CENWS-OD-TS-DMMO

MEMORANDUM FOR: RECORD March 10, 2010

SUBJECT: DMMP DETERMINATION ON THE SEDIMENT QUALITY OF THE EXPOSED SEDIMENT SURFACE AFTER UNPERMITTED DREDGING TO VERIFY COMPLIANCE WITH THE WASHINGTON STATE ANTIDEGRADATION POLICY FOR THE CAMAS SLOUGH, CAMAS, WASHINGTON DREDGING PROJECT (2003-01135)

1. Introduction. This determination is a follow up to the Suitability Determination Memorandum for this project dated August 2, 2007, and is in response to a permit violation that took place during the subject dredging. The original SDM evaluated the quality of the proposed post-dredge surface following dredging and upland disposal. As part of this original evaluation, the surface below the proposed dredge prism in one out of four DMMUs (DMMU 3) was found to have contamination that violated the state antidegradation policies in the state Sediment Management Standards. To prevent degradation of surface sediments, DMMU 3 was not permitted for dredging.

In a letter dated March 11, 2009, the permittee (Georgia-Pacific Consumer Products LLC in Camas) reported that 3,217 cy in DMMU 3 had been dredged in violation of the permit. The unapproved dredging occurred on January 12-14, 2009 (Figure 1). As part of the response to this violation, GP was required to conduct a post-dredge survey of the exposed surface to determine whether anti-degradation had actually occurred. A Sampling and Analysis Plan (SAP) was prepared by GP and approved by the agencies (Table1).

Table 1. Project Specifics

Project ranking	Moderate
SAP received	June 1, 2009
SAP approved	July 16, 2009
Sampling dates	Bathymetry: August 4, 2009 Sediment cores: August 10, 2009
Data report submitted	November 2009
USACE Permit Application Number	NWS-2003-01135

2. Background. Only one core sample was taken in DMMU 3 in the original characterization in 2006, with a 4-foot core from the existing sediment surface of -8.5 MLLW to one foot below the design depth of -11.5 MLLW. From that sample, the top three feet of the core were composited and analyzed to represent the proposed dredge material, while the bottom foot of core sediment was analyzed to represent the proposed post-dredge surface. As summarized in the DY2008 SDM, the sample representing the dredge material in DMMU 3 passed the chemical guidelines for open water disposal, but the Z-layer did not. At the time, GP Camas chose not to dredge DMMU 3 in the absence of measures to address the degraded surface that would be exposed should the dredging occur.

3. Project Sampling. The required bathymetric survey was conducted prior to sediment sampling. Core sediment samples were collected with a direct push Vibracore from three locations within DMMU 3 (Figure 2). Sediment samples were collected from each core at the 0-1 ft. interval, 2-3 ft. interval, and 4-5 ft. interval to determine not only the exposed surface but, if further remediation should be necessary, to determine whether contamination continued to increase with depth below the exposed sediment surface.

Samples were placed along the length of the DMMU. Sample B13 was positioned near the 2006 sampling station (B8) but not directly on it, as the bathymetry at station B8 would not allow for the desired sample.

4. **Chemical Analysis**. The nine resulting samples (three from each core) were analyzed separately for the chemicals of concern found elevated in the previous Z-layer analysis: metals, PCBs and dioxins/furans. Results were compared to freshwater screening levels from the 2006 Interim Final Sediment Evaluation Framework (SEF). In all three cores, the top one foot of material had no exceedances of either S1 or S2 for any COCs, though deeper samples exhibited increased detections and in some cases exceeded the screening levels (Tables 2 and 3).

5. **Evaluation**. Since the top foot of each of 3 separate Z-samples showed no exceedances of target chemicals, there is no evidence of degradation to the surface occurring subsequent to dredging at DMMU 3. This could be for any number of reasons, e.g.:

   a. *Sampling and dredging variability.* This evaluation showed contamination increasing with depth, as did the initial evaluation. But sampling technologies are not always precise to a one foot increment, and dredging is never really accurate to a one foot window. These observations are leading the DMMP to programmatically propose a two foot z-layer, to account for standard variability in dredging technology.
   b. *Environmental variability.* The original determination was based on the findings of one sample, which could not be replicated due to dredging in the area. The samples taken during this evaluation were taken at proscribed distances from the existing ground surface—but the actual elevations varied by several feet. The surface obviously varies in elevation and most likely the elevations at which contamination are found vary within the area.
   c. *Sedimentation since dredging.* Because the subject area lies at the mouth of an unregulated river, normal sedimentation could have deposited clean sediments over the degraded ones exposed by dredging. Almost ten months passed between dredging and sampling (January to August).

6. **Recommendations**. No further action is necessary to bring the exposed sediment surface into compliance with the state antidegradation standards. Further penalties for the permit violation are not within the purview of the DMMP program.

7. **Agency Signatures.**

Concur:

3/11/2010
Date

Lauran Cole Warner, Seattle District Corps of Engineers

3/18/2010
Date

Erika Hoffman, Environmental Protection Agency

03/16/2010
Date

Laura Inouye, Washington Department of Ecology

03/22/2010
Date

Dave Vagt, Washington Department of Natural Resources

Copies furnished:

DMMP Signatories
Steve Manlow, Corps Regulatory
DMMO file

Table 2. Sediment conventional, metals, and PCB results

CORE SAMPLE			B13						B14						B15						Z sample 2006	
	Elevation BSS		0 - 1 ft		2 - 3 ft		4 - 5 ft		0 - 1 ft		2 - 3 ft		4 - 5 ft		0 - 1 ft		2 - 3 ft		4 - 5 ft		3 - 4 ft	
	USGS MSL		-9 to -10		-11 to -12		-13 to -14		-13 to -14		-15 to -16		-17 to -18		-14 to -15		-16 to -17		-18 to -19		-11.5 to -12.5	
SEF SLs - FW	SL1	SL2																				
CONVENTIONALS																						
Total Solids, %	-	-	54.1		54.5		64.5		58.3		60.4		57.9		57.2		61.7		62.7		56.8	
Total Organic Carbon, %	-	-	2.37		2.9		2.61		2.3		2.56		2.76		3.30		1.68		1.65		1.98	
Total Sulfides, mg/kg	-	-	76.7		217		211		121		268		327		103		87.9		143		309	
Total Ammonia, mg/kg	-	-	16.1		4.4		1.5 J		12.6		2		2.6		2.3		5.4		10.6		50.7	
METALS (mg/kg)																						
Antimony	-	-	0.195		0.29		0.230		0.190		0.304		0.453		0.184		0.206		0.265		5.9	U
Arsenic	20	51	4.59		4.81		5.57		5.06		5.00		6.08		4.25		4.19		5.10		7	U
Cadmium	1.1	1.5	0.506		0.51		0.69		0.523		1.25		2.47		0.64		0.693		0.885		2.1	
Chromium	95	100	13.6		14.0		15.6		13.9		18.6		22.6		13.2		13.2		15.4		27.1	
Copper	80	830	31.5		33.8		34.6		32.5		31.8		43.2		27.8		24.5		29.2		46.8	
Lead	340	430	12.7		14.2		21.8		14.6		24.7		32.4		13.1		13.9		17.0		29.5	
Mercury	0.28	0.75	0.076		0.05		0.06		0.070		0.145		0.225		0.062		0.049		0.067		0.183	
Nickel	60	70	13.5		13.7		15.2		14.1		15.1		16.1		13.6		14.2		16.0		17.3	
Silver	2	2.5	0.166		0.18		0.1		0.089		0.116		0.149		0.079		0.101		0.098		0.7	U
Zinc	130	400	87.0		91.9		121		94		157		225		105		173		153		207	
PCBs (µg/kg)																						
Aroclor 1016	-	-	10	U	10	U	10	U	10	U	10	U	9.9	U	9.9	U	9.9	U	10	U	-	
Aroclor 1221	-	-	20	U	20	U	60	U	20	U	20	U	20	U	20	U	20	U	20	U	-	
Aroclor 1232	-	-	10	U	10	U	10	U	10	U	10	U	9.9	U	9.9	U	9.9	U	10	U	-	
Aroclor 1242	-	-	10	U	10	U	10	U	10	U	10	U	9.9	U	9.9	U	9.9	U	10	U	-	
Aroclor 1248	-	-	10	U	10	U	10	U	10	U	10	U	9.9	U	9.9	U	9.9	U	10	U	-	
Aroclor 1254	-	-	10	U	10	U	13	U	10	U	92		44		9.9	U	9.9	U	10	U	-	
Aroclor 1260	-	-	10	U	10	U	10	U	10	U	10	U	9.9	U	9.9	U	9.9	U	10	U	-	
Total PCBs	60	120	20	U	20	U	60	U	20	U	92		44		20	U	20	U	20	U	-	

BSS = Below Sediment Surface
USGS MSL = United States Geological Survey mean sea level

Table 3. Dioxin results and TEFs

CORE SAMPLE		B13						B14						B15						Z sample 2006	
	Elevation BSS	0 – 1 ft		2 – 3 ft		4 – 5 ft		0 – 1 ft		2 – 3 ft		4 – 5 ft		0 – 1 ft		2 – 3 ft		4 – 5 ft		3 – 4 ft	
	USGS MSL	-9 to -10		-11 to -12		-13 to -14		-13 to -14		-15 to -16		-17 to -18		-14 to -15		-16 to -17		-18 to -19		-11.5 to -12.5	
DIOXINS/FURANS (ng/kg)	TEF WHO 2005																				
Dioxins																					
2,3,7,8-TCDD	1	0.248	U	0.270		0.829	U	0.406	U	1.05	U	1.77		0.215	U	0.268	U	0.294	U	1.61	
1,2,3,7,8-PeCDD	1	0.311		0.36	U	0.463	U	0.504		1.02		0.774		0.266	U	0.205	U	0.316	U	0.716	
1,2,3,4,7,8-HxCDD	0.1	0.569		0.55		0.654	U	0.622		1.05		1.25		0.417	U	0.325	U	0.366		1.06	
1,2,3,6,7,8-HxCDD	0.1	1.77		1.88		3.59		2.50		20.1		23.7		2.32		1.50		3.09		17.0	
1,2,3,7,8,9-HxCDD	0.1	1.49		1.7		2.76		2.20	U	9.90		8.46		1.61		1.12		1.83		6.12	
1,2,3,4,6,7,8-HpCDD	0.01	28.4		29.9		40.3		44.9		236		500		35.3		18.8		27.9		417	
OCDD	0.0003	238		255		423		665		4,120		12,900		486		166		258		7,310	
Furans																					
2,3,7,8-TCDF	0.1	0.426		0.69		1.30		0.615		3.49		5.17		1.21		1.94		1.04		3.91	
1,2,3,7,8-PeCDF	0.03	0.138	U	0.230	U	0.330		0.190		0.516	U	0.623		0.213		0.223	U	0.201	U	0.596	
2,3,4,7,8-PeCDF	0.3	0.292	U	0.33	U	0.521		0.277	U	0.782		0.744		0.216	U	0.240	U	0.291		0.929	
1,2,3,4,7,8-HxCDF	0.1	0.579		0.7		0.890	U	0.569		1.75		1.78		0.532		0.343		0.474		1.64	
1,2,3,6,7,8-HxCDF	0.1	0.301		0.41	U	0.817	U	0.336		1.37		0.918		0.335	U	0.338		0.445		1.01	
1,2,3,7,8,9-HxCDF	0.1	0.052	UJ	0.06	UJ	0.153	U	0.0666	U	0.235	J	0.115	J	0.125	UJ	0.091	UJ	0.0592	UJ	0.089	J
2,3,4,6,7,8-HxCDF	0.1	0.274	U	0.300	U	0.450	U	0.266	U	0.878	U	0.713	U	0.250	U	0.186	U	0.239	U	0.742	
1,2,3,4,6,7,8-HpCDF	0.01	4.01		5.04		5.69		6.42		34.7		60.9		4.49		3.39		4.99		53.5	
1,2,3,6,7,8,9-HpCDF	0.01	0.350		0.45	U	0.586		0.469		2.73		3.83		0.322		0.284		0.344		3.28	
OCDF	0.0003	8.94		16.1		14.2		20.2		120		276		15.5		11.8		13.6		181	
TEQ (ND=0)		**1.23**		**1.25**		**1.53**		**1.70**		**9.05**		**16.53**		**1.13**		**0.80**		**1.23**		**12.76**	
TEQ (ND=1/2 DL)		**1.41**		**1.53**		**2.32**		**2.06**		**9.63**		**16.56**		**1.45**		**1.11**		**1.55**		**12.76**	

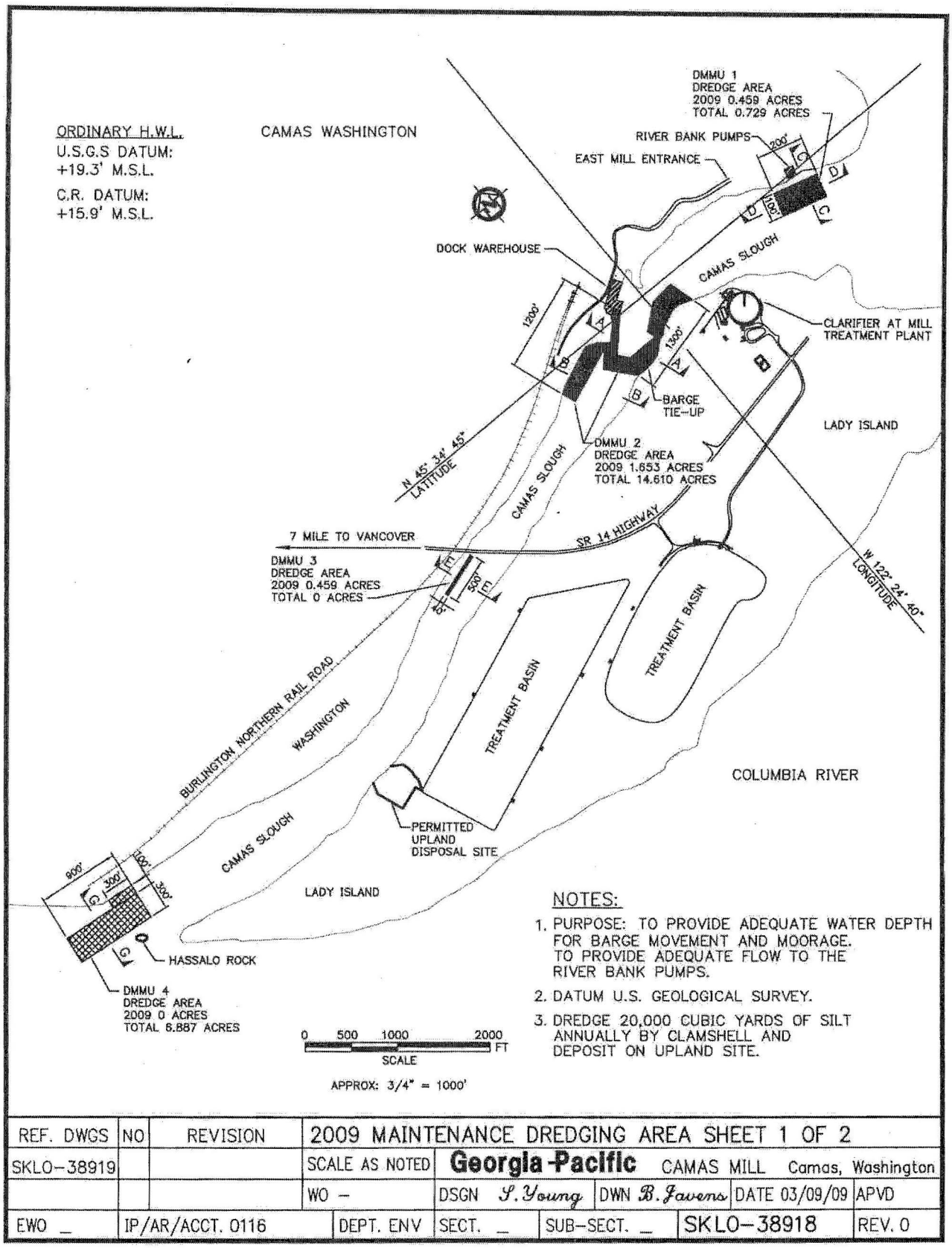

Figure 1. Project dredging areas. Non-permitted dredging occurred in DMMU 3.

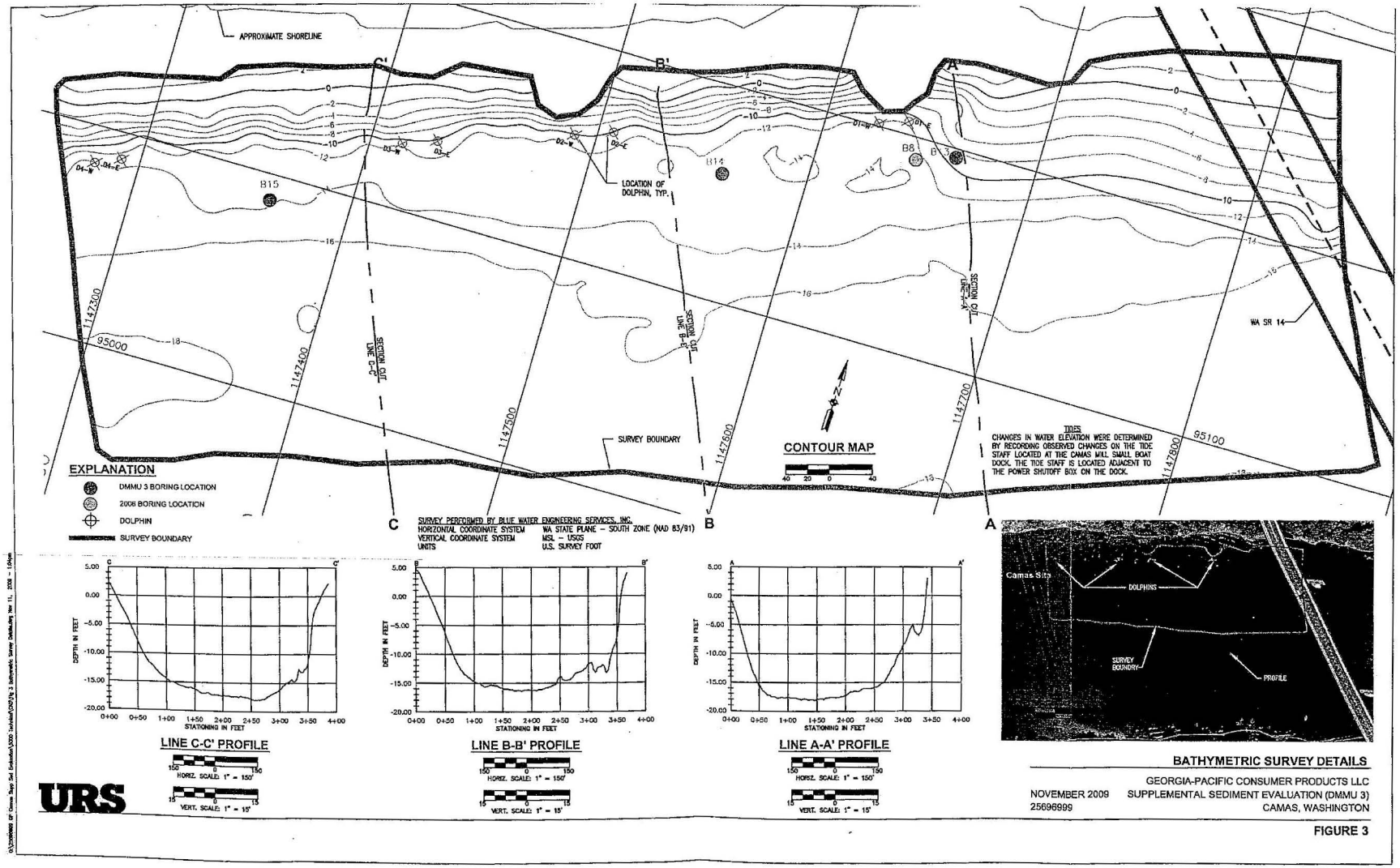

Figure 2. DMMU 3 post dredge sampling locations and bathymetry.