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Dear Chris

The following is in response to your comments provided by email on Monday November 10, 2008. First, we thank you for the information that you provided. It served as additional information that we had not dealt with in our planning. We have reviewed that information in light of your comments and would like to provide additional information that we think will help explain our plan as well as demonstrate reasons why we propose to maintain the sampling location between Transects 1 and 2 (NF Area) for the sampling effort to evaluate the sediment from Douglas Harbor. To accomplish that in a relatively straight forward manner we will divide our discussion into two segments. The first segment addresses the location of the reference site and the second provides additional information on the modification to the Inland Testing Manual that we proposed to perform testing using a Reference Envelope Approach.

**Location:** The area proposed for a dredged material disposal site reference area is defined in the Inland Testing Manual as a location "…outside the influence of previous disposal operations… but near enough to the disposal site that the reference sediment is subject to all the same influences (except previously disposed dredged material) as the disposal site (Section 3.2.1 Reference Sediment Sampling). Generally, the guidance for selecting a disposal site reference suggests that equal water depths, similar sediment grain size and organic carbon concentrations, similar characteristics associated with dispersive or non-dispersive characteristics of the dredged material disposal site and similar faunal components are important elements of these comparisons. As you have indicated there is little information available on the characteristics of sites within Gastineau Channel except the data on metals contents in sediment (Rudis, 1996). Additional information is also contained on the Coast and Geodetic Survey Charts relative to water depth and bottom topography in the two alternative sites proposed for reference samples. We have evaluated the water depths, change in water depths and metals concentrations in and near these two locations relative to these data at various locations in Gastineau Channel ranging from its mouth to the transect line off Juneau (Transect 5 – Rudis, 1996).

The two areas under consideration for the proposed reference location include 1) the region that we had suggested that is located near the middle of the Gastineau Channel between Sheep and DuPont Creeks and your suggestion for the location to be offshore of DuPont Creek in an area represented by Transect 1 at station J (Rudis, 1996; Figure 1). The following table compares water depth, surrounding bathymetry range and a rank order statistical evaluation of the groups of stations based on their metals concentrations

relative to the two locations that are being suggested as alternative sites for reference comparisons.

Table 1. Station/Area characteristics of alternative disposal site reference areas.

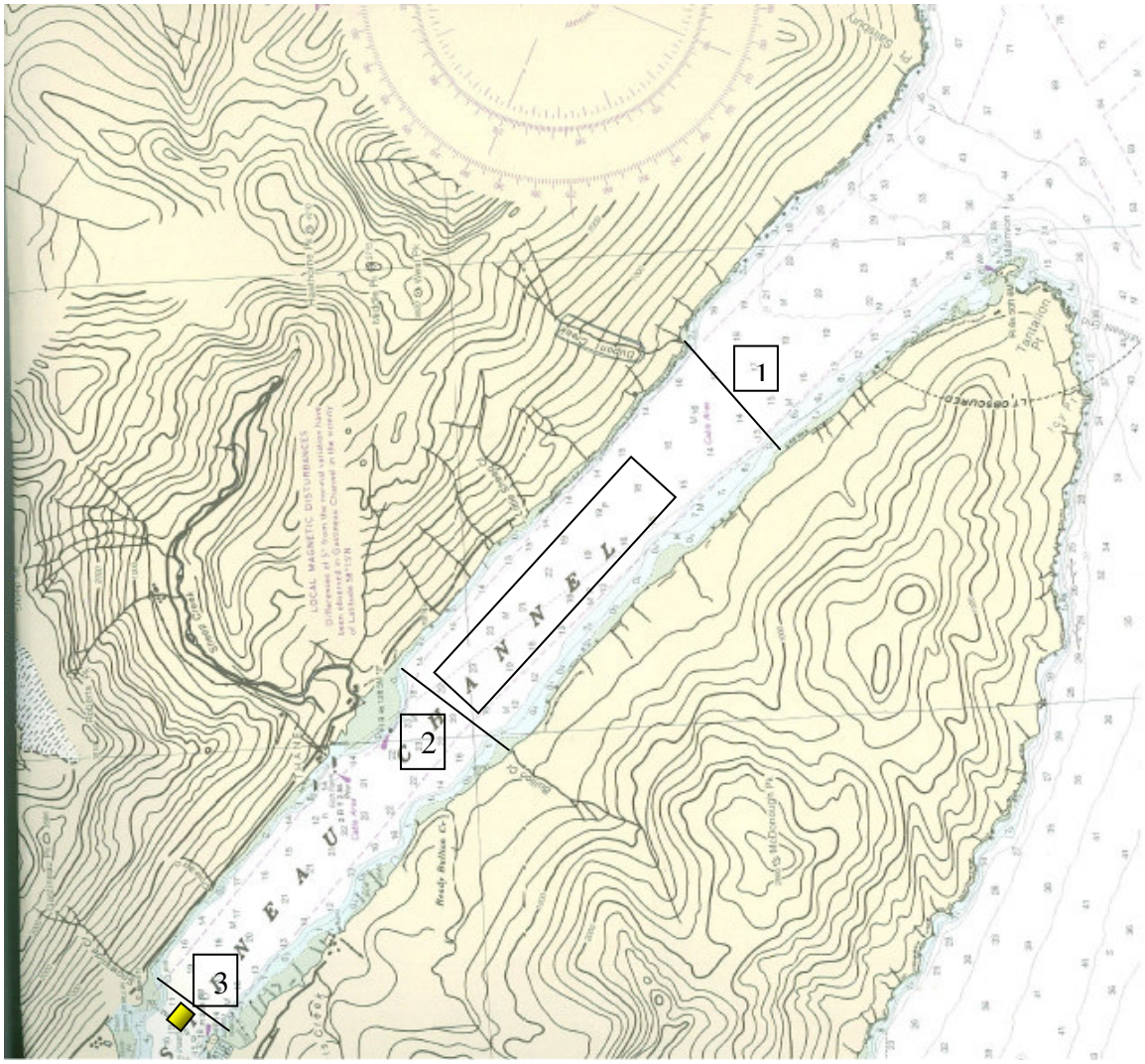
| **Station/Area** | **Bottom Depth** | **Depth to West/ Depth to East** | **Mound, Depression or Same** | **Metals Grouping** |
|---|---|---|---|---|
| Disposal Site | 19-20 Fathoms | 18-20 18-20 Fathoms | Same | Group D Higher Concentrations* |
| NF Area | 17-23 Fathoms | 14-18 20 Fathoms | Same | Bounded by stations with lowest grouping |
| Station 1J | 15 Fathoms | >15 <23 Fathoms | Mound | Among Lowest Stations (Group A/B) |

*See Attachment A

Based on these data the Disposal Site offshore of Douglas Harbor is most similar to the NF area and least similar to station 1J in bottom depth (approximately 30ft difference) and surrounding depth characteristics. Metals concentrations are distinctly different at Transects 1 and 2 (and presumably the region between 1 and 2) and have the lowest metals concentrations while transects 3 (adjacent to the disposal site) and 5 (near Juneau) are separately grouped due to having the highest metals concentrations of this data set. These comparisons are based on a non-parametric rank order comparison ANOVA and Tukey's HSD evaluation that groups stations into non-statistically significant groups. (Attachment A). Transect 1 does have the lowest concentrations among all the station but they are not statistically significantly different than the stations at Transect 2. The region between Transect 1 and 2 are assumed to also reflect this relationship. The major difference between the two areas (NF and Transect 1 - station J) is water depth and the presence of a small sill at the mouth of Gastineau Channel (deeper depths leading to shallower and then deeper depths progressing inward into the channel). Sills are common attributes of fjord type environments and provide a mechanism for overturning water when it escapes or enters the channel. This is very different than the disposal site and the lowest concentrations of metals at this location are reflective of this more dynamic water mass that exists near the mouth of Gastineau Channel.

I would anticipate that the sediment in Region 1 will be relatively coarse because of the shallower environment at the sill and that organisms present at this location will be more of the hard substrate species that are attached to cobble found in these same types of environments elsewhere (brachipods, gorgonians, Episammic grazing gastropods, hydroids, bryozoans, etc.). The benthic organisms in the depressions between DuPont and Sheep Creek and the disposal site are more likely to be reflective of sediment dwellers (amphipods, polychaetes, pelecypods, ophiuroids, etc) rather than attached fauna. Because of these differences at Region 1 and the testing regimen of using infaunal organisms to evaluate the potential effect of dredged material at the disposal site in Gastineau Channel we need to have sediment and not cobble/gravel type environments. We continue to recommend maintaining the sampling area in the depression between transects 1 and 2 (the NF Area).

Figure 1. Gastineau Channel locations evaluated for Reference Site/Area selection



**Reference Envelope Approach:** The reference envelope approach is not one of the methods indicated in the Inland Testing Manual. It is a modification that we suggested to provide additional value to the sediment testing being conducted for this Douglas Harbor Tier 4 evaluation. At present there is little information, as indicated above, to address the selection of a reference station or environs composite. We do not know how variable the sediment conditions are within the disposal site nor do we know how variable the sediment conditions are at any location within Gastineau Channel. The observations on bottom topography (mounds or sills and depressions) within the channel indicate that there will be differences in the sediment coarseness and the organisms present at specific locations. The reference needs to be a good surrogate for estimating the potential effects of the dredged material from Douglas Harbor on the disposal site, in the absence of prior influences from dredged material. The metals evaluation that we performed and discussed above indicates that transects 1 and 2 (Rudis, 1992) are not significantly different in terms of the rank order of the concentrations of these metals. The presence of shallower water and an apparent sill at transect 1 leads to a potential issue with grain size and types of fauna that occupy that area (both unknown but projected based on similar habitats at other locations). This would not be a good location to evaluate the effects of contaminants on sediment infaunal organisms.

Because of the importance of acquiring sediment that is appropriate for the assessment type (infaunal sediment dwellers) and the lack of information on potential locations throughout Gastineau Channel we recommended a Reference Envelope Approach. In this case, multiple locations would be sampled and handled as separate replicates for the area. They would not be composited but would be treated separately. This provides a comparison that would address the potential effects in an area rather than at a pre-selected point and also allow separately handling the data that is obtained so that multiple sites could be examined. Ideally, all of the sediment would behave the same way but if there is an outlier response that area-replicate could be removed and the data reanalyzed using an unbalanced number of replicates. Reference envelopes are being used in a variety of regions to characterize disposal site environments on a research basis (Puget Sound, San Francisco, Columbia River, LA-3 off Orange County, California, etc.). The proposed characterization of effects of Douglas Harbor sediment is a Tier 4 evaluation and performing the Reference Envelope sampling and analysis process will provide much needed data for reference sites in Gastineau Channel. We think this is the best approach for this area and will provide the best way to characterize the potential sediment effects while also acquiring additional information for future planning and testing.

Attachment A. Concentrations of metals and rank order of concentrations by station.

| | Concentrations | | | | | | | | Ranks (1=Highest, 20=Lowest) | | | | | | | | Comment |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Site | As | Cd | Cu | Hg | Pb | Se | Zn | | As | Cd | Cu | Hg | Pb | Se | Zn | Sum | |
| D1 | 9.28 | 0.089 | 25.7 | 0.221 | 30.9 | 0.524 | 73.9 | | 19 | 20 | 19 | 10 | 18 | 20 | 19 | 125 | Least Contaminated |
| X1 | 9.72 | 0.09 | 26.1 | 0.137 | 25.3 | 0.693 | 75.5 | | 18 | 19 | 18 | 15 | 19 | 18 | 18 | 125 | |
| J1 | 6.69 | 0.264 | 21.8 | 0.098 | 19 | 1.04 | 60.9 | | 20 | 15 | 20 | 20 | 20 | 7 | 20 | 122 | |
| N1 | 12.5 | 0.16 | 41.2 | 0.355 | 43 | 0.76 | 108 | | 17 | 18 | 17 | 2 | 15 | 17 | 15 | 101 | |
| D5 | 12.9 | 0.316 | 65.9 | 0.122 | 37.4 | 0.613 | 98.7 | | 15 | 13 | 5 | 16 | 16 | 19 | 16 | 100 | |
| N5 | 12.9 | 0.362 | 45.1 | 0.182 | 43.6 | 0.85 | 94.6 | | 15 | 11 | 16 | 11 | 14 | 15 | 17 | 99 | |
| J2 | 18.3 | 0.267 | 48.5 | 0.16 | 37 | 1.13 | 109 | | 12 | 14 | 14 | 13 | 17 | 5 | 13 | 88 | |
| D4 | 17.8 | 0.501 | 49.9 | 0.166 | 52.7 | 0.923 | 115 | | 13 | 9 | 11 | 12 | 13 | 12 | 12 | 82 | |
| D2 | 17.2 | 0.349 | 48.8 | 0.347 | 62.2 | 0.947 | 109 | | 14 | 12 | 13 | 3 | 8 | 10 | 13 | 73 | |
| X4 | 25.3 | 0.676 | 48.1 | 0.317 | 53.1 | 0.87 | 124 | | 7 | 6 | 15 | 6 | 12 | 14 | 10 | 70 | |
| X2 | 19.1 | 0.247 | 54.5 | 0.3 | 56.2 | 1.04 | 135 | | 11 | 16 | 8 | 7 | 11 | 7 | 8 | 68 | |
| N2 | 19.7 | 0.23 | 58.3 | 0.346 | 60.5 | 0.99 | 127 | | 10 | 17 | 7 | 4 | 9 | 9 | 9 | 65 | |
| J4 | 35.4 | 0.96 | 49.3 | 0.109 | 70.5 | 0.88 | 143 | | 3 | 3 | 12 | 18 | 5 | 13 | 6 | 60 | |
| N4 | 27.7 | 0.913 | 53.6 | 0.117 | 70.5 | 0.935 | 136 | | 5 | 4 | 9 | 17 | 5 | 11 | 7 | 58 | |
| D3 | 19.8 | 0.433 | 70.4 | 0.326 | 58.1 | 1.06 | 120 | | 9 | 10 | 3 | 5 | 10 | 6 | 11 | 54 | |
| J3 | 47.5 | 3.05 | 52.6 | 0.099 | 71.3 | 0.78 | 191 | | 2 | 1 | 10 | 19 | 3 | 16 | 1 | 52 | |
| X5 | 23.9 | 0.509 | 72.2 | 0.249 | 71.3 | 1.31 | 151 | | 8 | 8 | 2 | 9 | 3 | 1 | 5 | 36 | |
| X3 | 51 | 1.31 | 58.9 | 0.143 | 66 | 1.22 | 181 | | 1 | 2 | 6 | 14 | 7 | 2 | 2 | 34 | |
| N3 | 29.9 | 0.803 | 70.2 | 0.267 | 81.7 | 1.19 | 165 | | 4 | 5 | 4 | 8 | 1 | 3 | 3 | 28 | |
| J5 | 25.9 | 0.544 | 74.4 | 0.376 | 80.5 | 1.16 | 156 | | 6 | 7 | 1 | 1 | 2 | 4 | 4 | 25 | Most Contaminated |

Group membership based on the rank order concentrations of seven (7) sediment metal concentrations at 20 stations. ANOVA of ranks followed by Tukey's grouping provides the groupings with a 0.05 level of significance. Stations with the same letter group membership are not significantly different from each other. There are two distinct groups (blue and green shading with the yellow shading blending the two distinct groups).

| Site | Group Membership | | | | | |
|---|---|---|---|---|---|---|
| D1 | A | | | | | |
| X1 | A | | | | | |
| J1 | A | B | | | | |
| N1 | A | B | C | | | |
| D5 | A | B | C | | | |
| N5 | A | B | C | | | |
| J2 | A | B | C | D | | |
| D4 | A | B | C | D | E | |
| D2 | A | B | C | D | E | F |
| X4 | A | B | C | D | E | F |
| X2 | | B | C | D | E | F |
| N2 | | | C | D | E | F |
| J4 | | | C | D | E | F |
| N4 | | | C | D | E | F |
| D3 | | | C | D | E | F |
| J3 | | | C | D | E | F |
| X5 | | | | D | E | F |
| X3 | | | | D | E | F |
| N3 | | | | | E | F |
| J5 | | | | | | F |