

# CMG ENVIRONMENTAL, INC.

---

December 17, 2002

Edwin P. Madera  
Senior Environmental Technologist  
Raytheon Company  
1001 Boston Post Road  
Mail Stop MS-1-2-1567  
Marlborough, MA 01752

**Re: Additional Commentary on Previous Assessment Activities and  
Public Comment on Phase IV Remedy Implementation Plan  
Former Raytheon Facility, 430 Boston Post Road, Wayland MA  
CMG ID 2002-003**

Dear Mr. Madera:

For the record, the Wayland Board of Selectmen has retained me to provide technical review of document submittals and other activities at the above-referenced property (the Site) on behalf of the Town of Wayland.

In this role I provided public commentary on October 21, 2002 on the Draft Release Abatement Measure Plan Modification #1 prepared by Environmental Resources Management (ERM) and dated September 18, 2002. I am taking this opportunity to comment on assessment activities Raytheon and ERM conducted at the Site in July through September of this year. I am also providing you with my public comment on the November 27, 2002 Draft Phase IV Remedy Implementation Plan (RIP) prepared for the Site by ERM.

## ADDITIONAL COMMENTARY ON PREVIOUS ASSESSMENT ACTIVITIES

### 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  $3 \times 10^{-8}$  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.

---

600 CHARLTON STREET, SOUTHBRIDGE MA 01550  
PHONE (508) 765-8510  
FAX (508) 765-8515

PARAMETER	TOXIC EQUIVALENCY FACTORS	RCGW-1 REPORTABLE CONCENTRATIONS (PG/L)
<b>PCDDs:</b> 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
<b>PCDFs:</b> 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.

## II) 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.

## COMMENTS ON DRAFT PHASE IV RIP

### III) 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.

### IV) 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.

### V) 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.

#### VI) 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.

#### VII) 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.

#### VIII) 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.

#### IX) 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).

#### X) 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.

#### XI) 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.

#### XII) 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 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.

#### XIII) 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.

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.

#### XIV) 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.

#### XV) 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.

I thank you for the opportunity to offer this commentary on behalf of the Town of Wayland and look forward to your response.

Sincerely,  
CMG ENVIRONMENTAL, INC.



Benson R. Gould, LSP, LEP  
Principal

cc: Environmental Resources Management (John C. Drobinski, P.G., LSP)  
Mr. Devens Hamlen, Wayland  
Mr. J. Andrew Irwin, Wayland  
Ms. Anette Lewis, Wayland  
Massachusetts DEP (Pat Donahue, Larry Immerman, Karen Stromberg)  
National Parks Service (% Jamie Fosberg)  
Mr. Lewis Russell, Wayland  
Mr. Harvey and Ms. Linda Segal, Wayland  
Ms. Kimberly Tisa, U.S. EPA Region I  
Wayland Board of Health PIP Repository (% Steve Calichman, Health Director)  
Wayland Board of Selectmen (% Executive Secretary Jeff Ritter)  
Wayland Business Center, LLC (% Paula Phillips, Congress Group Ventures)  
Wayland Conservation Commission (% Brian Monahan)  
Wayland Public Library PIP Repository (% Louise Brown)