TOWN OF WAYLAND

MASSACHUSETTS
01778

CONSERVATION COMMISSION

TOWN BUILDING
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November 24, 2001

Mr. Ronald C. Slager, Jr.
Manager Environmental Restoration
Raytheon Company
1001 Boston Post Road
Marlborough, MA 01752

RE: Former Raytheon Facility
430 Boston Post Road
Tier IB Permit #133939

Dear Mr.Slager,

Through a collaborative effort between the Wayland Conservation Commission, Water Department and Board of Health, and with a consultant hired by the Town, Dr. Irwin Silverstien, we have developed the attached comments regarding the Phase II and Phase III reports that were submitted as drafts through the PIP program. The major points raised in these comments were communicated to you LSP in advance of the PIP meeting on October 24, 2001; however, the issues were not resolved by responses received at that meeting.

We hold the common objective of prompt implementation of an effective clean up that will resolve issues under the Massachusetts Contingency Plan. These comments are intended to support the site assessment process so that an adequate degree of confidence can be held in the conclusion that the remedy will achieve a condition of no significant risk at the disposal site.

We look forward to your responses to the specific comments. If you have questions regarding the comments you may reach me as the point of contact at (508) 653-8007.

Sincerely,

J. Andrew Irwin
Conservation Commissioner

cc: Mr. John Drobinski - ERM
Wayland Board of Selectmen
Wayland Board of Health
Wayland Water Department
Pat Donohue – DEP Northeast Region BWSC
Karen Stromberg - DEP Northeast Region BWSC PIP Coordinator
Wayland Public Library (PIP Repository)
Nancy Smith – EPA Region I

PIP Comments on Phase II and Phase III Reports
430 Boston Post Road

Comments Regarding Data Gaps in Phase II and Phase III Reports

These comments are submitted to Raytheon Corporation on behalf of the Wayland Water Department and Wayland Conservation Commission in response to the presentation of the Phase II/Phase III reports conducted at the October 24, 2001 Public Involvement Plan meeting. These comments will focus on issues and concerns associated with apparent data gaps.

1. Nature and Extent of Contamination
   a) Delineation of the boundaries of the trichloroethene (TCE) plume and the disposal site, as defined by the Massachusetts Contingency Plan (MCP), southwest of the site has not been characterized. Temporal and spatial data are necessary to define the magnitude and extent of TCE migration between the site and the Sudbury River to the southwest. Data presented in the Phase II report do not extend beyond the property line, nor are they sufficient to determine whether the leading edge or trailing edge of the plume now exists at the property line. For example, depicting groundwater concentrations for one snapshot in time, as was shown in Figure 15 of the Phase II report, is insufficient to show how the plume has migrated over time and whether higher concentrations exist off-site. In addition, page 12 of the Phase III report refers to the extent of TCE impact in groundwater mapped in this figure, yet the plume is shown as open-ended. Further, the comment on page 81 of the Phase II report and page 4 of the Phase III report (extrapolation of the extent of groundwater impact downgradient indicates dilution to below the analytical reporting limits) is unsubstantiated by the data presented. Based on this data gap, the installation and testing of additional well clusters are warranted between the Raytheon property line and the river to the southwest.
   b) The Phase III report includes the statement that there is no complete pathway to drinking water, yet the extent of the TCE plume in the direction of the Baldwin Water Supply wells is not completely defined. With regard to the northwest portion of the site, localized groundwater elevation data presented on Figure 12 of the Phase II report, suggest a possible flow component to the north/northwest. For example, well MW-1 has a higher water table elevation (124.78 feet) than two wells, MW-TP-3 (122.94) and MW-32 (122.33), located to the northwest. This potential component of groundwater flow, the presence of 4.2 parts per billion (ppb) of TCE at a historic release location (well MW-TP-3), and the detection of low concentrations of chlorinated compounds at the Baldwin wells, raise a concern that a portion of the plume may be migrating toward, or is being influenced by, these drinking water supply wells. Therefore, the installation and testing of additional well clusters placed between MW-TP-3 and the Baldwin wells are warranted.
   c) The removal action conducted near well MW-TP3 was for a release of polychlorinated biphenyls (PCB)s, yet TCE was detected in that well.

Comment both on how data may support or reject the possible existence of a pathway between the source area near the buildings and the detection of TCE at this location.

d) The extent of TCE impacts to the east of well MW-40 is not defined. The Phase III report suggests that a separate release may have occurred at Drywell DW-05. Therefore, the installation and testing of additional well clusters east of this well is warranted.

e) There is an intermittent stream and wetland area to the east of MW-40 in the direction of groundwater flow projected in the Phase II report. Comment on whether there is a possible Condition of Substantial Release Migration and whether samples will be collected to confirm whether TCE has impacted the surface water.

f) The three-dimensional extent of the TCE plume is not completely defined. The completeness of the 5 ppb TCE contour shown in Figure 16 of the Phase II report for cross section A-A' is not substantiated by the data shown, since there are no downgradient wells screened at a depth of about 45 feet below surface grade (corresponds to the highest TCE value, 120 ppb, detected in well MW-45M). Additional groundwater data at several depths are needed to definitively represent the three-dimensional extent of the TCE plume for this and other cross sections shown.

g) Contrary to the statement on page 46 of the Phase II report, the Russell's Garden Center bedrock well is not the only downgradient receptor. For example, based on TCE concentrations at the southern property line, groundwater TCE concentrations off-site likely exceed the applicable GW-1 standard of 5 ppb (properties to the southwest are within the Zone II delineation as indicated on Figure 9 of the 1994 Report on the Conceptual Zone II Study of the Baldwin Pond Wellfield). GW-2 standards also could apply off-site since the water table there is likely within 15 feet of existing structures. Although Raytheon contends that concentrations detected with their sampling to date do not exceed GW-2 standards, there are no data to determine whether these standards have been exceeded off-site. In addition, there is no credible presentation why off-site concentrations might not be higher from an older source that has migrated away from the point of origin. Further, there are no wells to provide groundwater data or is there evidence of past attempts to collect indoor air samples to determine whether an active indoor air pathway exists.

h) Screening of soils for volatile organic compounds (VOCs) using a photoionization detector during installation of borings for well cluster MW-43 detected headspace concentrations of 33 parts per million by volume (ppmv) in the interval of 25 to 26 feet below surface grade (bsg), where the other readings in soil borings did not exceed about 5 ppmv. Comment on why a monitoring well was not screened in this zone to assess groundwater concentrations associated with this elevated reading. Comment on the completeness of source characterization since this

elevated concentration is located 25 feet bsg without an established connection to a point of discharge or release.

i) Many figures in the Phase II report indicate that the site is defined by the Raytheon property lines. However, the disposal site, as defined by the MCP (40.0006), appears to encompass neighboring properties. Clarification of the boundaries of the "disposal site" is needed to identify all areas where oil and hazardous materials have come to be located.

j) On page 46 of the Phase II report, an attenuation factor of 10 was applied for groundwater discharging to the river, projecting a surface water concentration of 16 ppb of TCE in surface water. On what groundwater data was this projection based? Until the full extent of the plume is defined to the southwest, there are insufficient data on which to predict what the groundwater concentration is at the point of discharge to the river. A discussion of this attenuation factor and Ambient Water Quality Criteria in this section of the report does not address migration of contaminated groundwater to off-site properties.

k) In the Phase III a statement is made that "Extrapolation of the extent of groundwater impact downgradient indicates dilution to levels below detection limits." Comment on how this is consistent with the projection in the Phase II report that detectable levels would reach and discharge to the Sudbury River.

2. Groundwater Flow Contours:

a) The groundwater flow map (Figure 12) depicted in the Phase II report is based on data collected during the spring of 2000. A groundwater contour map based on data collected during the summer, when the weather is drier and the water demand is higher, is necessary to determine whether contaminant migration from the northern portion of the Raytheon site may be flowing to the northwest under these seasonal conditions. Therefore, the presentation of additional groundwater contour maps for historical measurements during summer, fall and winter months to address this potential data gap is warranted.

b) The groundwater flow map is depicted with flow arrows, particularly in the southeastern portion of the property, in a direction of lower to higher water table elevations. The flow map also shows a groundwater divide in this portion of the site. Additional groundwater elevation data are needed to verify the suggested presence of a groundwater divide.

c) The groundwater flow map depicts contours in the northwestern portion of the property that are not consistent with elevation data. Comment on whether potentiometric surface mapping suggests a northerly flow direction in the vicinity of MW-TP3 where TCE was detected in shallow groundwater and *why* there are no deeper wells for characterization at depth.

d) Data for the elevation(s) of the Sudbury River are not presented with the sampling data for groundwater elevations. Because the site is potentially

subject to hydraulic influences of the Sudbury River, a significant data gap may exist in the characterization of site hydrogeology.

e) Page 33 of the Phase II report refers to a 1994 Report on the Conceptual Zone II Study of the Baldwin Pond Wellfield as supportive of an opinion that the groundwater is flowing across the Raytheon site to the southwest and not toward the wellfield. Reference is also made to the Zone II Study and an inferred groundwater divide tending in a southwest to northeast direction at the northern portion of the site. However, review of Figure 6 of the Zone II Study indicates a potential for groundwater to flow toward the wellfield from the northern portion of the site under pumping conditions. Therefore, the potential for TCE to be drawn toward the water supply wells during pumping activities and a groundwater flow component to the northwest in the northern portion of the site cannot be ruled out.

f) Relevant data regarding detection of 1,1,1-trichloroethane in the Baldwin Pond Well field wells over the past three years is not addressed in the Phase II report. At the PIP presentation there was a comment made that the contamination might be from another source as yet undefined; but, there is no discussion of what that alternative source might be. Additionally, there was detection of TCE in the Baldwin Pond Wells on one occasion in November 2000 that is not discussed.

~~g)~~ Only two bedrock wells were installed. Explain why this limited exploration of the bedrock aquifer is sufficient to eliminate the bedrock as a potential contaminant migration pathway.

3. Impact on Drainage and Effluent Outfall Discharge

a) Provide clarification on the exact location of the sample collected to represent the outfall discharge. Was the sample collected in the pipe or within the swale at the point of discharge? Recent sampling by the Wastewater Management District Commission of the water in the pipe discharging at the outfall did not exhibit any increase in concentrations from the concentrations entering the pipe at the treatment plant suggesting that the "outfall sample" may not represent a local condition.

b) If the sample was collected *at* the pipe discharge, comment is needed on the apparent introduction of site contaminants of concern (COCs) between the treatment plant and the point of discharge. Comments are warranted on *1)* the data for screening of conductivity in groundwater as that may relate to contamination involving inorganic species, *2)* whether data support or reject the potential for groundwater to enter the pipe and impact the discharge, and 3) whether data have been collected to establish whether there is an accumulation of COCs within the pipeline that may contribute to an ongoing source of discharge to the wetlands. Further investigations of the conveyance system appear warranted to determine whether an ongoing source is still present.

4. Area of Stunted Growth:
   a) Figures 18a through 18e do not show the outline of the area of stunted vegetative growth. Figure 18f shows the outline of the area of stunted growth but does not show the lead distribution within. Also, this area does not appear to coincide with the distribution of concentrations of COCs. Therefore, other COCs, besides copper and chromium, cannot be ruled out as causative agents for the stunted growth effect.
   b) Our research of historical records and permits indicates use of various chemical compounds in the operations including the following: cyanides, boron, fluoride, phosphorus, ammonia, nitrates, chlorides, and certain types of VOCs (aromatics, chlorinateds, aldehydes, alcohols, and glycol ethers). These compounds were not among the analytes for which tests were conducted in the wetlands. Given the degree of aquatic toxicity associated with these potential COCs, comment on the lack of characterization for these compounds.
   c) Detailed analysis for PCB congeners was conducted in the wetland but there was no testing conducted for dioxins or dibenzofurans. Comment on why at least one sample was not analyzed for these contaminants.
   d) How was the extended area of readily apparent harm (ARAH) presented in the Phase III report as the area to be excavated delineated?
   e) The discussion of ARAH and expanded ARAH requires further comment and clarification. For example, tables presented in the Phase II refer to concentration data for samples "in" and "out" that are used in the risk characterization; however, the apparent split of which data are used respectively is not presented so that values can be verified.
   f) The Phase II report does not provide a clear delineation of which portion of the site requires remediation to address the condition of significant risk to human health posed by wetland sediments, and which portion does not require remedial actions. For example, the expanded ARAH is discussed in the Ecological Risk Assessment Appendix, but not addressed in the body of the Phase II report.
   g) The assessment of ecological endpoints for impact in the Stage II ecological risk assessment was never presented in a scope of work (SOW) that was part of the public review. While there was discussion of an amendment of the SOW, it was not formalized.
   h) The uncertainty of using information collected by United States Department of Fish and Wildlife (USF&W) from many years prior to the current evaluation is not discussed in the risk assessment.
   i) Data are not presented for groundwater quality in the wetlands. Without these data, the remedial action may not sufficiently address areas of the site that exceed the GW-1 standards. Provide the technical justification for supporting the statement that "OHM in wetland/sediment does not appear to act as a source of input to **groundwater** or surface water during floods.[emphasis added]" In addition, provide the justification why monitoring wells are not warranted in the wetlands and in the area north of the wetlands.

j) Data suggest that COCs were detected in surface waters during flooding conditions. Provide the technical justification for supporting the statement that "OHM in wetland/sediment does not appear to act as a source of input to groundwater or **surface water** during floods [emphasis added]."

k) Explain why the dispersion pattern of contamination throughout the wetlands doesn't coincide with the areal extent of the tributary that flows from the outfall to the river.

l) Although the Phase II report discussion assumes that discharge from the outfall pipe was the source of COCs in the wetland, there is no discussion for the possible existence of other sources and how the data might be used to explain that another source is involved.

m) The pattern of contamination for the stunted growth area is dislocated from the outfall pipe and comes closest to the embankment at a point further to the south. What data or investigations have been conducted to eliminate the possibility of subsurface waste material within the embankment? Comment on the lack of geophysical surveys or groundwater sampling wells along the embankment area that appears to have been filled historically.

5. Sediment Issues

a) In accordance with section 40.0904 of the MCP, the extent of impacts to Sudbury River sediment has not been completely defined, since sampling for COCs in the Sudbury River downstream of the impacted wetlands were not conducted by Raytheon to confirm reliance on data collected many years prior by others for a different purpose. Comment on the data quality of sampling performed by others and included in this assessment.

b) Justify the use of sediment sample GMS-7, containing a polychlorinated biphenyl (PCB) concentration of 1.8 parts per million, (ppm), in the determination of "background" when it appears to be proximate to the area of mapped impact to sediments emanating from the disposal site? For example, it is located about 120 feet "downstream" from a sample having a PCB concentration of 5 to 20 ppm. By including this sample in the calculation of the background PCB value, the result may be overestimated. A background sample should be collected for the purpose of establishing background conditions. USF&W had no indication of the extent of impact from the release when they collected that sample. Also comment on why a specific background sample was not collected from another location, such as across the Sudbury River.

c) Comment on how the use of GMS-7 in determining background sediment concentrations may have resulted in the overestimating the background concentrations of aluminum, barium, beryllium, iron, and nickel (reference, Table 18 of the Phase II report).

d) The Phase II report carries no clear distinction between wetland sediments and Sudbury River channel sediments. The text should be clarified to distinguish which data are being used in the risk assessment tables.

e) The environmental risk characterization (ERC) report by Entrix has relied upon the Great Meadows sediment data previously collected between 1986 and 1990 for a Stage I Screening in the assessment of local conditions. The Entrix report does not present any confirmatory samples to demonstrate that these 11 to 15-year old data are relevant and applicable to current conditions. In addition, section 4.2.2.1 of the Entrix report discusses sampling conducted on the Raytheon site from 1998 to 2000 to confirm Great Meadows data, yet the report does not present a comparison of these past and current data. Further, sample locations GMS-1 through GMS-6 were not shown on any of the figures in the Phase II report.

f) Reference is made on page 54 of the Phase II report to upstream locations SS-2 and SS-2D on Figure 8, yet this figure shows SW-2 and SW-2D. Does this figure need to be amended?

6. Risk Assessment

a) Copper in surface water is attributable to low pH conditions ubiquitous to Wayland's public water supply and is sited as a local condition. This "local conditions" argument requires the presentation of data that shows discharges from the treatment plant contain comparable copper levels to discharges from the conveyance system that terminates at outfall OF-1. Until these data are obtained, copper cannot be ruled out as a surface water COC.

b) Discharges containing chlorinated solvents associated with past site operations may have entered the conveyance system. Therefore, based on this site history and the fact that volatile organic compounds were not analyzed in sediment and surface water, on what basis are they ruled out as COCs for these media?

c) Beryllium was eliminated as a contaminant of concern, yet it is present at a maximum concentration (1.8 mg/kg) that is more than 50% greater than the maximum value for the background data (1.1 mg/kg). (Reference page 2-47 of the MADEP Guidance for Disposal Site Risk Characterization – 1995). Explain.

d) Workers involved with the remediation in the targeted wetlands area should be evaluated as potential human receptors in section 6.5.1 of the Phase II report.

e) The elimination of the Sudbury River from consideration of surface water impacts was based on two samples collected in 1990, which were only analyzed for copper and zinc. However, 17 additional metals were listed as COCs in Table 19. Explain how 11-year old data for only two metal COCs is sufficient in addressing impacts to surface water.

f) Surface water exists during certain times during the year in the wetlands, yet this surface water was not evaluated in the risk assessment. Provide the justification for eliminating periodic exposure of the on-site resident to surface water areas within the wetlands, from the human health risk assessment.

g) Why was exposure to sediment not included in the human health risk assessment for the on-site resident?

h) Until the extent of the TCE plume is defined, the exposure point concentrations for TCE, perchloroethene and vinyl chloride represented in the Phase III report may not be representative of the worst case conditions upon which the risk assessment and evaluation of remedial alternatives is based.

i) The concentrations for hexavalent chromium appear to have been underestimated in the tables that relate to the risk characterization. For example, in Table 25, instead of values of 55 and 2, the values should, by our review, be 587 and 166. If these higher values are correct, the hazard index and excess lifetime cancer risk calculations need to be adjusted accordingly

j) Table 14 is inconsistent with regard to the average concentrations for five polycyclic aromatic hydrocarbons (PAHs) and cadmium. The average concentrations are lower than the minimum values, which is mathematically incorrect.

k) Why was dermal contact not included in the evaluation for the on-site resident's exposure to groundwater?

l) The groundwater carcinogenic cancer risk for the on-site resident was omitted from Table 34.

m) Spot checking of the data presented in the Phase II report detected some inconsistencies and deficiencies. Comment on the effort that will be made to assure that the final calculations of input concentrations and risk indices for the risk characterization will undergo sufficient quality assurance review.

n) The uncertainty analysis for the human health risk characterization does not indicate an overall conclusion whether the major assumptions and limitations have resulted in an underestimation or overestimation of risk. As stated in the 1995 in the MADEP guidance document for risk characterization, an attempt should be made to describe the magnitude and direction of the effect that each particular area of uncertainty is likely to have on the numerical risk estimates.

7. Evaluation of Remediation Alternatives

a) In section 5.4 of the Phase III report, the evaluation of the groundwater treatment alternatives only considers treatment to the extent of contamination at the property line. A comparison of the alternatives should be made with the need to remediate groundwater beyond the property limits to the extent of the plume exceeding GW-1 standards off-site. This evaluation should be revisited once the data gaps associated with the extent of contamination are addressed. For example, during the evaluation of air sparging/SVE (page 31 of the Phase III report), a continuous wall of injection and extraction well points are proposed along the property line to prevent migration off-site. However, until the extent

of the plume is defined, the number and placement of injection and extraction points would not necessarily end at the property line.

b) The extent of excavation for the "expanded ARAH" does not extend beyond the area of visibly stunted plant growth to the west or to the southeast. The method of interpolation between the sample points within and outside the stunted growth area is not presented. Comment on how the boundary was determined and provide the technical justification that higher concentrations do not extend further toward the sampling points located 90 to 100 feet away.

c) Explain how pockets of elevated concentrations of lead, PAHs, and PCBs that exist outside the targeted remediation area will be remediated to a condition of no significant risk to human health. For example, there appear to be pockets of elevated PCB concentrations (> 2 ppm) shown on Figure 8 of the Phase III report that can be considered individual exposure points.

d) The vertical profile of COC concentrations in the wetland sediments was not clearly presented in support of the proposed excavation to 18 inches.

8. Other issues

a) TCE is present in bedrock well MW-45B at 4-7 ppb (last sampled 7/19/00); this well should be resampled to determine whether current impacts are at steady state.

b) Sample location identification numbers for figures 18a through 18f are difficult to correlate to the laboratory results.

c) Reference is made throughout the Phase II report comparing contamination levels with the release notification criteria (i.e., reportable concentrations, or RCs). It is more appropriate in the context of a Phase II risk assessment report to compare contamination levels with soil and groundwater cleanup standards (i.e., Method 1 S-1 soil standards), which can differ from the RCs.

e) Annual O&M unit costs and totals for the excavation alternatives do not compute.

f) Transportation by rail costs vary by factor of two between Table 2 and Table 3.

g) LRA reports were not part of the PIP records and confirmatory sampling data do not appear to be included in the Phase II. Particularly, there is the issue of drywell removal involving chlorinated solvents and the apparent impact to the groundwater. Comment on whether residual concentration data from the LRAs should be considered in the Phase II. Also, if the LRAs were successful and involved sources that did not impact groundwater (by definition of a LRA), comment on where the source of TCE groundwater contamination is located.

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Ronald C. Slager
Raytheon Company
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November 26, 2001

RE: RTN 3-13302, 3-19482, 3-13574, 3-13302, Tier 1B Permit Number 133939

(submitted via Fax, email and U.S. Certified Mail)

Dear Mr. Slager:

I respectfully submit this public comment letter to you as a private citizen regarding the former Raytheon Research Facility, 430 Boston Post Road, Wayland, subsequent to the well-attended PIP(Public Involvement Plan) meeting held in our Town Building on October 24, 2001 for the presentation of your Phase 2 and Phase 3 draft reports. I offer these comments with the hope and expectation that you will respond to them and apply them to your project.

First I thank you and Raytheon for extending this recent public comment period. It has allowed citizens more time to evaluate the enormous amount of material ERM (your LSP) delivered to our Town's DEP repositories in October. The Wayland Water Department has hired an LSP (Licensed Site Professional), Dr. Irwin Silverstein, Hydro-Environmental Technologies, Acton, who kindly met with citizens and town officials the Tuesday after the PIP meeting to help us better understand these documents.

I also thank you for placing a copy of the overheads (powerpoint presentation) used at the October 24 PIP public meeting in our town's repositories. I ask that you please modify the cover on this undated binder to identify that in fact this document is the presentation from that evening's public meeting.

Comments on the Raytheon PIP process:

When the draft PIP plan for this site was published, I requested there be a separate public meeting for the presentation of the Phase 2 report, including the risk assessment. While it appears that the PIP plan document was modified to incorporate my suggestion, the reality is that a separate public meeting was not held for the presentation and discussion of the Phase 2 report. Instead, both the Phase 2 and Phase 3 draft reports were delivered to the Town repositories on October 9 with the announcement of the October 24 PIP meeting. Entirely too much information (10 inches of paper) was unloaded on our Town all at once. That is unreasonable, impractical and not very considerate of the public's role for a PIP site. Apparently Raytheon faces a November 28 permit deadline.

The outcome of this unfortunate timing was evident at the October 24 PIP public meeting. There was no printed meeting agenda nor were any handouts provided for meeting attendees. It appeared to be an imposing task for one person to make a cogent presentation to an educated but technically untrained audience covering such a broad amount of complex information. While ERM brought a number of experts to the meeting, none of them made presentations or described their work on this project. For example, nobody from the firm who performed the risk assessment stood up to explain their work. Their draft report is dated December 2000. Why did Raytheon wait 10 months to share this document with the Town? It seems logistically unrealistic to plan to present years of Phase 2 and Phase 3 information in just one meeting. I found the presentation to be a too-broad overview with inadequate detail, and the discussion appeared to end a bit prematurely.

MCP regulations provide for Raytheon to cogently explain your PIP project and findings to the public. By waiting until five weeks before your permit deadline to make a public presentation of the Phase 2 and Phase 3 reports, the outcome frankly disappointed me. This limited timeframe also appeared to increase the already existing burden on interested townspeople. There is no question of your company's firm commitment to remediate this site. But there also is a great deal at stake here for our town with various locations of desposition in our Aquifer Protection District, within the Zone II for our Baldwin Drinking Water Well Field, in wetlands and along the Sudbury River.

I agree with others that there appear to be serious data gaps in the Phase 2 and Phase 3 reports. Submitting draft reports and following up afterwards with addenda does not meet my expectations for this PIP project. We read that activities proposed for this cleanup will cost Raytheon many millions of dollars. If that is the case, I would expect the data gathering, planning and documentation to be done with the greatest of care and with the focus squarely on proposing and conducting a scientifically valid cleanup that engenders the public's confidence, praise and endorsement. I expect to see maximum effort made to present draft reports that are as complete as possible and where needed that edits be made and data gathered and properly analyzed BEFORE documents are submitted for review and approval to the DEP and all the other entities where permitting will be required. Experts reviewing this project for the months and years to come should be reading data, reports and analyses that are well-crafted and coherently presented.

I therefore disagree with what apparently will occur now in order to meet this week's deadline, i.e. that draft documents for Phase 2 and Phase 3 are to be submitted to the DEP with addenda to follow. The Town's independent LSP has reviewed your submitted materials. In just a few days, it seems unlikely his many pages of highly technical comments will be fully integrated into Raytheon's draft documents when submitted to the DEP. I fear the product of all that expert advice will be tucked away in follow-up addenda. Will the full totality of all that technical information ever be presented in such a way that it will readily understood by the many entities expected to be involved in permitting this project in the upcoming year?

I would prefer to see the DEP issue a limited time extension to your permit deadline so that all required information to properly characterize the nature and extent of the contamination can be cogently presented. Hurry up and meet a deadline and then we will adjust things later is not what a PIP project should look like, particularly because this complex project has no DEP project manager constantly tracking and overseeing the content and quality of the information being generated.

Technical comments:

1) I do not understand why this site is classified Tier 1B instead of Tier 1A when it has a numerical ranking score of 732. Perhaps it would be prudent to consider having a DEP project manager assigned to oversee a cleanup of this magnitude and complexity spanning some 40 years of site activity and located in our town's Zone II where Wayland draws drinking water from groundwater in this aquifer.

2) According to MCP regulations, a disposal site is not supposed to be defined by real estate boundaries but rather by the true extent of the contamination. Wetlands and groundwater contamination on this site appear to extend beyond Raytheon's property lines. I do not understand how Raytheon can claim to have performed a valid and complete risk assessment when it has not tested in earnest beyond its property lines. When I asked about this at the October 24 meeting, I recall hearing that Raytheon used computer modeling. Use of such modeling instead of performing real tests in the field tends to engender more questions and lack of public confidence. I do not understand how one can determine the ecological and human risks presented by the contamination on this site without fully characterizing the nature and extent of the contamination and evaluating all possible pathways of exposure.

3) I do not understand why Raytheon chose to take its background wetland sediment sample from the mapped area showing metals contamination (end of the Phase 2 report, Volume 1). A background sample is supposed to provide a means to compare the contaminated area to a similar area where contamination clearly does NOT exist. Why was a scientifically more appropriate location not chosen? Generating credible background data is critical for establishing benchmarks. It appears that this particular background sample (GMS 7) taken in a location laden with chromium, copper and PCBs is inadequate and data resulting from it suspect if not invalid.

4) Why did it take Raytheon about a year to erect the fence that finally has been installed to protect the public from the wetlands area of stunted growth as required by the Wayland Conservation Commission? Such a protracted delay for a non-technical task raises concerns about the PRP's ability to meet other standards during the implementation of upcoming remedies.

5) I do not understand why the latest reports do not show complete groundwater contouring, particularly knowing that the drinking water wells of concern are located only a half mile north. Groundwater contour lines for this site appear to stop at the western edge of the existing asphalted parking lot. At the PIP meeting we were told groundwater flows south and southwest, even in the wetlands at the western part of the site near the Sudbury River, which flows northward. My review of the groundwater contour lines shows them turning northward just at the edge of the parking lot. Why would scientists stop drawing groundwater contours at an artificial (parking lot) boundary? Groundwater contouring also needs to be determined by data collected in multiple seasons, particularly in drier periods than what was sampled to reflect actual drawdown and flow in the area between the Baldwin Well Field and the contaminated wetland.

6) It seems imperative that Raytheon install groundwater monitoring wells and gather data between the contaminated wetland and the Baldwin Well Field. In November, 2000 the

Wayland Water Department found a very small amount (1 ppb) of TCE (Trichloroethylene) for the first time in a Baldwin Water Well sample. I understand small amounts of another chlorinated solvent (111Trichloroethane) have been detected at Baldwin wells over the past 3 years. If over time solvents and metals tend to fall deeper and deeper into the groundwater, it also seems important to carefully plan sampling at the appropriate depths. I believe a member of the Wayland Conservation Commission asked a Raytheon representative to test groundwater between the affected wetland and the well field, but that has yet to occur.

7) Raytheon attributes the wetland's stunted growth to contamination from the outfall from the waste disposal system, yet the maps (colorful figures at the end of the Phase 2 document, Volume 1) seem to suggest the possibility of other sources of the contaminants. For example, on Figure 18a, there are two areas of PAHs not contiguous to the area of stunted growth. On Figure 18b, there seems to be a similar hot spot of PCBs near the Sudbury River. Figure 18f also shows several separate hot spots for lead. The unusual deposition of these contaminants shown on these report figures suggests to me that they may not have all originated at the outfall, which begs the question how did they get where they are?

8) It appears Raytheon has not yet tested for the presence of substances found in earlier waste generation reports, i.e. cyanide, fluoride and VOCs. PCB testing did not include sampling for the presence of dioxins and furans. Greater care should be taken to account for all chemicals of concern. Accurate risk calculations cannot be made if all known possible contaminants are not investigated.

9) The TCE plume, which originated near the former circuit board shop, appears to migrate downgradient, moving south from the former lab building towards the property line. Given the documented flow pattern, the plume is heading towards Route 20 and beyond, potentially affecting private homes, businesses and eventually the Sudbury River. I do not understand why Raytheon has not fully characterized this plume. Novel technology is being applied in a limited RAM without defining the full extent and location of the problem. Again, I do not understand how one can perform a site-specific Method 3 Risk Characterization without having actual data for such a compelling condition.

10) Groundwater monitoring well MW40 shows the presence of TCE higher than the drinking water standard. This well is located east of the existing lab building, yet there appears to be no explanation for this particular location nor an attempt to determine if the TCE is migrating east of the charted groundwater divide. Moving in that easterly direction, one quickly reaches the beginning of the residentially zoned portion of the property where a subdivision of private homes was recently approved by the Planning Board. There also is an intermitent stream and wetlands. In multiple public meetings in recent years, it has been reported there are no contamination issues east of the building. Given the groundwater data and site history from MW40, Raytheon should determine whether or not there is any migration or risk.

11) Table 16 shows summary data used for the risk characterization. The area of readily apparent harm (ARAH) is not just the area of stunted growth in the wetland. Again, if one consults the colorful figures (maps) at the end of the binder, priority pollutant metals and PCBs are found way beyond the area of stunted growth. If that is the case, the ARAH does not seem to be properly defined and therefore the risk calculation data may not be accurate.

Conclusion:

I believe the overall basic premise Raytheon has stated and repeatedly used, that Wayland does not draw our town's drinking water from the groundwater in this affected area, is incorrect. It is my view that Raytheon needs to remove that premise from ALL of its documents, then modify and complete the Phase 2 report after performing more groundwater contouring and testing to properly characterize the full extent of contamination on this site.

Given the range and severity of the data gaps, the Phase 3 report appears to me to be presented prematurely. I understand the Wayland Conservation Commission has made numerous overtures to continue to work with Raytheon towards achieving a successful outcome for this project. More testing needs to occur. With more accurate Phase 2 data in hand, the risk assessment needs to be revised and then after achieving a more complete assessment, Raytheon should propose a Phase 3 Remedial Action Plan. Each of the major MCP steps needs to be carefully planned, and it does not seem prudent to me to advocate haste or allow for a less-than-credible product in order to meet a procedural deadline.

Thank you for this opportunity to provide these comments to you. Please incorporate them so that your final Phase 2 and Phase 3 reports will be valid, complete and in compliance. I also respectfully request that you send me a copy of all the current public comment submittals as well as your responses to them.

Sincerely,

Linda L. Segal

Linda L. Segal

cc: John Drobinski, LSP, ERM
Karen Stromberg, DEP PIP Coordinator, Wilmington
Chris Coolen, DEP, BWSC, Wilmington
Pat Donohue, DEP, BWSC, Wilmington
Steve Johnson, DEP, BWSC, Wilmington
Jeff Ritter, Wayland Executive Secretary
Steven Calichman, Wayland Board of Health Director
Brian Monahan, Wayland Conservation Commission Administrator
Don Hollender, Wayland Water Superintendent
PIP Repository, Wayland Public Library
Andrew Irwin, Wayland Conservation Commissioner
Dr. Irwin Silverstein, LSP, Hydro-Environmental Technologies
Nancy Smith, EPA Region 1

LEWIS
33 Claypit Hill Road
Wayland, MA 01778

November 26, 2001

Mr. Ronald C. Slager, Jr.
Raytheon Company
1001 Boston Post Road
MS-1-2-1567
Marlborough, MA 01752

Re: Tier IB Permit #133939
Former Raytheon Facility, 430 Boston Post Road, Wayland
Comments on Draft Phase II and III Reports

Dear Mr. Slager:

Following are my comments on the draft October 9, 2001 Phase II and Phase III Reports for the above-referenced Site. Kindly respond to each comment and revise the text, tables, and figures in each of the reports to reflect necessary additions and corrections to the data already presented.

1. State clearly in the text of the Phase II Report the fact that the numerical ranking for this Site places it in the IA Tier Classification and explain/describe how/why it received a Tier IB permit. Refer to all meetings, correspondence, telephone calls, other documents or communications that led to the apparent reclassification and place such source materials in the PIP Record Repositories.

2. At the time of the October 24, 2001 PIP Meeting, the Phase I Report for the Site had not been included in the materials sent to the Record Repositories. Nor was I able to find a copy of the completion statement for that report. Please assure that all materials including draft and final reports, notes of meetings and telephone conferences with regulatory agencies where substantive and procedural issues are discussed, and all correspondence with the Town and regulatory agencies are placed in the Record Repositories so that the public can follow the process along.

3. It is apparent that much of the contamination on site and in and along the Sudbury River is the result of discharges from Outfalls 1 and 2; however, it is unclear from the documentation available in the Record Repository precisely which constituents were discharged, what the permitted limits were for each constituent, whether there were exceedences of the limits and on how many occasions, whether other non-permitted substances were discharged through those outfalls. Information on each of these points should be included in the historical background section of the Phase II Report so that the public can understand why only certain constituents are being addressed. From my brief review, it would seem that there are additional constituents of concern that should be looked at.

4. The Phase II and III Reports need clearer explanations of all of the actions taken to address each of the Release Tracking Numbers. There should be a separate description for each tracking number, and, among other things, a list of the constituents of concern for each, a statement of the media (i.e., groundwater, surface water, soil, sediment, air) in which contamination was found, the levels found, a comparison to the cleanup standards, and the current status of each.

5. The Phase II Report contains some maps and depictions of sampling locations, but there is no visual organization of the data points. Thus, it is impossible to get a handle on precisely what the nature and extent of the contamination is. It is not readily apparent from the information presented. Please remedy this by pulling together a series of Site maps (which also encompass the areas beyond the former Raytheon property) for each group of constituents of concern (i.e., VOC, metals, PAHs, PCBs, petroleum hydrocarbons, etc.). For example, for metals, there would be a maximum of five maps (one for each media) and the map would depict the location of each sampling point in that media; and for each sampling point, the date of each sample taken, the depth of the sample, and the analytical result.

6. Based on the information presented in the Phase II Report, there does not appear to be a clear justification for your statement that groundwater impacts are limited to the shallow overburden. After you review the maps requested in number 5 above, please consider the locations in which additional sampling must be conducted. I note that there is a paucity of existing monitoring wells for a site of this size, especially to the north and west of the former Raytheon property.

7. Monitoring wells need to be installed in the direction of toward the water supply wells to adequately assess groundwater impacts and potential impacts on the water supply wells.

8. Based on the information presented in the Phase II Report, it is not clear why the areas in which VOCs were tested for was so limited. Please explain this. On Figure 15 of that Report, there are references to "HA". What does that abbreviation stand for? It is not contained in the key of notations.

9. State the month and year when data for ground flow directions was obtained. In order to adequately assess the groundwater flow direction in this area, data should be representative of the four seasons.

10. Because the nature and extent of the contamination at this Site has still not been adequately characterized, the risk assessment is based on insufficient data. Therefore it would be inappropriate to treat the Phase III document as anything more than a preliminary assessment. The document cannot be relied on to choose final remedial options for this Site.

Thank you for the opportunity to comment on these documents. I will look forward to reading your responses and especially to reviewing the mapping of data points so that the true nature and extent of contamination can be viewed. Inasmuch as this is a PIP Site, it is imperative that information be presented in a user friendly manner so that educated laymen and professionals can assess the data before them.

Very truly yours,

Anette Seltzer Lewis

cc: LIST

November 26, 2001

Ronald C. Slager, Jr.
Raytheon Company
MS-1-2-1567
1001 Boston Post Road
Marlborough, MA 01752

RE: Assessment/cleanup of former Raytheon-Wayland site,
RTN 3-13302, 3-19482, 3-13574, 3-13302, Tier 1B Permit #133939.

Mr. Slager:

I hereby present my comments. These comments relate to the TCE "hot spot" between the building and the railroad, and to the plume from that "hot spot." My silence as to other issues should not be construed as support of or acquiescence to any filings as to such issues.

I note that your documents show a cluster of test wells near the railroad in which TCE concentrations were found in concentrations almost 100 times the current regulatory limit for drinking water (DW-1). Yet the plume of this extreme poison (at least at this cluster) is depicted vaguely at best, and simply ignored outside the nearest property line, which abuts the railroad. I believe we ought to have a detailed analysis of that TCE plume. The plume's current location needs to be delineated three-dimensionally, with detailed readings of TCE concentrations organized in contours from the maximum at least down to the current DW-1 limit. In addition, the plume's historic and predicted migration path both need to be delineated, again three-dimensionally.

Finally, your discussion of proposed treatment for that TCE "hot spot" and its plume comes across to me as primarily hand-waving, and also as relying more on dilution than removal. To the extent that my impression is accurate, I object to that proposed treatment. I believe we ought to have a reviewable, defensible treatment plan which is addressed specifically to that TCE "hot spot" and its plume, including any portion of the plume which has strayed across the property line. And the treatment plan should not countenance dilution in any way, shape, or form.

Sincerely,

Stan Robinson
9 Wheelock Road
Wayland, MA 01778
508-358-2282

BY FAX AND CERIFIED MAIL #7000-2870-0000-6641-7044

November 26, 2001

Mr. Ronald C. Slager, Jr.
Manager Environmental Restoration
Raytheon Company
1001 Boston Post Road
Marlborough, MA 01752

RE: Former Raytheon Facility
430 Boston Post Road
Tier IB Permit #133939 (Multiple RTNs)

Dear Ron;

I am writing as an individual citizen to follow up on several issues raised in my letter of September 17, 2001 to John Drobinski that were neither addressed in the Phase II or Phase III documents as suggested by your reply to that letter prior to the PIP meeting on October 24, 2001 nor in the PIP meeting.

1 Please provide technical justification why you did not notify DEP of the categorical Imminent Hazard to Human Health posed by the surface sediment concentrations of PCBs, arsenic, and hexavalent chromium within 500 feet of a recreation area or park (Great Meadows National Wildlife Refuge). And when were the data collected that exceeded the criteria in 310 CMR 40.0321(2)?

2 Please provide technical justification why the release notification form submitted by you in response to discovery of the stunted growth area had checked off that you had a "potential imminent hazard" and did not indicate "poses imminent hazard."

3 Please provide technical justification why 72-hour reporting for one or more Condition(s) of Substantial Release Migration (CSRM) 310 CMR 40.0313(5) was not made regarding the following points:

3-A Although you notified DEP of the imminent hazard evidenced by stressed biota, why was there no notification of the CRSM triggered by actual detection of contaminants in wetland sediments? What was the first date of sampling that detected contaminants in wetland sediments?

3-B You report sampling detected site contaminants of concern in surface water at the site. While you presented a position that the detection was a result of a "local condition" unrelated to your disposal site, why was the detection of contaminants in surface water was not reported to DEP? What was the first date of sampling that detected contaminants in surface water?

3-C You report detection of concentrations of VOCs in ground water at Monitoring Well MW-40 near the eastern extent of the property where there is an intermittent stream. The report did not include sampling of the stream to establish whether VOCs are detectable there, nor was there analysis of the potential rate of migration and whether VOCs are likely within one year to be detected. There are occupied residences in that direction such that definition of the extent of contamination around that well is also necessary to assess whether ground water have resulted or are within one year likely to result in the discharge of vapors into the occupied residential dwellings.

4 Your Phase II and Phase III reports summarily deny the possible pathway of migration to indoor air with nearby occupied residential dwellings but there is limited substantiation with fact that this pathway is not active, particularly the lack of characterization of off-site, down gradient groundwater concentrations. What is your technical justification to overcome the presumption as required by 310 CMR 40.0414(3) that immediate response actions such as the installation of monitoring wells near those residences or testing indoor air are not necessary to address the critical exposure?

The Raytheon operations were identified as a property subject to CERCLIS listing in 1980 by EPA and given high priority following their initial site visits during the mid-1980s. It is remarkable that discovery of the most serious conditions did not occur until 20 years later. The Massachusetts Contingency Plan regulations establish a system of reporting for each reportable condition identified at a disposal site. Those reporting requirements are the foundation and premise for subsequent timely actions by responsible parties and for disclosure in the public record.

Very truly yours,

J. Andrew Irwin
73 Plain Road
Wayland, MA 01778

Cc: Mr. John Drobinski - ERM
Wayland Conservation Commission
Wayland Board of Selectmen
Wayland Board of Health
Wayland Water Department
Pat Donohue – DEP Northeast Region BWSC
Karen Stromberg - DEP Northeast Region BWSC PIP Coordinator
Wayland Public Library (PIP Repository)
Nancy Smith – EPA
Susan J. Crane, Esq. – Scenic & Wild Rivers

WAYLAND WASTEWATER MANAGEMENT DISTRICT COMMISSION

Commissioners:
Lana Carlsson-Irwin
Eugene Roberts
Christopher Woodcock

Town Office Building
Cochituate Road
Wayland, MA 01778
508-358-3620

November 21, 2001

Mr. Ronald C. Slager, Jr.
Manager Environmental Restoration
Raytheon Company
1001 Boston Post Road
Marlborough, MA 01752

RE: Former Raytheon Electronics Systems facility
430 Boston Post Road, Wayland, MA

Dear Mr. Slager,

The Wayland Wastewater Management District Commission has the following questions and comments on the report submitted by Raytheon.

On October 26, 2000 Raytheon collected a water sample from the "effluent water stream outfall" of the Town's wastewater treatment plant. Their enclosed map showing the sampling point is unclear as to whether the water sample was collected from the water exiting the outfall pipe or from the swale located at the outfall pipe. We have enclosed a copy of the cover letter and report. They presented us with the results which found elevated amounts of some metals and a pH of 4.4. Their analytical results showed quality control exceedances for cadmium, calcium, lead, manganese, nickel and tin.

pertinant pages of the

Question 1: Will Raytheon clarify whether the sample was collected from the actual discharge or from the swale located at the outfall (surface water)? If not, why not?

Question 2: Will Raytheon be resampling from that same sample point wherever it is to given the quality failures of the first set of data? If not, why not?

On October 25, 2001, the Wastewater District had two water samples analyzed. One was from the sampling point within the plant at the head of the outfall pipe and the other from the actual outfall flow. The samples were analyzed for thirteen metals. Eleven of them had results at Below Reporting Limits (BRL). Copper and zinc were detected at below reporting concentrations at the outfall. Water was also tested at the sampling point for pH

which was reported to us by our operator as being approximately 7.0. A copy of our report is enclosed.

Question: Will Raytheon explain the discrepancy between their results and ours? If not, why not?

Very truly yours,

Wayland Wastewater Management District Commission

Sara Carlson-Irwin, Chair

Cc:
Wayland Board of Health
Wayland Conservation Commission
Wayland Water Department
Wayland Board of Selectmen

Karen Stromberg
PIP Coordinator
MA Department of Environmental Protection
205 Lowell Street
Wilmington, MA 01887

PIP Repository

GROUNDWATER ANALYTICAL

Project Narrative

Project: **Wayland/207006.002**
Client: **Woodard & Curran**

Lab ID: **45578**
Received: **10-25-01**

A. Physical Condition of Sample(s)

This project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged in appropriate containers with the correct preservation.

B. Project Documentation

This project was accompanied by satisfactory Chain of Custody documentation. The sample container label(s) agreed with the Chain of Custody.

C. Analysis of Sample(s)

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these sample(s). All data contained within this report are released without qualification.

(★) No - Preservatives (★)

GROUNDWATER ANALYTICAL

228 Main Street, P.O. Box 1200
Buzzards Bay, MA 02532
Telephone (508) 759-4441
FAX (508) 759-4475

CHAIN-OF-CUSTODY RECORD AND WORK ORDER

No 048357

Project Name: Wayland
Project Number: 207.006.002
Sampler Name: P. Cignarella
Project Manager: P. Cignarella

Woodard & Curran
Address: P.O. Box 159
City / State / Zip: Wayland, Mass 01778
Telephone: 508-358-7965

TURNAROUND

☐ STANDARD (10 Business Days)
☐ PRIORITY (5 Business Days)
☒ RUSH (RAN-__________)
(Rush requires Rush Authorization Number)

Please FAX ☒ YES ☐ NO
FAX Number: 508-358-7965

BILLING

Purchase Order No.:
GWA Reference No.:

INSTRUCTIONS: Use separate line for each container (except replicates).

Date (2001)	Time	Sample Identification	Matrix: Water	Type: Grab	Container: 600mL/16 oz Plastic	Preservation: Ice	Laboratory Number (Lab Use Only)	Metals: 13 Priority Pollutant metals
10-25		Plant Effluent	✓	✓	✓	✓	45578 1	✓
		Outfall Pipe	✓	✓	✓	✓	2	✓

ANALYSIS REQUEST

Volatiles / Semivolatiles / Pest/Herb/PCBs / Metals: ☒ 13 Priority Pollutant metals / Petroleum Hydrocarbons / Haz Waste / General Chemistry / Other: 13 PP metal - MW: TCLP

REMARKS / SPECIAL INSTRUCTIONS

Town of Wayland Request.
To be completed by (report) 10/31/01 Please
Total 2

DATA QUALITY OBJECTIVES

Regulatory Program

☐ Safe Drinking Water Act
☐ MA DEP Form
☒ NPDES/Clean Water Act
Specify State: ______
☐ RCRA/Haz. Waste Char.
☐ MA MCP (310 CMR 40) Reportable Concentrations
☐ RCGW-1 ☐ RCS-1
☐ RCGW-2 ☐ RCS-2
☐ MA Dredge Disposal
☐ NH ☐ RI ☐ CT ☐ ME
Specify Category: ______

Project Specific QC

Many regulatory programs and EPA methods require project specific QC. Project specific QC includes Sample Duplicates, Matrix Spikes, and/or Matrix Spike Duplicates. Laboratory QC is not project specific unless prearranged. Project specific QC samples are charged on a per sample basis. For water samples, each MS, MSD and Sample Duplicate requires an additional sample aliquot.

Project Specific QC Required: ☐ Sample Duplicate ☐ Matrix Spike ☐ Matrix Spike Duplicate

Selection of QC Sample: ☐ Selected by laboratory ☐ Please use sample: ______

CHAIN-OF-CUSTODY RECORD

NOTE: All samples submitted subject to Standard Terms and Conditions on reverse hereof.

Relinquished by	Date	Time	Received by
Relinquished by Sampler: Preston Cignarella	10-25-01	13:32	Alan Maddigan
Relinquished by:			Received by:
Relinquished by: Alan Maddigan	10/25/01	5:33	Received by Laboratory: [illegible]

Receipt Temperature: 21.1 °C
Shipping/Airbill Number:
Custody Seal/Cooler Serial Number:

Method of Shipment: ☐ GWA Courier ☐ Express Mail ☐ Federal Express ☐ UPS ☐ Hand ☐

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: **Plant Effluent**
Project: **Wayland/207006.002**
Client: **Woodard & Curran**
Container: **250 mL Plastic**
Preservation: **HNO3 / Cool**
Matrix: **Aqueous**

Laboratory ID: **45578-01**
Sampled: **10-25-01**
Received: **10-25-01**
Preserved: **10-25-01**

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QC Batch	Method
7440-36-0	Antimony,Total	BRL	mg/L	0.06	10-27-01	MB-0448-W	200.7
7440-38-2	Arsenic,Total	BRL	mg/L	0.01	10-27-01	MB-0448-W	200.7
7440-41-7	Beryllium,Total	BRL	mg/L	0.004	10-27-01	MB-0448-W	200.7
7440-43-9	Cadmium,Total	BRL	mg/L	0.005	10-27-01	MB-0448-W	200.7
7440-47-3	Chromium,Total	BRL	mg/L	0.01	10-27-01	MB-0448-W	200.7
7440-50-8	Copper,Total	0.075	mg/L	0.025	10-27-01	MB-0448-W	200.7
7439-92-1	Lead,Total	BRL	mg/L	0.005	10-27-01	MB-0448-W	200.7
7439-97-6	Mercury,Total	BRL	mg/L	0.0002	10-29-01	MP-1052-W	245.1
7440-02-0	Nickel,Total	BRL	mg/L	0.04	10-27-01	MB-0448-W	200.7
7782-49-2	Selenium,Total	BRL	mg/L	0.05	10-27-01	MB-0448-W	200.7
7440-22-4	Silver,Total	BRL	mg/L	0.01	10-27-01	MB-0448-W	200.7
7440-28-0	Thallium,Total	BRL	mg/L	0.02	10-27-01	MB-0448-W	200.7
7440-66-6	Zinc,Total	BRL	mg/L	0.2	10-27-01	MB-0448-W	200.7

Method References: Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised (1983), and Methods for the Determination of Metals in Environmental Samples, Supplement I, EPA-600/R-94-111, (1994), and 40 C.F.R. 136, Appendix C (1990).

Report Notations: BRL Indicates result, if any, is below reporting limit for analyte. Reporting limit is the lowest value that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

GROUNDWATER ANALYTICAL

Trace Metals by ICP-AES and CVAA

Field ID: **Outfall Pipe**
Project: **Wayland/207006.002**
Client: **Woodard & Curran**
Container: **250 mL Plastic**
Preservation: **HNO3 / Cool**
Matrix: **Aqueous**

Laboratory ID: **45578-02**
Sampled: **10-25-01**
Received: **10-25-01**
Preserved: **10-25-01**

CAS Number	Analyte	Concentration	Units	Reporting Limit	Analyzed	QC Batch	Method
7440-36-0	Antimony,Total	BRL	mg/L	0.06	10-27-01	MB-0448-W	200.7
7440-38-2	Arsenic,Total	BRL	mg/L	0.01	10-27-01	MB-0448-W	200.7
7440-41-7	Beryllium,Total	BRL	mg/L	0.004	10-27-01	MB-0448-W	200.7
7440-43-9	Cadmium,Total	BRL	mg/L	0.005	10-27-01	MB-0448-W	200.7
7440-47-3	Chromium,Total	BRL	mg/L	0.01	10-27-01	MB-0448-W	200.7
7440-50-8	Copper,Total	0.077	mg/L	0.025	10-27-01	MB-0448-W	200.7
7439-92-1	Lead,Total	BRL	mg/L	0.005	10-27-01	MB-0448-W	200.7
7439-97-6	Mercury,Total	BRL	mg/L	0.0002	10-29-01	MP-1052-W	245.1
7440-02-0	Nickel,Total	BRL	mg/L	0.04	10-27-01	MB-0448-W	200.7
7782-49-2	Selenium,Total	BRL	mg/L	0.05	10-27-01	MB-0448-W	200.7
7440-22-4	Silver,Total	BRL	mg/L	0.01	10-27-01	MB-0448-W	200.7
7440-28-0	Thallium,Total	BRL	mg/L	0.02	10-27-01	MB-0448-W	200.7
7440-66-6	Zinc,Total	0.2	mg/L	0.2	10-27-01	MB-0448-W	200.7

Method References: Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised (1983), and Methods for the Determination of Metals in Environmental Samples, Supplement I, EPA-600/R-94-111, (1994), and 40 C.F.R. 136, Appendix C (1990).

Report Notations: BRL Indicates result, if any, is below reporting limit for analyte. Reporting limit is the lowest value that can be reliably quantified under routine laboratory operating conditions. Reporting limits are adjusted for sample dilution and sample size.

TCLP

GROUNDWATER ANALYTICAL

Groundwater Analytical, Inc.
P.O. Box 1200
228 Main Street
Buzzards Bay, MA 02532

Telephone (508) 759-4441
FAX (508) 759-4475

October 31, 2001

Mr. Preston Cignarella
Woodard & Curran
P.O. Box 159
Wayland, MA 01778

Project: **Wayland/207006.002**
Lab ID: **45578**
Sampled: **10-25-01**

Dear Preston:

Enclosed are the Metals Analyses performed for the above referenced project. This project was processed for Rush turnaround.

This letter authorizes the release of the analytical results, and should be considered a part of this report. This report contains a project narrative indicating project changes and non-conformances, a brief description of the Quality Assurance/Quality Control procedures employed by our laboratory, and a statement of our state certifications.

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

Should you have any questions concerning this report, please do not hesitate to contact me.

Sincerely,

Jonathan R. Sanford
President

JRS/dem
Enclosures

Raytheon

Command, Control, Communication and Information Systems
1001 Boston Post Road
Marlborough, Massachusetts
01752-3789 USA
508.490.1000

June 14, 2001

Wastewater Management Committee
Attn: Gene Roberts
Wayland Town Hall
41 Cochituate Road
Wayland, MA 01778

RE: WWTP– OF-1 Sampling Results
Former Raytheon Electronic Systems Facility
430 Boston Post Road
Wayland, Massachusetts

Dear Mr. Roberts:

On October 24, 2000, Environmental Resources Management (ERM) on behalf of Raytheon Electronic Systems (Raytheon) requested permission from Mr. Gene Roberts of Town of Wayland Wastewater management Committee to collect an effluent sample from the Town of Wayland's Nation Pollution Discharge Elimination System (NPDES) outfall OF-01 located on and adjacent to, the former Raytheon facility at 430 Boston Post Road in Wayland. A photocopy of the request letter dated October 24, 2000 is included as Attachment 1. On October 25, 2000, ERM received verbal approval from Mr. Gene Roberts of the Town of Wayland to sample outfall OF-01.

The purpose of this letter is to provide the Town of Wayland with effluent water sample results collected from the above referenced location. On October 26, 2000 ERM collected a water sample from the effluent water stream from outfall OF-01. Refer to the Figure 1 (Attachment 2) for approximate location of outfall OF-01.

Water sample OF-01 was analyzed for dissolved organic carbon, dissolved metals (including hexavalent chromium) and hardness at Woods Hole Group Environmental Laboratories, located in Raynham, Massachusetts. A photocopy of the laboratory analytical report for the water sample collected from OF-01 is included as Attachment 3. Field parameters (pH, temperature, and conductivity) were recorded using a Hydac Meter. Refer to Table 1 (below) for summary of field parameters.

Table 1. Summary of Field Parameters

Location ID	pH	Temperature	Conductivity
OF-01	4.4	64.2	2.27

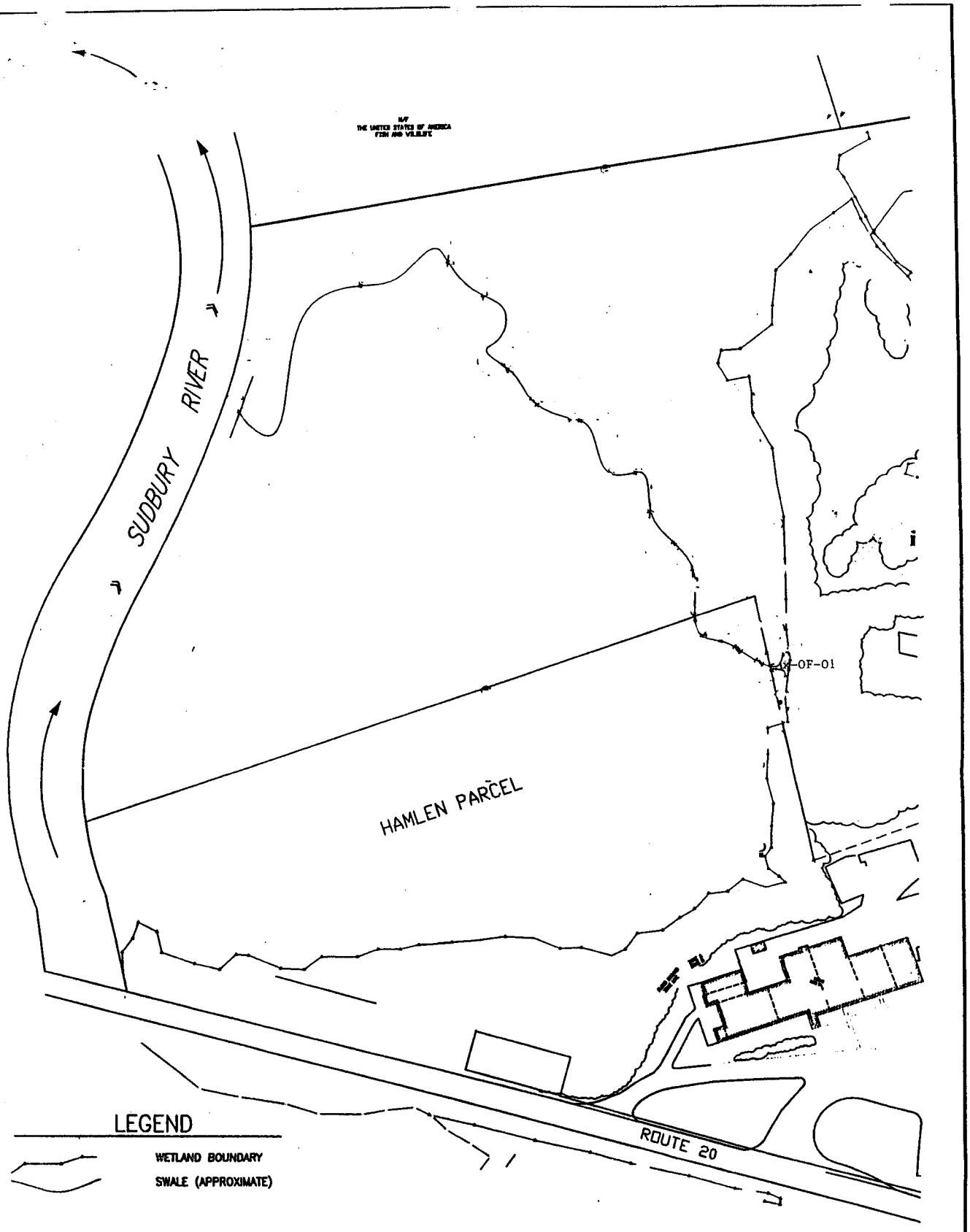
If you have any questions, please do not hesitate to contact me at (508) 490 – 1351.

Sincerely,

Edwin P. Madera
Raytheon Company
Senior Environmental Technologist
1001 Boston Post Road
M/S 1-2-1567
Marlborough, MA 01752

Attachments

cc: John W. McTigue, ERM, 399 Boylston Street, 6th Floor, Boston, MA 02116



Note: Base Map adpated from 1996 VHB facility map

ERM	Raytheon Company	Designed by:	Approximate Location of Outfall OF-01
	430 Boston Post Road Wayland, Massachusetts	Drawn by: RL/CMP	
Revisions		Checked by: RJF	
Symbol / Description / Date / Approved		Reviewed by: JMcT	Scale: 1" = 120' Date: 02/19/01/03.12.01
		Submitted by:	Drawing No. Figure No.

120 60 0 120
Scale in Feet

ANALYTICAL REPORT

Prepared for:

ERM, New England, Inc.
399 Boylston Street
Boston, MA 02116

Project:	Raytheon
ETR:	00045058
Report Date:	11/16/2000

Certificates
Massachusetts MA030
Connecticut PH-0141
New Hampshire 220699
Rhode Island 64
New Jersey 59015
Maine MA030

CASE NARRATIVE

Woods Hole Group Environmental Laboratories

ETR: 45058
Project: Raytheon

All analyses were performed according to Woods Hole Group's documented Standard Operating Procedures (SOPs), within holding time and with appropriate quality control measures except where noted. Blank correction of results is not performed in the laboratory for any parameter. Soil/sediment samples are reported on a dry weight basis unless otherwise noted.

Metals

Samples associated with this data package were filtered through 0.45µm pore size membrane filters upon receipt at the laboratory. Results are reported for dissolved metals analyzed by ICP MS (Method 6020). Hardness was determined by calculation on a digested portion of the total sample.

Sample OF-1 (laboratory ID 45058-01) was digested in duplicate with a high and low matrix spike, preparation blank and LCS. All instrument and batch QC results were within method acceptance criteria except the following:

1. Cadmium: The RPD between the sample result and the serial dilution result was 22.8% and higher than the 10% method acceptance limit. All results are flagged (E) to indicate this QC failure.
2. Calcium: The RPD between the sample result and the serial dilution result was 12.0% and higher than the 10% method acceptance limit. All results are flagged (E) to indicate this QC failure.
3. Lead: The RPD between the sample result and the serial dilution result was 46.4% and higher than the 10% method acceptance limit. All results are flagged (E) to indicate this QC failure.
4. Manganese: The RPD between the sample result and the serial dilution result was 91.3% and higher than the 10% method acceptance limit. All results are flagged (E) to indicate this QC failure.
5. Nickel: The RPD between the sample result and the serial dilution result was 24.4% and higher than the 10% method acceptance limit. All results are flagged (E) to indicate this QC failure.
6. Tin: Recovery of tin from the matrix spike sample was 128.5% and outside of the 75% - 125% method acceptance range indicating that reported results may be overestimated. All sample results were below the method detection limit and are flagged (N) to indicate this QC failure. The LCS recovery was within method acceptance limits.

The enclosed results of analyses are representative of the samples as received by the laboratory. Woods Hole Group makes no representations or certifications as to the method of sample collection, sample identification, or transporting/handling procedures used prior to the receipt of samples by Woods Hole Group. To the best of my knowledge, the information contained in this report is accurate and complete.

Approved by: Susan R. Drake Date: 11-29-00
Woods Hole Group Environmental Laboratories

ANALYTICAL REPORT

Woods Hole Group Environmental Laboratories

ERM, New England, Inc.
399 Boylston Street
Boston, MA 02116

ETR: 00045058
Project: Raytheon

Sample ID: OF-1 **Matrix:** WATER **Date Collected:** 10/26/2000
Lab ID: 0045058-01 **Date Received:** 10/27/2000

Parameter	Result	Qualifier	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Aluminum, Dissolved	310		µg/L	5	50	6020		11/13/2000	LMV
Antimony, Dissolved	5.0	U	µg/L	5	5.0	6020		11/13/2000	LMV
Arsenic, Dissolved	0.71		µg/L	5	0.50	6020		11/13/2000	LMV
Barium, Dissolved	82		µg/L	5	0.50	6020		11/13/2000	LMV
Beryllium, Dissolved	0.50	U	µg/L	5	0.50	6020		11/13/2000	LMV
Cadmium, Dissolved	0.56	E	µg/L	5	0.50	6020		11/13/2000	LMV
Calcium, Dissolved	53000	E	µg/L	5	250	6020		11/13/2000	LMV
Chromium, Dissolved	1.0	U	µg/L	5	1.0	6020		11/13/2000	LMV
Cobalt, Dissolved	1.5		µg/L	5	0.50	6020		11/13/2000	LMV
Copper, Dissolved	90		µg/L	5	0.50	6020		11/13/2000	LMV
Hardness, Total	160000		µg/L	1	5000	2340B	11/13/2000	11/14/2000	LMV
Iron, Dissolved	200		µg/L	5	50	6020		11/14/2000	LMV
Lead, Dissolved	1.8	E	µg/L	5	0.50	6020		11/13/2000	LMV
Magnesium, Dissolved	11000		µg/L	5	250	6020		11/14/2000	LMV
Manganese, Dissolved	110	E	µg/L	5	0.50	6020		11/15/2000	LMV
Mercury, Dissolved	0.20	U	µg/L	2	0.20	7470	11/13/2000	11/14/2000	DJL
Nickel, Dissolved	18	E	µg/L	5	0.50	6020		11/13/2000	LMV
Potassium, Dissloved	69000		µg/L	5	250	6020		11/13/2000	LMV
Selenium, Dissolved	2.5	U	µg/L	5	2.5	6020		11/13/2000	LMV
Silver, Dissolved	0.50	U	µg/L	5	0.50	6020		11/13/2000	LMV
Thallium, Dissolved	0.50	U	µg/L	5	0.50	6020		11/13/2000	LMV
Tin, Dissolved	20	U E	µg/L	1	20	282.2		11/13/2000	CLM
Vanadium, Dissolved	2.5	U	µg/L	5	2.5	6020		11/13/2000	LMV
Zinc, Dissolved	360		µg/L	5	2.5	6020		11/13/2000	LMV

Sample ID: T-2-6 **Matrix:** WATER **Date Collected:** 10/26/2000
Lab ID: 0045058-02 **Date Received:** 10/27/2000

Parameter	Result	Qualifier	Units	Dilution Factor	RL	Method	Date Prepared	Date Analyzed	Analyst
Aluminum, Dissolved	210		µg/L	5	50	6020		11/13/2000	LMV

U = The analyte was analyzed for but not detected at the sample s

N/A = Not Applicable
RL = Reporting Limit