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To: Tom Bolen, Northwest Arctic Borough
From: Nana Pacific, LLC
Date: October 11, 2006
Re: Kivalina Seawall – Damage Analysis

This memorandum follows John DeGeorge’s Trip Report dated September 19, 2006, Dean Camery’s Trip Report dated September 27, 2006, in which NANA Pacific personnel provided their observations of the seawall damage and identified several potential issues for NWAB to pursue. The Kivalina Seawall was damaged during the storm of September 11 & 12, 2006. Mr. DeGeorge inspected the seawall damage on September 15, 2006, and Mr. Camery followed with a site visit on September 22, 2006. NANA Pacific also provided Mr. Bolen with a CD containing photos of the seawall taken during each field visit identified in the Trip Reports. In a recent telephone conversation, Mr. Bolen of NWAB asked NANA Pacific to elaborate on the observations pertaining to the HESCO Concertainers®. This memorandum is intended to provide NWAB with further details on observed manufacturing variances and discrepancies of the HESCO Concertainers that were used by NWAB for the Kivalina Seawall.

HESCO Concertainers

HESCO Bastion USA, LLC manufactured the Concertainers delivered to NWAB for use in constructing the Kivalina seawall. HESCO offers various options for Concertainers, including the standard Concertainer with a geotextile fabric lining (C-3315 Standard Concertainer), and an arctic Concertainer with a geotextile fabric inner liner and HDPE arctic fabric partial-outer liner (A-3315 Arctic Concertainer). Based on sample HESCO Concertainers obtained by NANA Pacific, each A-3315 Arctic Concertainer is generally constructed with the following components and associated accessories: a square 3’ x 3’ welded steel wire mesh basket; a non-woven polypropylene geotextile fabric lining stapled to the inside of the basket; a HDPE fabric (“arctic fabric”) layer covering part of the geotextile fabric and stapled to the outside of the geotextile fabric; a welded steel wire mesh lid; and fasteners for the lid.

Manufacturing Variances and Discrepancies

Based on the observations noted in the Trip Report and the product samples and product literature received from HESCO, NANA Pacific has preliminarily concluded that there are significant design and manufacturing variations and discrepancies in some of the A-3315 Arctic Concertainers and associated accessories delivered to NWAB. These variations and discrepancies may constitute nonconformities and/or manufacturing defects or flaws. In

addition, given the information known to date, it would be reasonable for NWAB to conclude that the variances and differences in the HESCO products caused or contributed to, at least in part, the failure mechanism identified in the Trip Report.

Specifically, NANA Pacific identified the following manufacturing variances and discrepancies in the Concertainers delivered to NWAB:

1. There were two different folding and stapling patterns for A-3315 Arctic Concertainers delivered to NWAB. The geotextile and arctic fabric in some Arctic Concertainers were folded and stapled such that the geotextile and arctic fabric formed a seamless barrier between the material placed inside the basket and the front face of the basket (Version 1). The geotextile and arctic fabric in other Arctic Concertainers were folded and stapled such that there were gaps and openings in the fabrics at the corners and along the sides of the baskets located on the front face of the baskets (Version 2). Unlike the seamless barriers found in the Arctic Concertainers described as Version 1, the gaps and openings in the Arctic Concertainers described as Version 2 do not provide a continuous barrier and could provide a pathway for material placed inside the basket to escape. The fact that HESCO used two different manufacturing methods for the fabrics may, standing alone, establish a manufacturing defect.
2. Concertainers described as Version 2 exhibit a different final design and manufacture when compared to the product samples that HESCO provided to NANA Pacific. NANA Pacific received several miniature product samples from HESCO that show the final design and construction of the Concertainers with geotextile and arctic fabric lining. The geotextile and arctic fabric liners in Concertainers described as Version 1 are constructed similarly to the arctic and fabric linings shown in HESCO's product samples. The geotextile and arctic fabric linings in Concertainers described as Version 2 are put together differently than the geotextile and arctic fabric lining shown in the miniature product samples.
3. Unlike HESCO's product samples, the Version 2 Arctic Concertainers delivered to NWAB contained arctic fabric lining that was placed in such a way to create a gap and opening at the top and along the sides of the Concertainer located on the front of the baskets. Specifically, the layering sequence from the outside to the inside of the side walls of each Arctic Concertainer should have been as follows: 1) wire mesh, 2) arctic fabric, 3) geotextile fabric, and 4) sand and gravel contents. In many of the Version 2 Arctic Concertainers observed at the Kivalina seawall, however, the layering sequence was as follows: 1) wire mesh, 2) geotextile fabric, 3) arctic fabric, and 4) sand and gravel contents. If in fact HESCO had modified a pre-manufactured standard Concertainer to create an Arctic Concertainer, then in order for HESCO to make a Version 1 Arctic Concertainer, HESCO would have been required to expend extra effort and time to correctly install the arctic fabric over the geotextile fabric to create a seamless front face, as shown in HESCO's product samples. Based on our observations, it appears that HESCO did not take the time and effort to properly modify the pre-manufactured standard Concertainer.
4. The design of the lid fastening system used for the Concertainer delivered to NWAB is much different from the design of the lid fastening system shown in HESCO's product literature. First, the lid shown in HESCO's literature is fastened down with long spiral coils or rings along the entire length of the lid, while the lid for the Concertainers

delivered to NWAB is attached with three metal clips or “hog rings” spaced about 3 inches apart, leaving the lid unsecured for about 15 inches on both sides of the clips.

5. Based on conversations with NWAB, we understand that the Concertainers delivered to NWAB may have been manufactured in two different HESCO plants (with one plant in Louisiana, and the other plant in the Midwest). If there are multiple manufacturing sites, then HESCO may have a manufacturing problem at one of its manufacturing plants. Given the significant variance in stapling and folding patterns, it is possible that each HESCO manufacturing plant staples and folds the fabrics differently. If this is the case, then one HESCO plant manufactures the HESCO Arctic Concertainers contrary to product samples. Alternatively, it is possible that HESCO manufactured all of the Arctic Concertainers at the same site, but under different specifications. To ascertain the location of where specific Arctic Concertainers were made, NWAB should locate and examine all shipping documents, bills of lading, packing slips, and invoices from HESCO.

In reaching the assessments and conclusions above, NANA Pacific relies upon the following assumptions:

HESCO knew that the Concertainers purchased by NWAB were to be used as an ocean seawall.

NWAB did not instruct or advise HESCO on how to staple and/or fold the geotextile and arctic fabric linings for any of the Concertainers delivered to NWAB.

HESCO recommended to NWAB that NWAB purchase and use hog clips instead of the spiral fasteners for fastening down the lids.

HESCO recommended using the hog clips, sparsely applied, for the lid fastening system used for the Kivalina seawall rather than the spiral coil fasteners.

HESCO did not advise NWAB that the hog clip would weaken the overall stability and design of the lid fastening system.

HESCO solely established the hog clip fastening system, including the fastening method using 3 hog clips near the middle of the lid, thereby leaving approximately 15 inches on both sides of the lid unsecured.

HESCO demonstrated the hog clip fastening system for NWAB’s work force, and advised them to attach the hog clips in the manner in which they currently exist.

HESCO offers for sale to the public the A-3315 Arctic Concertainer with geotextile and arctic fabric as part of its product offerings.

NWAB did not request HESCO to make any changes or alterations to HESCO’s Concertainers manufactured with geotextile and arctic fabric.

HESCO manufactured the Arctic Concertainers under two different specifications or procedures, thereby creating Version 1 and Version 2; HESCO possibly manufactured the Arctic Concertainers at two different manufacturing plants, and at one of those manufacturing plants,

HESCO may have built the Version 2 Arctic Concertainers with the variances and differences noted above.

HESCO's product warranty does not preclude a claim against HESCO for defects or flaws in manufacture or design with respect to the folding, stapling and fastening of the geotextile fabric and/or the arctic fabric lining in the Arctic Concertainers, or with respect to the lid fastening system recommended by HESCO.