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**Progress Report – 1 Dec 2015 – 31 Dec 2015**

Contract Number: HSHQDC-06-D-00022

Contract Number 7500097279

Order Number: HSCG23-07-J-TED150

Task Order – Performance Work Statement (PWS) 1.12

Attachments: (1) SAROPS subcontractor financial reports

1. **I am still overhauling the SimLand code, but it appears as if I have a good scheme now. There have been several attempts and, as each has been implemented, flaws have appeared and better ones thought of. I feel as if I own at least a summary of the scheme I am finishing up now. The main problem is SimLand and its basic challenge is the storage of millions of edges and hundreds of thousands of polygons in such a way that crossings can be detected, and both is-it-in and closest-edge are fast. N-squared algorithms are impractical with these sizes. The approach that I’m taking has to be simple enough so that it has a chance of working and being maintained; buckets of complex code are not practical.  
    The main idea is to use surrounding lat/lng boxes to eliminate vast sub-collections of the edges under consideration. Care must be taken here; if we use a single lat/lng box for (e.g.) the North America polygon, we won’t be able to eliminate much since that lat/lng box is huge, even relative to the size of the polygon. Same with Asia. For example, since the lat/lng box for North America does indeed intersect the lat/lng box of South America (but not Asia’s), we cannot say that N/A’s edges and S/A’s edges don’t intersect simply by considering their lat/lng boxes. Hence, N/A and S/A have to broken into smaller collections of edges so that only one or two of these sub-collections from N/A have to be checked against 1 or 2 of S/A’s subcollections. Defining these sub-collections intelligently is what has hung me up, but I do think that I’m on my way out. At the risk of sounding like Robert McNamara, I do think that I see the light at the end of the tunnel. I wish I had been able to better estimate the length of the tunnel when I started into it.**
2. **Finished installers for elliptical areas. These can be points along a voyage or simply LKPs.**
3. **Related to this is that I have finishd exporting the code that computes ellipses from LOBs. Jim is successfully calling the resulting C++ library that I am writing. He gets the same ellipse from C++ that I produce from an LOB scenario. The end effect of this is that the ellipse can be computed and displayed before an LOB scenario is run, and then we don’t need the LOB scenario at all; because elliptical LKPs are now available, one can simply give SIM that instead. Of course, there is still the problem of what to do with inconsistent LOB data. The old way of doing things is to simply keep the LOBs. The C++ routine does identify which if any LOBs are being discarded when the ellipse is computed, and if no ellipse can be computed, it returns that information as well. In that case, the LOBs would be passed to SIM as before.**
4. **Wrote code that allows manipulation of ESS parameters and makes a graph. This is an analysis tool; Certain user inputs (e.g., air and water temperature) are manipulated in text boxes, other text boxes display intermediate calculations, and are updated, and the resulting LRC is also graphed. This is based on a constant spreadsheet that is part of the data that the program reads in, and this spreadsheet is invisible and not modifiable within this little program.**
5. **Discussed circular inclusion/exclusion regions with Art Allen, and came up with a scheme to deal with varying unknown antenna heights aboard the missing vessel.**

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| **Name** | **Activity Worked** | **Hours Worked** | **Hourly Cost** | **Total Cost** |
| Kratzke | Coding/Doc/Travel | 176 | 282 | 49632 |
| Vergamini | Coding/Doc/Travel |  |  |  |
| Stone | Doc | 0 | 223 | 0 |
| L White (Tech Writer) |  | 0 |  | 0 |
|  |  |  |  |  |
| **Totals** |  | 118 |  | 49632 |
|  |  |  |  |  |