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MEMORANDUM

To:	Valmichael Leos and Anne Foster, USEPA	**Date:**	February 21, 2014
From:	Wendell Mears, Randy Brown, David Keith, John Verduin, and John Laplante	**Project:**	090557-01.04
Cc:	Dave Moreira and Andrew Shafer, MIMC Phil Slowiak, IP		
Re:	San Jacinto River Waste Pits TCRA Armored Cap Enhancement Completion Report		

INTRODUCTION

This document provides a summary of enhancement activities with respect to the armored cap protective cover installed as part of the Time Critical Removal Action (TCRA) at the San Jacinto River Waste Pits (SJRWP) Superfund Site (TCRA Site). Construction of armored cap enhancements for protective cover occurred from January 17 through 27, 2014; inspection of material gradations in the armored cap enhancement areas was completed on February 13, 2014.

BACKGROUND

The TCRA was implemented by the Respondents, International Paper Company and McGinnes Industrial Maintenance Corporation (collectively, Respondents) under an Administrative Settlement Agreement and Order on Consent (AOC) with the U.S. Environmental Protection Agency (USEPA) – Docket No. 06-12-10, effective May 17, 2010 (USEPA 2010). A description of the TCRA implementation is provided in the associated project documentation:

- Removal Action Work Plan (RAWP; Anchor QEA 2010, 2011)
- Revised Draft Final Removal Action Completion Report[1] (RACR; Anchor QEA 2012)

[1] David Keith, the Respondents' the Project Coordinator, received a revised RACR from Valmichael Leos via email on August 15, 2012; however, the appendix to the RACR including the Operations, Monitoring, and Maintenance Plan, was not provided and is assumed to remain unchanged. Respondents reserve all rights related to the changes made by USEPA to the Revised Draft Final RACR.

At USEPA's request, the Respondents conducted a reassessment of the TCRA design and construction in parallel with a reassessment by the USEPA and the U.S. Army Corps of Engineers (USACE). The USEPA/USACE reassessment was included with the November 1, 2013 correspondence from the USEPA and the associated report "Review of Design, Construction and Repair of TCRA Armoring for the Western Berm of San Jacinto Waste Pits" (U.S. Army Corps of Engineers [USACE] 2013).

The USEPA/USACE reassessment, as set forth in the USACE report, confirmed the adequacy of the original TCRA design and the adequacy of the maintenance activities involving the western berm.[2] It also contained several recommendations that the USACE concluded would, if implemented, increase the factor of safety and provide additional protection to the armored cap from forces that may arise during flood events in the San Jacinto River. These recommendations included limiting slopes to no steeper than 1V:3H in areas of potential wave runup or high bottom shear stresses and a preference for the use of Armor Cap C natural rock.

On November 27, 2013, the Respondents submitted to USEPA a set of responses to the USACE conclusions, including an Armored Cap Enhancement Work Plan (Work Plan; Attachment 1). The Work Plan was approved by USEPA in a letter dated Friday, January 10, 2014 (Attachment 2).

This Work Plan outlined the use of Armor Cap D natural rock to flatten armored cap slopes at the TCRA Site to 1V:3H or flatter at seven areas within the wave runup or surf zone that were identified using survey data collected during the October 2013 armored cap inspection (Figure 1). Armor Cap D rock used for the armored cap enhancement was previously stockpiled at a location approximately 15 miles from the TCRA Site; this rock was ordered, tested, and stockpiled as part of the TCRA construction project. As described by the Work Plan (Attachment 1), the Armor Cap D rock (D_{50}=10 inches, D_{85}/D_{15}=1.55) exceeds the computed Maynord equation D_{50} particle size and has a larger D_{50} than the Armor Cap C rock. The use of

[2] The TCRA cap design, which was reviewed and approved by the USEPA, utilized an engineered armor layer to provide reliable containment of materials within the impoundments north of I-10 under the USACE's "Minor Displacement" scenario. The armor materials for the TCRA were sized using a factor of safety of 1.3, which exceeds the USACE suggested minimum factor of safety of 1.1 (USACE 1994).

Armor Cap D rock provides an increased level of stability, a factor of safety of at least 1.5, and provides additional enhancement beyond the measures outlined in the USACE's report.

In accordance with the Work Plan, the Respondents' contractor, USA Environment, LP (Contractor), mobilized to the Site on Friday, January 17, 2014, to begin armored cap enhancement activities.

ACTIVITIES

Pre-Mobilization and Mobilization Activities – Friday, January 17, 2014

Pre-mobilization activities included reviewing the Contractor's Health and Safety Plan (HASP), the Site access plan, and insurance certificates; notifying and coordinating with the Texas Department of Transportation (TxDOT); ordering materials and equipment; and notifying the USEPA of the construction schedule.

Mobilization of equipment to the TCRA Site occurred on January 17, 2014. The components of the mobilization included the following:

- Mobilized an excavator, two skid steer loaders, and 14 crane mats to the TCRA Site.
- Completed a pre-construction survey and marked the seven areas to be enhanced.
- Mobilized a wheeled front end loader to the Armor Cap D stockpile area located approximately 15 miles from the TCRA Site.

Activity reports, including photographs, are provided in Attachment 3 (Armored Cap Enhancement Daily Reports).

Maintenance Activities – Monday, January 20 to Monday, January 27, 2014

Construction activities each day began with a tailgate safety meeting. Dump trucks delivered Armor Cap D rock from the stockpile to the TCRA Site, end dumping the rock onto a temporary stockpile area located in the southeast corner of the Western Cell. Skid steer loaders transported the rock from the stockpile to each enhancement area, where the excavator would place the rock and grade it to a 1H:3V slope or flatter.

Construction for each of the enhancement areas occurred on the following dates:

- Area #1: January 20 and 21, 2014

- Area #2: January 21, 2014
- Area #3: January 21 and 22, 2014
- Area #4: January 22 and 23, 2014
- Area #5: January 23 and 27, 2014
- Area #6: January 22, 2014
- Area #7: January 23 and 27, 2014

Before completing an enhancement area and moving to the next, the post-enhancement slopes were field-measured for 1H:3V or flatter slopes at approximately 20-foot intervals using marked wooden boards placed horizontally and vertically atop the armored cap using a field level.

Construction proceeded first on the South Berm, then on the Central Berm in a north-to-south direction on the Central Berm. There was no construction activity on Friday, January 24, 2014, due to safety concerns resulting from freezing rain which would have made transport of personnel and Armor Cap D rock treacherous. Armored cap enhancement construction was finished on Monday, January 27, 2014, and a post-construction topographic survey of the enhancement areas was completed on the same date. Figures 2 and 3 contain cross-sections of the enhancement areas; each cross-section displays pre- and post-construction topographic survey data, and a line depicting the target 1V:3H slope.

Demobilization Activities – Monday, January 27, 2014

The Contractor loaded the crane mats and skid steers for transport from the TCRA Site on the afternoon of Monday, January 27, 2014. The TxDOT right-of-way was inspected for damage or debris. All materials and equipment used for the armored cap enhancement were demobilized from the TCRA Site on Monday, January 27, 2014. At request of the rental company, the excavator was placed outside the locked gate to the TCRA Site and picked up on Wednesday, January 29, 2014.

Material Gradation Inspection – Thursday, February 13, 2014

As a quality assurance check of the gradation for the materials used in the armored cap enhancement, an inspection was conducted to confirm that the rock placed during armored cap enhancement activities was appropriately sized and met the design criteria. The inspection was completed on February 13, 2014, and consisted of field gradation measurements conducted within the enhancement areas. The inspection was performed using the procedures outlined in

Appendix D of the National Cooperative Highway Research Program Report 568 – Riprap Design Criteria, Recommended Specifications, and Quality Control (NCHRP 2006). NCHRP Report 568 recommends the determination of gradation (i.e. particle size distribution) using along transects using the Wolman method (Wolman 1954).

Using this method, the particle sizes of the Armor Cap D rock was measured along three transects within the enhancement areas: the South Berm, the eastern slope of the central berm, and western slope of the central berm. The inspection was conducted in a zig-zag pattern across each transect (see Figure 4), measuring a rock size every 5 feet; 177 measurements were taken. Each rock was measured using a ruler across its intermediate axis, perpendicular to both the longest and shortest axes of the rock.

Results of the inspection are summarized in Table 1 below.

Table 1

Material Gradation Inspection Summary

Size[1]	Armor Cap D Specification	Gradation from Quarry Testing[2,3]	Gradation from Field Testing[4]
Maximum Size	18	15.2	21
D_{60}	N/A[5]	10.2	10
Median Size (D_{50})	8	9.9	9
D_{30}	N/A[5]	8.7	8
D_{10}	N/A[5]	7.1	6

1. All sizes presented in inches.
2. Quarry test results for Armor Rock D submitted during the TCRA by Contractor under Submittal #08.
3. Size computed assuming average diameter between a perfect sphere and perfect cube, using measured weight distribution of a sample collected at the quarry stockpile.
4. Field gradation based on measurement of the intermediate axis (B-axis) length of each rock.
5. N/A – not applicable. No specification requirement for this size class.

At each transect, the median measured particle size was 9 to 9.5-inches, greater than both the 6-inch D_{50} specification for Armor Cap C rock recommended by USACE as part of their assessment (USACE, 2013) and the 8-inch D_{50} for Armor Cap D rock that was used for the enhancements. This quality assurance review indicates that the Armor Cap D rock used for the armored cap enhancements was appropriately sized and did not undergo significant change during transport, handling, and installation.

TABLES

Table 1 Material Gradation Inspection Summary

FIGURES

Figure 1 Armored Cap Enhancement Locations
Figure 2 Cross Sections – Armored Cap Rock Enhancement (A-A', B-B', C-C')
Figure 3 Cross Sections – Armored Cap Rock Enhancement (D-D', E-E', F-F')
Figure 4 Typical Transect for Material Gradation Specification

ATTACHMENTS

Attachment 1 – Respondents' Armored Cap Enhancement Work Plan
Attachment 2 – USEPA Armored Cap Enhancement Work Plan Approval Letter
Attachment 3 – Armored Cap Enhancement Daily Construction Reports

REFERENCES

Anchor QEA, LLC (Anchor QEA), 2010. *Removal Action Work Plan*, San Jacinto River Waste Pits Superfund Site. Prepared for U.S. Environmental Protection Agency (USEPA) Region 6 on behalf of McGinnes Industrial Maintenance Corporation and International Paper Company. November 2010.

Anchor QEA, 2011. *Removal Action Work Plan*, San Jacinto River Waste Pits Superfund Site. Prepared for U.S. Environmental Protection Agency (USEPA) Region 6 on behalf of McGinnes Industrial Maintenance Corporation and International Paper Company. Revised February 2011.

Anchor QEA, 2012. *Revised Draft Final Removal Action Completion Report*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency (USEPA) Region 6. Revised March 2012.

National Cooperative Highway Research Program (NCHRP), 2006. *NCHRP Report 568 – Riprap Design Criteria, Recommended Specifications, and Quality Control*.

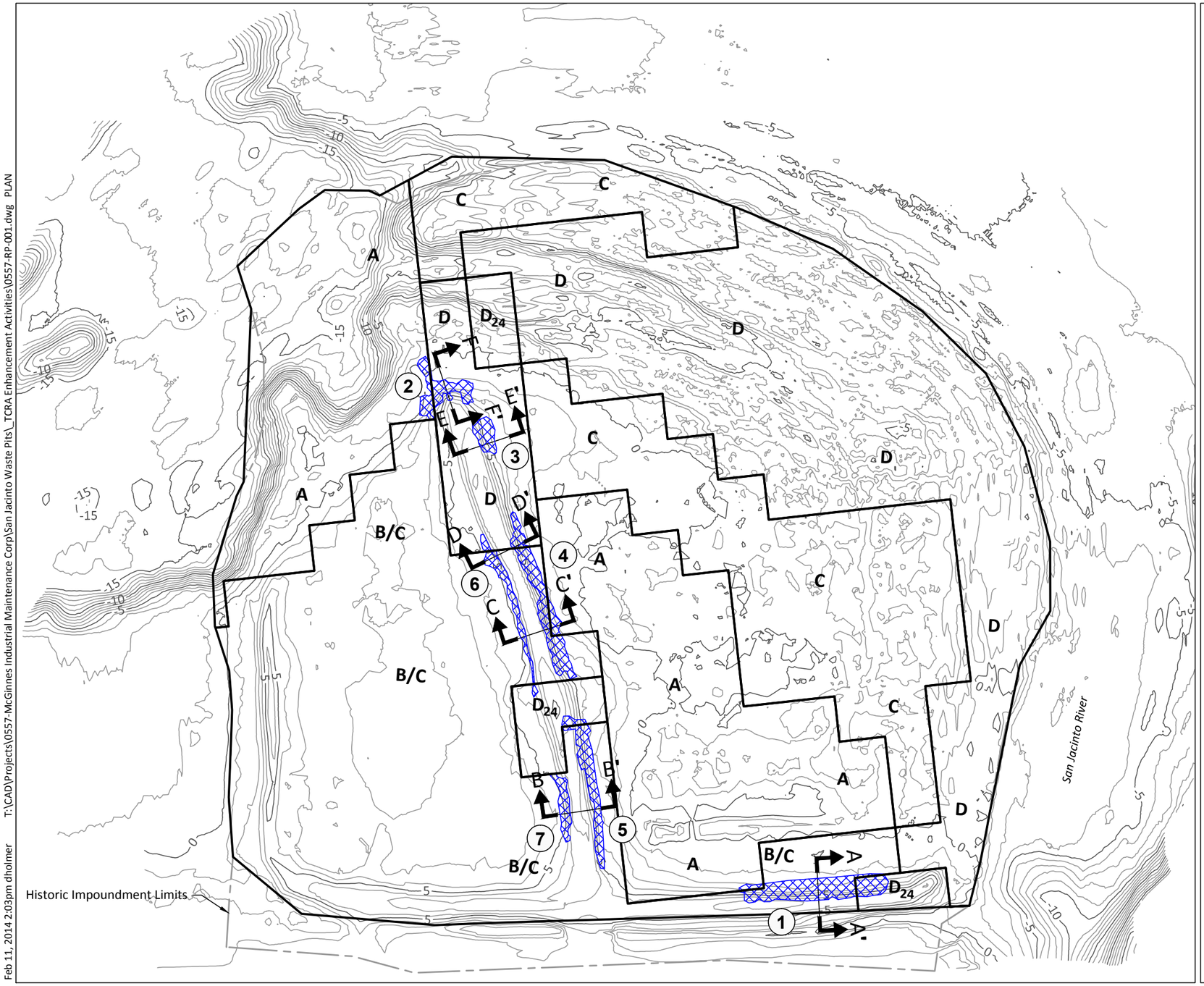
U.S. Army Corps of Engineers (USACE), 1994. Hydraulic Design for Flood Control Channels EM1110-2-1601.

USACE, 2013. *Review of Design, Construction and Repair of TCRA Armoring for the West Berm of San Jacinto Waste Pits.* Prepared for USEPA, Region 6. USACE Engineer Research and Development Center, 3909 Halls Ferry Road, Vicksburg, Mississippi, 39180-6199. October 2013.

USEPA, 2010. *Administrative Settlement Agreement and Order on Consent for Removal Action*. U.S. Environmental Protection Agency Region 6 CERCLA Docket No. 06-03-10. In the matter of: San Jacinto River Waste Pits Superfund Site Pasadena, Harris County, Texas. International Paper Company and McGinnes Industrial Management Corporation, Respondents.

Wolman, M.G., 1954. *A Method of Sampling Coarse Bed Material*. American Geophysical Union.

FIGURES



LEGEND:

- Existing Contour (1 Foot Interval)
- B/C — Armored Cap Type and Boundary
- Historic Impoundment Limits
- 1 — Areas of Additional Rock Placement and Designation (Approximate)
- A A' — Cross Section Location and Designation

SOURCE: Drawing prepared from surveys provided by Hydrographic Consultants dated October 2012 and January/February 2013.
HORIZONTAL DATUM: Texas State Plane South Central, NAD83, U.S. Feet.
VERTICAL DATUM: NAVD 88.

0 120
Scale in Feet

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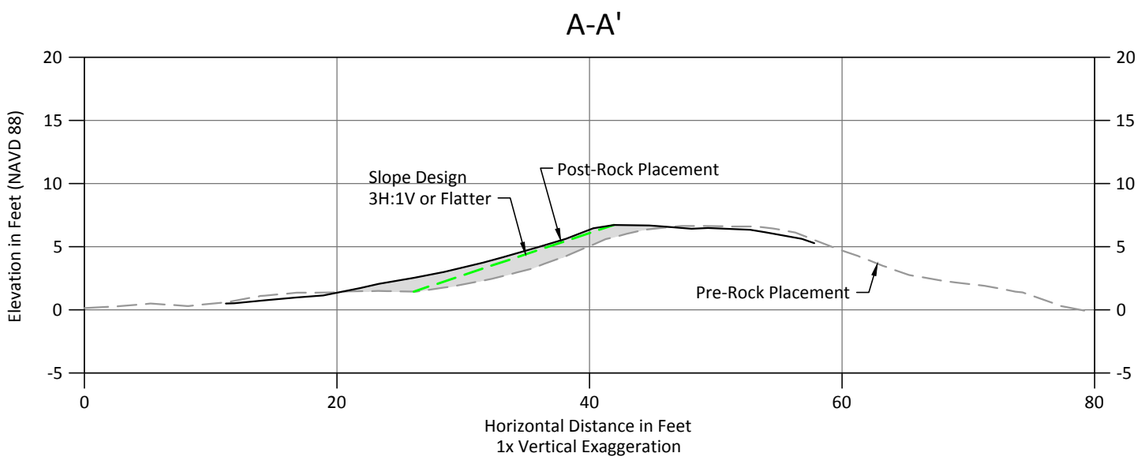
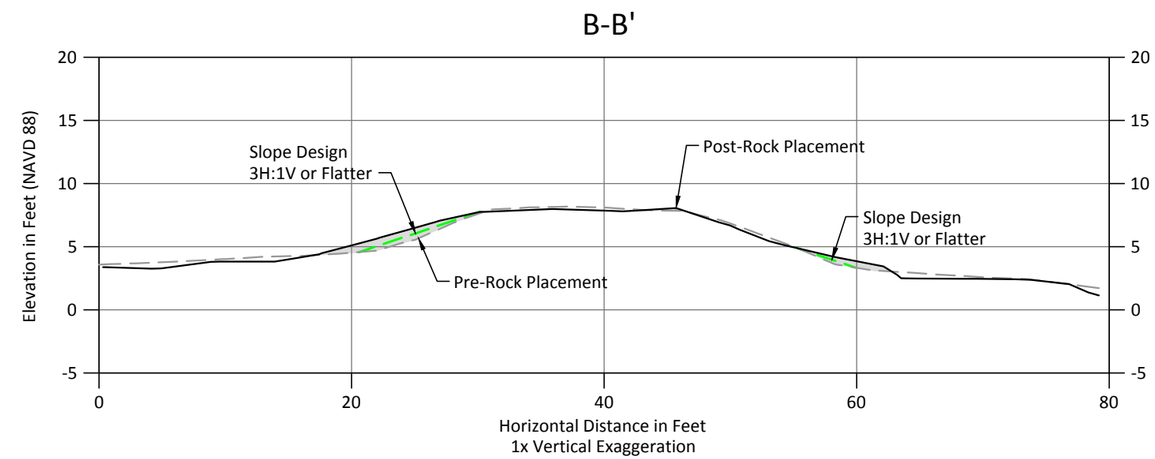
Figure 1
Armored Cap Enhancement Locations
TCRA Enhancement
San Jacinto River Waste Pits Superfund Site





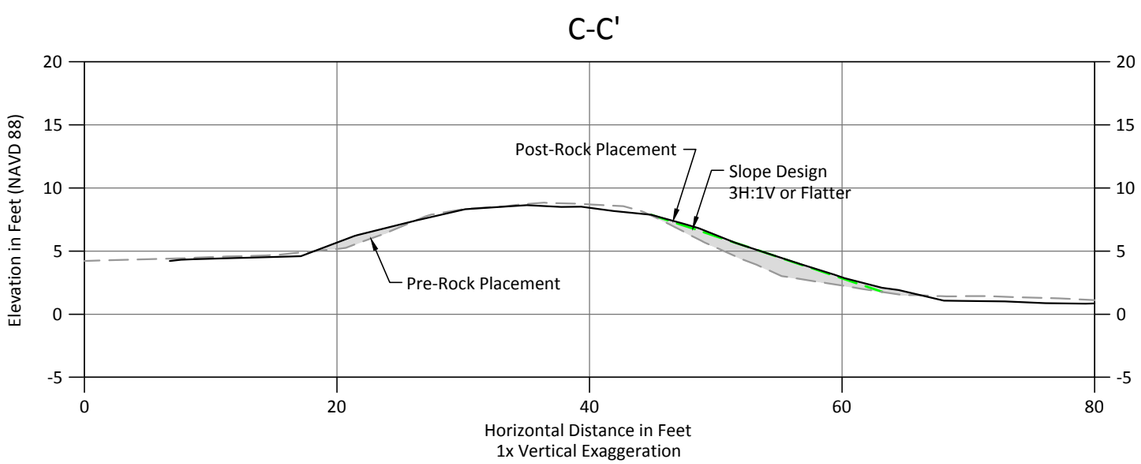


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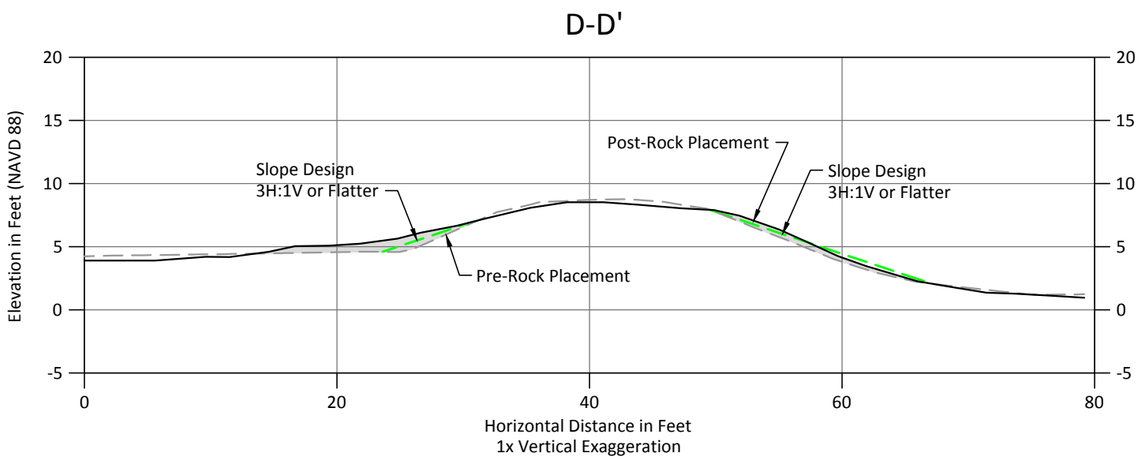
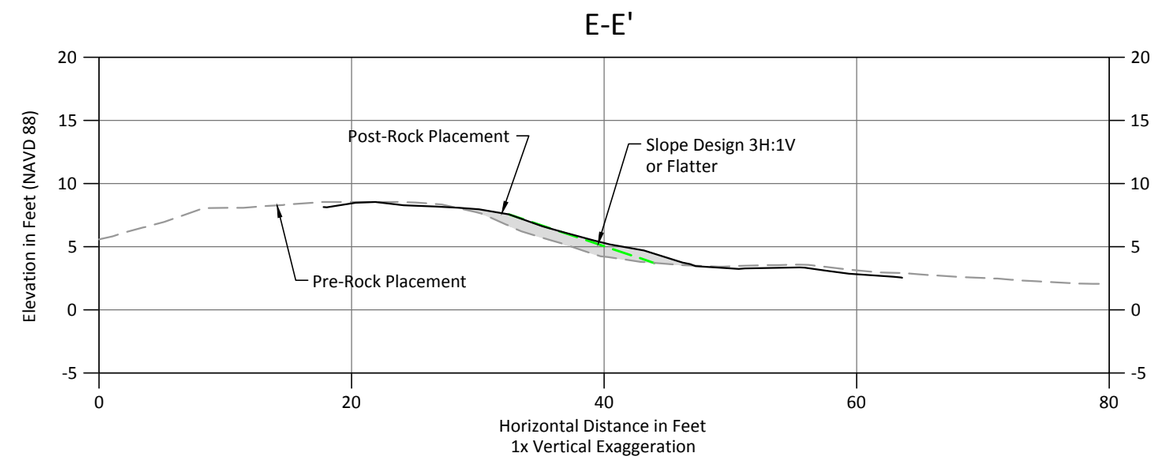
Figure 2
Cross Sections - Armored Cap Rock Enhancement
TCRA Enhancement
San Jacinto River Waste Pits Superfund Site





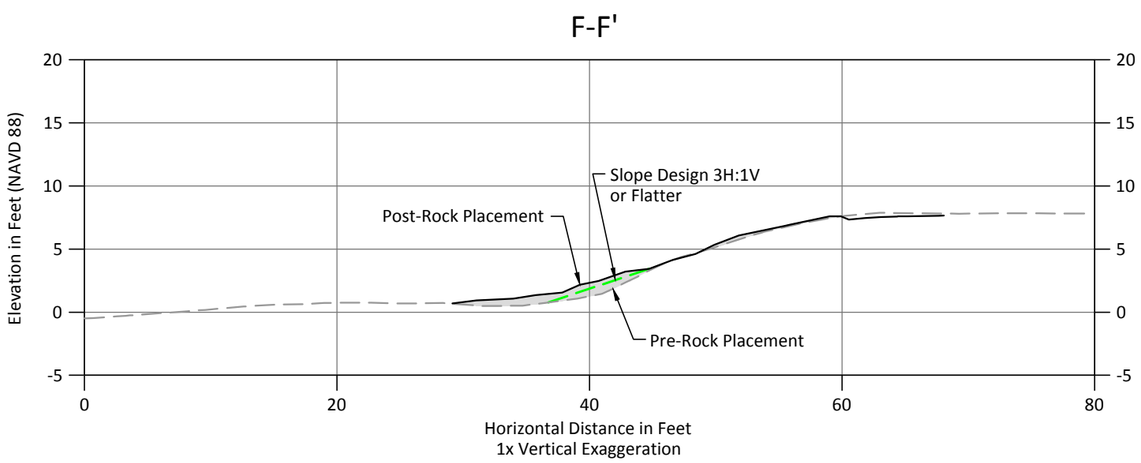


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Figure 3
Cross Sections - Armored Cap Rock Enhancement
TCRA Enhancement
San Jacinto River Waste Pits Superfund Site

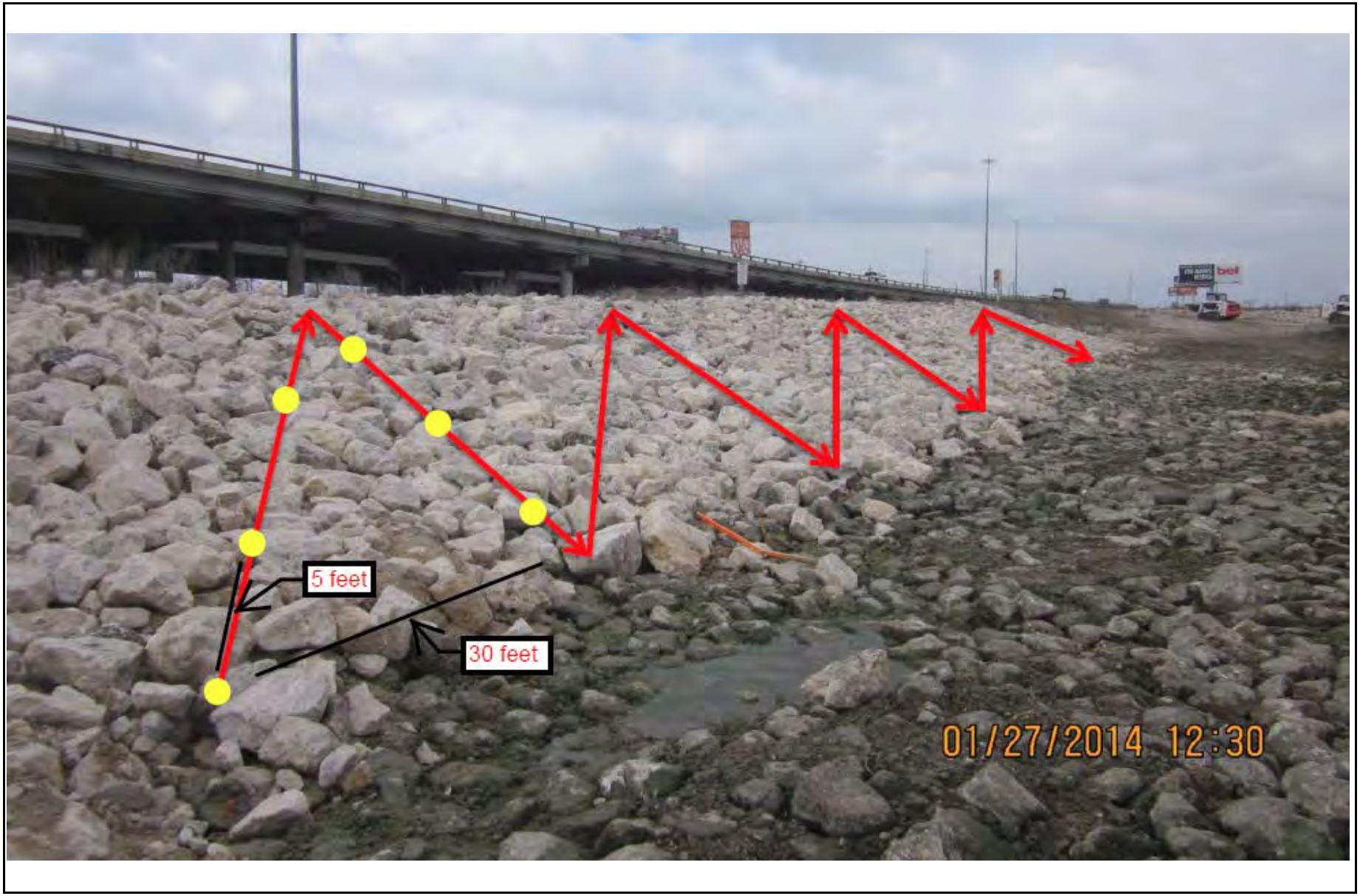

Figure 4
Typical Transect for Material Gradation Inspection
TCRA Enhancement
San Jacinto River Waste Pits Superfund Site

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ATTACHMENT 1

RESPONDENTS' ARMORED CAP ENHANCEMENT WORK PLAN

ANCHOR QEA

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November 27, 2013

Valmichael Leos
EPA Project Coordinator (6SF-RA)
United States Environmental Protection Agency
Region 6
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202

Re: Armored Cap Enhancement Work Plan
San Jacinto River Waste Pits Superfund Site Time Critical Removal Action United States Environmental Protection Agency, Region 6, CERCLA Docket No. 06-12-10

Project Number: 090557-01

Dear Mr. Leos:

In response to the November 1, 2013 correspondence from the U.S. Environmental Protection Agency (USEPA) and the associated report "Review of Design, Construction and Repair of TCRA Armoring for the Western Berm of San Jacinto Waste Pits" (U.S. Army Corps of Engineers (USACE) 2013), this correspondence and Armored Cap Enhancement Work Plan (Work Plan) is being submitted on behalf of the Respondents, International Paper Company and McGinnes Industrial Maintenance Corporation (collectively, Respondents).

The construction of the Time Critical Removal Action (TCRA) at the San Jacinto River Waste Pits Superfund Site was completed in July 2011 and USEPA conducted a final inspection of the construction on August 1, 2011. On September 2, 2011, the Respondents timely submitted a Draft Removal Action Completion Report (RACR), summarizing the work performed on the TCRA. The Draft RACR included as Appendix N a proposed

Operations, Monitoring, and Maintenance Plan (OMM Plan), which the USEPA approved by email on January 18, 2012. The approved OMM Plan set out the required procedures for regular inspections of the TCRA and the completion of necessary maintenance. Consistent with the approved OMM Plan, quarterly reports have been provided to the USEPA to document the requisite site inspections, as well as any subsequent routine maintenance activities that were required (e.g., fence repair, sign replacement, erosion repair, etc.).

At USEPA's request, the Respondents have conducted a reassessment of the TCRA design and construction in parallel with a reassessment by the USEPA and USACE. The reassessment focused on the western berm of the TCRA armored cap, where maintenance activities were performed following a quarterly inspection in July 2012. The USEPA/USACE reassessment, as set forth in the USACE report, confirmed the adequacy of the original TCRA design and the adequacy of the maintenance activities involving the western berm.[1] It also contained several recommendations that the USACE concluded would, if implemented, increase the factor of safety and provide additional protection to the armored cap from forces that may arise during flood events in the San Jacinto River. These recommendations included limiting slopes to no greater than 1V:3H in areas of potential wave runup or high bottom shear stresses in areas of the cap other than the western berm and a preference for the use of Armor Cap C natural rock. The recommendations contained in the USACE report are also consistent with the enhancements to the armored cap described as part of Alternative 3 in the Draft Feasibility Study (FS) for the Site (Anchor QEA 2013) that is currently under review by USEPA.[2]

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[1] The TCRA cap design, which was reviewed and approved by the USEPA, utilized an engineered armor layer to provide reliable containment of materials within the impoundments north of I-10 under the USACE's "Minor Displacement" scenario. The armor materials for the TCRA were sized using a factor of safety of 1.3, which exceeds the USACE suggested minimum factor of safety of 1.1 (USACE 1994).

[2] Alternative 3 in the draft FS is designed to achieve USACE's "No Displacement" scenario by increasing the factor of safety to 1.5 for sizing the armor rock and by flattening the slopes in the surf, or "wave runup" zone to 1V:5H.

As requested, the Respondents' responses to the conclusions from the USACE report and the Work Plan are described in the following sections.

USACE CONCLUSIONS AND ANCHOR QEA RESPONSES

1. *Parameterization of the stone size equation. The inputs to the equation were not provided. The design velocity from the hydrodynamic model may not account adequately for the slope changes due to limitations in spatial resolution. The factor of safety may not [be] adequate for the uncertainties in construction, slopes, material gradation, waves, non-uniform flow, flow constrictions and overtopping.*

Response: Anchor QEA provided the inputs for the riprap design equation in a letter dated June 14, 2013 that responded to a series of USEPA questions. A copy of that letter is enclosed. The information provided in that letter regarding the design of the TCRA cap addresses the design velocity and demonstrates that the design accounted for slope changes and had a factor of safety that was adequate for the uncertainties referenced in the USACE report.

The June 14, 2013 letter noted that Appendix I of Anchor QEA's TCRA Work Plan (Anchor QEA 2010) (RAWP) described how the two-dimensional Environmental Fluid Dynamics Code (EFDC) model was used to predict the local depth-averaged velocities and water depths spatially over the TCRA during several extreme events. For the TCRA design, the factor of safety was increased to 1.3 in Maynord's equation from the recommended 1.1 (as described in the USACE's design manual for Hydraulic Design for Flood Control Channels (1994)). This was done as a conservative method to account for changes in bathymetry and topography across the TCRA Site, and the associated potential changes in velocities and turbulence intensity for TCRA Site variations that are smaller than the EFDC model grid resolution.

The USACE report noted that a factor of safety of 1.3 to 1.5 would be appropriate equation inputs for the TCRA armored cap design. As noted above and in the June 14, 2013 letter, Anchor QEA used a factor of safety of 1.3 in the original TCRA design, which meets the USACE's recommended factor of safety.

2. *Slope. The slope of the face of the berm just below the crown was steeper than the design slope and was not modified prior to capping. For the non-uniform recycled concrete used for Armor Cap B/C, the design slope should have been 1V:3H or flatter to prevent excessive displacement and loss of gravel and sand sized particles.*

Response: As documented in the TCRA Maintenance Completion Report (Anchor QEA, 2012), a localized area of the western berm was addressed as part of work performed in early August 2012 using Armor Cap C material. The post-maintenance survey confirmed the slope was less than 1V:3H; therefore, no additional work is required on the western berm to address the above conclusion. The Respondents are submitting the Work Plan to provide for further enhancement of existing slopes to 1V:3H or flatter in other areas of the armored cap with Armor Cap D material. The Armored Cap Enhancement Plan section provides details of the proposed enhancement work.

3. *Armor cap material gradation. The uniformity of the armor cap material was not specified. The material specifications allowed too much gravel and sand sized particles to be used, which could be eroded from the cap because they did not meet internal stability and retention criteria. Greater uniformity of the armor cap is preferable in the high energy regimes of the cap, particularly the southwestern corner of the berm.*

Response: The material specifications were provided as part of the TCRA design in Appendix C, Section 3.2.5 of the RAWP (Anchor QEA, 2010). They were also included in the Revised Removal Action Work Plan (Anchor QEA 2011), which was reviewed and approved by USEPA on March 3, 2011. In addition, the approved TCRA design was based on a "minor displacement" scenario, and therefore anticipated possible movement of cap materials and the need for placement of additional rock materials following regular post-construction inspections. For that reason, the OMM Plan provided for stockpiling of both Armor Rock C and D, in the event such materials were needed as part of the maintenance conducted pursuant to the OMM Plan.

The Work Plan does not include work on slopes on the western berm. The USACE report concludes that Armor Cap C rock was "appropriate for maintenance and should be sufficiently stable when placed at a slope 1V:3H." (Section 4). As noted in the August 2012

TCRA Maintenance Completion Report, the southwestern berm was enhanced with Armor Cap C rock and slopes that are flatter than 1V:3H. Therefore, the western berm meets the USACE recommendations.

As described in the Armored Cap Enhancement Plan section below, the Respondents propose to use Armor Cap D rock to flatten any existing slopes that are steeper than 1V:3H. The use of D rock will further increase the internal stability and retention of these slopes, consistent with the recommendations in the USACE report.

4. *Repair should ensure that the final surface throughout the repair area and adjacent areas has a slope of 1V:3H or flatter.*

Response: The Work Plan proposes to add Armor Cap D rock as necessary to reduce existing slopes to 1V:3H. The details of the proposed activities are described in the Armored Cap Enhancement Plan section below.

ARMORED CAP ENHANCEMENT PLAN

Using the October 2013 quarterly inspection survey data, Anchor QEA has delineated areas that have slopes steeper than 1V:3H within the wave runup or surf zone of the TCRA armored cap. As shown in Figure 1, seven discrete areas have been identified. The Respondents will reduce the slopes of the seven areas to 1V:3H with stockpiled Armor Cap D rock. The use of D rock to reduce the slopes was modeled for and discussed in the Draft FS (Appendix B). As described in Appendix B of the Draft FS, the D rock (D_{50}=10 inches, D_{85}/D_{15}=1.55) exceeds the computed Maynord equation D_{50} particle size (Anchor 2013) and has a larger D_{50} than the C rock. The Armor Cap D rock also has a uniformity coefficient that falls within the recommended range provided by the Transportation Research Board (NCHRP 2006). The use of Armor Cap D rock provides an increased level of stability, a factor of safety of 1.5, and addresses the enhancement outlined in the USACE's report. The proposed construction requirements, construction schedule, and QA/QC procedures, and plans for the continued implementation of the OMM Plan, are described below.

Cap Enhancement Construction

The October 2013 TCRA quarterly inspection survey will serve as the baseline for construction. The contractor will reduce the slopes as outlined in the construction plans. Construction will follow the same requirements outlined in the original TCRA construction documents, except as provided below.

To reduce the slopes to 1V:3H or flatter, the contractor will transport the Armor Cap D rock from the stockpile and place the rock in the locations shown in Figure 1. Using a small loader (Bobcat, Skid Steer or equivalent equipment as appropriate), the contractor will transport and place the rock in a manner that prevents breakage of the rock. The contractor's survey crew will monitor the rock placement to confirm the required grades are met during construction. After the contractor has completed the rock installation, the areas will be re-surveyed to confirm the slopes are 1V:3H or flatter. The Armor Cap D stockpile is located approximately 15 miles away from the TCRA Site. The Armor Cap D rock meets or exceeds the TCRA original design requirements for each area of the armored cap. The Armor Cap D rock was purchased and stockpiled expressly for maintenance purposes and has already been tested and approved for gradation and chemistry.

Design and Construction Schedule

The following table provides the proposed design and construction schedule. The completion dates assume that the USEPA approves the work plan in mid-December and that the contractor is able to mobilize in early to mid-January. Upon receipt of final USEPA approval and confirmation of the contractor's availability, we will adjust these dates accordingly.

Task	Approximate Duration	Estimated Completion
USEPA Approval of Work Plan	-	Week of December 9, 2013
Contractor Mobilization	3 Days	Week of January 6, 2014
Armor Rock Installation	9 Days following mobilization	Week of January 13, 2014
Post Construction Survey	1 Day	Week of January 27, 2014
Submission of Report	2 Weeks	Week of February 10, 2014

Construction Quality Control and Quality Assurance (QA/QC) Procedures

Cap enhancement activities will be observed and documented using the QA/QC procedures provided in the Construction Quality Assurance Plan (Appendix G of the RAWP). The specific QA/QC procedures that will be observed and documented are as follows:

1. Using the most recent survey data, the extent of the enhancement areas will be marked with grade stakes, marking paint or other similar methods to clearly identify the construction areas.
2. An estimate of the cubic yards of cap material imported from the off-site stockpile will be recorded on the daily reports. The estimated quantity removed from the stockpile will be calculated based on truck capacity and the percentage full for each load.
3. Photographs will be taken daily to document the progress of the work.
4. A daily report will be prepared summarizing the day's work activity. The format of the report and details recorded will be consistent with the daily reports that were generated during the TCRA construction and previous maintenance events.
5. Following completion of the enhancement activities, a survey of the top of cap surface will be performed using the same standards and procedures as used for cap monitoring surveys. This survey will be compared to the survey information described above to document that the required 1V:3H or flatter slopes are present in the enhancement areas.

Upon completion of construction activities, a TCRA armored cap enhancement report will be prepared and submitted to the USEPA for review and approval.

Continuing Implementation of OMM Plan

The TCRA will be subject to continued operations, monitoring, and maintenance as described in the OMM Plan. This monitoring will include continued survey and visual observations during routine inspections and following significant storm events.

Please contact us if you have any questions.

Sincerely,

John P. Laplante for David C. Keith
Project Coordinator

cc: Anne Foster, U.S. Environmental Protection Agency
Amy Salinas, U.S. Environmental Protection Agency
Philip Slowiak – International Paper Company
David Moreira and Andrew Shafer – McGinnes Industrial Maintenance Corporation

Attachments: Figure 1 – Armored Cap Enhancement Plan
Letter dated June 14, 2013

REFERENCES

Anchor QEA, LLC (Anchor QEA), 2010. *Final Removal Action Work Plan*, Time Critical Removal Action, San Jacinto River Waste Pits Superfund Site. Prepared for U.S. Environmental Protection Agency, Region 6, on behalf of McGinnes Industrial Maintenance Corporation and International Paper Company. Anchor QEA, LLC, Ocean Springs, MS. November 2010.

Anchor QEA, 2011. *Revised Final Removal Action Work Plan*, San Jacinto River Waste Pits Superfund Site. Prepared for U.S. Environmental Protection Agency Region 6 on behalf of McGinnes Industrial Maintenance Corporation and International Paper Company. Revised February 2011.

Anchor QEA, 2012. *Revised Draft Final Removal Action Completion Report*, San Jacinto River Waste Pits Superfund Site. Prepared for McGinnes Industrial Maintenance Corporation, International Paper Company, and U.S. Environmental Protection Agency Region 6. March 2012.

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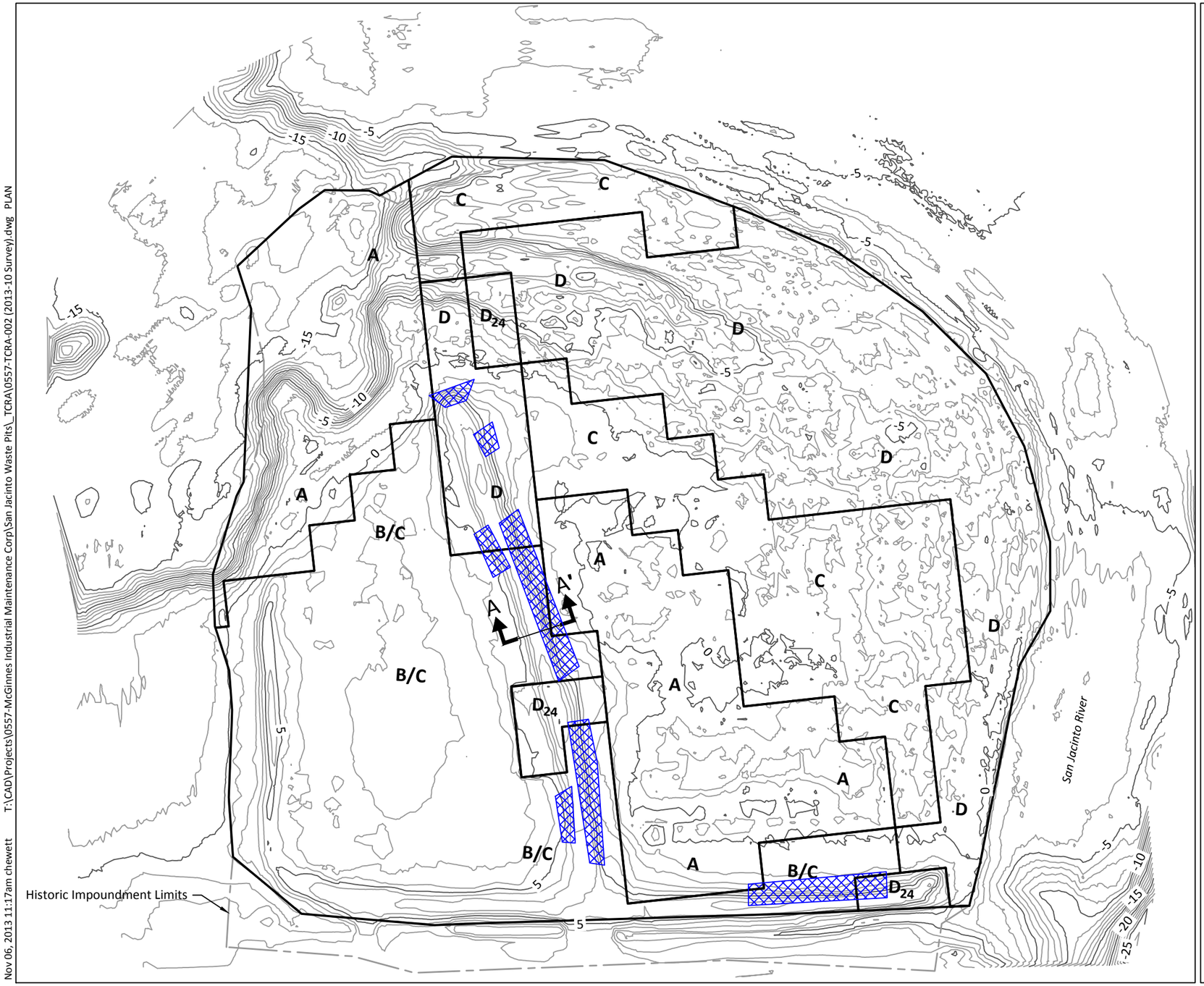
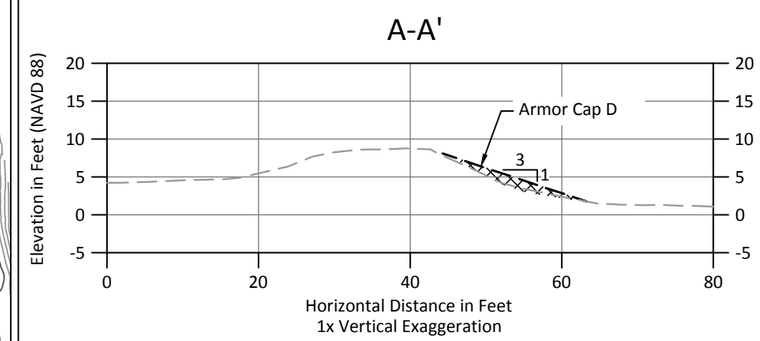
FIGURES



LEGEND:

- Existing Contour (1 Foot Interval)
- B/C — Armored Cap Type and Boundary
- Historic Impoundment Limits
- Areas of Additional Armor Cap D Rock Placement
- A A' — Cross Section Location and Designation



SOURCE: Drawing prepared from surveys provided by Hydrographic Consultants dated October 2012 and October 2013.
HORIZONTAL DATUM: Texas State Plane South Central, NAD83, U.S. Feet.
VERTICAL DATUM: NAVD 88.

0 120
Scale in Feet

T:\CAD\Projects\0557-McGinnes Industrial Maintenance Corp\San Jacinto Waste Pits_TCRA\0557-TCRA-002 (2013-10 Survey).dwg PLAN
Nov 06, 2013 11:17am chewett

ANCHOR QEA

Figure 1
Armor Cap Repair Plan
San Jacinto River Waste Pits Superfund Site

ANCHOR QEA

614 Magnolia Avenue
Ocean Springs, Mississippi 39564
Phone 228.818.9626
Fax 228.818.9631

June 14, 2013

Mr. Valmichael Leos
EPA Project Coordinator (6SF-RA)
United States Environmental Protection Agency, Region 6
1445 Ross Avenue Suite 1200
Dallas, Texas 75202

Re: San Jacinto River Waste Pits Superfund Site Time Critical Removal Action
Response to USEPA Questions on TCRA Cap Assessment
CERCLA Docket No. 06-12-10

Project Number: 090557-01

Dear Mr. Leos:

On behalf of International Paper Company and McGinnes Industrial Maintenance Corporation (the Respondents), this letter provide responses to USEPA questions on the Time Critical Removal Action (TCRA) Assessment for the San Jacinto River Waste Pits Superfund Site (the Site), which were transmitted via email to Anchor QEA, LLC (Anchor QEA) on April 25, 2013, and received by certified mail on May 6, 2013.

Below are the USEPA questions, with responses provided following each question.

Question:

1. **How was Maynord's equation for stable armor size parameterized? What are the values used for**
    a. **Safety factor**
    b. **Stability coefficient**
    c. **Velocity distribution coefficient**

d. **Blanket thickness coefficient**
e. **Gradation uniformity coefficient**
f. **Depth used for the berm slope and crest (depth of grid cell containing the berm, was it averaged over the 15 meters? Was it assigned to the minimum depth?)**

Response:

As described in Section 5 of Appendix I of the Time Critical Removal Action (TCRA) Removal Action Work Plan [RAWP, Anchor QEA (2010)], predicted current velocities within the TCRA Site were used to calculate the median particle diameter (D_{50}) for the cover material using the Maynord (1998) method. The method presented in Maynord (1998) is based on the U.S. Army Corps of Engineers (USACE) "Hydraulic Design of Flood Control Channels" (USACE 1994). This method uses velocity and flow depth computed by the depth-averaged hydrodynamic model to determine the size of the granular cover material that will be stable for a given current velocity. The following values were used for the coefficients in the Maynord Equation (which is based on USACE 1994):

- Safety factor (S_f) = 1.3 (from page A-6 of Maynord 1998). Per Maynord (1998), the minimum safety factory for rip rap design is 1.1. Although the TCRA was intended as a short-term remedy, a higher safety factor of 1.3 was used for the TCRA to be more conservative and protective.
- Stability coefficient (C_s) = 0.3 for angular rock (from page A-6 of Maynord 1998).
- Vertical velocity distribution coefficient (C_v) = 1.0 (from page A-6 of Maynord 1998).
- Blanket thickness coefficient (C_t) = 1.0 for flood flows and a thickness = D_{100} (from page A-6 of Maynord 1998).
- Gradation uniformity coefficient (D_{85}/D_{15}) = 3.5 for a well-graded material (page A-6 of Maynord 1998).
- The Environmental Fluid Dynamics Code (EFDC) hydrodynamic model grid cells that contained the western berm was based on the maximum elevation that the model grid cell covered. Therefore, the depth in the grid cells that covered the western berm slope and crest represented the western berm crest (i.e., the minimum water depth for that cell, not the average depth).

Question:

2. **What is the measured or estimated grain size distribution for the B/C armor material? Specifically, what are the**
    a. **D_{100}**
    b. **D_{85}**
    c. **D_{60}**
    d. **D_{50}**
    e. **D_{15}**
    f. **D_{10}**
    g. **D_{30}**

Response:

Using the contractor gradation submittal for the B/C armor material, the following is the measured and estimated grain size distribution for this material:

- D_{100} 12 inches
- D_{85} 9 inches
- D_{60} 8 inches
- D_{50} 6 inches
- D_{30} 4 inches
- D_{15} 0.12 inches
- D_{10} 0.033 inches

A grain size distribution curve for this material is attached for reference.

Question:

3. **What was the maximum design slope for the foundation of the West Berm armor?**

Response:

As described in Section 2.2.2 of Anchor QEA (2013), the steepest foundation design slope used in the TCRA Removal Action Work Plan was 2 Horizontal (H): 1 Vertical (V). During the TCRA cap reassessment (Anchor QEA 2013), a western berm foundation design slope of 1H:1V was evaluated.

Question:

4. **How was armor stability evaluated for waves and overtopping? What is the maximum wave height or characteristic wave height?**

Response:

As described in Section 2.1 of Anchor QEA (2013), vessel-and wind-generated waves were calculated for the TCRA Site. Due to the amount of turbulence generated by breaking waves in the surf zone, the armor layer was modeled in the TCRA design as a rubble mound berm; that is, a sloped berm (or revetment) consisting of rock. Armor stone for sloped berms was sized using guidance from USACE (USACE 2006) as part of the original TCRA design. The USACE guidance was used because the methodology to evaluate armor stone sizes for sediment caps presented in USEPA's design guidance (Maynord 1998) does not consider the effects of waves breaking on a cap, as would be the case for the sloped berms at the TCRA Site. The surf zone is defined as the region extending from the location where the waves begin to break to the limit of wave run-up on the shoreline slope. Within the surf zone, wave-breaking is the dominant hydrodynamic process (USACE 2006).

As described in Anchor QEA (2010), wind-generated waves and vessel wakes were expected to be less than 2 feet at the TCRA Site. Specifically, wind-generated waves were estimated to be less than 1.7 feet, and vessel generated wakes were expected to be less than 1.2 feet at the TCRA Site.

Details of vessel and wind-generated wave analysis are included in Section 2.1 of Anchor QEA (2013).

Questions 5 and 6

Because these two questions pertain to the same general subject of combined wave generated and orbital forces, they are presented here together and a unified response is provided.

5. **The 2-D EFDC model runs with vertically averaged velocities will underestimate local shear stress in areas with these steeper slopes because the speeds are greater due to the vertical component. How does the design approach account for the higher vertical velocities and turbulence along face of the slope than modeled in EFDC due to limitations in the grid resolution to represent the actual slope or account for vertical velocities? The model represents the maximum slope as approximately 1V:10H while the actual slope is 1V:2H or greater.**
6. **The reassessment of the west berm analyzed the stability of the armor layer for wave runup and overtopping using techniques from the USACE Coastal Engineering Manual, but did not analyze the stability for sustained flow up and over the west berm. Bottom shear stresses from sustained flow were estimate from the EFDC model runs. The 2-D EFDC model runs with vertical averaged velocities does not include wave effects, which can be sizable for shallow water as along the crest and upper portion of the berm. When the western cell is inundated under extreme flow events such as the 25-yr and 100-yr events and high flow velocities are predicted to occur along and over the west berm, how are the bottom shear stress computed to incorporate the shear stress induced by orbital velocities from waves? Or how does the design approach account for the higher vertical velocities and turbulence along [the] face of the slope induced by waves?**

Response:

The armor stone at berm faces that have the steepest slopes is sized to resist breaking waves. The design is therefore conservative because the required rock size to resist breaking wave forces is higher than the required rock size to resist the combined orbital velocity + current forces. The Safety Factor (S_f) was increased to 1.3 in Maynord's Equation from the recommended 1.1 as a conservative method to account for variations in bathymetry and topography and the associated potential variations in velocities and turbulence intensity for small-scale site variations that are smaller than the two-dimensional EFDC model grid resolution.

Discussion

Outside of the surf zone, orbital velocities from waves combined with currents can increase bottom shear stresses. Combining extreme river current with extreme orbital velocity forces is considered to be very conservative because the probability of both extreme events occurring simultaneously is very low. Nevertheless, in response to USEPA's questions, the following discussion was developed to present additional evaluations for such conditions.

As described in Section 2.1 of Anchor QEA (2013), the armor stone is designed to resist forces due to waves breaking on the TCRA cap (that is, waves would propagate and break on the western berm armor stone). Within the surf zone (the location where waves break), wave-breaking is the dominant hydrodynamic process (USACE 2006).

An example is provided below to demonstrate how designing the armor stone to resist breaking waves will also protect against combination of bottom velocities due to superimposed wave and current forces when the berm is overtopped. Two methods were used as a comparison: 1) calculation of the combined bottom shear stresses due to waves, and 2) currents and the use of an orbital velocity-based equation presented in Maynord (1998).

Method 1 – Combined Current/Wave Shear Stress

The bottom shear stress due to the combination of waves and currents can be calculated using the quadratic stress law (Christoffersen and Jonsson, 1985):

$$\tau = \rho_w \left(C_{f,c} u_c^2 + C_{f,w} u_w^2 \right)$$

Where

- τ = bottom shear stress
- ρ_w = density of water
- $C_{f,c}$ = bottom friction coefficient for currents
- u_c = maximum current velocity
- $C_{f,w}$ = bottom friction coefficient for waves
- u_w = maximum bottom velocity due to waves

An example is provided below using the results for the EFDC model grid cell along the western berm with the highest computed bed shear stresses due to currents as computed by the EFDC model. In the example, the maximum bed shear stress due to flows computed by the model are added to the computed bed shear stresses due to waves, and a stable particle size is determined based on those stresses. The stable particle size is computed for the 25-year and 100-year return-interval flow events conservatively assuming that the 100-year return-interval wave occurs at the same time as these events.

For the 25-year return-interval flow event, the computed bed shear stress is 6.33 Pascals (0.132 pounds per square foot) for the model grid cell. For the 100-year return-interval flow event, the computed bed shear stress is 14.2 Pascals (0.298 pounds per square foot) for the model grid cell.

The bottom friction coefficient for waves is computed using (van Rijn, 1993):

$$C_{f,w} = 0.045\left(\frac{u_w A_w}{\upsilon}\right)^{-0.2}$$

Where

$C_{f,w}$ = bottom friction coefficient for waves
u_w = maximum bottom velocity due to waves
A_w = peak orbital excursion
ν = kinematic viscosity of water

Maximum bottom velocities and peak orbital excursions for the 100-year return-interval wave were computed with water depths over the western berm set equivalent to the 25-year and 100-year return-interval flow events using the *Linear Wave Theory Module* in ACES. Based on this analysis, the estimated bed shear stress due to waves is 4.91 Pascals (0.103 pounds per square foot) for the 25-year event and 0.494 Pascals (0.0103 pounds per square foot) for the 100-year event. The shear stresses due to waves are higher for the 25-year return-interval flow event as compared with the 100-year return-interval flow event because the water depths over the berm are lower. Table 1 below summarizes the results of this analysis:

Table 1

Summary of Combined Forces from Currents and Waves

Flood Flow Return-Interval	Forces from Currents			Forces from Waves					Combined Forces	
	Maximum Depth-Averaged Velocity Computed by EFDC Model (m/s)	Maximum Shear Stress Computed by EFDC Model (Pa)	Maximum Shear Stress Computed by EFDC Model (psf)	Peak Orbital Velocity Computed in ACES (m/s)	Peak Orbital Excursion Computed in ACES (meters)	$C_{f,w}$	Computed Shear Stress For Waves (Pa)	Computed Shear Stress For Waves (psf)	Combined Shear Stress due to Waves and Currents (Pa)	Combined Shear Stress due to Waves and Currents (psf)
25-year	1.19	6.33	0.132	0.684	0.234	0.0105	4.91	0.102	11.2	0.235
100-year	2.12	14.2	0.298	0.163	0.0560	0.0186	0.494	0.0103	14.7	0.308

Notes:
m/s = meters per second
Pa = Pascals
psf = pounds per square foot

The stable median diameter (D_{50}) for particles subject to a given shear stress can be estimated based on the approach described by Shields (1936). The correlation between shear stress and particle size presented below represents the point at which the subject particle begins to move or "rock" on the bed and does not necessarily imply significant transport of particles of this size. In addition, Shield's work is based on a bed of uniform particles and does specifically account for the increased stability resulting from a well-graded armor layer constructed from a range of angular particles.

$$\tau_{*c} = \frac{\tau_c}{(\gamma_s - \gamma)D_{50}}$$

Where

τ_{*c} = critical shear stress parameter (pounds per square foot)

τ_c = critical shear stress (threshold of motion) (pounds per square foot)

γ_s = specific weight of the particle [pounds per cubic foot (pcf)]

γ = specific weight of the water

D_{50} = median particle size (feet)

Shields provides a plot of dimensionless critical shear stress versus a dimensionless Reynolds number. This graphical representation, commonly known as the Shields diagram, is widely used to determine a general relationship for incipient motion. Rouse (1939) fitted a mean curve to the zone of these data points, above which particles are considered to be in motion, and showed that at higher values of the Reynolds number (i.e., coarse sediments/larger grain sizes, and/or fully turbulent flow), the critical shear stress parameter approaches a constant value of 0.060. Since then, others have proposed more conservative values for the critical shear stress parameter ranging from 0.039 by Laursen (1963) to 0.045 by Yalin and Karahan (1979).

Rearranging the equation above to solve for median particle size, and substituting a recycled concrete specific weight of 145 pcf (and assuming that the wave event occurs during freshwater flow event) and a conservative critical shear stress parameter of 0.039, yields the relationship below.

$$D_{50} = \frac{\tau}{3.2}$$

The maximum combined bed shear stresses for combined waves and currents for the 25-year and 100-year return-interval events are 0.235 pounds per square foot and 0.308 pounds per square foot, respectively. The median particle size (D_{50}) to resist the combined waves and currents ranges between 0.9 and 1.2 inches using this method, which is lower than the design median particle size of 6 inches that was selected to resist breaking waves.

Method 2 – Orbital Velocity Shear Stress

Another method to evaluate the stable particle size to resist the combination of currents from waves and flood flows is provided in Maynord (1998):

> "Significant wind wave activity can create large bottom velocities that can erode an unprotected sand cap. To define the required armor layer size to prevent scour, Equation 5 should be used with the maximum horizontal bottom velocity from the wave. For orbital velocities beneath waves, a C_3 = 1.7 is recommended."

Using Equation 5 from Maynord (1998) with C_3 = 1.7, as recommended, to represent the contribution from orbital velocities, the following equation can be used to compute D_{50} to resist currents from waves:

$$D_{50} = \frac{\left(\frac{V}{C_3}\right)^2}{g\left(\frac{\gamma_s - \gamma_w}{\gamma_w}\right)}$$

Where

V	= maximum horizontal bottom velocity from the wave
C_3	= 1.7 for orbital velocities beneath waves (page A-13 from Maynord 1998)
γ_s	= unit weight of recycled concrete
γ_w	= unit weight of freshwater
g	= 32.2 ft/s^2

Conservatively adding the maximum depth-averaged velocities predicted by the EFDC model to the maximum bottom orbital velocity for waves and substituting that value into the

above equation, the computed D_{50} is 3.7 inches for the 25-year return-interval event and 5.5 inches for the 100-year return-interval event. These values are also lower than the required median grain size of 6 inches that was determined to resist breaking waves.

Both example calculations demonstrate that the selection of B/C armor material (with a D_{50} of 6 inches and a D_{100} of 12 inches) to withstand breaking waves will also more than adequately withstand combined currents from waves and flood flows.

Questions 5 and 6 Summary

As described in USACE (1994):

> "Equation 3-3 gives a rock size that should be increased to resist hydrodynamic and a variety of nonhydrodynamic-imposed forces and/or uncontrollable physical conditions. The size increase can best be accomplished by including the safety factor, which will be a value greater than unity. The minimum safety factor is $S_f = 1.1$."

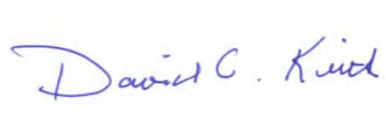
As described in Appendix I of Anchor QEA (2010), the two-dimensional EFDC model was used to predict the local depth-averaged velocities and water depths spatially over the TCRA during several extreme events. While the EFDC model provides local velocities, the increase in the safety factor to a minimum of 1.3 was considered appropriate and conservative to account for these potential small-scale variations.

The TCRA cap also includes an Operations, Monitoring, and Maintenance (OMM) Plan to periodically inspect the site and address any issues that might arise from small-scale effects on the cap. This monitoring program currently includes quarterly visual inspection of exposed surfaces of the armored cap, combined with topographic and bathymetric surveys of the armored cap. A quantitative comparison of survey results is completed at each inspection to identify potential areas of cap thinning. If deficient areas of the cap are identified, the OMM Plan requires additional inspections, and expeditious development and implementation of corrective measures. Pre-tested stockpiles of armor rock C and armor rock D materials are stored at a nearby location to complete any maintenance activities. Because these two armor sizes are the largest of the four types of armor used in the cap, they

can also be conservatively substituted for armor rock A and armor rock B/C for maintenance activities in any area of the cap. The same OMM activities are required if a 25 year storm or greater occurs between scheduled quarterly monitoring events.

We hope the above responses to your questions address any remaining concerns you may have on the TCRA design. Please let us know if you would like to discuss anything further.

Sincerely,



David Keith, Project Coordinator
Anchor QEA, LLC

Cc:
Barbara Nann – United States Environmental Protection Agency
Philip Slowiak – International Paper Company
David Moreira – McGinnes Industrial Maintenance Corporation

REFERENCES

Anchor QEA, LLC (Anchor QEA), 2010. Final Removal Action Work Plan, Time Critical Removal Action, San Jacinto River Waste Pits Superfund Site. Prepared for U.S. Environmental Protection Agency, Region 6, on behalf of McGinnes Industrial Maintenance Corporation and International Paper Company. Anchor QEA, LLC, Ocean Springs, MS. November 2010. Revised February 2011.

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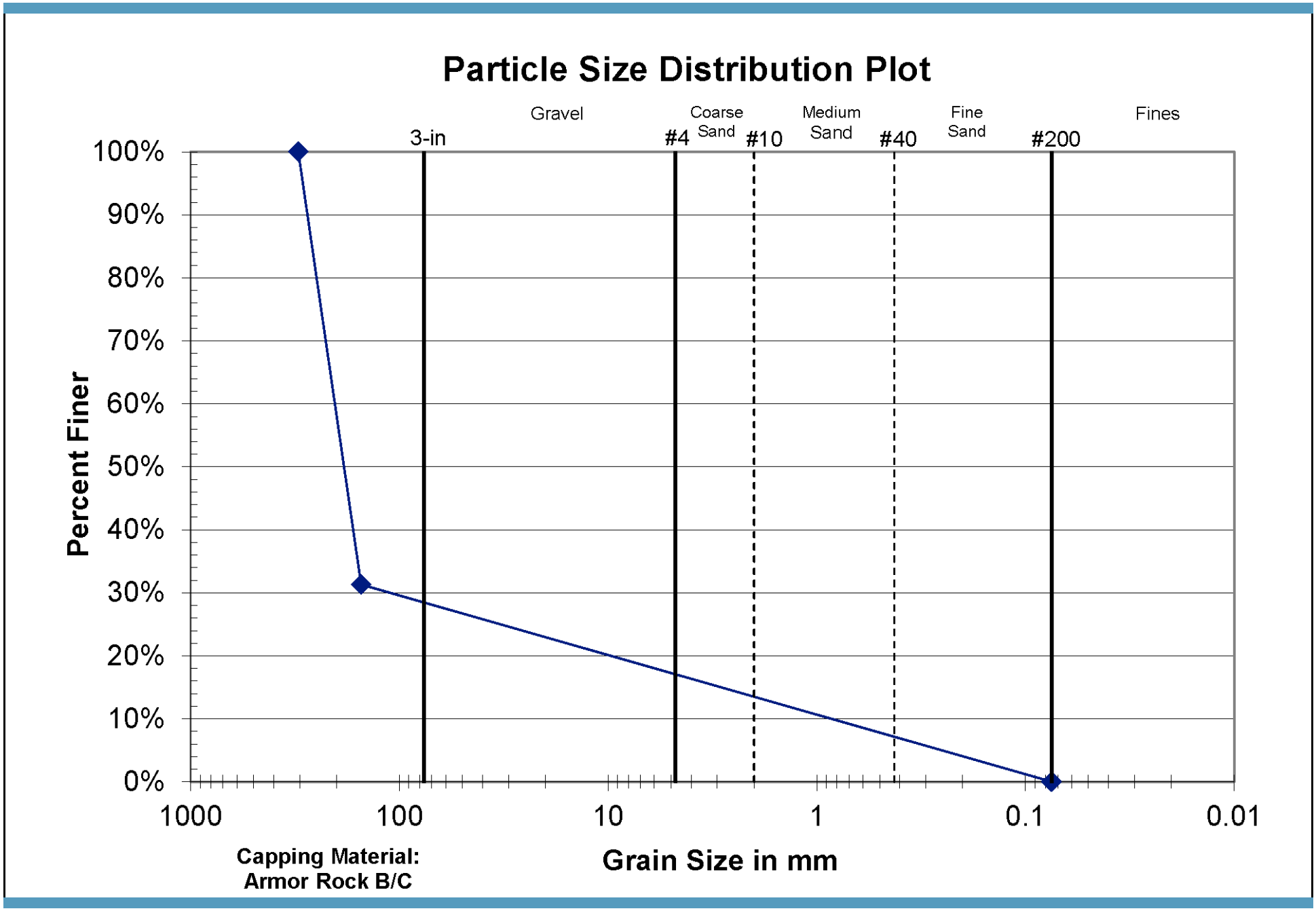

Figure 1
Gradation of Armor Rock B/C
San Jacinto River Waste Pits Time Critical Removal Action

ANCHOR QEA

ATTACHMENT 2

USEPA ARMORED CAP ENHANCEMENT WORK PLAN APPROVAL LETTER

From:	Leos, Valmichael
To:	John Laplante; David Keith
Cc:	Al Axe; Andrew Shafer; David Moreira; Francis Chin; Miller, Garyg; Inglin, Sonja A.; Jennifer Sampson; John Cermak; John Verduin; Ken Haldin; Phil Slowiak; Rick Prior; Stephen Ellis ; Steve Ginski; Teri Freitas; Wendell Mears; Salinas, Amy; Foster, Anne
Subject:	RE: SJRWP TCRA Armor Cap Work Plan
Date:	Friday, January 10, 2014 3:34:16 PM
Attachments:	image003.png

John / David,

EPA has reviewed the SJRWP TCRA Armor Cap repair work plan and has no comments. Please proceed with the work. I will be awaiting an estimated timeline of contractor mobilization for the work.

Sincerely,

Valmichael Leos
Federal On-Scene Coordinator (OSC)
1445 Ross Ave (6SF-PE)
Dallas, Texas 75202
Leos.valmichael@epa.gov

214.665.2283 * *fax 214.665.2278*

From: John Laplante [mailto:jlaplante@anchorqea.com]
Sent: Wednesday, November 27, 2013 7:50 PM
To: Leos, Valmichael
Cc: John Laplante; Al Axe; Andrew Shafer; David Keith; David Moreira; Francis Chin; Miller, Garyg; Inglin, Sonja A.; Jennifer Sampson; John Cermak; John Verduin; Ken Haldin; Phil Slowiak; Rick Prior; Stephen Ellis ; Steve Ginski; Teri Freitas; Wendell Mears; Salinas, Amy; Foster, Anne
Subject: SJRWP TCRA Armor Cap Work Plan

Valmichael,

On behalf of International Paper Company and McGinnes Industrial Maintenance Corporation, please find attached the Work Plan requested by USEPA in your November 1, 2013 letter regarding the San Jacinto River Waste Pits Time Critical Removal Action. Five hard copies are being sent via FedEx.

Regards,

John P. Laplante, PE

ANCHOR QEA, LLC
jlaplante@anchorqea.com
720 Olive Way, Suite 1900
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ATTACHMENT 3

ARMORED CAP ENHANCEMENT DAILY CONSTRUCTION REPORTS

ANCHOR QEA

DAILY REPORT

PROJECT	San Jacinto River Waste Pits TCRA Armored Cap Enhancement	**PROJECT NO.**	090557
CONTRACTOR	USA Environment, LP	**SUPERINTENDENT**	Ron Griffith
DAY OF WEEK & DATE:	Friday, January 17, 2014	**REPORT NO.**	001
WEATHER	Sunny with slight breeze	**TEMPERATURE**	L:45 H:64 degrees F

NUMBER/CLASS OF CONTRACTOR'S PERSONNEL:	**MAJOR EQUIPMENT ON JOB (Size/capacity):**
6 – USA Environment 2 – Hydrographic Consultants	1 Kobelco SK210 excavator 2 skid steers 1 Komatsu WA250PZ front end loader (at Blue Bonnet facility)
TIDE INFORMATION:	**HEALTH AND SAFETY INFORMATION:**
Time: n/a Height: n/a	No incidents or near misses on this date.

CHRONOLOGICAL ACCOUNT OF DAY'S WORK:

0730 to 0800 – Tailgate safety meeting with USA Environment at Blue Bonnet Landfill (armor rock stockpile location)

0800 – H. Samaha and 4 USA Environment personnel depart for the Site while the remaining 2 wait for trucks to arrive at the landfill

0830 – Arrive at San Jacinto River Waste Pits

0840 to 0930 – H. Samaha performs visual inspection of cap

0900 – Hydrographic Consultants (surveyor) arrive on-site for pre-construction survey and to mark areas to be enhanced

0935 – Learn that the wrong trucks were dispatched to the landfill; USA Environment trying to find tandem dump trucks for use in the afternoon

1025 to 1150 – H. Samaha performs fence inspection for the area south of I-10 and west of the San Jacinto River; no holes were noted and the fence was observed to be in good condition

1150 to 1250 – Excavator arrives on-site and crane mats (14) are unloaded

1250 – Crew breaks for lunch

1250 to 1320 – H. Samaha performs fence inspection for the area south of I-10 and east of the San Jacinto River; no holes were noted and the fence was observed to be in good condition

1415 – Learn the tandem trucks will not arrive until Monday, January 20.

1420 – All but one USA Environment crew member leave Site

1450 – 2 skid steers arrive on-site

1500 – H. Samaha and remaining USA Environment crew member leave Site

ANCHOR QEA

DAILY REPORT

Summary of Progress on this Date:

- Mobilized excavator, skid steers (2), and crane mats to Site
- Mobilized front end loader to Blue Bonnet facility for loading Armor Cap D rock
- Surveyors marked areas along South and Central berms to be enhanced
- Began pre-construction bed elevation survey
- Conducted quarterly cap and fence visual inspection

Persons On-site on this Date:

Holly Samaha (Anchor QEA)
USA Environment (6 crew)
Hydrographic Consultants (2 crew)

Material Delivery Summary as of this Date:

Material	Units	Delivered 1/17 (units)	Delivery Verification Method	Preceding Delivered Total	Total Delivered for Project
Armor Cap D	cy	0	Truck bed measure	0	0

TESTS PERFORMED:	None

PHONE LOG:

SITE PHOTOS/VIDEOS TAKEN: (attached below)	**FORCE ACCOUNT WORK/ CHANGES ENCOUNTERED:**
3 photos (descriptions provided underneath photo)	None

FIELD REPRESENTATIVE	Holly Samaha	HRS	6	DATE	01/17/2014

Photo 1 – Hydrographic Consultants perform pre-construction survey.

Photo 2 – Unloaded crane mats and excavator on-site.

Photo 3 – Areas to receive armored cap enhancement marked along the South Berm.

ANCHOR QEA

DAILY REPORT

PROJECT	San Jacinto River Waste Pits TCRA Armored Cap Enhancement	**PROJECT NO.**	090557
CONTRACTOR	USA Environment, LP	**SUPERINTENDENT**	Ron Griffith
DAY OF WEEK & DATE:	Monday, January 20, 2014	**REPORT NO.**	002
WEATHER	Sunny, light breeze from southwest	**TEMPERATURE**	L:50 H:75 (°F)

NUMBER/CLASS OF CONTRACTOR'S PERSONNEL:	**MAJOR EQUIPMENT ON JOB (Size/capacity):**
6 – USA Environment	1 Kobelco SK210 excavator 2 skid steers 3 tandem dump trucks (Martin Guiterrez trucking) 1 Komatsu WA250PZ front end loader (at Blue Bonnet facility)
TIDE INFORMATION:	**HEALTH AND SAFETY INFORMATION:**
Time: n/a Height: n/a	No incidents or near misses on this date.

CHRONOLOGICAL ACCOUNT OF DAY'S WORK:

0720 – R. Brown (Anchor QEA) arrive on-site and meet with USA personnel, discuss details of work and safety protocols

0730 – Front-end loader at Blue Bonnet facility is not running; R. Griffith (USA) departs the Site to troubleshoot; Neff Rentals are on-site to weld a steel plate to the bucket of the Kobelco excavator

0740 – Take pre-construction photos of the armored cap enhancement areas along the South and Central Berms

0815 – Front-end loader at the Blue Bonnet facility is reported to be operational and begins to load trucks

0900 – Dump trucks loaded with Armor Cap D rock begin arriving at the Site; 3 trucks will haul throughout the day

0910 – Neff Rentals complete with modifications to the excavator bucket and depart the Site

0920 – USA Environment begins placing Armor Cap D rock in the enhancement area on the South Berm

- Using 2 skidsteers to deliver and place the rock in the enhancement area
- Excavator is positioned atop the South Berm and is assisting with placement of the rock and final shaping to a 1V:3H slope

1020 – First of 3 trucks arrives at the Site with their second load of Armor Cap D rock; approximately 80 minutes for the cycle time between the first and second loads

1045 – R. Brown mobilizes to the Blue Bonnet facility to observe the loading of trucks

1120 – Last of 3 trucks departs the Blue Bonnet facility with its third load of the day; 9 truck loads transported thus far

1220 – R. Brown arrives back at the Site

1250 – Neff Rentals on-site to remove a skid steer from the Site and replace it with one that has wider tracks

1335 – Fifth round of truck loads(Loads #13 to #15 for the day) begin arriving at the Site

ANCHOR QEA

DAILY REPORT

1400 – Andrew Shafer (MIMC) arrives on-site

1445 – Sixth round of truck loads (Loads #16 to #18 for the day) begin arriving at the Site

1450 – Andrew Shafer (MIMC) departs from the Site

1645 – Last dump truck of the day offloads at the Site; 23 loads were received. Based on an estimated 12 cubic yards (cy) per truck load, 276 cy were received on this date

1705 – USA discontinues placing Armor Cap D rock for the day and begins staging equipment and materials for overnight

1710 – R. Brown paces off the day's progress; enhancement of the South Berm has been completed for approximately 90 linear feet of the 150-foot target area

1730 – All materials and equipment have been staged for overnight; USA Environment and R. Brown off-site

Summary of Progress on this Date:

- Received Armor Cap D rock and stockpiled at the intersection of the South and Central berms
- Initiated armored cap enhancement along the South Berm in the Eastern Cell

Persons On-site on this Date:

Andrew Shafer (MIMC)
Randy Brown (Anchor QEA)
USA Environment (6 crew)
Neff Rentals (2 crew)

Material Delivery Summary as of this Date:

Material	Units	Delivered 1/20 (units)	Delivery Verification Method	Preceding Delivered Total	Total Delivered for Project
Armor Cap D	cy	276	Truck bed measure	0	276

TESTS PERFORMED:	None

PHONE LOG:

SITE PHOTOS/VIDEOS TAKEN: (attached below)	**FORCE ACCOUNT WORK/ CHANGES ENCOUNTERED:**
6 photos (descriptions provided underneath photo)	None

FIELD REPRESENTATIVE	Randy Brown	HRS	10	DATE	01/20/2014

Photo 1 – Enhancement area on South Berm staked out before initiating rock placement.

Photo 2 – Loading dump truck with Armor Cap D rock at the Blue Bonnet facility.

Photo 3 – Unloading Armor Cap D rock at the intersection of the South and Central Berms.

Photo 4 – Skidsteers transporting Armor Cap D rock to the South Berm enhancement area.

Photo 5 – Skidsteer placing Armor Cap D rock in the South Berm enhancement area.

Photo 6 – Skidsteer placing Armor Cap D rock in the South Berm enhancement area.

ANCHOR QEA

DAILY REPORT

PROJECT	San Jacinto River Waste Pits TCRA Armored Cap Enhancement	**PROJECT NO.**	090557
CONTRACTOR	USA Environment, LP	**SUPERINTENDENT**	Ron Griffith
DAY OF WEEK & DATE:	Tuesday, January 21, 2014	**REPORT NO.**	003
WEATHER	Sunny, wind from the north	**TEMPERATURE**	L:50 H:60 (°F)

NUMBER/CLASS OF CONTRACTOR'S PERSONNEL:	**MAJOR EQUIPMENT ON JOB (Size/capacity):**
6 – USA Environment	1 Kobelco SK210 excavator 2 skid steers 3 tandem dump trucks (Martin Guiterrez trucking) 1 Komatsu WA250PZ front end loader (at Blue Bonnet facility)
TIDE INFORMATION:	**HEALTH AND SAFETY INFORMATION:**
Time: n/a Height: n/a	No incidents or near misses on this date.

CHRONOLOGICAL ACCOUNT OF DAY'S WORK:

0700 – Anchor QEA (R. Brown) and USA Environment (4 personnel) arrive on-site

0700 – Attended tailgate health and safety meeting; main topic was awareness of potential dust generation from the Armor Cap D rock stockpile on a windy day

0720 – USA resumes placing Armor Cap D rock in the South Berm enhancement area, beginning at the point at which they left off on January 20

0735 – First round of three trucks (Martin Gutierrez trucking) begin arriving on-site, offloading Armor Cap D rock

0830 – Second round of three trucks begins arriving on-site; cycle time for the trucks is approximately one hour

1050 – USA Environment completes the South Berm enhancement area

1050 – R. Brown measures the slope at six locations using an 8-foot long 1x2 piece of wood and a level; all six field measurements were more gently sloped than the target slope (measured from 1H:3¼ V to 1H:4V)

1100 – USA mobilizes to the north end of the Central Berm to scout the enhancement area at that location

1120 – USA begins to transport Armor Cap D rock to the northernmost enhancement area along the Central Berm using two skid steers, and placing the rock within the enhancement area using the Kobelco excavator

1130 – Fifth round of trucks (#13 to #15 of the day) begins arriving on-site

1200 – USA breaks for lunch

1230 – USA resumes cap enhancement activity at the north end of the Central Berm

1400 – Western half of the northernmost enhancement area is complete; four field measurements with the level measured a 1H:3V to a 1H:3½V slope

ANCHOR QEA

DAILY REPORT

1415 – USA mobilizes excavator and skid steers to the eastern side of the Central Berm to begin placing Armor Cap D rock in the east half of the northernmost enhancement area

1430 – Eighth round of trucks (load #22 to #24 for the day) begin arriving on-site; R. Brown and R. Griffith discuss when to discontinue truck transport and agree to stop the trucks after the ninth round of the day, which will yield 27 truck loads for the day and 50 truck loads total

1600 – USA completed enhancement area at the north end of the Central Berm; four field measurements on the east portion of this area using a level were 1H:3½V to 1H:4V

1615 – USA begins placing Armor Cap D in the third enhancement area on the east side of the Central Berm

1625 – Last dump truck of the day offloads at the Site; 27 loads were received. Based on an estimated 12 cubic yards (cy) per truck load, 324 cy were received on this date

1720 – USA discontinues placing Armor Cap D rock for the day and begins staging equipment and materials for overnight

1730 – All materials and equipment have been staged for overnight; USA Environment and R. Brown off-site

Summary of Progress on this Date:

- Received Armor Cap D rock and stockpiled at the intersection of the South and Central Berms
- Completed armored cap enhancement along the South Berm and at the north end of the Central Berm
- Initiated armored cap enhancement at northernmost area on the east side of the Central Berm

Persons On-site on this Date:

Randy Brown (Anchor QEA)
USA Environment (6 crew)

Material Delivery Summary as of this Date:

Material	Units	Delivered 1/21 (units)	Delivery Verification Method	Preceding Delivered Total	Total Delivered for Project
Armor Cap D	cy	324	Truck bed measure	276	600

TESTS PERFORMED:	None

PHONE LOG:

1110 – Discussed rock transport with W. Mears (Anchor QEA); estimate 50 truck loads total by end of the day
1230 – Discussed schedule with P. Slowiak (IP) who will be in Houston the week of January 29; R. Brown informed him that the enhancement work is currently expected to finish by the end of this week (January 25)

SITE PHOTOS/VIDEOS TAKEN: (attached below)	**FORCE ACCOUNT WORK/ CHANGES ENCOUNTERED:**
6 photos (descriptions provided underneath photo)	None

FIELD REPRESENTATIVE	Randy Brown	HRS	10.5	DATE	01/21/2014

Photo 1 – Placing and grading Armor Cap D rock in the South Berm enhancement area.

Photo 2 – Using a level to field-check the slope in the South Berm enhancement area.

Photo 3 – Pre-enhancement slope of the South Berm.

Photo 4 – Post-enhancement slope of the South Berm.

Photo 5 – Pre-enhancement slope of the north end of the Central Berm.

Photo 6 – Post-enhancement slope of the north end of the Central Berm.

ANCHOR QEA

DAILY REPORT

PROJECT	San Jacinto River Waste Pits TCRA Armored Cap Enhancement	**PROJECT NO.**	090557
CONTRACTOR	USA Environment, LP	**SUPERINTENDENT**	Ron Griffith
DAY OF WEEK & DATE:	Wednesday, January 22, 2014	**REPORT NO.**	004
WEATHER	Sunny, light wind from south	**TEMPERATURE**	L:40 H:70 (°F)

NUMBER/CLASS OF CONTRACTOR'S PERSONNEL:	**MAJOR EQUIPMENT ON JOB (Size/capacity):**
4 – USA Environment	1 Kobelco SK210 excavator 2 skid steers
TIDE INFORMATION:	**HEALTH AND SAFETY INFORMATION:**
Time: n/a Height: n/a	No incidents or near misses on this date.

CHRONOLOGICAL ACCOUNT OF DAY'S WORK:

0700 – Anchor QEA (R. Brown) and USA Environment (3 personnel) arrive on-site

0700 – Attended tailgate health and safety meeting; main topic was bumpy or uneven terrain for skid steers transporting Armor Cap D rock to the enhancement areas

0715 – USA Environment resumes placing Armor Cap D rock in Area #3, on the east slope of the Central Berm (see attached map for numerical designations of the cap enhancement areas)

0815 – USA Environment completed placing rock in Area #3; R. Brown measured the slope at four locations within this area; results were 1H:5V, 1H:4V, 1H:4V, and 1H:3¼V

0820 – USA Environment mobilized the excavator to Area #4 on the east slope of the Central Berm

0910 – USA Environment advanced approximately 30 feet into Area #4; R. Brown measured the slope at three points and measured 1H:2¾V to 1H:3V; R. Brown directed the operator to place additional rock to extend the base of the slope another 3 feet beyond the base of the current slope

1000 – Following the placement of additional rock in Area #4, R. Brown re-measures the slope at the same three locations that were measured at 0910; each measured 1H:3V to 1H:3¼V

1030 – Additional equipment operator (Rosario) for USA Environment arrives on-site

1100 – USA Environment begins placing Armor Cap D rock in Area #6 on the west slope of the Central Berm; they will concurrently place Areas #4 and #6 working from north-to-south along the Central Berm

1110 – Cap enhancement at Area #4 progress is approximately 75 of 200 linear feet of the target area

1230 – USA breaks for lunch

1300 – USA resumes cap enhancement activity in Area #6 along the western slope of the Central Berm

ANCHOR QEA

DAILY REPORT

1500 – USA Environment completes Armor Cap D placement along the western slope of the Central Berm in Area #6, and the area south of Area #6; this additional area reached to the 24-inch thick Armor Cap D layer

1500 – R. Brown measured the slope of Area #6, including the additional area to the south of Area #6, at 10 locations; each of the locations measured a slope of 1H:3V to 1H:3½V

1515 – USA resumes cap placement in Area #4 on the eastern slope of the Central Berm

1700 – Cap enhancement progress at Area #4 is approximately 130 of 200 linear feet of the target area

1705 – R. Brown off-site for the day

Summary of Progress on this Date:

- Completed armored cap enhancement along eastern and western slopes of the Central Berm at Areas #3 and #6
- Initiated armored cap enhancement at on the east slope of the Central Berm at Area #4; this area is approximately two-thirds complete

Persons On-site on this Date:

Randy Brown (Anchor QEA)
USA Environment (4 crew)

Material Delivery Summary as of this Date:

Material	Units	Delivered 1/22 (units)	Delivery Verification Method	Preceding Delivered Total	Total Delivered for Project
Armor Cap D	cy	0	Truck bed measure	600	600

TESTS PERFORMED: None

PHONE LOG: None

SITE PHOTOS/VIDEOS TAKEN: (attached below)

6 photos (descriptions provided underneath photo)

FORCE ACCOUNT WORK/ CHANGES ENCOUNTERED:

None

FIELD REPRESENTATIVE	Randy Brown	HRS	10	DATE	01/22/2014

Photo 1 – Pre-enhancement slope of Area #3 on east slope of the Central Berm.

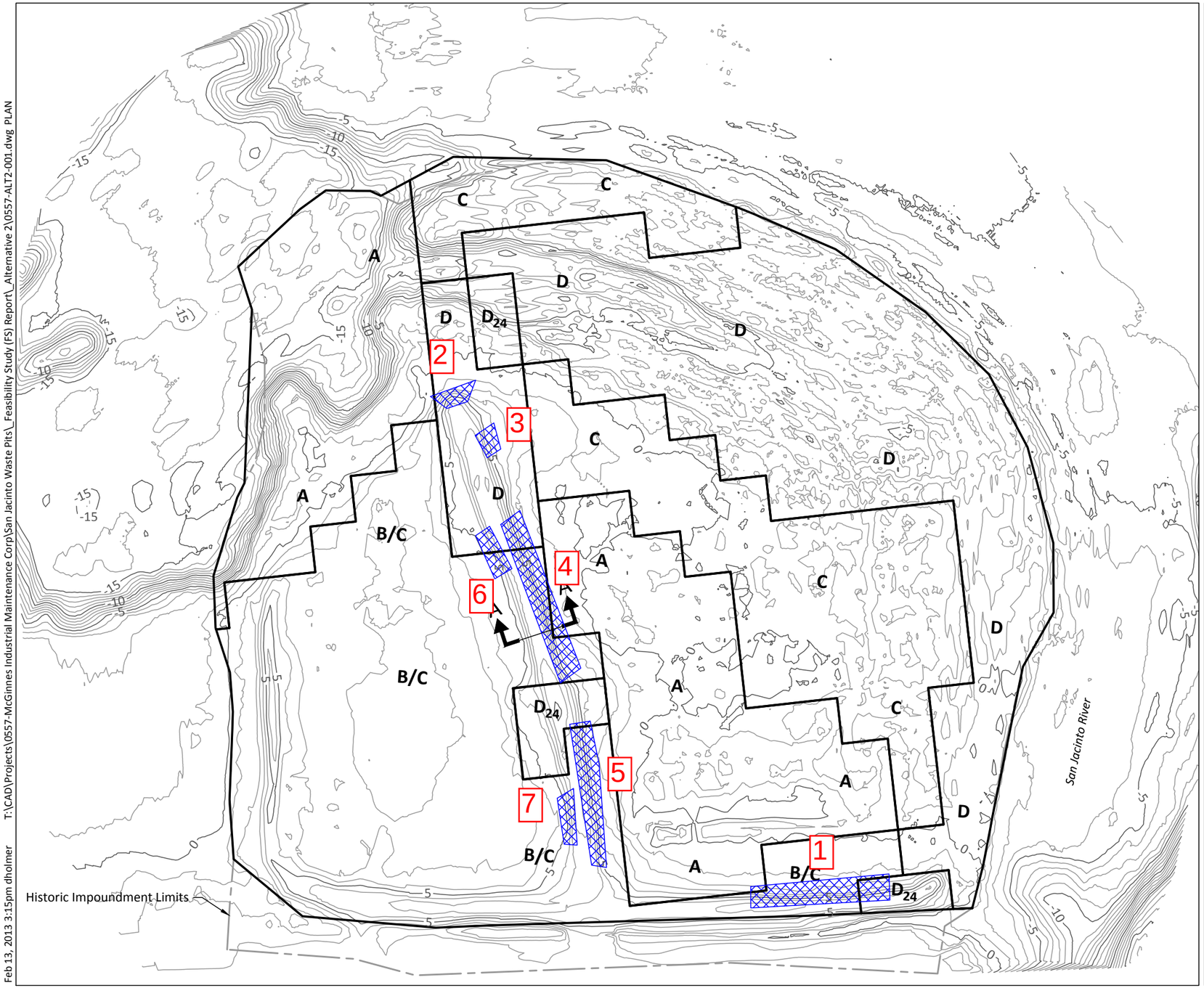
Photo 2 – Post-enhancement of Area #3.

Photo 3 – Placing and grading Armor Cap D rock along east slope of the Central Berm.

Photo 4 – Grading Armor Cap D rock along east slope of the Central Berm in Area #4.

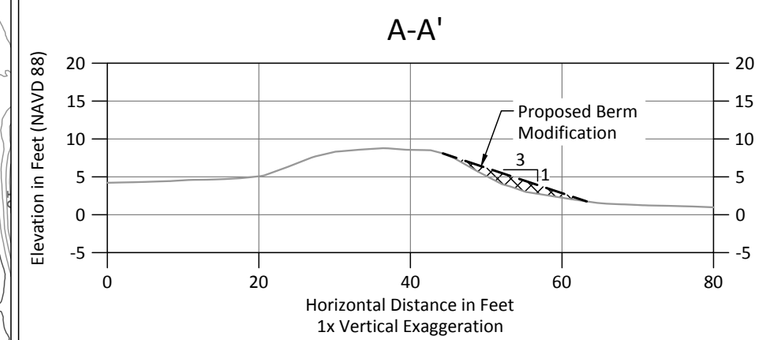
Photo 5 – Pre-enhancement slope of Area #6 on the western slope of the Central Berm.

Photo 6 – Post-enhancement slope of Area #6 on the western slope of the Central Berm.



LEGEND:

- Existing Contour (1 Foot Interval)
- B/C — Armored Cap Type and Boundary
- Historic Impoundment Limits
- Areas of Additional Rock Placement (Approximate)
- A A' — Cross Section Location and Designation



SOURCE: Drawing prepared from surveys provided by Hydrographic Consultants dated October 2012 and January/February 2013.
HORIZONTAL DATUM: Texas State Plane South Central, NAD83, U.S. Feet.
VERTICAL DATUM: NAVD 88.

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Scale in Feet

T:\CAD\Projects\0557-McGinnes Industrial Maintenance Corp\San Jacinto Waste Pits_Feasibility Study (FS) Report_Alternative 2\0557-ALT2-001.dwg PLAN
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ANCHOR QEA

Figure 1
Additional Rock Placement Plan - Alternative 2
Post TCRA...
San Jacinto River Waste Pits Superfund Site

ANCHOR QEA

DAILY REPORT

PROJECT	San Jacinto River Waste Pits TCRA Armored Cap Enhancement	**PROJECT NO.**	090557
CONTRACTOR	USA Environment, LP	**SUPERINTENDENT**	Ron Griffith
DAY OF WEEK & DATE:	Thursday, January 23, 2014	**REPORT NO.**	005
WEATHER	Cloudy, wind from north, intermittent rain in p.m.	**TEMPERATURE**	L:40 H:60 (°F)

NUMBER/CLASS OF CONTRACTOR'S PERSONNEL:	**MAJOR EQUIPMENT ON JOB (Size/capacity):**
4 – USA Environment	1 Kobelco SK210 excavator 2 skid steers
TIDE INFORMATION:	**HEALTH AND SAFETY INFORMATION:**
Time: n/a Height: n/a	No incidents or near misses on this date.

CHRONOLOGICAL ACCOUNT OF DAY'S WORK:

0700 – Anchor QEA (R. Brown) and USA Environment (4 personnel) arrive on-site

0700 – Attended tailgate health and safety meeting; main topics were (1) a new operator on-site today, so provide assistance as needed; and (2) freezing rain is expected overnight so be aware of conditions and do not drive to the site if roads are hazardous

0720 – USA Environment resumed placing Armor Cap D rock in Area #4, on the east slope of the Central Berm (see attached map for numerical designations of the cap enhancement areas); this area is approximately two-thirds complete

0815 – Area #4 is approximately 80 percent complete; R. Brown measured the slope at eight locations within Area #4 at 20-foot intervals; the slope at each locations was measured between 1H:3V to 1H:3½V

1130 – USA Environment completed Area #4 on the east slope of the Central Berm and mobilizes to Area #5

1140 – R. Brown measured the slope at three more locations within Area #4 at 20-foot intervals; the slope at these three locations ranged from 1H:3¼V to 1H:4V

1200 – USA Environment crew break for lunch

1205 – R. Brown and R. Griffith discuss remaining areas to complete (#5 and #7) and the size of the remaining stockpile; an estimated 80 to 100 cy remain in the stockpile, which may not be sufficient to complete Areas #5 and #7; R. Griffith began contacting suppliers to schedule rock deliveries for Friday, January 24, 2014

1230 – USA Environment crew resumes Armor Cap D placement in Area #5 on the eastern slope of the Central Berm

1400 – R. Griffith (USA Environment) informs R. Brown that trucking and equipment have been scheduled to bring 4 to 6 truckloads of Armor Cap D rock to the Site on Friday, January 24, 2014

1420 – Area #5 nearly complete; R. Brown measured the slope at eight locations at 20-foot intervals; the northernmost two locations were 1H:2¾V and will require additional rock; the other six locations ranged from 1H:3V to 1H:3½V

ANCHOR QEA

DAILY REPORT

1440 – USA Environment began placing Armor Cap D in Area #7, on the western slope of the Central Berm

1455 – USA Environment fully depleted the on-site stockpile of Armor Cap D rock; Area #7 is approximately 80 percent complete

1500 – An estimated 4 truckloads of Armor Cap D are needed to complete Areas #5 and #7; two trucks are scheduled to bring Armor Cap D rock to the Site tomorrow morning (Friday, January 24, 2014), weather permitting

1500 – USA Environment, R. Brown off-site for the day

Summary of Progress on this Date:

- Completed armored cap enhancement at Area #4 along the eastern slopes of the Central Berm
- Initiated armored cap enhancement at on the eastern slope of the Central Berm at Area #5 and the western slope of the Central Berm at Area #7; these areas are 80-to-90 percent complete

Persons On-site on this Date:

Randy Brown (Anchor QEA)
USA Environment (4 crew)

Material Delivery Summary as of this Date:

Material	Units	Delivered 1/23 (units)	Delivery Verification Method	Preceding Delivered Total	Total Delivered for Project
Armor Cap D	cy	0	Truck bed measure	600	600

TESTS PERFORMED:	None

PHONE LOG:

1200: Contacted W. Mears (Anchor QEA) to inquire the estimated yardage needed to complete Areas #5 and #7; approximately 120 cy needed, with an estimated 80 to 100 cy available in the on-site stockpile. Based on this phone conversation, Anchor QEA directed USA Environment to arrange for trucking and front end loader to deliver 4 to 6 truckloads of Armor Cap D to the Site on Friday, January 24, 2014

SITE PHOTOS/VIDEOS TAKEN: (attached below)	**FORCE ACCOUNT WORK/ CHANGES ENCOUNTERED:**
6 photos (descriptions provided underneath photo)	None

FIELD REPRESENTATIVE	Randy Brown	HRS	8	DATE	01/23/2014

Photo 1 – Skid steers loading rock from the on-site Armor Cap D stockpile to bring to Area #4.

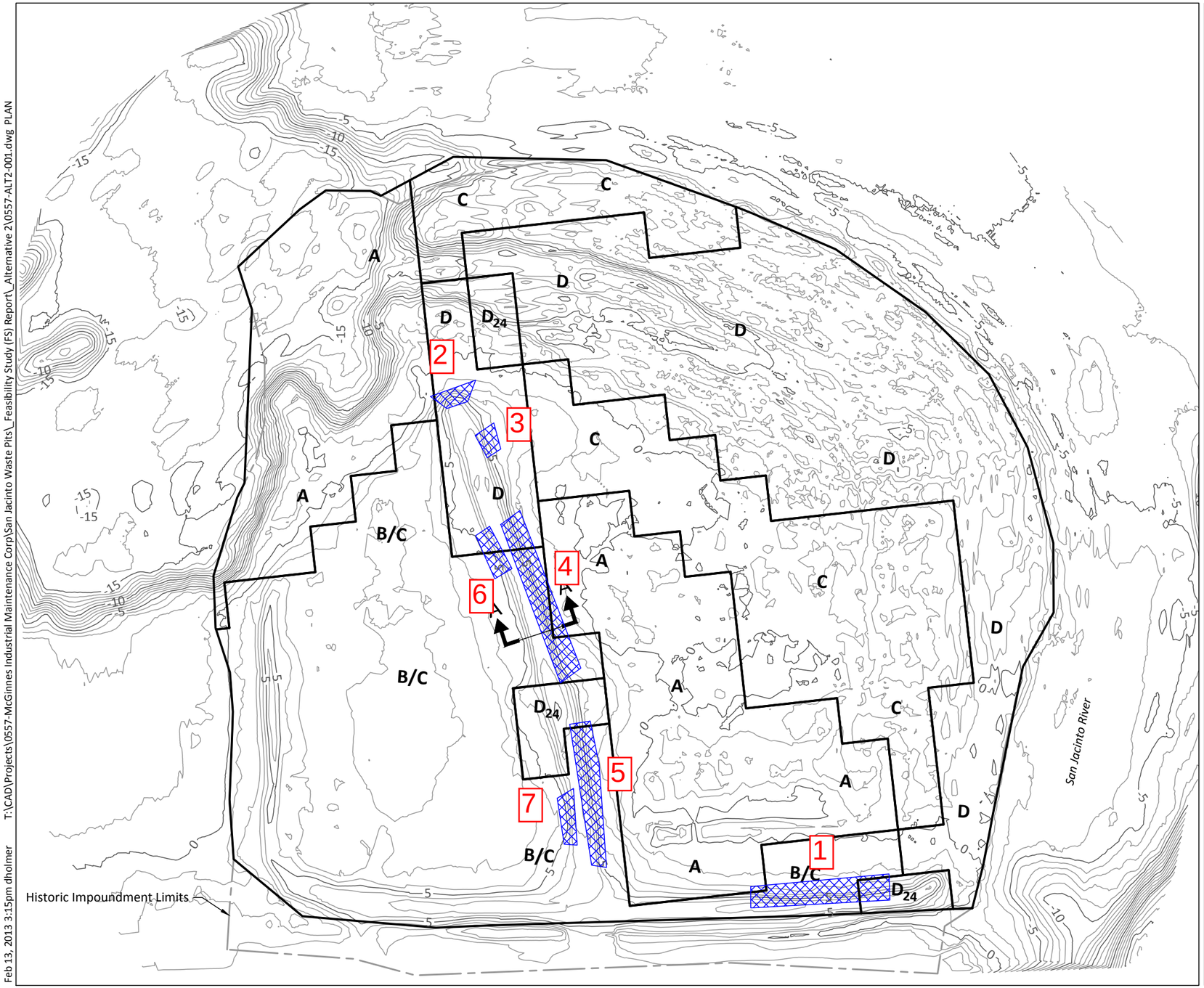
Photo 2 – Grading Armor Cap D rock on the eastern slope of the Central Berm in Area #4.

Photo 3 – Pre-enhancement slope of Area #4 on the eastern slope of the Central Berm.

Photo 4 – Post-enhancement slope of Area #4 on the eastern slope of the Central Berm.

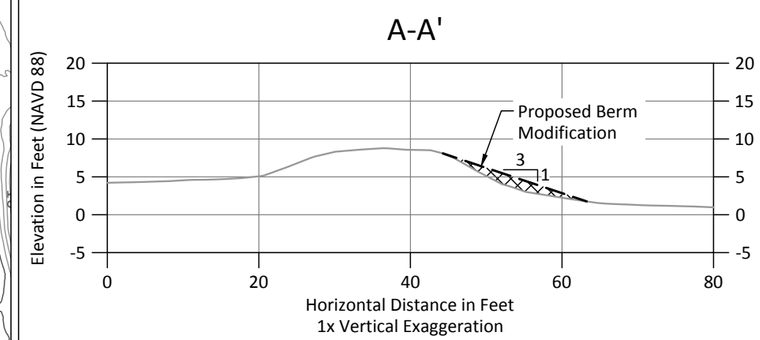
Photo 5 – Rock placement in progress at Area #5 on the eastern slope of the Central Berm.

Photo 6 – Rock placement in progress at Area #7 on the western slope of the Central Berm.



LEGEND:

- Existing Contour (1 Foot Interval)
- B/C — Armored Cap Type and Boundary
- Historic Impoundment Limits
- Areas of Additional Rock Placement (Approximate)
- A A' — Cross Section Location and Designation



SOURCE: Drawing prepared from surveys provided by Hydrographic Consultants dated October 2012 and January/February 2013.
HORIZONTAL DATUM: Texas State Plane South Central, NAD83, U.S. Feet.
VERTICAL DATUM: NAVD 88.

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T:\CAD\Projects\0557-McGinnes Industrial Maintenance Corp\San Jacinto Waste Pits_Feasibility Study (FS) Report_Alternative 2\0557-ALT2-001.dwg PLAN
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ANCHOR QEA

Figure 1
Additional Rock Placement Plan - Alternative 2
Post TCRA...
San Jacinto River Waste Pits Superfund Site

ANCHOR QEA

DAILY REPORT

PROJECT	San Jacinto River Waste Pits TCRA Armored Cap Enhancement	**PROJECT NO.**	090557
CONTRACTOR	USA Environment, LP	**SUPERINTENDENT**	Ron Griffith
DAY OF WEEK & DATE:	Monday, January 27, 2014	**REPORT NO.**	006
WEATHER	Mostly cloudy, wind from north	**TEMPERATURE**	L:55 H:60 (°F)

NUMBER/CLASS OF CONTRACTOR'S PERSONNEL:	**MAJOR EQUIPMENT ON JOB (Size/capacity):**
4 – USA Environment 2 – Hydrographic Consultants	1 Kobelco SK210 excavator 2 skid steers 1 Front end loader (at Armor Cap D stockpile area)
TIDE INFORMATION:	**HEALTH AND SAFETY INFORMATION:**
Time: n/a Height: n/a	No incidents or near misses on this date.

CHRONOLOGICAL ACCOUNT OF DAY'S WORK:

0700 – Anchor QEA (R. Brown) and USA Environment (4 personnel) arrive on-site

0700 – Attended tailgate health and safety meeting; main topic was keeping mind on activities on the last day of job

0850 – First truck of the day arrived on-site and offloaded Armor Cap D rock

0900 – USA Environment began adding Armor Cap D rock to the northernmost 50 feet of Area #5 on the west slope of the Central Berm

0910 – Second truck of the day arrived on-site and offloaded Armor Cap D rock

0920 – Hydrographic Consultants (2 personnel) arrived on-site to survey the armored cap enhancement areas

1010 – Fourth truck of the day arrived on-site and offloaded Armor Cap D rock – USA Environment will have both trucks pick up one more load each

1050 – USA Environment crew complete with enhancements to Area #5, currently working on enhancements to the northernmost 100 feet of Area #5 on the eastern slope of the Central Berm

1055 – Holly Samaha (Anchor QEA) on-site for the regularly scheduled visual/photo inspection of the armored cap visible above the water line

1115 – Sixth and final truck of the day arrived on-site and offloaded Armor Cap D rock

1145 – USA Environment completed the enhancements to Area #5; R. Brown measured the slope at five locations at 20-foot intervals along the northernmost 100 feet of Area #5 where additional rock was placed, and slopes at all five locations were measured in a range from 1H:3V to 1H:3¼V

1150 – Approximately two loads' worth of Armor Cap D rock were left in the on-site stockpile in the southeast corner of the Western Cell – R. Brown directed USA Environment to spread this rock across the stockpile area

ANCHOR QEA

DAILY REPORT

1200 – All armored cap enhancement work is complete

1210 – Truck arrives on-site to load crane mats for transport off-site; USA Environment began loading the mats onto the truck

1320 – All crane mats loaded onto the transport truck, which departed the site

1345 – Neff Rentals picks up the two skid steers and transports them off-site

1420 – Holly Samaha (Anchor QEA) completed the visual/photo inspection of the armored cap and departed the site

1445 – Per USA Environment, Neff Rentals contacted them and informed them that they could not pick up the Kobelco excavator until Wendesday morning; Neff Rentals instructed USA to position the excavator outside the main gate where they will pick it up on Wednesday, January 29, 2014

1455 – Hydrographic Consultants completed their survey of the armored cap enhancement areas

1500 – USA Environment, Hydrographic Consultants, R. Brown off-site for the day

Summary of Progress on this Date:

- Completed the final two armored cap enhancement areas (Area #5 and #7)
- Visual/photo inspection of the armored cap above the water line for the regularly scheduled cap inspection
- Demobilized two skid steers from the site and front-end loader from the stockpile area
- Collected survey data in the armored cap enhancement areas

Persons On-site on this Date:

Anchor QEA (Randy Brown, Holly Samaha)
USA Environment (4 crew)
Hydrographic Consultants (2 crew)

Material Delivery Summary as of this Date:

Material	Units	Delivered 1/27 (units)	Delivery Verification Method	Preceding Delivered Total	Total Delivered for Project
Armor Cap D	cy	72	Truck bed measure	600	672

TESTS PERFORMED:	None

PHONE LOG: None

SITE PHOTOS/VIDEOS TAKEN: (attached below)	**FORCE ACCOUNT WORK/ CHANGES ENCOUNTERED:**
8 photos (descriptions provided underneath photo)	None

FIELD REPRESENTATIVE	Randy Brown	HRS	8	DATE	01/27/2014

Photo 1 – Close-up of Armor Cap D rock at the on-site stockpile area.

Photo 2 – Collecting survey data along the South Berm at Area #1.

Photo 3 – Grading Armor Cap D rock on the eastern slope of the Central Berm in Area #5.

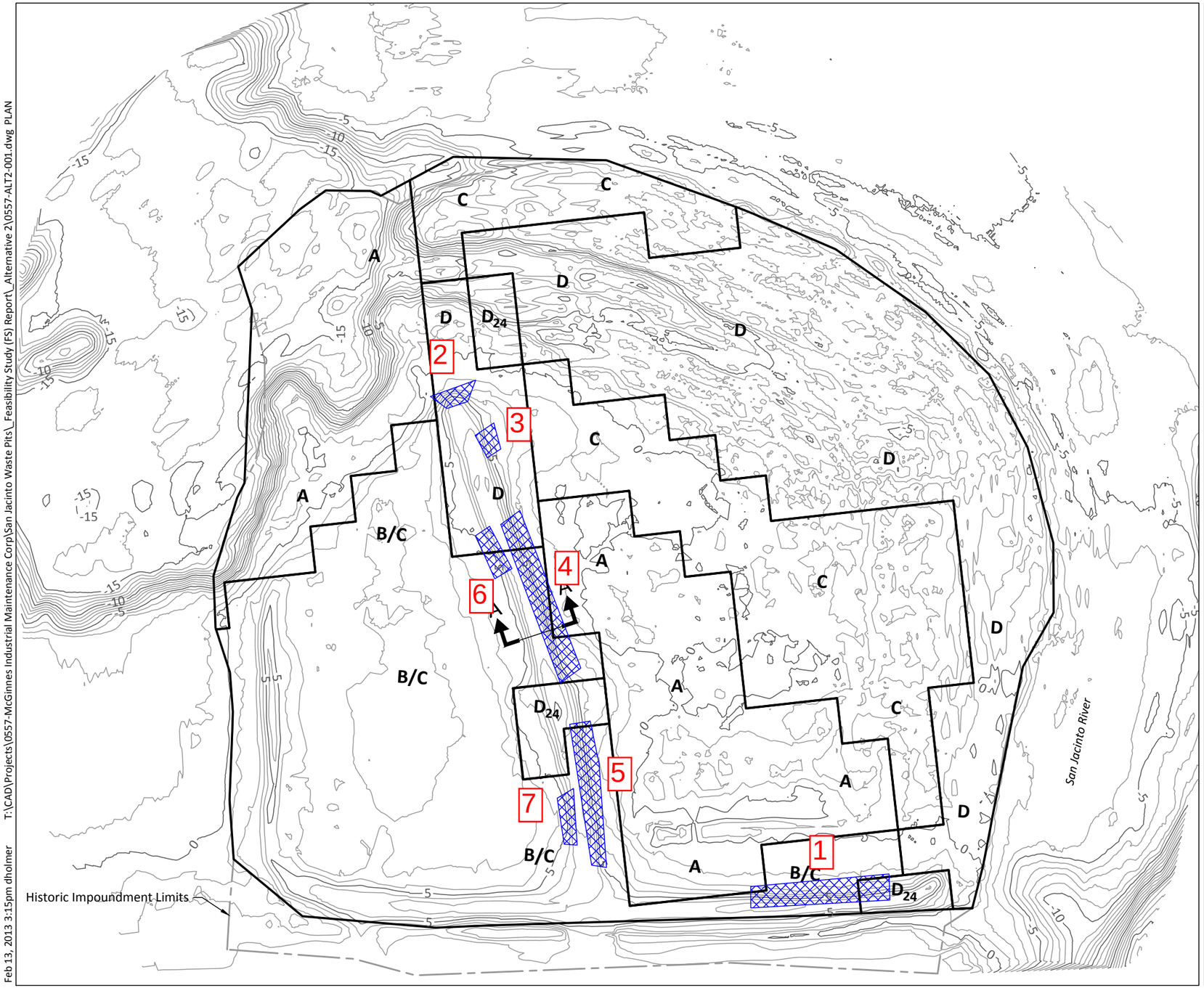
Photo 4 – Pre-enhancement slope of Area #5 on the eastern slope of the Central Berm.

Photo 5 – Post-enhancement slope of Area #5 on the eastern slope of the Central Berm.

Photo 6 – Armor Cap D rock spread across the stockpile area in the southeast corner of the Western Cell.

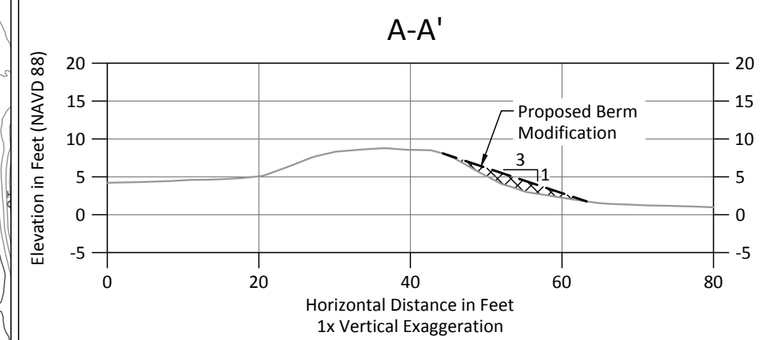
Photo 7 – Loading crane mats for transport off-site.

Photo 8 – Transporting skid steers off-site.



LEGEND:

- Existing Contour (1 Foot Interval)
- B/C — Armored Cap Type and Boundary
- Historic Impoundment Limits
- Areas of Additional Rock Placement (Approximate)
- A A' — Cross Section Location and Designation



SOURCE: Drawing prepared from surveys provided by Hydrographic Consultants dated October 2012 and January/February 2013.
HORIZONTAL DATUM: Texas State Plane South Central, NAD83, U.S. Feet.
VERTICAL DATUM: NAVD 88.

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Scale in Feet

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ANCHOR QEA

Figure 1
Additional Rock Placement Plan - Alternative 2
Post TCRA...
San Jacinto River Waste Pits Superfund Site