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March 10, 1993

VIA CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Ms. Pamela Shields
Remedial Project Manager
U.S. Environmental Protection Agency
Waste Management Division (HRS-CAN3)
JFK Federal Building
Boston, MA 02203

Re: Comments on the Proposed Plan for
Nyanza Chemical Waste Dump Site, Operable Unit III

Dear Ms. Shields:

The following comments are submitted on behalf of Rohm Tech, Inc. by Robert G. Edwards, Ph.D., Technical Consultant, Marc L. Fleischaker, Esq., and Andrew C. Cooper, Esq. The following parties join in support of these comments: AIF Realty Trust, Environmental Restoration Trust, Dr. Robert M. Lurie, MCL Corporation, Nyacol Products, Inc., Dr. Thomas L. O'Connor, and PQ Corporation.

Generally, the need to remediate the so-called Continuing Source Areas is not demonstrated in the Remedial Investigation/Risk Assessment ("RI/RA") performed by Halliburton NUS ("NUS"), nor is it convincingly supported by the resulting Feasibility Study ("FS"). We therefore urge that no remedial action beyond that presented in Alternatives 1 or 2 be undertaken. This would be consistent with the National Contingency Plan ("NCP").

Nevertheless, if EPA decides that remediation of the Areas is required, reopening of the Operable Unit I cap is still both unnecessary and undesirable, and the Eastern Wetland can be remediated satisfactorily without the disruption of dredging (using an Alternative Remedy originally rejected by NUS).

Even if that suggestion is in turn rejected by EPA, and if Alternative 11 remains the Preferred Remedy, the selected Target Cleanup Level associated with Alternative 11A is unrealistic and without adequate scientific justification, and should be replaced by a higher, more cost-effective and more achievable Target Cleanup Level such as that presented for Alternative 11C.

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Finally, the longer-term goal of Operable Unit IV, namely, dredging of the Sudbury River after further studies, would inevitably be extremely costly, and is scientifically and fiscally insupportable.

(A) Remediation of Continuing Source Areas

The various remedial Alternatives presented by NUS in the FS and selected by them for further consideration, and the various cleanup goals associated with them, are summarized in the Proposed Plan. The designs and goals of these Alternatives are, of course, derived from the information presented in the RI and the conclusions drawn in the RA, particularly with regard to site-derived mercury contamination; we shall therefore concentrate on mercury contamination in the following discussions. It should be stressed, however, that there is a bias in the way that key data are presented in the RI, making the mercury contamination appear more severe than it is, and thereby exaggerating the need for further remedial action. This bias is carried through into the RA, where some or many conclusions appear facile, simplistic, unscientific or generally misleading and selective.

As a starting point, NUS states on p. 4-1 of the RI/RA that "of [the Site-related contaminants], only mercury (and associated methylmercury) is considered unique to the Nyanza Site discharges." However, this statement is directly contradicted later in the same section of the RI/RA: mercury was measured in the background area sediment samples at up to 1.59 ppm, and averaged 1.05 ppm (p. 4-59).

In its tabulation of fish contamination results (Table T-4), NUS provides values for not only the total number of samples, the number of samples in which specific contaminants were detected, the average level of contamination ("average reported"), and the maximum level of each contaminant detected, but also the "minimum" level of contamination (a meaningless quantity, since in most cases the minimum level was actually "Not Detected"), and "average detected" or "detected average". NUS states (p.4-75) that the "detected average" value of mercury in fish taken from throughout the Study Area was 2.02 ppm; the source of this value is not referenced. However, from the results in Table 4.4, "Summary of Fish Analytical Results: Fillet by Reach", for the eight different locations from which fish were taken, the so-called "detected average" of total mercury appears to be 1.52 ppm, or only 0.52 ppm above the FDA action level of 1 ppm. Even if the results for the background areas (Reach 1 and Sudbury Reservoir) are excluded, the "detected average" rises only to 1.56 ppm.

Moreover, NUS's use of "detected averages" or "Average Detected Concentrations (ADCs)" (FS, p. 1-17) introduces a considerable bias into these results: it does not take into account the fish in which no mercury contamination was detected, i.e., it presents only the average of results from the fish (161 from the entire Study Area, 145 from Reaches 2-9) in which mercury was above

analytical method detection limits. This is a completely artificial basis for exclusion of data, and the entire computation of a set of "detected averages" is not only pointless but also misleading, since it is quoted in the text.

Thus, when the entire population of fish caught for the study is included (258 in the entire Study Area, 224 for Reaches 2-9 only), the true, "reported", averages become 1.006 (rounded off to 3 significant figures as 1.01) for the entire Study Area and 1.07 for Reaches 2-9 only, both barely above the round and therefore somewhat arbitrarily chosen figure of 1 ppm selected by FDA as the action level. Also, it can be seen from these totals that over one-third of the fish sampled (36.7% in the Study Area, 35.3% in Reaches 2-9 alone) contained no detectable mercury. But without reviewing the raw data, it is not possible to ascertain what greater percentage of fish fell below the FDA action level of 1 ppm mercury. NUS did not volunteer the information for this investigation, although it referenced earlier studies showing FDA action level exceedance in only 25% of specimens sampled. However, NUS states, in highly generalized, uninformative and misleading fashion (FS, p.1-23), that:

> Maximum and/or average mercury concentrations detected in fish tissue samples collected downstream of the Nyanza site exceed the FDA Action Level for mercury in fish.
>
> The fact that . . . mercury concentrations exceed FDA Action Levels in one or more cases presented for each surface water body evaluated suggests that adverse noncarcinogenic health effects are anticipated for the sports fisherman and subsistence fisherman under the defined conditions of the exposure scenarios.

The average concentrations in individual sampling locations were actually below the FDA action level in all but two areas, namely Fairhaven Bay, where the concentration barely exceeded the action level, at 1.05 ppm, and Reservoir 2, at 2.19 ppm. By combining discussion of average concentrations (which are the only ones which should be used to calculate long-term health effects), and maximum concentrations, which are, of course, based on a single fish, NUS carefully introduces a glaring bias into the Summary, making the fish contamination situation appear more severe and more widespread than it really is. Also, by referring to downstream areas only, NUS is able to avoid mention in the Summary of the fact that the most highly contaminated fish was actually found in an upstream (background) location, Cedar Swamp Pond, which also put that area's average contamination figure above the FDA action level. NUS reports that "adverse health effects are anticipated" without providing any quantitative justification for this statement.

The RI/RA (p. 4-76 and Table 4.4) indicates that many fish contain, apart from mercury, other significant non-site-related contamination, principally:

> PCBs Arochlor 1254 and 1260, in concentrations as high as 760 ppb. Also significant was a repeat occurrence of 4,4'-DDE, 4,4'-DDD and 4,4"-DDT [i.e. the pesticide DDT and its breakdown products]. DDE was detected in over 75 percent of fish tissue samples analyzed, and concentrations ranged from detection limits to 250 ppb."

Like methylmercury, PCBs and DDT biomultiply in the food chain (RI/RA, p. 5-20). Unlike mercury and its derivatives, PCBs, DDT and its breakdown products are probable human carcinogens; hence the risk assessment required calculation of hazard quotients (HQs) for mercury, and lifetime cancer risks for PCBs and pesticides.

Although the Proposed Plan's remedial action objectives are designed solely around mercury contamination (p. 8), the Risk Assessment Summary barely mentions mercury HQs, but rather muddies the discussion by referring collectively to the Hazard Indices (HIs, sum of all the HQs) of all the Contaminants of Concern (COCs) (pp. 6-157, 6-170). Moreover, the Summary Table of Risk Results (Table 6-48, pp. 6-158 to 6-161) gives equal prominence to HQs calculated both from average fish contamination values from each site, and from maximum contamination values based on a single specimen from each site. There is, however, no scientific validity in the use of maximum contamination values for computation of HQs, and especially chronic HQs; only average values can possibly have any statistical validity in calculating the long-term contaminant exposure levels needed in order to derive the HQs. NUS's action in calculating and presenting HQs derived from single-specimen maximum contaminant levels is therefore both pointless and misleading, and has no basis in EPA's "Risk Assessment Guidance for Superfund: Human Health Evaluation Manual, Part A".

The following statements (RI/RA, pp. 6-157, 6-170; FS, p. 1-22, 1-23) are once again constructed to imply that mercury contamination is more widespread and a greater cause for concern than it really is:

> Hazard indices calculated for all COCs detected in fish tissue samples collected during the RI exceed unity in at least one of the cases presented for each surface water body evaluated. The cases presented include an evaluation of maximum and average COC concentrations....
>
> The Hazard index calculated for all COCs ranged from 1.5 (Southville Pond, average COC concentrations) to 120 (reservoir No. 2, maximum COC concentrations) when the subsistence fisherman is considered the receptor of concern. The hazard index calculated for all COCs ranged from 0.21 (Southville Pond, average COC concentrations) to 17 (reservoir No. 2, maximum COC concentrations) when the sports fisherman is considered the receptor of concern. The HQ calculated for mercury

and/or methyl mercury exceeds unity in every case that the hazard index exceeds unity.

Hazard indices calculated for fish tissue sample results from surface water bodies downstream of the Nyanza site exceed 10 in one or more cases presented.

In fact, the following is readily apparent from the Risk Summary table:

- Considering only HQs derived from average mercury contamination values, a value of 1 is only exceeded for sportfishermen in a single area, Reservoir No. 2, and then only by a very small and probably insignificant margin[1/] (HQ = 1.3 for total mercury, 1.1 for methyl mercury).

- Again considering only HQs derived from average mercury contamination values, a value of 1 is exceeded for so-called subsistence fishermen in all areas sampled, including the background areas. Although the highest mercury HQ was 9.9 for Reservoir No. 2, values of 4.0 and 3.3 were obtained for two of the background areas, Sudbury Reservoir and Cedar Swamp Creek, respectively.

There appears to be no proof as to the existence of the "subsistence fishermen", and there has even been public comment to the contrary (see later discussion). For this reason, discussion of HQs for the "subsistence fisherman" scenario is irrelevant.

The Risk Summary indicates that other, non-site-related COCs (pesticides, PCBs, metals) "contribute significantly to the carcinogenic and noncarcinogenic risks estimated for some of the river reaches and surface water bodies evaluated" (p. 6-157). Based once again on average contamination values, cancer risks from these contaminants (where detected) for the fish-ingestion exposure scenarios are as high as 3.0 E-04 (3 in 10,000) and 4.0 E-05 (4 in 100,000) for subsistence and

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1/ The HQ represents the ratio between estimated contaminant exposure dose, in milligrams per kilogram of body weight per day, and a contaminant-specific reference dose (RfD). If this ratio, i.e. the HQ, exceeds 1, there may be a potential health risk associated with exposure to the contaminant. However, an RfD is only "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime" (p. 6-38). The RfD used by NUS has an uncertainty factor of 10 for methyl mercury (p. 6-34).

sportfishermen, respectively, in the background areas (Sudbury Reservoir, Table 6-11, p. 6-69), and 1.3 E-03 (1.3 in 1000) and 1.8 E-04 (1.8 in 10,000) in the downstream areas (Fairhaven Bay, Table 6-43, p. 6-146). There is no specific discussion of non-site-related excess lifetime cancer risks in the Risk Assessment Summary, except to state that:

> In all cases presented, risks associated with "other Sudbury River contaminants" exceed those estimated for Nyanza Site contaminants. (RI/RA, p.6-171; FS, p. 1-24)

While there is appreciable discussion in the Summary about HQs and HIs which are greater than unity specifically aimed at site-derived mercury, there is no discussion of the significance of these non-site-related excess lifetime cancer risks, which would not be reduced by further on-site remediation. This is especially surprising, since in the case of Fairhaven Bay, for example, they are more than 2 and 3 orders of magnitude (for sport and subsistence fishermen, respectively), greater than EPA's current level for concern of 1 in 1,000,000, and cannot be regarded as acceptable exposure risks in terms of the NCP. 40 C.F.R. §300.430 (e)(2)(i)(A)(2). Further remediation of the Nyanza site would have no effect on this cancer risk, and the supposed protection of the subsistence fishermen would, therefore, be illusory.

SELECTION OF PREFERRED ALTERNATIVE

The FS described thirteen Alternatives for remediation of the so-called Continuing Source Areas. Of these, seven were rejected by NUS, leaving six for consideration by EPA for selection for the Proposed Plan. We have returned to the FS in order to judge the merits of all thirteen Alternatives in the context of consistency with the NCP.

(a) The case for no remedial action.

The general goals of the remedial action plan as set forth in the FS and the Proposed Plan address only contamination caused by elemental mercury from the Nyanza site, and appear to be as follows: (i) to remove unacceptable health risks from accidental ingestion of, or dermal contact with, contaminated sediments in the Continuing Source Areas (the Sudbury River itself being too deep for such ingestion or contact to occur), (ii) to protect sportfishermen from adverse health effects from ingestion of contaminated fish, (iii) to protect subsistence fishermen from similar adverse health effects, and, (iv) to prevent an increase in the contamination of the Sudbury River caused by an influx of contaminated sediment from the Continuing Source Areas.

The FS concluded that reduction of mercury contamination in the Continuing Source Areas to 30 mg/kg of sediment would offer sufficient protection against health risks resulting from accidental ingestion or dermal contact. However, the following are the "reported average" mercury contamination levels in mg/kg in the Continuing Source Areas: Eastern Wetlands, 36; Outfall Creek, 36; Raceway, <1; lower Raceway and Trolley Brook, not measured (RI/RA, Table 4.1). The data in the RA (Table 6-17A "Risk Assessment Results for Sediment Exposure Scenarios: Eastern Wetlands", p. 6-81), clearly show no significant risk from either dermal contact nor from accidental ingestion, even at these current contamination levels. However, NUS would have us believe otherwise; in the RA Summary (p.6-171) and the FS (p. 1-24), they state:

> With few exceptions, hazard quotients and hazard indices calculated for the recreational sediment exposure scenarios do not exceed unity. However, hazard indices calculated for the COC concentrations detected in the Eastern Wetlands sediments (recreational exposure scenarios) exceed unity when maximum contaminant concentrations are evaluated and a small child is considered the receptor of concern. (In this case, the hazard index calculated for chemicals affecting the kidney and/or central nervous system equals unity (>0.95).)

This paragraph is misleading or inaccurate in several ways; if taken at face value, it could certainly affect the decision on whether the continuing Source Areas require remediation. Specifically:

(i) The use of maximum contamination results to calculate HQs, and the summation of those HQs to obtain the HI, is without any scientific validity, and even discussion of them in the text is misleading. NUS is taking the result from a single sample, i.e., a single data point (that with the maximum value for a particular parameter), and extrapolating it over many events and several years in order to calculate long-term exposure. To compound this insupportable process, they then sum the risk factors (the HQs) thus obtained, even though maximum values for different parameters may well have been obtained from different samples. They themselves refer to "the difficulty posed by discussing individual data points; a discussion of data groups better represents distribution of contaminants." (RI/RA, p. 4-75.) This process of using maximum concentration values is also contrary to EPA Guidelines, which define the value for exposure concentration which should be used in the calculation of risk as follows:

> **Exposure concentration.** The concentration term in the intake equation is the arithmetic average of the concentration that is contacted over the exposure period. Although this concentration

does not reflect the maximum concentration that could be contacted at any one time, it is regarded as a reasonable estimate of the concentration likely to be contacted over time. This is because in most situations, assuming long-term contact with the maximum concentration is not reasonable.

(EPA: "Risk Assessment Guidance for Superfund. Human Health Evaluation Manual Part A, §6.4.1.) (Emphasis added.)

(ii) Since the risk for no single organ exceeds unity, and since HQs should be summed according to the target organ affected (RI/RA, p. 6-62), referring in general terms to a non-organ-specific HI value that exceeds unity is irrelevant and misleading. (The highest HQ obtained is 0.93 (for total mercury), and the highest non-organ-specific HI is 1.1, an insignificant margin above unity, and one that includes non-site-related contaminants. The risk summary, as quoted above, merely reports that it "exceeds unity", leaving the reader with the impression that there might actually be a risk of some significance.)

(iii) When NUS employs average contamination results in the calculation of risk, the highest HQ obtained, for mercury, is 0.22 (accidental ingestion of sediment by a child) and the highest HI for all COCs (both site-related and non-site-related) is 0.28, for the same category. Both are obviously well below unity.

(iv) The final statement that "the hazard index...equals unity (>.95)" is another, minor but clumsy, distortion. It is repeated in the more detailed discussion of Eastern Wetland risks (RI/RA, pp. 6-80 to 6-88), which presented this organ-specific HI value as "unity (=0.95)" [sic] by summation of maximum exposure risks for both the central nervous system and kidney, for both the accidental ingestion and dermal contact routes. The Eastern Wetland discussion continued: "the [HI] calculated for the Nyanza Site contaminants detected in the Eastern Wetlands clearly exceeds that calculated for other Sudbury River contaminants." Nevertheless, these values are still clearly less than unity, however small the margin. Once again, NUS, in subtle ways, appears to be implying the presence of a risk when none is there.

In a discussion of the bordering wetlands in the previous paragraph (RI/RA, p. 6-171; FS, p. 1-24), NUS states that "adverse noncarcinogenic health effects are anticipated when HQs or HIs (calculated on a target organ specific basis) exceed unity". This is somewhat of a distortion; EPA's Risk Assessment Guidance Manual states:

> The [HQ] assumes that there is a level of exposure (i.e., RfD) below which it is unlikely for even sensitive populations to experience adverse health effects. If the exposure level (e) exceeds this threshold (i.e., if E/RfD [HQ] exceeds unity), there may be concern for potential noncancer effects. As a rule, the greater the value of E/RfD above unity, the greater the level of concern. (Emphasis added.)

This is not the same as saying that "adverse ...health effects are anticipated".

NUS concedes that the exposure dose assumptions made in the exposure scenarios are "conservative in nature" (RI/RA, p. 6-174). For a small (33 lb) child in the recreational scenario, for example, that would involve swimming or wading in the Continuing Source Areas for 2 hours/day, 50 days per year, of which one-third would be swimming and two-thirds would be wading (RI/RA, p. 6-54 to 6-58). The sediment ingestion rate is assumed to be the same whether swimming or wading. Even if the arguments presented above against NUS's perception of a recreational exposure risk in the Continuing Source Areas are ignored, it is hard to believe that there is not sufficient conservatism built into these exposure dose assumptions to allow for an extremely modest increase in the "protective" contamination ceiling from NUS's 30 mg/kg to something above 36 mg/kg, and thereby once more render unnecessary any remediation of the Continuing Source Areas in order to protect against accidental dermal contact with or ingestion of sediments. All that this would require would be a reduction in the exposure frequency, in this particular example, to 40 days per year, or the daily exposure time to 1 hour 35 minutes. (The patent absurdity of assuming such long-term, presumably adult-supervised, voluntary recreation by a small child in the Continuing Source Areas need not be addressed if this small concession could be agreed upon.)

It should also be stressed that the values of the HQs for total mercury, and therefore the values of the HIs for each sampling location, are dependent upon the RfD value selected from the literature. NUS used the "current oral RfD (chronic) for inorganic mercury and methyl mercury" of 3×10^{-4} (RI/RA, p. 6-34) in calculating HQs and HIs. However, elemental mercury is considerably less toxic than either mercury salts (inorganic mercury) or methyl mercury (confirmed by NUS on p. 6-33), and should require a considerably lower RfD value, if available. Therefore, since the principal form of mercury contamination in all media but the fish is elemental mercury, with very little methyl mercury detected, the already low risks from ingestion of, or contact with, sediments and/or water have clearly been overestimated, probably by a wide margin. Even in the case of the most contaminated fish, at Reservoir No. 2, for example, an appreciable proportion of the total mercury remains elemental and unmethylated. In this case, therefore, the risk to fishermen has also been exaggerated.

Thus there is nothing in the results of the resident exposure scenario which would warrant the on-site remediation called for in the Proposed Plan.

Since the Continuing Source Areas themselves are not populated by fish, and therefore cannot be perceived as a direct food-chain threat to either humans or fish-eating predators, the level of protection chosen for sportfishermen (7 mg/kg mercury in sediment) was that calculated as being required for fishing activities in the Sudbury River itself. However, as discussed at the beginning of this letter, the data in the RI/RA show that the average mercury contamination in both the entire study area and the downstream area exceeds the FDA action level almost imperceptibly, and the difference between them is probably statistically insignificant. The highest HQ for mercury for the sportfisherman exposure scenario, at 1.3 (reservoir No. 2), is of similar statistical insignificance, especially considering the imprecision and margin of uncertainty with which the reference dose is selected, and the conservative parameters selected for the scenario itself.[2/] Possibly more significant, and not really addressed in either the FS or the Proposed Plan, is the residual cancer risk from non-site-related contaminants such as PCBs and chlorinated pesticides. As discussed above, the cancer risk for fish from Fairhaven Bay, for example, for the sportfisherman scenario is 1.8 in 10,000 (1 in 5550), which could be a greater concern than the very small toxicity risk, and which would remain totally unaffected by any remedial efforts at the Nyanza site.

The whole concept of subsistence fishermen[3/] is discussed later in this letter, in sections (A)(c)(ii) and (B). Suffice it to say at this point that the entire existence of this group of sensitive receptors is completely unproven, and, moreover, local residents have made public statements that "the same people are never seen twice". (It is far from proven that they exist, and the expenditure of many millions of dollars in public funds in an effort to protect such an elusive group would not be consistent with the National Contingency Plan.) Although the highest HQ for mercury for this group was calculated to be 9.9 at Reservoir No. 2, other relatively high values were obtained in areas not impacted by Nyanza, namely Sudbury Reservoir (4.0) and Cedar Swamp Pond (3.3). Moreover, cancer risks from non-site-related contaminants, which once again would remain unaffected by remedial activities at Nyanza, were high (average 1.3 E-03, or 1 in 770, at Fairhaven Bay), and may well be more significant than the hazard quotients. This fact, however, was not really addressed in the FS or Proposed Plan.

[2/] Ingestion of 0.054 kg of fish per day, 350 days/year (i.e., 41.7 pounds/year) for 30 years, 25% of which comes from the Sudbury River (RI/RA, p. 6-60).

[3/] The exposure scenario for subsistence fishermen provides for a daily consumption of 0.132 kg fish per day, 350 days/year (i.e., 101.8 pounds/year), for 30 years; 75% would come from the Sudbury River. (RI/RA, p. 6-60).

Since the highest average ("reported average", not the spurious "detected average") concentration of mercury in sediment in the Continuing Source Areas was only 36 mg/kg, minor incursions from these Areas of small quantities of sediment resuspended during storm events would have no measurable adverse effect on the overall mercury contamination levels of the Sudbury River, either in the surface water (where it remains at undetectable levels) or the sediment. No evidence has been presented to the contrary. The Continuing Source Area contamination would need to be an order or orders of magnitude greater for it to cause a measurable increase in River water and sediment concentrations under these circumstances; indeed, the term "Continuing Source Areas" is a misnomer. Thus, if the River currently meets the federal Ambient Water Quality Criteria (AWQCs) for aquatic life, reported by NUS (FS, p. 2-5) to be 2.4 and 0.012 µg/l for acute and chronic levels, respectively, it will continue to meet them without further remediation of the Continuing Source Areas. It would make no scientific sense to insist that, in order to meet all state and federal ARARs, the Areas themselves (which are not a fish habitat) meet the chronic AWQC for mercury, which is 167 times lower than the drinking water MCL and MCLG of 2 µg/l. In fact, the average unfiltered mercury contamination in the surface water of the Eastern Wetland (which is not a source of drinking water) was at the drinking water MCL of 2 µg/l, and all samples of filtered water from the Wetland, together with all filtered and unfiltered water from the other Continuing Source Areas, were either well below the MCL, or were Not Detected. (RI/RA, Table 4.1.)

Nevertheless, NUS attempts to apply this AWQC to the Eastern Wetland and Outfall Creek (FS, pp. 2-21/22, 2-24). However, the NCP states that "Water quality criteria established under sections 303 or 304 of the Clean Water Act shall be attained where relevant and appropriate under the circumstances of the release." 40 C.F.R. §300.430(e)(2)(i)(E). The expenditure of an additional $13,000,000 of public funds (the excess cost of Alternative 11A over Alternatives 1 or 2) in order to meet a chronic AWQL 167 times lower than human drinking water standards for non-fish-bearing bodies of non-navigable water in an industrial area is far from being relevant and appropriate under the circumstances of the release. Thus the NCP states:

> (C) An alternative that does not meet an ARAR [in this case, the AWQC] under federal environmental or state environmental or facility siting laws may be selected under the following circumstances:
>
> * * *
>
> (6) For Fund-financed response actions only, an alternative that attains the ARAR will not provide a balance between the need for protection of human health and the environment at the site and the availability of Fund monies to respond to other sites that may present a threat to human health and the environment.

40 C.F.R. §300.430(f)(1)(ii). Moreover, NUS has stated (FS, p. 1-26) that the primary threats to aquatic life (apart from mercury) are aluminum, DDT, DDD, DDE, and bis(2-ethylhexyl)phthalate (all non-site-related); the threats to surface water-drinking birds and animals are zinc and bis(2-ethylhexyl)phthalate (also non-site-related). Extensive and costly remediation of the Continuing Source Areas would have no effect on levels of these major contaminants.

The first of the nine criteria for evaluation of remedial Alternatives under the NCP states that "Alternatives shall be assessed to determine whether they can adequately protect human health and the environment....from unacceptable risks posed by hazardous substances." It is our position that the Continuing Source Areas in their current state present no significant risk, and certainly no unacceptable risk, either to human health or to the environment, and that a combination of Alternatives 1 and 2, involving no remedial actions beyond monitoring and some institutional controls (such as the continued fishing ban and restricted on-site access), is adequately protective of human health and the environment, consistent with the NCP.[4/] The on-going risks as presented by NUS, using a blend of subtle bias, omission, selectivity and unscientific deduction, are not supported by their own hard data. Implementation of one of these alternatives would save approximately $13,000,000 in public funds, which could be put to far better use at other sites where real, significant risks to human health and the environment continue. Moreover, it would obviate continued disruption to the lives of the residents of Ashland, and would therefore be more likely than the preferred Alternative to gain community acceptance.

4/ Note also the following current EPA policy:

> If the baseline risk assessment and the comparison of exposure concentrations to chemical-specific standards indicates that there is no unacceptable risk to human health or the environment and that no remedial action is warranted, then the CERCLA Section 121 cleanup standards for selection of a Superfund remedy, including the requirement to meet applicable or relevant and appropriate requirements (ARARs), are not triggered.

(OSWER Directive 9355.0-30. Memorandum entitled "Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions", Don R. Clay, Assistant Administrator, April 22, 1991, p. 6.)

(b) The case for selection of another Alternative

Although remedial action beyond that presented for Alternatives 1 or 2 is totally unwarranted and is not consistent with the NCP, a secondary position is hereby presented in the event that the arguments against further remediation are ignored.

The Proposed Plan presents 11A as the Preferred Alternative for remedial action. This involves the selection of, among other things, the value of 1 mg/kg mercury (background) as the Target Cleanup Level. As explained in (ii)-(iv) below, this level is both unnecessarily low in terms of reasonable protection of human health and the environment, and scientifically unproven and unsupported.

The Proposed Alternative involves removal of the cap and exposure of approximately 2 acres of the Megunko Hill landfill for up to 22 months, with the dredging, dewatering and cross-site hauling of an estimated 20,206 cubic yards of sediment. The January 6 Ashland meeting revealed considerable local opposition to removal of the cap and reopening of the landfill, and it appeared that imposition of this Alternative by EPA would be against the wishes of the community. For this reason alone it is worth reconsidering other Alternatives, including those proposed and rejected by NUS in the FS prior to EPA's preliminary selection; other reasons include a need to justify the proposed expenditure of public monies in terms of benefits derived, and re-examination of NUS's stated reasons for rejection of other Alternatives.

To this end, Alternative 7, as presented in the FS, has been reexamined. This Alternative involves the dredging of Trolley Brook, Outfall Creek and Lower Raceway, as in Alternative 11; treatment of the sediment (which amounts to less than 4% of the total dredged material estimated in Alternative 11A, and about 5% of that estimated in 11B) by solvent extraction/soil washing, followed by redeposition of the decontaminated material; and construction of a sediment cover in ponded areas of the Eastern Wetland. There would be major benefits:

- The Megunko Hill landfill would remain capped and unopened (as preferred by residents), in contrast to the situation in Alternative 11.
- Dredging would be reduced to 4% or 5% of that required in Alternative 11, considerably reducing heavy vehicular traffic on and around the site, and thereby reducing both the probability of additional contamination and also the danger and nuisance to local residents.
- While the cost of solvent extraction/soil washing of more than 20,000 cubic yards of material caused Alternative 3A to be rejected in favor of 11A, the

additional cost of treating only a small fraction of that material (570-750 cubic yards) would be relatively minor.[5]

- The total destruction of the Wetland as it currently exists, necessitated by Alternative 11, would be avoided. Instead, two feet of cover (silt, sand, gravel and/or topsoil) would be applied, thus preventing direct human contact with the contaminated sediments, preventing migration of the contaminants (and thereby ending the status of the Wetland as a Continuing Source of river contamination), but retaining its function as a wetland.

- The process should be completed in considerably less than the 22 months proposed for Alternative 11.

- While NUS did not cost out in the FS the Alternatives it rejected, it is clear from the above that the selection of Alternative 7 would save millions of dollars from the estimated costs of Alternative 11A. As such, it would demonstrate considerable fiduciary responsibility in the appropriate disposition of Superfund (taxpayer) monies, especially when balanced against the need for the same funds at many other sites, and at a time of greatly increased scrutiny of all public expenditures.

NUS dismissed Alternative 7 on the grounds that the "long term ability of the cover system [in the ponded areas of the Eastern Wetland] to effectively contain contaminated sediment" was "questionable". Reading NUS's rationale for this conclusion, however, indicates that it not so much "questionable" (i.e. suspect) as unproven, at least in NUS's experience. That should not mean that the Alternative should not be tried. The arguments that NUS presents against this alternative appear very weak, at best: "Long-term protection would require monitoring and maintenance....Institutional controls such as fencing and signs would be necessary....The integrity of the cover can be compromised by burrowing aquatic and semi-aquatic animals." These do not justify rejection of this Alternative without further consideration.

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[5]NUS was surprisingly vague on the details of removal of mercury by this process. The specific treatment of sediment contaminated with such a unique, liquid metallic element would surely be quite different from that used for material contaminated with the more common organic pollutants or metallic salts. It has to be assumed that NUS has already researched this matter, since it provided a specific cost per pound for the unspecified treatment. However, details of the treatment should have been provided, in order to add more credibility to the Alternatives for which it was proposed, e.g., #3.

The process of applying a sediment cover has precedent under Superfund in the 1984 ROD for the Hudson River PCB Superfund Site (EPA-ID: NY980763841), the findings of which were later confirmed in the Consent Decree (Civil Action No. 90-CV-575, United States v. General Electric Company, dated 9.27.89, signed 5.11.90). Extensive PCB contamination was found in 5 exposed shoreline remnant deposits, which lay in the floodplain of the river (as does the Eastern Wetland in the case of the Sudbury River). The principal concerns were direct contact by members of the public, and direct discharge of contaminants from the shoreline to the river. The alternatives were (i) complete removal, which was deemed too costly ($12m), and involved a large number of truck trips and some adverse short-term effects; (ii) partial removal, which was still costly ($9m) and involved the same problems as (i); and (iii) in-place containment, utilizing 2 feet of cover, which, at an estimated cost of $2.95m, was the selected remedy. In the ROD, the EPA Assistant Administrator declared:

> I have determined in-place containment of the PCB-contaminated remnant deposits is a cost-effective method to effectively mitigate the most significant threats to health and the environment posed by the remnant deposits....I have determined that the action taken is appropriate when balanced against the availability of trust fund monies for use at other sites.

The same principles should be applied to the Nyanza site, and Alternative 7 should be the selected remedy. If, in the worst (and unlikely) case, the sediment cover does fail at some point, the cost to have created it will have been relatively low; moreover, while dredging might have to be reconsidered, other technical alternatives may be available by then. The opportunity to save millions of dollars and a considerable amount of time, to avoid reopening the cap, to avoid considerable, prolonged heavy vehicular traffic on- and off-site, and to meet the concerns of the local residents, more than outweighs this small risk. Moreover, this situation only applies to the Wetland: using Alternative 7, the streams will still have been remediated (probably to a greater extent than is necessary).

(c) The case for Alternative 11C

Sections (a) and (b) above present sufficient argument that Alternative 11, in any form, should not be the final selected remedy. However, should those arguments in turn be rejected, a third position is hereby presented in support of Alternative 11 but with less stringent, less disruptive and less costly cleanup goals.

(i) Establishment of Target Cleanup Level

It appears from the FS that the alternative Target Cleanup Levels (30 mg/kg,

7 mg/kg, or 1 mg/kg of mercury) were derived by NUS using simple mathematical models, are approximate, and are not supported in the technical literature (FS Executive Summary).

NUS asserts that the principal pathway for direct human exposure to contaminated sediments is from accidental ingestion or dermal contact, applicable only in areas where the water is sufficiently shallow to permit wading, as in the Eastern Wetland. Their risk assessment calculations indicate that a cleanup goal of 30 mg/kg would eliminate unacceptable risk from this pathway, leaving ingestion of contaminated fish as the only remaining threat to human health requiring consideration.

Using regression analysis, NUS then calculates the target cleanup goals for mercury-contaminated sediment which would be protective for (a) a sportfisherman and (b) a subsistence fisherman (FS, p. 2-25):

> The exposure scenario for a subsistence fisherman correlates to a sediment cleanup goal of below zero, which indicates that the regression analysis is invalid for this scenario. For the sports fisherman, the regression analysis indicates a target cleanup goal of 7 mg/kg. Background levels of mercury in sediment have been determined to be about 1 mg/kg for the Operable Unit III area. Setting a Remedial Action objective below background levels is imprudent, and not the policy of EPA. (Emphasis added.)
>
> Therefore, the sediment target cleanup goal for a subsistence fisherman is set at the background concentration of about 1 mg/kg of mercury....The use of the target cleanup goal of 7 mg/kg mercury in sediment may be protective of the sport fisherman, however, protection for the subsistence fisherman may rely on institutional controls at any Target Cleanup Level, including background.

A calculated Target Cleanup Level of less than zero is meaningless, while a level of less than background is pointless, and reveals the invalidity of the mathematical model for the "subsistence fisherman" scenario, as NUS concedes. Although there may be a scientific or mathematical basis for derivation of the alternative cleanup goals of 30 mg/kg and 7 mg/kg (but disputed in our foregoing arguments), the preferred goal of 1 mg/kg cannot be supported in this way, since its selection is totally arbitrary, and lacks logic. Although NUS does not admit it in so many words, this final figure of 1 mg/kg was basically pulled out of the air; it represents only the lowest theoretically attainable cleanup level.

Additional insight into the basic invalidity of the preferred Target Cleanup Level is presented in a letter, dated May 21, 1992, from Susan Svirsky of EPA to Ken Carr and Steve Mierzykowski of the Fish and Wildlife Service. (This letter was

included with the FS in the volume entitled "Administrative Record, Addendum I, Volume I".) Ms Svirsky writes:

> The principal issue arises in the need for a sediment clean-up level(s) for use in evaluating remedial alternatives in the FS. Back calculation from the risk assessment using literature information estimates that a clean-up level would be lower than background concentrations at the site. Part of the problem with this calculation is the highly conservative nature of the literature values available for use in the modelling of clean-up levels and the lack of site-specific data. This led the site manager to give a clean-up level of 10 mg/kg to the contractor for use in the FS out of desperation and with no basis other than do-ability.
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>
> I would like the Agency to be in a position to be able to quantify the risk reduction associated with various clean-up levels and the associated costs, so that the risk managers can see what they are buying with each remedial alternative. The current information does not allow us to even begin to do this with the amount of uncertainty imbedded in the modelling. (Emphasis added.)

"Do-ability" provides a far sounder basis for setting a minimum cleanup (maximum contaminant) level than the procedure presented by NUS.

(ii) Justification for Target Cleanup Level

The lowest of the three Target Cleanup Levels (1 mg/kg) was intended to minimize the risk to the only humans remaining exposed below the intermediate cleanup level of 7 mg/kg, namely, the hypothetical "subsistence fishermen". There appears to be absolutely no evidence of the existence of such people who, it is "conservatively" assumed in the risk assessment, fish from the same stretch of river 350 days per year, yet, according to a quote in the Public Meetings summary which accompanies the FS, have never been seen twice by local residents. Moreover, there appears to be no real tradition even of legitimate local fishing. Even when the reservoirs are restocked with trout by the Massachusetts Division of Fisheries and Wildlife, it appears to be sportfishermen rather than subsistence fishermen who are active, and the restocked fish are certainly not given much of an opportunity to bioaccumulate contaminants from the sediment. The statement in the Proposed Plan that "historically, the River has been used for sport fishing as well as a regular source of food for a population of newly emigrated inner city residents attracted by the River's bounty and accessibility" appears to be an exaggeration in the case of the sport fishing, and completely unsubstantiated in the case of subsistence fishing and river bounty. At one local meeting, several older residents publicly remarked that, even as children (i.e., many decades ago),

they had been warned never to swim or bathe in the river; under such circumstances, it is hard to believe that the river has historically been regarded as a significant source of food. Additionally, NUS reported that their fish sampling team "often did not have an abundant catch", even when armed with boat-mounted electroshocking equipment and gill nets (RI/RA, p. 2-12). They also reported that "Much of the Sudbury River is unsuitable for trout and most other sport fish...due to low dissolved oxygen levels in some areas of the River" (p. 3-18). This information hardly supports the concept of a bountiful river.

(iii) Attainment of proposed cleanup goals

Cleanup to background level (1 mg/kg elemental mercury) at such a long-contaminated site is a very different matter from cleanup to a finite level above background (e.g., 7 or 30 mg/kg), since it implies absolute, 100% removal of contamination even where that contamination may be widely dispersed. It is surprising that NUS felt that they were able to cost out this action with such precision and confidence, since removal of that last increment of contamination -- for example, the last 1 mg/kg or so above background -- would assuredly be subject to the "law of diminishing returns", and might easily involve excavating another 1 foot, 4 feet or 8 feet deeper than planned (or budgeted). At the Ashland meeting, you agreed that such a situation was indeed possible. If Alternative 11A were adopted, as in the Proposed Plan, the consequences would be a substantial cost overrun, and a significant increase in the volume of material requiring on-site disposal, even to the point of exceeding the excess capacity said to be available beneath the Megunko Hill cap (a distinct possibility for which no solution has been offered).

In order to demonstrate that the selected Target Cleanup Level met all federal and state ARARS, specifically the Clean Water Act's Ambient Water Quality Criterion (AWQC) of 0.012 µg/l for mercury, NUS attempted to find a correlation between mercury concentrations in sediment and in overlying surface water, but found only:

> a very low correlation. However, for lack of other data, the regression analysis was used to provide a rough estimate of a mercury concentration in sediment that might provide some protection from the standpoint of the AWQC. The regression analysis yielded a value of 4.5 mg/kg mercury in sediment to meet the AWQC, which may or may not relate to the concentration that would occur in the surface water. (Emphasis added.)

(FS, p. 2-24). In other words, since there was no reasonable correlation between mercury concentrations in sediment and in surface water, the target value of 4.5 mg/kg mercury in sediment proposed for achieving the AWQC is probably no better than guesswork, and is, again, scientifically insupportable.

Thus the Target Cleanup Level of 1 mg/kg is unjustified either in terms of scientific data, or in terms of a realistic estimation of the exposed population. EPA should therefore reconsider this matter, and select a Target Cleanup Level no lower than 30 mg/kg, as proposed in Alternative 11C.

(B) Further Study of Sudbury River Contamination

The Proposed Plan addresses the creation of "a Fourth Operable Unit in order to perform additional studies on sediments and fish in the Sudbury River to determine a sediment cleanup level that would lower risks to human health and the environment for River Areas. A final remedy decision will be made for River Areas based on these additional studies."

Although, in the preceding arguments, these issues have already been commented upon, it should be stressed that, in the broader context of the proposed Operable Unit IV, no cleanup goal should be envisioned which would extend beyond the protection from Nyanza-related contamination of sportfishermen who occasionally consume their catches, and it should certainly not encompass, on an unsubstantiated and completely theoretical level, protection of subsistence fishermen whose existence remains totally unproven (especially when excess lifetime cancer risks from non-site-related contaminants may be more significant than noncarcinogenic risks from mercury). Thus the ongoing studies referred to in the Proposed Plan should envision no more than protection of the sportfisherman as the ultimate goal of a remedy for the river. Major dredging of the river cannot be justified on the basis of protection of the hypothetical "subsistence fishermen". The costs involved could be enormous: at the January 6 meeting in Ashland, you mentioned an initial estimate of $0.5 to 1.5 billion of taxpayers' money, which had caused reevaluation of the original scope of OU III, and postponement of river studies to the new OU IV as a consequence. Moreover, such large-scale dredging could well be environmentally devastating, with the destruction of any overlying, relatively uncontaminated protective sedimentary layer laid down subsequent to the period of active contamination, the resuspension and widespread dispersal throughout the river of much of the contaminated sediment itself, and the need to dispose of a vast quantity of dredge spoil elsewhere. (A similar conclusion was drawn in the Record of Decision for the Hudson River PCB Superfund Site, cited above.)

Such enormously expensive activity, particularly if undertaken to create an incremental layer of protection from risk designed solely for the benefit of "subsistence fishermen", cannot possibly be justified as appropriate when balanced against the availability of Superfund monies for use at other sites. Nor can it be justified as consistent with the NCP, since the site-related risks, after close scrutiny, cannot be described as "unacceptable", whatever NUS would have us believe.

(C) Public Awareness Program

There has been much discussion, both in the Administrative Record and in the Public Meetings, concerning the "No Fishing" warning signs placed at various locations and at various times along the Sudbury River, and the fact that many signs have been either vandalized or at least not properly maintained. As a consequence, it is feared that the general public (beyond the immediate, more knowledgeable residents) is not adequately informed, and some members might endanger their health by inadvertently ignoring the fishing ban.

Compared with the cost of possible remediation of the River, the cost of an adequate and well-maintained public awareness program is very small. So long as a single government agency, whether federal or state, is given total responsibility for it, and it is seen as an on-going, rather than a one-time, effort, there is no reason why it should fail in the future, and certainly not as woefully as it has reportedly failed in the past. It should be noted that a similar fishing ban was effected in the case of the Hudson River PCB Superfund Site.

As an additional disincentive to both fishing and to vandalism of the signs, we suggest that substantial fines for both be established, and advertised on the signs themselves.

We trust that EPA will give these comments its careful consideration.

Sincerely,

Robert G. Edwards, Ph.D. Marc L. Fleischaker, Esq. Andrew C. Cooper, Esq.