Scandia/North Cape Monitoring: SSC Update 2/10/96
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As of February 5, 1996, EPA I has collected and reported to me data on TPH concentrations in 138 samples of water, 11 samples of sediment and 6 of clams from ocean, coastal, pond and lobster tank sampling. The period of sampling so far available is from January 21 through January 28, 1996 (spill days 2 through 9). No data have been received from samples taken since then and I have no record of anything after 1/28.

All data and available supporting information were entered into a master spread sheet. Attempts were made to resolve questionable information (sampling locations, dates, depths, detection limits, etc) with only partial success so far. A lot of supporting data apparently remains with the collecting agencies and has not been collected by EPA 1.

At least 3 agencies (EPA I, EPA-N, DOI, U Conn) collected samples or made fluorescence measurements, each focusing, by plan or otherwise, on a different region or area.

Overview

Water TPH data were sorted and analyzed by location, time period and to the extent possible, sampling depth, to get an idea of the geographical and temporal distribution of the oil. This resulted in data set modules containing from 1 to 16 samples.

Figures 1 and 2 present an overview of mean (average) TPH concentrations among various areas and time periods. The means are arrayed approximately east (right) to west (left) so that one can see how oil concentrations varied with distance from the spill site at Moonstone Beach. Area-mean concentrations ranged from <0.1 ppm (detection limit) to over 4.0 ppm. The highest individual value encountered was 6.0 ppm 0.5 Mi east of the barge on 1/21/96 (data not shown). Generally, concentrations decreased with distance from the spill site and over time (see below).

Geographical Distribution of Oil

The best data marking the spill epicenter is the highest peak on these graphs: this (about 4.2 ppm) is the mean of 5 samples taken aboard the URI Cap'n Bert 1/21/96 (spill day 2) along a transect parallel to and 0.5 Mi offshore of the coast and extending 1 to 2 miles east and west of the barge. The mean includes a concentration observed within 0.5 Mi of the barge.

As one moves away from the spill area TPH concentrations decreased offshore and into the ponds. Two additional along-shore transects taken the same day at 1.0 Mi ( about 1.5 ppm) and 2.0 Mi (about 1.8 ppm) offshore, indicated that the barge oil was generally present at ppm levels throughout the 5 x 2 mile grid area. Oil blew into adjacent Trustom Pond, contaminating it to an extent similiar to that found 1-2 Mi offshore of the spill site. Concentrations dropped off rapidly to the west both in coastal water and in western ponds (eg Quonchonpaug and Ninigret). To the east, hover, concentrations were high through

the sampling week, especially in the Harbor of Refuge. Here, TPH concentrations actually increased (to 1.5 ppm) during mid-week before beginning a decrease to about 0.6 ppm by 1/28 (but, one sample only that date). Concentrations decreased in the channel connecting the Harbor of Refuge to Point Judith Pond and Potter Pond (which connects only to Point Judith Pond). Time series (1/22 to 1/28/96) within Point Judith Pond reflect an increase and then decrease similar to that observed in the Harbor of Refuge.

Figure 1 presents these data on a linear scale. However, background (normal concentrations of TPH) is likely to be less than the 0.1 ppm (or in some cases, 0.09 or 0.2 ppm) detection limit. The importance of this detection limit is emphasized in the semi-log plot of the same data in Figure 2. Presumably, if there was no oil from the spill, and an appropriate detection limit was used (ie, 0.01 ppm or less), this graph would show no positive data. Unfortunately, no samples from un-oiled pods have yet been analyzed at a lower detection limit so we are really in the dark in deterring how clean is clean with respect to background in the different areas.

Depth Distribution

Additional analyses (not shown here) were performed to examine depth distribution of the oil. The mean of surface and subsurface TPH concentrations in five paired samples from Point Judith Pond on 1/22 was 0.14 (sd 0.2)n and 0.27 (sd .28) ppm, respectively, suggesting higher concentrations near the bottom on that data. Mean 1/22 concentrations were also higher near the bottom in the Harbor of Refuge ( 0.9 ppm surface and 1.63 ppm near bottom, including a harbor of Refuge maximum value of 3.88 ppm). However, depth differences disappear in later sampling.

Trends

How long will the oil remain, at least above detection? MERL experiments conducted in the 1980's indicated a tank half life of 6 days for No. 2 fuel at low temperatures. If dynamics of Pond and coastal water were similar, that means concentrations would be expected to decrease by one half at approximately weekly intervals. Extrapolating from admittedly weak time series data (only a few samples by 1/28 for example), the trends apparent for the Harbor of Refuge and Point Judith Pond, seen in Figure 1, represent more like a half life of 3 or 4 days or possibly less. This should place all sites having on the order of 1 ppm on 1/22 to have 0.0625 ppm, or well below the detection limit, on 2/9/96 which was yesterday. It would be comforting to confirm this.

Other Data

Sediment samples collected 1/21/96 on the Cap'n Bert cruise, indicated concentrations on the order of 5 to 50 ppm around the barge site, but 300-400 ppm at two sites in the Harbor of Refuge. Thus the highest TPH concentrations in sediments do not necessarily match the highest concentrations in the water (which were around the spill site). It is possible the Harbor of Refuge sediments also contain petroleum hydrocrabons from other sources,

such as normal vessel and marine activity. This point should be investigated before concluding that the barge was largely responsible for contaminating those sediments.

Impounded Lobster Tanks.

Lobsters at Champlin's Seafood and other Galilee sea food establishments were exposed via intakes to contaminated Point Judith Pond water for 7 full days before they were removed to a depuration facility. One sample of Champlin's tanks was taken on 1/26 and contained 0.46 ppm, a concentration higher by a factor of 2 than samples taken on the same day in the Pond itself. Several sites sampled near Galilee in the Pond on 1/22 had concentrations of 0.29 to 0.46 ppm. Thus it appears that the impounded lobster were exposed to an oil concentration on the order of 0.4 ppm for five if not more days. I still do not have the mortality data, but undrstand that it was less than 5%, which is normal.

These data may be important in evaluating the causes and periods of mortality to ocean beach lobsters. For example, a chronic exposure (ie 7 days) to 0.4 ppm was apparently insufficient to kill adult lobster. Locations where that concentration and duration was not exceeded should not have suffered adult lobster mortality directly from the oil. This does not preclude impacts from a combination of non-lethal narcotizing (which might result in stranding if lobster are unable to withstand the vigors of storm waves and surf).

Recommendation

We are close, but not close enough, to learning the persistence of dispersed No. 2 oil is in wintertime conditions in New England. Lessons learned from this response can be enhanced greatly with additional water TPH measurements that could confirm our first-order estimate of the loss of the oil. If water sampling has not been accomplished since 1/28, one more survey this coming week could be very informative.