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Management

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4 February 2003
Reference: 143.65

Massachusetts Department of Environmental Protection
Northeast Region
205 Lowell Street
Wilmington, MA 01887

Re: Response to Public Comments
Draft Phase IV Remedy Implementation Plan
Former Raytheon Facility
430 Boston Post Road
Wayland, Massachusetts (the "Site")
Permit No. 133939/RTN 3-13302

Dear Department Representative:

On behalf of Raytheon Company, Environmental Resources Management (ERM) has prepared this letter providing responses to comments prepared by CMG Environmental, Inc. (CMG), consultant to the Town of Wayland, and Mr. Stan Robinson regarding the Draft Phase IV Remedy Implementation Plan (RIP), dated 27 November 2002. CMG's comment letter, dated 17 December 2002, contains 15 comments concerning previous assessment activities and the Draft Phase IV RIP. An additional five comments were received on 23 December 2002 from Mr. Stan Robinson. This response letter includes relevant portions of each comment in italics and responses in plain text.

CMG's Comments

1) DIOXIN DETECTIONS IN GROUNDWATER. On October 2, 2002, ERM provided a letter re: "Wetlands Assessment Activities Update." There were several 'draft summary tables' and a Site figure attached to this letter. Of particular interest were detections of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzo-p-dibenzofurans (PCDFs) in monitoring wells MW-33S, MW-33D, MW-45S, MW-45M, MW-45D, MW-45B, MW-47S, and MW-47M (see Table 4, reproduced as RIP Table 8).

The MCP sets the RCGW-1 reportable concentration for 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) as 3×10^{-8} mg/L (equal to 30 pg/L). The MCP specifies that reportable concentrations for generic 'dioxins' are to be "expressed as equivalents of [2,3,7,8-TCDD]." They published a list of "toxic

equivalency factors" (TEFs) relative to 2,3,7,8-TCDD in 1991. The following table reproduces the listed TEFs and the corresponding RCGW-1 values derived from them.

Parameter		Toxic Equivalency Factors	RCGW-1 Reportable Concentrations (pg/L)
PCDDs:	2,3,7,8-TCDD	1	30
	1,2,3,7,8-PeCDD	0.5	60
	1,2,3,4,7,8-HxCDD	0.1	300
	1,2,3,6,7,8-HxCDD	0.1	300
	1,2,3,7,8,9-HxCDD	0.1	300
	1,2,3,4,6,7,8-HpCDD	0.1	300
	1,2,3,4,6,7,8,9-OCDD	0.001	30,000
PCDFs:	2,3,7,8-TCDF	0.1	300
	1,2,3,7,8-PeCDF	0.5	60
	2,3,4,7,8-PeCDF	0.5	60
	1,2,3,4,7,8-HxCDF	0.1	300
	1,2,3,6,7,8-HxCDF	0.1	300
	2,3,4,6,7,8-HxCDF	0.1	300
	1,2,3,7,8,9-HxCDF	0.1	300
	1,2,3,4,6,7,8-HpCDF	0.1	300
	1,2,3,4,7,8,9-HpCDF	0.1	300
	1,2,3,4,6,7,8,9-OCDF	0.001	30,000

Multiplying the individual congener identifications by the DEP TEFs yields the 2,3,7,8-TCDD toxicity equivalent summations tabulated below.

Well	Summation of Toxicity Equivalent to 2,3,7,8-TCDD
MW-33S	0.0076
MW-33D	2.4
MW-45S	0.092
MW-45M	13
MW-45D	0.12
MW-45B	0.088
MW-47S	1.8
MW-47M	1.2
MW-47D	0.024

Based on the summation of TEFs, there are no exceedances of the RCGW-1 dioxin criterion. However, the dioxin toxicity-equivalent concentration in well MW-45M is 44% of the RCGW-1 standard.

Given the extreme toxicity of PCDDs and PCDFs, Wayland requests that Raytheon provide a plan for further assessment in groundwater, soil, and (if warranted) sediment at the Site. We would also like an explanation of the source(s) of these compounds at the Site and development of a conceptual site model for how they came to be present in groundwater as deep as 92-97 feet below grade. The Town is also eager to know the results of your PCDD and

PCDF analysis of soil/sediment samples (collected on August 12, 2002). Please provide us with a written schedule for public documentation of these results.

We understand and respect the Town's concerns regarding the presence of PCDDs and PCDFs in groundwater at the Site. To date, Raytheon has collected groundwater samples for analysis of PCDDs and PCDFs from 15 wells at the Site. Analytical results for 13 of these samples were presented in the Phase IV Report. Data from the initial 13 wells sampled indicated that neither PCDDs or PCDFs have been detected in Site groundwater at concentrations exceeding applicable Massachusetts Contingency Plan (MCP, 310 CMR 40.0000) Reportable Concentrations (RCGW-1).

Since submission of the Phase IV Report, ERM collected groundwater samples from two wells (i.e., MW-TP-3 and MW-261S) in the northern portion of the Site on 7 and 8 January 2003 for analysis of PCDDs and PCDFs. Pending receipt of these analytical results and assuming that the results are consistent with previous testing (i.e., no detections at or above applicable reportable concentrations), the MCP does not require that additional assessment of Site groundwater be conducted with respect to the presence of PCDDs and PCDFs. At this time, Raytheon does not plan to conduct additional site assessment activities or develop a conceptual site model for PCDDs or PCDFs in groundwater.

With respect to the Town's request for information on potential sources of these compounds, several potential sources could have contributed to the PCDDs and PCDFs detected in Site groundwater, three of which are presented for consideration:

- Impurities associated with other organic compounds released at the Site (e.g., trichloroethene (TCE) or polychlorinated biphenyls (PCBs));
- Atmospheric deposition from the nearby former Town burn dump; or,
- Naturally occurring PCDDs and PCDFs associated with clay minerals present in overburden deposits at the Site.

The results of the wetland sediment samples for PCDDs/PCDFs are still pending.

2) INVESTIGATION OF NORTHERN AREA PLUME. On October 9, 2002, ERM provided a letter re: "Proposed Additional Assessment Activities." In this

letter, they indicated nine boring/monitoring well locations. Wayland concurs with the placement of eight of these locations (designated P-1 through P-7 and P-9). However, the Town believes that location P-8 is too far to the southwest for assessment purposes, based on the field data from this past summer. Furthermore, we recommend that Raytheon place another sample point north of previous locations B-230 and between B-226 and B-237.

At the Public Involvement Plan (PIP) meeting on December 12, 2002, Mr. Joseph Fiacco and Mr. John Drobinski of ERM informed me that you had made adjustments in the proposed boring locations based on field observations that are essentially in conformance with this comment.

We appreciate your input regarding the location of new monitoring wells in the northern portion of the site. During the initial phase of the drilling program, similar observations were made and some of the monitoring wells were relocated, as we previously discussed. Attached please find an updated site plan showing the surveyed locations of the wells installed during December 2002 in the northern portion of the Site.

3) SEPARATE DISPOSAL SITE FOR NORTHERN PORTION OF PROPERTY. On Page 2 of the RIP, ERM states that Raytheon will submit a release notification form (RNF) for the detection of chlorinated volatile organic compounds (VOCs) in groundwater within the 120-day notification period. The Town of Wayland is concerned that setting up an entirely separate 'disposal site' will significantly delay completion of response actions at the property as a whole. We request you provide a written schedule and goals for assessment of this area.

We understand the Town's concerns regarding the potential for this issue to delay other Site reponse actions. It is Raytheon's intent to comply with the MCP and its prescribed timelines to the extent feasible in assessing, remediating and closing all portions of the Site. It is Raytheon's intent to track the newly discovered release conditions independently to expedite completion of response actions for previously reported releases. Raytheon recently submitted a Phase IV Remedy Implementation Plan (RIP) to complete remedial activities to abate impacts to wetlands sediments and groundwater in the southern portion of the Site. These activities are currently scheduled for completion during 2003 and 2004, pending regulatory approvals and logistical considerations (e.g., Sudbury River below flood stage).

In an effort to proceed expeditiously in investigating the new conditions at the Site, Raytheon submitted a Release Notification Form (RNF) on 17

December 2002 including the northern portion of the Site. In addition, a Work Plan will be developed to assess the source, nature and extent of CVOC impacts to groundwater in this portion of the Site, as well as MTBE and arsenic impacts to groundwater in other portions of the Site. This Work Plan will be presented to the public and be made available for public comment during Spring 2003. Once the Work Plan is finalized, Raytheon will seek approvals of the Wayland Conservation Commission and abutting property owners necessary to complete the work.

It is important to note that the new release conditions are currently in the Preliminary Response Action phase of the MCP process (i.e., during the first year following discovery of the release). Development of the conceptual site model, a Work Plan to assess the source, nature and extent of new release conditions, and involvement of the public in that process are normally conducted as Comprehensive Response Actions (i.e., during the second or third year following discovery of the release). This acceleration of Site assessment activities demonstrates Raytheon's commitment to expedite response actions for these new conditions in an effort to complete required cleanup actions for all portions of the Site in a timely fashion.

4) GROUNDWATER FLOW DIRECTION. ERM discusses groundwater flow data on pages 16 and 17 of the RIP. While describing the apparent northerly direction of shallow overburden groundwater at the northern portion of the Site, they state that "Raytheon is committed to installing a series of additional monitoring wells in this portion of the Site" (including bedrock wells). As you are aware, the Baldwin Pond wellfield lies north of the Site.

The RIP indicates a lack of confidence in the mapped shallow overburden groundwater flow direction (Figure 4) because of the influence of well DEP-19S, a nearby intermittent stream, and a wetland. Once Raytheon has installed additional monitoring wells in this portion of the Site, Wayland expects you will re-calculate the shallow groundwater flow direction here. Because of the potential to affect water quality at the Baldwin Pond Wellfield, the Town would like Raytheon to make a written commitment to obtaining groundwater flow information for the northern portion of the Site, including a schedule for groundwater gauging and public documentation of flow data.

The Town would also like to point out that the apparent distribution of chlorinated VOC contamination in groundwater at the northern portion of the Site provides secondary evidence of an overall northwesterly groundwater flow direction.

Raytheon is in the process of reviewing data collected during December 2002 and January 2003 for the northern portion of the Site. These data will be used to more thoroughly evaluate groundwater flow directions in the northern portion of the Site. Raytheon will provide the public with updated maps and data for the northern portion of the Site as part of the Work Plan that is being developed for further characterization of CVOC impacts to groundwater in this portion of the Site. This Work Plan will be presented to the public and will be made available for public comment during Spring 2003.

5) VERTICAL GROUNDWATER FLOW COMPONENT. The summary table of vertical gradient data (October 2002) on page 19 of the RIP and the accompanying explanatory text is difficult to follow. Wayland requests that Raytheon prepare an additional figure clearly illustrating the direction and magnitude of vertical hydraulic gradients across the Site. At the December 12 PIP meeting, Mr. Fiacco informed me that ERM is in the process of developing a hydraulic flow net for the entire Site. Upon receipt of groundwater elevation data from the wells they are currently installing at the northern portion of the Site, ERM will evaluate whether they have sufficient data to publish this flow net.

Figure 7 (Deep Overburden Groundwater Elevation Map) provides contours only across the central portion of the Site. The deep overburden groundwater elevation at well cluster MW-218 is depicted as 115.25 feet, but this point lies between the mapped contours for 113 and 114 feet. At the December 12 PIP meeting, Mr. Fiacco informed me that ERM believes the data point for well MW-218 may be inaccurate.

The Town requests that Raytheon provide deep overburden groundwater contour mapping for all available points and provide us with a copy of the flow net diagrams at your earliest convenience following data validation.

Raytheon is in the process of reviewing data collected during December 2002 and January 2003 for the northern portion of the Site. These data will be used to more thoroughly evaluate deep overburden groundwater flow directions and vertical flow components in the northern portion of the Site. Raytheon will provide the public with updated maps and data for the northern portion of the Site as part of the Work Plan that is being developed for further characterization of CVOC impacts to groundwater in this portion of the Site. This Work Plan will be presented to the public and will be made available for public comment during Spring 2003.

At this time, Raytheon anticipates conducting quarterly Site-wide groundwater elevation gauging rounds starting in Spring 2003. These data will be compiled and plotted in plan view and in cross section as a flow net to more thoroughly demonstrate groundwater flow directions and vertical components of groundwater flow across the entire Site.

6) NUMERATION ERRATA. In the first and third paragraphs on page 21 of the RIP, references to Figures 6, 7a, and 7b are incorrect and should be to Figures 4, 5a, and 5b.

The groundwater summary table reference at the bottom of page 24 should be to Table 8, not Table 7.

The sediment analyses summary table reference at the bottom of page 27 should be to Table 7, not Table 8.

Raytheon appreciates your input on numeration errata. These errors have been corrected in the final Phase IV RIP document.

7) MTBE REPORTABLE CONCENTRATIONS. On page 24 of the RIP, ERM describes identifying reportable concentrations of methyl tertiary butyl ether (MTBE) in a groundwater sample collected from MW-202M. They state that "Raytheon will submit a RNF for this condition within the required timeframe." Wayland requests that Raytheon make a written commitment to a schedule for assessing (and if necessary, remediating) this condition as well as making the required DEP notification.

As noted in the response to comment #3, Raytheon filed a RNF with the Department reporting the detection of MTBE in groundwater at a concentration above the applicable Reportable Concentration (RCGW-1) on 17 December 2002. The timeline for investigating this release condition will be consistent with that presented in the response to comment #3.

8) ARSENIC IN UPLAND SOIL SAMPLE. On page 26 of the RIP, ERM indicates an exceedance of the RCS-1 value for arsenic in soil. Unlike previous reportable concentration identifications, ERM makes no comment regarding whether Raytheon will report this condition to DEP. The Town requests that Raytheon commit in writing to properly notify DEP of this apparently localized condition and assess (and if necessary, remediate) it, or alternatively, conduct a Limited Removal Action to address arsenic contamination.

In response to this comment, ERM modified the final Phase IV RIP report on page 26 to more clearly state our position on the need to report the detection of arsenic in one soil sample at a concentration above the applicable Reportable Concentration (RCS-1) as follows: "Based on the data collected to date, it is ERM's opinion that arsenic in soil does not constitute a reportable condition, pursuant to 310 CMR 40.0317(14)."

ERM's opinion is based on the fact that a total of 12 soil samples were initially collected from the upland area immediately east of the wetlands for analysis of arsenic. Of these samples, one (B-312) reportedly contained arsenic at a concentration of 36 milligrams per kilogram (mg/kg), which exceeded the applicable Reportable Concentration (RCS-1) of 30 mg/kg. Arsenic concentrations in the other 11 samples ranged from 5.1 mg/kg to 6.4 mg/kg. Three additional soil samples (B-316 through B-318) were collected in close proximity to B-312 to evaluate the repeatability of the regulatory exceedance detected at that location. Arsenic concentrations in these three samples ranged from 5.1 mg/kg to 6.0 mg/kg, consistent with the majority of soil samples collected in this portion of the Site. Pursuant to 310 CMR 40.0317(14), "releases of oil and/or hazardous material that require notification solely because an RP, PRP or Other Person obtains knowledge of media concentrations and/or site conditions that meet one or more of the sets of criteria set forth in 310 CMR 40.0311 through 310 CMR 40.0315, when such media concentration value(s) and/or knowledge of site conditions resulted from a sampling, analytical or observational error, as established by a preponderance of the evidence and/or as verified by additional sampling, analyses, and/or observation, within the applicable time period for notification." At this time, it is ERM's opinion that the preponderance of evidence indicates that a reportable condition for arsenic in soil does not exist at the Site.

9) ARSENIC IN WETLANDS SEDIMENT. On page 27 of the RIP, ERM notes arsenic in wetlands sediment samples at concentrations up to 160 mg/Kg, but makes no statement regarding notification or remediation of this contamination. Wayland requests that Raytheon commit in writing to properly notify DEP of this condition (if not already done) and incorporate remediation of arsenic-contaminated sediment into the wetlands remediation as appropriate.

Review of arsenic information in previous ERM reports indicates that 11 of the over 100 sediment samples analyzed for metals at the Site exhibit greater than 30 mg/Kg arsenic (the RCS-1 and RCS-2 criterion). Six of these are in the areas slated for wetlands remediation. However, the other five samples include the two

with the highest arsenic detected in Site sediments (160 mg/Kg at 0-6" in T-3-1 and 150 mg/Kg at 0-6" in T-5-A).

Raytheon understands the Towns concerns regarding arsenic detected in wetland sediment. Please note that Raytheon has previously notified the DEP of releases of metals to wetland sediment. Raytheon's proposed wetland restoration plan ensures remediation of sediment quality such that remaining levels are protective of human health and the environment.

10) ARSENIC IN GROUNDWATER. Also on page 27 of the RIP, ERM also notes RCGW-1 exceedances of arsenic in groundwater samples collected from monitoring wells 313S, 313D, 314D, 315S, and 315D, and states that "Raytheon will submit a RNF for this condition within the required timeframe." The Town requests that Raytheon make a written commitment to a schedule for assessing (and if necessary, remediating) this condition as well as making the required DEP notification.

As noted in the response to comment #3, Raytheon filed a RNF with the Department reporting the detection of arsenic in groundwater at concentrations above the applicable RCGW-1 on 17 December 2002. The timeline for investigating this release condition will be consistent with that presented in the response to comment #3.

11) EROSION CONTROLS. In the Erosion Control section on page 39 of the RIP, ERM describes the controls "along the perimeter of the targeted remedial area." Please clarify whether this includes the estimated 2,000-square foot area targeted for manual remediation near transect 10. If not, the Town requests that Raytheon provide for adequate erosion controls in this area, and provide a written description of what form you plan these controls to take.

Erosion control measures will be implemented for any area where manual remediation is required. The erosion control section will be updated appropriately.

12) PROPOSED WETLAND SAMPLING PROTOCOL. The Statistical Analysis Procedures discussion on page 53 of the RIP envisions grouping quadrants of closure sampling data if PCB distributions exhibit high variability. While this will lower the statistical variability of PCB data, Wayland questions whether this is the right approach; if the data are highly variable, then the Town opines that it may be inappropriate to use this data for closure purposes – it may indicate that additional remediation is indicated. Grouping the data as ERM

suggests would eliminate information necessary to select locations for 'spot remediation' if warranted.

Wayland had previously criticized the proposed wetlands sampling plan specifically because it does not provide sufficient assurance that that it would identify individual 'hot spot' locations for targeted second-round remediation. The post-excavation sampling plan presented in the RIP does not respond to this previous criticism. At the risk of repeating ourselves, the Town requests that Raytheon not composite samples from the excavation perimeter, so that discrete analyses can identify locations where minimal additional remediation can have a strong effect on overall residual concentrations of PCBs and other contaminants of concern. Alternatively, Raytheon might conduct additional pre-excavation characterization within 10-50 feet of the proposed limits of excavation, to determine the optimal remediation area.

At the December 12 PIP meeting, Mr. Drobinski informed the public that Raytheon will collect single-point perimeter samples for PCB analysis following sediment removal. If the results of these analyses exceed a risk-based threshold value (not yet determined), Raytheon will conduct iterative additional sediment removal and re-sampling until the perimeter samples all meet the threshold criteria. Wayland requests that Raytheon express this modification to the remediation plan in writing, and provide the Town with a properly documented calculation of the putative risk-based threshold value.

There are approximately 165 grids to be sampled in the targeted remedial area. Each grid is 20' by 20'. There are nine sample locations within each grid that are composited to determine the average concentration of that 400 square foot area. A total of approximately 165 samples will be used to determine the average residual concentration of the targeted remedial area. This is a significant number of samples to determine if a 1.6 acre area has met its cleanup goal. If individual locations were sampled the number of analysis would approach 1,500, which is not appropriate.

This is a risk-based disposal plan and potential risk is calculated using average concentrations over space and time for wetland soil/sediment. Therefore ERM believes that this sampling approach is appropriate for this Site. At the Town's request perimeter sampling around the area targeted for remediation will be used to ensure that, after removal of soils and replacement by clean fill, clean up goals are met. These clean up goals are stated on page 33 of the Phase IV RIP.

13) AREA OF PROPOSED WETLAND REMEDIATION. Wayland also previously requested that Raytheon provide written documentation to the public of an iterative approach to determining the optimal remediation area based on anticipated average residual PCB concentrations. ERM's September 26, 2002 Draft Application for Risk-Based Disposal Approval provided three remediation scenarios (ARAH only, the 'expanded ARAH,' and the area needed to achieve background), although Raytheon informed us at the last PIP meeting that you had considered "several" wetlands remediation scenarios. It seems to the Town that incorporation of a small additional area into the remediation plans (namely along transect 8 from T-8-1 to T-8-3, along transect 10 from T-10-9 to T-10-12, and isolated remediation in the vicinity of T-12-8) would eliminate nearly all the areas that exhibit elevated PCB concentrations at relatively little incremental cost.

We have analyzed an additional scenario (Scenario 2-B) to consider the net environmental benefits of removal of the area targeted for remediation plus all additional sample locations with PCB concentrations above 4.70 ppm.

The table below shows the Net Environmental Benefit Analysis (NEBA) estimates for all the scenarios including a breakdown of staging, access and disturbance zone costs associated with each.

Environmental Benefits and Costs of Removal (DSAYs)						
Scenario	Description	Benefits	Removal Costs	Staging & Access	Environmental Total Costs	Environmental Net Benefits
1	Stunted Growth	7.95	0.05	3.22	3.27	4.68
2	Area To Be Remediated	10.36	0.01	0.67	0.68	9.69
2-A	HQs > 5	2.02	0.06	5.79	5.84	-3.82
2-B	Area with PCBs ≥ 4.7	0	0.01	1.33	1.34	-1.34
3	Area with PCBs ≥ 2.0	0	0.01	19.26	19.27	-19.27

Note – Summing errors exist due to rounding

The scenarios specify target areas that are incremental. Thus, Scenario 2 considers the additional area, beyond the area of stunted growth, incorporated in the Area Targeted for Remediation. Scenarios 2-A, 2-B and 3 are all incremental to the Area Targeted for Remediation.

The results show that active remediation of the area of stunted growth in Scenario I result in a present value of benefits equal to 7.95 Discounted Service Acre Years (DSAYs). The present value of the environmental costs are 3.27 DSAYs. Therefore, remediation of the target area in Scenario 1 generates a net environmental benefit of 4.68 DSAYs. Further, remediation of the target area in Scenario 2 also generates positive net environmental benefits. Combined, the NEBA results show that, active remediation of the Area Targeted for Remediation generates net environmental benefits equal to 14.4 DSAYs, equivalent to creation of about 2 acres of new wetlands. Remediation of the area outlined in Scenario 2-A results in net environmental benefits of minus 3.82 DSAYs.

Additional remediation to remove locations with PCB concentrations above 2.0 ppm or 4.7 ppm results in net environmental losses. The target areas for Scenarios 2-B and 3 are comprised of areas in Zones 3, 4, and 5. In these zones, no effect of metals on plant productivity is seen. Moreover, the ecological risk characterization demonstrated no risk of food service reductions outside of Zones 1 and 2. These considerations imply no loss of services in this area. Therefore, there are no environmental benefits to be gained from remediation of these areas. The net environmental benefits from remediation of the target areas under Scenario 2-B and 3 are minus 1.34 DSAYs and minus 19.27 DSAYs respectively.

Again, for convenience, in the final NEBA, the five scenarios presented and discussed above will be labeled Scenarios 1 through 5. For instance, Scenario 2-A will be labeled Scenario 3, Scenario 2-B will be labeled Scenario 4 etc.

Furthermore, it seems premature for Raytheon to finalize wetlands remediation plans until you have received the results of dioxin analysis of wetlands sediments. If testing identifies significant levels of dioxin (as evidenced by 10% of the RCS-1 reportable concentration for summed TEFs or greater), then Wayland requests that Raytheon revise your environmental risk assessment (and human health risk assessment in the wetlands portion of the Site) incorporating this data.

The environmental and human health risk assessment will be revised appropriately if significant levels of dioxin are detetected in wetland sediment based on sediment screening criteria.

14) PFLAI REMEDIATION. On page 61 of the RIP, ERM stated that they conducted pilot testing of pneumatic fracturing and liquid atomized injection (PFLAI) using permanganate solution at only 50% of the pressure capability of this technique, which gave an apparent radius of influence of 20 feet. They then assert that they could achieve a 40-foot radius of influence at maximum pressure. Aside from safety concerns about operating high-pressure equipment at full capacity, Wayland believes there is a mathematical error in ERM's estimation. PFLAI affects a spheroidal volume; doubling the pressure would double this volume, resulting in a radius increase by a factor of the cube root of 2 (approximately 1.26). Therefore, doubling the pressure would only increase the radius of influence to about 25 feet. There are no doubt additional complicating factors such as the actual shape of the affected pore volume, anisotropy in hydraulic permeability, and frictional losses.

The Town requests that if Raytheon is considering increasing the pressure involved in PFLAI, that you present your calculations to support your estimated radius of influence increase, and document proposed field techniques to verify these results.

Raytheon agrees with the Town's comment regarding the increase in radius of influence affected by doubling the injection pressure. At this point in time, ERM believes that the radius of influence created by pressure injection of permanganate will likely be geology dependent and will therefore, vary in different portions of the Site. In response to the Town's comment and in recognition of the variability in potential radii of influence across the Site, ERM has removed references to projected radii of influence from the RIP. Additional information/results will be documented in upcoming RAM Status Reports.

15) RIP OMISSIONS. ERM has done a comprehensive job in preparing the draft RIP to address most of the requirements of 310 CMR 40.0874(3). However, our initial review did not identify any portion of this report that satisfies the requirements of:

- *40.0874(3)(b)6.b. – [expected treatment, destruction, immobilization, or containment efficiencies and documentation of how that degree of effectiveness was determined],*
- *40.0874(3)(g) – [a discussion of any property access issues which are relevant to the implementation of the comprehensive Remedial*

Action, and a plan and timetable for resolving property access problems, as appropriate].

Wayland requests that Raytheon address these items in conformance with DEP regulations. If there are sections of the RIP that do so, please bring these to our attention. We thank you for providing us with the CD-ROM version of the RIP appendices, which includes the requisite health and safety plan pursuant to 310 CMR 40.0874(3)(e). Pending the outcome of dioxin testing of wetland sediments, you may wish to incorporate health and safety protocols for these contaminants of concern during future remediation activities.

Raytheon appreciates the Town's detailed review of the RIP with respect to MCP requirements. With respect to compliance with 310 CMR 40.0874(3)(b)6.b, Sections 4.3.1 and 5.1 address the requirement to estimate the expected treatment efficiencies for remediation of wetlands sediments and CVOC impacts to groundwater, respectively. Excavation of wetlands sediments is a proven technique for abating PCB, PAH and metals impacts to soil/sediment. The efficiency of this technique is well established and will be confirmed through the closure sampling plan, which is documented in Section 4.3.1 and discussed in further detail in the response to comment #12. Oxidation using permanganate is a proven technique to effectively treat chlorinated ethenes in groundwater. Results of the preliminary pilot study (i.e., TCE concentrations were reduced to below detection limits within the MW-43 pilot study area) demonstrated the effectiveness of in situ chemical oxidation (ISCO) over a small portion of the Site. The ongoing expanded pilot study will provide additional data regarding the efficacy of this approach over a larger area.

With respect to compliance with 310 CMR 40.0874(3)(g), Sections 4.4.6 and 5.3.7 address this requirement for obtaining access to properties necessary to complete the comprehensive Remedial Action. Raytheon intends to secure access to any remaining parcels for which they do not currently have access agreements prior to Summer 2003 to ensure completion of Site remediation activities in a timely fashion.

Mr. Robinson's Comments

2) *TCE OXIDATION EXPERIMENT. Running the "pilot" TCE oxidation experiment as proposed, in a location right near where MTBE has just been discovered, seems to be asking for trouble. There must be a better place to run this brave experiment, where there is no risk of confounding a proper MTBE investigation.*

Raytheon appreciates your concern and assure you that the Raytheon-ERM project team has extensive experience in conducting oxidation remediation. ERM personnel implementing the remedial action have completed over 100 ISCO remedial projects. Though ISCO is still considered an "innovate" technology by some, ERM and Raytheon have a significant level of experience using permanganate to treat chlorinated ethenes. With respect to the location of the ongoing pilot study, the most downgradient permanganate injection point is located approximately 425 feet upgradient of MW-202M, the monitoring well in which MTBE was detected at a concentration above the applicable Reportable Concentration (RCGW-1). As part of the ongoing ISCO pilot study, ERM is monitoring several wells located along the western edge of the main building between the permanganate injection wells and MW-202M. These monitoring wells will provide early warning if permanganate migrates in the direction of MW-202M.

ERM previously estimated that it would take on the order of one to two years for groundwater containing permanganate to advectively flow from the pilot study area to the monitoring wells located along the western edge of the main building. ERM estimates that all of the injected permanganate would be consumed by either CVOCs in groundwater or natural oxidant demand prior to reaching these wells. Therefore, ERM does not believe that there is a likelihood that permanganate will adversely effect our ability to adequately characterize the nature and extent of MTBE impacts to Site groundwater.

3) A BETTER WETLAND SCENARIO. Raytheon's "Net Environmental Benefit Analysis" (NEBA) should be redone because at least one important scenario was ignored. I will refer to it as Scenario 3B. Scenario 3B consists of creating at least 5.3 acres of NEW wetlands as quickly as possible at the Raytheon site, then excavating and cleaning up all 5.3 acres of CURRENT wetlands on which PCB contamination exceeds 1 ppm. Properly sequenced and executed, the ONLY meaningful negative component of impact of Scenario 3B arises from delay in removal of PCBs, which is inherent in ALL scenarios. Substitute wetland services would be nearly 100% by Fall 2003 when PCB cleanup is scheduled to begin. PCB cleanup would be far more thorough than in Scenarios 1, 2, and 2B, and equal to Scenario 3. Wetland services would be far less impaired than in Scenarios 1, 2, 2B, and 3. Accordingly, Scenario 3B's "net environmental benefit" (as Raytheon defines it) is more positive than any of Raytheon's four scenarios. In the absence of an even better one, Scenario 3B should be adopted.

The NEBA demonstrates that implementation of scenerios 1 and 2 will optimize the environmental services at the Site. Given this risk-based finding from the environmental risk characterization, the NEBA concluded that removal of additional locations of PCBs does not increase ecological services and provides no environmental benefit. Therefore, the NEBA concluded that active remediation of any additional scenarios for PCBs only results in environmental harm via physical disruption of current services as the existing wetland plants and soil communities are removed.

4) EXTENT OF CLEANUP GOAL. Raytheon's use of the euphemistic term "risk-based disposal" translates to a goal of only PARTIAL cleanup of its pollution, down to so-called MMCLs. In short, RESIDUAL POLLUTION IN ANY AMOUNT IS NOT ADEQUATELY PROTECTIVE OF COMMUNITY OR ENVIRONMENTAL HEALTH. Our goal must be FULL cleanup, equivalent to undoing ALL of the pollution inflicted by Raytheon. To the extent this proves beyond feasible reach, we need maximum feasible cleanup now, followed by continuing cleanup work each time an advance in feasibility presents itself.

Raytheon understands your concern and the apparent confusion associated with the use of the term "risk-based disposal." For clarification, "risk-based disposal" is a term defined by federal regulations (i.e., Toxic Substance Control Act (TSCA)) as related to a process for federal approval of the remedial action. Raytheon has used this term in several reports to ensure consistency with applicable regulations.

Raytheon has adopted contaminant specific cleanup goals for wetland sediment and groundwater in accordance with state, federal and local regulations that ensure future protection of human health and the environment. In addition, Raytheon is committed to restore sediment and groundwater quality to "background conditions" to the extent feasible and allowable under applicable state and federal regulations.

5) *MISLEADING USE OF THE TERM "NO SIGNIFICANT RISK." The foundation of "risk-based disposal," so-called risk analysis, presumes to balance health and other risks borne by the victims of pollution against cleanup costs which the polluters might have to pay.*

Raytheon understands your concern and the apparent confusion associated with the use of the term "no significant risk." For clarification,

"no significant risk" is a term defined by state regulations (i.e., Massachusetts Contingency Plan (MCP, 310 CMR 40.0000)) as related to a level of cleanup protective of human health and the environment. Raytheon has used this term in several reports to ensure consistency with applicable regulations. Raytheon is committed to restoring Site conditions to levels protective of human health and the environment.

If you have any questions or comments please contact Mr. Edwin Madera of Raytheon at (978) 440-1813.

Sincerely,

R. Joseph Fiacco, Jr., P.G.
Project Manager

John C. Drobinski, P.G., LSP
Principal-in-Charge

Rachel B. Leary
Senior Project Engineer

rjf/rbl

Attachments: Figure 1 Site Plan

cc: Mr. Edwin Madera, Senior Environmental Engineer, Environmental Restoration Program, Raytheon Company, 528 Boston Post Rd., MS-1880, Sudbury, MA 01776

Public Repository (Primary Location), Former Raytheon Facility, Wayland Public Library, Louise Brown, 5 Concord Road, Wayland, MA 01778

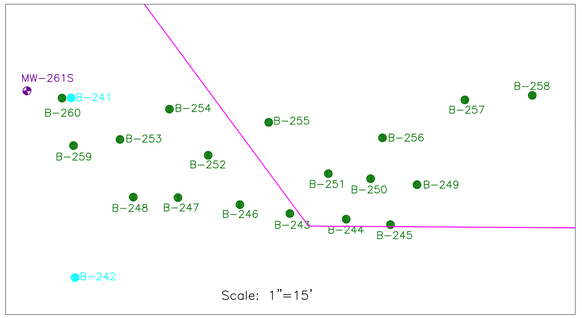
Public Repository (Secondary Location), Former Raytheon Facility, Wayland Town Hall, 41 Cochituate Road, Wayland, MA 01778

Mr. Benson R. Gould, CMG Environmental, Inc., 600 Charlton Street, Southbridge, MA 01550

Mr. Stan Robinson, 9 Wheelock Road, Wayland, MA 01778

Legend

- Existing Building
- 100' Buffer Zone
- Tree Line
- Delineated Wetland Boundary
- Property Line
- Existing Monitoring Well Location
- Newly Installed Monitoring Well Location
- Soil Boring Location
- Waterloo Profiler and/or CPT Boring Location
- Sediment Sample Location



Note: DEP Wells MW-19S, MW-19M and MW-19D are Approximate Locations to be Surveyed in the Future.

Environmental Resources Management	399 Boylston Street, Boston, MA 02116, (617) 267-8377

Revisions			
Symbol	Description	Date	Approved
	Fig 2 Phase IV		
	G:\Projects\143.xx-Raytheon\Wayland\Job File\		
	Summer 2002 Site Investigations\Raytheon.dwg		

Designed by:	
Drawn by:	JE
Checked by:	RL
Reviewed by:	JMcT
Submitted by:	

Former Raytheon Facility
430 Boston Post Road Wayland, MA

Site Plan

Scale:	1"=100'	Date:	2/3/03
Drawing No.		Figure No.	1
Contract No.	143.65		