

21 October 2020

Mr. Jay Sennewald
Oregon Parks and Recreation Department
12735 NW Pacific Coast Hwy
Seal Rock, OR 97376

Subject: Response to Request for Additional Information - ERM Independent Hazard Analysis for
Edge Cable Holdings

Dear Mr. Sennewald:

ERM-West, Inc. (ERM) is responding to your request for additional information transmitted to Edge Cable Holdings on 1 October 2020. As the author of the Independent Hazard Analysis (Analysis) for the Jupiter Drill Break, we are pleased to have an opportunity to provide clarification on the Analysis relative to Oregon Parks and Recreation Department's (OPRD) jurisdiction. Please note that this response was also peer-reviewed by Geosyntec, consistent with the prior Analysis submitted.

In response to your request, we have provided comments by OPRD in bold font followed by ERM's response directly answering each inquiry.

Thank you in advance for your review of this information.

Sincerely,



Nikki Payne
Partner

cc: Dr. Paul Krause, Partner, ERM
Kim Marcus, Partner, ERM
Tony Rice, Senior Principal, Geosyntec Consultants, Inc.

Attachment: Figure 1, Jupiter Plan View and HDD Profile

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION - ERM INDEPENDENT HAZARD ANALYSIS FOR EDGE CABLE HOLDINGS

1. The introduction to the ERM analysis states “On 28 April 2020, during the drilling operation and 500 feet from the exit point, the HDD drilling pipe broke, resulting in drill tooling and drilling mud (collectively “Remaining Materials”) being left at an average depth of approximately 50 feet below the seafloor between approximately 1,690 and 520 feet offshore, as described further below.” In general, the ERM analysis appears to focus on the potential impacts to the seafloor and marine environment, and to a much lesser extent on impacts to the ocean shore. For the purpose of OPRD’s regulatory concerns in this matter, the ocean shore means “the land lying between extreme low tide of the Pacific Ocean and the statutory vegetation line as described by ORS 390.770 or the line of established upland shore vegetation, whichever is further inland.” It will be important for responses to address not only potential impacts to the seafloor and marine environment, but also to distinctly and specifically analyze impacts to the ocean shore. Use of the word “offshore” should be limited to analysis of areas below extreme low tide.

Response:

ERM’s Independent Hazard Analysis (Analysis) for the Jupiter Drill Break was developed in response to the pipe break incident that occurred on 28 April 2020. The definition of Remaining Materials provided in the Analysis is inclusive of the materials that remained in place as a result of the incident. As shown on Figure 1, the Remaining Materials extend approximately 300 feet into OPRD’s jurisdiction (the “ocean shore”) from the Extreme Low Tide line, ranging in depth from -47.1 to -75.1 feet [NAVD88] as shown on Figure 1). It is important to note that the segment of the Remaining Materials within OPRD’s jurisdiction includes steel bore pipe and surrounding drill mud but **does not** include the drilling components on the seaward end of the pipe (i.e., drill head, Monel, ParaTrack probe, ParaTrack gyro module, and jetting module); those remaining components are **outside** of OPRD’s jurisdiction.

The impact analysis conclusions of Section 3 of the Analysis, including those related to toxicity potential, migration, and geologic events, all apply directly and accurately to the segment of Remaining Materials within OPRD’s jurisdiction.

2. **Provide Incident Report and other documents.** Section 2.2.1 of the report refers to an Incident Report provided to ERM to aid in their analysis. Please provide a copy of the same report and any other documents that Facebook or Edge Cable Holdings provided to ERM for use in preparing the Independent Hazard Analysis, including the work order for this report, to aid OPRD in understanding the details of what happened, and to understand what served as the basis for the analysis.

Response:

Documents reviewed and considered by ERM for completion of the Independent Hazard Analysis will be provided under separate cover and supplement the documents already provided as attachments to the Independent Hazard Analysis.

3. **The ERM analysis does not clearly specify the location of the Remaining Materials in relation to the “ocean shore” boundaries identified above.**

There are several references to the remaining materials being left “*at an average depth of approximately 50 feet below the seafloor between approximately 1,690 and 520 feet offshore.*” If all of the Remaining Materials are located entirely seaward of the extreme low tide of the Pacific Ocean, then it will be important to indicate so. If some of the Remaining Materials were left landward of extreme low tide under the ocean shore, then it is necessary to identify what portion of the ocean shore contains Remaining Materials, and what those materials are (steel bore casing, drilling mud, drill pipe, or other).

Response:

Please see description above in Response #1 and Figure 1 attached for a clear specification of Remaining Materials within the ocean shore boundaries.

4. **In addition, the depth of the borehole and any Remaining Materials nearest the bore entry hole are necessarily at a shallower depth than those under the seafloor, so it is important to identify their depth under the ocean shore instead of identifying the “average depth of 50 feet.” In order to clarify the location and depth of the borehole path across the ocean shore and the location of the Remaining Materials, please direct ERM to provide a cross section, drawn to scale, which visually illustrates these features in relation to both the ocean shore and the seafloor. For example, the analysis suggests all remaining materials are located seaward of 7.5 feet past Joint #15. This location should be identified in your cross section.**

Response:

As requested, the locations and depths of Remaining Materials and the borehole path beneath the ocean shore are depicted on Figure 1, which includes a plan and cross sectional view drawn to scale. As shown on Figure 1, the Remaining Materials extend approximately 300 feet into OPRD’s jurisdiction (the “ocean shore”) from the Extreme Low Tide line, ranging in depth from -47.1 to -75.1 feet [NAVD88]. The demarcation of the ocean shore boundaries, specifically the Extreme Low Tide (based on Lowest Astronomical Tide) and Statutory Vegetation Line (SVL) are shown on the figure to visually illustrate the Remaining Materials in relation to these boundaries.

5. **Section 2.2.3 identifies the drilling mud composition including additives. The Independent Hazard Analysis list does not match the list of drilling fluid components previously provided to the public by Edge Cable Holdings. This discrepancy needs to be reconciled with some explanation in order to properly inform OPRD and the public.**

Response:

As part of the application to the United States Army Corps of Engineers (Corps) for coverage under the Corps nationwide permits, SDSs were included as an attachment to the Horizontal Directional Drilling (HDD) Operations Plan describing typical drilling mud bentonite powder and additives that might be used. These SDSs were labeled as “EXAMPLE”. Following the Jupiter drill break, Edge Cable Holdings shared these SDSs with the public and agencies in

response to questions about what constituents are in the Remaining Materials. ERM's independent review of the drill break involved a toxicity analysis of the exact constituents and quantities used in the drilling mud, specifically, Super Gel-X®, Wyo-Vis DP®, Platinum D-D, Sand Force, and Soda Ash, as supported by the Drilling Mud Log (See Appendix C of the Analysis). The actual constituents used in the drilling mud served the same purpose as the Bore-Gel, Quik-Bore, and PAC-LE products.

6. **Section 2.3.2 states that consultation with the U.S. Army Corps of Engineers identified 17 ESA listed species within the project area. The section states “*The Oregon Parks and Recreation Department (OPRD), in consultation with the Oregon Department of Fish and Wildlife, indicated that there were no listed species known to inhabit the site.*” This statement requires clarification. The term “site” in our Staff Report assessment is specific to the ocean shore, which is a subset of the project area, and focused on species that would be likely to occur on the ocean shore. The marine environment and the species using that portion of the project area are not within OPRD’s jurisdiction. Additional analysis should identify specifically which species may occupy (vs. inhabit) the ocean shore and the potential impacts to those species.**

Response:

ERM agrees that the excerpt in the Analysis should have specified that the consultation with OPRD pertained only to listed species within OPRD’s jurisdiction.

The OPRD’s Findings of Fact Staff Report, dated March 26, 2019, states on Page 6 that “there are no reports of any rare, threatened, or endangered species of fish or wildlife [within OPRD’s jurisdiction].” ERM interprets this statement to mean that protected special status species have neither been reported to inhabit nor occupy the ocean shore.

Regardless of which species have the potential to be present within the ocean shore and their protection status, no impacts to any species from the drill break incident are expected due to the lack of an exposure route from the borehole to the ecological receptors (Section 3.1.2).

7. **Section 2.3.3 states “no known water quality concerns exist in the vicinity of the Landing Site and localized offshore area, based on the Oregon Health Authority (2020), which lists the nearby Neskowin Beach as ‘open,’ meaning swimming and bathing are permitted.” Neskowin Beach is over 30 miles south of the project, with Cape Kiwanda and the Nestucca River mouth between there and the Landing Site. The Independent Hazard Analysis does not establish that the criteria the Oregon Health Authority employs to test water quality in Neskowin would identify water quality impacts to ocean shore users or resources proximate to the incident in terms of location or time of testing.**

Response:

The use of the Oregon Health Authority rating for Neskowin Beach was meant to provide a high-level baseline of water quality and recreational water use of the region. This water quality testing location was the closest available information to the Jupiter Project Landing Site. However, ERM notes that Neskowin is over 30 miles to the south of the Jupiter Project

Landing Site and agrees that the Neskowin Beach is too far from the Project area for use as a proxy of the baseline conditions.

Regardless of baseline water quality within the ocean shore, the water quality of ocean water accessed by recreational users of the ocean shore was not altered or impacted by the bore pipe break, as there is no identified or expected release of drilling mud or degraded materials to the surface. As described in Section 3.1.1.1, a release of the drilling mud did not occur during the bore pipe break nor is it expected to occur in the future.

8. **Section 3.1.1.1 focuses on potential eco toxicity levels on the benthic zone and water column. As mentioned above, the borehole under the ocean shore, particularly nearest the bore entry point is shallower than the “average” depth of 50 feet. It is essential that additional analysis focus on potential toxicity levels if any remaining drilling fluid emerged to the surface of the ocean shore for any reason. As mentioned above, if no remaining drilling fluid is located under the ocean shore, then the analysis should indicate so, and also distinguish the potential of any release within OPRD’s ocean shore jurisdiction.**

Response:

The locations and depths of Remaining Materials and the borehole path beneath the ocean shore are depicted on Figure 1.

The entirety of the analysis provided in Section 3.1.1.1 applies to the Remaining Materials within OPRD’s jurisdiction. Regarding the portion of the borehole path within OPRD’s jurisdiction, residual mud may be present at shallower depths as a result of normal and permitted drilling activities that occurred prior, and unrelated, to the pipe break. As shown on Figure 1, the shallowest depth of the former borehole path (at the SVL) is at 0 NAVD88 or 15 feet below the ocean shore. For OPRD’s purposes, ERM can confirm that the results of the Independent Hazard Analysis would also apply to residual mud that may be present elsewhere along the former borehole path.

If any of the additive constituents were to migrate “for any reason”, which is not expected based on their chemical compositions and containment in the hardened drilling mud, these constituents would be very fine-grained, clay-like particles attempting to migrate through sand, and other fine, clay-like sediments. These surrounding fine-grained sediments would prevent the effective migration of any of the drilling mud, resulting in none of the constituents reaching the ocean shore. If the drilling mud constituents were to migrate out of the borehole path vicinity, which is not expected, all constituents would be below toxic thresholds at the surface of the ocean shore based on their current concentrations. There are no conceivable toxic impacts to ecological or public receptors present within the ocean shore.

9. **The additional analysis should include potential emergence of drilling fluid from geologic events discussed in Section 3.2.1.**

The entirety of the analysis provided in Section 3.2.1 applies to the Remaining Materials within OPRD’s jurisdiction. As stated above, the analysis within Section 3.2.1 would also apply to any residual mud within the borehole path unrelated to the incident.

- 10. One last matter of concern is that of any risks associated with attempts to drill a new borehole in close proximity to, and along the same path as the failed borehole, considering the lithology surrounding the borehole has likely collapsed since the drill pipe and steel bore casing was removed, as stated in Section 2.2.1.**

Response:

The “new borehole” (“2021 borehole”) design will be confirmed upon completion of additional geotechnical surveys. The 2021 borehole (shown as the green line labelled “Tentative Profile” on Figure 1), in proximity to the previous borehole (“2020 borehole”), does not present risk for significant displacement of the 2020 bore pipe or liquefaction of drilling mud nor does it affect the stability of the subsurface where the 2021 borehole will advance. While the drilling contractor has indicated that they will make every effort to avoid contact with the Remaining Materials, as described below, the risks associated with direct contact are negligible.

It is known at this time that the 2021 borehole entry point will be set back from the 2020 borehole entry point and the 2021 borehole will likely be at a deeper (rather than shallower) profile than the 2020 borehole. Specifically, the 2021 entry point will be set back from the 2020 borehole entry point to avoid subsurface sediment previously disturbed. The 2021 operations will utilize 16-inch steel casing to extend seaward further than the casing for the 2020 operation to direct the 2021 borehole path deeper than the end of the broken pipe. Once at the desired depth, the drill bit will advance horizontally. This process will advance the 2021 borehole path below the depth of the 2020 borehole path and avoid direct contact with Remaining Materials and collapsed portion of the 2020 borehole.

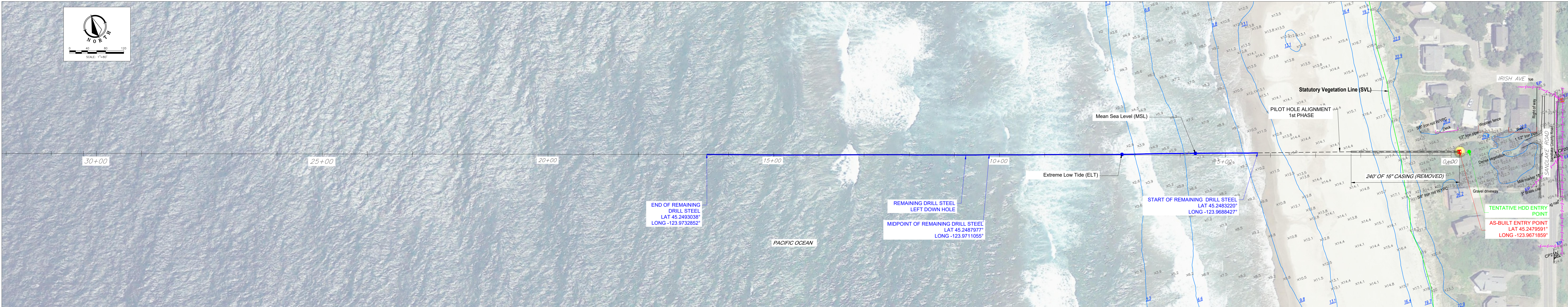
However, even if the 2021 borehole path were to rise and intersect the 2020 borehole path, contact with the Remaining Materials would neither result in liquefaction of the residual drilling mud, nor displacement of the remaining steel. Such contact would occur at a low velocity, at a low intersection angle and be at a low enough energy level to allow the drilling assembly to simply be pulled back and redirected to the new borehole path along a deeper profile to avoid subsequent contact. In the unlikely event that hardened residual mud was encountered, it would not liquefy upon contact but rather would return to the entry pit as cuttings and be placed in containment.

Vibrations from the 2021 drilling activity would be at levels of magnitude incapable of displacing the 2020 steel bore pipe or liquefying and displacing bentonite. Bentonite does not liquefy with the type of vibrations induced by drilling activity. According to a vibration monitoring study (October 2017) overseen by ERM for a similar HDD drilling operation and lithology (i.e., primarily sandy)¹, the magnitude of vibrations detected at the surface at an average distance of 10 feet from the drilling activity were an order of magnitude lower than project specific vibration trigger criteria for structural damage. Considering the data collected, and accounting for differences in thrust and torque between drill rigs, levels of vibration that would be expected from the 2021 drilling activity below the 2020 borehole would not result in consequential effects on the Remaining Materials or present a risk to soil stability for the 2021 borehole. While the exact depth of the 2021 borehole will be determined based on collection of

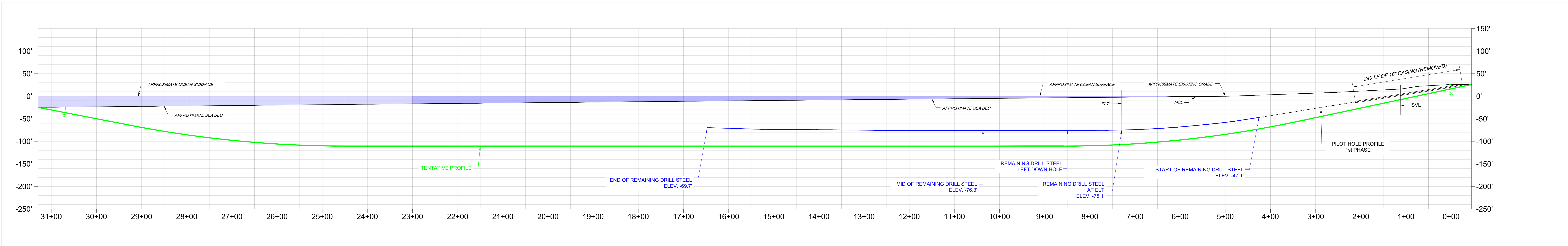
¹ Horizontal Well Drilling Vibration Monitoring Report, Northern California Confidential Location and Client, Confidential Structural Engineering Firm. October 5 2017.

additional geotechnical data, this analysis is applicable for any distance from the 2020 borehole up until the point of direct contact (should the distance of separation completely diminish), which is addressed above.

FIGURE 1 Jupiter Plan View and HDD Profile



HDD Plan View
SCALE: 1"=80'



HDD Profile
HOR. SCALE: 1"=80'
VER. SCALE: 1"=80'

NOTES:

- HORIZONTAL DATUM = NAD83
- VERTICAL DATUM = NAVD88
- ENTRY AND EXIT COORDINATES ARE CONVERTED INTO STATE PLANE COORDINATE SYSTEM (3601 OREGON NORTH).

Legend

CB Concrete block
CO Column
CS Culvert
FB Flower bed
FH Fire hydrant
FP Footpath
LP Lamp pole
MH Manhole
NB Notice board

PB Post box
RB Rubbish bin
RS Road sign
SB Sign board
SP Sign pole
T Telephone box
TB Telephone box
TL Traffic light
TP Telegraph pole

TS Temporary structure
WT Water tap
BMH Surveyed beach manhole
M Manhole
MT Manhole (Telecom)
MS Manhole (Sewage)
LP Lamp pole

Tree
Control point
Gate
Spot levels above/below survey datum (LAT)
General topographic features (with annotation)

Features
General topographic boundary (with annotation)
Road
Fence
Building

Plan View & HDD Profile (HDD As-built Plan)									
Jupiter Segment 2 HDD Pacific City, Oregon									
Pacific City Oregon HDD Pilot Hole, RevD 2.dwg	0.2	30 Oct 2025	PGS (Edw)	NS	AS	SubCom Comments	Contractor	SUBCOM LLC	
Pacific City Oregon HDD Pilot Hole, RevD 1.dwg	0.1	10 Oct 2025	PGS (Edw)	NS	AS	SubCom Comments	Subcontractor	Maritech International Ltd	
Pacific City Oregon HDD Pilot Hole, RevD 1.dwg	0	10 Oct 2025	PGS (Edw)	NS	AS	SubCom Comments	Subcontractor	Maritech International Ltd	
Pacific City Oregon HDD Pilot Hole, RevC 1.dwg	0.1	30 Sep 2025	PGS (Edw)	NS	AS	Minor editing	Maritech International Ltd	SUBCOM LLC	
Pacific City Oregon HDD Pilot Hole, RevC 1.dwg	0	30 Sep 2025	PGS (Edw)	NS	AS	Minor editing	Maritech International Ltd	SUBCOM LLC	
Pacific City Oregon HDD Pilot Hole, RevB 1.dwg	0	30 Sep 2025	PGS (Edw)	NS	AS	Minor editing	Maritech International Ltd	SUBCOM LLC	
Pacific City Oregon HDD Pilot Hole, RevA 1.dwg	0	30 Sep 2025	PGS (Edw)	NS	AS	Minor editing	Maritech International Ltd	SUBCOM LLC	
Rev Drawing	Revision	Date	Prepared by	Checked by	Approved by	Issue for	SUBCOM LLC		