CENPS-OP-DMMO

MEMORANDUM FOR RECORD 20 August 1992

SUBJECT: DETERMINATION ON THE SUITABILITY OF DREDGED MATERIAL TESTED UNDER PSDDA GUIDELINES FOR THE US NAVY HOMEPORT - ELEMENT II DREDGING PROJECT (OYB-2-013387) TO BE DISPOSED OF AT THE PORT GARDNER OPEN-WATER DISPOSAL SITE.

1. The following summary reflects the PSDDA agencies' (Corps of Engineers, Department of Ecology, Department of Natural Resources and the Environmental Protection Agency) consensus determination on the acceptability of the sampling plan and all relevant test data to make a determination of suitability for the 428,000 cubic yards of material initially proposed for dredging from the US Navy Homeport-Element II project site for disposal at the PSDDA Port Gardner open-water disposal site. The initial full PSDDA characterization was conducted in April 1990. A supplemental sampling effort was subsequently conducted in July 1992 to characterize dioxin levels in the project area. The area characterized for dioxin reflected a reduced dredging area of 110,000 cubic yards as compared with the initial characterization volume of 428,000 cubic yards. Analysis of dioxin levels was necessary due to dioxin concerns raised in a September 1991 Environmental Protection Agency report entitled "Dioxin and Furan Concentrations in Puget Sound Crabs". Results of these analyses are documented separately within this memorandum.

INITIAL FULL PSDDA CHARACTERIZATION:

2. Initial full PSDDA characterization sampling was conducted in April 1990. Sampling and analysis results for chemical and biological testing took place in two separate rounds. Due to a sediment larval bioassay hit under the single-hit rule in the first round for a single dredged material management unit, chemical testing was conducted during the second round to characterize the individual samples comprising that management unit. Second round biological testing was conducted for those constituent samples with screening level exceedances. In addition, two dredged material management units which had screening level exceedances in the first round, were inadvertently not run for bioassays during the first round, due to a communication problem between the prime contractor and chemical testing subcontractor. Second round bioassays included these two management units. Testing results and interpretation for both rounds follow:

3. Round 1 Sampling and Testing

a. Twelve dredged material management units were characterized under the original sampling and analysis plan. Test samples L1C1, L1C2 and L1C3 represented composited surface sediments (0-4 ft) from 11 sampling stations. Test samples L2C1, L2C2, L3C1, L3C2, L4C1, L4C2, L5C1, L5C2 and L6-8C1 represented composited subsurface sediments (4-30 ft) from these same 11 stations.

b. Chemistry data indicated that one or more exceedances of the 1989 PSDDA screening levels (SL) occurred for test samples L1C1, L1C2, L1C3, L2C2 and L3C1 (see attachment 1). These included both detected concentrations and limits of

enclosure 1

detection above the SL. There were no exceedances of bioaccumulation triggers (BT) or maximum levels (ML).

c. The SL exceedances (both actual and detection limit) for these five test samples trigger the requirement for biological testing under the tiered testing approach. The amphipod 10-day acute toxicity test, echinoderm sediment larval combined mortality and abnormality (effective mortality) test, the Neanthes 10-day acute toxicity test, and the Microtox bacterial luminescence test were conducted. PSDDA interpretation guidelines specified in the Phase II Management Plan Report (September 1989), modified by changes made at the second annual review meeting, were used to evaluate the bioassay data. The control sediment for the amphipod and Neanthes bioassays was from West Beach (Whidbey Island). The reference sediment was from Jetty Island.

d. Test sediment L2C2 was subjected to biological testing in the first round. In addition, under terms of the Settlement Agreement between the U.S. Navy and Friends of the Earth, which called for biological testing of twenty-five percent of the laboratory samples, bioassays were also conducted for test sediments L1C2, L1C3 and L3C2 (L1C2 and L1C3 had minor detection limit exceedances of 1,2,4-trichlorobenzene as well). Test sediments L1C1 and L3C1 should have been included in biological testing but were inadvertently left out. These two test sediments were included in round 2.

e. There were no hits for any of the test sediments for the amphipod, Neanthes or Microtox tests. One test sediment, L2C2, experienced a hit under the single-hit rule in the echinoderm sediment larval bioassay, with test sediment effective mortality greater than 20% over seawater control, significantly different from reference, and greater than 30% over reference. L2C2 had 51.1% effective mortality compared to 18.0% for the Jetty Island reference sediment. Two other test sediments, L1C3 and L3C2, experienced hits under the two-hit rule, with effective mortalities greater than 20% over seawater control and significantly different from reference, but less than 30% over reference. L1C3 and L3C2 had effective mortalities of 37.9% and 32.7% respectively.

f. Based on the results of the chemical and biological testing in round 1, all sediments except those characterized by L2C2 would be acceptable for open-water disposal. The U.S. Navy decided to further characterize L2C2 in a second round of chemical and biological testing by individually testing each of its constituent samples.

4. <u>Round 2 Sampling and Testing</u>

a. In round 2, the six samples comprising dredged material management unit L2C2 were recollected and individually analyzed for all PSDDA chemicals of concern. These samples were from six different locations (the same locations used during Round 1 sampling) and came from the 4-8 foot lift of the dredging prism. The samples were identified as L2C2S05, L2C2S07, L2C2S08, L2C2S09, L2C2S10 and L2C2S11.

b. Chemical analysis isolated the contamination to a single sample, L2C2S11, which had two chemicals with concentrations above ML (2-methylphenol and 2,4-dimethylphenol) and one additional chemical above SL (4-methylphenol). No other sample had any chemicals exceeding SL. see Attachment 1. Full COC Testing Summary for Round 2 Testing

c. Tiered biological testing was conducted for this round (the PSDDA agencies were not consulted as to which sediments should be tested, resulting in unnecessary bioassays being performed). L2C2S11 was subjected to the full suite of bioassays, as was L2C2S09, which had one chemical of concern (1,2,4-trichlorobenzene) with a concentration exactly equal to the SL. Both of these tests were unnecessary. With two chemicals of concern above ML, and in the absence of data on chronic sublethal effects, there is reason to believe that L2C2S11 is unacceptable for open-water disposal. As for L2C2S09, biological testing is only required if an SL is exceeded. Test sediments L1C1 and L3C1, both of which had exceedances of SL for total xylene but were not tested during round 1, were also subjected to biological testing during round 2.

d. For round 2 biological testing, control sediment came from West Beach and reference sediment came from Jetty Island. In this round of testing there were no hits for any of the test sediments for any of the bioassays. The seawater control in the sediment larval test had 12.8% abnormality, which exceeded the guideline value of 10%. But total effective mortality was only 15% which is considered excellent, so the data were considered useable. The Jetty Island reference sediment failed to meet the performance limit of less than or equal to 20% over seawater control in the sediment larval test, but this was irrelevant as no test sediment had effective mortality greater than 20% over seawater control, a requirement for scoring a hit of any kind.

5. The PSDDA-approved sampling and testing plan was followed, and quality assurance/quality control guidelines specified by PSDDA were generally complied with. The data gathered were deemed sufficient and acceptable for regulatory decision-making under the PSDDA program. Based on the combined round 1 and round 2 results of chemical and biological testing the following consensus decision was made by the PSDDA agencies concerning the suitability of the characterized material for disposal at the Port Gardner open-water disposal site:

Due to the exceedance of two MLs for the uncomposited sample L2C2S11, and in the absence of data on chronic sublethal effects, there is reason to believe that the approximately 6,296 cubic yards represented by this sample are unsuitable for open-water disposal. It was determined that the source of the contamination within composited sample L2C2 was isolated and confined to L2C2S11 and that the balance of sediment characterized by L2C2 (31,485 cubic yards) was suitable for open-water disposal. All other proposed dredged material was also deemed suitable for open-water disposal. In summary, a total of 6,296 cubic yards was deemed unsuitable for open-water disposal, while 421,704 cubic yards were deemed suitable for open-water disposal at the Port Gardner open-water site (see dioxin suitability summary below). It should be noted that the Navy's preferred design alternative is to construct a breakwater pier which will not involve dredging of any of L2C2S11 or overlying material. Only the rock breakwater design, which is not the preferred alternative, involves dredging of L2C2S11. If the final design for Element II includes the dredging of L2C2S11, a dredging plan must be submitted which is adequate for separating the sediments characterized by L2C2S11 from the other sediments in this project.

DIOXIN CHARACTERIZATION:

6. The following summary reflects the consensus supplemental determination of the Agencies' (U.S. Army Corps or Engineers, Department of Ecology, Department of Natural Resources, and the Environmental Protection Agency) with jurisdiction on dredging and disposal on the suitability of the revised project of 110,000 cubic yards[1], relative to dioxin at Everett, Washington for unconfined open-water disposal at the Port Gardner disposal site. The determination of suitability is based on the acceptability of the dioxin sampling plan and all relevant test data contained in August 3, 1992 SAIC Draft Report.

7. Three uncomposited surface and three subsurface sediment samples were sampled on 12 June 1992 and analyzed for dioxins by Twin City Testing Corporation utilizing EPA method 8290. These data are summarized in attachment 2. Results indicated that 2,3,7,8 TCDD (Tetrachloro-Dibenzo-p-Dioxin) was **undetected** in all six samples with sample specific detection limits ranging from a low of 0.13 to a high of 0.6 pptr (parts per trillion). This congener is regarded by the EPA as the most toxic form of dioxin. A few other less toxic dioxin congeners were detected at low parts per trillion concentrations. Attachment 2 also shows the toxicity equivalence in terms of 2,3,7,8-TCDD for the nine most toxic congeners of furan and dioxin.

8. One way to summarize potential toxicity for mammals is to calculate the toxicity equivalent concentrations (TEC) measured in tissue. Total TEC is calculated by multiplying the toxicity equivalent factor (TEF) by the congener specific concentration and summing the TECs for all congeners. Total TEC comparisons are usually used for food ingestion, and have limited applicability to sediment because TEC **does not** consider the relative bioavailability of the congeners. Accordingly, TEC overstates toxicity to mammals when applied to sediments. TEC as a toxicity measure does not apply to fish, shellfish or birds. For comparison purposes only, the TECs ranged from a low of 0.36 to a high of 2.47 pptr.

9. Based on the dioxin chemistry testing results described above no bioaccumulation testing was required for the six DMMU.

10. The Agencies' approved dioxin sampling and testing plan was followed, and quality assurance/quality control guidelines specified by PSEP and the PSDDA program were generally complied with. The data gathered were deemed sufficient and acceptable for decision making by the Agencies based on best professional judgement.

11. Based on the Agencies' present best professional judgment, these low concentrations are unlikely to be environmentally harmful for this project. The Agencies' consensus is that the material is suitable for unconfined open-water disposal at the Port Gardner PSDDA disposal site relative to these dioxin test results. The Agencies concluded based on the above discussion and summary of sediment chemical characterization results for the proposed Element II dredging area

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[1] initial full PSDDA characterization conducted in April 1990 included an expanded project consideration of 428,000 cubic yards, of which, 421,704 cubic yards is suitable for unconfined open-water disposal at the Port Gardner PSDDA disposal site (see paragraph 5 above). The Navy elected to reduce the scope of the dredging to 110,000 cubic yards subsequent to the initial characterization.

for the U.S. Navy Homeport Project at Everett, Washington, that all the dredged material tested (110,000 cubic yards) is suitable for disposal at the Port Gardner PSDDA disposal site.

12. This memorandum documents the suitability of proposed dredged sediments for disposal at a PSDDA open-water disposal site. It does not constitute final agency approval of the project. A public notice will be issued for this project. During the public comment period, which follows a public notice, the resource agencies will provide input on the overall project. A final decision will be made after full consideration of agency input, and after an alternatives analysis is done under Section 404 (b)(1) of the Clean Water Act.

Concur:

8/26/92
Date

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14 September 1992
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Attachment 1. DAIS Value Table - Dry Weight Basis (all COC except Dioxin/Furan)

Project: US Navy Homeport   HOME21BF035

	units	S1	S2	S3	S4	S5	S6
SEDIMENT CONVENTIONALS							
Total Solids	%	69.2	75.3	62.1	67.4	66.5	74.3
Volatile Solids	%	4.2	2.9	7.2	4.8	4.6	2.8
Total Organic Carbon	%	1.39	1.61	2.76	1.71	1	0.62
Ammonia	MG/KG	180	210	210	200	250	140
Total Sulfides	MG/KG	14 u	47	51	40	26	24
METALS							
Antimony (1)	MG/KG	0.76	1.3	1.1	1.1	1	0.71
Arsenic	MG/KG	1.9	2.8	3.2	3	3	8
Cadmium	MG/KG	0.41	0.22	0.26	0.37	0.26	0.35
Chromium (4)	MG/KG	-	-	-	-	-	-
Copper	MG/KG	26	44	48	53	52	35
Lead	MG/KG	2.1 u	14	12	2.3 u	10	2.4 u
Mercury	MG/KG	0.09	0.16	0.16	0.16	0.02 u	0.07
Nickel	MG/KG	38	44	47	45	47	43
Selenium (4)	MG/KG	-	-	-	-	-	-
Silver	MG/KG	0.12	0.15	0.14	0.16	0.13	0.64
Zinc	MG/KG	60	73	85	91	86	83
LPAH							
2-Methylnaphthalene (1)	UG/KG	21 u	22 u	47	45	51	24
Acenaphthene (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Acenaphthylene (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Anthracene (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Fluorene (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Naphthalene (1)	UG/KG	21 u	22 u	90	93	100	24
Phenanthrene (1)	UG/KG	21 u	22 u	71	67	70	20 u
Total LPAH (1)	UG/KG	21 u	22 u	208	205	221	48
HPAH							
Benzo(a)anthracene (1)	UG/KG	21 u	67	69	43	55	20 u
Benzo(a)pyrene (1)	UG/KG	21 u	72	81	53	66	20 u
Benzo(g,h,i)perylene (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Benzofluoranthenes (1)	UG/KG	21 u	80	90	65	77	20 u
Chrysene (1)	UG/KG	21 u	78	78	53	64	20 u
Dibenzo(a,h)anthracene (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Fluoranthene	UG/KG	21 u	37	55	55	55	20 u
Indeno(1,2,3-c,d)pyrene (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Pyrene	UG/KG	21 u	65	97	81	91	20 u

	units	S1	S2	S3	S4	S5	S6
Total HPAH (1)	UG/KG	21 u	399	470	350	408	20 u
CHLORINATED HYDROCARBONS							
1,2,4-Trichlorobenzene (1)	UG/KG	4.2 u	4.3 u	4.7 u	6.4	4.2 u	4 u
1,2-Dichlorobenzene (1)	UG/KG	6.3 u	6.5 u	7.1 u	7.2 u	6.4 u	6.1 u
1,3-Dichlorobenzene (3)	UG/KG	13 u	13 u	14 u	14 u	13 u	12 u
1,4-Dichlorobenzene (1)	UG/KG	13 u	13 u	14 u	14 u	13 u	12 u
Hexachlorobenzene	UG/KG	13 u	13 u	14 u	14 u	13 u	12 u
PHTHALATES							
Bis(2-ethylhexyl)phthalate (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Butyl benzyl phthalate (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Di-n-butyl phthalate (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Di-n-octyl phthalate (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Diethyl phthalate (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Dimethyl phthalate (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
PHENOLS							
2 Methylphenol (1)	UG/KG	6.3 u	6.5 u	7.1 u	7.2 u	6.4 u	130
2,4-Dimethylphenol (1)	UG/KG	6.3 u	6.5 u	7.1 u	7.2 u	6.4 u	79
4 Methylphenol (1)	UG/KG	21 u	22 u	43	50	47	160
Pentachlorophenol	UG/KG	63 u	65 u	71 u	72 u	64 u	61 u
Phenol (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	91
MISCELLANEOUS EXTRACTABLES							
Benzoic acid (1)	UG/KG	110 u	110 u	120 u	120 u	110 u	100 u
Benzyl alcohol (1)	UG/KG	6.3 u	6.5 u	7.1 u	7.2 u	6.4 u	6.1 u
Dibenzofuran (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Hexachlorobutadiene (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
Hexachloroethane (1)	UG/KG	21 u	22 u	24 u	24 u	21 u	20 u
N-Nitrosodiphenylamine (1)	UG/KG	13 u	13 u	14 u	14 u	13 u	12 u
VOLATILE ORGANICS							
Ethylbenzene (1)	UG/KG	2.5 u	2.8 u	3.3 u	2.9 u	2.9 u	2.7 u
Tetrachloroethene (1)	UG/KG	2.5 u	2.8 u	3.3 u	2.9 u	2.9 u	2.7 u
Total Xylene (1)	UG/KG	2.5 u	2.8 u	3.3 u	2.9 u	2.9 u	2.7 u
Trichloroethene (1)	UG/KG	2.5 u	2.8 u	3.3 u	2.9 u	2.9 u	2.7 u
PESTICIDES AND PCBs							
Aldrin (3)	UG/KG	0.6 u	0.7 u	0.8 u	0.7 u	0.7 u	0.6 u
Chlordane (2)	UG/KG	2.1 u	2.3 u	2.5 u	2.2 u	2.3 u	2.1 u
Dieldrin (3)	UG/KG	0.8 u	0.9 u	1 u	0.9 u	0.9 u	0.8 u
Heptachlor (3)	UG/KG	1 u	1.2 u	1.3 u	1.1 u	1.2 u	1.1 u
Lindane (3)	UG/KG	0.6 u	0.7 u	0.8 u	0.7 u	0.7 u	0.6 u
Total DDT	UG/KG	2.1 u	2.3 u	2.5 u	2.2 u	2.3 u	2.1 u
Total PCBs	UG/KG	42 u	46 u	51 u	44 u	46 u	42 u
ORGANOMETALLICS							
Tributyltin (porewater) (2)	UG/L	-	-	-	-	-	-

	units	S1	S2	S3	S4	S5	S6

A dash indicates that no data exists for this analyte in DAIS

(1) = No BT exists (2) = No ML exists (3) = No BT or ML exists (4) = No SL or ML exists

END OF REPORT

Attachment 2. Updated Summary of DY1992 US Navy Homeport Dioxin Data (Round 2 Testing)

	WHO (05)	USN-EH - S1 = 4000cy			USN-EH - S2 = 12000cy			USN-EH - S3 = 4000cy			USN-EH - S4 = 12000cy			USN-EH - S5 = 4000cy			USN-EH -S6 = 12000cy		
Analyte	**TEF**	**ng/kg-dw**	**LQ**	**TEQ**	**ng/kg-dw**	**LQ**	**TEQ**	**ng/kg-dw**	**LQ**	**TEQ**	**ng/kg-dw**	**LQ**	**TEQ**	**ng/kg-dw**	**LQ**	**TEQ**	**ng/kg-dw**	**LQ**	**TEQ**
2,3,7,8-TCDD	1	0.33	u	0.165	0.26	u	0.13	1	u	0.500	0.5	u	0.25	1.2	u	0.6	1.3	u	0.65
1,2,3,7,8-PeCDD	1	0.24	u	0.12	0.3	u	0.15	0.48	u	0.240	**0.36**		0.36	1.1	u	0.55	0.77	u	0.385
1,2,3,4,7,8-HxCDD	0.1	0.1	u	0.005	0.18	u	0.009	0.76	u	0.038	0.23	u	0.0115	0.67	u	0.0335	0.47	u	0.0235
1,2,3,6,7,8-HxCDD	0.1	**0.23**		0.023	0.45	u	0.0225	1.2		0.12	**0.53**		0.053	**2.1**		0.21	0.52	u	0.026
1,2,3,7,8,9-HxCDD	0.1	0.3	u	0.015	0.31	u	0.0155	0.83	u	0.042	0.3	u	0.015	1.4	u	0.07	0.5	u	0.025
1,2,3,4,6,7,8-HpCDD	0.01	3	zu	0.015	1.5	zu	0.0075	**18**		0.18	**3.8**		0.038	**29**		0.29	**4**		0.04
OCDD	0.0003	28	zu	0.0042	21	zu	0.00315	**110**		0.033	31	zu	0.00465	**210**		0.063	36	zu	0.0054
2.3.7.8-TCDF	0.1	**0.43**		0.043	**0.51**		0.051	**1.3**		0.13	**0.94**		0.094	**3**		0.3	**0.56**		0.056
1,2,3,7,8-PeCDF	0.03	0.28	u	0.0042	0.27	u	0.00405	**0.44**		0.0132	**0.28**		0.0084	1	u	0.015	0.97	u	0.01455
2,3,4,7,8-PeCDF	0.3	0.21	u	0.0315	0.09	u	0.0135	**0.95**		0.285	**0.81**		0.243	1.6	u	0.24	0.57	u	0.0855
1,2,3,4,7,8-HxCDF	0.1	0.24	u	0.012	0.08	u	0.004	0.33	u	0.017	**0.25**		0.025	0.57	u	0.0285	0.3	u	0.015
1,2,3,6,7,8-HxCDF	0.1	0.19	u	0.0095	0.12	u	0.006	0.46	u	0.023	0.24	u	0.012	0.64	zu	0.032	0.31	u	0.0155
2,3,4,6,7,8-HxCDF	0.1	0.36	zu	0.018	0.42	u	0.021	1.4	zu	0.070	1	zu	0.05	1.6	zu	0.08	0.79	u	0.0395
1,2,3,7,8,9-HxCDF	0.1	0.1	u	0.005	0.06	u	0.003	0.24	u	0.012	0.12	u	0.006	0.54	u	0.027	0.45	u	0.0225
1,2,3,4,6,7,8-HpCDF	0.01	0.76	zu	0.0038	0.42	u	0.0021	6.2		0.062	0.86	zu	0.0043	**11**		0.11	0.53	u	0.00265
1,2,3,4,7,8,9-HpCDF	0.01	0.14	u	0.0007	0.19	u	0.00095	0.18	u	0.001	0.12	u	0.0006	0.54	u	0.0027	0.64	u	0.0032
OCDF	0.0003	1.4	zu	0.00021	0.86	u	0.000129	**14**		0.0042	0.53	zu	0.0000795	**21**		0.0063	1.5	zu	0.000225
Total TEQ (u = 1/2):				**0.475**			**0.443**			**1.769**			**1.176**			**2.658**			**1.410**
Total TEQ (u=0):				**0.066**			**0.051**			**0.707**			**0.821**			**0.979**			**0.096**
Total TOC, %:				**1.2**			**1.7**			**8.4**			**2.9**			**2**			**1.60**

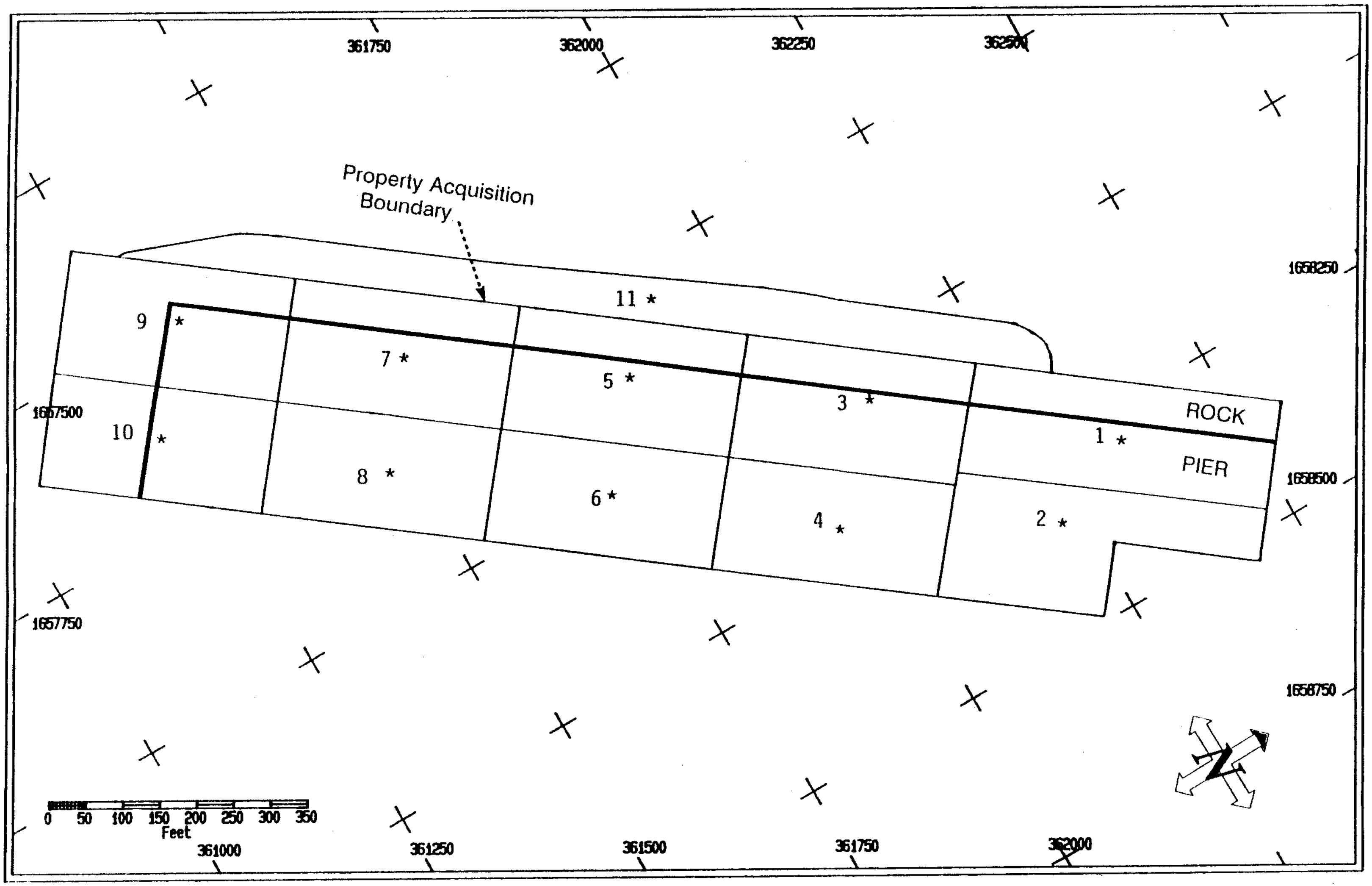

Figure 1. The distribution of the eleven Element II dredging area stations sampled in 1990. The footprints of both the rock and pier breakwaters are shown relative to the sampling locations. Boxes represent proposed dredging areas of approximately 8,000 cubic yards each (SAIC, 1991a).

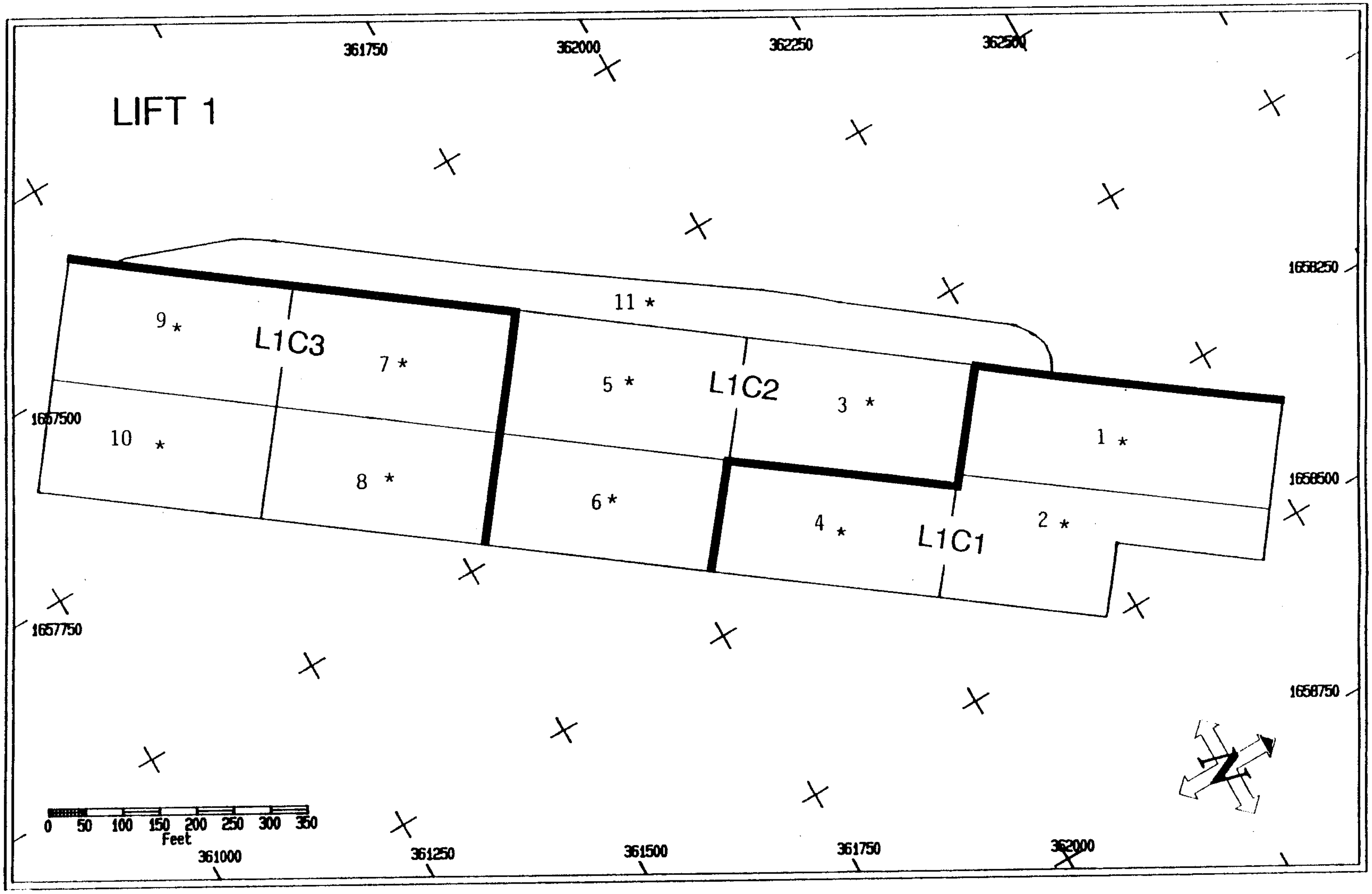

Figure 2. The compositing plan for Lift 1 surface sediments (0-4 ft.) sampled from the Element II dredging area. The bold lines indicate how each core sample was grouped into composites (L1C1, L1C2, and L1C3) (SAIC, 1991a).

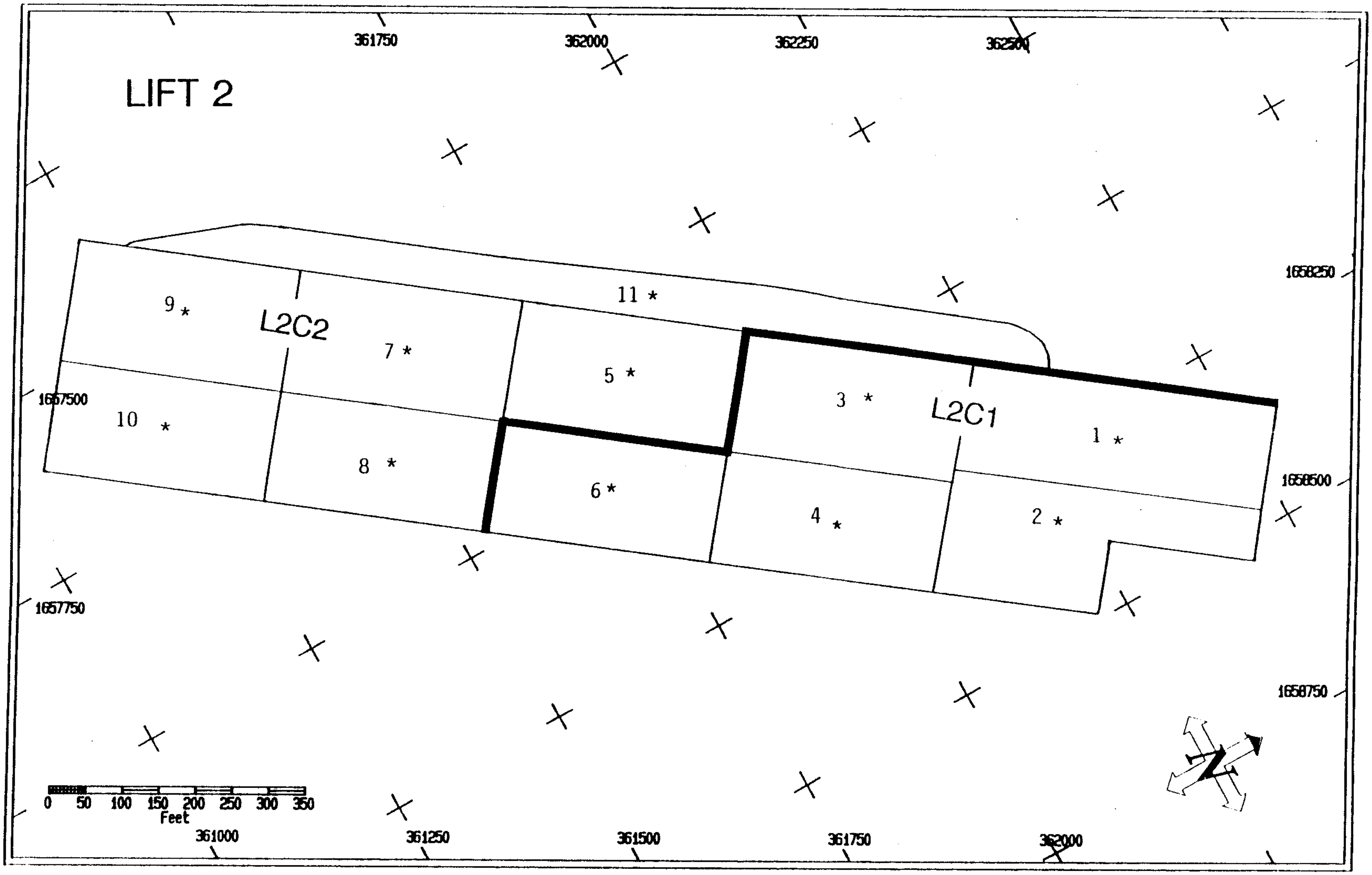

Figure 3. The compositing plan for Lift 2 suburface sediments (4-8 ft.) sampled from the Element II dredging area. The bold lines indicate how each core sample was grouped into composites (L2C1 and L2C2) (SAIC, 1991a).

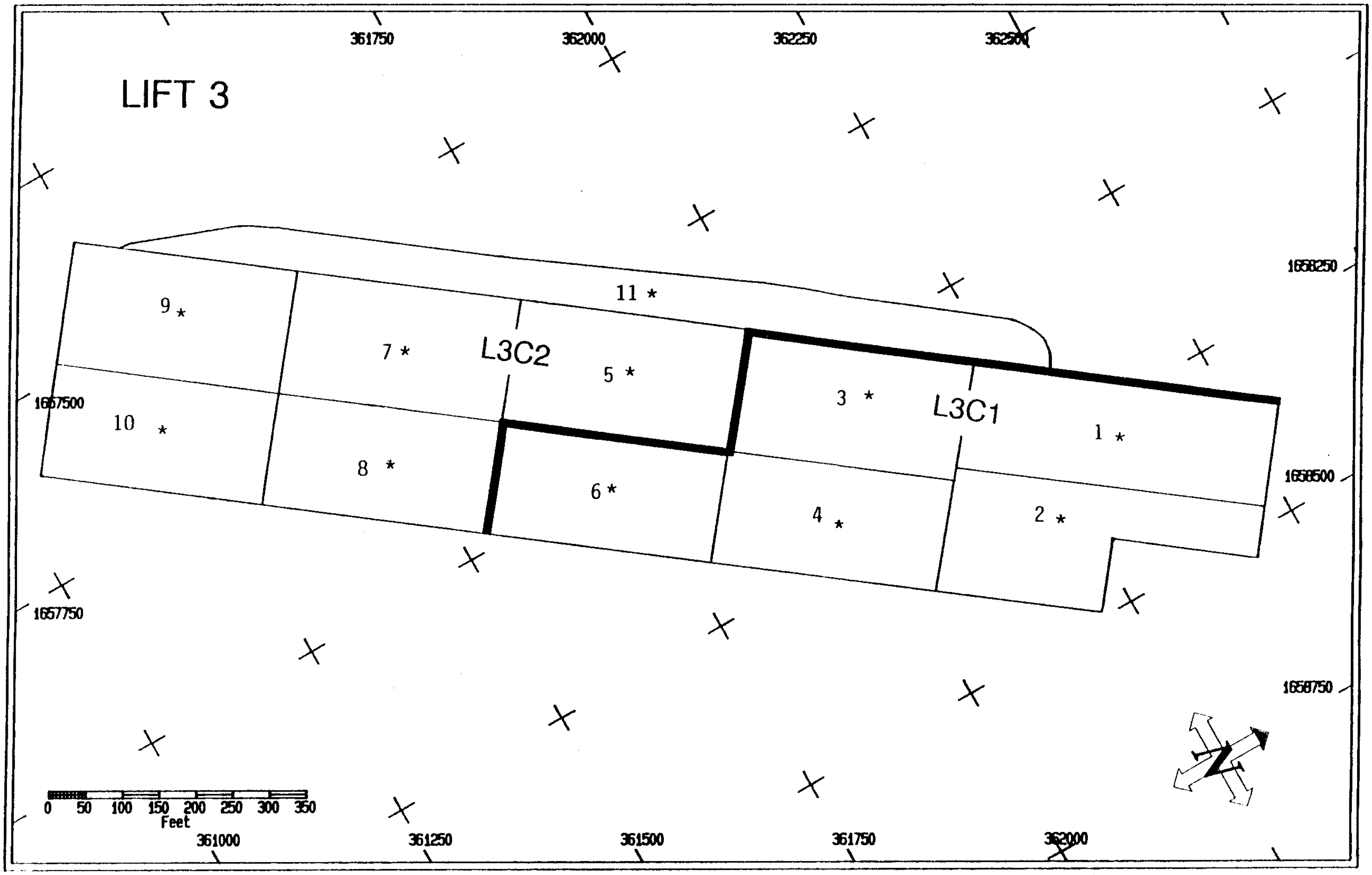

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Figure 4. The compositing plan for Lift 3 suburface sediments (8-12 ft.) sampled from the Element II dredging area. The bold lines indicate how each core sample was grouped into composites (L3C1 and L3C2) (SAIC, 1991a).

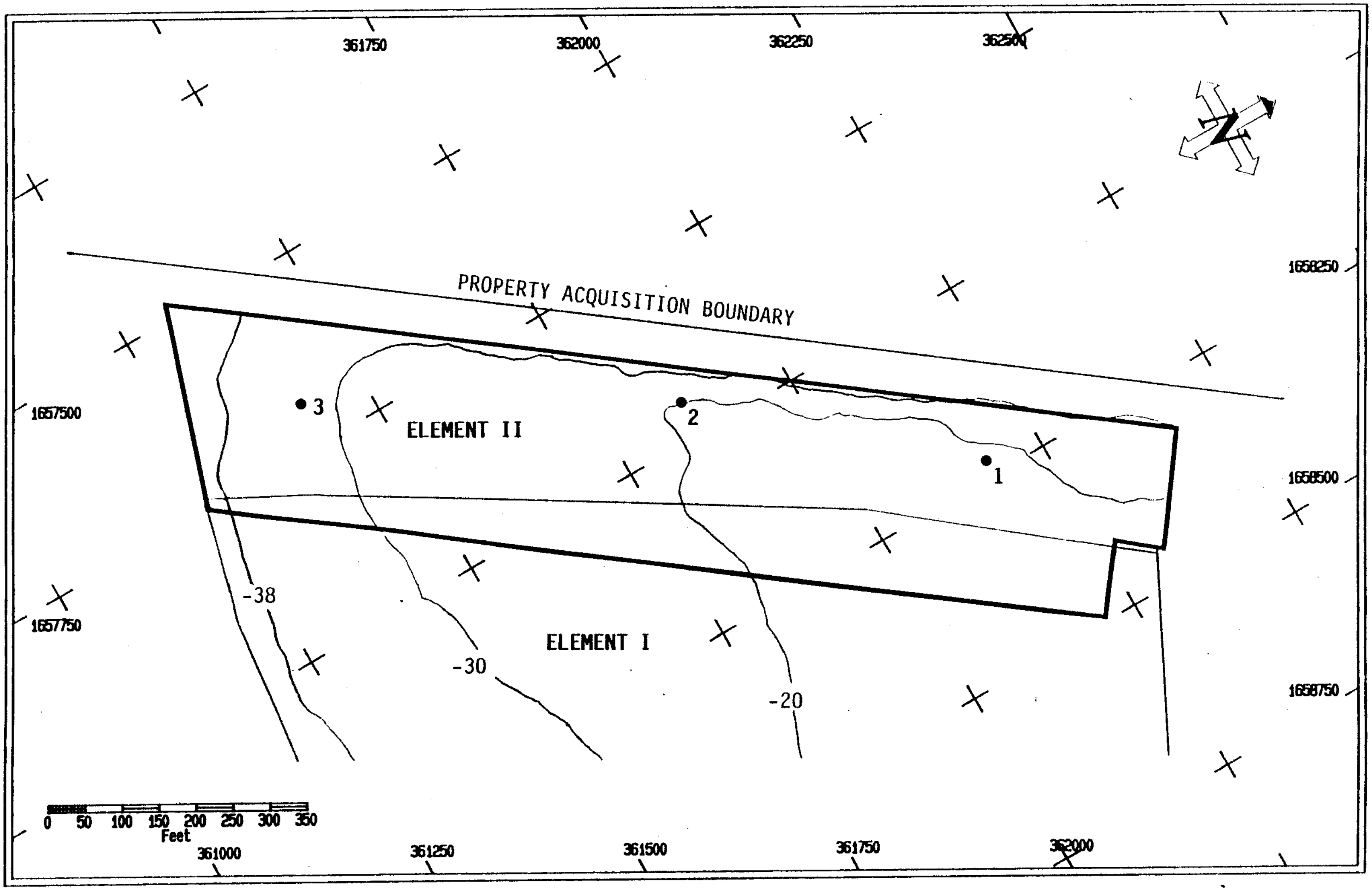

Figure 5. The three locations within Element II to be sampled for sediment dioxin analyses.