72
169.30	60.30	22
171.50	60.30	20
174.30	60.30	17
174.60	60.30	29
164.80	60.30	88
176.10	60.30	45
178.10	60.30	42
122.20	66.30	23
123.50	66.30	55
125.30	66.30	91
127.40	66.30	42
128.90	66.30	25
132.30	66.30	92
133.70	66.30	29
134.00	66.30	45
135.00	66.30	38
137.40	66.30	32
140.00	66.30	37
146.80	66.30	34
149.50	66.30	23
152.30	66.30	37
154.90	66.30	28
159.80	66.30	54
161.60	66.30	69
162.00	66.30	112
165.20	66.30	29
167.50	66.30	26
120.60	72.30	63
122.40	72.30	18

X (meter)	Y (meter)	DEPTH (cm)
162.30	106.60	18
162.30	107.20	34
162.30	124.30	12
162.30	115.80	15
162.30	126.70	18
162.30	140.60	43
162.30	145.00	29
162.30	157.80	42
168.30	161.40	69
168.30	157.70	40
168.30	154.80	52
168.30	154.20	18
168.30	153.30	17
168.30	148.50	51
168.30	146.10	49
168.30	140.50	45
168.30	135.60	20
168.30	134.10	15
168.30	125.00	17
168.30	118.80	14
168.30	116.60	14
168.30	98.50	28
168.30	92.40	37
174.30	94.80	74
174.30	104.60	26
174.30	108.20	38
174.30	109.60	15
174.30	116.60	12
174.30	124.90	27
174.30	129.70	29
174.30	132.60	14
174.30	136.50	15
174.30	150.30	44
174.30	157.30	44
180.00	157.40	49
180.00	150.80	17
180.00	150.30	20
180.00	139.80	89
180.00	123.50	31
180.00	121.10	54
171.30	168.30	32
175.00	168.30	14
176.00	174.30	9
168.70	174.30	51
172.30	180.00	37
173.00	180.00	35
168.80	186.30	15
177.90	210.00	45
173.80	210.00	79
173.20	210.00	65
167.70	210.00	91
165.90	210.00	26
157.00	210.00	18
149.30	210.00	79

X (meter)	Y (meter)	DEPTH (cm)
178.90	90.30	12
126.30	5.30	55
126.30	8.50	55
126.30	10.90	18
126.30	13.60	23
126.30	16.70	69
126.30	32.50	17
126.30	34.40	18
126.30	36.90	51
126.30	37.60	43
126.30	41.40	49
126.30	43.10	23
126.30	45.50	41
126.30	49.40	23
126.30	52.10	18
126.30	54.00	54
126.30	56.20	35
126.30	58.10	34
126.30	59.40	14
126.30	60.90	22
126.30	61.60	46
126.30	65.40	100
126.30	66.00	25
126.30	67.20	34
126.30	69.60	29
126.30	72.20	15
126.30	73.30	29
126.30	74.70	108
126.30	77.00	26
126.30	82.90	119
126.30	84.70	40
126.30	86.50	115
126.30	87.50	57
126.30	88.20	49
132.20	4.00	48
132.20	5.00	51
132.20	5.70	82
132.20	8.50	38
132.20	11.40	29
132.20	26.20	38
132.20	27.20	48
132.20	34.20	58
132.20	36.60	60
132.20	41.10	20
132.20	43.70	20
132.20	51.30	18
132.20	52.30	25
132.20	54.90	18
132.20	55.60	14
132.20	57.80	92
132.20	58.70	42
132.20	62.20	19
132.20	65.00	73
132.20	66.00	56

X (meter)	Y (meter)	DEPTH (cm)
11.40	192.30	17
13.40	192.30	45
20.70	192.30	71
25.60	192.30	74
30.30	192.30	94
33.80	192.30	74
35.30	192.30	72
37.70	192.30	66
39.30	192.30	64
57.10	192.30	38
58.20	192.30	35
67.20	192.30	15
68.20	192.30	18
84.00	192.30	26
84.70	192.30	26
85.30	192.30	83
88.00	192.30	37
89.30	192.30	21
93.30	192.30	52
98.30	192.30	23
100.00	192.30	26
101.00	192.30	22
102.30	192.30	25
107.20	192.30	57
113.00	192.30	55
123.20	192.30	54
123.70	192.30	62
135.10	192.30	51
138.70	192.30	41
140.70	192.30	35
141.80	192.30	82
143.50	192.30	15
143.80	192.30	15
157.80	192.30	77
166.70	192.30	40
167.00	192.30	88
177.30	192.30	15
137.70	186.30	42
136.70	186.30	96
132.60	186.30	77
128.70	186.30	111
121.00	186.30	114
112.30	186.30	22
110.30	186.30	46
110.00	186.30	17
101.10	186.30	28
96.70	186.30	34
94.70	186.30	25
87.70	186.30	48
85.00	186.30	20
74.80	186.30	51
69.90	186.30	94
64.00	186.30	69
52.10	186.30	18

X (meter)	Y (meter)	DEPTH (cm)
144.30	71.00	72
150.30	2.80	32
150.30	3.50	20
150.30	5.40	22
150.30	6.90	51
150.30	10.30	42
150.30	17.30	17
150.30	18.30	18
150.30	19.30	65
150.30	20.70	46
150.30	22.30	46
150.30	23.30	66
150.30	25.00	62
150.30	27.00	14
150.30	32.80	57
150.30	34.90	35
150.30	37.20	15
150.30	39.00	86
150.30	40.80	49
150.30	45.30	18
150.30	45.70	62
150.30	64.20	20
150.30	65.40	49
150.30	66.90	55
150.30	70.10	149
156.30	38.80	92
156.30	44.20	86
156.30	47.00	114
156.30	48.00	18
156.30	49.30	29
156.30	50.60	71
156.30	54.70	112
156.30	58.60	96
156.30	64.20	15
156.30	66.70	54
156.30	68.50	146
162.30	31.40	34
162.30	33.80	76
162.30	37.20	77
162.30	39.60	20
162.30	46.90	108
162.30	47.60	60
162.30	53.80	55
162.30	57.00	94
162.30	64.80	69
162.30	66.00	115
162.30	67.00	162
162.30	68.00	77
162.30	79.80	40
162.30	81.80	62
162.30	82.20	43
162.30	89.30	80
168.30	41.00	14
168.30	44.30	54

X (meter)	Y (meter)	DEPTH (cm)
156.30	192.00	55
156.30	197.70	43
156.30	207.00	22
156.30	209.50	18
156.30	199.10	59
156.30	196.70	77
144.30	198.00	77
144.30	204.20	17
144.30	206.40	26
138.30	182.00	17
138.30	182.20	99
138.30	183.60	15
138.30	184.20	37
138.30	186.80	108
138.30	187.50	51
138.30	189.50	79
138.30	191.00	15
138.30	192.10	12
138.30	199.90	18
138.30	201.30	28
138.30	202.90	18
138.30	204.00	17
133.30	181.50	15
133.30	186.30	63
133.30	192.60	146
133.30	196.80	96
133.30	202.30	109
133.30	204.80	23
126.30	182.70	18
126.30	183.00	79
126.30	184.10	20
126.30	185.40	18
126.30	190.10	35
126.30	191.40	120
126.30	202.00	49
120.30	184.40	82
120.30	190.60	65
120.30	198.30	43
120.30	203.20	48
114.30	182.70	29
114.30	192.00	34
114.30	194.60	18
114.30	195.60	21
114.30	197.60	15
114.30	199.30	16
114.30	201.10	17
114.30	205.50	14
108.30	181.90	68
108.30	182.60	45
108.30	186.70	40
108.30	201.00	43
108.30	206.00	68
102.30	180.30	42
102.30	182.30	42

X (meter)	Y (meter)	DEPTH (cm)
34.50	108.30	15
40.80	108.30	9
42.90	108.30	22
50.80	108.30	25
56.10	108.30	40
57.30	108.30	77
60.00	108.30	46
30.00	114.30	96
32.30	114.30	46
36.30	114.30	18
41.00	114.30	51
42.80	114.30	32
44.40	114.30	11
45.00	114.30	86
51.10	114.30	31
52.10	114.30	23
56.30	114.30	86
60.00	114.30	42
38.40	114.30	103
41.70	120.30	80
45.70	120.30	60
46.60	120.30	12
49.40	120.30	42
54.60	120.30	40
1.40	126.30	51
4.90	126.30	63
7.10	126.30	43
8.20	126.30	23
8.70	126.30	8
12.50	126.30	9
18.50	126.30	62
23.00	126.30	31
27.00	126.30	58
29.70	126.30	15
34.90	126.30	77
35.50	126.30	43
39.90	126.30	72
40.90	126.30	17
48.00	126.30	15
51.80	126.30	15
54.20	126.30	48
55.50	126.30	17
57.40	126.30	17
56.60	126.30	65

X (meter)	Y (meter)	DEPTH (cm)
42.30	186.80	17
42.30	187.40	62
42.30	195.60	32
42.30	201.50	12
42.30	206.10	48
42.30	207.00	40
42.30	207.90	52
42.30	209.10	80
36.30	184.50	15
36.30	192.90	65
36.30	193.60	62
36.30	206.60	38
36.30	209.70	43
30.30	180.50	42
30.30	181.60	48
30.30	192.30	96
30.30	192.90	52
24.30	183.10	39
24.30	193.10	68
24.30	196.30	58
24.30	200.70	92
24.30	200.90	58
24.30	202.80	75
24.30	211.40	18
18.30	182.80	46
18.30	185.00	43
18.30	191.40	46
18.30	192.60	49
18.30	195.00	69
18.30	196.80	18
18.30	200.00	49
18.30	206.60	15
18.30	211.10	17
12.30	184.00	54
12.30	189.10	64
12.30	195.10	15
12.30	197.40	18
12.30	202.80	21
12.30	205.30	48
6.30	183.80	71
6.30	187.10	32
6.30	189.50	54
6.30	192.20	72
6.30	199.90	72