115 Broad Street - Suite 200
Boston, MA 02110
One Wamsutta Street
New Bedford, MA 02740
Telephone 617-728-0070
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M E M O R A N D U M

To: Mr. Ken Gaynor, QCSM
Jacobs Engineering
New Bedford Harbor Superfund Site
103 Sawyer Street
New Bedford, MA 02746

From: Apex Companies, LLC
One Wamsutta Street
New Bedford, MA 02740

Date: 23 October, 2007

Re: Bathymetric Survey – EPA Operable Unit #3 (OU#3)
New Bedford Harbor Superfund Site

Bathymetric Survey: New Bedford Harbor: EPA Operable Unit #3

Apex Companies, LLC has completed the bathymetric survey of the EPA Operable Unit #3 (OU#3), per the contract modification dated 9/19/2007 to contract number 35BG0601-S07-0009 between Apex Companies, LLC and Jacobs Engineering. Apex personnel completed the bathymetric survey between Tuesday, October 2, 2007 and Saturday, October 6, 2007. The survey was performed by Apex personnel Kris van Naerssen, Greg Dolan and Josh Ray.

Apex utilized a 19-foot fiberglass survey vessel, ODEC (Bathy500 DF) digital fathometer, Trimble Pro-XRS DGPS survey system, and Hypack Version 6.2 navigation and data collection software for the survey.

The bathymetric survey data is referenced to Mean Lower Low Water vertical datum. Tidal readings were obtained from a tideboard located on the pier outside of the New Bedford Harbor Hurricane Barrier. The tideboard was placed at the eastern end of the pier located near the intersection of Franklin Street and East Rodney French Boulevard. Apex personnel installed the tideboard, which was measured in1/10th foot increments, on September 26, 2007. The tideboard elevation is based upon geodetic control point TS1, which was installed on May 16, 2005 by Coler & Colantonio surveyors.

Weather Conditions:

10/02/07

- Temperature: 75 degrees;
- Cloud Cover: Partially Cloudy
- Wind: Varied. 5 - 15 Knots from northeast

10/03/07

- Temperature: 70 degrees;
- Cloud Cover: Overcast
- Wind: Varied. 10 - 15 Knots from southeast

10/06/07

- Temperature: 80 degrees;
- Cloud Cover: Partially Cloudy
- Wind: Varied. 5 - 10 Knots from northeast

QA/QC Checks:

- At the mooring ball located to the northeast of the East Rodney French Boulevard public boat launch, Apex used the vertical manual depth rods to check the fathometer readings, after initial instrument calibration, which included offset checks and sound velocity adjustments.
- The sound velocity check was conducted at the mooring, to ensure that the survey was ran at a sound velocity setting that reflected the water conditions. After the instrument calibrations, all rod and transducer checks correlated well.
- Fourteen manual (vertical) rod checks were performed at various depths during the survey. A survey rod was used to ensure greater accuracy during the manual rod checks. The field survey equipment passed all rod checks that were performed, as the rod and fathometer depths matched. Field notes with the QA/QC and data check results are attached to this memorandum.
- The pre-survey calibrations were conducted at 4, 5, 6, 10 and 15 feet at Operable Unit #3. Apex repeated the sound velocity checks at the completion of each survey day and prior to conducting surveys on subsequent days.
- Tide measurements were collected approximately every 20-30 minutes at the tide boards established by Apex. Readings are referenced to Mean Lower Low Water.
- Apex performed four latency line checks within the survey area by repeating survey lines in opposite directions. The results of the latency check indicated no latency discrepancies, and corrections were not required.
- Apex ran cross-tie lines in two directions (east and west) at the completion of the survey of OU#3.

Survey Procedures – Comparison to Previous Years

- All survey procedures were consistent with Apex's previous surveys at OU#3. Survey lines were run in a southeast to northwest orientation, to ensure the most bathymetric coverage over the capped area.
- The 25' spacing was consistent with the January 2006 survey. The July 2005 survey of OU#3 was conducted at 12.5' spacing, as this represented the higher resolution "As-Built" survey for the OU#3 Cap Placement Area.
- As with the previous surveys, multiple QA/QC checks (Including Rod Checks, Depth/ Rod Checks, Tide Readings and Latency checks) were performed prior to, during, and after the survey, as described above.

Processing:

Apex processed the survey data on Thursday 10/4/2007 and Wednesday 10/10/2007 using the QA/QC protocols previously noted. Pre-processing was conducted with Hypack software, and post-processing with Oasis Montaj. Corrections were applied in Hypack to account for the increased wave and wake activity at the OU#3 area. "Flyers" were removed from the data-set, and a non-linear filter was applied, removing any soundings that differed by more than 0.2-feet over 1 fiducial (sounding). Apex compared the 2007 survey results with survey data collected previously, by Apex and others, both in plan and section view. Additionally, the data from the survey was compared with the pre-dredge conditions survey. Statistics were performed on the data and the results were reviewed and analyzed. After the data had successfully passed through the QC checks, it was transcribed into the maps which are included with this memo.

Deliverables:

Apex is including with this memo:

- The 10/06/2007 Cap Thickness (Isopach) survey map;
- A copy of the previously produced 01/12/06 Cap Thickness (Isopach) survey map;
- A copy of the previously produced 07/26/05 As-Built Cap Thickness (Isopach) survey map;
- A figure depicting the limits of the 2005 Cap contour vs. 2007 Cap contours.
- Cap thickness cross section, produced from data at the southwestern portion of the Cap;
- A .pdf copy of the field notes, calibration check and data processing sheets.

Discussion - Cap Changes with Time:

OU#3 Pilot Cap surveys and Cap statistics have been conducted for 2005, 2006, and 2007 (see attached). Cap statistics were conducted for both the Intended Cap Area, and for the Full Placement Area. The Intended Cap Area is that area which was designated in the design to be capped. The Full Placement Area was that area which ultimately received cap material during the cap construction.

For the 2007 dataset, the Full Placement Area limits were determined by selecting the 0.5-foot contour around the placed material. The size of the cap area in 2007 (using the 0.5-foot contour interval) was determined to be 20.76 Acres. The capped area footprint in 2005 was 18.9 acres, at the 0.5-foot contour line.

A review of the Cap surveys from 2005 through 2007 indicates that the material placed within the Intended Cap Area is acting generally as expected over time: the "peaks" are decreasing, with the material winnowed from the peaks generally moving into the valleys. The overall effect is that the Cap is flattening out and becoming more uniform within the Intended Cap Area. Statistics indicate that within the Intended Cap Area, by 2007 the Cap exceeds two feet in thickness over nearly 75% of the area, and exceeds one foot in thickness over more than 98% of the area.

In the Full Placement Area, the 2007 Cap statistics indicate that a lower percentage of the overall area is covered by the one and two foot thicknesses. It is thought that this is due to "toe-ing" at

the edges of the Cap, as placed material seeks a more stable angle of repose at the edges over time. This "toe-ing" effect is illustrated on the attached cross sections, which show a flattening of the slope at the very edge of the Cap between the 2005 and 2007 surveys. This phenomenon suggests that future Cap placement efforts in this area should include a provision to extend the Cap beyond the edge of the Intended Cap Area in order to account for "toe-ing" of the Cap at it's edges over time.

Comparison of Statistics:

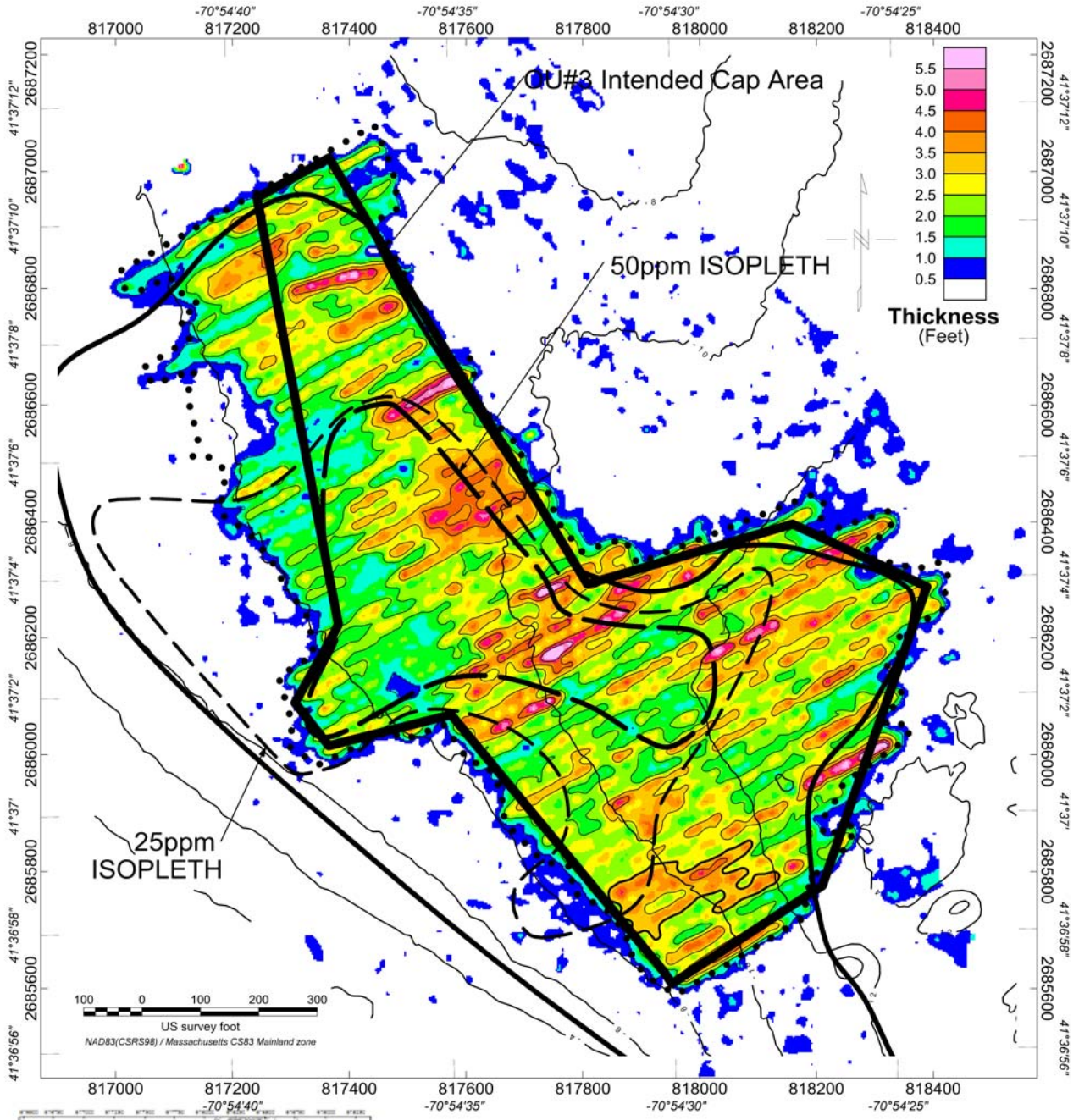
Apex has re-calculated the statistics for the material that was placed within the "Intended Cap Area" for the previous years' surveys. The statistics have been re-calculated, so that a comparison may be made, of the same area over time. The Intended Cap Area, as defined above, is depicted on the 2007 Cap Thickness Map. The coverage percentages for the Intended Cap Area over time are presented below:

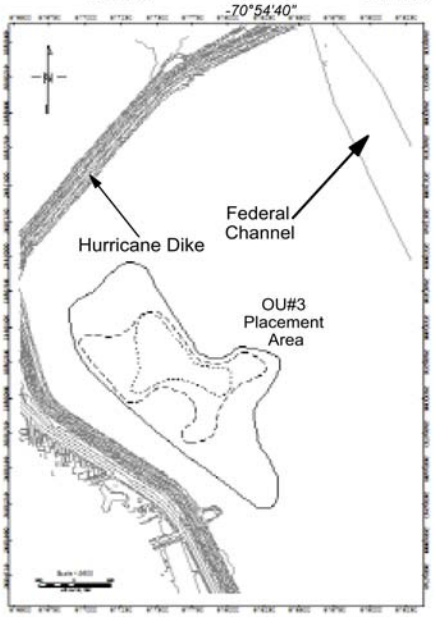
Year	Thickness of Cap > 1' Foot	Thickness of Cap > 2' Foot
2005	92.6%	58.5%
2006	97.8%	67.0%
2007	98.4%	74.6%

If you have any questions concerning the data collection and/or data processing activities described here-in, please do not hesitate to contact either: Kris van Naerssen, Greg Dolan or Jay Borkland (617) 728-0070. Apex is please to support Jacobs in this very important field program. Please do not hesitate to contact us if you have questions or comments.

Sincerely: Jay Borkland, Greg Dolan, Kris van Naerssen

Attachments (email attachments): maps, cross-sections, field notes and calibration forms.





STATISTICS

Intended Cap Area: AREA OF CAP ~15.24 ACRES
THICKNESS OF CAP >1-FOOT 98.4%
>2-FOOT 74.6%

Full Placement Area: AREA OF CAP ~20.76 ACRES
THICKNESS OF CAP >1-FOOT 88.9%
>2-FOOT 61.7%

Statistics Notes:
1. Statistics of "Intended Cap Area" indicates material from "peaks" continues to fill in the "valleys", increasing the overall percentage of "Intended Cap Area" covered by 1' or more of cap.
2. Statistics of the "Full Placement Area" indicates some "winnowing" of material at the edges of the cap, slightly decreasing the cap thickness at the edges as material 'toes-out'.

GENERAL NOTES:
1. BATHYMETRIC INFORMATION COLLECTED BY APEX COMPANIES FROM 10/02/07 TO 10/06/07. BATHYMETRY WAS REFERENCED TO THE MEAN LOWER LOW WATER (MLLW) DATUM. THE ISOPACH (CAP THICKNESS) SURFACE WAS CONSTRUCTED BY SUBTRACTING THE DIGITAL TERRAIN MODEL (DTM) FOR THE PRE-PLACEMENT SURVEY CONDUCTED BY COLER & COLANTONIO (06/2005) FROM THE DTM CONSTRUCTED USING THE 10/02/07 THROUGH 10/06/07 DATA. DTM SURFACES WERE CONSTRUCTED USING GEOSOFT'S OASIS MONTAJ'S MINIMUM CURVATURE ALGORITHMS.
2. CAP THICKNESS CONTOUR INTERVAL IS 1-FOOT.
3. STATISTICS CALCULATED USING AUTOCAD 2007 EXTENDED STATISTICS FOR THE ISOPACH DTM. STATISTICS CALCULATED FOR AREA FILLED WITHIN THE PLACEMENT FOOTPRINT.
4. PRE-PLACEMENT BASEMAP SUPPLIED BY U.S. ARMY CORPS OF ENGINEERS AND HAS NOT BEEN FIELD VERIFIED.
5. 2-FOOT BATHYMETRIC CONTOURS SHOWN ON THE PRE-PLACEMENT SURVEY PERFORMED BY COLER & COLANTONIO 6/23/05. CONTOURS REPRESENT MINIMUM CURVATURE EXISTING CONDITIONS SURFACE CONSTRUCTED BY GEOSOFT'S OASIS MONTAJ.
6. INTENDED CAP AREA = AREA THAT WAS DESIGNATED IN THE DESIGN TO BE CAPPED.
FULL PLACEMENT AREA = AREA THAT ULTIMATELY RECEIVED CAP MATERIAL DURING CAP CONSTRUCTION.

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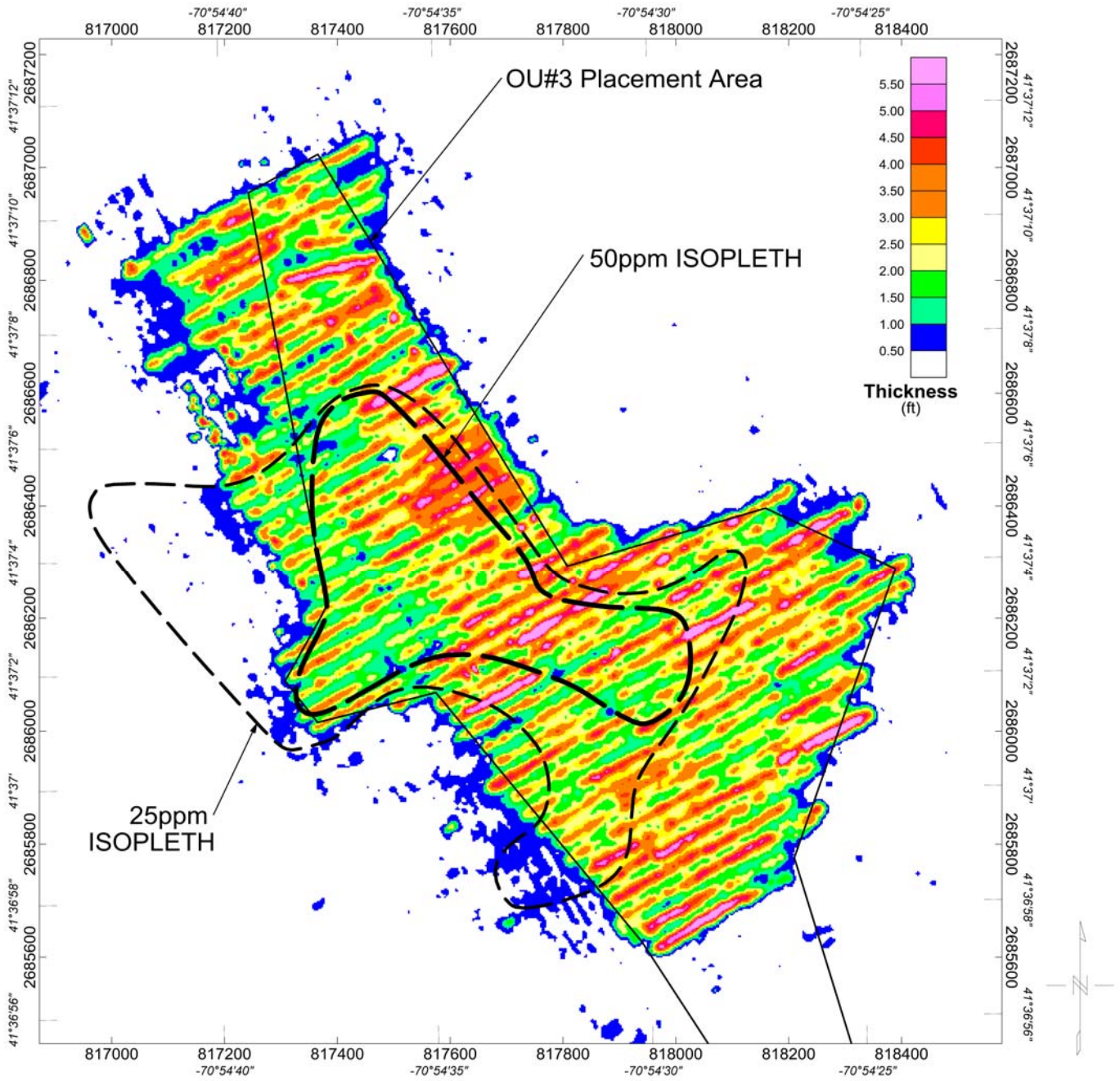
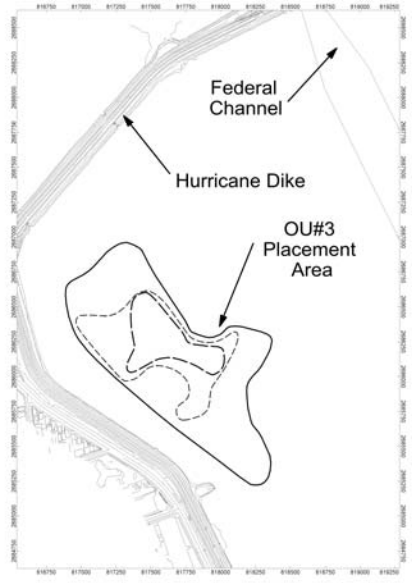
10/06/07 CAP THICKNESS
OU#3 Placement Area Survey

Thickness of CAP
Constructed By Subtracting Pre and Post Final Placement Surveys

Apex Companies, LLC





100 0 100 200 300

US survey foot

NAD83(CSRS98) / Massachusetts CS83 Mainland zone

STATISTICS

AREA OF CAP ~18.9 ACRES
THICKNESS OF CAP >1-FOOT 98%
>2-FOOT 70%

NOTES

1. BATHYMETRIC INFORMATION COLLECTED BY APEX ENVIRONMENTAL ON 01/12/06. BATHYMETRY WAS REFERENCED TO THE MEAN LOWER LOW WATER (MLLW) DATUM. THE ISOPACH (CAP THICKNESS) SURFACE WAS CONSTRUCTED BY SUBTRACTING THE DIGITAL TERRAIN MODEL (DTM) FOR THE PRE-PLACEMENT SURVEY CONDUCTED BY COLER & COLANTONIO FROM THE DTM CONSTRUCTED BY THE 01/12/06 DATA. DTM SURFACES WERE CONSTRUCTED USING GEOSOFTS OASIS MONTAJ'S MINIMUM CURVATURE ALGORITHMS.
2. CAP THICKNESS CONTOUR INTERVAL IS 1-FOOT.
3. STATISTICS CALCULATED USING AUTOCAD 2005 EXTENDED STATISTICS FOR THE ISOPACH DTM. STATISTICS CALCULATED FOR AREA FILLED WITHIN THE PLACEMENT FOOTPRINT.
4. BASEMAP SUPPLIED BY U.S. ARMY CORPS OF ENGINEERS AND HAS NOT BEEN FIELD VERIFIED.
5. 2-FOOT BATHYMETRIC CONTOURS SHOWN OF THE PRE-PLACEMENT SURVEY PERFORMED BY COLER & COLANTONIO 6/23/05. CONTOURS REPRESENT MINIMUM CURVATURE EXISTING CONDITIONS SURFACE CONSTRUCTED BY GEOSOFT'S OASIS MONTAJ.

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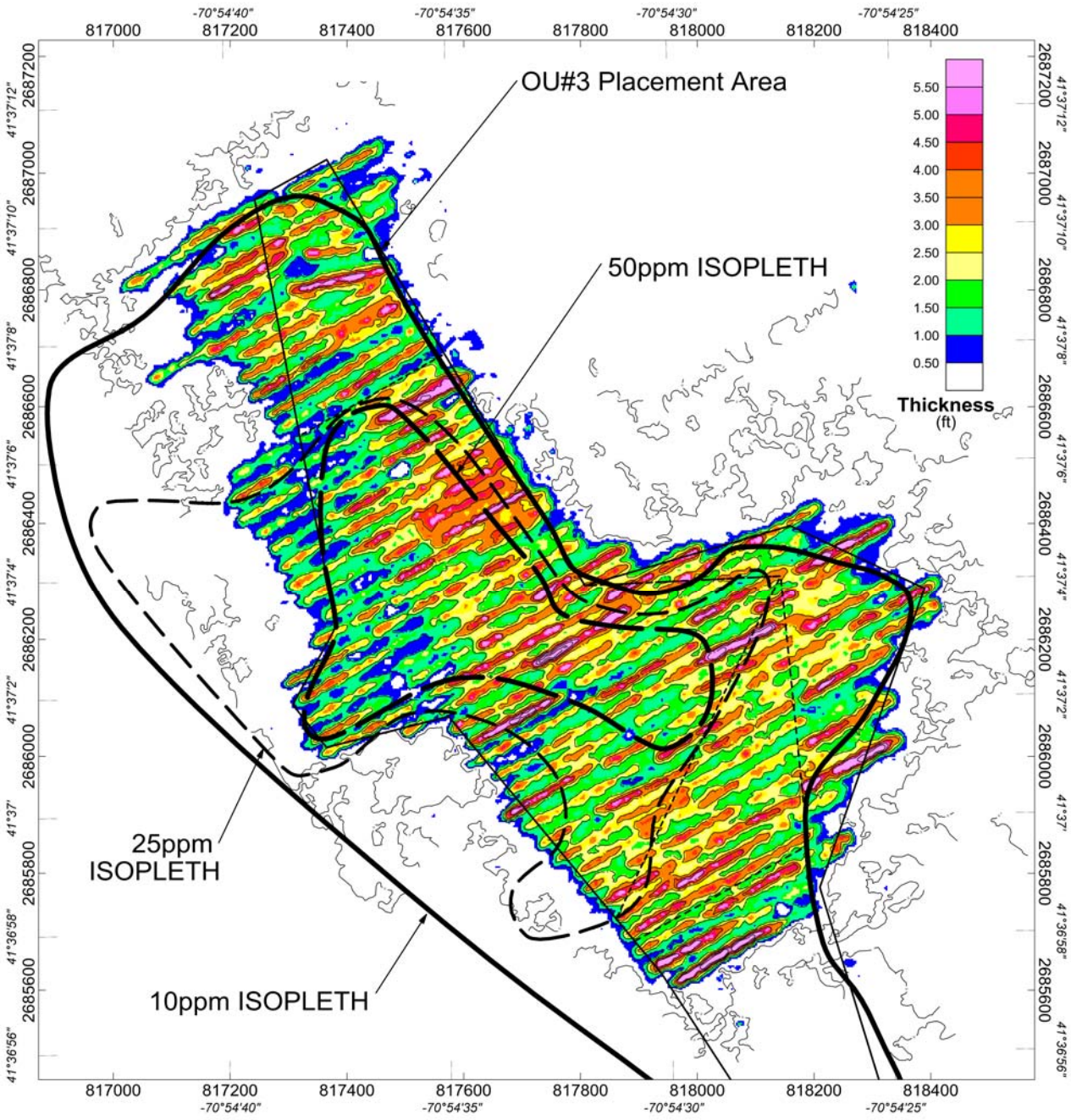
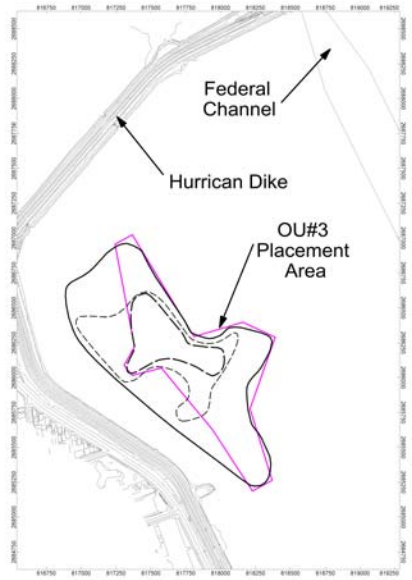
Apex environmental, inc.

01/12/06 CAP THICKNESS
OU#3 Placement Area Survey

Thickness of CAP
Constructed By Subtracting Pre and Post Final Placement Surveys

Apex Environmental





Scale 1:2400

100 0 100 200 300

US survey foot

NAD83(CSRS98) / Massachusetts CS83 Mainland zone

STATISTICS

AREA OF CAP ~18.9 ACRES
THICKNESS OF CAP >1-FOOT 95%
>2-FOOT 65%

NOTES

1. BATHYMETRIC INFORMATION COLLECTED BY APEX ENVIRONMENTAL ON 7/26/05. BATHYMETRY WAS REFERENCED TO THE MEAN LOWER LOW WATER (MLLW) DATUM. THE ISOPACH (CAP THICKNESS) SURFACE WAS CONSTRUCTED BY SUBTRACTING THE DIGITAL TERRAIN MODEL (DTM) FOR THE PRE-PLACEMENT SURVEY CONDUCTED BY COLER & COLANTONIO FROM THE DTM CONSTRUCTED BY THE 7/26/05 DATA. DTM SURFACES WERE CONSTRUCTED USING GEOSOFTS OASIS MONTAJ'S MINIMUM CURVATURE ALGORITHMS.
2. CAP THICKNESS CONTOUR INTERVAL IS 1-FOOT.
3. STATISTICS CALCULATED USING AUTOCAD 2005 EXTENDED STATISTICS FOR THE ISOPACH DTM. STATISTICS CALCULATED FOR AREA FILLED WITHIN THE PLACEMENT FOOTPRINT.
4. BASEMAP SUPPLIED BY U.S. ARMY CORPS OF ENGINEERS AND HAS NOT BEEN FIELD VERIFIED.

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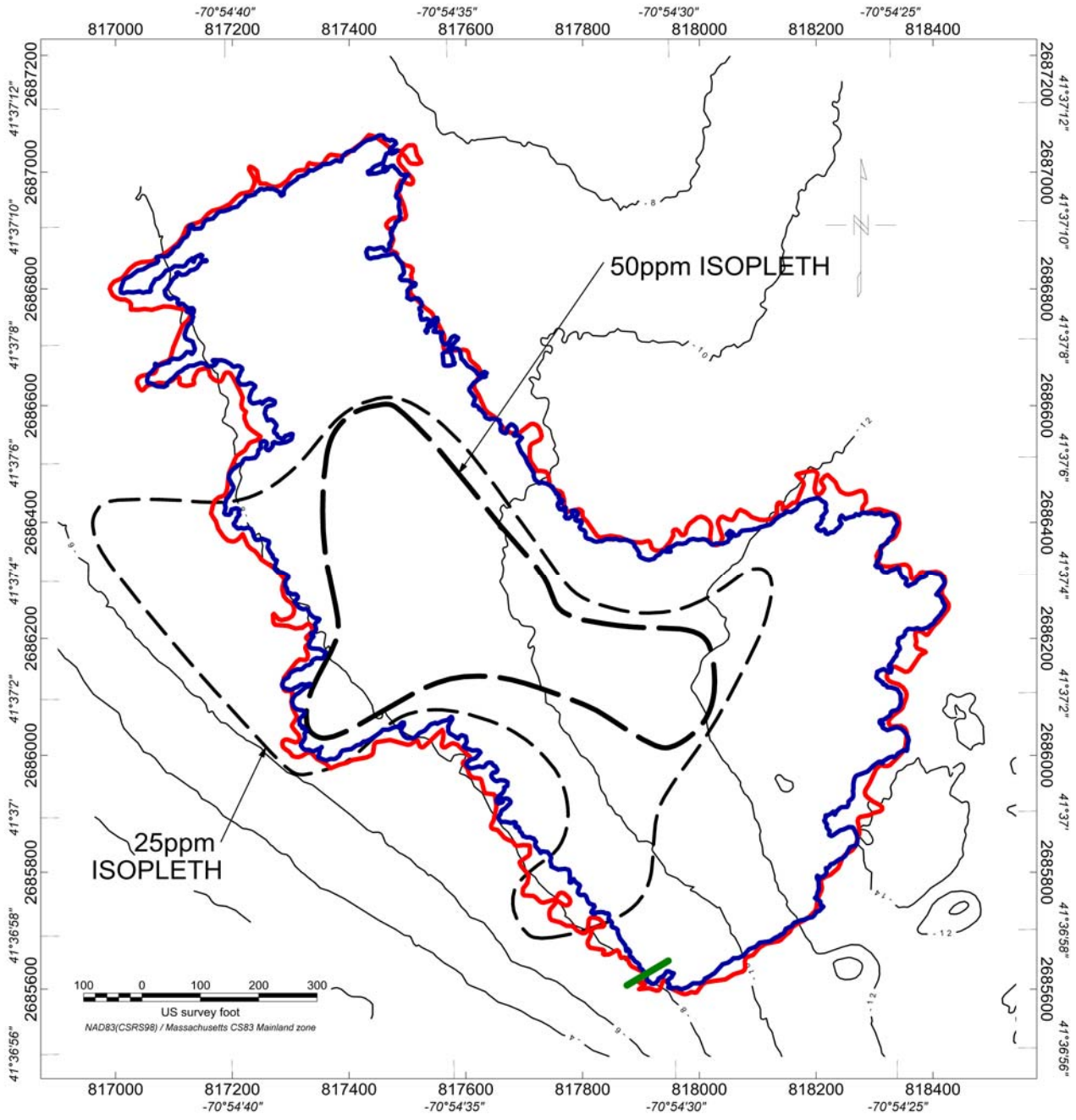
07/26/05 CAP THICKNESS
OU#3 Placement Area Survey

Thickness of CAP
Constructed By Subtracting Pre and Final Placement Surveys

Apex Environmental



2007 OU#3 CAP Footprint: AREA OF CAP ~20.76 ACRES

2005 OU#3 CAP Footprint: AREA OF CAP ~18.9 ACRES

Cross-Section Location

GENERAL NOTES:

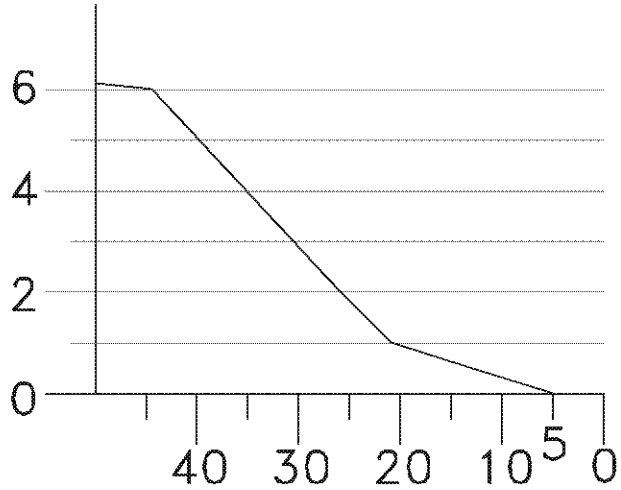
1. CAP FOOTPRINT AREA DETERMINED AT THE 0.5-FOOT CONTOUR INTERVAL.
2. 2007 BATHYMETRIC INFORMATION COLLECTED BY APEX COMPANIES FROM 10/02/07 TO 10/06/07. BATHYMETRY WAS REFERENCED TO THE MEAN LOWER LOW WATER (MLLW) DATUM. THE 2007 ISOPACH (CAP THICKNESS) SURFACE WAS CONSTRUCTED BY SUBTRACTING THE DIGITAL TERRAIN MODEL (DTM) FOR THE PRE-PLACEMENT SURVEY CONDUCTED BY COLER & COLANTONIO (06/2005) FROM THE DTM CONSTRUCTED USING THE 10/02/07 THROUGH 10/06/07 DATA.
3. THE 2005 ISOPACH (CAP THICKNESS) SURFACE WAS CONSTRUCTED BY SUBTRACTING THE DIGITAL TERRAIN MODEL (DTM) FOR THE PRE-PLACEMENT SURVEY CONDUCTED BY COLER & COLANTONIO (06/2005) FROM THE DTM CONSTRUCTED USING BATHYMETRIC DATA COLLECTED BY APEX ON 7/26/2005.
4. PRE-PLACEMENT BASEMAP SUPPLIED BY U.S. ARMY CORPS OF ENGINEERS AND HAS NOT BEEN FIELD VERIFIED.
5. DTM SURFACES WERE CONSTRUCTED USING GEOSOFT'S OASIS MONTAJ'S MINIMUM CURVATURE ALGORITHMS.
6. CAP THICKNESS CROSS SECTIONS WERE CONSTRUCTED IN GEOSOFT'S OASIS MONTAJAND IN AUTOCAD.

CAP Footprint Comparisons
OU#3 Placement Area Survey

2005 vs. 2007 CAP Footprint
CAP Area Constructed at 0.5-Foot Contour Interval

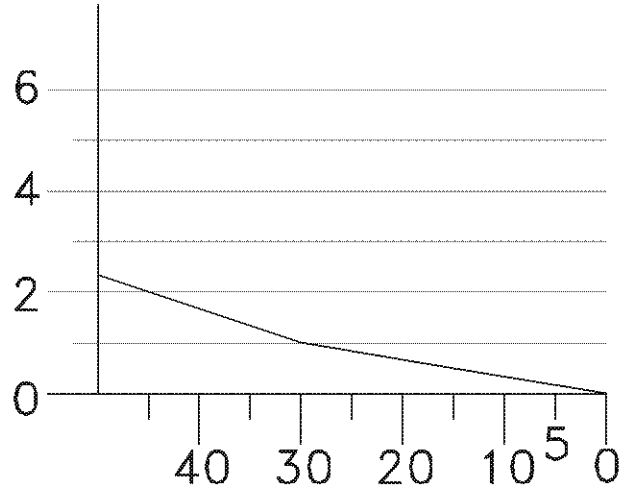
Apex Companies, LLC

2005 PROFILE AT EDGE OF CAP



VERTICAL SCALE EXAGGERATION 5:1

2007 PROFILE AT EDGE OF CAP



VERTICAL SCALE EXAGGERATION 5:1

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Date of Survey 10/2/07
Date of Processing 10/4/07
Areas Surveyed OU #3
Surveyors KWN + JFK
Processors KWN
Oasis Project Name JACOBS 2007

Hypack Step

Oasis Step

Tide File Created	100207.TID
Sound Velocity File	100207.VEL

1524 m/sec

	Hypack Line	Stop & Turn Edited	Exported	Exported from Oasis?
1	43.1143	✓	✓	
2	44.1147	✓	✓	
3	45.1151	✓	✓	
4	46.1212	✓	✓	
5	47.1214	✓	✓	
6	48.1216	✓	✓	
7	49.1219	✓	NO	LATENCY
8	49.1220	✓	✓	
9	50.1222	NO - JUNK	NO	JUNK
10	50A1222	✓	✓	
11	51.1225	✓	✓	
12	52.1230	✓	✓	
13	53.1249	✓	✓	
14	54.1253	✓	✓	
15	55.1300	✓	✓	
16	56.1305	✓	✓	
17	56.1310	✓ ✓	NO	LATENCY
18	56.1314	✓	NO	LATENCY
19	57.1319	✓	✓	
20	58.1324	✓	✓	
21	59.1330	✓	✓	
22	60.1337	✓	✓	
23	61.1342	✓ (WAVES)	✓	
24	62.1351	✓	✓	
25	63.1355	✓	✓	
26	64.1400	✓	✓	
27	64.Mark	✓	✓	
28	65.1418	✓	✓	
29	66.1416	✓	✓	
30	67.1422	✓	✓	
31	67.1429	✓	✓	
32	68.1434	✓	✓	
33	69.1440	✓	✓	
34	70.1447	✓	✓	
	71.1443	✓	✓	
35	71.1452	✓	✓	
36	72.1454	✓	✓	
37	70.1455	✓ (WAVES)	✓	
	69.1459	✓	✓	
38	68.1500	✓ (WAVES)	✓	
39	45.1520	✓	✓	
40	46.1524	✓	✓	
41	47.1527	✓	✓	
42	48.1529	✓ (WAVES)	✓	
43	49.1532	✓	✓	
44	50.1537	✓	✓	
45	51.1540	✓	NO ✓	X-TIE
46	52.1543	✓	NO ✓	X-TIE
47	51.1550	✓	✓	
48				
49				
50				
51				
52				
53				
54				
55				

Oasis Database Name

Oasis New Grid Name

Oasis Previous Week Grid Name

Isopach Grid Name

- a subtracted grid
(previous week minus current week)

Isopach Grid Statistics	
Mean	
Median	
Mode	
Std Dev	

Database Profile View	
Current Data	
Previous Data	
OK?	

Oasis Column for EXPORT

Name of Exported .XYZ files

Sorted in Hypack(s)	
North Area	
South Area	

Name of Sorted Files

Time/Date Processing Completed

X, Y, Corr, Raw, TIDE, File
OU#3_100207 + 100307.TXT

Apex Companies, LLC

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Date of Survey 10/3/07
Date of Processing 10/4/07
Areas Surveyed OU #3
Surveyors KJN + GCD
Processors KJN
Oasis Project Name JACOBS 2007

Hypack Step

Oasis Step

3.280' / m

Tide File Created	100307.TID
Sound Velocity File	100307.VEC

1554.48 m/sec

	Hypack Line	Single Beam Edited	Exported	Exported from Oasis?
1	8.1157	✓	—	
2	9.1159	—	—	
3	10.1202	—	—	
4	11.1204	—	—	
5	12.1205	—	—	
6	13.1209	—	—	
7	14.1212	—	—	
8	15.1214	—	—	
9	16.1219	—	—	
10	17.1223	—	—	
11	19.1229	—	—	
12	19A.1253	✓ (Waves)	—	
13	20.1245	✓ (waves)	No	(AGENCY
14	20.1251	—	—	
15	21.1257	—	—	
16	22.1302	—	—	
17	23.1309	—	—	
18	24.1313	—	—	
19	25.1325	—	—	
20	26.1330	—	—	
21	27.1344	—	—	
22	28.1354	✓ (waves)	—	
23	29.1358	—	—	
24	30.1402	—	—	
25	31.1409	—	—	
26	32.1411	—	—	
27	33.1420	—	—	
28	33.1424	—	—	
29	45.1436	—	—	
30	46.1439	—	—	
31	47.1442	—	—	
32	48.1455	—	—	
33	49.1457	—	—	
34	50.1500	—	—	
	51.1502	—	—	
35				
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Oasis Database Name

Oasis New Grid Name

Oasis Previous Week Grid Name

Isopach Grid Name

- a subtracted grid
(previous week minus current week)

Isopach Grid Statistics	
Mean	
Median	
Mode	
Std Dev	

Database Profile View	
Current Data	
Previous Data	
OK?	

Oasis Column for EXPORT

Name of Exported .XYZ files

Sorted in Hypack (.s5)	
North Area	
South Area	

Name of Sorted Files

Time/Date Processing Completed

X, Y, Con, Row, Tide, Rec

OU #3_100207+100307.TXT

Apex Companies, LLC

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Date of Survey 10/6/07
Date of Processing 10/10/07
Areas Surveyed OU #3
Surveyors KJN + GSD
Processors KJN
Oasis Project Name JACOBS 2007

Hypack Step

Oasis Step

Tide File Created	100607_OU#3.TID
Sound Velocity File	100607.OU#3.VEL

	Hypack Line	Single Beam Edited	Exported	Exported from Oasis?
1	52-1126	✓	✓	
2	53-1128	✓	✓	
3	54-1130	✓	✓	
WAVES → 4	55-1133	✓	✓	
5	56-1136	✓	✓	
WAVES → 6	57-1138	✓	✓	
7	58-1140	✓	✓	
8	59-1142	✓	✓	
9	60-1144	✓	✓	
10	61-1146	✓	✓	
11	62-1150	✓	✓	
12	63-1158	✓	✓	
13	64-1210	✓	✓	
14	65-1212	✓	✓	
15	1-1216	✓	✓	
16	2-1219	✓	✓	
17	3-1221	✓	✓	
18	4-1223	✓	✓	
19	5-1225	✓	✓	
20	6-1228	✓	✓	
21	7-1230	✓	✓	
22	8-1233	✓	✓	
23	9-1236	✓	✓	
24	10-1239	X-TIE	NO	
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46				
47				
48				
49				
50				
51				
52				
53				
54				
55				

Oasis Database Name

Oasis New Grid Name

Oasis Previous Week Grid Name

Isopach Grid Name

- a subtracted grid
(previous week minus current week)

Isopach Grid Statistics	
Mean	
Median	
Mode	
Std Dev	

Database Profile View	
Current Date	
Previous Data	
OK?	

Oasis Column for EXPORT

Name of Exported .XYZ files

Sorted in Hyapck (s5)	
North Area	
South Area	

Name of Sorted Files

Time/Date Processing Completed

X, Y, Corr, raw, Tide File

Apex Companies, LLC
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1 Wamsutta Street
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Project Name	Jacobs Engineering Superfund Dredge - 2007
Project #	6539.061
Surveyors	KVN C/ER
Weather	Partly Cloudy 75°F Calm
Wind	5Kn fr. NE
Temp	75°F
Frequency	5000'/sec
Hypack Prj.	Jacobs 2007
Line File	Jacobs-2007-003
Transducer Offset	1.1
Range	30

Date	10/2/07
High Tide Time	
Low Tide Time	
Survey Area	003

Tide	Time	Board
1	10:20	2.6
2	10:45	2.9
3	11:06	3.2
4	11:38	3.7
5	12:07	3.9
6	12:38	4.2
7	1:24	4.25
8	1:49	4.1
9	2:32	3.6
10	14:46	3.35
11	15:07	3.0
12	15:58	2.2
13		
14		
15		
16		
17		
18		
19		

-Cool pocket Tide bo...
-OU#3 Tideboard

Bar Check

Pre-Survey		Post-Survey	
Depth	Velocity	Depth	Velocity
4	5000	5	5000
5	5000	10	4980
6	5000	15	4980
10	4940		
15	~~4940~~ 5000		

Choppy water
KVN

Latency Lines

049-1220
056-1310

QC/Rod Check

Line #	Rod	Fatho	Pass/Fail
QAQC	16.1	15.9	P
QAQC2	16.3	16.3	P
53	9.8	9.8	P
64	7.1	7.1	P
67	9.2	9.1	P

line 45-60

	Hypack Line	Direction	Hypack Line	Direction	Hypack Line	Direction	Hypack Line	Direction
1	043-1143	NW	061-1342	SE	050-1537	SE		
2	044-1147	SE	062-1351	NW	051-1540	SW		
3	045-1151	NW	063-1355	SE	-X TIE			
4	046-1212	NW	064-1400	NW	052-1543	NE		
5	047-1214	SE	064-1408	NW	-X TIE			
6	048-1216	NW	065-1410	SE	051-1550	NE		
7	049-1218	SE	066-1416	NW				
8	049-1220	NW	067-1422	SE				
9	050-1222	REDO	067-1429	SE*				
10	050A1222	SE	068-1438	NW				
11	051-1225	NW	069-1440	SE				
12	051-1228	NW	070-1441	NW				
13	052-1230	SE	071-1443	SE				
14	053-1249	NW	071-1452	SE				
15	054-1253	SE	072-1451	NW				
16	055-1258	NW	070-1455	SE				
17	056-1305	SE	069-1458	NW				
18	056-1310	NW	068-1500	SE				
19	056-1314	NW	045-1520	NW				
20	057-1318	SE	046-1524	SE				
21	058-1328	NW	047-1527	NW				
22	059-1332	SE	048-1529	SE				
23	060-1338	NW	049-1532	NW				

Wave/wake 1st line junk (line 6)
Latency line (lines 18, 19)
fast ferry wave ½ way thru line #22 waves

R:redo - N/E/S/W compass heading - noise - wake - aborted - etc

Line 061_1342SE: waves
070_1455SE: waves
069_1458NW: bubbles at start/waves
068_1500SE: waves
048-1529SE: waves ½ way thru

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267-
1700

Project Name	Jacobs Engineering Superfund Dredge - 2007
Project #	6639.001
Surveyors	KJN + GCD
Weather	Overcast
Wind	10-12 Kn - SE
Temp	70°
Frequency	Ram @ 5030
Hypack Prj.	Jacobs 2007
Line File	
Transducer Offset	1.1'
Range	30'

Date	10/3/07
High Tide Time	14:14
Low Tide Time	8:45
Survey Area	OU#3

Tide	Time	Board
1	11:30	2.35'
2	11:53	2.7'
3	12:41	3.45
4	1321	3.95
5	1337	4.1
6	14 17	4.15
7	14:49	4.1
8	15:10	3.95
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		

Bar Check

Pre-Survey		Post-Survey	
Depth	Velocity	Depth	Velocity
4.0	5050	5	5050
5.0	5050	10	5000
6.0	5060	15	5000
10.0	5000		
15.0	5000		

Latency Lines

20-1251
45 thru 51

QC/Rod Check

Line #	Rod	Fatho	Pass/Fail
QAQC	12.1	12.1	P
27	8.9	8.9	P
33	6.4	6.4	P
51	7.8	7.7	P
51	8.0	8.0	P

	Hypack Line	Direction	Hypack Line	Direction	Hypack Line	Direction	Hypack Line	Direction
1	8.1156	~~SW~~ NW	31-1407	NW				
2	9-1158	SE	32-1413	SE				
3	10-1202	NW	33-1420±	NW				
4	11-1204	SE	33-1424	NW				
5	12-1206	NW	45-1436	SE				
6	13-1208	SE	46-1439	NW				
7	14-1212	NW	47-1442	SE				
8	15-1214	SE	48-1455	NW				
9	16-1218	NW	49-1457	SE				
10	17-1223	SE	50-1500	NW				
11	18-1229	NW	51-1502	SE				
12	19A 1233	SE						
13	20-1245	SE						
14	21 1257	NW						
15	22-1302	SE						
16	23-1308	NW						
17	24-1313	SE						
18	25-1325	NW						
19	26-1330	SE						
20	27-1349	NW						
21	28-1354	SE						
22	29-1358	NW						
23	30-1402	SE						

Margin notes: "Waves in middle of lines - from wake of ships in channel" (arrows to lines 12 and 13); "waves" (arrow to line 21)

R:redo - N/E/S/W compass heading - noise - wake - aborted - etc

Waves on 33-1424NW

Jacobs Bubbles in Water 46-1439

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Project Name	Jacobs Engineering Superfund Dredge - 2007	Date	10/6/07
Project #	6637.0001	High Tide Time	17:20
Surveyors	KVN + GLD	Low Tide Time	11:19
Weather	80, S, ~7, Calm	Survey Area	OU #3
Wind	5 Kn fm NE		
Temp	90°		
Frequency	5000' / SEC		
Hypack Prj.	JACOBS 2007		
Line File	100607-OU#3		
Transducer Offset	1.1'		
Range	30'		

Tide

	Time	Board
1	10:44	0.8'
2	11:20	0.8'
3	12:05	0.95'
4	12:55	1.4'
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		

Bar Check

4' 5090
5' 5070
6' 5070
10 4890

Pre-Survey		Post-Survey	
Depth	Velocity	Depth	Velocity
4'	5090		
5'	5070		
6'	5070		
10	4890		

Latency Lines

QC/Rod Check

Line #	Rod	Fatho	Pass/Fail
QAQC	8.4	8.4	P
1	9.4	9.4	P
63	9.0	9.0	P
10	9.5	9.5	P

	Hypack Line	Direction	Hypack Line	Direction	Hypack Line	Direction	Hypack Line	Direction
1	52_1126	NW	10_1239	SE				
2	53_1128	SE						
3	54_1130+	NW						
4	55_1133	SE						
5	56_1136	NW						
6	57_1138	SE						
7	58_1140	NW						
8	59_1142	SE						
9	60_1144	NW						
10	61_1146	SE						
11	62_1150	NW						
12	63_1158	SE						
13	64_1210	NW						
14	65_1212	SE						
15	01_1216	SW						
16	02_1219	NE						
17	03_1221	SW						
18	04_1223	NE						
19	05_1225	SW						
20	06_1228	NE						
21	07_1230	SW						
22	08_1233	NE						
23	09_1236	SW						

waves start →
waves →
Wave →
Bubbles waves →
waves at start →

R:redo - N/E/S/W compass heading - noise - wake - aborted - etc