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**WPNSTA YORKTOWN COMMENTS ON THE
DRAFT GEOPHYSICAL INVESTIGATION DATED JULY 1992
COMMENTS FAXED SEPTEMBER 29, 1992**

GENERAL COMMENTS

1) A statement in the introduction explaining why GPR was not employed at all sites (i.e., inaccessibility, physical limitations, equipment requirements, etc.) should be included. Also a brief explanation as to what EM provides vice GPR, preferably in layman's terms would be beneficial.

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 1-1, Section 1, paragraph 1, line 8 and page 2-4, Subsection 2.3.2, paragraph 1, line 2 for further clarification of this comment.

2) Orient all inset maps in the same plane as larger, color maps (or vice versa) and include landmarks (especially roads, monitoring wells, ponds, creeks, etc.) as reference points on both maps. Also, EM and interpretative GPR maps should show same nomenclature and landmarks (i.e., Figure 3-1A identifies a grassy area, while Figure 3-1D identifies the same location as Capped Area/Clean Backfill).

The figures in the Draft Final version of the Round 1 RI Report have been modified to incorporate the aforementioned comment.

3) List of figures in table of contents lists page numbers for conductivity plots/profiles but the actual figures are not numbered.

The figures in the Draft Final version of the Round 1 RI Report have been numbered to incorporate the aforementioned comment.

SPECIFIC COMMENTS

Cover Page: Insert WPNSTA Yorktown Environmental Programs logo beneath cover page window (this logo is available from Melissa Davidson of Baker Environmental, Inc.).

The cover page of the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment.

Post-It™ brand fax transmittal memo 7671		# of pages ▶	13
To	Brenda Norton	From	A. Sarkis
Co.	Naval Fac. Engrg.	Co.	Weston
Dept.	Command	Phone #	215/430-7505

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Page 1-3: Map has some problems..We are not an island surrounded by Kings Creek, so delete this label from the border outline. The location of the Colonial National Historical Park is incorrect; it is to the east and the southeast of the community of Lackey. Ballards Creek is located on Park property, not WPNSTA property. Change Route 64 to Interstate 64.

The figure in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment (see page 1-3).

Page 1-4: The GPR data should also be maintained at WPNSTA, Yorktown as well as LANTDIV and WESTON. Anyone in the local area interested in reviewing these data should not have to travel to see them; it is expected to be maintained at the facility.

The GPR data will be forwarded to WPNSTA Yorktown for their files.

Page 2-1, Section 2.1: Explain why GPR grids vary in spacing from 25 ft to 100 ft (same comment for Table 1-1).

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 2-1, paragraph 1, lines 3-8 for further clarification.

Page 2-1, Section 2.2.1: Please translate last sentence of 1st paragraph (i.e., "Apparent conductivity...") into a language us laymen can understand.

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 2-1, Subsection 2.2.1 for further clarification.

Page 3-4: Paragraph 1 states that ..."it is estimated that the waste extends another 250 to 300 feet to the east and south...". Does this mean that we only mapped the upper NW quadrant of the suspected landfill area? If so, why weren't grids extended south and east to give the big picture and to further delineate these boundaries? This would have eliminated the need for hypothesizing about the extent of the actual disturbed areas. Furthermore, GPR shows that "disturbances extend beyond the northern limits of the waste area as defined by the EM data." It appears that grids should also have been extended further north to assist in defining this boundary. Has the objective to delineate all boundaries by GPR been met, as stated in Table 1-1?

The text in the Draft Final version of the Round 1 RI Report has been modified

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to incorporate the aforementioned comment. See page 3-4, paragraph 4 for further clarification.

Also, conductivity values are presented throughout the report in ms/m, yet they are shown in mmhos/m in Table 3-1. It is difficult to compare these data when different units of measure are used. This inconsistency should be corrected.

The text, figures, and tables in the Draft Final version of the Round 1 RI Report have been modified to show consistent units.

Figure 3-1C: The legend on this figure states this traverse is taken from Site 16. If this is true, why is Site 16 traverse used for Site 1, and why is a calibration traverse over a water pipe used to show a "representative radar profile" at this site? If incorrect, please correct legend. If it is indeed profile lines from Site 1, the traverse is 00E, not 000.

The figure in the Draft Final version of the Round 1 RI Report has been modified.

Page 3-7, Section 3.2: The first paragraph states "This anomaly is artificially induced by the monitoring well..." Couldn't the mine casings, ammo boxes, torpedo bodies, etc. found NE of the 0/0 grid node (to the right of the entrance to the site) also be contributing to this anomaly?

No visible waste has been found in the vicinity of monitoring well MW2-01. The other two anomalies encountered at this site may be attributed to surface debris.

Page 3-11, Section 3.3: The second paragraph states that the northern limits of Site 3 are ill defined, yet Table 1-1 states the objective is to define all boundaries. Why was northern boundary not delineated? Furthermore, what makes author suspect that northern boundary approximates the 200N grid line? What is the basis for this suspicion?

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 3-11, Subsection 3.3, paragraph 2, lines 4-6 for further clarification.

Figure 3-3A: Is the road on the larger map drawn correctly? The scale seems a little off when comparing it with the inset map.

The figure in the Draft Final version of the Round 1 RI Report has been

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modified to incorporate the aforementioned comment.

Page 3-14, Section 3.4: There is no reference to Table 3-2 in the discussion of how background conductivity values are identified (i.e., the relationship between conductivities and the type of sediments found at the site as identified in the well installation boring logs). Same comment applies to Site 12.

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 3-14, Subsection 3.4 for further clarification.

Correct the typo on line 8 of Section 3.4 from "on in the in-phase" to "on the in-phase."

The text in the Draft Final version of the Round 1 RI Report has been corrected to "on the in-phase."

Dashed lines are referenced as being on Figure 3-4B. Where? They are on Figure 3-4D, but this is for GPR, not EM results.

The dashed lines indicating the waste boundaries have been added to the figures.

Perhaps the "...southern and eastern limits of the fill area are not as well defined in the plots as their counterparts" because the survey did not extend far enough in these directions. Has the objective to define the boundaries as identified in Table 1-1 been met?

The survey did not cover this area as it was not part of the scope. However, in several cases, the survey coverage was extended far beyond the areas that were scoped. The boundaries were identified as found.

Last sentence in Section 3.4 states that the blue anomaly at 105S/200E is associated with exposed ash. This statement could mislead the reader into thinking all blue anomalies are indicative of ash in the area. Should reword this to avoid confusion.

This statement has been reworded to be less misleading. The reference to blue was deleted to avoid misleading the reader into thinking that all blue anomalies are associated with ash. The reference to blue was merely an indication of the electromagnetic intensity.

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The GPR profile shown was conducted along the 250E, not 200E, from 15S to 300S, not from 10S to 300S (reference found in Appendix, Page A-3).

The GPR profile shown in Figure 3-4C was conducted along the 250E traverse from 10S to 300S. This figure is a segment of the profile from 15S to 100S.

The last sentence reiterates Section 2 discussion of calibrations of two-way travel times (tw) and known depths of buried utilities. Why is this mentioned? Perhaps the first part of the next paragraph which discusses the depth of a certain reflector is the reasoning behind mentioning twt and known depths. If this is the case, please tie the two ideas together by combining them into the same paragraph.

This reference relates to additional calibration profiles that were conducted at Site 4.

Figure 3-4C: Traverse is not identified. Is line 38 E or W? Horizontal axis is not identified.

The Figure (3-4C) has been revised. The traverse number (250E) has been included in the footer. The line number (38) is an index number. The horizontal axis has been labeled.

Page 3-19, Section 3.4: The text states that "...boundaries to the north, west and southeast are well defined...", yet the text on page 3-14 states that the southern and eastern boundaries are ill defined... Are we well or ill? The text further states that "it is likely that it (eastern boundary) extends to the adjacent treeline"... Why is this likely? Did I miss something?

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 3-14, Subsection 3.4, line 15 and page 3-19, paragraph 2, line 12 for further clarification.

Page 3-19, Section 3.5: The 6 to 10+ ms/m color scale appears to be shown as light green to red, not brown, as seen in Figure 3-5A.

The text in the Draft Final version of the Round 1 RI Report has been modified to address the aforementioned comment (see page 3-15, Subsection 3.5).

Page 3-22: Is the western boundary interpreted to terminate near the 150 South line, as stated in the text, or the 150 East line?

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The text in the Draft Final version of the Round 1 RI Report has been modified to address the aforementioned comment. See page 3-22, paragraph 1, line 7 for further clarification.

In the first paragraph of the GPR section, the fourth sentence identifies four areas where the subsurface has been disturbed. The fifth sentence states this area demarcates the northern boundary limits. Which area of the four identified demarcates the northern limits? 0N, 50N, 75S, or 150S? Additionally, three of these four points lie north of the existing road leading to the incinerator, but the current landfill boundaries show this road as the northern boundary. Does this imply the landfill is further north than previously identified? Why or why not?

The interpretive (dashed) boundaries of the waste area shown in the figures represent what is believed to be the main fill area. Some independent anomalies were identified to the north that may reflect scattered debris outside of the main fill area.

Why is there no radar profile for this site?

A complete set of color radar profiles for all sites will be forwarded to WPNSTA Yorktown for their files.

Figure 3-5C: This figure is the most confusing figure yet! There are no landmarks to identify location. Please insert landmarks as shown in the inset to orient the reader. Why doesn't the "suspected buried utility" running from 125S/60E to 125N/150E show up on the EM figures?

Figure 3-5C has been modified; site landmarks have been added to the figure. The characteristics of some of the utilities do not always provide complimentary results between the EM and GPR. For example, the overhead power lines at Site 12 (evident in the EM) are not seen in the radar profiles. In some situations, the GPR may profile a signal with a consistent geometry that is more easily identifiable as a utility, but is not apparent to the EM. In other situations, there may be good correspondence between the GPR und EM anomalies.

Figures 3-6A and B: Monitoring well 16GW02 is not located correctly; the well lies north, not south, of the road shown. To what does the dashed, circled area refer? There is a line that bisects the contour lines, encircling the suspected fill area. What does this line represent? If it is supposed to represent the boundary of the landfill, why is it only shown at this site and not the other sites?

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This figure has been corrected as follows. Monitoring well 16GW02 has been correctly relocated. The dash circle and solid line that bisected the contours were "carryovers" from the rough interpretation plots, have no bearing on the interpretation, and have been deleted.

Figure 3-6C: Does this traverse refer to line 12 referenced in Appendix A? If so, the Station runs from -160N to -370N, not -37N.

The figure in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment.

Figure 3-6D: This figure has absolutely no landmarks included to orient the reader. Where exactly is it that I am looking?

The figure in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment.

Figure 3-8A: The slope on this figure is drawn incorrectly. Perhaps when the larger map and the inset map are similarly oriented, this will be much more obvious. Additionally, monitor well 21GW01 is not located in the road, but to the east of it, and monitor well 21GW02 is not located in the ravine, as portrayed in the figure, but on top of the slope leading to the ravine.

The figure in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment.

It appears the waste area is much larger than originally thought. The area in the figure shows it to extend eastward well beyond the present road. Why is this rather significant observation missing from mention in the text?

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See Subsection 3.8, line 7 for further clarification.

Page 4-1, Bullet 3: Delete "the" so the first sentence will read "...the southern boundary fill extends to approximately the 25N grid line..."

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment (see page 4-1, bullet 3).

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Page 4-1, Bullet 4: Which dashed line in Figure 3-4B approximates the northern and western boundaries? I thought the dashed lines represented the traverses used in the study. Why does this figure, Figures 3-4A, 3-2A, 3-2B, 3-7A, and 3-7B use dashed lines when the other figures use a solid line with hash marks to represent the traverses?

Figure 3-4B has been revised to show the waste boundaries approximating the dashed line. The differences between dashed and solid lines are a function of the control parameters which are set during the contour plotting procedures. This has no impact at all on either the data or its interpretation.

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**U.S. EPA COMMENTS ON THE
DRAFT GEOPHYSICAL INVESTIGATION DATED JULY 1992
COMMENTS DATED AUGUST 25, 1992; FAXED SEPTEMBER 29, 1992**

GENERAL COMMENTS

Section 2, Page 2-4

The reason for using GPR on only four of the eight sites should be stated.

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 1-1, Section 1, paragraph 1, line 8 and page 2-4, Subsection 2.3.2, paragraph 1, line 2 for further clarification.

Section 3.1, Site 1

A statistical or surface trend analysis between in-phase and quadrature EM-31 components may support differentiation of cultural or soil conductivity anomalies from metal object anomalies.

The inclusion of a statistical or surface trend analysis between in-phase and quadrature electro-magnetic components was outside the scope of work for this project.

Page 3-4 The conclusion from the EM interpretation is that waste extends 250 to 300 feet east and south of 0N/400E. There is no EM data south and east of this point. Is this conclusion based on the other reference physical features?

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 3-4, paragraph 1, line 2 for further clarification.

Page 3-4 The referenced northern limits of the waste area as defined by EM should be identified in plan view.

The figures in the Draft Final version of the Round 1 RI Report have been modified to incorporate the aforementioned comment (see Figures 3-1A and 3-1B).

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Page 3-4 An appendix of all the GPR profiles would assist a more complete technical review.

The GPR profiles are too voluminous to be included as part of the Round One RI Report. There are approximately 160 profiles (with each profile made up of approximately 3 panels) totaling approximately 450 panels. A copy of this data will be forwarded to EPA for their files.

Page 3-7 The areas of subsurface disturbed areas and EM anomalies do not correlate well. Also, specifically how has GPR helped delineate the landfill and meet the objective of the investigation?

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 3-4, paragraph 4 for further clarification.

Section 3.2. Site 2

Page 3-7 Are the referenced geoelectric measurements based only on Yorktown site field measurements as is suggested?

Yes, the term "other sites" refers to the other sites surveyed at WPNSTA Yorktown.

Section 3.3. Site 3

Page 3-11 The interpretation based upon EM data appears appropriate. It is suggested, however, that the rationale for suggesting boundaries outside the EM grid be explained.

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 3-11, paragraph 3, line 5 for further clarification.

Page 3-11 The text states that the western waste limits extend to approximately the 0E grid line. Which figure is this based on and how? It appears from Figure 3-3A that the western limit is approximately 110E.

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 3-11, paragraph 3, line 2 for further clarification.

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Section 3.4, Site 4

Page 3-14 The referenced dashed line in Figure 3-4b defining western and northern boundaries is not shown.

The figure in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment.

Page 3-14 It is stated that the GPR found material in the woods to be shallow. Is the material waste? If so, does this imply that the shallow waste indicated that the area is the landfill edge?

The text in the Draft Final version of the Round 1 RI Report has been revised to incorporate the aforementioned comment. See Page 3-14, paragraph 1, line 16 for further clarification of this comment.

Figure 3-4C Stations should be labeled on the Typical profile. Again, additional profiles would aid technical review.

Stations have been labeled on the typical radar profiles. A set of, all radar profiles will be forwarded to EPA for their files.

Figure 3-4D What does the dashed line represent? The legend should address such issues.

The dashed line represents an area of scattered surface debris. The legend has been appropriately modified.

Section 3.5, Site 12

Page 3-22 The western boundary is stated to be the 150S line, but should probably be the 150E line.

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment (see Page 3-22, paragraph 1, line 6).

Page 3-22 It is stated that the eastern boundary terminates at the drainageway. The text should state how this was determined and whether the southern boundary was determined as well.

The text in the Draft Final version of the Round 1 RI Report has been modified

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to incorporate the aforementioned comment. See page 3-22, paragraph 1, line 7 for further clarification.

Page 3-22 A fill area 400 feet east of Building 587 is mentioned. No EM or GPR data were recorded in the region. Therefore, how was this fill area limit determined? Is this fill area the "wood dump"?

The area east of Building 587 was not included in the scope of work for the EM and GPR surveys for Site 12. The reference related to this area are based on personal field observations. The northwest boundary grades in to the hillside and is not clearly defined. However, the southeast waste boundary is clearly exposed. Based on the exposed materials this appears to be the "wood dump."

Page 3-22 The most evident anomaly on the EM data is attributed to utilities, however, this anomaly is not identified by GPR. Similarly, a different anomaly is suspected from GPR (Figure 3-5C) but no corresponding anomaly is shown by the EM data. Please explain or re-evaluate the data.

The characteristics of some of the utilities do not always provide complimentary results between the EM and GPR. For example, the overhead power lines at Site 12 (evident in the EM) are not seen in the radar profiles. In some situations, the GPR may profile a signal with a consistent geometry that is more easily identifiable as a utility, but is not apparent to the EM. In other situations, there may be good correspondence between the GPR and EM anomalies.

Page 3-22 The northern fill boundary is established at 100S by EM, but the northern waste limits are interpreted to be farther north (i.e., 50N/42SE). Which is the interpreted northern limit?

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 3-22, paragraph 1, line 5 for further clarification.

Page 3-22 The southern boundary was not defined. Was this omitted from the objectives of the investigation?

The text in the Draft Final version of the Round 1 RI Report has been modified to incorporate the aforementioned comment. See page 3-22, paragraph 1, line 8 for further clarification.

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Figures 3-5 A, B, & C The inset map shaded area does not appear to correlate to the investigated area. Why?

The investigation covered approximately 1/2 of the shaded area and an additional 400 feet to the west. The shaded area to the east was not accessible to GPR. Also the fill boundary is defined in this area by the waste exposure.

Section 3.6, Site 16

Page 3-24 It is stated that a "drainage" is shown in Figure 3-6A. How and where is this shown? What is the heavy dashed line in Figures 3-6A and B? The figures and associated insets need complete legends.

The figures in the Draft Final version of the Round 1 RI Report have been modified to incorporate the aforementioned comment.

Page 3-27 The EM anomalies in the topographic ravine (blue areas) were attributed in the report to surface material, and underlying waste was assumed. However, the waste boundary was established by GPR. Additional section displays are necessary to confirm this interpretation.

The text and figures in the Draft Final version of the Round 1 RI Report have been modified to incorporate the aforementioned comment. See page 3-24, Subsection 3.6 and Figures 3-6a, 3-6b, and 3-6c for further clarification.

Section 3.7, Site 17

Figure 3-7B The EM in-phase results for Site 17 have been masked by the presence of railroad tracks running through the area. Aerial photography has depicted some ground disturbance in the west, and south-western section of the site. Further investigations into Site 17 may concentrate on those areas.

EPA's suggestion to concentrate on areas identified in historical air photo is noted.

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