May 30, 2012

Ms. Jane M. Hicks
Division Chief, Regulatory Division
U.S. Army Corps of Engineers
1455 Market Street, 16th Floor
San Francisco, California 94103-1398

Mr. Jason Brush
Manager, Wetlands Office
U.S. Environmental Protection Agency, Region 9
75 Hawthorne Street
San Francisco, California 94105

Re: DMB Redwood City Saltworks Salt Plant, Redwood City, San Mateo County, California

Dear Ms. Hicks and Mr. Brush:

In accordance with U.S. Army Corps of Engineers (Corps) Regulatory Guidance Letter (RGL) 08-02, DMB Redwood City Saltworks (Saltworks)[1] – previously requested, and the Corps issued, a preliminary jurisdictional determination (PJD). The PJD covered approximately 1,365 acres of industrial salt production facilities (effectively, all areas interior to the perimeter levee system, herein referred to as Salt Plant) and approximately 113 acres of adjacent areas in and around Redwood City, San Mateo County, California.[2] Collectively, this 1,478 acres was the PJD area.

That request was made as the Saltworks team was pursuing a particular vision for redevelopment, reuse, and restoration of the Salt Plant with the City of Redwood City. As explained in greater detail below, Saltworks is no longer pursuing that project application and is,

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[1] Saltworks is a venture whose principals are DMB Pacific Ventures, LLC and Westpoint Slough, LLC, an affiliate of Cargill, Incorporated. The real property at the Salt Plant is owned by Cargill Point, LLC, an affiliate of Cargill, Incorporated.

[2] Letter from David C. Smith, DMB Redwood City Saltworks, to Jane Hicks, Chief, Regulatory Division, U.S. Army Corps of Engineers (Nov. 12, 2009); Letter from Jane M. Hicks, Chief, Regulatory Division, U.S. Army Corps of Engineers, to David Smith, DMB Redwood City Saltworks (Apr. 14, 2010). The PJD covered both the Salt Plant and the adjacent areas, a total of approximately 1,478 acres.

instead, contemplating a dramatically reduced development proposal confined to the most historically disturbed portion of the Salt Plant.

In pursuing this revised and reduced proposal, Saltworks now withdraws the PJD. Instead, Saltworks and Cargill now seek a formal, legally binding, and final jurisdictional determination under the Rivers and Harbors Act (RHA) and the Clean Water Act (CWA) for the 1,365 acre Salt Plant. The Corps has the authority to make the RHA jurisdictional determination.[3] We request that the CWA jurisdictional determination be made by the U.S. Environmental Protection Agency (EPA) pursuant to the "Memorandum of Agreement (MOA) between the Department of the Army and the Environmental Protection Agency Concerning the Determination of the Geographic Jurisdiction of the Section 404 Program and the Application of the Exemptions under Section 404(f) of the Clean Water Act" (Jan. 19, 1989) (1989 MOA). Finally, as explained below and in the attached jurisdictional submission, we set forth the reasons why the Salt Plant is not subject to either the RHA or the CWA.

Local Processing of the Proposed Restoration and Reuse of the Saltworks Salt Plant

Well before bringing forward any specific proposal for the restoration and reuse of the Salt Plant, the Corps, EPA, and other agencies strongly encouraged the Saltworks team to engage Redwood City residents and elected officials regarding any proposal for the future of the Salt Plant. We agreed. Both then and now, that foundation of grassroots outreach has been and remains the foundation of the evolving proposal for the Salt Plant.

The initial proposal, filed with the City in May 2009, was the product of nearly two years of outreach and public engagement involving community forums, planning charrettes, and other means of input. The Saltworks team documented over 10,000 comments and suggestions during this period which informed and guided the first project application to the City. Titled the "50/50 Balanced Plan," this application proposed using half of the Salt Plant for development and the other half for open space and restoration uses.

The 50/50 Balanced Plan proposed a transit-oriented, mixed-use community consisting of a maximum of 12,000 residential units; up to 1,000,000 square feet of commercial office uses; 140,000 square feet of neighborhood commercial and personal services uses; over 40 acres devoted to schools including four elementary school sites, a middle school site, and a high school site; community facilities consisting of a branch library, fire station, 4-H club farm and community garden; and approximately 794.5 acres of open space including creation of approximately 476 acres of tidal marsh habitat. Visually, the plan had a prominent crescent configuration that extended across most of the Salt Plant, wrapping around the core restoration area.

[3] 33 U.S.C. § 403; 33 C.F.R. § 329.14(b).

The City conducted extensive study and analysis of the May 2009 proposal. Additionally, during much of 2011, the City carried out an extensive "scoping" process pursuant to, though far exceeding the requirements of, the California Environmental Quality Act. That process included four topical workshops, a planning commission hearing, and a City Council hearing. That process produced hundreds of comments on the proposed plan from Redwood City residents, regional stakeholders, and regulatory agencies.

In light of the tremendous amount of public participation and thoughtful feedback, the Saltworks team began a thorough re-evaluation of the project proposal. In fact, because it was clear that the reconsideration would involve significant revisions to central aspects of the proposed project, the Saltworks team officially notified the City in November 2011 to stop all work on and consideration of the pending 50/50 Balanced Plan application. Ultimately, that application was officially withdrawn from the City in May 2012.[4]

Saltworks has not yet submitted a revised project proposal to the City. However, it has notified the City that the new project proposal will be a dramatic departure from the prior plan. Specifically, all proposed development will be confined to a much smaller footprint, roughly half the disturbance area proposed in the May 2009 project. Further that disturbance area will be limited to and confined within the most historically filled and manipulated area of the Salt Plant. The attached jurisdictional submittal, Attachment B, and the "Early History Report," Exhibit 5 thereto, lay out that disturbance history in detail.

In addition to the development footprint being confined to the area of greatest historic disturbance, it also is wholly contained within the City's "Urban Reserve" designation in its General Plan. The Urban Reserve designation identifies "land to be preserved for future use to *expand the limits of the urbanized area of the City*." Redwood City General Plan, The Built Environment, Urban Form and Land Use, at BE-41 (adopted October 11, 2010) (emphasis added). This much-reduced and consolidated development footprint significantly expands the area and opportunities available for restoration and habitat creation.

Saltworks will not proceed with the PJD.

As you know, RGL 08-02 establishes that a PJD is not a "legally binding determination . . . regarding whether CWA/RHA jurisdiction exists" over a particular location.[5] Rather, it is a tool available at the option of the applicant to "set aside questions regarding CWA/RHA jurisdiction .

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[4] Letter from John Paul Bruno, Redwood City Saltworks, to the Honorable Alicia Aguirre, Mayor, City of Redwood City (May 4, 2012) (formally withdrawing the 50/50 Balanced Plan application), included here as Attachment A.

[5] U.S. Army Corps of Engineers, Regulatory Guidance Letter No. 08-02 at 3 (June 26, 2008), *available at* http://www.usace.army.mil/Portals/2/docs/civilworks/RGLS/rgl08-02.pdf.

. ., usually in the interest of allowing the landowner or 'affected party' to move ahead expeditiously to obtain a Corps permit authorization where the party determines that it is in his or her best interest to do so." *Id.* Under RGL 08-02, a PJD may be used "even where initial indications are that the water bodies or wetlands on a *site may not be jurisdictional*," as is the case with the Salt Plant. *Id.* (emphasis added). Moreover, "a recipient of a preliminary JD can . . . request and obtain an approved JD if that later becomes necessary or appropriate during the permit process . . . ." *Id.*

As we noted in our prior letters, Saltworks and Cargill consistently have maintained that the Salt Plant is not subject to federal jurisdiction under either the CWA or the RHA. By the terms of RGL 08-02, a landowner's election to proceed under a PJD is voluntary and subject to rescission at the behest of the landowner. Indeed, the Corps noted in its April 14, 2010 letter issuing the PJD that Saltworks and Cargill could request an approved jurisdictional determination at any time. Accordingly, Saltworks and Cargill no longer elect to proceed with the PJD and now seek a formal, legally binding, final determination of RHA and CWA jurisdiction over the Salt Plant from the regulatory agencies. This determination will assist Saltworks and Cargill in assessing alternative future uses of the Site and in working with State, regional, and local officials as well as other stakeholders.

The Salt Plant is not subject to CWA or RHA jurisdiction.

As explained in the attached submission, Redwood City Approved Jurisdictional Determination Submission (May 30, 2012), Attachment B, the Salt Plant is not subject to federal jurisdiction under either the RHA or the CWA. Major portions of the Salt Plant have been in agricultural and industrial use as early as the 1860s. The present-day Salt Plant was defined and constructed pursuant to a United States War Department permit issued under the RHA in 1940.[6] Although that construction fully and finally severed the entire Salt Plant from San Francisco Bay, the western-most portion of the Salt Plant had a history of disturbance and fill for decades predating that permit.

As to RHA, the Salt Plant is not subject to jurisdiction because it is not subject to the ebb and flow of the tide, and it does not constitute navigable waters capable of transporting interstate or foreign commerce. With the exception of two sloughs–First Slough and Westpoint Slough–the Corps never asserted RHA jurisdiction over the Salt Plant. Indeed, a 1931 Coast and Geodetic Survey Sheet reflects the conversion to fast land of the vast majority of the Salt Plant west of what was First Slough. Today, the entire Salt Plant is surrounded by levees which sever any connection to San Francisco Bay. The 1940 War Department permit authorized the damming

[6] At the time of the 1940 permit, the Corps was part of the United States War Department. The War Department was dissolved in 1949 and the Corps is now part of the United States Department of the Army, a military department within the United States Department of Defense.

and leveeing of First Slough and the construction of levees along Westpoint Slough around the perimeter of the Salt Plant. The effect of these permitted actions was to cut off all remaining tidal flow to the Salt Plant so that the interior areas could be converted to saltmaking operations. In sum, the Corps historically claimed only limited RHA jurisdiction over the Salt Plant, and what jurisdiction it may have had was extinguished by the 1940 permit.

As to CWA, the Salt Plant is not subject to jurisdiction because it was filled and permanently converted into an industrial saltworks facility prior to the passage of the CWA in 1972. The Salt Plant had none of the characteristics of "waters of the United States" at the time the CWA took effect. The long and dynamic history of disturbance and fill of the western-most portion of the Salt Plant is documented in the attached jurisdictional submission with its accompanying Early History Report. Further, with the construction of the levees, the remainder of the Salt Plant was hydrologically separated from San Francisco Bay. Moreover, the Salt Plant today does not constitute "waters of the United States" under Corps and EPA regulations or under controlling CWA case law, including case law from the United States Court of Appeals for the Ninth Circuit.

Saltworks seeks a case-specific CWA jurisdictional determination from EPA.

Because any CWA jurisdictional determination involving the Salt Plant will present important, long-disputed legal and policy issues, and given EPA's extensive involvement with San Francisco Bay salt production facilities over the past decade, Saltworks requests that EPA make a case-specific jurisdictional determination for the Salt Plant pursuant to the 1989 MOA. Under the MOA, EPA can make a final determination of the jurisdictional scope of waters of the United States where significant issues are anticipated and where clarifying guidance is likely to be needed. Those circumstances exist here.

The CWA jurisdictional status of Cargill's saltmaking operations around the Bay has been the subject of repeated litigation over the past 40 years.[7] But none of the cases have addressed or resolved the issue of jurisdiction at the Salt Plant. Here, the determination of jurisdiction will necessarily require resolution of numerous important policy and legal issues, such as:

- The legal effect of the lawful conversion of the entire Salt Plant to fast land under a 1940 RHA permit prior to enactment of the CWA;

- Whether brines that are intermediate industrial products and that, when discharged into "waters of the United States" are regulated by EPA as statutory "pollutants" under the CWA, can also be "waters of the United States;" and

[7] From 1971 to 2007, there were at least 18 cases addressing the jurisdictional status of the various Cargill saltmaking operations around the Bay.

- The application of CWA jurisdiction, if any, to an isolated site following *Solid Waste Agency of Northern Cook Cnty. v. U.S. Army Corps of Eng'rs*, 531 U.S. 159 (2001), and *Rapanos v. United States*, 547 U.S. 715 (2006).

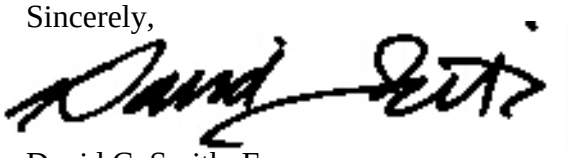
Further, principles of economy and efficiency warrant EPA's involvement on the front end of this analysis. We are certainly aware of and sympathetic regarding the significant workload shouldered at EPA Region IX by just a few professionals in the Water Division. But given the history of disagreement regarding this and other Cargill facilities in San Francisco Bay, involvement by EPA seems inevitable. Up-front involvement and direction from the ultimate authority on CWA issues would certainly appear to be in all parties' interest.

Moreover, EPA has a long history of involvement with the CWA jurisdictional questions related to Cargill's saltmaking facilities, including at the Napa Plant Site. EPA is thoroughly familiar with saltmaking operations, including in particular the Redwood City Salt Plant. Indeed, EPA was a critical player in the 2003 sale and donation of 16,500 acres of Cargill saltmaking facilities around San Francisco Bay, which specifically involved, but did not resolve, the jurisdictional status of the Salt Plant. Accordingly, given the history and questions presented by the Redwood City Salt Plant, EPA should make a case-specific CWA jurisdictional determination.

Conclusion

The Saltworks team has been exploring potential future uses for the Salt Plant since 2006. The significant amount of public engagement – both in support and opposition – testify to the pivotal importance of this Salt Plant. Its size, location, and characteristics afford an unparalleled opportunity for impacting both the region's dire lack of housing as well as providing both the land and financial resources to accomplish substantial wetlands restoration. The varied and extensive history of disturbance and fill at the Salt Plant warrant a thoughtful consideration of all the dynamics this Salt Plant presents. We look forward to working with you as you complete the Salt Plant's jurisdictional determination. Please contact me if you have any questions regarding our request or the information contained in or attached to it. Thank you very much for your prompt attention to this important matter.

Sincerely,



David C. Smith, Esq.
Senior Vice President
DMB Redwood City Saltworks

cc: Melissa Scianni, EPA Region IX
Hugh Barroll, EPA Region IX
Katerina Galactos, EPA Region IX
Cameron Johnson, USACE, San Francisco District
Blake Lyon, Senior Planner, City of Redwood City
Pamela Thompson, City Attorney, City of Redwood City

Attachments

Attachment A:

Letter from John Paul Bruno, Redwood City Saltworks, to the Honorable Alicia Aguirre, Mayor, City of Redwood City (May 4, 2012)

Redwood City
Saltworks

May 4, 2012

The Honorable Alicia Aguirre
Mayor
THE CITY OF REDWOOD CITY
City Hall
1017 Middlefield Road
Redwood City, California 94063

Re: Withdrawal of Pending Saltworks "50/50 Balanced Plan" Project Proposal, May 2009

Dear Mayor Aguirre,

We are aware the Redwood City City Council intends to review and discuss potential options regarding the Saltworks proposal on Monday, May 7. So as to avoid any unnecessary confusion, we write to clarify the status of the pending application, our intentions procedurally moving forward, and the revisions we intend for the future proposal.

Initially, we commend the City for its consistent and unyielding commitment to conduct an open, transparent, and fact-based environmental investigation of our proposal for the future of the Saltworks site, our "50/50 Balanced Plan," filed with the City in May 2009. As you publicly committed, you have managed a fair, exhaustive, and balanced process fully consistent with and, indeed, exceeding the mandates of state law. We find it saddening and ironic that those efforts have resulted in intense criticism of the City Council and staff, collectively and individually, from outside interests.

Your thorough and inclusive process produced a wealth of input, feedback, criticism, and vision from the community, stakeholders and regulators. As you know, in light of that tremendous response, we have been working for the last five months on a revised proposal for the Saltworks. In our efforts to complete that revised plan, we continue to explore the related process with the federal agencies.

There has been a great deal of speculation about the timing and direction of our revised proposal for the Saltworks. In evaluating a revised vision for the Saltworks, we have focused on the very unique history and character of this site. Activities ranging from agricultural production to disposal of dredge spoils from the initial digging for the Port of Redwood City fashioned the most highly disturbed and engineered nature of the

westerly most part of the site (within the present-day crystallizer beds) as early as the late 1800s. This area is the most heavily manipulated and has not been in any significant way a functioning part of San Francisco Bay for over 100 years. The easterly portion, however, remained largely undisturbed until much later and was constructed pursuant to a 1940 federal permit.

Reflective of this history, our revised plan for the Saltworks will be focused on a much more limited footprint restricted to the area of greatest historic disturbance. Accordingly, we anticipate that the revised proposed development footprint will be approximately half the acreage of that proposed in the May 2009 50/50 Plan submittal. Importantly, this area also is fully contained within the portion of the site currently designated "Urban Reserve" under the City's General Plan which, as you know, is for "land to be preserved for future use to *expand the limits of the urbanized area of the City*." (Redwood City General Plan, The Built Environment, Urban Form and Land Use, Page BE-41 [adopted October 11, 2010], *emphasis* added.)

The magnitude of change in the focus and footprint of this revised proposal is such a significant departure from the existing 50/50 proposal, and is so foundationally derived from the disturbance history of the site, that it must be considered in light of federal regulatory parameters. Accordingly, we feel any specific proposal back to the City would be premature until we better understand the regulatory implications of our revised vision.

Mayor Aguirre, we could not be more appreciative of the professional and courteous relationship with Redwood City – its citizens, City Staff, and its elected and appointed officials – that has matured over these past few years. The City's staff and officials have shown great commitment to the integrity of the process in evaluating the appropriate future use of this site. Given the critical importance of this site for the future of Redwood City, we also remain committed to being thoughtful and thorough in bringing our revised Saltworks proposal to the City.

To be clear, and to avoid any unnecessary confusion or distraction by the City, we hereby withdraw the May 2009 50/50 Balanced Plan proposal currently on file with the City in its entirety.

Should you or the City staff have any questions regarding this matter, please feel free to contact me.

Sincerely,

John Paul Bruno
General Manager and Senior Vice President

cc: City Council
Bob Bell, City Manager
Pamela Thompson, City Attorney
Bill Ekern, Community Development Director
Blake Lyon, Senior Planner
City Clerk

Attachment B:

Redwood City Salt Plant Approved Jurisdictional Determination Submission

May 30, 2012

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Figure 1: 1868 San Mateo County Map showing landownership at Redwood City Salt Works site

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Exhibit 6: WRA, Inc., Summary of Historic Levee Construction (Feb. 2012).

Exhibit 7: Michael Josselyn, Ph.D., WRA, Inc., Topographic Sheets Denote Marsh Elevations above Mean High Water (Feb. 27, 2012) ("Marsh Elevations Report").

Attachment A. 1940 War Department Permit Sheet 1

Attachment A. 1940 War Department Permit Sheet 2

Attachment B. USCGS Sheet: 4643, July 1st, 1931

Attachment C. USCGS Sheet: 4643, July 1st, 1931 (delineating approved dam and levees)

Exhibit 8: War Department Permit issued to Stauffer Chemical Company (Jan. 16, 1940) ("1940 Permit").

Exhibit 9: Listings of Navigable Waters in the South Pacific Division (1932, 1958, 1965, 1971).

Exhibit 10: Redwood City Salt Plant Crystallizer Grading Drawings 772 (1949).

Exhibit 11: U.S. Army Corps of Eng'rs, San Francisco District, Public Notice No. 71-22 (June 11, 1971); U.S. Army Corps of Eng'rs, San Francisco District, Public Notice No. 71-22(a) (Jan. 18, 1972).

Exhibit 12: Letter from Lt. General F.J. Clarke to Henry S. Reuss, Chairman, House Subcommittee on Conservation and Natural Resources (Feb. 9, 1972).

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Exhibit 14: Secretary of War, Reports on Preliminary Examination and Survey of Redwood City Harbor, Cal., H.R. Doc. No. 65-551 (1917).

Exhibit 15: Statement of Brig. Gen. William M. Glasgow, Jr., Div. Eng'r, U.S. Army Corps of Eng'rs, before the Subcommittee on Conservation and Natural Resources of the H. Committee on Government Operations (Aug. 20, 1969).

Exhibit 16: Letter from Col. Charles R. Roberts, Dist. Eng'r, U.S. Army Corps of Eng'rs, to San Francisco Bay Conservation and Development Commission (Dec. 9, 1970).

Exhibit 17: Defendants' Admissions of Fact and Genuineness of Documents, Admission No. 16, *Leslie Salt Co. v. Froehlke*, No. C-73-2294 (N.D. Cal. Mar. 14, 1974).

Exhibit 18: Memo from the Office of the Chief of Eng'rs to Div. Eng'r, Report on Application for a Department of the Army Permit to Fill Former Marshland for the Hahn Shopping Center in San Francisco Bay, Corte Madera, California (Apr. 25, 1975); Letter from H. A. Flertzheim, Dist. Eng'r, to James L. Barrett, Esq. (May 7, 1975).

Exhibit 19: Memorandum from Steven L. Stockton, Director of Civil Works, U.S. Army Corps of Engineers, to South Pacific Division Commander, The "normal circumstances" concept as applied to Cargill's plant site at Redwood City, CA consisting of salt production facilities (Oct. 2, 2009) ("Normal Circumstances Memo").

Exhibit 20: Memorandum from Daniel W. McGovern, Regional Administrator, Region IX, EPA, Geographical Extent of Clean Water Act Jurisdiction at Bolsa Chica, Orange County, CA (Feb. 10, 1989).

Exhibit 21: Excerpts, Preliminary Jurisdictional Determination Form for Redwood City Salt Production Facility submitted by DMB Saltworks to U.S. Army Corps of Eng'rs (Jan. 21, 2010) ("PJD Form").

Exhibit 22: Letter from Jane M. Hicks, Chief, Regulatory Division, U.S. Army Corps of Engineers, to David Smith, DMB Redwood City Saltworks (Apr. 14, 2010) (with accompanying attachments) ("Hicks Letter").

Exhibit 23: Michael Josselyn, Ph.D., Special Aquatic Habitat Assessment for Redwood City Plant Site (June 2002) ("Josselyn 2002 Special Aquatic Habitat Assessment").

Exhibit 24: WRA, Inc., Evaluation of Saltworks Hydrologic, Physical, Chemical, and Biological/Ecological Functions and Effects on Surrounding Areas (Feb. 27, 2012) ("Significant Nexus Analysis").

Exhibit 25: Letter from John Paul Bruno, Redwood City Saltworks, to the Honorable Alicia Aguirre, Mayor, City of Redwood City (May 4, 2012).

Attachment B:

Redwood City Salt Plant Approved Jurisdictional Determination Submission

May 30, 2012

I. Executive Summary

DMB Redwood City Saltworks (Saltworks),[1] seeks a formal, legally binding and final determination of Rivers and Harbors Act (RHA) and Clean Water Act (CWA) jurisdiction from the U.S. Army Corps of Engineers (Corps) and the Environmental Protection Agency (EPA) for the Redwood City salt production facility (Salt Plant). The Salt Plant and its immediate vicinity have a long and dynamic history of disturbance, fill, and leveeing activity dating back to the mid-1860s. While the Salt Plant's current structure and configuration were established pursuant to a federal permit issued in 1940, the western-most portion of the Salt Plant has a history of disturbance and fill predating that permit by decades. Over time, agricultural and industrial activities converted the Salt Plant from marsh to fast land[2] and areas permanently severed from the Bay by levees.

The Salt Plant is not subject to RHA jurisdiction because it is not subject to the ebb and flow of the tide, and it is not capable of transporting interstate or foreign commerce. Historically, but for two sloughs, the Corps treated the entire Salt Plant as fast land and/or marshland above the mean high water (MHW) line and therefore not subject to RHA

[1] Saltworks is a venture whose principals are DMB Pacific Ventures, LLC and Westpoint Slough, LLC, an affiliate of Cargill, Incorporated. The real property at the Salt Plant is owned by Cargill Point, LLC, an affiliate of Cargill, Incorporated.

[2] Fast land includes land that was once tidal but has been converted such that it is now non-tidal land. *See* 40 Fed. Reg. 19,766, 19,770 (May 6, 1975) (Corps proposed rule equating the deposition of fill material into navigable waters with the creation of fast land); U.S. Geological Survey, USGS Fact Sheet 037-99, Oklahoma (Aug. 1999) (fast land is land adjacent to a water body that was created by the depositional process of that water body and that is no longer inundated by waters); Glossary of Geology, American Geological Institute, 5th ed. (2005) (fast land is "land that is high and dry near water, such as an upland").

jurisdiction. Currently, there are no tidal waters on the Salt Plant; the western-most portion of the Salt Plant had been largely filled well before creation of the Salt Plant and levees separate the remainder of the Salt Plant from San Francisco Bay. Further, the line on the shore reached by MHW is on the Bay side of the outboard levees. The federal Department of War issued an RHA permit in 1940 that acknowledged the prior conversion of the western-most portion of the Salt Plant into industrial saltmaking facilities and authorized the damming and leveeing of First Slough and the construction of levees along Westpoint Slough around the perimeter of the Salt Plant.[3] The effect of these permitted actions was to cut off all remaining tidal flow to the Salt Plant so that the interior areas could be converted to saltmaking operations. Thus, the 1940 permit extinguished what little RHA jurisdiction the Corps ever claimed to have had. Therefore, there is no basis for RHA jurisdiction over the Salt Plant now.

Similarly, the Salt Plant is not subject to CWA jurisdiction because it is not "navigable waters," defined by the CWA as "the waters of the United States." As a result of site construction and filling during the first half of the 20th century, the Salt Plant had been substantially and permanently altered such that, by the time the CWA was passed in 1972, the Salt Plant did not (and still does not) qualify as navigable waters within the meaning of the CWA. The construction of the levees separated the Salt Plant from San Francisco Bay, and the interior areas do not have legal or physical characteristics to connect them with waters of the United States. Moreover, even if the intermediate industrial products contained in the Salt Plant were considered to be water, which they are not, the Salt Plant is not jurisdictional under controlling CWA case law. Under *Solid Waste Agency of Northern Cook County v. U.S. Army*

[3] At the time of the 1940 permit, the Corps was part of the United States War Department. The War Department was dissolved in 1949 and the Corps is now part of the United States Department of the Army, a military department within the United States Department of Defense.

Corps of Eng'rs, 531 U.S. 159 (2001) (*SWANCC*), the agencies cannot assert CWA jurisdiction over the Salt Plant because it is isolated. *United States v. Riverside Bayview Homes, Inc.*, 474 U.S. 121 (1985), and *Rapanos v. United States*, 547 U.S. 715 (2006), are also unavailing: *Riverside Bayview* because the Salt Plant does not contain wetlands; and *Rapanos* because it is not connected to, nor does it have a significant nexus with, traditional navigable waters. Likewise, the Salt Plant does not meet any of the criteria of a "water of the United States" under applicable regulations, 33 C.F.R. § 328.3(a)(1)-(7), and therefore is not jurisdictional under the regulations. For these reasons, explained more fully herein, the agencies should determine that there is no RHA or CWA jurisdiction over the Redwood City Salt Plant.

II. Background

A. Saltmaking Operations

The Redwood City Salt Plant is an industrial facility in Redwood City, San Mateo County, California, located approximately 30 miles south of San Francisco.[4] The Salt Plant is bounded to the north by the Pacific Shores office complex, Westpoint Marina, and Westpoint Slough; to the south by light industrial and modular home facilities and Highway 101; to the east by Flood Slough; and to the west by Seaport Boulevard and heavy industrial uses at and around the Port of Redwood City.[5] The Salt Plant is part of a larger industrial salt production complex located around San Francisco Bay that uses the sun and wind to produce salts for industrial and other purposes.[6] The process begins on the east side of San Francisco Bay, where water is drawn into "evaporators." At the evaporator sites, water is slowly evaporated to produce

[4] WRA, Inc., Map of San Francisco Bay Area, Exh. 1.

[5] *See* WRA, Inc., Map of Redwood City Salt Plant (Feb. 17, 2012), Exh. 2.

[6] *See* WRA, Inc., Overview of Former and Current Salt Production Areas (Feb. 7, 2012), Exh. 3.

concentrated brines. After about four years of evaporation and the moving of brines through miles of concentrating ponds, highly concentrated brines, known as "pickle," are pumped across San Francisco Bay through a pipeline into the pickle ponds at the Salt Plant. When the pickle is fully concentrated, it is transferred to crystallizer beds where the sodium chloride precipitates out from the brine to form common salt. The crystallizer beds are highly manipulated production areas. The beds are routinely graded, leveled, compacted and filled to create even-bottomed surfaces for salt harvesting. The salt is mechanically harvested from the crystallizer beds using heavy construction equipment. The residual solution, "bittern," which contains lower levels of sodium and higher levels of magnesium, is eventually moved into a separate cell. Solid bittern salts can also be harvested. The liquid bittern is either recycled back into the process or pumped into trucks and sold for other commercial/industrial uses. Salts and other elements can and do precipitate on the entirety of the Salt Plant depending on weather and other operating conditions.[7]

The Salt Plant consists of approximately 1,365 acres and includes a pickle complex (approximately 437 acres), a crystallizer complex (approximately 533 acres), a bittern complex (approximately 245 acres), facility headquarters and levees (approximately 89 acres),[8] and a

[7] The saltmaking process at the Salt Plant is distinct from the processes that go on at Cargill's evaporator sites. The evaporator sites are used in the early stages of the saltmaking operations to slowly evaporate water to produce brines that move slowly through a complex system of evaporating ponds. The evaporator systems are designed so that the flow of the brine from pond to pond is largely passive (by gravity) through control gates. As the brine moves through the system of evaporation ponds it gradually becomes more concentrated. By the time the saturated brine is pumped across the Bay and reaches the pickle ponds of the Redwood City Salt Plant, however, 95 percent of the original water has been removed, and the five-year solar evaporation process has transformed the brine into pickle. As discussed above, at the Salt Plant, the highly saline brines precipitate and the salt that forms in the crystallizer beds is harvested using an industrial harvester that scrapes the salt from the bed floors.

[8] This area includes the tops of the levees that separate the various portions of the Salt Plant.

multi-use area complex that has had a variety of different uses over the history of the Salt Plant (approximately 61 acres).[9] The Salt Plant is, in effect, a factory without a roof, as the solar evaporation process at Redwood City is identical to the mechanical vacuum evaporation process that occurs inside buildings in salt refineries, such as Cargill's Newark Plant, but without the intensive energy use.[10]

B. History of Salt Plant Construction

In its historic state and at the time construction began in 1901, the entire Salt Plant was marshland above mean high water with some sloughs of varying sizes crossing certain portions of the property.[11] Cargill's predecessors[12] began construction on portions of the Salt Plant in or around 1901, just two years after the passage of the Rivers and Harbors Act of 1899 (RHA). In 1901, Redwood City Salt Company leased 1,784 acres of land and constructed levees, including levees along the eastern side of Redwood Creek and the southwestern side of First Slough, to build their salt works in portions of the present-day crystallizers.[13] Beginning in 1901, the company operated its salt works, including evaporators, crystallizers, and other production

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[9] *See* Map of Redwood City Salt Plant, Exh. 2.

[10] Unlike the open-air Salt Plant at Redwood City that relies on solar energy, Cargill's Newark Salt Plant also has an indoor refining process that uses a series of steam-driven vacuum evaporator pans, along with tanks, pumps, and other machinery to produce vacuum salt. William E. Ver Planck, State of California Department of Natural Resources, Salt in California 85-89 (1957).

[11] WRA, Inc., Map of Redwood City Salt Plant Area Prior to Salt Construction, USCGS Sheet: 664 (1857), Exh. 4 (The marshland is denoted on the survey sheet with closely spaced parallel lines containing marsh symbols).

[12] In 1901, portions of the Salt Plant were owned by the Redwood City Salt Company and portions were owned by the West Shore Salt Company. Subsequent owners over the years included Stauffer Chemical Company and Leslie Salt Company. Cargill acquired the Salt Plant through the Leslie acquisition in 1978.

[13] *See* Michael Josselyn, Ph.D., WRA, Inc., Early History of Redwood City Salt Plant Site (Feb. 27, 2012) ("Early History Report"), Exh. 5, at 2 and Map 1, Historic Salt Production (1901-1907).

ponds, on approximately 432 acres east of Redwood Creek and southwest of First Slough. *Id.* at 2, 4, Map 1. In 1902, another salt company, West Shore Salt Company, purchased 192 acres of land and began construction of additional salt works in the southern portions of the present-day crystallizers. *Id.* West Shore constructed levees, including levees along Steinberger Creek, and installed the first dam across Steinberger Creek. *Id.* Like Redwood City Salt Company, West Shore Salt Company commenced salt production in portions of the current-day crystallizers in 1902.[14]

In 1907, Redwood City Salt Company merged with West Shore Salt Company's successor, Stauffer Chemical, to form Leslie Salt Company.[15] In 1913, Leslie Salt sold approximately 500 acres of its land to Redwood City Harbor Company in the area of the current port facilities and the northern portion of the present-day crystallizers. The Harbor Company bought the land to develop a new port on the edge of the Bay. In 1914, the Harbor Company constructed levees around its holdings, and the Corps of Engineers deposited dredged material from its dredging operation in Redwood Creek on the Harbor Company land to create dry land for the new port facility.[16] The Harbor Company also constructed a road and railroad spur across Steinberger Creek connecting downtown Redwood City with new port facilities on the edge of the Bay. As shown in Maps 2 and 3 of Exhibit 5, beginning in 1913, Redwood City Harbor Company reclaimed several acres of marshland around the port area and used these areas for dredged material disposal, particularly in the area of the current port facilities and the northern portion of the current-day crystallizers.[17]

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[14] *Id*. at 4, Map 1.

[15] Early History Report, Exh. 5, at 4, Map 2.

[16] *Id*. at 6.

[17] *Id*. at 6, 7 and Figure 4, Maps 2-3.

By 1931, as a result of all of the construction by the Redwood City Harbor Company, the salt companies, and the Corps, the former marshland areas between Redwood Creek, Westpoint Slough, and First Slough were permanently separated from San Francisco Bay and the adjacent sloughs by levees.[18] A 1931 U.S. Coast and Geodetic Survey of the Salt Plant shows that this 603-acre diked area had been converted into industrial saltmaking facilities, filled areas, and reclaimed marsh.[19] The 1931 survey depicts the remainder of the Salt Plant as marshland crossed by sloughs of varying size.[20] The marshland is denoted on the survey sheets with closely spaced parallel lines containing marsh symbols. Most of the sloughs crossing the Salt Plant are also shown with a closely spaced parallel lines and marsh symbols running over them, indicating that they were treated as marshland as well. Marshland was considered to be above MHW.[21]

In 1939, Stauffer Chemical Company (a predecessor of Leslie Salt and Cargill) applied for an RHA permit to extend the existing saltmaking operations into the eastern portions of the Salt Plant. The War Department issued the permit in 1940. It authorized construction of "an earth dyke or levee across and along the bank of First Slough, and along the banks of Westpoint Slough and an unnamed tributary thereof."[22] The plan accompanying the 1940 permit shows that the former marshland areas between Redwood Creek, Westpoint Slough, and First Slough had been converted previously and that the areas between First Slough, Westpoint Slough, and Flood

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[18] *See* WRA, Inc., Summary of Historic Levee Construction, Exh. 6.

[19] *See* Michael Josselyn, Ph.D., WRA, Inc., Topographic Sheets Denote Marsh Elevations above Mean High Water (Feb. 27, 2012) ("Marsh Elevations Report"), Exh. 7, at 2-3 and Attachments B, C, USCGS Sheet 4643 (Jul. 1, 1931). A diagram accompanying the 1940 War Department permit, discussed below, shows that the ground of the marshland on the Site was at mean higher high water (MHHW), which is higher than MHW. *See* War Department Permit issued to Stauffer Chemical Company (Jan. 16, 1940) ("1940 Permit"), Exh. 8, Sheet 1.

[20] *See* Marsh Elevations Report, Exh. 7, Attachments B, C.

[21] *Id.* at 2-3 and Attachments B, C.

[22] *See* 1940 Permit, Exh. 8, at 1.

Slough were marshland above MHW. Therefore, as shown in Attachments A, Sheet 2, and C of Exhibit 7, the permit authorized obstruction and conversion of the only areas of the Salt Plant that the Corps treated as subject to RHA jurisdiction–First Slough and Westpoint Slough.[23] The Corps did not require a permit for any other areas within the Salt Plant. The permit the Corps issued authorized the permanent separation of the salt production facilities from San Francisco Bay and the construction of the present pickle ponds, bittern ponds, and portions of the crystallizers, which, in conjunction with the crystallizer beds that had previously been constructed, completed construction of the Salt Plant.

Pursuant to the 1940 permit, Leslie Salt continued work through the 1940s to construct the Salt Plant by leveeing off, excavating, filling, and compacting the Salt Plant to create the crystallizer beds, pickle ponds, bittern ponds, facility headquarters, and multi-use areas. Aerial photographs show that the levees authorized under the 1940 permit were completed in or around 1946, and the crystallizers were completed in 1950.[24] This site construction and topographical manipulation permanently altered the Salt Plant, and the levees permanently excluded tidal waters from the interior areas, thus eliminating any hydrological connection to San Francisco Bay. Construction drawings for the crystallizer beds show that these structures were highly engineered.[25] The crystallizers were designed with a clay bottom surface that would be flat and

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[23] For purposes of this analysis, First Slough and Westpoint Slough will be characterized as areas that the Corps treated as "navigable waters" subject to Corps RHA jurisdiction because the Corps required an RHA permit for work in those areas. However, it should be noted that starting in the early 1900s and continuing to the present, the Corps has maintained lists of waters found to be "navigable" and Westpoint Slough is the only area of the Site to ever have been included on these lists. *See* Listings of Navigable Waters in the South Pacific Division (1932, 1958, 1965, 1971), Exh. 9.

[24] *See* Early History Report, Exh. 5, at 18 and Figures 11 and 12, 1946 aerial photographs of First Slough dam and Westpoint Slough and Flood Slough levees.

[25] *See* Redwood City Salt Plant Crystallizer Grading Drawings 772 (1949), Exh. 10.

hard such that the crystallizers could be graded and leveled after each salt harvest. All the Salt Plant work was completed, and the present day boundaries and functions of the Salt Plant established, by 1951. In that year, bulk salt product was first shipped from the Salt Plant. The Salt Plant has operated to produce and harvest salt from 1951 to the present day. Since that time, Cargill has continued its saltmaking operations, including salt harvesting using heavy construction equipment and the grading and leveling of the crystallizers with every salt crop.

III. The Salt Plant Is Not "Navigable Waters of the United States" Under the RHA.

Section 10 of the RHA, 33 U.S.C. § 403, requires a permit for structures and/or work in or affecting the "navigable waters of the United States" and directs the Corps to make "navigable waters" jurisdictional determinations.[26] The term "navigable waters of the United States" has been judicially defined to cover waters that are subject to the ebb and flow of the tide, *United States v. Stoeco Homes, Inc.*, 498, F.2d 597, 610 (3d Cir. 1974); are presently used to transport interstate or foreign commerce, *The Daniel Ball*, 77 U.S. 557, 563, 10 Wall. 957 (1870); have been used in the past to transport interstate or foreign commerce, *Economy Light & Power Co. v. United States*, 256 U.S. 113, 121-22 (1921); and may be susceptible to use in their ordinary condition or with reasonable improvement to transport interstate or foreign commerce, *United States v. Appalachian Elec. Power Co.*, 311 U.S. 377, 407 (1940). Under Corps regulations, "navigable waters of the United States" are:

> those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce.

33 C.F.R. § 329.4.

[26] 33 U.S.C. § 403; *see also* 33 C.F.R. § 329.14(b).

Accordingly, there are two broad categories of "navigable waters of the United States:" 1) waters that are subject to the ebb and flow of the tide; and 2) waters that are either currently used, have been used in the past, or are susceptible for use[27] to transport interstate or foreign commerce.[28] The Corps has defined the "limits of jurisdiction" in each of these categories of waters. The limit of jurisdiction in waters that are tidal is the "line on the shore reached by the plane of mean (average) high water," 33 C.F.R. § 329.12, and the limit of jurisdiction in navigable waters is the "head of navigation," 33 C.F.R. § 329.11(b). This means that areas can be subject to the ebb and flow of the tide but not jurisdictional under the RHA because they are shoreward of the line on the shore reached by the plane of MHW. Similarly, a river segment can be part of a navigable river but not jurisdictional under the RHA because it is upstream of the head of navigation. The Corps may extinguish RHA jurisdiction, in whole or in part, by issuing a permit or otherwise authorizing actions in areas deemed navigable waters under the RHA. *See Stoeco Homes*, 498 F.2d at 610-11; *United States v. Milner*, 583 F.2d 1174, 1193 n.13 (9th Cir. 2009).[29]

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[27] The "past" and "susceptible" concept applies to RHA waters that are jurisdictional under the "navigability" prong of the RHA but not to waters that are subject to RHA jurisdiction under the "tidal" prong. 33 C.F.R. § 329.4 (providing two categories of navigable waters: "waters that *are* subject to the ebb and flow of the tide" and waters that "are presently used, or *have been used* in the past, or *may be susceptible* for use to transport interstate or foreign commerce") (emphasis added); *Stoeco*, 498 F.2d at 610.

[28] In a recent decision, the United States Supreme Court recognized the distinction between waters that are subject to the ebb and flow of the tide and navigable waters capable of transporting interstate or foreign commerce. *PPL Montana, LLC v. Montana*, 132 S. Ct. 1215, 1226-29 (Feb. 22, 2012).

[29] The notion recognized by some courts that "once found to be navigable, a waterway remains so," *Appalachian Elec. Power*, 311 U.S. at 408, does not limit the power of the Corps to surrender its RHA jurisdiction, as discussed more fully below, by issuing a permit or by not requiring project-specific permits in certain areas or for certain kinds of projects. *Cf. Stoeco Homes*, 498 F.2d at 610-11; *Leslie Salt v. Froehlke*, 578 F.2d 742, 753 (9th Cir. 1978); *Milner*, 583 F.2d 1174, 1193 n.13.

A. The Salt Plant Is Not "Subject to the Ebb and Flow of the Tide."

Under the RHA, the Corps has jurisdiction over waterbodies "that *are* subject to the ebb and flow of the tide," not waterbodies that *were* subject to the ebb and flow of the tide. The fact that tidal waters are determined based on present conditions is clear from the language of the regulations. The "limit of jurisdiction in coastal areas extends to the line on the shore reached by the plane of the mean (average) high water." 33 C.F.R. § 329.12(a)(2). Likewise, "[m]arshlands . . . are considered 'navigable in law,' but only so far as the area *is subject to inundation* by the mean high waters." *Id*. at § 329.12(b) (emphasis added). The MHW line "must be established by survey with reference to the available tidal datum, preferably averaged over a period of 18.6 years." *Id*. at § 329.12(a)(2). Thus, the limit of jurisdiction is fixed by the *line on the shore* at the *present* location of the MHW line, not where it might have been at some point in the past or under different conditions. The limit of jurisdiction is not an *elevation* per se, but rather a *location* on the shore. *Id*.

The Salt Plant is not subject to the ebb and flow of the tide. Instead, it is bounded by a system of levees constructed in the early 20th century. Clearly, the Salt Plant is not "subject to inundation" because the levees permanently exclude Bay water from the internal areas of the Salt Plant. In its current state, the "line on the shore" reached by the plane of MHW is on the bayward side of the levees; it does not reach the Salt Plant. The Salt Plant has been permanently converted to fast land, it is no longer subject to the tide's ebb and flow, and it lies well shoreward of the line on the shore reached by the plane of MHW.[30]

[30] It is clear from the Corps regulations that jurisdiction at the Salt Plant may not be established by identifying the MHW elevation on the Bay side of the Salt Plant's levees and then applying that elevation inside the levees to conclude that everything below that elevation within the levees is below MHW. Rather, the regulations require jurisdiction to be established by "the line on the shore" reached by MHW.

Regulatory history confirms that RHA jurisdiction extends to the line on the shore reached by the plane of MHW in its current state, not its historical location. Although language in *Leslie Salt Co. v. Froehlke* has occasionally been argued to mean that RHA jurisdiction extends to a theoretical point to which MHW would extend if the levees did not exist, the issue before the court in *Froehlke* was the Corps's short-lived attempt to extend RHA jurisdiction on the Pacific Coast beyond the MHW to the mean higher high water (MHHW) line. *See* 578 F.2d at 753. In 1971, the San Francisco District of the Corps had issued a public notice, Public Notice No. 71-22, purporting to extend the limit of its RHA jurisdiction in tidal waters to the line on the shore reached by the plane of MHHW.[31] The next year, in an attempt to assert jurisdiction over Leslie Salt's facilities, the San Francisco District issued Public Notice No. 71-22(a) which elaborated on the previous notice by requiring permits for "all new work in unfilled portions of the interior of diked areas below former mean higher high water."[32]

Shortly after publication of these notices, the Corps officially amended its regulations to extend its jurisdiction to the line on the shore reached by the plane of MHHW on the Pacific coast. 37 Fed. Reg. 18,289, 18,291 (Sep. 9, 1972); 33 C.F.R. § 209.260(k)(1)(ii) (1973); 40 Fed. Reg. 31,320, 31,324-5 (July 25, 1975); 33 C.F.R. § 209.120(d)(2)(i)(a) (1976). Significantly, even for the short period in which the Corps regulations used MHHW as the jurisdictional limit, the regulation spoke in terms of the "line on the shore." 33 C.F.R. § 209.260(k)(1)(ii). The amended regulations never extended jurisdiction to areas behind dikes or to former MHHW as the San Francisco District's second notice purported to do.

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[31] U.S. Army Corps of Eng'rs, San Francisco District, Public Notice No. 71-22 (June 11, 1971), Exh. 11.

[32] U.S. Army Corps of Eng'rs, San Francisco District, Public Notice No. 71-22(a) (Jan. 18, 1972), Exh. 11.

In consolidated lawsuits initiated respectively by environmental groups and Leslie Salt, both of which sought declaratory judgment on the scope of the Corps's RHA jurisdiction in San Francisco Bay, the Ninth Circuit rejected the Corps's amended regulations (and, with them, the San Francisco District's public notices). The court held that the proper limit was MHW, not MHHW. *See Froehlke*, 578 F.2d at 753. Thus, ultimately, the Corps's attempt to extend its jurisdictional reach to cover Leslie Salt's facilities was unsuccessful. In direct response to *Froehlke*, the Corps amended its regulations to re-establish MHW as the standard.[33] Significantly, when the Corps adopted new regulations in the wake of *Froehlke*, it did not adopt *Froehlke*'s language about determining MHW in a hypothetical "unobstructed, natural state." Instead, post-*Froehlke* regulations (still in effect today) look for the "line on the shore" and require that it be established based on current surveys of available tidal data averaged over a period of 18.6 years. 33 C.F.R. § 329.12(a)(2). Indeed, had an "unobstructed, natural" standard been adopted, it would have caused extreme results, *e.g.*, downtown San Francisco; large portions of Orange County, California; Texas City/Galveston; and all of New Orleans could be treated as "tidal waters" based on the hypothetical locations of former MHW at some undefined time in the past or projections of the present-day plane of MHW past levees or other protective structures. Such a standard would have taken RHA jurisdiction well beyond the line on the shore reached by the plane of MHW and would have the potential to subject all prior and future

[33] The Corps stated explicitly that it was amending its regulations to effectuate *Froehlke*: "Based on a court decision (Leslie Salt Co. v. Froelke [sic], 578 F.2d 742 (9th Cir. 1978)) the shoreward limit of navigable waters of the United States (frequently referred to as 'Section 10 waters') in coastal areas is the mean high water line on both the Atlantic and Pacific coasts (formerly the mean higher high water was used on the Pacific coast)." 47 Fed. Reg. 31, 794, 31,797 (July 22, 1982).

activities in those areas to RHA jurisdiction to the detriment of settled titles and reasonable, investment-backed expectations.[34]

Moreover, even under an extreme reading, *Froehlke*'s language does not support the assertion of RHA jurisdiction over the Salt Plant. Before work began in 1901 to convert the Salt Plant for saltmaking, the majority of the Salt Plant was marshland *above MHW*, and therefore would not have been considered RHA tidal waters in its natural unobstructed state.[35] This is documented in Corps records.[36] Pursuant to the Corps's policies and practice, the Corps did not require permits for work done on the Salt Plant except for construction involving the only two sloughs that the Corps treated as navigable–First Slough and Westpoint Slough.[37] Moreover, the fact that the elevation of certain areas behind the levees may have increased or decreased since the levees were constructed and may currently be below MHW as measured at some unknown location clearly does not establish that they were below MHW in their "unobstructed, natural state" or that they are currently below the line on the shore reached by the plane of MHW.

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[34] *Cf. PPL Montana*, 132 S. Ct. at 1234-35 (noting that PPL's reliance upon the State's failure to assert title for over a century is some evidence to support the conclusion that the water segments at issue were not navigable waters for title purposes); *see also Stoeco*, 498 F.2d at 610-611 (stressing importance of reliance on Corps's practice of not asserting jurisdiction); *Froehlke*, 578 F.2d at 753 (same); *Milner*, 583 F.3d at 1193 n. 13 (same).

[35] *See* Early History Report, Exh. 5, at 2; *Froehlke*, 578 F.2d at 745 n.2 (Corps does not dispute that "the former marshlands in question were located above the line of mean high water . . ."); Letter from Lt. General F.J. Clarke to Henry S. Reuss, Chairman, House Subcommittee on Conservation and Natural Resources (Feb. 9, 1972), Exh. 12, at 2 ("The [Leslie Salt] structures were constructed in areas considered to be outside the jurisdiction of the Corps of Engineers."); 1940 Permit, Exh. 8, Sheet 1, Section B-B (indicating that ground of marshland at Redwood City Site was located at MHHW, which is higher than MHW).

[36] *See* Statement by Col. Charles R. Roberts, Chief Div. Eng'r, U.S. Army Corps of Eng'rs, to the Fremont Recreation Comm'n (Jan. 20, 1971), Exh. 13 (Leslie Salt's marshlands are not subject to RHA jurisdiction).

[37] *Froehlke* also recognized that if the salt making facilities had been developed below MHW, it would be possible that the government's power had been surrendered, *Froehlke*, 578 F.2d at 753, as it was when the Corps issued a permit to construct a dam across First Slough and levees along Westpoint Slough. *See Stoeco*, 498 F.2d at 610-11.

Indeed, the *Froehlke* background confirms that these areas were above MHW and beyond RHA jurisdiction. In *Froehlke*, the Corps conceded that most of Cargill's properties were located on former marshland and above MHW in their historic condition. *Id.* at 745 n.2 (Corps recognized that former Leslie Salt marshlands were located above line of MHW). It was because of the MHW "limit of jurisdiction" that the San Francisco District attempted to change its policies to regulate up to the MHHW and behind the levees. That a change from MHW to MHHW was necessary to reach Leslie's salt ponds confirms that the Salt Plant was always accepted as above MHW. Moreover, after *Froehlke* invalidated the line of MHHW as the limit of tidal jurisdiction, the Corps did not ever attempt to regulate the Redwood City Salt Plant.

Finally, had any other portions of the Salt Plant been constructed in RHA jurisdictional areas, *Stoeco Homes*, *Froehlke*, and *Milner* establish that the Corps's issuance of a permit, or its practice of not requiring project-specific permits in certain areas or for certain kinds of projects subject to its RHA jurisdiction can extinguish its jurisdiction. *Stoeco Homes*, 498 F.2d at 610; *Froehlke*, 578 F.3d at 753; *Milner*, 583 F.2d at 1193 n.13. Here, historical records show that the Corps was well aware of construction of the saltmaking facilities on the Salt Plant. Between 1900 and 1930, the Corps allowed portions of the Salt Plant to be dammed or leveed off and converted for salt production without requiring any permits.[38] It later issued the 1940 permit for the only areas it treated as navigable–authorizing the damming and leveeing off of First Slough and the leveeing off of Westpoint Slough–but treated the rest of the Salt Plant as

[38] *See* Statement by Col. Roberts, Exh. 13, at 5 ("I can flatly say that through the years the Corps in the San Francisco district is aware of Leslie Salt's operation and in the marshlands they are not navigable and not under our jurisdiction."); *see also* Secretary of War, Reports on Preliminary Examination and Survey of Redwood City Harbor, Cal., H.R. Doc. No. 65-551 (1917), Exh. 14, at 6-7, 14-15 (War Department explains that salt works were operating in Redwood City area and that Redwood City Harbor Co. had constructed levees and done other work in the area); Early History Report, Exh. 5, at 3.

nonjurisdictional.[39] It imposed "[n]o restrictions on the use of such filled sloughs"[40] and, except for the ill-fated attempt to regulate above MHW, which the Ninth Circuit rejected in *Froehlke*, it never attempted to regulate the converted fast lands behind the levees.[41] In short, as in *Stoeco*, the Corps's practice with respect to the Salt Plant operates as a "blanket consent with respect to a class of properties" which extinguishes whatever RHA jurisdiction that may have existed. *Stoeco*, 498 F.2d at 610-11. Moreover, after the Corps promulgated new permitting regulations in 1968, 33 Fed. Reg. 18,670 (Dec. 18, 1968), it published revisions to its permitting rules explicitly authorizing "work or structures completed before December 18, 1968, [or] where potential applicants had received expressions of disclaimer prior to the [1968 regulation] . . . ." 38 Fed. Reg. 12,217, 12,222 (May 10, 1973) (proposed rule); 33 C.F.R. § 209.120(g)(12)(vii) (1974), now codified at 33 C.F.R. § 330.3(b) (permitting "[s]tructures or work completed before December 18, 1968, or in waterbodies over which [the Corps] had not asserted jurisdiction at the time the activity occurred . . . .). The site construction converting the areas into an industrial salt

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[39] Statement by Col. Roberts, Exh. 13, at 2 (The Corps list of navigable waters "does not list any of the marshlands or any of the minor sloughs in the marshland in the Leslie property area. Therefore, those marshlands are not navigable–for administrative purposes–and are not subject to the jurisdiction of the Corps regulations."); *see also Froehlke*, 578 F.2d at 745 n.2 (Corps recognized that former Leslie Salt marshlands were located above line of MHW).

[40] Statement of Brig. Gen. William M. Glasgow, Jr., Div. Eng'r, U.S. Army Corps of Eng'rs, before the Subcommittee on Conservation and Natural Resources of the H. Committee on Government Operations (Aug. 20, 1969), Exh. 15, at 14; *see also* Letter from Col. Charles R. Roberts, Dist. Eng'r, U.S. Army Corps of Eng'rs, to San Francisco Bay Conservation and Development Commission (Dec. 9, 1970), Exh. 16, at 1.

[41] Defendants' Admissions of Fact and Genuineness of Documents, Admission No. 16, *Leslie Salt Co. v. Froehlke*, No. C-73 2294 (N.D. Cal. Mar. 14, 1974), Exh. 17 ("At no time until the adoption of 33 C.F.R. § 209.260 [regulation extending jurisdiction to MHHW that was later invalidated by *Froehlke*] . . . and the adoption of Public Notices Nos. 71-22 and 71-22(a) [public notices extending jurisdiction to MHHW that were later invalidated by *Froehlke*] has the Department of the Army and Corps of Engineers required Leslie Salt Co. to seek a permit for any work conducted in either filled or unfilled portions of interior diked areas either above or below higher high water.").

facility occurred before 1968. Thus, even if the Corps had not allowed conversion of part of the Salt Plant without a permit in the early 1900s and even if it had not authorized conversion of the rest of the Salt Plant through the 1940 permit, it would nonetheless have been deemed lawfully converted pursuant to the 1968 regulation.

B. The Salt Plant Is Not "Navigable" within the Meaning of the RHA.

The other RHA category of "navigable waters" subject to RHA jurisdiction is waters that are presently used, have been used in the past, or are susceptible to being made navigable to transport interstate or foreign commerce. *See* 33 C.F.R. § 329.4. It is indisputable that the Salt Plant is not currently used to transport interstate commerce. Although portions of the Salt Plant–Westpoint Slough and First Slough–were treated by the Corps as "navigable," the 1940 RHA permit authorized the damming and leveeing of First Slough and the construction of levees along Westpoint Slough around the perimeter of the Salt Plant. The effect of these permitted actions was to cut off all remaining tidal flow to the Salt Plant so that the interior areas could be converted to saltmaking operations. Thus, the 1940 permit extinguished RHA jurisdiction. Finally, the Salt Plant is not susceptible to being made navigable to transport interstate or foreign commerce.

1. The Salt Plant Is Not Presently Used to Transport Interstate or Foreign Commerce.

Under the Corps regulations, a water is considered a "navigable water of the United States" and therefore subject to RHA Section 10 jurisdiction if it is presently used to transport interstate or foreign commerce. 33 C.F.R. § 329.4. The Salt Plant is not a waterway; it is an industrial plant. Substantial portions of the Salt Plant have been used to produce and harvest salt since 1902, and it has been completely converted to saltmaking since 1946. No navigation occurs at the Salt Plant. It is not presently used to transport interstate or foreign commerce.

2. The 1940 RHA Permit Extinguished RHA Jurisdiction Over the Only Areas of the Salt Plant the Corps Treated As Navigable.

A water that is not presently used for commerce, or is presently incapable of such use, *id.* § 329.9(a), may nonetheless be a "navigable water of the United States" and therefore subject to RHA jurisdiction if it has been used in the past to transport commerce, 33 C.F.R. § 329.4, and if the Corps has not surrendered its authority. The Corps may extinguish its RHA jurisdiction by issuing a permit or otherwise allowing an area within its jurisdiction to be converted to fast land. *Stoeco Homes* establishes that the Corps's "administrative practice" of giving blanket consent with respect to a class of properties extinguishes regulatory jurisdiction over those areas. *Stoeco*, 498 F.2d at 610.[42] As the Third Circuit explained in *Stoeco*:

> Section 10 by its plain language contemplates congressional consent to some encroachments on the navigational servitude, and delegates to the Army Corps of Engineers and the Secretary of the Army authority to grant such consent on its behalf. If the administrative agency gives an express consent by permit in a specific instance, with no reservation of the right to compel removal, surely that consent must be considered to be a surrender of the federal servitude over the fee in question. Section 10 is silent as to the method of giving consent, but textually a blanket consent with respect to a class of properties does not appear to be prohibited.

Id. Applying this reasoning, the *Stoeco* court held that waters filled under the Corps's "blanket consent" had been filled legally, and thus the navigational servitude had been surrendered. *Id.* at 610-611.

With respect to the Salt Plant, the Corps's administrative practice in the early days of the RHA program provided blanket consent, which operated to extinguish jurisdiction over the areas

[42] The Corps likewise recognized that its previous practice should be formally recognized as authorization when it adopted the regulation in 1968 that formally authorized activities that occurred prior to 1968. 33 C.F.R. § 330.3(b) (providing formal blanket consent for activities completed before December 18, 1968). *See supra* Section III.A at 16.

of the Salt Plant that were converted to fast land in the early 1900s. Only two sloughs on the Salt Plant–First Slough and Westpoint Slough–were ever treated by the Corps as "navigable" and the War Department issued a permit in 1940 authorizing the construction of a dyke or levee across and along First Slough and the placement of a levee along Westpoint and Flood Sloughs to authorize a salt production facility. As a result, all the lands within the levees and dams were converted to fast land. As shown in the plans accompanying the 1940 permit, the Corps recognized that the former marshland areas between Redwood Creek, Westpoint Slough, and First Slough had long since been converted to fast land and did not require permit authorization.[43] Thus, the 1940 permit reinforced the previous blanket consent for those portions of the Salt Plant converted prior to 1930 and "express[ed] consent by permit in a specific instance," *Stoeco*, 495 F.2d at 610, for the remaining portions of the Salt Plant, thereby extinguishing RHA jurisdiction for the entire Salt Plant. *See also Froehlke*, 578 F.2d at 753 (Ninth Circuit recognized that RHA jurisdiction could have been extinguished by Corps authorizing actions in areas deemed to be navigable waters); *Milner*, 583 F.3d at 1193 n.13 (Ninth Circuit acknowledged that government's RHA jurisdiction could have been extinguished because Corps allowed actions in areas deemed to be navigable waters).[44]

The Corps has applied *Stoeco*'s holding in a situation in the San Francisco District similar to that presented here. In 1975, the Hahn Corporation proposed to construct a shopping center in

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[43] *See* 1940 Permit, Exh. 8, Sheet 2 (showing "salt evaporating ponds," "reclaimed marsh," "cement works," and the railroad spur).

[44] Other courts have also found the Corps's RHA jurisdiction to have been extinguished in certain circumstances. *See, e.g., United States v. 119.67 Acres of Land*, 663 F.2d 1328, 1337-38 (5th Cir. 1981) (holding that a Corps agreement that the area in question was not a navigable water of the United States extinguished the Corps's RHA jurisdiction over the area); *James River v. Richmond Metro. Auth.*, 359 F. Supp. 611, 640 (E.D. Va.), *aff'd*, 481 F.2d 1280 (4th Cir. 1973) (Corps does not have RHA jurisdiction over parking lot that had been site of a canal because the area was no longer a navigable water and had been developed on the reasonable supposition that permission was not required).

Corte Madera, California. The land in question was former marshland which had been separated from the Bay and converted into fast land decades earlier by the construction of a railroad embankment. Physically, the situation was similar to the areas landward of the levees at the Redwood City Salt Plant. The district referred the jurisdictional question to the Office of the Chief of Engineers, which determined that the land was not subject to RHA jurisdiction based on *Stoeco* and the 1968 regulation that provides blanket authorization for work in RHA waters completed before December 18, 1968.[45] The Office of the Chief of Engineers explained, "This provision in the regulations coupled with the inaction of the Corps in respect to the construction of the railroad embankment and levees makes applicable the rationale of the *Stoeco* case that, 'the premises in question became fast rather than tidal land.'"[46]

Likewise, because any Corps jurisdiction over the Salt Plant has been extinguished, either through "express consent by a permit in a specific instance" or "blanket consent with respect to a class of properties," none of the Salt Plant is jurisdictional under the RHA by virtue of past determinations of "navigability."

3. The Salt Plant Is Not Susceptible to Being Made "Navigable."

The Corps also considers a water to be a "navigable water of the United States" if it is susceptible for use in its ordinary condition or by reasonable improvement to transport interstate commerce. 33 C.F.R. §§ 329.4, 329.9(b); *see also United States v. Appalachian Elec. Power Co.*, 311 U.S. 377 at 407-08. As mentioned above, the inquiry is not whether the water is susceptible to being made tidal. *See supra* note 27 and accompanying text; *Stoeco Homes*, 498

[45] 33 C.F.R. § 209.120(g)(12)(vii) (now codified at 33 C.F.R. § 330.3(b)).

[46] *See* Memo from the Office of the Chief of Eng'rs to Div. Eng'r, Report on Application for a Department of the Army Permit to Fill Former Marshland for the Hahn Shopping Center in San Francisco Bay, Corte Madera, California (Apr. 25, 1975); Letter from H. A. Flertzheim, Dist. Eng'r, to James L. Barrett, Esq. (May 7, 1975) (disclaiming RHA jurisdiction over Hahn property), Exh. 18.

F.2d at 610. What is a *reasonable* improvement "is always a matter of degree; there must be a balance between cost and need at a time when the improvement would be (or would have been) useful." 33 C.F.R. § 329.8(b) (emphasis added). *See, e.g., United States v. Rio Grande Dam & Irrigation Co.*, 174 U.S. 690, 699 (1899) (finding that it would be financially, if not physically, impracticable to make the river at issue navigable because of the many millions of dollars that would be required).

The Salt Plant is not susceptible for use to transport interstate commerce. As a result of site construction and pursuant to the 1940 permit, the Salt Plant is and has remained completely severed from San Francisco Bay. As explained in greater detail previously herein, the physical contours and attributes of this industrial facility include neither navigational access nor internal capacity for transport of interstate commerce. Conversion of the Salt Plant for salt production has eliminated any actual or potential navigational capacity of the Salt Plant in its ordinary condition.

Similarly, the Salt Plant is not susceptible by "reasonable improvement" to transport interstate commerce. Even were it financially viable to make it susceptible for transporting commerce, which it is not, the geographic dynamics of the area demonstrate the notion to be unreasonable. First, the only deep-water port in the south San Francisco Bay–the Port of Redwood City ("Port")–is very close to the Salt Plant. It is that facility that is and would remain the focus of commercial navigation in this region. Although the Salt Plant is relatively close to the Port, there are significant barriers that would prohibit utilization of the Salt Plant in conjunction with Port navigational operations. Seaport Boulevard is a linear barrier along the full length of the Port/Salt Plant interface. Further, heavy industrial uses, Port operation structures, office buildings, and a railroad line all separate the Port and the Salt Plant. Finally, a

major high-end, Class A office complex–Pacific Shores, consisting of 1.7 million square feet of offices in 10 buildings–is located at the far north boundary of the Salt Plant and the Port, access to which would be cut off if a navigational connection were established between the Port and the Salt Plant.

Additionally, the northern, Bay-side perimeter of the Salt Plant is largely bounded by Greco Island, part of the Don Edwards National Wildlife Refuge. Though Westpoint Slough separates Greco Island from the Salt Plant, it would likely be impossible to create and maintain commercial navigation capability absent extensive and repeated dredging operations (giving rise to the contentious issue where the dredged spoils would be disposed). And, even with the establishment of physical access, the navigational traffic and resulting disturbances would have significant negative impacts on the protected habitats and species on Greco Island.

For these reasons, the Salt Plant is not susceptible for use to transport interstate commerce, nor could it be made so by reasonable improvement.

IV. The Salt Plant is Not "Waters of the United States" Under the CWA.

A. The Salt Plant Is Not Jurisdictional Because it Had Been Permanently Converted to Fast Land by the Time the CWA Was Enacted in 1972.

The CWA requires a Corps permit for the discharge of dredged and fill material into "the navigable waters," defined as "the waters of the United States." 33 U.S.C. § 1362(7). The CWA's express objective is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" and to achieve "water quality." 33 U.S.C. § 1251(a), (a)(2). The CWA is presumed not to be retroactive, and Congress has expressed no intent to overcome

that presumption. *See Landgraf v. USI Film Products*, 511 U.S. 244, 270-71 (1994) (explaining presumption against retroactive application of statutes).[47]

Likewise, Corps and EPA regulations have long recognized that CWA jurisdiction includes only areas that are *currently* aquatic in nature, not areas that were historically aquatic. In the preamble to EPA's final rule adopting the present regulatory definition of "waters of the United States," EPA recognized that the CWA does not reach areas that used to be waters. The Agency explained that "[w]hen a portion of the [w]aters of the United States has been legally converted to fast land by a discharge of dredged or fill material, it does not remain waters of the United States. . . ." 45 Fed. Reg. 85,336, 85,340 (Dec. 24, 1980). Similarly, in the preamble to its 1977 final rules for its permit programs, the Corps stated that "Section 404 . . . regulate[s] discharges of dredged and fill material into the aquatic system as it exists, and not as it may have existed over a record period of time." 42 Fed. Reg. 37,122, 37,128 (July 19, 1977).

Consistent with this regulatory history and the Act itself, the Salt Plant is not subject to CWA jurisdiction. As discussed above, the Salt Plant was substantially and permanently altered prior to the passage of the CWA in 1972. In the early part of the twentieth century, the salt production facilities were leveed off and permanently separated from San Francisco Bay. With extensive excavating, filling, and compacting, Leslie Salt created the crystallizer beds, pickle ponds, bittern ponds, and multi-use area. The site construction and topographical manipulation permanently altered the Salt Plant and the levees permanently excluded tidal waters from the interior areas. Ongoing saltmaking operations over the years required significant earth-moving with heavy equipment, and the crystallizers were graded and leveled during salt harvest. As the

[47] Moreover, as in the RHA context, the Corps has promulgated regulations explicitly authorizing discharges of dredged or fill material into all waters of the United States, including wetlands, that occurred before July 1, 1977. 33 C.F.R. § 330.3(a).

Corps has noted, the Salt Plant was hydrologically severed from the Bay by the construction of the levees and "[a]ll site construction and topographical manipulation occurred prior to the enactment of the CWA."[48] Because the Salt Plant had already been substantially and permanently altered such that it did not constitute "waters of the United States" when the CWA was passed, CWA jurisdiction over the Salt Plant never attached. And because the Salt Plant remains converted fast land today, it remains outside CWA jurisdiction.

As the Ninth Circuit held recently in *Milner*, if land was not jurisdictional "at the time the CWA was enacted, it will not be considered part of the waters of the United States . . . ." *Milner*, 583 F.3d at 1195. The *Milner* court cited the regulatory history of the provisions discussed above as well as the language and policies of the CWA when it reversed a district court decision that relied on *Froehlke* to find a CWA violation. The lower court had found a CWA violation because, in the course of reconstructing their shore defense structures, the defendants had discharged fill material below where the high tide line would have fallen in its natural, unobstructed state. Noting that *Froehlke* had not applied the "natural, unobstructed" theory to CWA jurisdiction, the *Milner* court found persuasive the administrative policy of not asserting "jurisdiction over lands that once were submerged but which have been transformed into dry land . . . Even if land has been maintained as dry through artificial means, if the activity does not reach or otherwise have an effect on the waters, excavating, filling, and other work does not present the kind of threat the CWA is meant to regulate." *Id.*, 583 F.3d at 1195 (citing *Froehlke*, 578 F.2d at 754). In sum, the *Milner* court held:

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[48] Memorandum from Steven L. Stockton, Director of Civil Works, U.S. Army Corps of Eng'rs, to South Pacific Division Commander, The "normal circumstances" concept as applied to Cargill's plant site at Redwood City, CA consisting of salt production facilities (Oct. 2, 2009) ("Normal Circumstances Memo"), Exh. 19, at 7.

> [I]f land was dry upland at the time the CWA was enacted, it will not be considered part of the waters of the United States unless the waters actually overtake the land, even if it at one point had been submerged before the CWA was enacted or if there have been subsequent lawful improvements to the land in its dry state. In short, in such a situation, the waters of the United States are demarcated by the reach of the high tide line, but not as it would be in its unobstructed, natural state if the fill or obstruction was in place at the time the CWA was enacted or if there was a legally authorized filling or improvement done after the enactment of the CWA.

583 F.3d at 1195 (footnote omitted). *See also Golden Gate Audubon Soc. v. U.S. Army Corps of Eng'rs*, 700 F. Supp. 1549, 1557 (N.D. Cal. 1988) (regulatory definition of "waters of the United States" does not retroactively extend the Corps's jurisdiction to areas that have been converted to dry land). Under this case law, areas that were lawfully converted prior to the enactment of the CWA or that are otherwise not currently aquatic are not subject to CWA jurisdiction, regardless of where MHW would be if the artificial obstructions were removed. As the *Milner* court explained, this result flows directly from the plain language of the statute: "The CWA . . . is designed to restore and maintain the integrity of the nation's waters, which it does by limiting the discharge of pollutants into the waters. [Defendants'] activities . . . would not involve a discharge into waters of the United States if conducted solely on fast land" and therefore would not trigger CWA regulation. *Milner*, 583 F.2d at 1196.[49]

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[49] Moreover, the process brines that move from the pickle ponds to the crystallizers to the bittern ponds are not water but an intermediate industrial product. The Bay water brought into the East Bay processing facilities five years earlier and used as one ingredient in the saltmaking process has been transformed chemically and biologically so that the industrial product piped across the Bay into the plant site five years later is "saturated brine." Under the CWA, the process brine and all associated process liquids (including the bitterns) and salt products, if discharged into "waters of the United States," are regulated as "process wastewater pollutants." 40 C.F.R. § 415.161(b), 415.162(a)-(b). As the brines are "pollutants" when discharged into waters of the United States, they cannot be discharged except in accordance with a National Pollutant Discharge Elimination System (NPDES) permit. To treat the brines as both potential pollutants and waters of the United States would be to read the CWA as prohibiting the discharge of a pollutant into a pollutant. *See Washington Wilderness Coalition v. Hecla Mining Co.*, 870 F.

The Corps's recent determination on the application of the "normal circumstances" concept at the Salt Plant reinforces this principle. The Corps stated that "[i]f an activity . . . that occurred before the passage of the CWA effected a one-time structural change, the normal circumstances for the site would be as it exists with the structural change in place."[50] Thus, "areas that had previously been legitimately converted from wetlands to some other use should not be categorized as wetlands . . . ." *Id*. at 4. Likewise, in a special case jurisdictional determination for Bolsa Chica, Orange County, California, EPA noted that "portions of the site which have been legally filled" are not subject to CWA jurisdiction.[51]

In accordance with regulatory history, judicial precedent, agency regulatory policies and determinations, and the Act itself, the Salt Plant is not subject to CWA jurisdiction because it was permanently altered such that it was not "waters of the United States" when the CWA was enacted. The Salt Plant remains converted fast land today and, therefore, remains outside CWA jurisdiction.

Supp. 983, 989 n.3 (E.D. Wash. 1994) (although not dispositive to outcome, court noted that it would be illogical to classify ponds at issue as both point source and navigable water); *see also Milner* at 1195 (activity that does not reach or otherwise have an effect on water does not present the kind of threat the CWA is meant to regulate). This would fail to give independent meaning to the distinct statutory terms and would lead to an absurd result.

[50] Normal Circumstances Memo, Exh. 19, at 7.

[51] Memorandum from Daniel W. McGovern, Regional Administrator, Region IX, EPA, Geographical Extent of Clean Water Act Jurisdiction at Bolsa Chica, Orange County, CA (Feb. 10, 1989), Exh. 20, at 15.

B. Under Controlling Case Law, the Salt Plant Is Not Jurisdictional Under the CWA.

1. *SWANCC* Precludes the Use of (a)(3) Factors to Establish Jurisdiction Over This Isolated Salt Plant.

The jurisdictional status of Cargill's saltmaking facilities around San Francisco Bay has been litigated repeatedly over the years.[52] Because the saltmaking facilities are isolated and have no hydrological connection with the Bay, the only jurisdictional hook advanced by litigants seeking to assert jurisdiction over other Cargill ponds around San Francisco Bay was the so-called Migratory Bird Rule–*i.e*., the theory that the presence of migratory birds was sufficient to establish the requisite Commerce Clause nexus to justify the assertion of CWA jurisdiction.[53]

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[52] *San Francisco Baykeeper v. Cargill Salt Div*., 481 F.3d 700 (9th Cir. 2007); *San Francisco Baykeeper v. Cargill Salt Div*., 263 F.3d 963 (9th Cir. 2001); *Leslie Salt Co. v. United States*, 55 F.3d 1388 (9th Cir. 1995), *cert. denied, Cargill, Inc. v. United States*, 516 U.S. 955 (1995); *Leslie Salt Co. v. United States*, 896 F.2d 354 (9th Cir. 1990), *cert. denied*, 498 U.S. 1126 (1991); *Sierra Club v. Leslie Salt Co*., 659 F.2d 1090 (9th Cir. 1981); *Leslie Salt Co. v. Froehlke*, 578 F.2d 742 (9th Cir. 1978); *Cargill v. West*, No. C 92-20756-RMW (N.D. Cal. Aug. 8, 1995) (stipulation to dismissal and order of dismissal); *Cargill v. West*, No. C 92-20756 RMW, 1994 WL 721593 (N.D. Cal. Dec. 23, 1994); *Cargill v. West*, No. C-92-20756-RMW (N.D. Cal. July 12, 1994) (order on dispositive motions); *Leslie Salt Co. v. United States*, Nos. C-85-8615-CAL & C-86-4187-CAL, 1993 WL 137283 (N.D. Cal. Apr. 26, 1993); *Leslie Salt Co. v. United States*, 820 F. Supp. 478 (N.D. Cal. 1992); *Leslie Salt Co. v. United States*, 789 F. Supp. 1030 (N.D. Cal. 1991); *Leslie Salt Co. v. United States*, 700 F. Supp. 476 (N.D. Cal. 1988), *as amended* Jan. 11, 1989; *Leslie Salt Co. v. United States*, 660 F. Supp. 183 (N.D. Cal. 1987); *Sierra Club v. Leslie Salt Co*., 412 F. Supp. 1096 (N.D. Cal. 1976); *Leslie Salt v. Froehlke*, 403 F. Supp. 1292 (N.D. Cal. 1974); *Sierra Club v. Leslie Salt Co*., 354 F. Supp. 1099 (N.D. Cal. 1972); *Alameda Conservation Ass'n v. California*, 437 F.2d 1087 (9th Cir.), *cert. denied, Leslie Salt Co. v. Alameda Conservation Ass'n*, 402 U.S. 908 (1971).

[53] *See, e.g., San Francisco Baykeeper v. Cargill Salt Div*., 263 F.3d at 964 (rejecting plaintiff environmental groups' allegations that Cargill salt ponds were subject to CWA jurisdiction based on use by migratory birds); *Leslie Salt Co. v. United States*, 55 F.3d at 1390, 1396 (declining to revisit issue of whether Leslie Salt's "isolated, seasonally dry intrastate waters used only by migratory birds are within the regulatory reach of the Clean Water Act"), *cert. denied, Cargill, Inc. v. United States*, 516 U.S. at 955-57 (Thomas, J., dissenting) (Justice Thomas noted that he would grant certiorari to resolve "whether the potential or occasional existence of migratory birds on [Cargill's] property creates a sufficient nexus with interstate commerce to permit Corps regulation of these lands."); *Leslie Salt Co. v. United States*, 896 F.2d 354, 360 (9th Cir. 1990) (remanding to district court to determine whether there is sufficient

But the Supreme Court rejected the Migratory Bird Rule in 2001 in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Eng'rs*, 531 U.S. 159, 174 (2001) ("*SWANCC*") ("33 CFR § 328.3(a)(3) . . ., as clarified and applied to petitioner's [isolated ponds] pursuant to the 'Migratory Bird Rule,' 51 Fed. Reg. 41217 (1986), exceeds the authority granted to respondents under § 404(a) of the CWA.") The regulation that the Migratory Bird Rule "clarified" was 33 C.F.R. § 328.3(a)(3), which asserted jurisdiction under a substantial effects on commerce rationale.[54] Because the Migratory Bird Rule and the regulation that it "clarified" purported to exercise Congress's power to regulate activities substantially affecting commerce–but the CWA was an exercise of Congress's commerce power over navigation–the Migratory Bird Rule and the regulation exceed the scope of the CWA. *SWANCC*, 531 U.S. at 168 n.3. The Corps's attempt to assert jurisdiction over "nonnavigable, isolated, intrastate waters" because they were used as habitat by migratory birds "[was] a far cry, indeed, from the 'navigable waters' and 'waters of the United States' to which the statute by its terms extends." *Id.* at 173. Thus, after *SWANCC*, CWA jurisdiction cannot be premised on an effects on commerce rationale, including under any provision of (a)(3).[55] As this Salt Plant is wholly isolated from any water

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migratory bird usage of the Leslie Salt properties to find that the property may be regulated under the CWA).

[54] As explained more fully below, the agencies' regulations assert CWA jurisdiction over "other waters" ("(a)(3)" waters) if their "use, degradation or destruction . . . could affect interstate or foreign commerce." *See* 33 C.F.R. § 328.3(a)(3); 40 C.F.R. § 232.2.

[55] *See* U.S. Environmental Protection Agency's and U.S. Army Corps of Eng'rs' Guidance Pertaining to Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in *Rapanos v. United States* & *Carabell v. United States* at 8-9 (Dec. 2, 2008) ("2008 Guidance"), *available at* http://www.ela.gov/wow/wetlands/pdf/CWA_Jurisdiction_Following_Rapanos120208.pdf; 68 Fed. Reg. 1,991, 1,993 (Jan. 15, 2003) ("*SWANCC* . . . calls into question whether CWA jurisdiction over isolated, intrastate, non-navigable waters could now be predicated on . . . 33 CFR 328.3(a)(3)(i)-(iii).").

body, *SWANCC*'s reasoning and holding eliminate the only jurisdictional theory that was ever advanced, and there is no CWA jurisdiction under the remaining controlling cases.

2. *Riverside Bayview* and *Rapanos* Do Not Provide Jurisdiction Because the Salt Plant Has No Wetlands and Is Not a Relatively Permanent Water.

United States v. Riverside Bayview Homes, Inc. confirmed jurisdiction over wetlands that actually abut a traditional navigable waterway. 474 U.S. 121, 135 (1985). But it does not provide a basis to assert jurisdiction over the Salt Plant because the Salt Plant does not have wetlands. As was acknowledged in the PJD issued by the Corps, there are no areas inboard of the Salt Plant's external levees that support wetlands, so there are certainly no wetlands that actually abut a traditional navigable water.[56] Likewise, the Salt Plant is not jurisdictional under either the plurality or concurring decisions in *Rapanos v. United States*, 547 U.S. 715, 729 (2006). The *Rapanos* plurality construed the statutory term "waters of the United States" to include "relatively permanent bod[ies] of water connected to traditional interstate navigable waters," and wetlands with "a continuous surface connection" to such waters. *Id*. at 742. The *Rapanos* plurality standard is not the controlling standard in the Ninth Circuit,[57] but even if it were, the Salt Plant is not a relatively permanent water under *Rapanos*, first, because the Salt

[56] *See* Excerpts, Preliminary Jurisdictional Determination Form for Redwood City Salt Production Facility submitted by DMB Saltworks to U.S. Army Corps of Eng'rs (Jan. 21, 2010) ("PJD Form"), Exh. 21; Letter from Jane M. Hicks, Chief, Regulatory Division, U.S. Army Corps of Engineers, to David Smith, DMB Redwood City Saltworks (Apr. 14, 2010) (with accompanying attachments) ("Hicks Letter"), Exh. 22 (issuing PJD based on data provided by DMB Saltworks); Michael Josselyn, Ph.D., Special Aquatic Habitat Assessment for Redwood City Plant Site (June 2002) ("Josselyn 2002 Special Aquatic Habitat Assessment"), Exh. 23.

[57] *See N. Cal. River Watch v. City of Healdsburg*, 496 F.3d 993, (9th Cir. 2007) (finding that Justice Kennedy's significant nexus test provided the "controlling rule of law" for the case at hand because Kennedy's concurrence "is the narrowest ground to which a majority of the Justices would assent"); *but see N. Cal. River Watch v. Wilcox*, 633 F.3d 766, 781 (9th Cir. 2011) (noting, without applying either *Rapanos* test, that *Healdsburg* "did not . . . foreclose the argument that Clean Water Act jurisdiction may also be established under the plurality's standard").

Plant is an industrial site containing brines and not natural waters, it is not considered a "relatively permanent" water, and, second, because there is no surface connection between the Salt Plant and any traditional navigable waters. The levees separate the Salt Plant absolutely from San Francisco Bay.

Similarly, the Salt Plant is not jurisdictional under Justice Kennedy's *Rapanos* concurrence. Justice Kennedy held that wetlands could be jurisdictional under the CWA, "if the wetlands, either alone or in combination with similarly situated lands in the region, significantly affect the chemical, physical, and biological integrity of other covered waters more readily understood as 'navigable.'" *Rapanos*, 547 U.S. at 780 (Kennedy, J. concurring). Justice Kennedy's *Rapanos* concurrence does not provide a basis for jurisdiction over the Salt Plant because it only set forth a test for wetlands,[58] and, as discussed above, the Salt Plant does not have wetlands at all. And if Justice Kennedy's significant nexus were applicable to non-wetlands contrary to the Ninth Circuit's holding in *San Francisco Baykeeper v. Cargill Salt Division*, the Salt Plant would still be outside the CWA because it does not have any waters and does not have the requisite significant nexus with traditional navigable waters.[59]

WRA applied the significant nexus criteria to the Salt Plant and determined that the Salt Plant does not affect the hydrologic, physical, or chemical integrity of the surrounding wetland

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[58] *See San Francisco Baykeeper v. Cargill Salt Div.*, 481 F.3d at 707 (*Rapanos* "concerned the scope of the Corps' authority to regulate adjacent *wetlands*. Justice Kennedy's controlling concurrence explained that only wetlands with a significant nexus to a navigable-in-fact waterway are covered by the Act. . . No Justice, even in dictum . . ." suggested that the significant nexus concept should be applied to "waters" that are not wetlands.) (emphasis in original). Its application here–to regulate Cargill's brines–would be completely antithetical to Justice Kennedy's reasoning, which regulated wetlands because of the benefits they provide to related water bodies. Here, the salt making brines are not water at all, and they do not provide benefits to San Francisco Bay. *See* WRA, Inc., Evaluation of Saltworks Hydrologic, Physical, Chemical, and Biological/Ecological Functions and Effects on Surrounding Areas (Feb. 27, 2012) ("Significant Nexus Analysis"), Exh. 24.

[59] *See* Significant Nexus Analysis, Exh. 24.

and water areas.[60] The salt production cells and the surrounding levees were constructed and are maintained to exclude any surface connection with surrounding areas. *Id.* Because there is no physical or hydrologic connection with the surrounding wetland and water areas, the salt production cells do not affect the chemical integrity of those areas. *Id.* Nor does the Salt Plant provide substantial value for mammals, reptiles, amphibians, fish, or invertebrates. *Id.* In sum, the Salt Plant does not affect the chemical, physical, and biological integrity of traditional navigable waters, and, therefore does not have a significant nexus with traditional navigable waters.

3. *Baykeeper* Precludes "Adjacency" as a Basis for Jurisdiction over Non-Wetlands.

Finally, *San Francisco Baykeeper v. Cargill Salt Division* precludes the assertion of jurisdiction based on "adjacency" to San Francisco Bay. There, the Ninth Circuit reversed the district court's holding that non-wetland water bodies may be deemed jurisdictional based on their adjacency to navigable waters. 481 F.3d at 705 (9th Cir. 2007). The Ninth Circuit held instead that only wetlands may be deemed jurisdictional based on adjacency. *Id.* The *Baykeeper* court also rejected the use of an "adjacency-plus-nexus" approach to assert jurisdiction over non-wetlands, emphasizing that Justice Kennedy's *Rapanos* significant nexus standard did not apply to non-wetland waters. *Id.* Thus, pursuant to *Baykeeper*, the Salt Plant is not subject to CWA jurisdiction because, as explained above, the Salt Plant does not have waters, let alone wetlands,[61] so it cannot be jurisdictional by virtue of adjacency to navigable waters.[62]

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[60] *Id.*

[61] *See* PJD Form, Exh. 21; Hicks Letter, Exh. 22; Josselyn 2002 Special Aquatic Habitat Assessment, Exh. 23.

[62] Moreover, *Baykeeper* precludes reliance on the "physically proximate other waters" category invented by EPA and the Corps in their 2011 Draft Guidance. *See* EPA and the Corps's 2011 Draft Guidance on Identifying Waters Protected by the CWA, U.S. EPA & U.S. Army

C. The Salt Plant Is Not Jurisdictional Under the Agencies' CWA Regulations.

Although the Salt Plant's conversion to fast land long before the CWA was passed and its present fast land status establish that it is not subject to CWA jurisdiction, for the sake of completeness, the following paragraphs describe why, under present conditions, it would not qualify as waters of the United States under the regulations. Corps and EPA regulations define seven categories of waters to be "waters of the United States":

> (a) The term *waters of the United States* means
> (1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
> (2) All interstate waters including interstate wetlands;
> (3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters: (i) [w]hich are or could be used by interstate or foreign travelers for recreational or other purposes; or (ii) [f]rom which fish or shellfish are or could be taken and sold into interstate or foreign commerce; or (iii) [w]hich are used or could be used for industrial purpose by industries in interstate commerce;
> (4) All impoundments of waters otherwise defined as waters of the United States under the definition;
> (5) Tributaries of waters identified in paragraphs (a)(1) through (4) of this section;
> (6) The territorial seas;

Corps of Eng'rs, "Draft Guidance on Identifying Waters Protected by the Clean Water Act," (May 2, 2011), *available at* http://www.epa.gov/indian/pdf/wous_guidance_4-2011.pdf ("2011 Draft Guidance"). Under the 2011 Draft Guidance, "physically proximate other waters" are jurisdictional if they have a significant nexus with traditional navigable waters. This category is inconsistent with the agencies' own regulations, which *Baykeeper* held bar the use of "adjacency" to establish jurisdiction over non-wetlands. 481 F.3d at 705. At the most fundamental level, the Site is not a water body so it cannot be considered a "physically proximate other water." Moreover, as discussed above, the Site is isolated from the Bay and therefore would not have a significant nexus to traditional navigable waters even if the significant nexus test were properly applicable to non-wetlands.

> (7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a)(1) through (6) of this section.

33 C.F.R. § 328.3(a)(1)-(7). The Salt Plant does not satisfy the criteria for any of these categories.

First, the Salt Plant is not jurisdictional under (a)(1). The agencies have referred to (a)(1) waters as "traditional navigable waters."[63] Saltworks and Cargill do not necessarily agree with that characterization. However, the concept of traditional navigable waters is rooted in *The Daniel Ball*, which defines waters as navigable if they are (1) navigable-in-fact (or capable of being rendered so) and (2) together with other waters, form waterborne highways used to transport commercial goods in interstate or foreign commerce. 77 U.S. 557, 563 (1870). By the agencies' own standard then, the Salt Plant is not jurisdictional under (a)(1) because it does not contain any traditional navigable waters.[64] The Salt Plant does not contain areas that are navigable-in-fact or are used or susceptible to being used in the future for transporting interstate of foreign commerce. The 1940 War Department permit authorized the damming and leveeing off of First Slough and the construction of levees along Westpoint Slough–the only areas that the Corps has treated as navigable waters in the past.[65] The construction completed pursuant to the 1940 permit cut off all remaining tidal flow to the Salt Plant so that the interior areas could be

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[63] 2011 Draft Guidance at 6; 2008 Guidance at 4-5.

[64] The Corps's determination of RHA jurisdiction, which will determine if the Salt Plant is "navigable waters of the United States" under the RHA (*i.e.*, traditional navigable waters), will necessarily resolve the issue of whether there is CWA jurisdiction under 33 C.F.R. § 328.3(a)(1).

[65] Indeed, as a result of site construction allowed by the Corps in the early 1900s and activity authorized by the 1940 permit, the entire Salt Plant was filled in and permanently converted. These activities had the effect of changing the bottom elevation of the Salt Plant and of replacing the marsh with dry land. Thus, the Salt Plant has been "filled" within the meaning of the Corps's CWA regulations. 33 C.F.R. § 323.2(e)(1). Since the Salt Plant was converted, it has been subject to constant grading and filling required for producing and harvesting salt. *See* Crystallizer Grading Drawings, Exh. 7.

converted to saltmaking operations. These lawfully converted areas are not highways for commerce that can be characterized as traditional navigable waters and, thus, they are not jurisdictional under (a)(1).[66] Moreover, these areas were converted to fast land well before the enactment of the CWA, which, as explained above, cannot be applied retroactively. Finally, the Salt Plant is not jurisdictional under (a)(1) because it does not contain waters that "*are* subject to the ebb and flow of the tide." 33 C.F.R. § 328.3(a)(1) (emphasis added). As explained above, the levees separate the Salt Plant from the Bay such that it is no longer subject to the tide's ebb and flow.

The Salt Plant does not contain interstate waters subject to CWA jurisdiction under section 328.3(a)(2), nor, as discussed above, can it be jurisdictional under the "other waters" provisions of section 328.3(a)(3). *See* discussion *supra* in Section IV.B.

The Salt Plant is not an impoundment of waters of the United States subject to CWA jurisdiction under section 328.3(a)(4). This section asserts CWA jurisdiction over "[a]ll impoundments of waters otherwise defined as waters of the United States." 33 C.F.R. § 328.3(a)(4). The agencies' regulations do not define impoundment, but the dictionary defines impoundment to mean a body of water created by impounding, collecting or confining water, usually behind or upstream of a dam or other structure that blocks the flow of a waterway.[67] Under the regulations, the waters that are impounded must qualify on their own as waters of the United States. The Salt Plant is not an impoundment under (a)(4) for several reasons. First, the Salt Plant is not "impounding" (*i.e.*, "collecting" or "confining") anything. No streams enter the

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[66] Even under the agencies' flawed premise that a water can be considered a traditional navigable water if it can support recreational use, *see, e.g.*, 2011 Draft Guidance at 6, the Salt Plant would not qualify because it does not contain waters that could be used for recreation.

[67] Merriam Webster Dictionary, *available at* http://www.merriam-webster.com/dictionary/impoundment; http://www.merriam-webster.com/dictionary/impound.

Salt Plant that are impounded behind a dam. It is more akin to an "expoundment" because it excludes or keeps "out" (as opposed to confining "in") waters of the United States, *i.e.*, the waters of San Francisco Bay. It does not retain or impound such waters and their containment behind the levees would be entirely contrary to the function and purpose of the Salt Plant. Second, the area shoreward of the levees is fast land whose grade and contents has been extensively manipulated for industrial purposes. Third, the brines and bitterns moving through the saltmaking cells, if discharged to waters of the United States, are regulated as pollutants under the CWA. They are not "water," let alone waters of the United States. Therefore, the cells cannot be impounding "waters of the United States." Finally, these areas were created prior to the enactment of the CWA in 1972. The CWA cannot retroactively apply to site construction activities that took place prior to the CWA. *See Landgraf*, 511 U.S. at 270-71. Moreover, as explained above, Corps regulations explicitly authorize discharges of dredged or fill material into all waters of the United States, including wetlands, that occurred before July 1, 1977, 33 C.F.R. § 330.3(a), and Cargill's predecessors lawfully converted these areas into fast land well before 1977.[68]

The Salt Plant does not contain tributaries of waters identified in sections (a)(1) through (a)(4) (discussed above). 33 C.F.R. § 328.3(a)(5). Agency regulations do not define the term "tributary." The 2011 Draft Guidance defines a water as a tributary if it "contributes flow to a traditional navigable water or interstate water, either directly or indirectly by means of other tributaries." 2011 Draft Guidance at 11. Although the 2011 Draft Guidance's definition is overbroad and incorrect for several reasons, even under this standard, the Salt Plant does not contain any tributaries because the Salt Plant does not contribute flow to any traditional

[68] *See supra* note 47 and accompanying text.

navigable water or interstate water. Indeed, there is no surface connection between the Salt Plant and any "waters of the United States" because the outboard levees separate the Salt Plant from San Francisco Bay. As such, the Salt Plant does not contain any jurisdictional tributaries.

The Salt Plant does not contain territorial seas subject to CWA jurisdiction under 33 C.F.R. § 328.3(a)(6) because a "territorial sea" must be "in direct contact with the open sea." 33 U.S.C. § 1362(8). None of the Salt Plant is in direct contact with the open sea and, therefore, it cannot be jurisdictional as a territorial sea.

The Salt Plant does not contain adjacent wetlands subject to CWA jurisdiction under section 328.3(a)(7). Indeed, it has no wetlands at all, as discussed previously.[69] As the Corps explained in its 2009 Normal Circumstances Memo:

> [T]he "normal circumstances" for the Redwood City Cargill plant site are the circumstances of an industrial site for making salt, not the circumstances of the site that existed decades ago before the levees were built and before the area was converted into an industrial salt-making facility.[70]

In the Salt Plant's current, normal circumstances, there are no areas inboard of the external levees that support wetlands vegetation.[71] Moreover, as discussed above, *Baykeeper* precludes the use of "adjacency" to establish jurisdiction over non-wetlands. *See Baykeeper*, 481 F.3d at 707. Thus, the Salt Plant may not be deemed jurisdictional on an adjacency theory.

V. Conclusion

For all the foregoing reasons, the Redwood City Salt Plant Salt Plant is not subject to jurisdiction under the Rivers and Harbors Act or the Clean Water Act. Accordingly, the Corps

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[69] *See* discussion *supra* in Section IV.B and Significant Nexus Analysis, Exh. 24.

[70] Normal Circumstances Memo, Exh. 19 at 8.

[71] *See* PJD Form, Exh. 21; Hicks Letter, Exh. 22; Josselyn 2002 Special Aquatic Habitat Assessment, Exh. 23.

and EPA should issue jurisdictional determinations formally declaring that the Salt Plant is not subject to jurisdiction under either statute.

REDWOOD CITY SALT PLANT APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 1

WRA, Inc., Map of San Francisco Bay Area

Exhibit 1. Map of San Francisco Bay Area

DMB Redwood City Saltworks
Redwood City, California

wra
ENVIRONMENTAL CONSULTANTS

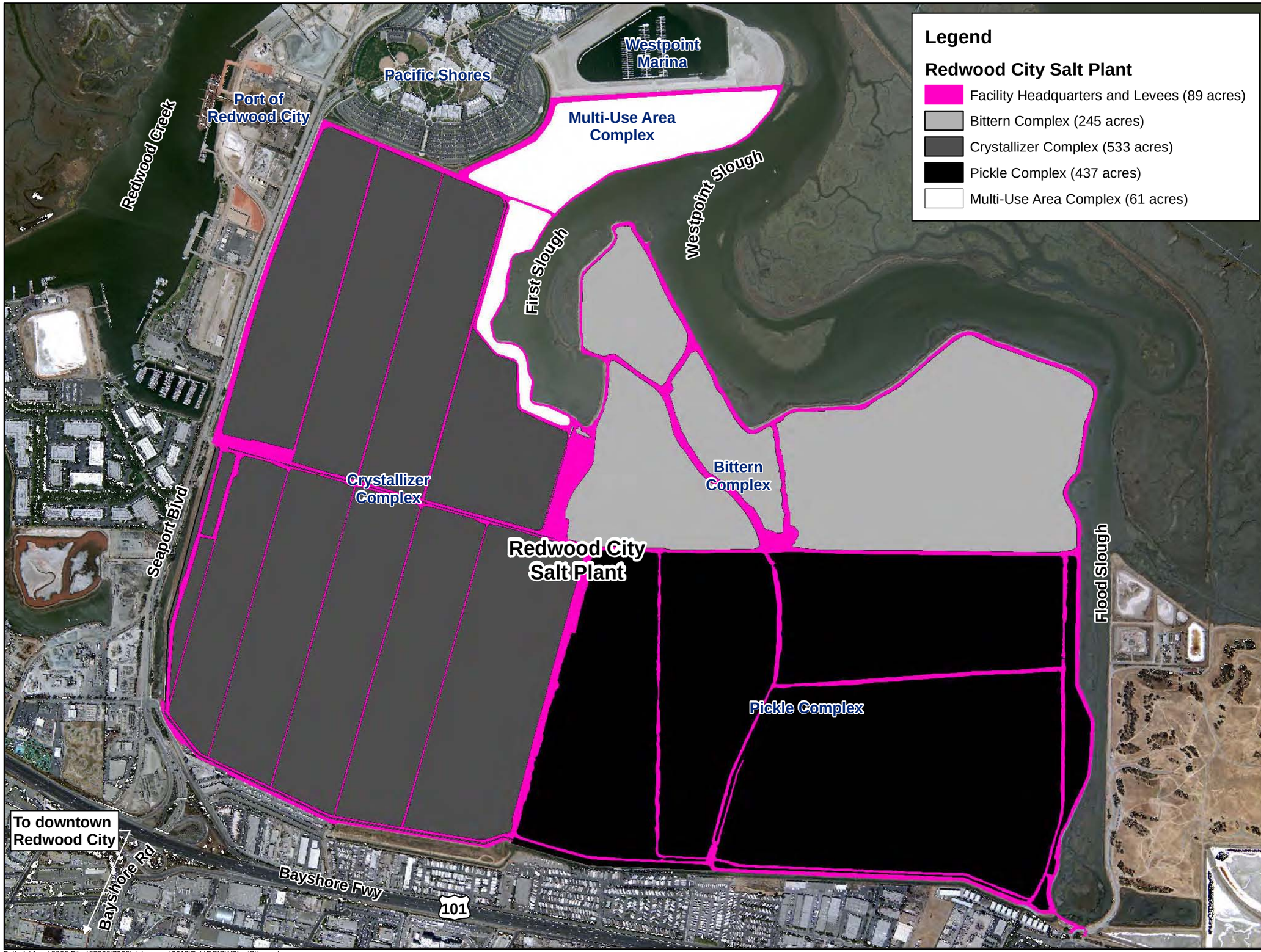
Map By: SG
Basemap: USGS Topo Quad

Path: L:\Acad 2000 Files\07000\7062\gis\arcmap\2012\Jan\SFBayOverview.mxd

REDWOOD CITY SALT PLANT APPROVED
JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 2

WRA, Inc., Map of Redwood City Salt Plant
(Feb. 17, 2012)



wra
ENVIRONMENTAL CONSULTANTS
2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

DMB Redwood City Saltworks

Redwood City, California

Exhibit 2. Map of Redwood City Salt Plant (Feb. 17, 2012)

This map is representational only, and not meant for use in detailed design.

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Map By: SG
Map Date: February 2012
Image Date: August 2008
Image Source: Redwood City Industrial Salt Works

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REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 3

WRA, Inc., Overview of Former and Current Salt Production Areas (Feb. 7, 2012)

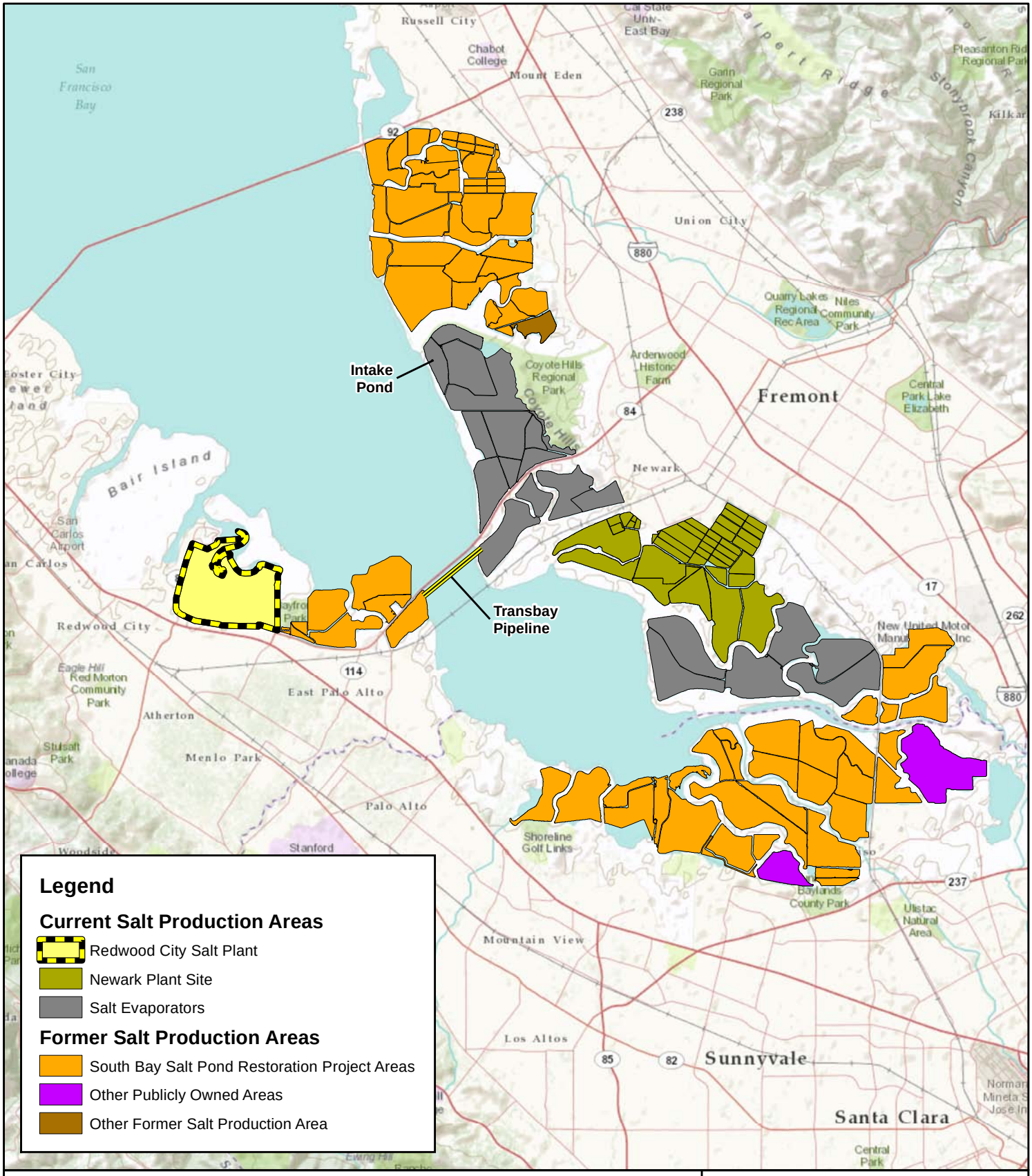

Exhibit 3. Overview of Former and Current Salt Production Areas (Feb. 7, 2012)

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DMB Redwood City Saltworks
Redwood City, California

Map By: SG
Basemap: USGS Topo Quad

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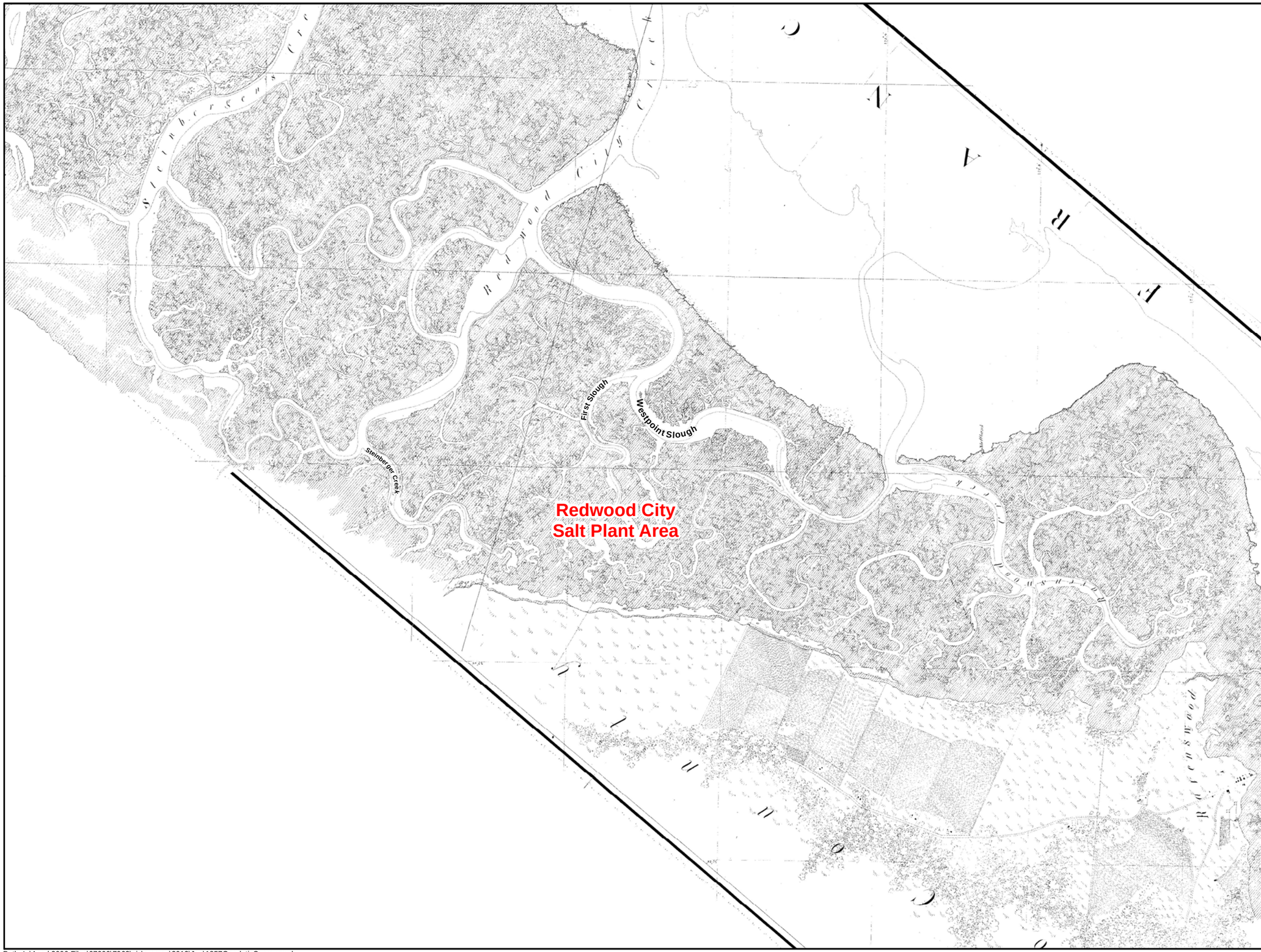
REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 4

WRA, Inc., Map of Redwood City Salt Plant Area Prior to Salt Construction, USCGS Sheet: 664 (1857)



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ENVIRONMENTAL CONSULTANTS
2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

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Redwood City, California

Exhibit 4.
Map of Redwood City Salt Plant Area Prior to Salt Construction, USCGS Sheet: 664 (1857)

This map is representational only, and not meant for use in detailed design.

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Base Date: 07/01/31
Base Source: T-Sheet 4643

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REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 5

Michael Josselyn, Ph.D., WRA, Inc.,
Early History of Redwood City Salt Plant Site
(Feb. 27, 2012)

("Early History Report")

Early History of Redwood City Salt Plant Site
1861-1951

Prepared by:

Michael Josselyn, PhD PWS
WRA, Inc.
2169 E Francisco Blvd Suite G
San Rafael, CA 94901

February 27, 2012

Purpose

The purpose of this report is to describe the early history of the reclamation of tidal marshes for the development of salt production facilities at the Redwood City Salt Plant with reference to the Corps practice in implementing the Rivers and Harbors Act of 1899. This report covers the period between 1861 and 1951. The activities described in this report are based on early maps, documents, and reports as described in the footnotes and supplemented with figures and maps as referenced. A bibliography is provided at the end of this report.

Early land ownership

The lands located at the Redwood City Salt Plant site have a long history of private ownership and conversion to industrial salt production. Initial private landownership dates back to 1861 when William Holder purchased, under the Swamp and Overflowed Lands Patents, 198 acres of land near the current junction of Seaport Boulevard and East Bayshore Road and in 1869 with the purchase of 2448 acres of lands by Miles Sweeney (Figure 1). These land purchases were made for the purpose of reclamation. Special Assessment Districts, as authorized by State Law, were established around the margin of the Bay to undertake reclamation activities for agricultural and industrial purposes[1].

Initial salt production companies and levee construction on western portion of site

In the south Bay, reclamation for agricultural purposes largely failed due to the high salinity of the soils; however, it was realized that solar salt production could be economically viable on these lands by using and expanding on the levees established by the earlier landowners. The initial use of the lands within the present day salt plant for salt production was undertaken early in the 20th century as landowners began the process of consolidating parcels and constructing levees and facilities for salt collection and processing.

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[1] Claire Lopez. 1971. Reclamation and Development the marsh and overflowed lands of the south San Francisco Bay. 38 pp.

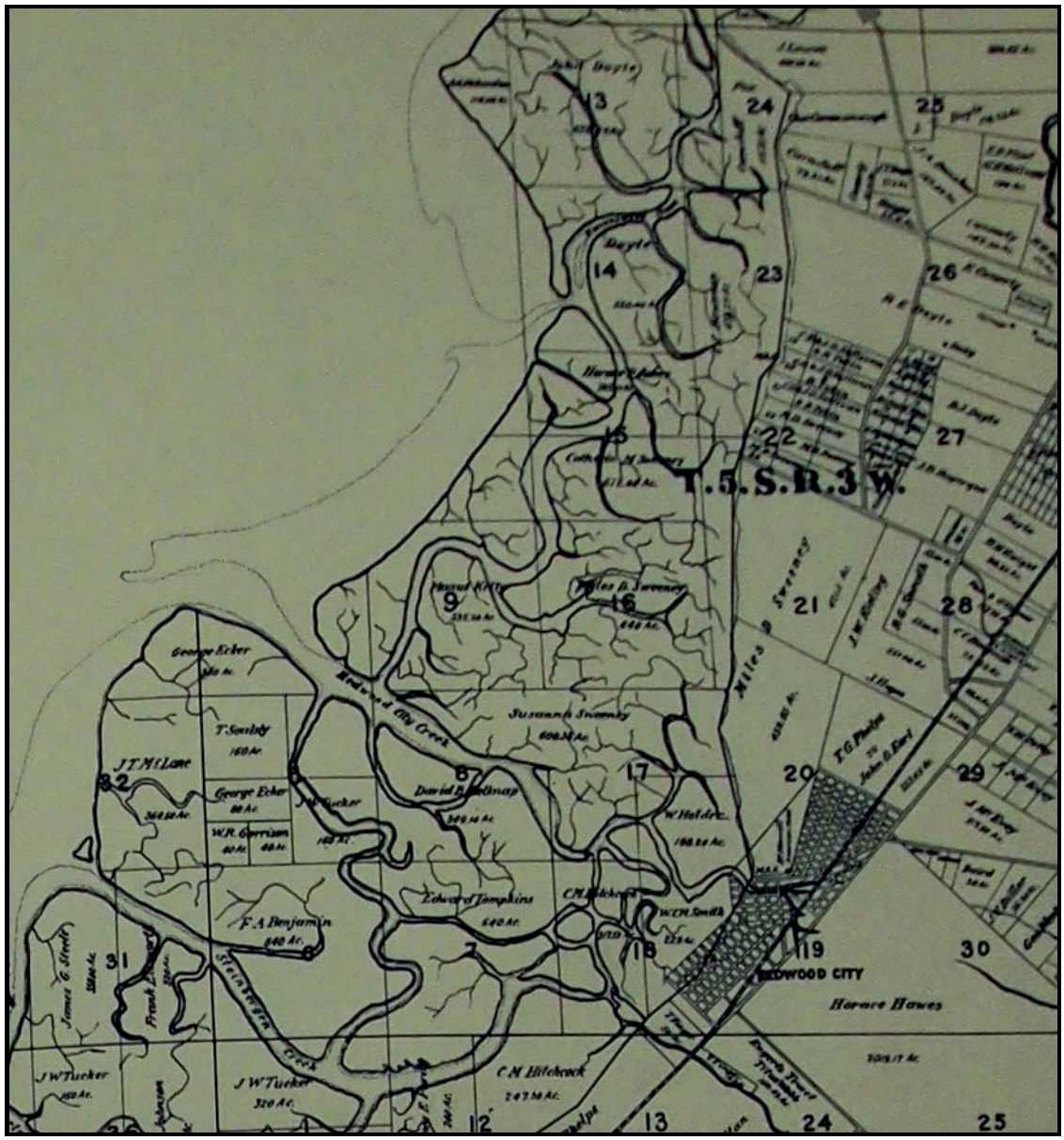
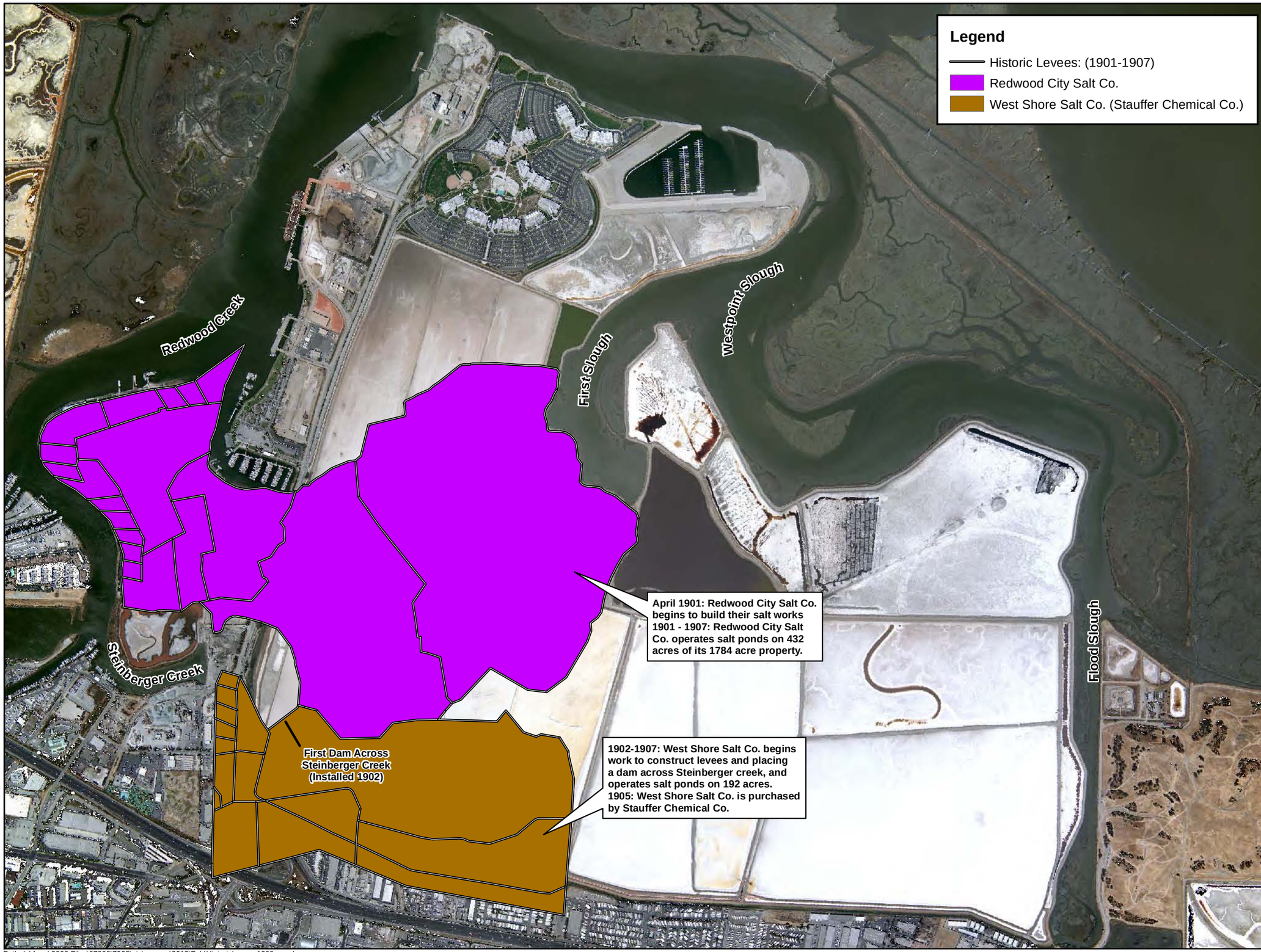


Figure 1: 1868 San Mateo County Map showing landownership at Redwood City Salt Plant site

In 1901, the Redwood City Salt Company leased 1784 acres and an April 27, 1901 news article in the Peninsula Pennant documents the construction of levees for a salt works consisting of evaporators, crystallizers, and other production ponds[2]. In 1902, a second salt company, the West Shore Salt Company began their salt works construction, including the construction

[2] Postel, M. 1980. More than a grain: the history of the salt industry in San Mateo County. La Peninsula 20(3): 14-19.



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ENVIRONMENTAL CONSULTANTS
2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

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Redwood City, California

Map 1. Historic Salt Production (1901-1907)

This map is representational only, and not meant for use in detailed design.

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Map By: SG
Image Date: August 2008
Image Source: Redwood City Industrial Salt Works

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of a dam across Steinberger Creek, which, together with exterior levees surrounding the salt works, removed the area inboard of the dams and levees from influence of tidal action (Map 1). According to the Redwood City Democrat, both companies were successful local businesses that produced their first crops in October 1902 and the lands that they had placed in production at that time are shown on Map 1. By 1905, Stauffer Chemical purchased the West Shore Salt Company and began negotiation for the Redwood City Salt Company, which was merged with the Stauffer Chemical Company to form Leslie Salt Company, which was officially incorporated in August 1907. Aerial photographs from 1916 and 1920 show these facilities as containing brines (Figures 2 and 3).

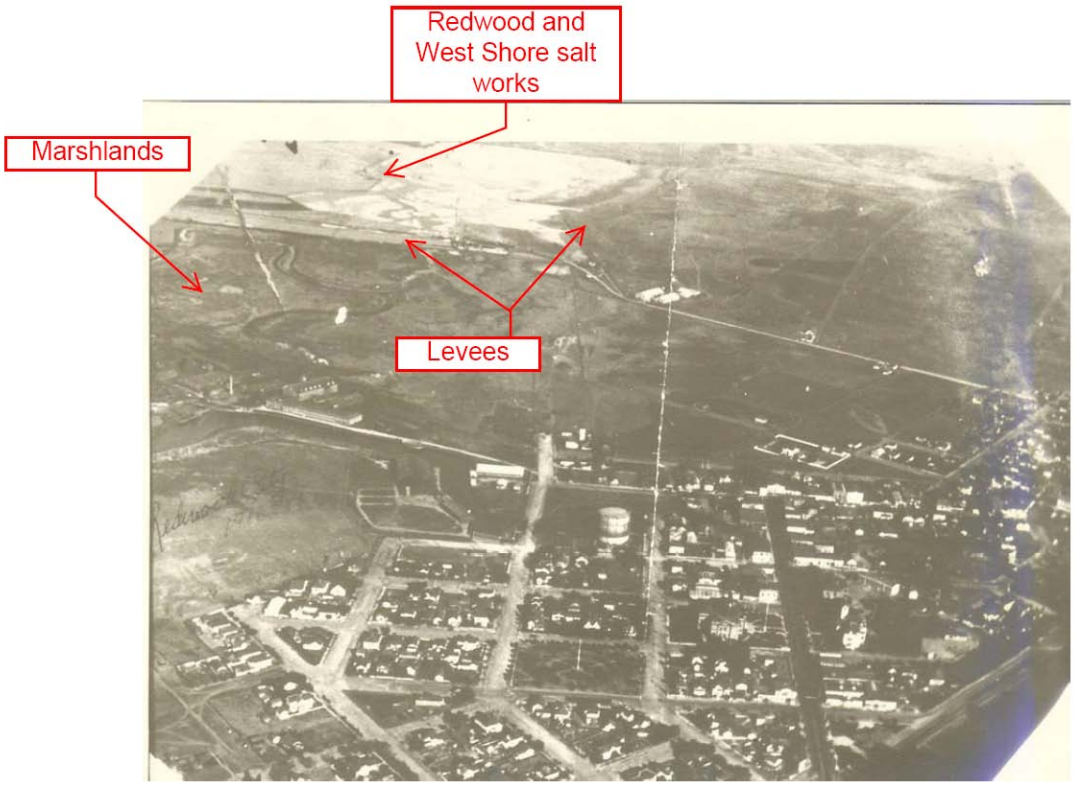


Figure 2: 1916 Aerial Photograph showing the leveed areas of former Redwood and West Shore Salt Works (in 1916 they had been merged to form Leslie Salt). Levees and railroad spur to Redwood City Harbor lands also evident.

The production of salt by these early salt companies was much the same as present day operations, though on a smaller scale. Water was taken in from San Francisco Bay by pumps and/or inlets, concentrated into brines by solar evaporation in sequential basins, and moved into small rectangular crystallizers to eventually crystallize as salt that was then harvested by hand. The salt production system consisted of large evaporators for initial evaporation located in the eastern portion of the salt works. The salt crystallizers are evident on Map 1 as the smaller rectangular basins adjacent to Redwood Creek Harbor and were the location where salt was harvested and shipped.

Salt production companies conducted their operations on tidal marsh lands and the construction of the levees to create these salt production facilities occurred by placement of dredged muds on the top surface of the marsh. The marsh plain consisted of vegetated areas at or above the elevation of Mean

High Water (MHW).[3] Some of the levees also crossed small sloughs which may have been below MHW; however, they were generally considered part of the vegetated marsh. The marsh plain was thus enclosed allowing for the containment of the brines that could be concentrated by evaporation over time. The effect of these levees was to convert vegetated marsh and its associated tidal sloughs into non-vegetated basins containing brines, crystallized salts, and various co-products. Permits under the Rivers and Harbors Act of 1899 (RHA) were not required for these levees as evidenced by the practice of the War Department during the period immediately following the enactment of the RHA as described below.

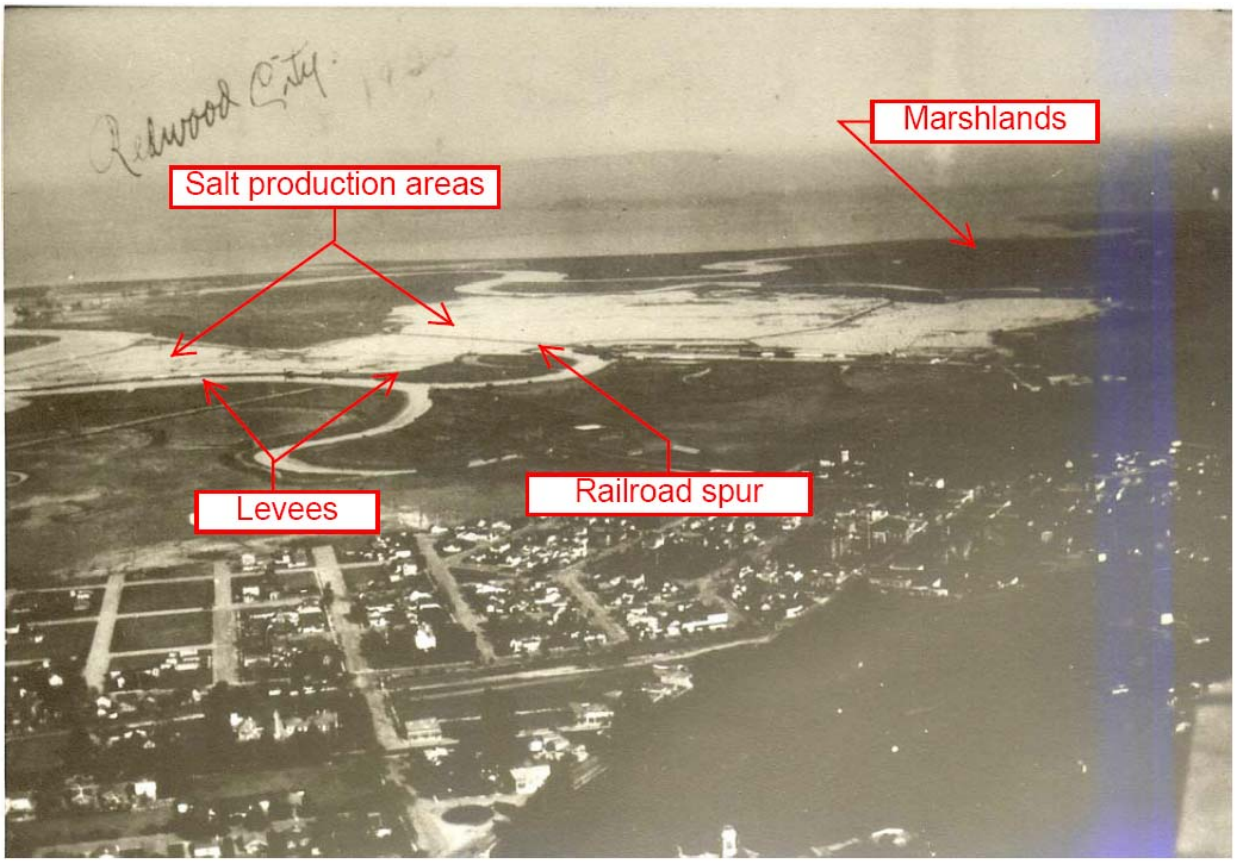


Figure 3: 1920 aerial showing the Redwood and West Shore salt ponds and RR spur crossing Steinberger Slough to Redwood City Harbor Company properties at far upper left of photo where dredged materials are being deposited for Port facilities.

Rivers and Harbors Act practice by the War Department

In the immediate decade following enactment of the RHA, the War Department records indicated that its permitting activity was restricted to projects that were directly related to maintaining or improving navigation for commercial shipping and national defense. According to records in the *Annual Report of*

[3] See Michael Josselyn, PhD PWS, Topographic Sheets Denote Marsh Elevations Above Mean High Water (Jan. 31, 2012).

the Chief of Engineers[4], RHA authorization was reported for 963 projects *nationwide* between 1900 and 1907, and all of those authorizations were related to building or modifying bridges, building or modifying dams, and construction of locks for river transport. Some of these permits were issued to private entities, such as railroad companies and harbor companies, with many issued to municipalities for public works infrastructure projects affecting navigation. The first authorizations for projects other than bridges, dams, or locks, was in 1911, when the Annual Report notes

> "numerous applications for permission to build structures of various kinds other than bridges (such as dams, wharves, dolphins, booms, weirs, etc.) in the navigable waters of the United States have been examined with a view to protect navigation interests. Upon the recommendation of the Chief of Engineers, permits have been granted by the Secretary of War for a number of such structures, *but specific reference is not deemed necessary.*" (emphasis added).

Similar statements appear in subsequent issues of the *Annual Report of the Chief of Engineers*, indicating that permit activity increased and began to include additional structures beginning in 1911.

In San Francisco Bay, these records indicate that eleven projects were approved under the RHA between 1900 and 1907, all of them authorizing construction of bridges, or for alteration of bridges that were determined to be affecting navigation. The closest location to Redwood City for which a RHA project authorization was reported was in 1907 for the Dumbarton rail bridge. All of these projects were related to issues of navigability in waters that were deemed deep enough to be suitable to transport commerce. The first authorization issued for a dam across a tidal slough in San Francisco Bay was in 1909 for two “small sloughs” entering Alviso Slough and Guadalupe Creek. However, the reclamation of marshes and associated sloughs for industrial and agricultural purposes had been undertaken with the knowledge of the War Department and were considered the normal and expected practice for the use of these lands as they were not considered to below MHW nor navigable.

As reported in the *Annual Report of the Chief of Engineers* and other records, the Corps of Engineers had been dredging Redwood Creek periodically since 1886 to maintain navigability between San Francisco Bay and downtown Redwood City. In 1913, the Redwood City Harbor Company purchased from Leslie Salt Company approximately 500 acres of land comprising what is now the Port facility of Redwood City, the Pacific Shore Center development, the Westpoint Marina, and a portion of the Redwood City Salt Plant site. The Corps of Engineers placed dredged materials on the adjacent marshlands to create dry land for these port facilities. The Redwood City Harbor Company then initiated the construction of the road and railroad spur across Steinberger Creek connecting Redwood City with the port facilities (Map 2). Starting in 1914, the Redwood City Harbor Company also constructed levees around its holdings and used these areas for dredged material disposal, particularly in the area of the current Port facilities, Pacific Shores Center, and the northern portion of the current crystallizers (Figure 4; Map 2).

[4] A report prepared annually by the Corps of Engineers for the Secretary of War. Reports between 1895 and 1930 viewed at the San Francisco Public Library, Main Library.

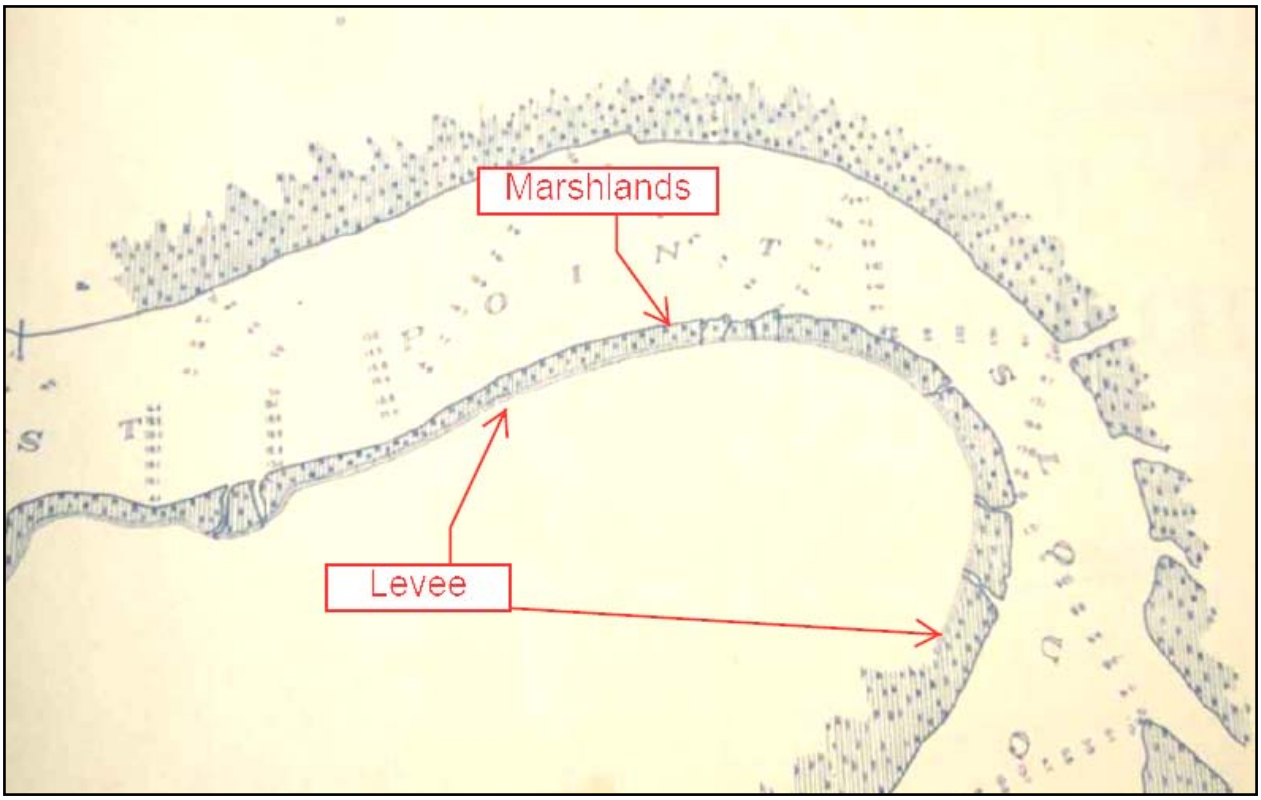
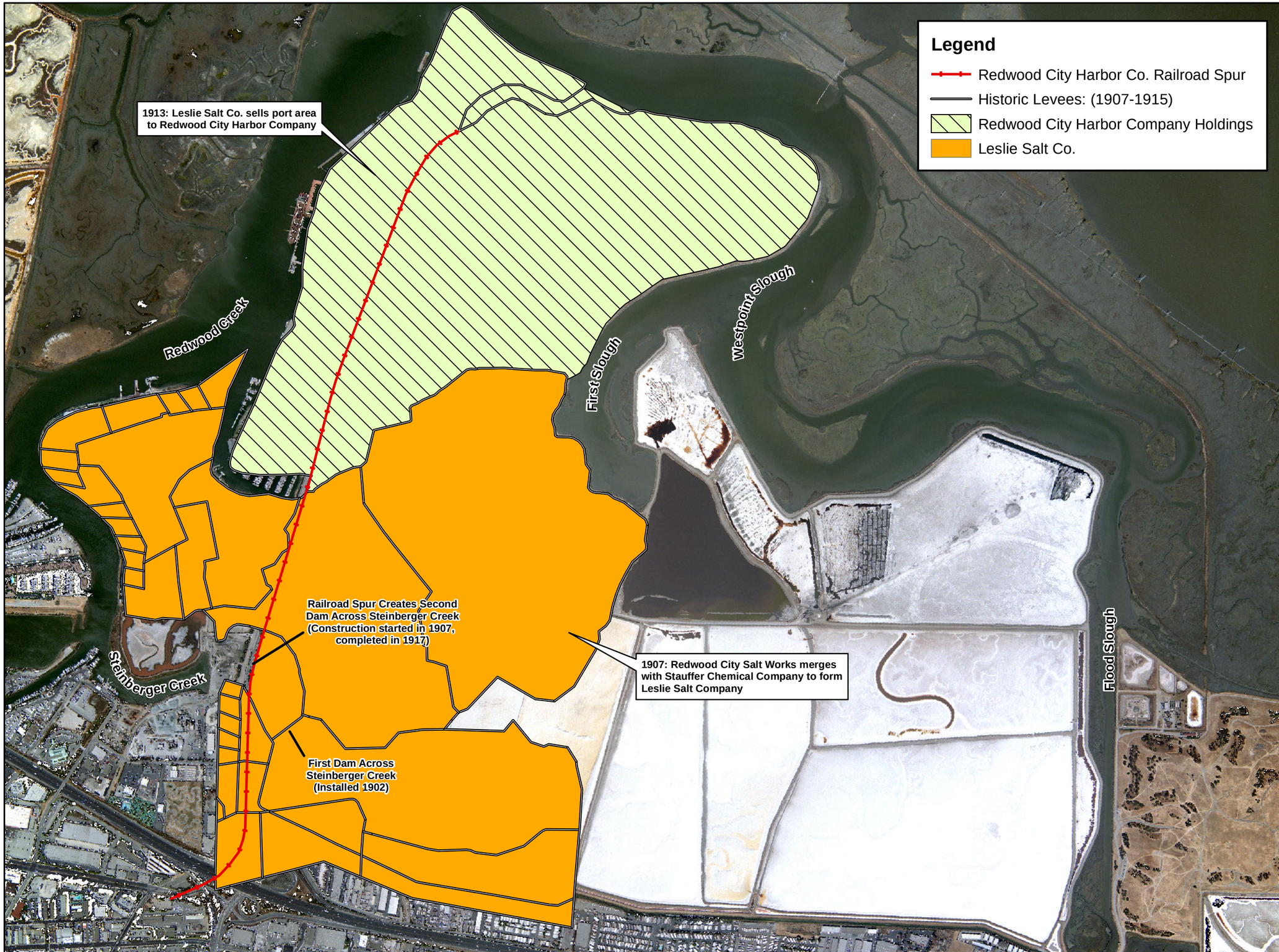


Figure 4: 1915 Corps map of Westpoint Slough in vicinity of current Pacific Shores Development and West Shore Marina showing levee (depicted as double line of dots) in place along edge of Westpoint Slough

In 1917, the Corps of Engineers produced a report for Congress that documented the costs and benefits of dredging the channel at Redwood City[5] that described the situation relative to the adjoining marshlands and the ongoing reclamation and salt making activities. Significant findings from this report indicate that the Corps recognized that the marsh lands were extensive, were above high water, and the Corps was aware that the marshlands and tidal sloughs were subject to reclamation for agricultural and industrial purposes.

> East of Redwood City there is a strip of marshland 2 miles wide on the average and about 12 miles long, containing about 25 square miles. This strip is much cut up by sloughs, but contains a large area of flats not covered by water, except at extreme flood tides. This section is capable of being reclaimed for agricultural and industrial purposes. [page 5]
>
> The whole section through which the creek flows as a navigable stream is marshland, *above high water most of the time*, but completely covered during extreme flood tides except for such portions as have been diked -off. The land is covered with marsh grass, and the banks are of the

[5] War Department 1917. Reports on Preliminary Examination and Survey of Redwood City Harbor, CAL. House of Representatives. 65th Congress. Document No. 551.



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ENVIRONMENTAL CONSULTANTS
2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

DMB Redwood City Saltworks

Redwood City, California

Map 2. Historic Salt Production (1907-1915)

This map is representational only, and not meant for use in detailed design.

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Map By: SG
Image Date: August 2008
Image Source: Redwood City Industrial Salt Works

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> usual character found in sloughs, sometimes steep and overhanging, 6 to 8 feet high, sometimes a gently sloping, muddy beach. [page 5—emphasis added]
>
> All lands adjacent to Redwood Creek are tide lands but can be easily and cheaply reclaimed and made into desirable sites for manufacturing establishments. [page 11]

These statements indicate that the Corps' focus on maintaining the navigability of Redwood Creek was intended in part to support the potential industrial and agricultural development in the surrounding marshlands. A description of the various industrial and commercial activities on these marshlands demonstrated that the Corps was well aware of the potential for their development as a justification for federal funds to dredge the channel. The report also makes clear that the Corps was aware of the salt works construction along Redwood Creek.

> The Tacoma Mill Co. owns extensive marshland holdings on the north and west bank of the creek close to town. It Imports, mostly by rail, between 2,500,000 and 3,000,000 feet of lumber annually, valued at between $50,000 and $60,000. There are several large salt works situated on Redwood Creek, the Greco Salt Co. and Leslie Salt Co. being the largest of these. They ship annually, via Redwood Creek, large quantities of salt. [page 6]

The Corps used the development underway by the Redwood City Harbor Company, including the construction of a levee around the marshlands (Figure 4) as a basis for considering the local expenditures that had already been made in the region.

> In addition to the industrial concerns already in operation in this section, due credit must be given to a prospective commerce that is reasonably certain to develop. The Redwood City Harbor Co. was organized about a year ago by a group of business men of recognized financial standing primarily for the purpose of providing sites on a deep-water harbor for the various business enterprises owned by themselves, secondarily as a real estate venture with the idea of attracting industries to the harbor, thirdly, for the benefit of Redwood City. [page 7]
>
> Around its property the Redwood City Harbor Co. is also constructing a levee by means of a clamshell dredger. The levee is already completed for a distance of 3 miles, shown by red-ink line from point H to point F on the map, leaving a comparatively short stretch from F to G to be completed. (Information has been received that this work has also been completed.) During the past year the harbor company has spent on its work about $120,000.

The federally sponsored dredging authorized in the Rivers and Harbors Act of 1910 included the placement of dredged material onto the adjoining marshlands:

> The dredged material was removed by a bucket machine with a very long boom, and the spoils were thrown back as far as practicable from the banks, which were so soft and yielding that the pressure probably squeezed or forced up the creek bottom. This can possibly be avoided in the future by the use of a suction pipe-line dredge and by depositing the dredged material over a larger area.

The Corps recommended the funding of the dredging project, in large part due to the commitment of the local community to the development of the adjoining marshlands for salt production, industrial uses, and port facilities to ship products from the inland areas.

In the decades following the enactment of the RHA, it is apparent that regulatory authority and actions by the War Department focused on navigable waterways used by commercial and defense shipping.

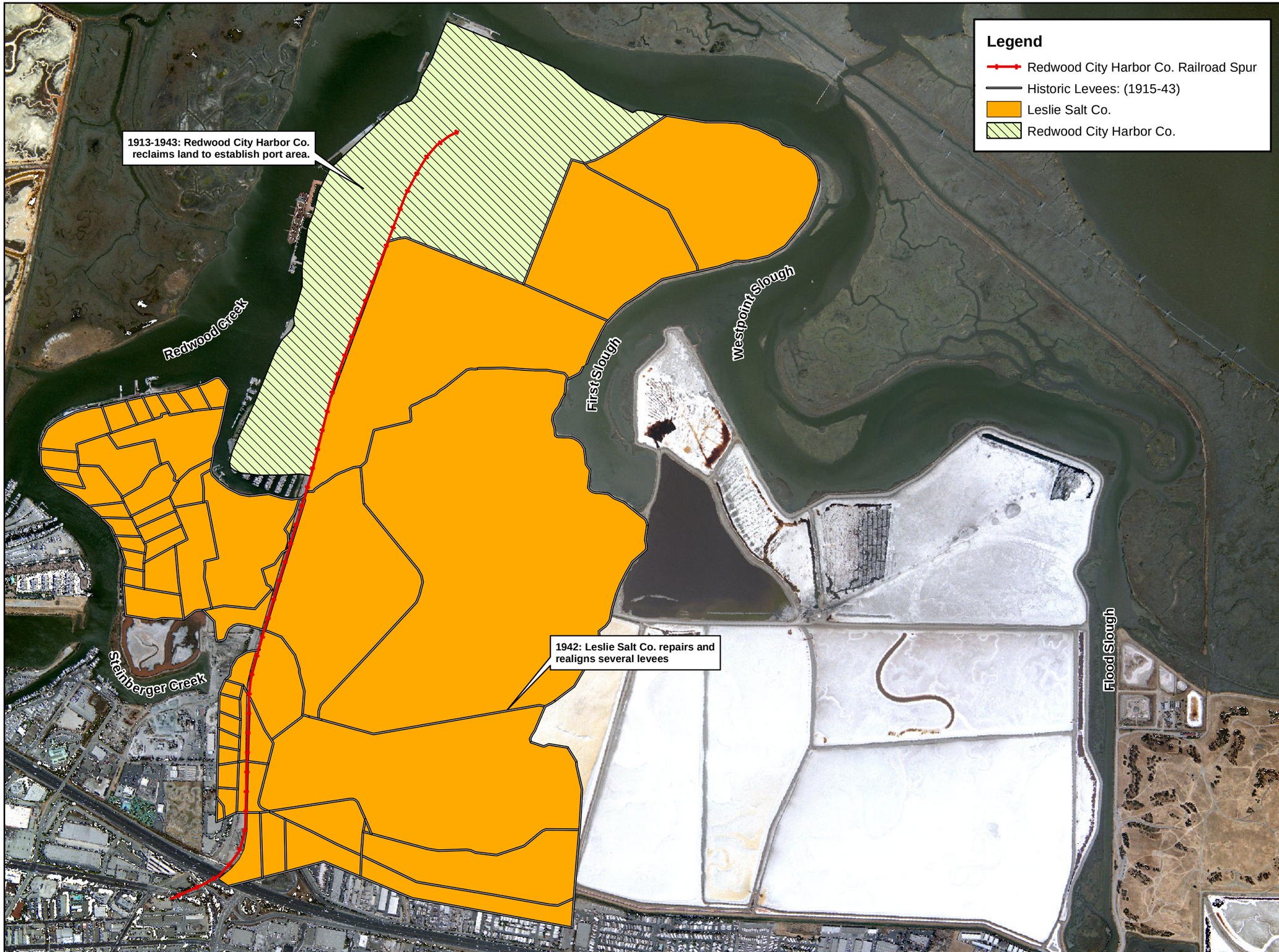
Marsh reclamation involving the construction of levees on the marsh plain and through small tidal sloughs was not regulated under the RHA as these areas were above MHW and considered outside of the areas of navigation. In particular, the reclamation of marsh lands, including the construction of levees to contain brines for salt production in San Francisco Bay, were considered an economic use that could be used to justify the expenditure of federal funds for dredging certain commercial areas.

Further development and use of the Redwood City Salt Plant site following completion of levee construction

A number of photos and documents show the extent of the levee system in place in the project area during the early 1900's and the activities occurring within the areas enclosed by the levees.

- 1915 map showing levees constructed along West Point Slough along area that was owned by Redwood City Harbor Company and currently the location of Pacific Shores Center and the Westpoint Marina (Figure 4).
- 1916 aerial photograph that shows the salt production on the Redwood City Salt Company property and the levees around the West Shore Salt Company (Figure 2).
- 1920 aerial photograph showing the flooding of the marshlands and salt production on both the Redwood City and West Shore Salt Company (by then consolidated into the Leslie Salt Company) as well as the railroad spur going out to the Redwood City Harbor Company lands at the present day Port of Redwood City. The railroad spur cut off Steinberger Slough from tidal action to present day Seaport Boulevard (Figure 3).
- 1930 aerial photographs showing the entire levee system in place at the time that includes the lands leveed and placed into salt production at that time and the areas used from dredged material disposal by the Redwood City Harbor Company (Figure 5).
- 1931 oblique aerial photograph that shows the entire levee system in place at that time and the salt production and dredged material disposal activities (Figure 6).

In 1931, the US Coast and Geodetic Survey prepared a map of the region that clearly demarcated the diked areas at that time (Figure 7). The diked areas between Redwood Creek, Westpoint Slough, and First Slough are mapped as "filled lands", salt evaporating ponds, and reclaimed marsh. All of these lands are separated from the sloughs by levees. Map 3 shows how these levees relate to modern conditions. On the US Coast and Geodetic Survey, a straight dredged channel on the right side of the map shown in Figure 7 (now called Flood Slough) is seen as connecting to Westpoint Slough. Between this dredged channel and First Slough, the area is shown as tidal marsh using parallel lines and an embedded marsh symbol.



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Map 3. Historic Salt Production (1915-1943)

This map is representational only, and not meant for use in detailed design.

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Map By: SG
Image Date: August 2008
Image Source: Redwood City Industrial Salt Works

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Figure 5: Composite of aerials from 1930 (Flight C-888, Frame 51, 56, and 54B) 1" = 1350 feet

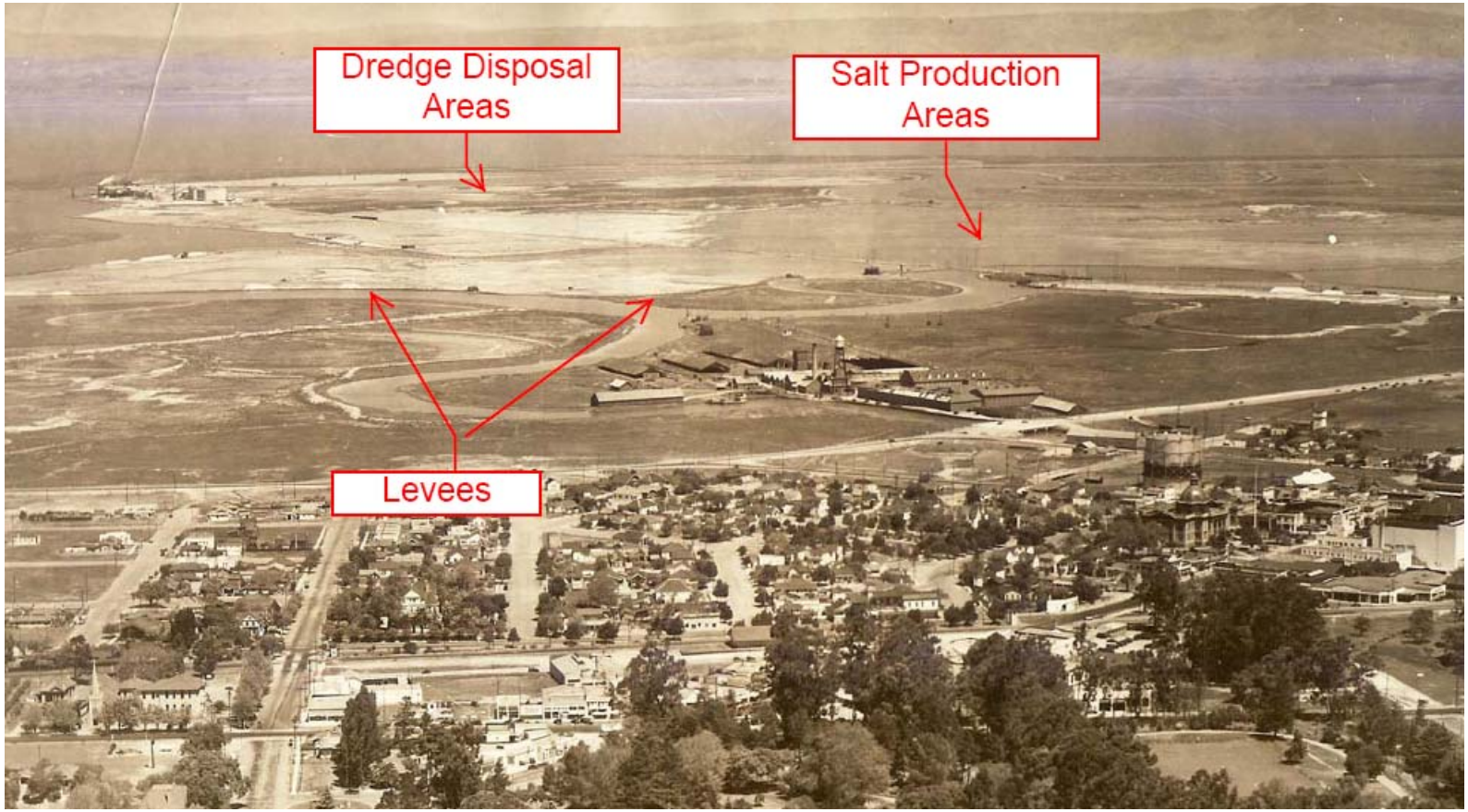

Figure 6: 1931 Aerial photograph showing the salt ponds and Redwood City Harbor District properties as leveed and in salt production and for use for the harbor industries and dredged material disposal.

Figure 7: 1931 Coast and Geodetic Survey Sheet T-4643

1940 War Department Permit for dam and levees on eastern portion of site

In 1939, the Stauffer Chemical Company applied to the US Army Corps of Engineers for a permit to dam First Slough and to construct levees enclosing the marsh area between then existing salt ponds and as far east as Flood Slough. The approval showed the levees in existence at that time and the salt production lands and reclaimed marshlands based on the US Coast and Geodetic Survey Sheet 4643 prepared in 1931. The proposed dam and the location of the proposed levees were clearly shown as a heavy dark line on the map (Figure 8). In 1940, the Corps approved the construction of the dam across First Slough and to construct a levee on the edge of the marsh that blocked off smaller tidal sloughs that were tributary to Westpoint Slough and to an unnamed channel (now Flood Slough) (Figure 8). In November of 1940, Leslie Salt (a different corporate entity from the Leslie Salt that was formed in 1907) acquired the Stauffer Chemical holdings and portions of the Redwood City Harbor Company. In 1943, the construction of the dam across First Slough was initiated.

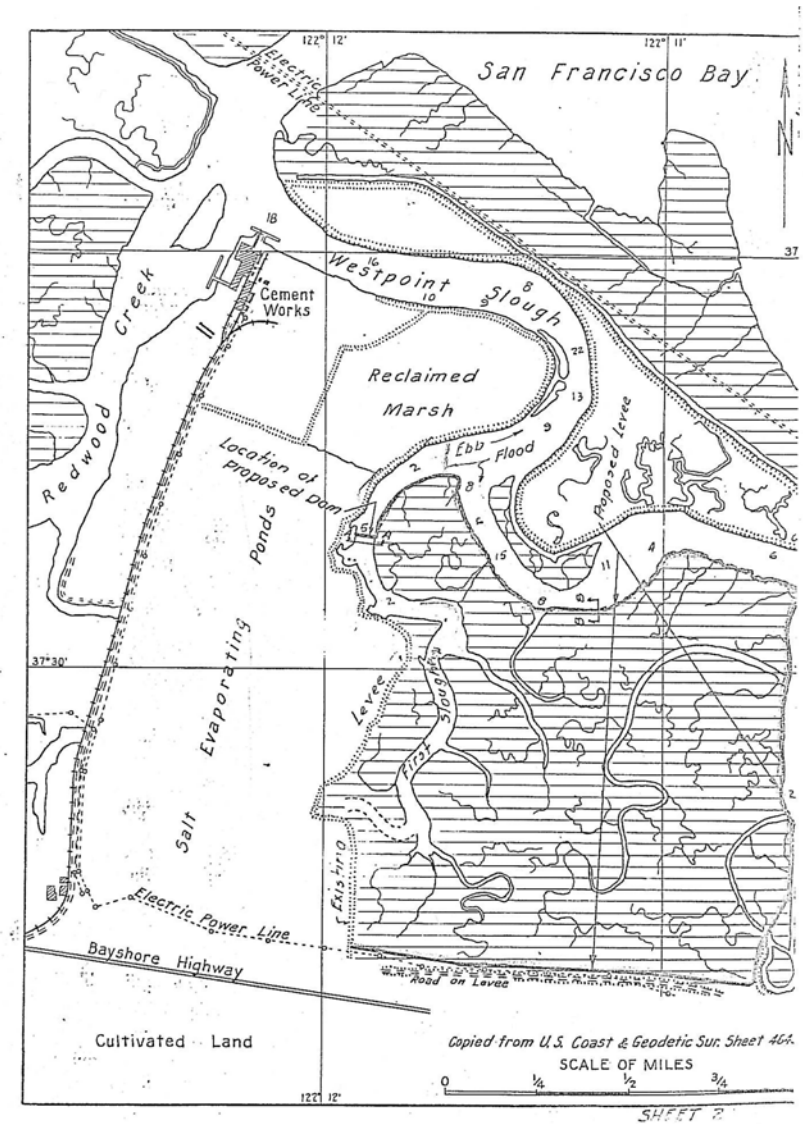

Figure 8: Plan View from 1940 War Department Permit enclose the marshland, including the other tidal sloughs, to allow for the construction of the solar salt production facilities.

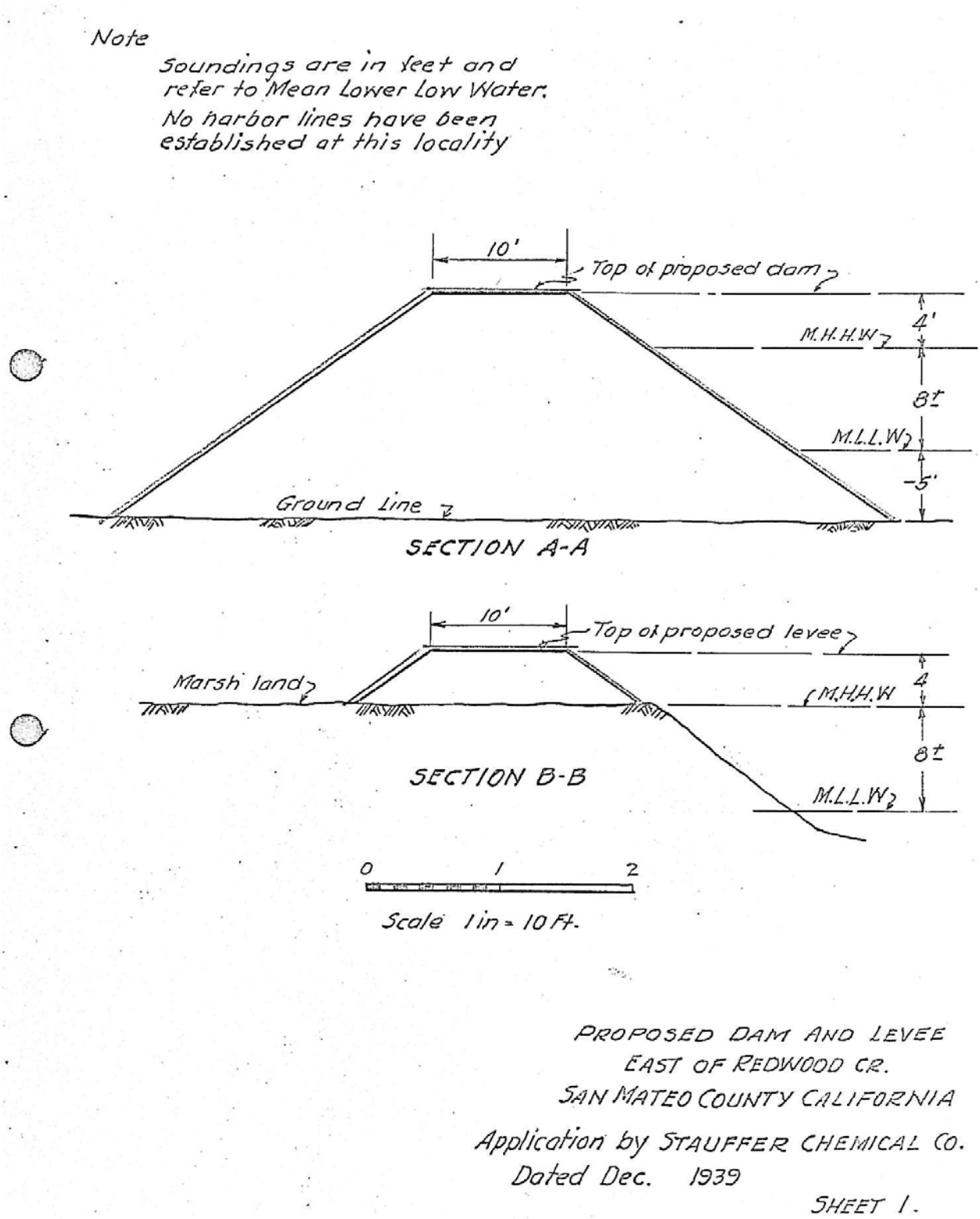

Figure 9: 1940 War Department Permit

The first available aerial photograph during the 1940s is dated March 1941 and shows all the areas that were then owned by Leslie Salt Company (Figure 10). The levees that were in place at that time are clearly visible in the aerial photograph. The areas that were historically used for salt production are also visible as containing brines and the area of the former Redwood City Harbor Company now owned by Leslie was enclosed by levees and dredged material, presumably from the dredging of Redwood Creek.

Figure 10. 1941 Aerial Photograph

By 1946, a series of aerials (Figures 11 and 12) clearly show the dam on First Slough and the levees along Westpoint Slough and Flood Slough. The marsh area (and its internal sloughs) was now completely enclosed and brines appear within the basins. Map 4 shows how these levees relate to the current conditions on the site.

Leslie continued to construct internal levees within the system to further improve salt production and its shipping facilities. In 1947, the War Department issued a permit to Leslie Salt Company to dredge 1.5 million cubic yards from Redwood Creek as part of the construction of its salt storage and the ship loading facility. The War Department also permitted the dredging of Redwood Creek for Leslie's loading facility. The permit shows that the dredged materials were to be deposited into the lands formerly owned by the Redwood City Harbor Company and the Redwood City Salt Company—areas that are presently the northern portion of the crystallizers were designated as the site to receive these dredged materials (Figure 13).

Throughout the late 1940's, Leslie Salt continued to develop its deep water shipping facility, salt storage, and pipelines in the area of the former crystallizers of the Redwood City Salt Company along Redwood Creek and therefore needed another and larger location for the final stages of salt production. In 1950, the construction of new crystallizer beds began and were completed in 1951 largely converting the holdings of the salt companies first constructed in 1901-2 and the Redwood City Harbor Company lands into the flat, rectangular beds that exist today (Map 4). The levees that surrounded the facility as authorized under the 1940 War Department permit were regularly maintained and the basins within flooded with brines and salt production co-products.

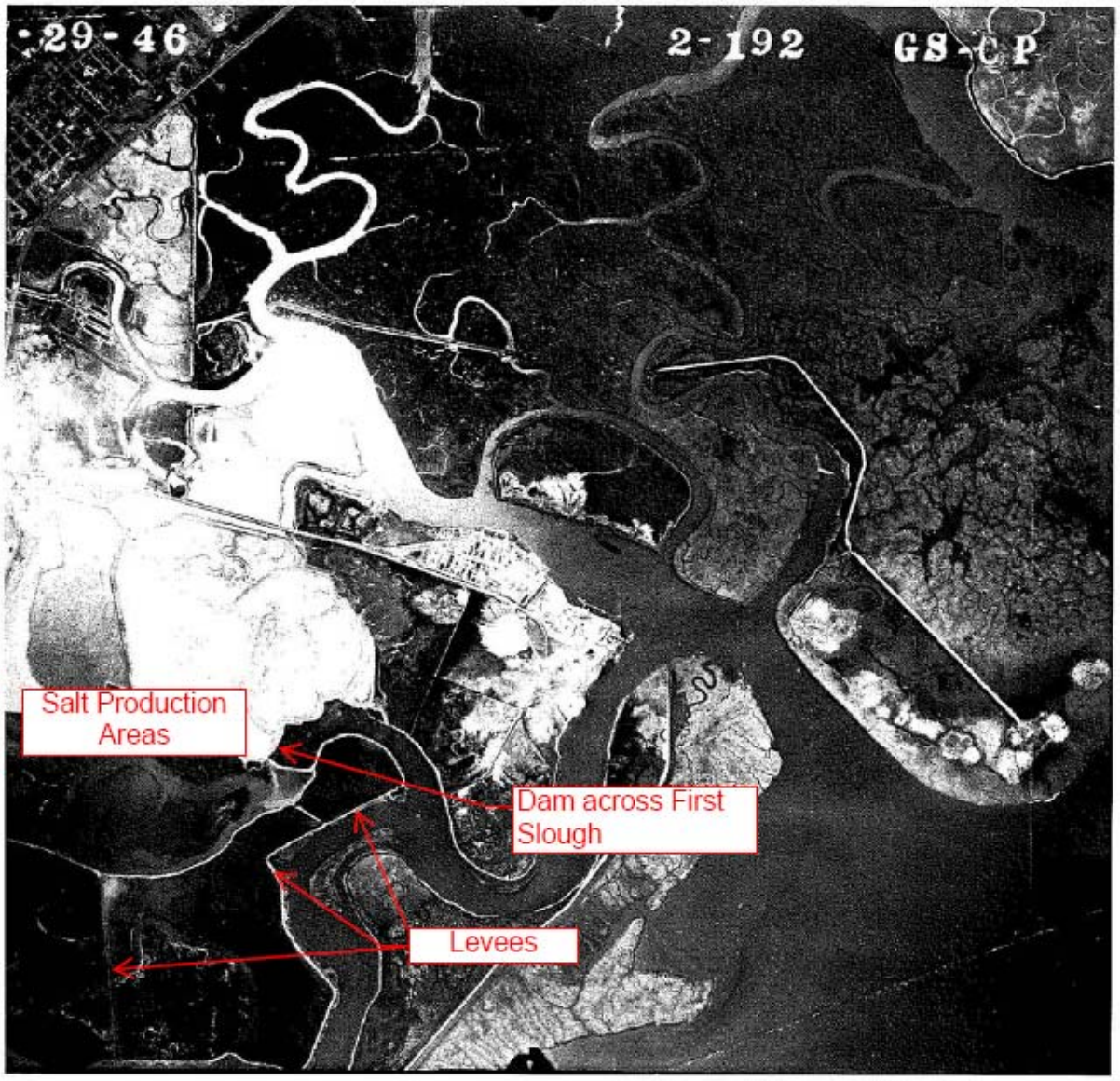

Figure 11. 1946 aerials showing dam across First Slough and levee along Westpoint Slough. Note that north is to the right on this photograph.

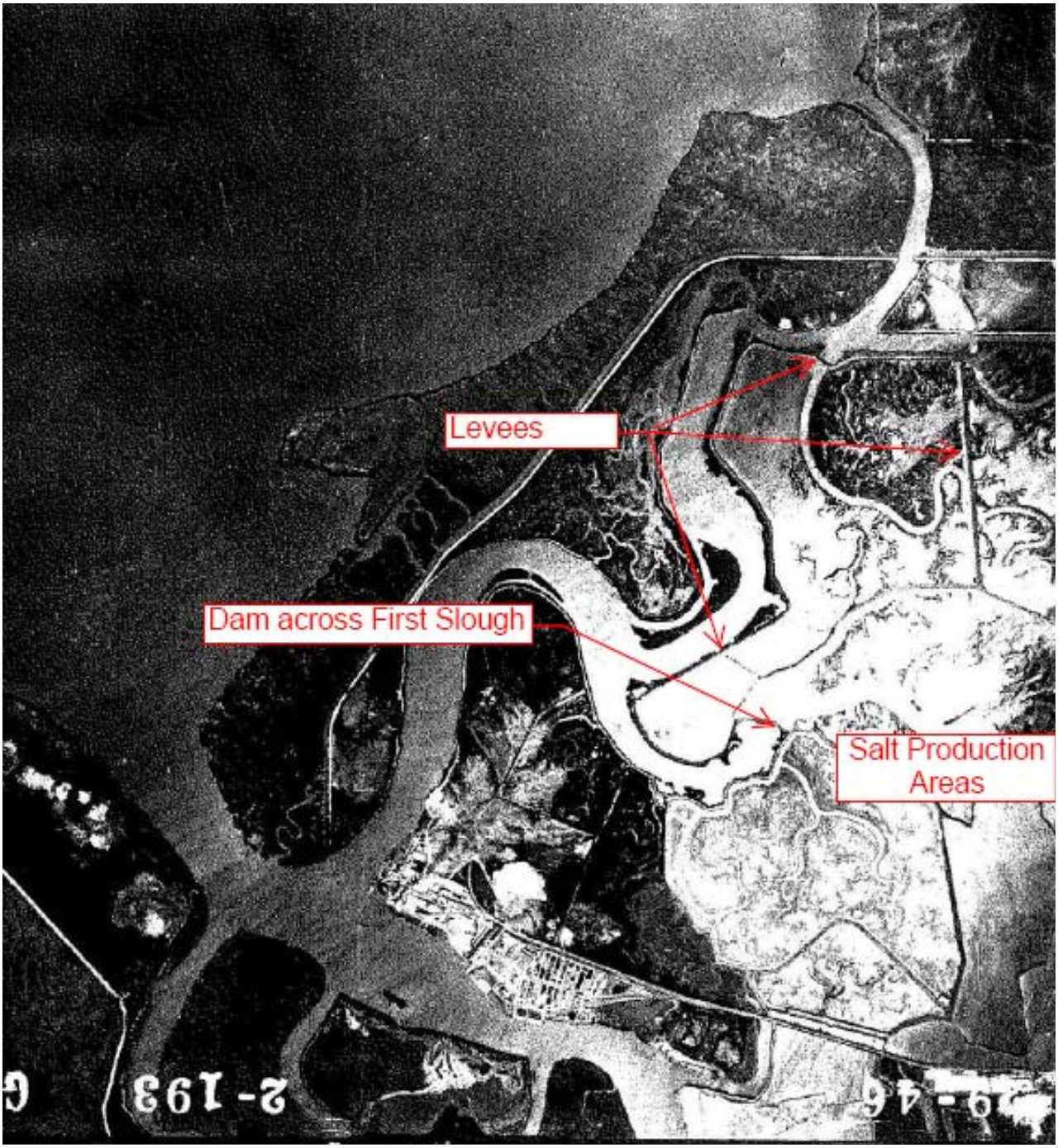

Figure 12. 1946 Aerial photograph showing levee along Westpoint Slough and brines within salt production facility. North is to the left in this photograph

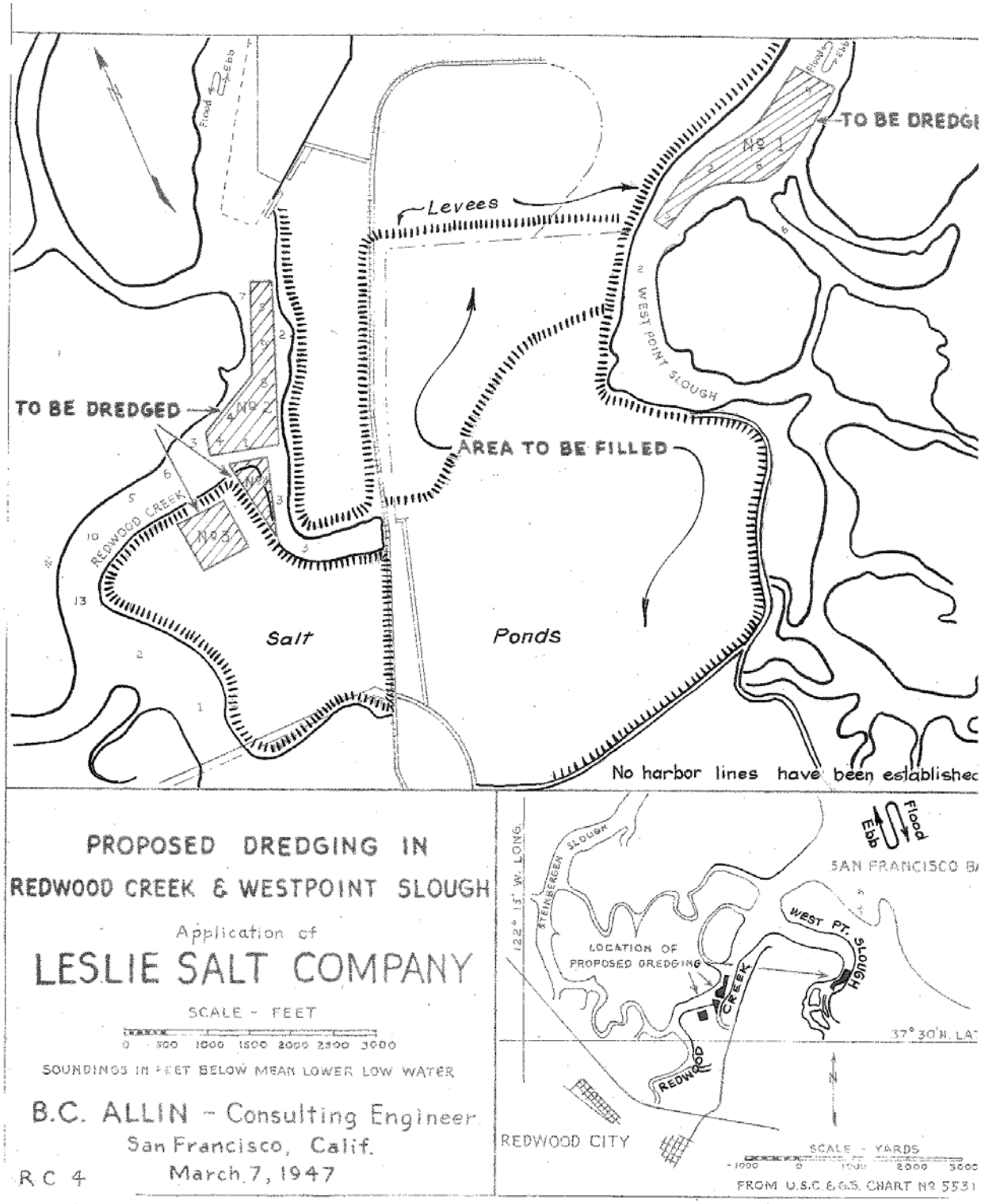

Figure 13: 1947 War Department Permit noting areas where dredged material will be placed on Leslie Salt lands

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Map 4. Historic Salt Production (1944-1951)

This map is representational only, and not meant for use in detailed design.

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Map By: SG
Image Date: August 2008
Image Source: Redwood City Industrial Salt Works

Path: L:\Acad 2000 Files\07000\7062\gis\arcmap\2012\Jan\HistoricLevees1950s.mxd

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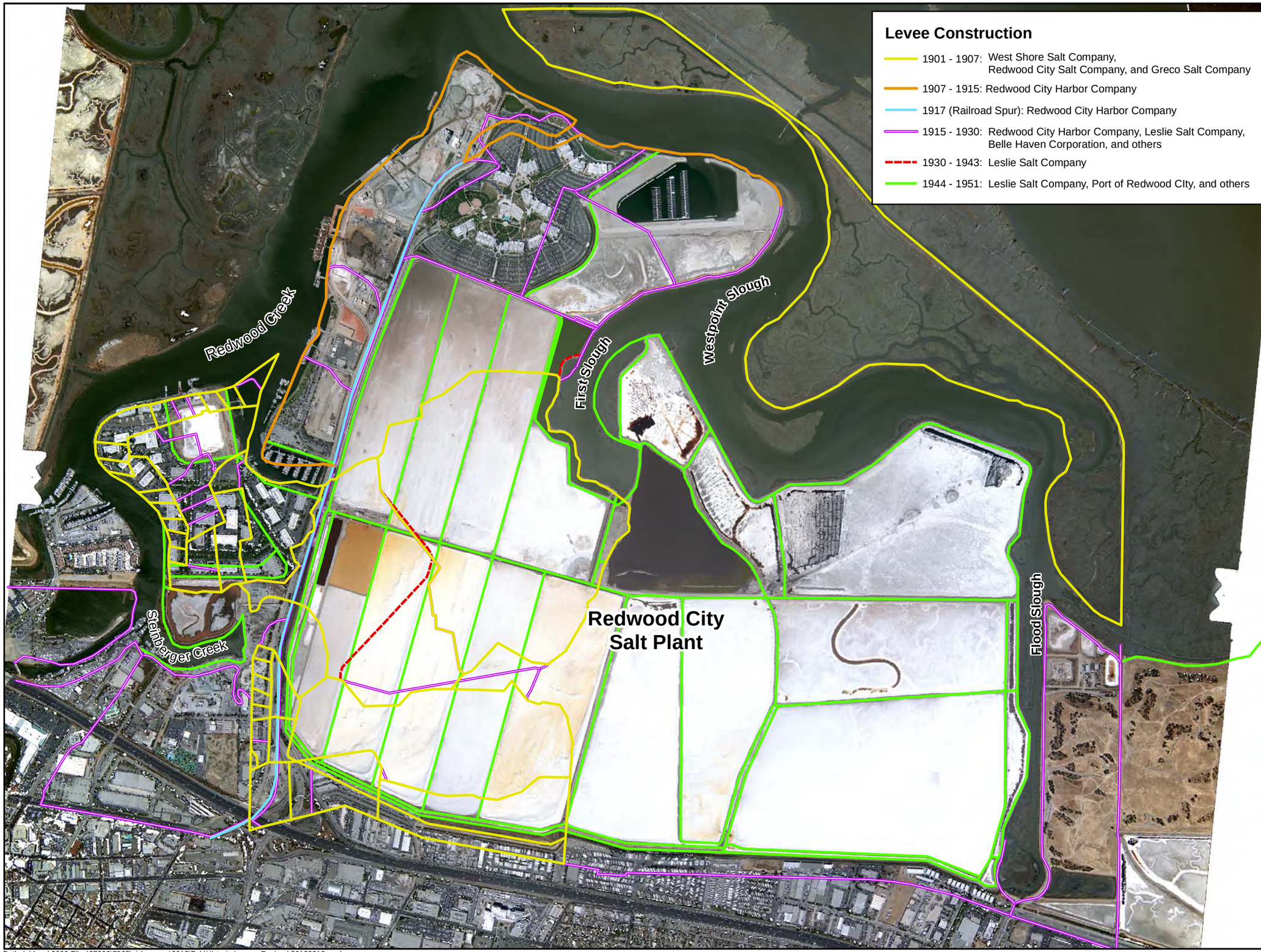
REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 6

WRA, Inc.,
Summary of Historic Levee Construction
(Feb. 2012)



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San Rafael, CA 94901
(415) 454-8868 Phone
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Redwood City, California

Exhibit 6. Summary of Historic Levee Construction (Feb. 2012)

This map is representational only, and not meant for use in detailed design.

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Map By: SG
Map Date: February 2012
Image Date: August 2008
Image Source: Redwood City Industrial Salt Works

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REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 7

Michael Josselyn, Ph.D., WRA, Inc.,
Topographic Sheets Denote Marsh Elevations above Mean High Water
(Feb. 27, 2012)

("Marsh Elevations Report")

Topographic Sheets
Denote Marsh Elevations above Mean High Water

Prepared by:

Michael Josselyn, PhD PWS
WRA, Inc.
2169 E Francisco Blvd Suite G
San Rafael, CA 94901

February 27, 2012

The mapping of shore lands and other features along San Francisco Bay was largely done by the US Coast and Geodetic Survey starting in the mid-1850's and continuing into the 1970's when it was merged into the current National Oceanographic and Atmospheric Administration (NOAA). Surveyors were guided by instructions from the US Government in regards to surveying shore lands, and, in particular, in providing surveyors with guidance on the placement of lines that would delineate the location of Mean High Water (MHW). This report provides documentation on the methodologies used in these surveys and the basis for the conclusion that the marsh areas shown on the US Coast and Geodetic Survey maps were generally located at or above MHW.

Mapping Marsh Areas Early surveyors were essentially mapping the extent of the vegetated marsh plain because it was easily recognized and traversed and also because it provided a basis for determining lands that may be reclaimed for agricultural, industrial, and development uses. All early topographic maps depicted the extent of the marsh plain with a designation consisting of closely spaced parallel lines bounded by a black line to separate it from open water and mudflat areas. The vegetation on this marsh plain was characterized by the presence of saline tolerant vegetation such as pickleweed and cordgrass that provide a distinct demarcation from the unvegetated mudflats along their edges.

In San Francisco Bay, the vegetated marsh "plain" is generally found near the mean higher high water (MHHW) and above the MHW mark[1]. Detailed topographic survey data collected at many tidal marsh plains in San Francisco Bay have shown that the elevation of the marsh plain in its natural state is approximately at MHW. This is due to the fact that, over time, suspended sediment in Bay water settles onto the marsh surface, raising the surface of the marsh plain so that eventually, as the duration of inundation decreases, less sediment is deposited. This equilibrium condition is reached between MHW and MHHW[2]. In addition, according to historic accounts, the tidal marshes resembled "a plain traversed by a branching system of sloughs"[3]. Early topographers such as Ferdinand Westdahl used "the level of

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[1] Mean Higher High Water is the average of the highest high tides whereas Mean High Water is the average of all high tides. For the tidal record in the Bay nearest Redwood City, MHHW is approximately 8.21 feet above Mean Lower Low Water (MLLW) and MHW.

[2] Josselyn, M. 1983. The ecology of San Francisco Bay tidal marshes: a community profile. US Fish and Wildlife Service, Division of Biological Services, Washington, DC. 102pp.

[3] Gilbert, G. K. 1917. Hydraulic-mining debris in the Sierra Nevada. U. S. Geol. Surv. Prof. Paper 105. 154pp.

the salt-marsh in its natural state" as a datum plane for upland elevations[4]. Assuming that the remaining pristine tidal natural marshes we can observe today represent typical conditions in the historic past, the marsh plain as mapped by early surveyors likely ranged within a few inches of Mean Higher High Water[5].

Mapping Mean High Water In 1915, the US Coast and Geodetic Survey[6] indicated to their field staff that "the high-water line, being one of the most important features of the sheet, should be drawn with sufficient strength to make it clearly distinguishable". Furthermore, in 1928, the guidance provided to surveyors was to locate the high water line as carefully as possible and instructions were provided on how to conduct the survey[7]. In maps completed by the US Coast and Geodetic Survey for San Francisco Bay, the outer edge of the marsh was easily accessible on most tides by surveyors and their rodmen and this perimeter was mapped with a solid black line. The solid black line, therefore, separated the marsh areas that were considered above MHW from the mudflats, open bay waters, and sloughs that were considered below MHW.

In 1938, the US Coast and Geodetic Survey[8] provided further guidance to surveyors and stated that:

> "The outer edge of vegetation shall be shown on all plane table and air photographic surveys by a fine solid black line… If it presents a fairly definite edge at mean high water it should be shown with a line."

Interpretation of Maps Used for the 1940 War Department Permit Applying these surveying methods to the drawings accompanying the 1940 War Department permit (Attachment A), establishes that all of the marshland and many of the smaller sloughs on the Redwood City plant site were above mean high water prior to construction of the levees. On the 1940 permit, the underlying map on Sheet 2 is indicated as being "copied from the US Coast and Geodetic Sur. Sheet 4643". I was able to acquire a copy of the original drawing of the USCGS Sheet 4643 from the archives maintained by the National Oceanographic and Atmospheric Administration (NOAA) (Attachment B). This survey was completed by USCGS staff based on aerial photography taken in 1931 and with comparison made to previous T-Sheets prepared by the USCGS.

USGCS Sheet 4643 (Attachment B) shows that the current solar salt production plant site consisted of existing salt evaporating ponds or reclaimed marsh that were previously diked off from the Bay or tidal marsh. In accordance with established surveying practices, the tidal marsh is indicated by closely

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[4] Westdahl, F. 1897. Descriptive report accompanying a resurvey of San Francisco Bay, California, Menlo Park to near Mountain View. U. S. Coast and Geodetic Survey Register No. 2312. 14 pp.

[5] Atwater et. al. 1979. History, Landforms, and Vegetation of the Estuary's Tidal Marshes. In Conomos, J. San Francisco Bay: The Urbanized Estuary. Pacific Division of the AAAS.

[6] US Coast and Geodetic Survey. 1915. General Instructions for Field Work of the U.S. Coast and Geodetic Survey. Special Publication No. 26. Department of Commerce.

[7] US Coast and Geodetic Survey. 1928. Topographic Manual. Special Publication No. 144. Department of Commerce.

[8] US Coast and Geodetic Survey. 1938. Field Engineers Bulletin. Number 12

spaced parallel lines with embedded marsh symbols. There are sloughs both adjacent to and within the tidal marsh. Most of the sloughs are shown with a single line and are depicted with parallel lines running over them and therefore would have been considered indistinguishable from the marsh plain.

First and Westpoint Slough do not have closely-spaced parallel lines containing marsh symbols. A few sloughs internal to the marsh system and tributary to First and Westpoint Slough do not have solid parallel lines through them. These "double lined" sloughs likely did not support vegetation and were mudflats or open water and therefore, considered below mean high water. Finally, where levees were present at that time, they are shown on the USCGS Sheet 4643 as two parallel dotted lines. Each of these features is clearly seen on Greco Island, the land mass in the upper right hand portion of the map above Westpoint Slough.

I have placed an orange line on Attachment C to show the location of the approved dam on First Slough. The dam across First Slough as approved by the Corps, resulted in not only the separation and conversion of First Slough from the bay but also all of the double lined tributaries to First Slough that were internal to the site and subsequently used for salt production.

I have placed a red line on Attachment C to show the location of the levee approved by the War Department along the edge of Westpoint Slough, an unnamed tributary (today's Flood Slough), and separating the upland areas from the tidal marsh along the project's southern boundary. The levee is was shown as thick line in the 1940 permit drawings that was drawn by pen or pencil along the edge of the marsh on the USCGS Sheet 4643 (see Attachment A). This thick line is indicated on the drawing by arrows as the "proposed levee". The approved levee was drawn directly on the edge of the marsh as demarcated on the USCGS T-sheet 4643. The cross-section through the approved levee (Sheet 1, Section B-B), also prepared for the 1940 Permit, illustrated the ground of the "marsh land" as at mean higher high water (MHHW) which is higher than MHW. Furthermore, the approved levee is shown as cutting off two "double-lined sloughs" that connected to Westpoint Slough and one "double-lined slough" that connected to Flood Slough. Both in the language of the 1940 authorization and the attached drawings, the Corps was approving the placement of the levees across these sloughs as the thick line designating the levee crosses the mouth of each of these sloughs.

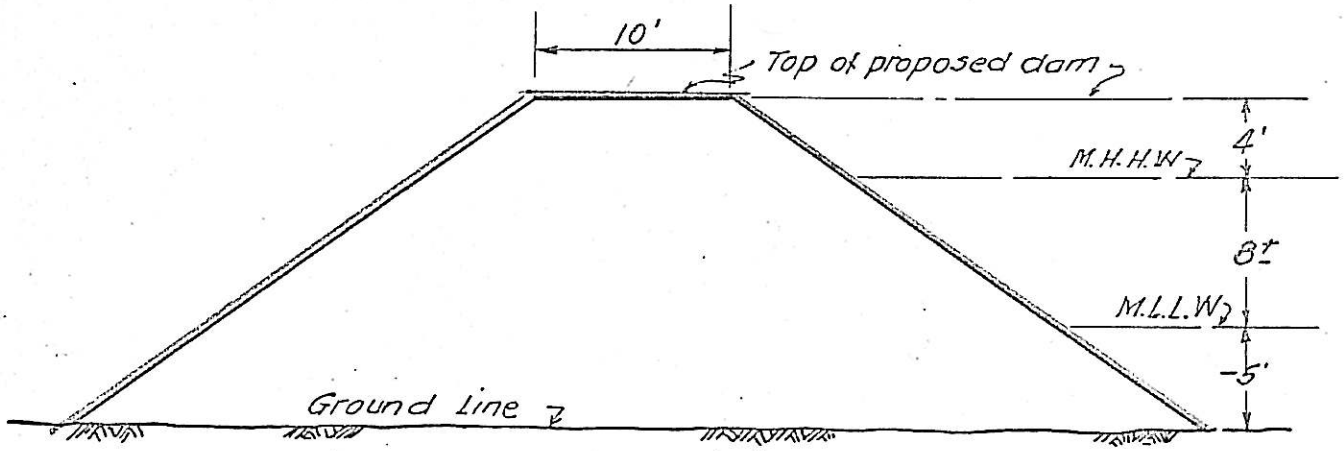
Conclusion Based on (1) the practice of the USCGS surveys to map the edge of marsh vegetation, (2) the fact that historic and present day tidal plains are described as occurring at or above MHW, (3) the Survey office instructions provided guidance to draw the edge of the marsh with a line to depict MHW, and (4) the 1940 permit's designation of the marsh plain as at MHHW, I conclude that the areas depicted with the marsh symbol and with parallel lines was at or above mean high water at the time the War Department issued the Permit in 1940. This would include those areas where the marsh symbols continue over the entire area (e.g. the single-lined sloughs).

Attachment A 1940 War Department Permit
Sheet 1

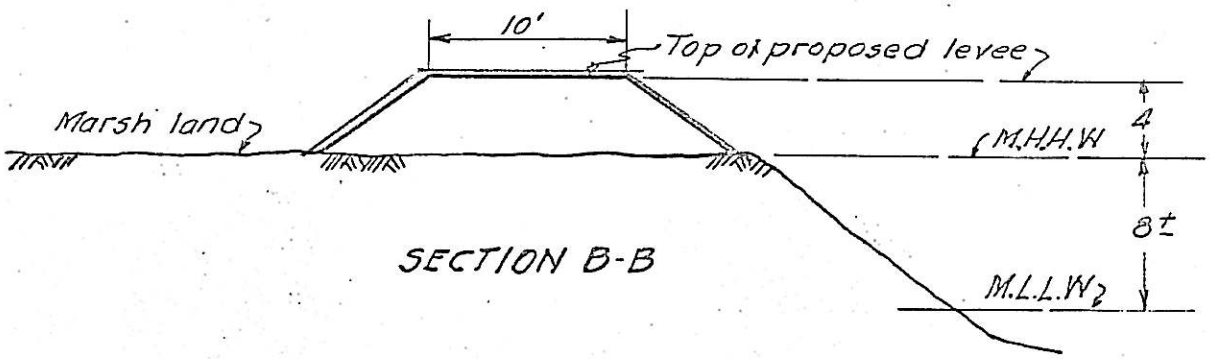
Note

Soundings are in feet and refer to Mean Lower Low Water.

No harbor lines have been established at this locality



SECTION A-A



SECTION B-B

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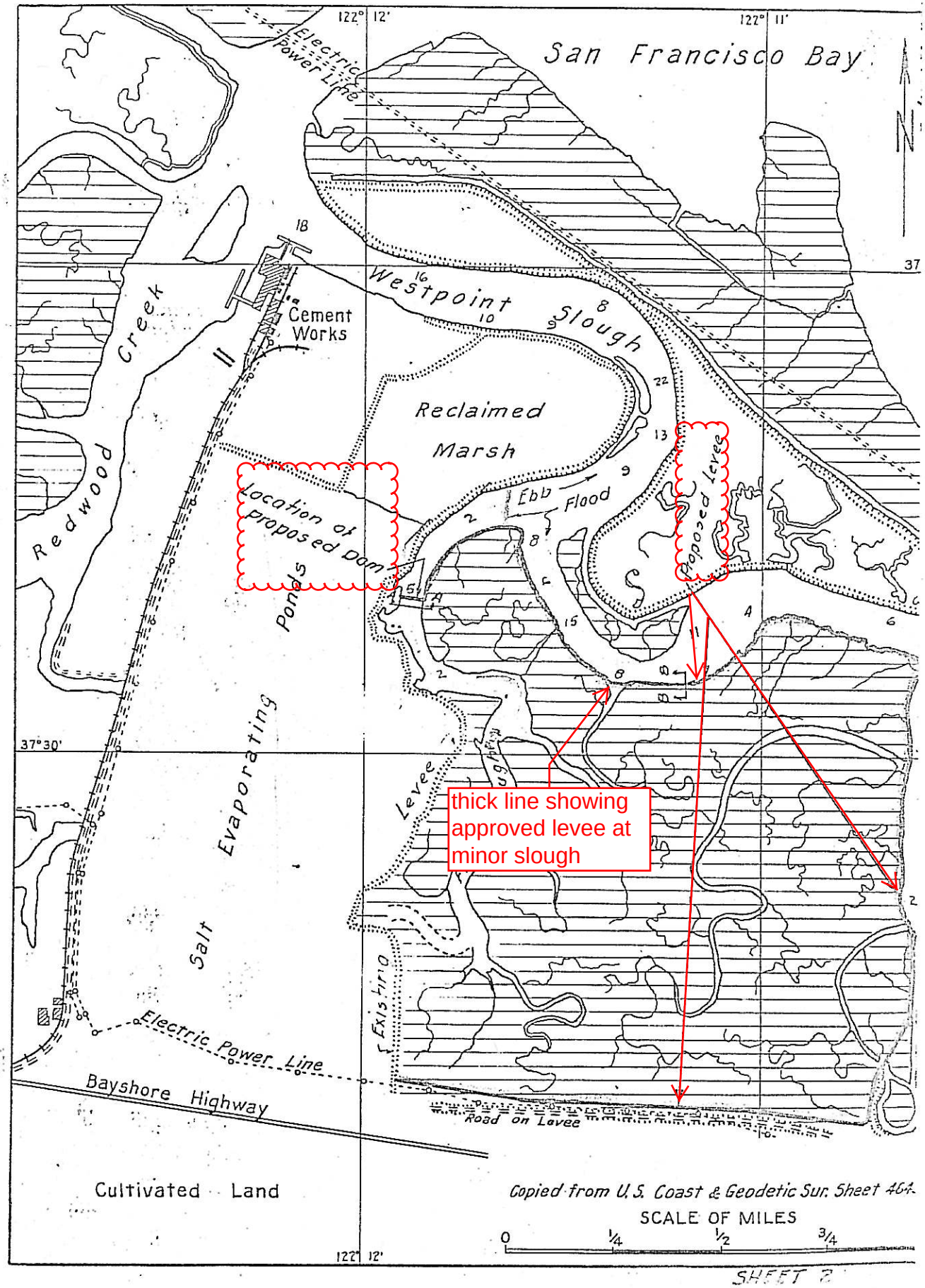
Scale 1 in = 10 Ft.

PROPOSED DAM AND LEVEE
EAST OF REDWOOD CR.
SAN MATEO COUNTY CALIFORNIA

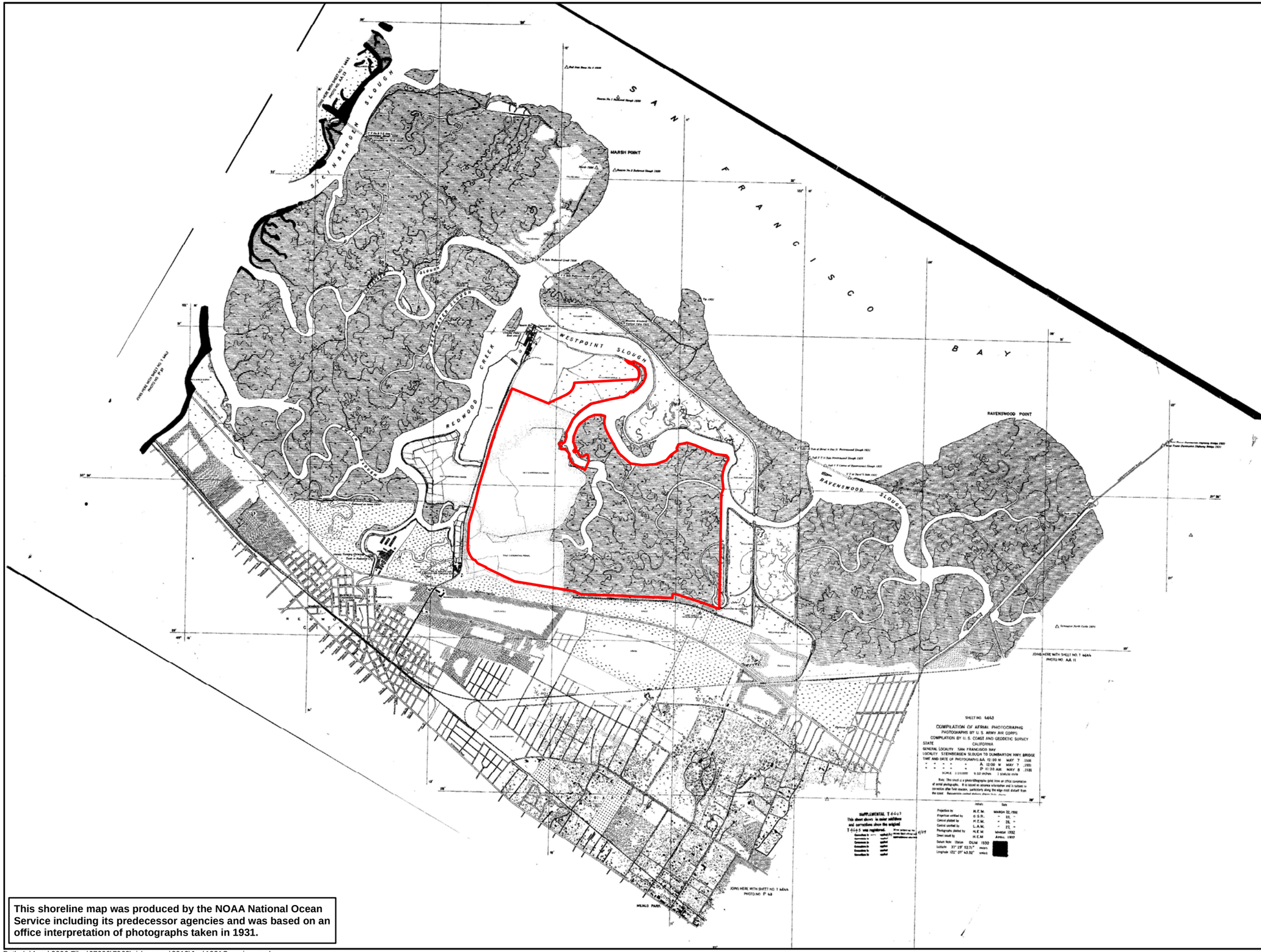
Application by STAUFFER CHEMICAL CO.
Dated Dec. 1939

SHEET 1.

Attachment A-- 1940 War Department Permit
Sheet 2



SHEET 2



This shoreline map was produced by the NOAA National Ocean Service including its predecessor agencies and was based on an office interpretation of photographs taken in 1931.

wra
ENVIRONMENTAL CONSULTANTS
2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

DMB Redwood City Saltworks

Redwood City, California

Attachment B.
USCGS Sheet: 4643
July 1st, 1931

Legend

Salt Plant Site

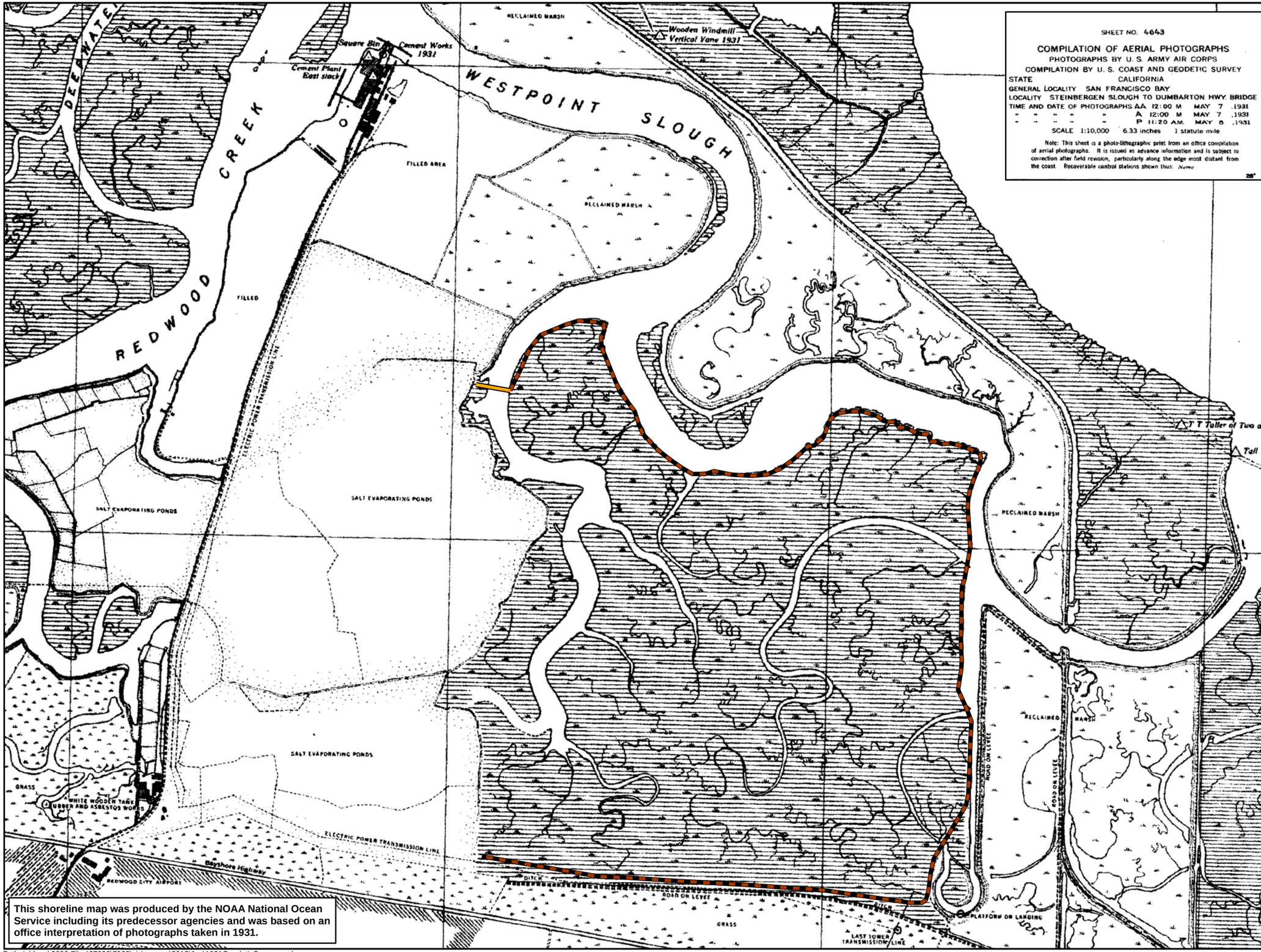
This map is representational only, and not meant for use in detailed design.

N
W E
S

0 1,500 3,000 6,000
Feet

Map By: SG
Base Date: 07/01/31
Base Source: T-Sheet 4643

Path: L:\Acad 2000 Files\07000\7062\gis\arcmap\2012\Jan\1931Overview.mxd



This shoreline map was produced by the NOAA National Ocean Service including its predecessor agencies and was based on an office interpretation of photographs taken in 1931.

Path: L:\Acad 2000 Files\07000\7062\gis\arcmap\2012\Jan\1931GeodeticSurvey.mxd

wra
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2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

DMB Redwood City Saltworks

Redwood City, California

Attachment C.
USCGS Sheet: 4643
July 1st, 1931

Legend

1940 War Department Permit

- Approved Dam
- Approved Levee

This map is representational only, and not meant for use in detailed design.

N
W E
S

0 1,000 2,000
Feet

Map By: SG
Base Date: 07/01/31
Base Source: T-Sheet 4643

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 8

War Department Permit issued to Stauffer Chemical Company (Jan. 16, 1940)

("1940 Permit")

WAR DEPARTMENT

NOTE.—It is to be understood that this instrument does not give any property rights either in real estate or material, or any exclusive privileges; and that it does not authorize any injury to private property or invasion of private rights, or any infringement of Federal, State, or local laws or regulations, nor does it obviate the necessity of obtaining *State assent* to the work authorized. IT MERELY EXPRESSES THE ASSENT OF THE FEDERAL GOVERNMENT SO FAR AS CONCERNS THE PUBLIC RIGHTS OF NAVIGATION. (See *Cummings* v. *Chicago*, 188 U. S., 410.) 3-8300

PERMIT

OFFICE, CHIEF OF ENGINEERS.
~~United States Engineer Office.~~

January 16, 19 40.

Stauffer Chemical Company,
624-638 California Street,
San Francisco, California.

Gentlemen:

Referring to written request dated December 8, 1939, addressed to the District Engineer, U. S. Army, 401 Custom House, San Francisco, Calif., - - - I have to inform you that, ~~upon the recommendation of the Chief of Engineers,~~ ~~and~~ under the provisions of Section 10 of the Act of Congress approved March 3, 1899, entitled "An act making appropriations for the construction, repair, and preservation of certain public works on rivers and harbors, and for other purposes," you are hereby authorized by the Secretary of War, - - - - - - - - - - to construct an earth dyke or levee across and along the bank of First Slough,
(Here describe the proposed structure or work.)
and along the banks of Westpoint Slough and an unnamed tributary thereof, - - -

in Westpoint Slough, -
(Here to be named the river, harbor, or waterway concerned.)

at about 1.0 mile southeasterly of the mouth of Redwood Creek, San Mateo County,
(Here to be named the nearest well-known locality—preferably a town or city—and the distance in miles and tenths from some definite point in the same, stating whether above or below or giving direction by points of compass.)
California, -

in accordance with the plans shown on the drawing attached hereto marked "Proposed
(Or drawings; give file number or other definite identification marks.)
Dam and Levee East of Redwood Cr., San Mateo County, California, Application by Stauffer Chemical Co., Dated Dec. 1939". -
subject to the following conditions:

6

2-2 5

(a) That the work shall be subject to the supervision and approval of the District Engineer, Engineer Department at Large, in charge of the locality, who may temporarily suspend the work at any time, if in his judgment, the interests of navigation so require.

(b) That any material dredged in the prosecution of the work herein authorized shall be removed evenly, and no large refuse piles, ridges across the bed of the waterway, or deep holes that may have a tendency to cause injury to navigable channels or to the banks of the waterway shall be left. If any pipe, wire, or cable hereby authorized is laid in a trench, the formation of permanent ridges across the bed of the waterway shall be avoided and the back filling shall be so done as not to increase the cost of future dredging for navigation. Any material to be deposited or dumped under this authorization, either in the waterway or on shore above high-water mark, shall be deposited or dumped at the locality shown on the drawing hereto attached, and, if so prescribed thereon, within or behind a good and substantial bulkhead or bulkheads, such as will prevent escape of the material into the waterway. ~~If the material is to be deposited in the harbor of New York, or in its adjacent or tributary waters, or in Long Island Sound, a permit therefor must be previously obtained from the Supervisor of New York Harbor, Army Building, New York City.~~

(c) That there shall be no unreasonable interference with navigation by the work herein authorized.

(d) That if inspections or any other operations by the United States are necessary in the interests of navigation, all expenses connected therewith shall be borne by the permittee.

(e) That no attempt shall be made by the permittee or the owner to forbid the full and free use by the public of all navigable waters at or adjacent to the work or structure

(f) That if future operations by the United States require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Secretary of War, it shall cause unreasonable obstruction to the free navigation of said water, the owner will be required, upon due notice from the Secretary of War, to remove or alter the structural work or obstructions caused thereby without expense to the United States, so as to render navigation reasonably free, easy, and unobstructed; and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners shall, without expense to the United States, and to such extent and in such time and manner as the Secretary of War may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable capacity of the watercourse. No claim shall be made against the United States on account of any such removal or alteration.

(g) That the United States shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the Government for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

(h) That if the display of lights and signals on any work hereby authorized is not otherwise provided for by law, such lights and signals as may be prescribed by the ~~Bureau of Lighthouses, Department of Commerce,~~ U. S. Coast Guard shall be installed and maintained by and at the expense of the owner.

(i) That the permittee shall notify the said district engineer at what time the work will be commenced, and as far in advance of the time of commencement as the said district engineer may specify, and shall also notify him promptly, in writing, of the commencement of work, suspension of work, if for a period of more than one week, resumption of work, and its completion.

(j) That if the structure or work herein authorized is not completed on or before the 31st day of December, 1942, this permit, if not previously revoked or specifically extended, shall cease and be null and void.

By authority of the Secretary of War:

(S)

Thomas M. Robins,
Brigadier General,
Acting Chief of Engineers.

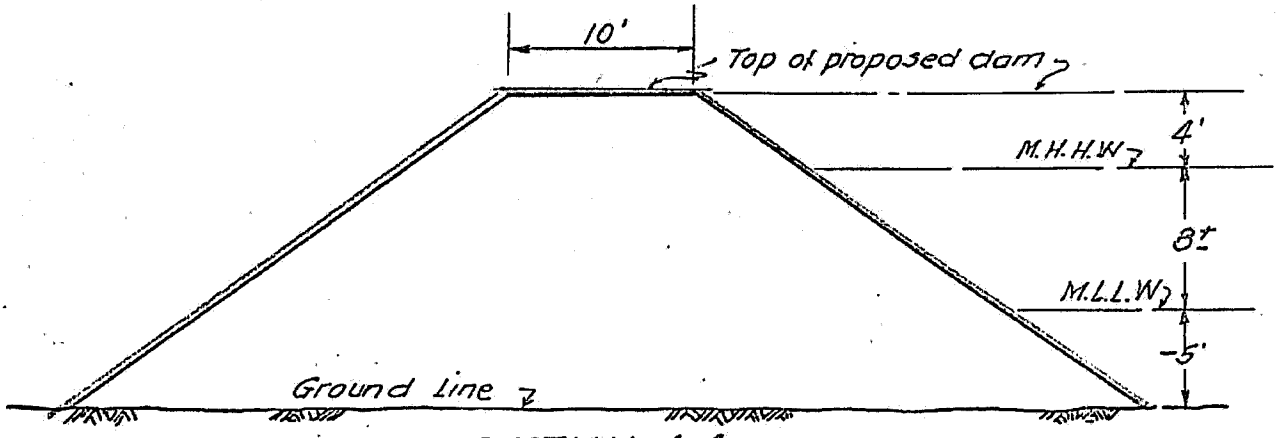
WAR DEPARTMENT
O. C. of E.
Form No. 96
Revised Jan. 6, 1927
8—8360

U. S. GOVERNMENT PRINTING OFFICE

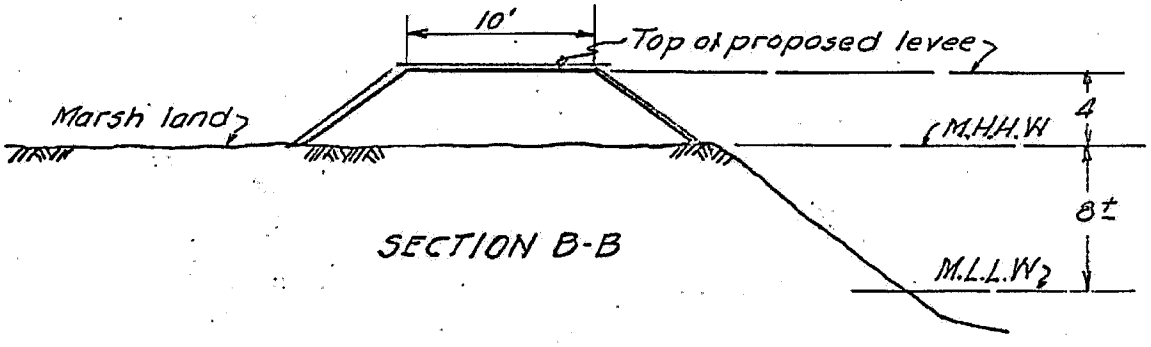
Note

Soundings are in feet and refer to Mean Lower Low Water.

No harbor lines have been established at this locality



SECTION A-A



SECTION B-B

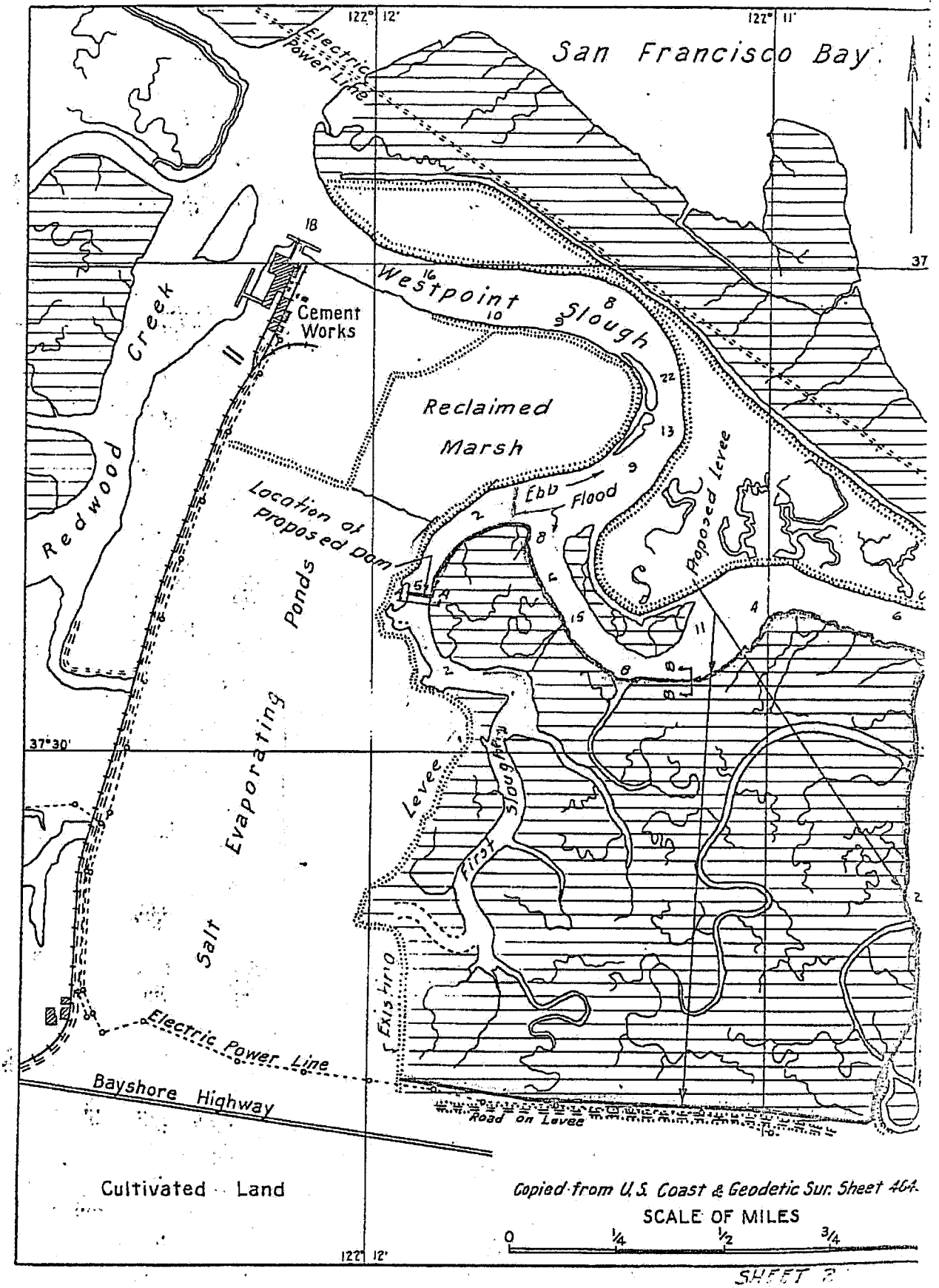
0 1 2

Scale 1 in = 10 ft.

PROPOSED DAM AND LEVEE
EAST OF REDWOOD CR.
SAN MATEO COUNTY CALIFORNIA

Application by STAUFFER CHEMICAL CO.
Dated Dec. 1939

SHEET 1.



Copied from U.S. Coast & Geodetic Sur. Sheet 464

SHEET 2

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 9

Listings of Navigable Waters in the South Pacific Division
(1932, 1958, 1965, 1971)

WAR DEPARTMENT
Office of the Chief of Engineers
Washington, D.C.

7074-65 April 18, 1932.

Subject: Navigable Status of Waterways.

To: The Division Engineer,
Pacific Division,
SAN FRANCISCO, CALIF.

1. Referring to your report of April 1, 1931, on the navigable status of waterways within the South Pacific Division, the conclusions of this office regarding the head of navigation of those listed for the San Francisco District and the Sacramento District are as follows:

Name of Waterway	Head of Navigation
Alameda Creek	Point where stream is crossed by highway bridge in the town of Union City (Alvarado).
Alviso Creek	Point where stream is crossed by tracks of the Southern Pacific Railroad Company at Alviso.
Napa River	Point where stream is crossed by First Street in the town of Napa, Calif.
Navarro River	Riffle in stream located approximately 4 miles upstream from its mouth.
Noyo River	Point on stream 3-1/2 miles upstream from its mouth.
Petaluma Creek	Point where stream is crossed by prolongation of Copeland Street in the town of Petaluma, Calif.

7074 - 65

To the Div. Engr., PACIFIC DIVISION

Name of Waterway	Head of Navigation
* Redwood Creek (Tributary of San Francisco Bay)	Point where stream is crossed by new State highway, 750 feet downstream from East Bradford Street, in the city of Redwood City, Calif.
San Rafael Creek	Point where stream is crossed by Irwin Street, in the town of San Rafael, Calif.
* Sonoma Creek	Point where stream is crossed by tracks of the Southern Pacific Railroad west of Shellville station.
Suisun Creek	Point on stream 450 feet upstream from Sacramento Street in the town of Suisun, Calif.
Feather River.	Point where the river is crossed by fixed bridge at Marysville.
Sacramento River	Point where river is crossed by fixed bridge at Red Bluff.
Old River	Entire length navigable from point of leaving San Joaquin River to junction therewith further downstream.
American River	Navigable to Folsom, 30 miles. (See 113 U.S. 205)
New York Slough	Navigable throughout.
Stockton Channel	Navigable throughout.
Mormon Channel	Navigable throughout.
Fremont Channel and McLeod Lake	Navigable throughout.

To the Div. Engr., PACIFIC DIVISION

2. Your conclusions as to the non-navigability of the following streams within the aforementioned districts are concurred in:

American River (South Fork)
Feather River (South Fork)
Silver Creek
Yuba River
Merced River
Stanislaus River
Piru Creek
Los Angeles River
Sespe Creek

3. The information at hand is insufficient to enable this office to concur in the conclusions of the division engineer regarding the navigable status of the following streams and it is desired that there be set forth in one report a brief description of the general characteristics thereof:

Islais River (Islais Creek)
San Mateo River
Middle River
Bucks Creek

4. It is desired that special reports on the navigable status of the Mokelumne River above the Galt-New Hope Bridge and the San Joaquin River above Hills Ferry be submitted.

5. The division engineer concludes that by virtue of common knowledge and accepted usage ~~that~~ the following sloughs and cuts are navigable:

Dutch Slough
False River
Fisherman Slough
Piper Slough
Taylor Slough
Washington Slough
San Mound Slough

7074 - 65

To the Div. Engr., PACIFIC DIVISION

Holland Cut
Connection Slough
Rock Slough
Latham Slough
Turner Cut
Whiskey Slough
Empire Cut
Indian Slough
Woodward Canal
No. Victoria Canal
Victoria Canal
North Canal
Liberty Island Cut
Italian Slough
Coney Island Cut
Grant Line Canal
Fabian and Bell Canal
Tom Paine Slough
Sugar Factory Canal
Burns Cut-off
Disappointment Slough
Little Connection Slough
Little Potato Slough
White Slough
Honker Cut
Potato Slough
Seven Mile Slough
Three Mile Slough
Georgiana Slough
Sutter Slough
Elkhorn Slough } Sacto Dist
Steamboat Slough }
Cache Slough
Miner Slough
Prospect Slough
Shag Slough
Doughty Cut
Salmon Slough
Crocker Cut
West Cut

7074 - 65

To the Div. Engr., PACIFIC DIVISION

A study of these waterways indicates that some are artificial cuts, probably constructed by private parties, and which should not be regarded as navigable waters of the United States. It is desired that there be submitted in one report a brief description of general characteristics of the waterways listed, whether artificial cuts, constructed by private parties, and the navigable connections of each.

By direction of the Chief of Engineers:

V. L. Peterson,
Lieut. Col., Corps of Engineers.

Notations shown in [redacted] are from State of Calif[redacted] Code.

WATERS CONSIDERED NAVIGABLE BY DECISION OF THE CHIEF OF ENGINEERS

27 January 1958

DISTRICT: SAN FRANCISCO
STATE: CALIFORNIA

WATERWAY		Rivers, Bayous, Creeks Canals and Intra-coastal Waterways: Navigable Length in Miles	Miles Under Authorized Project	Harbors, Bays, Lakes and Sounds: Length of Main Channel or Sailing Course-Miles	Miles Under Authorized Project	REMARKS
Alameda Creek SE	1	6	0	-	-	Head of navigation highway bridge at Alvarado
Alviso Slough SE	1	4	0	-	-	Head of nav. S.P.R.R. bridge at Alviso
Bodega Bay	2	-	-	3.2	3.2	
Crescent City Harbor	2	-	-	Not Applicable	-	
Eel River (navig. limit not given)	1	9	0	-	-	" " " highway bridge at Fernbridge
Eureka Slough NE	1	3	0	-	-	Navigable its entire length
Freshwater Slough NE	1	2	0	-	-	Head of navigation - Pigeon Pt.
Half Moon Bay	2	-	-	Not Applicable	-	Authorized but not constructed
Hookton Slough NE	1	2	0	-	-	Navigable its entire length (Hookton Ldg.)
Humboldt Hbr. & Bay	2	-	-	11.0	11.0	Mileage includes turning basins
Klamath River Northwestern	1	39	0	-	-	Head of navigation - Tully Rapids Shasta Ri
Lower San Francisco Bay	2	-	-	0	4.1	Authorized but not constructed
Mad River NE	1	1.4	0	-	-	Head of navigation -riffle 1.4 mi. upstrea
Mad River Slough NE	1	3	0	-	-	Navigable its entire length
Monterey Harbor	2	-	-	Not Applicable	-	
Moss Landing Harbor	2	-	-	1.0	1.0	From mouth to 60' below W. line of Lawrence St. Nap
Napa River	2	16.2	16.2	-	-	Head of navigation-first St., Napa
Navarro River Northwestern	1	4	0	-	-	" " " -Riffle 4 mi. upstream
Noyo River and Harbor	2	3.0 3.5	1.25	Not Applicable	-	" " " -3½ mi. upstream
Oakland Harbor	2	-	-	12.7	12.7	Mileage includes turning basin
Petaluma Creek (River)	2	18.9	18.9	-	-	Head of navigation-Copeland St., Petaluma
Redwood City Hbr(Red.Cr.)	2	4.8	4.8	-	-	Head of navigation-750' downstream from E. Bradford St.
Richmond Harbor	2	-	-	7.5	7.5	
Russian River	1	5.8	0	-	-	Head of navigation-Duncan Mills Bridge
San Francisco Harbor	2	-	-	76	4.7	
Salt River (Trib. Eel Riv.)	1	4	0	-	-	Head of navigation- Fort Kenyon
San Mateo Slough (Sta. Clara Co.) SE Bay	1	2.2	0	-	-	Navigable through-out its length

1. QUAD SHEET

EXHIBIT 25

WATERS CONSIDERED NAVIGABLE FOR ADMINISTRATIVE PURPOSES BY S.F.DIST. OFFICE

27 January 1958

DISTRICT: SAN FRANCISCO
STATE: CALIFORNIA

WATERWAY	Rivers, Bayous, Creeks Canals and Intra-coastal Waterways: Navigable Length in Miles	Miles Under Authorized Project	Harbors, Bays, Lakes and Sounds: Length of Main Channel or Sailing Course in Miles	Miles Under Authorized Project	REMARKS
Gallinas Creek	2.5				
" " South Fork	2				To approx. 0.5 mi. upstream of PR X-ing
Gray Goose Slough	2				From junction to end of waterway
Guadalupe River	6				To SP RR Crossing
Gualala River	1.5				To McCubbins Landing. Navig. limit not given.
Hook Slough Trib. of Eel	1.5				To end of country road S. of RR.
Indian Slough	4				From McNulty Slough to fork
Jenigan Creek	1				All of waterway
Jewel Slough	1.5				Trib. of Petaluma Creek?
Lagunitas Creek	2				To south shore Port (Restricted By USA)
McClusky Slough	2				(Papermill Cr.)
Morgan Slough	1				Isolated -between Pajaro Riv. & Elkhorn
Mattole River	2				To north and south road - Eel River
Mayfield Slough	2.5				To approach road at Stansbury Creek
McNulty Slough Trib. of Eel	4.5				Extends to dike & includes anchorage
Nare Gojo Slough	3				To Table Bluff Rancheria-N arm Eel River
Noeley Cutoff Trib. of Eel	1		Limit of tide		To SP RR X-ing
Old Vien Slough	2				All of waterway -Eel River to McNulty Sl
Quarry Slough	6				To Sewage Disposal Works
Rio Edna Slough	3.5				To Larkins Landing
Sand Slough	3				Near northerly meander of North Cr.
Napa Slough	9				To Warm Springs Landing
Newark Slough	5				All of waterway
Novato Creek	4				To Jarvis Landing
O'Neill Slough	1				To Blackpoint (Hwy 37) Road To Sweetzers Landing.
Pajaro River	2.5				
Plummer Slough					To Highway crossing
Plummer Creek	2.5				Coyote Hills Sl. thru loop N of small hill
Papermill Creek	2				To Plummer's Landing
					To Hwy. Bridge at Pt. Reyes Station.

Patterson Cr. See Coyote Hills Sl.

WATERS CONSIDERED NAVIGABLE FOR ADMINISTRATIVE PURPOSES BY S.F. DIST. OFFICE

27 January 1958

DISTRICT: SAN FRANCISCO
STATE: CALIFORNIA

WATERWAYS	Rivers, Bayous, Creeks Canals and Intra-coastal Waterways: Navigable Length in Miles	Miles Under Authorized Project	Harbors, Bays, Lakes and Sounds: Length of Main Channel or Sailing Course in Miles	Miles Under Authorized Project	REMARKS
Ravenwood Slough So Bay	2				To highway leading to Dumbarton Br.
Ryan's Slough U.S.	1				To first fork
Salinas River	5			Limit of Tide	To longitude 121°45' W
Salmon Creek Humboldt Co	1				To Highway Bridge-See Bodega Hd. Quad.
Salmon Creek	0.5				See Fortuna Quad. Sheet
San Antonio Creek	3				To westerly slough at end of levee
San Leandro Creek	1				To Hegenberger Road
San Lorenzo Creek	1				SP RR Bridge
San Lorenzo River	1				To junction with Branciforte Creek
Second Napa Slough San Pablo	3				All of waterway
Smith Slough - So Bay	2.5				Steinberger Slough to Redwood Creek
Soquel Creek - Monterey Bay	1				To highway X-ing
South China Slough San Pablo	7				A branch of South Slough
South Slough	6				Connects Napa Slough and Napa River
Steamboat Slough San Pablo	2				From overflow waterway to village of Sol
Steamboat Slough	1.5				With Napa River forms Bull Island
Steinberger Slough So Bay	3				To mouth of Smith Slough
Stemmer Slough	0.5				Extends to Bayshore Highway
Ten Mile River Mouth Ft Bragg	1				To highway bridge
Third Napa Slough San Pablo	2				From 2nd Napa Sl. to overflow waterway
Tolay Creek & N. Br. Petaluma	7				To bridge approx. 0.5 mi. S of McGill
Tomales Bay					
Walker Creek Tomales Bay	2				To highway bridge
Watsonville Slough Mouth	1				To beach road
Westpoint Slough So Bay	4				Redwood Creek to Ravenswood Creek

Notations shown in ink are from State of California Code.

WATERS CONSIDERED NAVIGABLE BY DECISION OF THE CHIEF OF ENGINEERS

27 January 1958

DIST: SAN FRANCISCO
ST: CALIFORNIA

WATERWAY		Rivers, Bayous, Creeks Canals and Intra-coastal Waterways: Navigable Length in Miles	Miles Under Authorized Project	Harbors, Bays, Lakes and Sounds: Length of Main Channel or Sailing Course-Miles	Miles Under Authorized Project	REMARKS
eda Creek SL	1	6	0	-	-	Head of navigation highway bridge at Alvarado
so Slough - SE	1	4	0	-	-	Head of nav. S.P.R.R. bridge at Alviso
ra Bay	2	-	-	3.2	3.2	
ment City Harbor	2	-	-	Not Applicable	-	
River (navig. limit not given)	1	9	0	-	-	" " " highway bridge at Pernbridge
ra Slough - SE	1	3	0	-	-	Navigable its entire length
nmater Slough HE	1	2	0	-	-	Head of navigation - Pigeon Pt.
ssen Bay	2	-	-	Not Applicable	-	Authorized but not constructed
on Slough HE	1	2	0	-	-	Navigable its entire length (Stockton Bdg.)
lct Hbr. & Bay	2	-	-	11.0	11.0	Mileage includes turning basins
th River	1	39	0	-	-	Head of navigation - Tully Rapids Shasta Ri
San Francisco Bay	2	-	-	0	4.1	Authorized but not constructed
iver HE	1	1.4	0	-	-	Head of navigation -riffle 1.4 mi. upstream
iver Slough HE	1	3	0	-	-	Navigable its entire length
rey Harbor	2	-	-	Not Applicable	-	
Landing Harbor	2	-	-	1.0	1.0	From mouth to 60' below W. line of Lawrence St. Nap
River	2	16.2	16.2	-	-	Head of navigation-first St., Napa
re River	1	4	0	-	-	" " " -riffle 4 mi. upstream
River and Harbor	2	3.0 3.5	1.25	Not Applicable	-	" " " -3½ mi. upstream
and Harbor	2	-	-	12.7	12.7	Mileage includes turning basin
ma Creek (River)	2	18.9	18.9	-	-	Head of navigation-Copeland St., Petaluma
od City Hbr(Fed.Cr.)	2	4.8	4.8	-	-	Head of navigation-750' downstream from E. Bradford St.
ood Harbor	2	-	-	7.5	7.5	
ma River	1	5.8	0	-	-	Head of navigation-Duncan Mills Bridge
rancisco Harbor	2	-	-	76	4.7	
iver (Trib. Eel Riv.)	1	4	0	-	-	Head of navigation- Fort Kenyon
teo Slough So. Bay	1	2.2	0	-	-	Navigable through-out its length

1. QUAD SHEET

WATERS CONSIDERED NAVIGABLE BY DECISION OF THE CHIEF OF ENGINEERS

DISTRICT: SAN FRANCISCO STATE: CALIFORNIA	Rivers, Bayous, Creeks Canals and Intra-coastal Waterways		Harbors, Bays, Lakes and Sounds		REMARKS
WATERWAY	Navigable Length in Miles	Miles Under Authorized Project	Length of Main Channel or Sailing Course-Miles	Miles Under Authorized Project	
Bay & Mare Is. Str. 2	-	-	10.9	10.9 Limit of Tide	Head of navigation-Irwin St., San Rafael
Rafael Creek 2	3.6	3.6	-	-	Head of navigation at SP RR X-ing W. of Shellville. (~~Factory Hotel in Town of San Luis~~)
~~[illegible]~~ Creek 1	10.0	-	-	-	
Leandro Bay 1	-	-	2.0	0	~~Head of navigation~~ - Limit of mean tide
th River 1	2.9	0	-	-	

Cal Water

1.5 OCE 15 MAY 1931

1. Approved by OCE after report by D.T.
2. Approved as a navigation project.

District: San Francisco State: California	Rivers, bayous, creeks, canals, intracoastal waterways		Harbors, bays, lakes and sounds		30 June 1965 Remarks
Waterway	Navigable length in miles	Miles under authorized project	Length of main channel or sailing course in miles	Miles under authorized project	
[illegible] Creek	4	0	-	-	Channel straightened and widened by Alameda County Flood Control and Water Conservation District from the mouth to tide gates located at Alvarado. Department of the Army permit 21 March 1955.
Albion River	3	0	-	-	To a point 0.5 mile west of Railroad Gulch
Alviso Slough	4	0	-	-	Head of navigation - SPRR Bridge at Alviso
Belmont Slough	3	0	-	-	To buildings near Bayshore Freeway
Big River	3	0	-	-	To access road at Big Bend near Highway.
Big Sur River	1	0	-	-	To Madena Ranch
Big John Slough	2	0	-	-	Also known as Rush Creek
Bodega Bay	-	-	3	3	
Bolinas Bay and Lagoon	-	-	Not applicable	0	
Carquinez Strait					Included with San Francisco Harbor
Castro Creek	1	0	-	-	Meander of stream from mouth to turning basin
Charleston Slough	1	0	-	-	To dike
Corkscrew Slough	4	0	-	-	Connects Steinbergen Slough and Redwood Creek
Corte Madera Creek	2	0	-	-	To BelAir Bridge at Larkspur
Coyote Creek	6	0	-	-	From Calaveras Pt. to westerly end of Big Loop
Coyote Hill Slough	4	0	-	-	To Newark Blvd. Bridge. Waterway is now part of Alameda Creek Flood Control Project.

EXHIBIT 26

District: San Francisco
State: California

30 June 1965

Waterway	Rivers, bayous, creeks, canals, intracoastal waterways: Navigable Length in Miles	Rivers, bayous, creeks, canals, intracoastal waterways: Miles under authorized project	Harbors, bays, lakes and sounds: Length of main channel or sailing course in miles	Harbors, bays, lakes and sounds: Miles under authorized project	Remarks
Cre[illegible]ent City Harbor	-	-	Not applicable	-	
Bevils Slough	2	0	-	-	Connects South China Slough with Napa Slough. Bridge at midpoint of this waterway
Drakes Bay and Estero	5	0	-	-	
Dutchman Slough	4	0	-	-	Waterway runs between South Slough and Napa River
East Lake Slough	2	0	-	-	Br.Eel River S. Cock Robin Is.
Eel River	8	0	-	-	Head of navigation highway bridge at Fernbridge
Elk River	1	0	-	-	To NWP RR X-ing Vicinity - Humboldt Bay
Elkhorn Slough	6	0	-	-	To SP RR Xing vicinity - Monterey Bay
Estero Americano	3	0	-	-	To Narrows above island - tributary of Bodega Bay
Est[illegible] De San Antonio	1	0	-	-	To Narrows above Island - tributary of Bodega Bay
Eureka Slough (Fay Slough)	3	0	-	-	Navigable its entire length
Freshwater Slough	2	0	-	-	Head of navigation-Pigeon Pt.
Gallinas Creek N. Fork	3	0	-	-	Head of navigation-approx. 0.5 mile upstream of NWP RR Bridge
Gallinas Creek S. Fork	2	0	-	-	From junction to end of waterway
Guadalupe River	6	0	-	-	To dam established under permi (28 Nov 1923)by Continental Salt & Chemical Co. located near what was once known as McCubbins Landing
Gualala River	2	0	-	-	To highway bridge
Halfmoon Bay	-	-	Not applicable	-	

Districts: San Francisco States: California	Rivers, bayous, creeks, canals, in intracoastal waterways		Harbors, bays, lakes and sounds		30 June 1965 Remarks
Waterway	Navigable Length in miles	Miles under authorized project	Length of main channel or sailing course in miles	Miles under authorized project	
Ha[illegible] Slough	2	0	-	-	From McNulty Slough to Fork
Hookton Slough	2	0	-	-	Navigable its entire length (Hookton Landing)
Hudeman Slough	3	0	-	-	Entire waterway
Hufchica Creek	1	0	-	-	Tributary of Hudeman Slough
Humboldt Hbr & Bay	-	-	11.0	11.0	Mileage includes turning basin
Klamath River	39.0	0	-	-	Head of navigation - Foot of Tully Rapids
Lagunitas Creek	2	0	-	-	To highway bridge at Pt. Reyes Station. Waterway also known as Papermill Creek
Lower San Francisco Bay	-	-	0	4	Authorized but not constructed
Mad River	1	0	-	-	Head of navigation - riffle 1.4 miles upstream from mouth
Mad River Slough	3	0	-	-	Navigable its entire length
Mattole River	2	0	-	-	To approach road at Stansberry Creek
Mayfield Slough	1	0	-	-	Extends to dike and includes anchorage
McNulty Slough	5	0	-	-	To Table Bluff Rancheria - north arm of Eel River
Monterey Harbor	-	-	Not applicable	-	
Morgan Slough	1	0	-	-	To north-south road Eel River
Mosley Cut-Off	1	0	-	-	All of waterway - Eel River to McNulty Slough
Moss Landing Harbor 1/	-	-	1	1	
Mt. Eden Slough	4	0	-	-	Near northerly meander of North Creek

1/ Includes the portion of

Districts: San Francisco
States: California

Waterway	Rivers, bayous, creeks, canals, intracoastal waterways: Navigable Length in miles	Rivers, bayous, creeks, canals, intracoastal waterways: Miles under authorized project	Harbors, bays, lakes and sounds: Length of main channel or sailing course in miles	Harbors, bays, lakes and sounds: Miles under authorized project	30 June 1965: Remarks
Mt. [illegible]ew Slough	1	0	-	-	To sewage disposal works
Newry Slough	6	0	-	-	To Larkins Landing
Mud Slough	3	0	-	-	To Warm Springs Landing
Napa River	16	16	-	-	Head of navigation - First St. Napa
Napa Slough	9	0	-	-	All of waterway-Sonoma Creek to Napa River
Navarro River	4	0	-	-	Head of navigation-riffle in stream located 4 miles upstream from its mouth
Newark Slough	5	0	-	-	To Jarvis Landing
Novato Creek	4	0	-	-	To Blackpoint road(Hwy 37)
Noyo River and Harbor	4	1	-	-	Head of navigation(~ 3½ miles upstream from mouth)to Western railroad and navigation Co. bridge)
Oak[illegible]nd Harbor	-	-	13	13	Mileage includes turning basin
Pajaro River	3	0	-	-	To Thurwachter Road Bridge
Papermill Creek					See Lagunitas Creek
Petaluma River	19	19	-	-	Head of navigation-approx.900' above Washington St. Bridge
Plummer Creek	3	0	-	-	To Plummers Landing
Ravenswood Slough	2	0	-	-	To Dumbarton Bridge Approach
Redwood City Harbor (Redwood Creek)	5	5	-	-	Head of navigation -Veterans Blvd. (Old Bayshore Hwy)
Richmond Harbor	-	-	8	8	
Rush Creek					See Blackjohn Slough
Russian River	6	0	-	-	Head of navigation - Duncan Mills Bridge
Ryan's Slough	1	0	-	-	To First Fork
Salinas River	5	0	-	-	To Longitude 121°45' W

District: San Francisco State: California	Rivers, bayous, creeks, canals, intracoastal waterways		Harbors, bays, lakes and sounds		30 June 1965 Remarks
Waterway	Navigable length in miles	Miles under authorized project	Length of main channel or sailing course in miles	Miles under authorized project	
Salmon Creek USC&GS 5502	1	0	-	-	To highway bridge - See Bodega Hd. Quad.
Salmon Creek USC&GS 5832	1	0	-	-	See Fields Landing Quad.
Salt River	4	0	-	-	Head of Navigation - Port Kenyon
San Antonio Creek	3	0	-	-	To westerly slough at end of levee
San Francisco Harbor 2/	-	-	76	11	Mileage includes San Bruno Shoal Channel
San Leandro Bay	-	-	3	0	
San Leandro Creek	1	0	-	-	To Hegenberger Rd. -Realigned by local flood control district
San Lorenzo Creek	1	0	-	-	To SP RR Bridge
San Lorenzo River	2	0	-	-	Waterway is part of Federal flood control project - To state sign route 17 highway bridge
San Mateo Slough(Seal Slough)	2	0	-	-	(This waterway includes a portion of O'Neill Slough) Navigable throughout its length
San Pablo Bay & Mare Is.Str.	-	-	11	11	
San Rafael Creek	4	4	-	-	Head of navigation - Irwin St. San Rafael
Santa Cruz Harbor	-	-	1	1	
Santa Venetia Creek					See Gallinas Creek
Seal Slough					See San Mateo Slough
Second Napa Slough	3	0	-	-	All of waterway
Smith River	2	0	-	-	Head of Navigation - 1½ miles upstream from mouth
Smith Slough	1	0	-	-	Steinbergen Slough to Redwood Creek

District: San Francisco State: California	Rivers, bayous, creeks, canals, intracoastal waterways		Harbors, bays, lakes and sounds		30 June 1965 Remarks
Waterway	Navigable Length in miles	Miles under authorized project	Length of main channel or sailing course in miles	Miles under authorized project	
Sonoma Creek	10	0	-	-	Head of navigation-SP RR Bridge W. of Schellville
Moquel Creek	1	0	-	-	To highway crossing
South China Slough	7	0	-	-	A branch of South Slough
South Slough	6	0	-	-	Connects Napa Slough and Napa River
Steamboat Slough(Sonoma Cr.)	2	0	-	-	From overflow waterway to junction of Schell Slough
Steamboat Slough(Napa River)	1	0	-	-	With Napa River forms Bull Is.
Steinbergen Slough	3	0	-	-	Extends to Bayshore Highway
Steinberger Slough	1	0	-	-	Extends to Harbor Blvd.
Ten Mile River	2	0	-	-	To junction of the S. Fork
Third Napa Slough	2	0	-	-	From Second Napa Slough to overflow waterway
Tolay Cr. & N. Branch	7	0	-	-	To bridge approx. 0.5 mile S. of McGill
Tomales Bay	-	-	All	0	Wholly navigable
Walker Creek	2	0	-	-	To highway bridge
Watsonville Slough	1	0	-	-	To beach road
West Point Slough	4	0	-	-	Redwood Creek to Ravenswood Slough

Note: 2/ Mileage includes San Francisco Airport Channel, Islais Creek Channel, Alcatraz, Presidio, Black Point Shoals and San Bruno Shoals.

District: San Francisco
State: California

2 August 1971

Waterway	Rivers, bayous, creeks, canals, intercoastal waterways: Navigable Length in Miles	Rivers, bayous, creeks, canals, intercoastal waterways: Miles under authorized project	Harbors, bays, lakes and sounds: Length of main channel or sailing course in miles	Harbors, bays, lakes and sounds: Miles under authorized project	Remarks
Alameda Creek	5.6	0	-	-	Channel straightened and widened by Alameda County Flood Control and Water Conservation District from mouth to tide gates located at Alvarado. Departm of Army permit 21 March 1965. Navigable to W. Al Road.
Albion River	3.5	0	-	-	Navigable to point 0.5 mile west of Railroad Quic
Alviso Slough	3.9	0	-	-	Navigable to SPRR bridge at Alviso
Belmont Slough	2.7	0	-	-	Navigable to vicinity of radio tower.
Bear River	0.5	0	-	-	Navigable to point one mile west of Capetown.
Big River	2.9	0	-	-	Navigable to access road at Big Bend near highway
Big Sur River	1.0	0	-	-	Navigable to Madena Ranch.
Black John Slough	2.1	0	-	-	Navigable to junction of Basalt Creek and Rush Cr
Bodega Bay	-	-	3	3	Entire bay navigable to M.H.H.W. line.
Bolinas Bay and Lagoon	-	-	Not applicable	0	Navigable to M.H.H.W. line.
Butano Creek	1.4	0	-	-	Navigable to 0.3 mile north of Pescadero Road.
Carquinez Strait			-		Included with San Francisco Harbor.
Castro Creek	0.9	0	-	-	Navigable to 0.2 mile east of junction with Wild Creek.
Charleston Slough	1.2	0	-	-	Navigable to dike.
Corkscrew Slough	3.9	0	-	-	Navigable for full length. Connects Steinberger with Redwood Creek.
Corte Madera Creek	3.2	0	-	-	Navigable to Marin Jr. College.
Coyote Creek:					
Main Branch	8.9	0	-	-	Navigable to Milpitas sewage disposal plant.
South Branch	2.6	0	-	-	Navigable to 0.5 mile west of sewage disposal p
S.E. Branch	1.9	0	-	-	Navigable to 0.5 mile S.W. of Fremont Airport.
Coyote Hill Slough	4.0	0	-	-	Navigable to Newark Blvd. Bridge.
Crescent City Harbor	-	-	Not applicable	-	Entire harbor navigable to M.H.H.W. line.
Devils Slough	1.7	0	-	-	Navigable in entire length. Connects South Chi with Napa Slough.

EXHIBIT 27

District: San Francisco
State: California

2 August 1971

Waterway	Rivers, bayous, creeks, canals, intercoastal waterways: Navigable length in miles	Rivers, bayous, creeks, canals, intercoastal waterways: Miles under authorized project	Harbors, bays, lakes and sounds: Length of main channel or sailing course in miles	Harbors, bays, lakes and sounds: Miles under authorized project	Remarks
Drakes Bay and Estero	5.0	0	-	-	Navigable in its entirety to M.H.H.W. line.
Dutchman Slough	3.6	0	-	-	Navigable it its entirety. Waterway connects S Slough and Napa River.
East Lake Slough	-	-	-	-	Now part of Eel River.
Eel River	7.1	0	-	-	Navigable to Worswick.
Elk River	1.6	0	-	-	Navigable to Elk River Corners.
Elkhorn Slough	6.9	0	-	-	Navigable to 0.3 mile east of SPRR crossing.
Estero Americano	3.0	0	-	-	Navigable to narrows above island
Estero De San Antonio	1.0	0	-	-	Navigable to narrows above first island. Tribu of Bodega Bay.
Eureka Slough (Fay Slough)	3.6	0	-	-	Navigable in entire length.
Freshwater Slough	1.5	0	-	-	Navigable to Pidgeon Point.
Gallinas Creek N. Fork	2.3	0	-	-	Navigable to 0.4 mile east of Highway 131.
Gallinas Creek S. Fork	1.6	0	-	-	Navigable from fork to end of waterway.
Garcia Creek	2.5	0	-	-	Navigable to Highway 1.
Guadalupe River	2.3	0	-	-	Navigable from Alviso to Campen Avenue.
Guadalupe Slough	5.2	0	-	-	Navigable to 0.9 mile north of Highway 237 Inte
Gualala River	1.2	0	-	-	Navigable to highway bridge.
Half Moon Bay	-	-	Not applicable	-	Navigable in its entirety to M.H.H.W. line.
Hawk Slough	1.6	0	-	-	Navigable to dike.
Hookton Slough	2.3	0	-	-	Navigable in its entirety.
Hudeman Slough	3.1	0	-	-	Navigable in its entirety.
Huichica Creek	0.4	0	-	-	Tributary of Hudeman Slough.
Humboldt Harbor & Bay	-	-	11.0	11.0	Entire waterway navigable to M.H.H.W. line.
Klamath River	39.0	0	-	-	Navigable to the foot of Tulley Rapids.
Lagunitas Creek	1.1	0	-	-	Navigable to 0.5 mile south of fork.
Lower San Francisco Bay	-	-	0	4.0	Entire waterway navigable to M.H.H.W. line. Au but not constructed.*
Mad River	1.4	0	-	-	Navigable to Tyee City.

* Milage includes channel and turning basi beginning about 3/4 mile southeast of Lumberto

District: San Francisco
State: California

2 August 1971

Waterway	Rivers, bayous, creeks, canals, intercoastal waterways: Navigable length in miles	Rivers, bayous, creeks, canals, intercoastal waterways: Miles under authorized project	Harbors, bays, lakes, and sounds: Length of main channel or sailing course in miles	Harbors, bays, lakes, and sounds: Miles under authorized project	Remarks
Mad River Slough	4.5	0	-	-	Navigable in its entirety.
Mattole River	1.8	0	-	-	Navigable to approach road at Stansberry Cr
Mayfield Slough	0.8	0	-	-	Navigable to 0.1 mile west of north-south d
McNulty Slough	2.3	0	-	-	Navigable to Table Bluff Rancheria.
Monterey Harbor	-	-	Not applicable	-	Entire harbor navigable to M.H.H.W. line.
Morgan Slough	1.4	0	-	-	Navigable in its entirety.
Mosley Cut-Off	1.3	0	-	-	Navigable in its entirety.
Moss Landing Harbor 1/	-	-	1.0	1.0	Entire project navigable to M.H.H.W line.
Mt. Eden Creek	3.6	0	-	-	Navigable to point near northerly meander o North Creek.
Mt. View Slough	1.3	0	-	-	Navigable to sewage disposal works.
Mowry Slough	6.0	0	-	-	Navigable to Newark city boundary.
Mud Slough	2.4	0	-	-	Navigable to 0.1 mile west of north-south p
Napa River	15.7	15.7	-	-	Navigable to First Street in Napa.
Napa Slough	8.6	0	-	-	Navigable in its entirety. Connects Sonoma Napa River.
Navarro River	4.0	0	-	-	Navigable to Marsh Gulch.
Newark Slough	4.9	0	-	-	Navigable to Thornton Avenue.
Novato Creek	5.3	0	-	-	Navigable to Northwestern Pacific RR crossi
Noyo River & Harbor	2.9	0.7	-	-	Navigable to section line between Section 8 T18N, R17W.
Oakland Harbor	-	-	13	13	Entire project navigable to M.H.H.W. line.
Pajaro River	3.0	0	-	-	Navigable to sewage disposal plant.
Papermill Creek					See Lagunitas Creek.
Petaluma River	20.5	20.2	-	-	Navigable to Petaluma & Santa Rosa RR bridg
Plummer Creek	2.0	0	-	-	Navigable to point 0.6 mile S.W. of intersec Willow St and Perrin Avenue.
Ravenswood Slough	2.8	0	-	-	Navigable to point 0.1 mile north of intersec SPCR and Willow Road.

Note: 1/ Includes the portion of Moro Cojo Slough up to the approach road to Moss Landing Harbor.

District: San Francisco
State: California

2 August 1971

Waterway	Rivers, bayous, creeks, canals, intercoastal waterways: Navigable length in Miles	Rivers, bayous, creeks, canals, intercoastal waterways: Miles under authorized project	Harbors, bays, lakes and sounds: Length of main channel or sailing course in miles	Harbors, bays, lakes and sounds: Miles under authorized project	Remarks
Redwood City Harbor			-	-	Navigable to Vetrans Blvd. (Old Bayshore Hig
(Redwood Creek)	5	5	8	8	Navigable in its entirety
Richmond Harbor	-	-			See Blackjohn Slough
Rush Creek			-	-	Navigable to point vicinity of Vacation Beac
Russian River	13.6	0	-	-	Navigable to first fork
Ryan's Slough	1.0	0	-	-	Navigable to longitude 121° 45'W.
Salinas River	7.0	0	-	-	Navigable to highway bridge
Salmon Creek USC&GS 5502	0.6	0	-	-	Navigable to point 0.1 mile west of Highway
Salmon Creek USC&GS 5832	1.3	0	-	-	Navigable to Port Kenyon.
Salt River	3.8	0	-	-	Navigable to point 0.3 mile west of North ce Pacific RR bridge.
San Antonio Creek	5.5	0			
San Francisco Harbor 2/	-	-	76	11	Navigable in its entirety to M.H.H.W. line.
San Leandro Bay	-	-	3	0	Navigable in its entirety to M.H.H.W. line.
San Leandro Creek	1.3	0	-	-	Navigable to 98th Street.
San Lorenzo Creek	0.5	0	-	-	Navigable to SPRR bridge.
San Lorenzo River	1.7	0	-	-	Navigable to point 0.4 mile south of Highwa
San Mateo Slough (Seal Slough)	3.9	0	-	-	Navigable throughout its length (includes O' Slough).
San Pablo Bay & Mare Island Strait	-	-	11	11	Waterways are navigable in their entirety t line.
San Rafael Creek	3.6	3.6	-	-	Navigable to Irwin St. Bridge. Includes 2.(accross flats.
Santa Cruz Harbor	2.1	1.1	-	-	Navigable in its entirety to M.H.H.W. line.
Santa Venita Creek					See Gallinas Creek.
Seal Slough					See San Mateo Slough.

Note: 2/ Milage includes San Franc to Airport Channel, Islais Cre Channel, Alcatraz Shoals, Presidio Shoals, Black Point Shoals and San Fr

District: San Francisco
State: California

2 August 1971

Waterway	Rivers, bayous, creeks, canals, intercoastal waterways: Navigable length in miles	Rivers, bayous, creeks, canals, intercoastal waterways: Miles under authorized project	Harbors, bays lakes and sounds: Length of main channel or sailing course in miles	Harbors, bays lakes and sounds: Miles under authorized project	Remarks
Second Napa Slough	3.2	0	-	-	Navigable in its entirety.
Smith River	4.5	0	-	-	Navigable to island near Morrison Creek Juncti
Smith Slough	1.4	0	-	-	Navigable in its entirety. Connects Steinberg Slough to Redwood Creek.
Sonoma Creek	9.4	0	-	-	Navigable to Highway 121.
Sonoyl Creek	0.8	0	-	-	Navigable to Highway 1.
South Chime Slough	6.9	0	-	-	Navigable in its entirety. A branch of South
South Slough	5.7	0	-	-	Navigable in its entirety. Connects Napa Slou Napa River.
Steamboat Slough (Sonoma Cr.)	2.0	0	-	-	Navigable from overflow waterway to junction o Schell Slough.
Steamboat Slough (Napa River)	1.3	0	-	-	Navigable in its entirety. With Napa River fo Bull Island.
Steinberger Slough	3.0	0	-	-	Navigable in its entirety. Extends to Bayshor
Steinberger Slough	0.3	0	-	-	Navigable in its entirety. Extends to vicinit Harbor Blvd.
Ten Mile River	1.5	0	-	-	Navigable to junction of South Fork.
Third Napa Slough	1.9	0	-	-	Navigable from Second Napa Slough to overflow
Tolay Creek & North Branch	7.0	0	-	-	Navigable to bridge approximately 0.5 mile sou McGill.
Tomales Bay	-	-	All	0	Navigable in its entirety to M.H.H.W. line.
Walker Creek	1.7	0	-	-	Navigable to highway bridge.
Watsonville Slough	1.4.	0	-	-	Navigable to vicinity of radio tower. Tributa Pajaro River.
West Point Slough	3.9	0	-	-	Navigable in its entirety. Connects Redwood C with Ravenswood Slough.

APPROXIMATELY 25 % OF THE SAN FRANCISCO BAY IS DIKED TO FORM EVAPORATION PONDS USED TO PRODUCE SALT. PRIOR TO 1971 THE DIKES AND THE PONDS WERE CONSIDERED OUTSIDE THE JURISDICTION OF THE CORPS OF ENGINEERS WITH REGARD TO DEPARTMENT OF THE ARMY PERMITS. AS A RESULT OF EXTREME PUBLIC PRESSURE FROM CONCERNED CITIZENS A RECOMMENDATION WAS SUBMITTED TO OCE BY SPD THAT THESE AREAS BE INCLUDED WITH THE REMAINDER OF SAN FRANCISCO BAY AS NAVIGABLE WATERS. A PUBLIC NOTICE TO THIS EFFECT WAS PUBLISHED ON 11 JUNE 1971. A SUPPLEMENTAL PUBLIC NOTICE WAS ISSUED ON 18 JANUARY 1972 SPECIFICALLY STATING THAT PERMITS ARE REQUIRED FOR ALL WORK IN UNFILLED AREAS SHOREWARD OF THE DIKES WHICH ARE BELOW FORMER MEAN HIGHER HIGH WATER. THE PRESENT INTERPRETATION OF "FORMER MEAN HIGHER HIGH WATER" IS THAT IT CORRESPONDS TO THE PRESENT PLANE OF MEAN HIGHER HIGH WATER. ON 29 MARCH 1972 THE SIERRA CLUB BROUGHT LEGAL ACTION AGAINST LESLIE SALT CO. WITH REGARD TO DIKES PRESENTLY EXISTING ON BAIR ISLAND LOCATED IN SAN FRANCISCO BAY. THE COURT IN ANOTHER CASE DETERMINED THAT THE LEGALITY OF THE CORPS' DEFINITION OF NAVIGABLE WATERS WOULD BE DETERMINED DURING THIS PENDING CASE.

FACSIMILE HEADER SHEET
(ER 103-1-3)

FROM (Name)	OFFICE SYMBOL	TELEPHONE NO.	RELEASER'S SIGNATURE
Wolfe	SPNCO	6-3625	James C. Wolfe
TO (Name)	**OFFICE SYMBOL**	**TELEPHONE NO**	**# PAGES / PRECEDENCE**
Godwin	SPOCO-O	6-3108	3 / PP

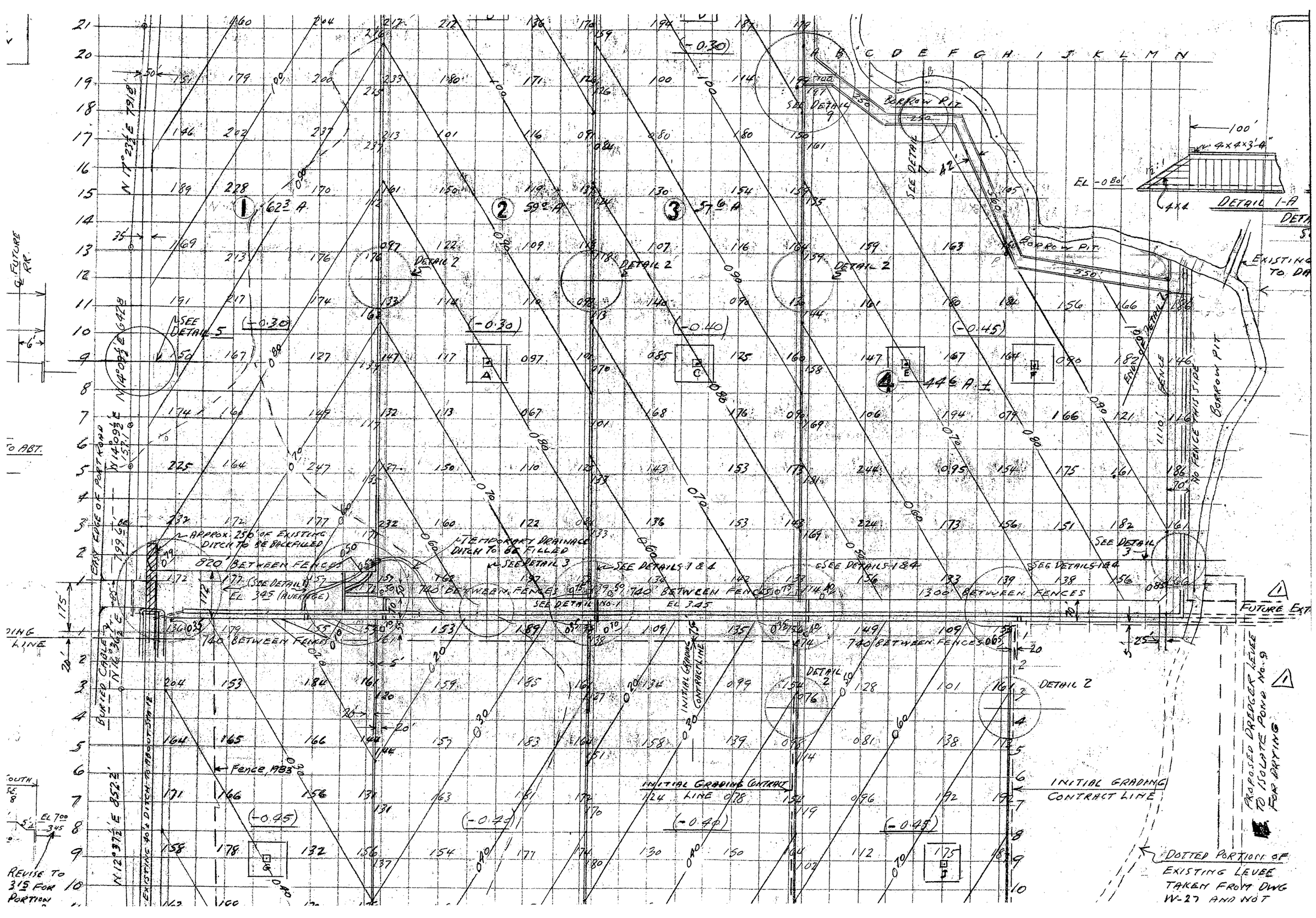
SUBJECT
Diked Areas - SF Bay

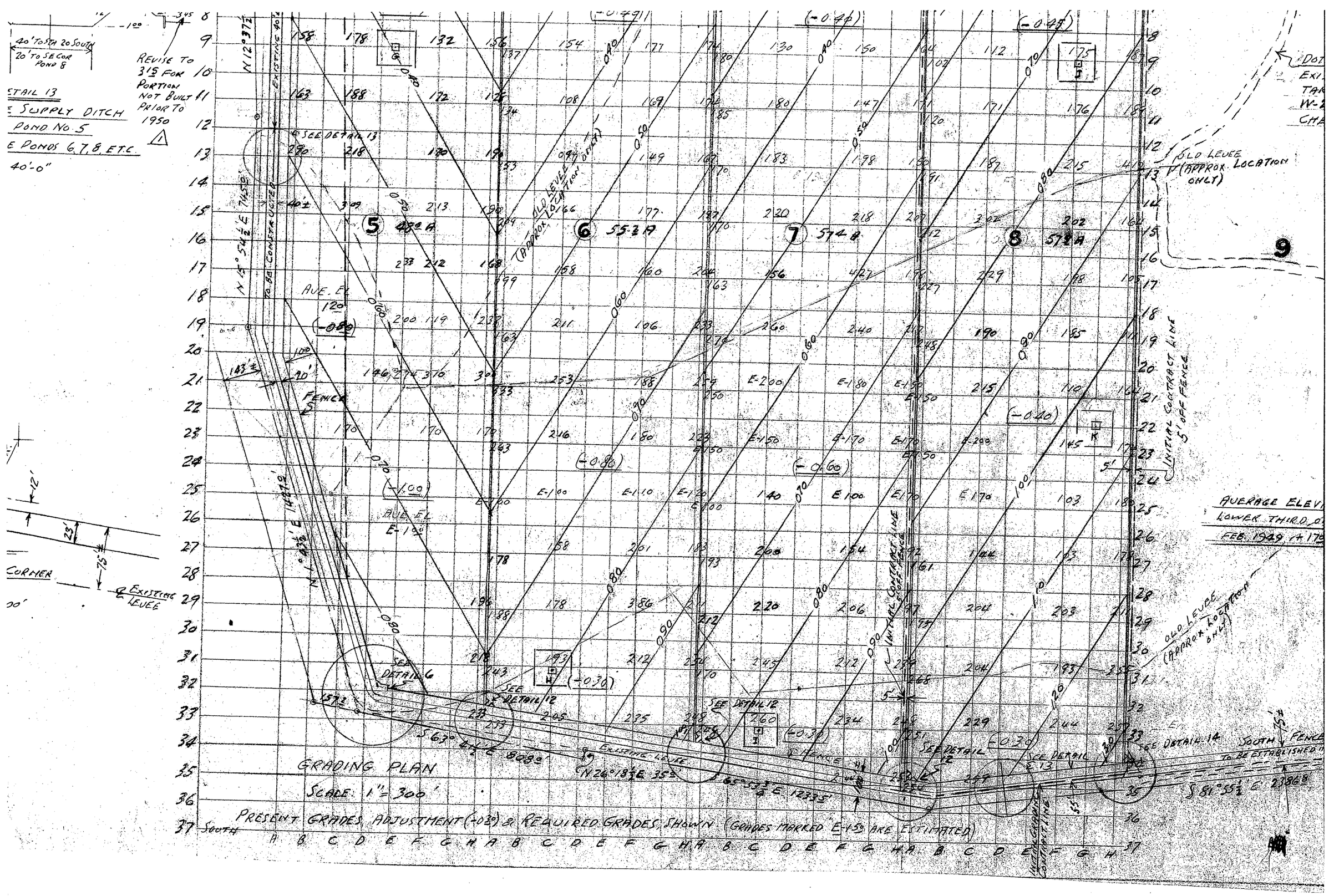
EXHIBIT 11

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 10

Redwood City Salt Plant Crystallizer Grading Drawings 772 (1949)


A B C D E F G H I J K L M N
BORROW PIT
SEE DETAIL 9
SEE DETAIL
DETAIL 1-A
4x4x3'-4"
EL -0.80'
4x4
DETAIL 2
SEE DETAIL 5
(-0.30)
(-0.40)
(-0.45)
1 623 A.
2 592 A.
3 576 A.
4 446 A.±
EXISTING TO DA
END OF DETAIL 2
FENCE
BORROW PIT
NO FENCE THIS SIDE
APPROX. 250' OF EXISTING DITCH TO BE BACKFILLED
820' BETWEEN FENCES
TEMPORARY DRAINAGE DITCH TO BE FILLED
SEE DETAIL 3
SEE DETAILS 1 & 4
SEE DETAILS 1 & 4
SEE DETAILS 1 & 4
740' BETWEEN FENCES
740' BETWEEN FENCES
1300' BETWEEN FENCES
740' BETWEEN FENCES
SEE DETAIL NO. 1
EL 3.45
EL 3.45 (BUCKRIDGE)
SEE DETAIL 4
SEE DETAIL 3
FUTURE EXT
BURIED CABLE
EAST EDGE OF PORTHOUSE
EXISTING 40' DITCH TO ABOUT STATE
Fence, 1983
INITIAL GRADING CONTRACT LINE
INITIAL GRADING CONTRACT LINE
DETAIL 2
PROPOSED DREDGER LEVEE TO ISOLATE POND No. 9 FOR DRYING
DOTTED PORTION OF EXISTING LEVEE TAKEN FROM DWG W-27 AND NOT
REVISE TO 3.5 FOR PORTION
EL 7.00
3.45
TO ABT.
℄ FUTURE RR.
N 17° 23½' E 791.8'
N 14° 09½' E 642.8'
N 14° 09½' E 157.1'
N 12° 37½' E 852.2'
N 17° 34½' E

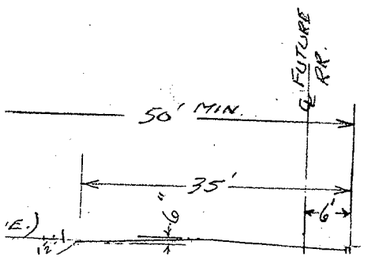

GRADING PLAN
SCALE: 1" = 300'
PRESENT GRADES, ADJUSTMENT (-0.30) & REQUIRED GRADES SHOWN (GRADES MARKED E-153 ARE ESTIMATED)
REVISE TO 315 FOR PORTION NOT BUILT PRIOR TO 1950
40' TO STA 20 SOUTH
20' TO SE COR POND 8
DETAIL 13
E SUPPLY DITCH
POND NO. 5
E PONDS 6, 7, 8, ETC.
40'-0"
CORNER
EXISTING LEVEE
EXISTING 40'
TO BE CONSTRUCTED
SEE DETAIL 13
OLD LEVEE (APPROX. LOCATION ONLY)
INITIAL CONTRACT LINE 5' OFF FENCE
AVE. EL
FENCE
SEE DETAIL 6
SEE DETAIL 12
SEE DETAIL 14
SOUTH FENCE TO BE ESTABLISHED
AVERAGE ELEV
LOWER THIRD OF
FEB. 1949
5
6
7
8
9

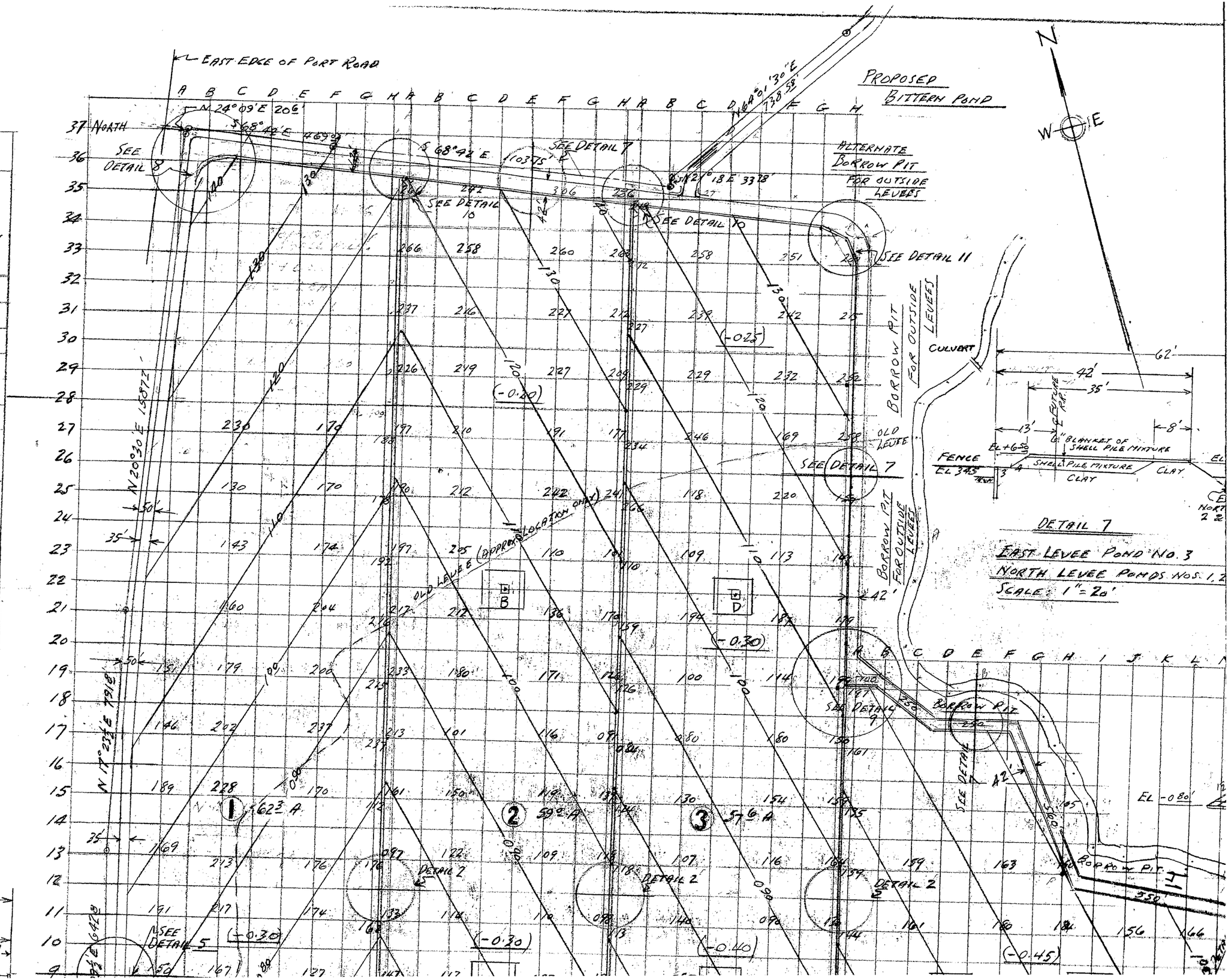
				OLIDATION TESTS 2-18-49
	BY TAMPING (FT)	ALLOWED FOR FOR SHRINKAGE	TOTAL (FT)	ESTIMATED SIZE OF LUMPS AND CONDITION
18	0.12	0.30		10"x10" MOIST
20	0.00	0.20		8 x 8 DRY
3	0.12	0.35		12x12 MOIST
5	0.00	0.25		10 x 10 DRY
5	0.10	0.35		8 x 8 MOIST
5	0.10	0.35		18"x18" MOIST
0	0.15	0.45		12x12 WET
8	0.07	0.25		24x24 MOIST
0	0.05	0.25		18x18 MOIST
7	0.12	0.35		12x12 MOIST
7	0.12	0.30		12x12 MOIST

ISTED OF FILLING CRACKS BY HAND TAMPING, IN AN AREA O SQ.FT. ESTIMATES OF LOATION BY SHRINKAGE, ROM VISUAL EXAMINATION

ING GRADES

ED GRADES





DETAIL 7

EAST LEVEE POND NO. 3

NORTH LEVEE PONDS NOS. 1, 2

SCALE: 1" = 20'

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 11

U.S. Army Corps of Eng'rs, San Francisco District,
Public Notice No. 71-22
(June 11, 1971)

U.S. Army Corps of Eng'rs, San Francisco District
Public Notice No. 71-22(a)
(Jan. 18, 1972)

U. S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
100 McALLISTER STREET
SAN FRANCISCO, CALIFORNIA 94102

PUBLIC NOTICE NO. 71-22

(This Public Notice supersedes Public Notice No. 71-21 dated 4 June 1971)

TO WHOM IT MAY CONCERN:

11 June 1971

This Public Notice is issued to inform all interested parties of the definition of navigable waters of the United States subject to tides in which the permit procedures established by the River & Harbor Act of 1899 are applicable. Henceforth limits of jurisdiction over such waters shall extend to the line on shore reached by the plane of the mean of the higher high water. Within the U. S. Army Engineer District, San Francisco, navigable waters are defined as the tidal waters extending from the Oregon-California border to Point San Martin, including San Francisco Bay and Humboldt Bay and their tributaries. In addition, the Klamath River is considered navigable beyond the tidal range to the foot of Tulley Rapids, a distance of 39.0 miles up-stream from the river mouth. Federal laws prohibit work in such waters unless recommended by the Chief of Engineers and authorized by the Secretary of the Army prior to commencement of the work. The authorization is ordinarily granted in the form of a permit. This notice will supersede the listing of navigable waters within the San Francisco District issued on 10 June 1965.

CHARLES R. ROBERTS
Colonel, CE
District Engineer

U. S. ARMY ENGINEER DISTRICT, SAN FRANCISCO
CORPS OF ENGINEERS
100 McALLISTER STREET
SAN FRANCISCO, CALIFORNIA 94102

PUBLIC NOTICE NO. 71-22(a)

TO WHOM IT MAY CONCERN: 18 January 1972

This is in elaboration of our previous Public Notice No. 71-22, dated 11 June 1971, announcing that the Corps of Engineers is now exercising its regulatory authorities within the area bound by the plane of the mean of the higher high water. Permits are required for all new work in unfilled portions of the interior of diked areas below former mean higher high water.

CHARLES R. ROBERTS
Colonel, CE
District Engineer

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 12

Letter from Lt. General F.J. Clarke to Henry S. Reuss, Chairman, House Subcommittee on Conservation and Natural Resources (Feb. 9, 1972)

DAEN-CWO-R

9 FEB 1972

Honorable Henry S. Reuss
Chairman, Subcommittee on Conservation
and Natural Resources
House of Representatives
Washington, D. C. 20515

Dear Mr. Reuss:

This is in response to your letter inclosing two copies of House Report 91-1433 containing recommendations for the conduct of certain agencies' activities in the San Francisco Bay area. The following responds to the correspondingly numbered recommendations in the report.

1.a. Corps of Engineers public notices involving permit applications for all construction in navigable waters of the San Francisco Bay area are being sent to the U.S. Geological Survey for review and comment. Arrangements have been made with the Secretary's Field Representative, Pacific Southwest Region, Department of the Interior, for inclusion of any comments of the Geological Survey in his consolidated statement to the San Francisco District Engineer and full consideration will be given to such comments. Insofar as Corps construction projects are concerned, coordination with all Federal agencies including the Geological Survey is presently being followed as essential to good planning. The comments of such agencies as the Geological Survey are fully considered in the planning for construction.

b. Applicants for permits for landfills in San Francisco Bay involving the construction of structures thereon will be required to furnish design data necessary for the Corps to make a determination on the structural stability in the event of seismic activity. This determination will follow consultation with the Geological Survey and will be carefully considered in reaching a judgment decision in the public interest. In addition, the Corps has and will continue to make every effort to evaluate the full range of factors which affect the public interest, including economic and environmental impacts as well as the impact on navigation, in determining whether to issue a Department of the Army permit.

SAN FRANCISCO DISTRICT

V.b. All applications for permits or permit renewals for solid waste disposal by filling of San Francisco Bay will be subject to rigid scrutiny to determine whether such filling is in the public interest and, if approved, the permits will be adequately conditioned to prevent damage or destruction to the bay and its shore areas near the perimeter of the fill area. It should be noted that no solid waste disposal fill applications received since the latter part of 1964 have been approved.

VI. The Corps is constantly seeking alternative means to dispose of material dredged from the bay so as to reduce harm to the environment. While we have been unable so far to develop acceptable alternatives to bay disposal, including containment sites, we are making every effort to minimize any possible harm therefrom. The disposal of dredged material is being constantly discussed and closely coordinated with interested Federal and State agencies in order that we may have the benefit of their expertise. Open disposal of other wastes by dumping in the bay is not permitted.

VII. The Council on Environmental Quality report on ocean dumping has been presented to Congress. Based on this study, H.R. 9727 was passed by the House in September 1971, and an amended version was approved by the Senate in November 1971. Since 30 November 1971, these bills have been in House-Senate Conference Committee. One of the purposes of the proposed legislation is to regulate dumping of material in the ocean. In the meantime, the San Francisco District has been performing comprehensive tests on the material presently disposed at sea to determine if pollution exists. Information obtained will determine the District's future course of action. There is no known reasonable alternative to the deposit of Corps or permitted dredge spoil outside the Golden Gate. Open disposal of other wastes within three miles of the coastline is not permitted.

IX and X. The unauthorized structures were constructed in areas considered to be outside the jurisdiction of the Corps of Engineers as it was administratively defined at various times in the past. As you were advised by the 16 June 1971 letter from Under Secretary Beal, the Corps now considers its jurisdiction to extend to the line on the shore reached by the plane of the mean of the higher high waters.

The authorized dams built by the Leslie Salt Company and its predecessors were approved by the State Engineer under authority granted by the State Legislature, by the State Department of Fish and Game, and by the applicable Board of Supervisors of City Council.

9 FEB 1972

Substantial problems are presented by structures over which original jurisdiction was uncertain, and by other structures validly authorized at time of construction but recently subjected to changed concepts of the public interest. We are at present actively studying the problem of continuing evaluation of both types of structures. The substantial practical and legal complexities involved must be resolved before an action program can be adopted.

XII. The Corps of Engineers has placed continuing emphasis on the installation of improved systems to treat waste discharged from vessels for an extended period. In 1960 a centralized macerator chlorinator system was installed on our Hopper Dredge MARKHAM, a large ship operating in the Great Lakes with a crew of 55 personnel. This was the first such installation on a U.S. ship, and represented the state-of-the-art at that time.

During the period of Fiscal Year 1960-Fiscal Year 1969 additional vessels were equipped with macerator chlorinator systems followed by the installation of aerobic systems during the latter portion of this period.

During Fiscal Year 1970 and Fiscal Year 1971 the testing and evaluation of new systems continued. Systems tested include several types of total retention system; and the following systems which discharge an effluent (a) an electrocoagulation system; (b) multiple tube filtration system and (3) systems utilizing activated charcoal columns.

Approximately $1,200,000 was spent during the period of Fiscal Year 1960 - Fiscal Year 1971 for the installation of the most effective sewage treatment systems on Corps vessels.

During Fiscal Year 1972, an expenditure of about $1,000,000 is scheduled for additional installations. By the beginning of the 1972 boating season in the Great Lakes every Corps vessel operating in the Great Lakes will be equipped with total retention sewage treatment systems (no overboard discharge). This is a substantial stride in the direction of water quality improvement and an action in which the Corps takes great pride.

Approximately $2,000,000 is scheduled in Fiscal Year 1973 for the installation of waste treatment systems on all of the remaining Corps vessels. Our testing and evaluation of improved waste treatment systems has been coordinated closely with the Environmental Protection Agency in the past. We intend to continue this relationship with the objective that our vessels will be equipped with the most effective waste treatment systems available.

DAEN-CWO-N

9 FEB 1972

Honorable Henry S. Reuss

XVIII. Public access to the bay will be a consideration of landfill applications and Corps permits will be conditioned whenever possible to insure availability of access."

Sincerely yours,

F. J. CLARKE
Lieutenant General, USA
Chief of Engineers

CF: SPD
San Francisco District

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 13

Statement by Col. Charles R. Roberts, Chief Div. Eng'r,
U.S. Army Corps of Eng'rs, to the Fremont Recreation Commission
(Jan. 20, 1971)

Statement by Col. Charles R. Roberts, chief division engineer,
U.S. Army Corps of Engineers
to
The Fremont Recreation Commission
Jan. 20, 1971

The provision of the Constitution which covers interstate commerce gave the Congress the authority to pass the Rivers and Harbors Act of 1899. It includes a portion which gave the Department of the Army and their agent, the Corps of Engineers, a wide responsibility for controlling structures in navigable waters of the United States. It does not say it would eliminate structures in navigable waters. It said the Corps had the responsibility to determine which structures were feasible and which structures would interfere with navigation, and prohibit those structures. And it also designated in navigable waters of the United States.

What the law does not do is say which are navigable waters of the United States and what are the limits of those navigable waters of the United States. Therefore, to administer this law decisions had to be made--administrative decisions--to eliminate these two questions. And I think this is where the problem arises. In statements relating to the limits of navigable waters some people have interpreted those answers as saying, "Which are the navigable waters?" You must answer the question, "Which are the navigable waters?" first before you can decide where you limit those navigable waters.

Now, recognizing this, the Corps years ago, beginning in the 1910's and 1920's, started to determine how to determine which were the navigable waters in the United States, and to do that

they prepared a list, and that list covered all of the various "rivers, bayous, creeks, canals, intercoastal waterways, harbors, bays, lakes and sounds" in the United States that were considered navigable. Now, along the way there were several court decisions as to what navigable waters were, and the one that seems the most pertinent--and I'll quote only part of this--but the one that would help us in our discussion was the Daniel Ball case in the 20's and that said:

> "Those rivers (in defining navigable waters) must be regarded as public navigable waters in law which are navigable in fact, and they are navigable in fact when they are used, or are capable of being used, in the ordinary condition, as a highway of commerce over which trade and trails are or may be constructed to the customary modes of trade and travel on water."

In other words, what that says is that when we determine what navigable waters are we determine waters that are navigable and are being used for commerce, highways of commerce. To do this, over the years the Corps has prepared a list of all navigable waters of the United States. This is a copy and it's the latest one that was done, which is dated 1965, of the navigable waters in the San Francisco district. It lists the navigable waters in the San Francisco Bay Area, including San Francisco Bay.

It does not list any of the marshlands or any of the minor sloughs in the marshland in the Leslie property area. Therefore those marshlands are not navigable--for administrative purposes--and are not subject to the jurisdiction of the Corps regulations.

I could stop right there but I won't because some of the other things that were included in these articles should be addressed. I'd like to point out that when I say these items are navigable, they are determined navigable purely for admini-

strative purposes and that is administrative purposes of administrative law. It should be understood that this merely represents the views of the Corps of Engineers since the justification of the United States must be determined by judicial action to actually determine what is the jurisdiction of the United States. In other words, if it comes to a discussion over whether a river is actually navigable or not in court, then it in fact must go to court to be determined.

But in the mean time, to administer the law the Corps has determined these navigable waters. Now, then we come to the point of what is the limit of navigation in those waters determined navigable. Now, on the West Coast of the United States--again, purely on an administrative rule--the Corps uses the mean high water mark. On the West Coast we use the mean higher high water mark, but I want to emphasize that this is determined navigation in those waters which are determined to be navigable or used for navigation.

So in this list, if you pick out one of these sloughs it will tell you where that slough is navigable to--so many miles from the headlands--that is, where it leaves the bay, to some point. That point may be a railroad bridge, which it is no longer navigable to that. It may be the Bayshore Freeway--which could have quite a bit--it's not navigable above that. It's navigable to that point, as described in this paper, and then its limits are mean higher high water on this coast.

Now, when we say mean higher high water, we use the Coast and Geodetic Survey maps as a guide for this. Now the lines on these maps are mean high water, but this is only a guide for us

to use to determine. Certainly anything waterward of [illegible] is in navigable waters because it's certainly below mean higher high water. And the point is really if it's not on one of these streams you can use this map to determine that if it's in this it may be in a waterway that's not determined navigable. You can use this map for that. Actually, determining whether that particular structure...or if somebody asks for a permit or if we're doing our investigation and find a structure being built in navigable waters of the United States or not, we don't use that map.

What we do is do an actual survey and people who are applying for the permit must determine the actual location of that structure--in other words, its actual heigthh-by survey. They can go back to the benchmarks to get this and then we have records that show the mean higher high water and it's a case of comparing those two figures to see if it's below that point or not. If it's above that point it's not in the navigable waters. If it's below it, it is in navigable waters and it will require a permit if it is built. I might point out that the newspaper articles that talked about thousands of acres that may come under our jurisdiction I think are extremely optimistic. We know that in the waters marked navigable there are no areas that vary that much between mean high and higher. I wonder if the people that made those statements realized the difference in the South Bay between mean high water and mean higher high water is 7 inches.

Although I suppose in special cases you could have some place where you can do that, I can tell you that for those streams declared navigable the banks are well established and that the

ifference is 7 inches. So there is no thousands of . ..

he Corps has not made any mistakes in reading any maps. People ave misunderstood or taken out of context what we have said in relating to the determination of the limit of navigation. The critical thing is you must go to whether the body source is igable and then determine the limits of navigation, and I can flatly say that through the years the Corps in the San Francisco district is aware of Leslie Salt's operation and in the marshlands they are not navigable and not under our jurisdiction. There are several major sloughs in their areas that are navigable and we have issued seven permits in the last 40 years to Leslie Salt for building of structures in those navigable sloughs.

I thought somebody would ask me something about property rights. The point is that a Corps permit gives no property rights. I would like to emphasize that by reading to you from the permits issued during this last 40 years up till 1965:

> "A permit issued by the Department of the Army does not give any property rights either in real estate or materials, or any exclusive privileges; and does not authorize any injury to private property or invasion of private privileges, or any fragmentation of Federal, State or local laws or regulations, nor does it obviate the necessity to obtain State permits to work in these waters. It merely expresses the assent of the Federal Government, only insofar as concerns the public rights of navigation."

Now, since 1965 that last sentence has been changed, where we talk about just navigation, and that now says:

> "Factors affecting the public interest including, but are not limited to, navigation, fish and wildlife, water quality, economics, conservation, aesthetics, recreation, water supply, flood damage prevention, ecosystems, and, in general, the needs and welfare of the people," will be considered in granting a permit in navigable waters.

End of Formal Statement

District: San Francisco
State: California

30 June 1965

Waterway	Rivers, bayous, creeks, canals, intracoastal waterways: Navigable Length in Miles	Rivers, bayous, creeks, canals, intracoastal waterways: Miles under authorized project	Harbors, bays, lakes and sounds: Length of main channel or sailing course in miles	Harbors, bays, lakes and sounds: Miles under authorized project	Remarks
Cr[illegible]ent City Harbor	-	-	Not applicable	-	
Bevils Slough	2	0	-	-	Connects South China Slough with Napa Slough. Bridge at midpoint of this waterway
Drakes Bay and Estero	5	0	-	-	
Dutchman Slough	4	0	-	-	Waterway runs between South Slough and Napa River
East Lake Slough	2	0	-	-	Br. Eel River S. Cock Robin Is.
Eel River	8	0	-	-	Head of navigation highway bridge at Fernbridge
Elk River	1	0	-	-	To MWP RR X-ing Vicinity - Humboldt Bay
Elkhorn Slough	6	0	-	-	To SP RR Xing vicinity - Monterey Bay
Estero Americano	3	0	-	-	To Narrows above Island - tributary of Bodega Bay
Est[illegible] De San Antonio	1	0	-	-	To Narrows above Island - tributary of Bodega Bay
Eureka Slough (Fay Slough)	3	0	-	-	Navigable its entire length
Freshwater Slough	2	0	-	-	Head of navigation-Pigeon Pt.
Gallinas Creek N. Fork	3	0	-	-	Head of navigation-approx. 0.5 mile upstream of MWP RR Bridge
Gallinas Creek S. Fork	2	0	-	-	From junction to end of waterway
Guadalupe River	6	0	-	-	To dam established under permit (28 Nov 1923) by Continental Salt & Chemical Co. located near what was once known as McCubbins Landing
Gualala River	2	0	-	-	To highway bridge
Halfmoon Bay	-	-	Not applicable	-	

District: San Francisco State: California	Rivers, bayous, creeks, canals, in intracoastal waterways		Harbors, bays, lakes and sounds		30 June 1965 Remarks
Waterway	Navigable Length in miles	Miles under authorized project	Length of main channel or sailing course in miles	Miles under authorized project	
Ha[illegible] Slough	2	0	-	-	From McNulty Slough to Fork
Hookton Slough	2	0	-	-	Navigable its entire length (Hookton Landing)
Hudeman Slough	3	0	-	-	Entire waterway
Hufichica Creek	1	0	-	-	Tributary of Hudeman Slough
Humboldt Hbr & Bay	-	-	11.0	11.0	Mileage includes turning basin
Klamath River	39.0	0	-	-	Head of navigation - Foot of Tully Rapids
Lagunitas Creek	2	0	-	-	To highway bridge at Pt.Reyes Station. Waterway also known as Papermill Creek
Lower San Francisco Bay	-	-	0	4	Authorized but not constructed
Mad River	1	0	-	-	Head of navigation - riffle 1.4 miles upstream from mouth
Mad River Slough	3	0	-	-	Navigable its entire length
Mattole River	2	0	-	-	To approach road at Stansberry Creek
Mayfield Slough	1	0	-	-	Extends to dike and includes anchorage
McNulty Slough	5	0	-	-	To Table Bluff Rancheria - north arm of Eel River
Monterey Harbor	-	-	Not applicable	-	
Morgan Slough	1	0	-	-	To north-south road Eel River
Mosley Cut-Off	1	0	-	-	All of waterway - Eel River to McNulty Slough
Moss Landing Harbor 1/	-	-	1	1	
Mt. Eden Slough	4	0	-	-	Near northerly meander of North Creek

1/ Includes the portion of

District: San Francisco
State: California

Waterway	Rivers, bayous, creeks, canals, intracoastal waterways: Navigable Length in miles	Rivers, bayous, creeks, canals, intracoastal waterways: Miles under authorized project	Harbors, bays, lakes and sounds: Length of main channel or sailing course in miles	Harbors, bays, lakes and sounds: Miles under authorized project	30 June 1965: Remarks
Mt. [illegible]ew Slough	1	0	-	-	To sewage disposal works
Newry Slough	6	0	-	-	To Larkins Landing
Mud Slough	3	0	-	-	To Warm Springs Landing
Napa River	16	16	-	-	Head of navigation - First St. Napa
Napa Slough	9	0	-	-	All of waterway-Sonoma Creek to Napa River
Navarro River	4	0	-	-	Head of navigation-riffle in stream located 4 miles upstream from its mouth
Newark Slough	5	0	-	-	To Jarvis Landing
Novato Creek	4	0	-	-	To Blackpoint road(Hwy 37)
Noyo River and Harbor	4	1	-	-	Head of navigation-3½ miles upstream from mouth)to Western railroad and navigation Co. bridge)
Oak[illegible]nd Harbor	-	-	13	13	Mileage includes turning basin
Pajaro River	3	0	-	-	To Thurwachter Road Bridge
Papermill Creek					See Lagunitas Creek
Petaluma River	19	19	-	-	Head of navigation-approx.500' above Washington St. Bridge
Plummer Creek	3	0	-	-	To Plummers Landing
Ravenswood Slough	2	0	-	-	To Dumbarton Bridge Approach
Redwood City Harbor (Redwood Creek)	5	5	-	-	Head of navigation -Veterans Blvd. (Old Bayshore Hwy)
Richmond Harbor	-	-	8	8	
Rush Creek					See Blackjohn Slough
Russian River	6	0	-	-	Head of navigation - Duncan Mills Bridge
Ryan's Slough	1	0	-	-	To First Fork
Salinas River	5	0	-	-	To Longitude 121°45' W

District: San Francisco

State: California

30 June 1965

Waterway	Rivers, bayous, creeks, canals, intracoastal waterways: Navigable length in miles	Rivers, bayous, creeks, canals, intracoastal waterways: Miles under authorized project	Harbors, bays, lakes and sounds: Length of main channel or sailing course in miles	Harbors, bays, lakes and sounds: Miles under authorized project	Remarks
Salmon Creek USC&GS 5502	1	0	-	-	To highway bridge - See Bodega Hd. Quad.
Salmon Creek USC&GS 5832	1	0	-	-	See Fields Landing Quad.
Salt River	4	0	-	-	Head of Navigation - Port Kenyon
San Antonio Creek	3	0	-	-	To westerly slough at end of levee
San Francisco Harbor 2/	-	-	76	11	Mileage includes San Bruno Shoal Channel
San Leandro Bay	-	-	3	0	
San Leandro Creek	1	0	-	-	To Hegenberger Rd. -Realigned by local flood control district
San Lorenzo Creek	1	0	-	-	To SP RR Bridge
San Lorenzo River	2	0	-	-	Waterway is part of Federal flood control project - To state sign route 17 highway bridge
San Mateo Slough(Seal Slough)	2	0	-	-	(This waterway includes a portion of O'Neill Slough) Navigable throughout its length
San Pablo Bay & Mare Is.Str.	-	-	11	11	
San Rafael Creek	4	4	-	-	Head of navigation - Irwin St. San Rafael
Santa Cruz Harbor	-	-	1	1	
Santa Venetia Creek					See Gallinas Creek
Seal Slough					See San Mateo Slough
Second Napa Slough	3	0	-	-	All of waterway
Smith River	2	0	-	-	Head of Navigation - 1½ miles upstream from mouth
Smith Slough	1	0	-	-	Steinbergen Slough to Redwood Creek

District: San Francisco State: California	Rivers, bayous, creeks, canals, intracoastal waterways		Harbors, bays, lakes and sounds		30 June 1965 Remarks
Waterway	Navigable Length in miles	Miles under authorized project	Length of main channel or sailing course in miles	Miles under authorized project	
Sonoma Creek	10	0	-	-	Head of navigation-SP RR Bridge W. of Schellville
Sequel Creek	1	0	-	-	To highway crossing
South China Slough	7	0	-	-	A branch of South Slough
South Slough	6	0	-	-	Connects Napa Slough and Napa River
Steamboat Slough(Sonoma Cr.)	2	0	-	-	From overflow waterway to junction of Schell Slough
Steamboat Slough(Napa River)	1	0	-	-	With Napa River forms Bull Is.
Steinbergen Slough	3	0	-	-	Extends to Bayshore Highway
Steinberger Slough	1	0	-	-	Extends to Harbor Blvd.
Ten Mile River	2	0	-	-	To junction of the S. Fork
Third Napa Slough	2	0	-	-	From Second Napa Slough to overflow waterway
Tolay Cr. & N. Branch	7	0	-	-	To bridge approx. 0.5 mile S. of McGill
Tomales Bay	-	-	All	0	Wholly navigable
Walker Creek	2	0	-	-	To highway bridge
Watsonville Slough	1	0	-	-	To beach road
West Point Slough	4	0	-	-	Redwood Creek to Ravenswood Slough

Note: 2/ Mileage includes San Francisco Airport Channel, Islais Creek Channel, Alcatraz, Presidio, Black Point Shoals and San Bruno Shoals.

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 14

Secretary of War, Reports on Preliminary Examination and Survey of Redwood City Harbor, Cal., H.R. Doc. No. 65-551 (1917)

65th Congress, 2d Session. | HOUSE OF REPRESENTATIVES. | Document No. 551.

REDWOOD CITY HARBOR, CAL.

LETTER

FROM

THE SECRETARY OF WAR,

TRANSMITTING,

WITH A LETTER FROM THE CHIEF OF ENGINEERS, REPORTS ON PRELIMINARY EXAMINATION AND SURVEY OF REDWOOD CITY HARBOR, CAL.

DECEMBER 11, 1917.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with illustration.

WAR DEPARTMENT,
Washington, December 10, 1917.

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

SIR: I have the honor to transmit herewith a letter from the Chief of Engineers, United States Army, dated the 7th instant, together with copy of a report from Lieut. Col. (now Col.) Thomas H. Rees, Corps of Engineers, dated September 16, 1915, and copy of a report from Col. W. H. Heuer, United States Army (retired), dated June 29, 1917, with map, on a preliminary examination and survey, respectively, of Redwood City Harbor, Cal., made by them in compliance with the provisions of the river and harbor act approved March 4, 1915.

Very respectfully,

NEWTON D. BAKER,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, December 7, 1917.

From: The Chief of Engineers, United States Army.
To: The Secretary of War.
Subject: Preliminary examination and survey of Redwood City Harbor, Cal.

1. There are submitted herewith for transmission to Congress report dated September 16, 1915, by Lieut. Col. (now Col.) Thomas H. Rees, Corps of Engineers, and report dated June 29, 1917, with map

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by Col. W. H. Heuer, United States Army (retired), on preliminary examination and survey, respectively, authorized by the river and harbor act approved March 4, 1915, of Redwood City Harbor, Cal.

2. Redwood Creek empties into San Francisco Bay about 25 miles south of San Francisco. Redwood City is situated on the creek at the head of tidewater, about 5½ miles from the bay. The existing project for improvement of Redwood Creek was adopted by the river and harbor act approved June 25, 1910, and provides for dredging a channel 150 feet wide and 5 feet deep at mean lower low water from San Francisco Bay up to the city dock, about three-fourths mile below Redwood City. The project was completed in 1911. At the junction of Redwood Creek and West Point Slough a company has under construction a terminal project which will provide facilities for coastwise vessels up to that point. Local interests now desire to have a channel 12 feet deep and 150 feet wide with a turning basin at the upper end near the municipal wharf; thence a channel 6 feet deep and 60 feet wide for a length of 5,000 feet to East Bradford Street in Redwood City, with a turning basin at the upper end of this channel. The district engineer, who is also the division engineer, believes that it is impracticable to provide a channel more than 10 feet deep and 100 feet wide at this locality and he accordingly submits an estimate for such a channel up to the Frank Tanning Co.'s landing, amounting to about $8,800, and an estimate for a channel 6 feet deep and 60 feet wide from this point to East Bradford Street, amounting to about $9,000. He is of opinion that the locality is worthy of improvement to the extent covered by these estimates, but he believes that the section above the Frank Tanning Co.'s landing should be maintained at the expense of local interests.

3. These reports have been referred, as required by law, to the Board of Engineers for Rivers and Harbors, and atention is invited to its report herewith, dated November 13, 1917. The board states that the commerce apparently is not increasing and that the channel provided has not been used to its full capacity. It expresses the opinion that it is not advisable at this time for the United States to undertake the improvement of the locality to a greater extent than is authorized by the existing project.

4. After due consideration of the above-mentioned reports, I concur in the views of the Board of Engineers for Rivers and Harbors and therefore report that the improvement by the United States of Redwood City Harbor, Cal., is not deemed advisable at the present time, to a greater extent than is authorized by the existing project.

W. M. Black,
Major General.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS ON SURVEY.

[Second indorsement.]

Board of Engineers for Rivers and Harbors,
November 13, 1917.

To the Chief of Engineers, United States Army:

1. The following is in review of the district engineer's reports authorized by the river and harbor act approved March 4, 1915, on preliminary examination and survey of Redwood City Harbor, Cal.

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2. Redwood City Harbor is formed by the lower part of Redwood Creek, a tidal stream emptying into San Francisco Bay about 25 miles south of San Francisco. Redwood City is situated at the head of tidewater on this creek, 5½ miles above its mouth. The mean range of tide is about 6 feet. The existing project for Redwood Creek, adopted by the river and harbor act of June 25, 1910, provides for a channel 150 feet wide and 5 feet deep at mean lower low water from San Francisco Bay to the city wharf (about three-fourths of a mile below Redwood City) at an estimated cost of $12,000 and $1,500 annually for maintenance. The project has been completed. To June 30, 1916, there had been expended $14,674.89 under the existing project, $46,117.55 under all projects.

3. The commerce of Redwood Creek in 1914 amounted to 26,000 tons, in 1915 to 41,000 tons, and in 1916 to 16,000 tons. It is of a miscellaneous character, the chief items being salt, tanbark, lumber, cement, crude petroleum, and fish. A private concern has expended $120,000 on the reclamation and development of lands at the junction of Redwood and West Point Creeks, about three-fourths of a mile above the bay. It is expected that this enterprise will lead to the establishment of new industries. Local interests have also expended about $9,000 for dredging and for the construction of the municipal wharf.

4. The improvement desired is a channel 12 feet deep at mean lower low water and 150 feet wide from deep water to a turning basin at the municipal wharf; thence a channel 6 feet deep and 60 feet wide for about 5,000 feet to East Bradford Street in Redwood City, with a turning basin at its upper end. The district engineer states that a channel 12 feet deep and 150 feet wide from the bay to the municipal wharf is not practicable because of the danger of caving banks, but he thinks that a channel 10 feet deep at mean lower low water and 100 feet wide will be sufficient for the needs of commerce. The following estimates are submitted:

(*a*) Channel 10 feet deep and 100 feet wide up to Frank Tanning Co.'s Landing adjacent to the municipal wharf	$8,729.10
Maintenance	1,000.00
(*b*) Channel from that point to East Bradford Street, 6 feet deep and about 60 feet wide	8,918.44
Maintenance	2,000.00

The district engineer, who is also the division engineer, is of opinion that the work indicated in estimate (*a*) and the original work in estimate (*b*) are worthy of being done by the Federal Government, but believes that the maintenance in estimate (*b*) should be undertaken by local interests.

5. The information presented did not convince the board that the improvement recommended by the district engineer was advisable. Interested parties were so informed and given an opportunity of submitting statements and arguments to the board. One communication has been received and given attention, and on September 25, 1917, Mr. H. C. Tuchsen, representing the board of trustees and the Chamber of Commerce of Redwood City, appeared before the board and made an oral statement in favor of an extended project.

6. The history of Redwood Creek shows that the work done before 1903 did not result in benefits commensurate with the cost, and that the improvement was discontinued. At a later time, conditions ap-

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pearing more favorable, the present project was adopted and carried to completion in 1911. The commerce reported in 1909 amounted to 57,500 tons, and it was claimed by those interested that on the completion of the existing project there would be a material increase. This expectation has not been realized, as the statistics show that the commerce for the year 1916 was less than for any year but one since 1887, and that in no year since 1909 has the tonnage reached the figure then reported. It appears that the commerce of the creek is not increasing, that the channel provided has not been used to its full capacity, and that any additional improvement beyond the present project, which provides a depth of 5 feet at low water and 11 feet at high water to a wharf three-fourths of a mile distant from the business district of the city, is not warranted by the resulting commercial benefits. The board therefore reports that in its opinion it is not advisable at this time for the United States to undertake the improvement of Redwood City Harbor, Cal., to a greater extent than is authorized by the existing project.

7. In compliance with law, the board reports that there are no questions of terminal facilities, water power, or other subjects which could be coordinated with the project proposed in such manner as to render the improvement advisable in the interests of commerce and navigation.

For the board.

WM. T. ROSSELL,
Brigadier General, United States Army (Retired),
Senior Member Present.

PRELIMINARY EXAMINATION OF REDWOOD CITY HARBOR, CAL.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE, FIRST DISTRICT,
San Francisco, Cal., September 16, 1915.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army.
Subject: Preliminary examination of Redwood City Harbor, Cal.

1. This examination was authorized by the river and harbor act of March 4, 1915, under the item, Redwood City Harbor, Cal., and was assigned to this office by letter from the Chief of Engineers of March 15, 1915, in accordance with which the following report is submitted.

2. The locality was visited and examined in person by Capt. Richard Park, Corps of Engineers, assistant in this office, who interviewed local authorities and interested persons, and who reports as follows:

GEOGRAPHY AND POPULATION.

Redwood Creek is one of the numerous sloughs or creeks that flow through the lowlands and marshes in south San Francisco Bay, emptying into the bay about 18 miles south of San Francisco. Redwood City is situated on this creek, about 3 miles from the bay, at the head of tidewater. In the territory tributary to Redwood Creek are situated the following residential towns: San Mateo, 8 miles north; Belmont, 3 miles north; Menlo Park, 4 miles south; Palo Alto, 5 miles south; Mayfield, 7 miles south; Mountain View, 11 miles south; Woodside and Portola about 4 and 7 miles, respectively, in the hills in a southwesterly direction.

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About 2 miles north of Redwood City the Belmont Hills reach close to the high-water line of the bay, but from that point south the flat country gradually enlarges, extending into the Santa Clara Valley about 12 miles distant. West of Redwood City the hill country develops about 2 miles distant and extends across the peninsula to the Pacific Ocean about 12 miles, the elevation of the divide varying from 1,500 to 2,500 feet, with occasional passes through. Redwood City is a small town of a few thousand inhabitants, and the whole territory considered tributary to Redwood Creek contains perhaps 15,000 people. East of Redwood City there is a strip of marshland 2 miles wide on the average and about 12 miles long, containing about 25 square miles. This strip is much cut up by sloughs, but contains a large area of flats not covered by water, except at extreme flood tides. This section is capable of being reclaimed for agricultural and industrial purposes.

PHYSICAL CHARACTERISTICS OF REDWOOD CREEK.

The portion of Redwood Creek suitable for improvement extends from the bay for a distance slightly under 5½ miles to Redwood City. The creek is a tidal stream up to this point. The tidal section in its natural state would extend some distance beyond the present tidal point, but is here stopped by a dam. The two small streams that converge in Redwood City to form Redwood Creek have their sources in the low hills to the west of Redwood City. Their upper portions are dry during the summer months, and at all times except during heavy rains the flow is small. The tidal section flows some 4 miles in a fairly straight course from the entrance buoy in the bay to a junction with Steinberger Slough, thence 1½ miles in a crooked channel to the city. At a point ½ mile from the mouth of the creek and 2½ miles from the entrance buoy Westpoint Slough joins the creek. Map[1] herewith, marked "Exhibit A," shows the condition of the channels in 1909 just prior to the last improvement. Map[1] Exhibit E shows the condition existing at present in the upper stretches of the creek. The depths through the middle ground, Westpoint Slough, and the entrance from the bay hold about as shown by the 1909 survey. The whole section through which the creek flows as a navigable stream is marshland, above high water most of the time, but completely covered during extreme flood tides except for such portions as have been diked off. The land is covered with marsh grass, and the banks are of the usual character found in sloughs, sometimes steep and overhanging, 3 to 8 feet high, sometimes a gently sloping, muddy beach. The top soil is mud, which gets well dried out during the dry season. A few feet below the surface hard blue clay is found. The outlet of the creek is a well-defined channel from 17 to 25 feet deep from the junction with Westpoint Slough to the entrance buoy. Westpoint Slough has the same characteristics as the creek as to bed and banks, but has a much greater depth of water than the creek has above the junction with the slough, the depths in Westpoint Slough in the channel near the south bank varying from 10 to 24 feet. The controlling depth over the entrance shoals from the bay is 17 feet.

Exhibit A shows a comparison of present depths in certain parts of the channel with those found in 1909, and Exhibit B[1] shows soundings now obtaining over the section that was dredged in 1911. Exhibit E is a complete hydrographic survey made in 1914 of that section. The channel as dredged in 1911 from the city dock downstream was 150 feet wide and 5 feet deep. This chart shows that the banks along this part have sloughed in and the channel depth has been reduced so that at only one place is a depth of 5 feet found; that the lower half averages 4 feet, and that the upper half averages under 4 feet, these depths also only obtaining over a narrow strip, possibly 50 feet wide, of the original channel width; that the depth at the city dock and junction of the sloughs is under 3 feet. In the stretch from the city dock to the city a channel about 60 feet wide was dredged over the first 1,700 feet to a 4-foot depth; for the next 800 feet to a 3-foot depth; and the balance to a 2-foot depth. At mean lower low water the 1914 chart shows for the first 400 feet under 4 feet and over 3 feet; for the next 3,000 feet, under 3 and over 2, except for one or two deeper pockets and one or two shoals; the next 1,000 feet shows under 2 and over 0; the balance, 500 feet, shows bare at mean low water. These depths also obtain only over a narrow channel, possibly 20 feet wide. The dredging was done with a dipper dredge, the excavated material being deposited on the bank back as far as the dredger arm could reach. Complaint was made by the Frank Tanning Co.

[1] Not printed.

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at the time the contract was let that the banks would not support this load. He maintained that the soft mud underlying the turf and supported on a bed of hard clay would be squeezed out by the pressure of the spoil bank, causing banks to slough in and channel to fill up. It is certain that the channel has shoaled. Upon inquiry it was ascertained that the hills back of Redwood City are generally wooded. It is considered unlikely, therefore, that any great amount of eroded material was brought down from the hills into this channel. It is believed that the deposit of the dredged material on the banks of the creek indirectly caused most of the shoaling. The soundings taken this year indicate that the dredged channel is still shoaling, while the depths below that section show in general the same depths as the 1909 survey, but a different location of the channel in many places.

INDUSTRIAL AND COMMERCIAL CONDITIONS.

The influence of Redwood Creek as a navigable stream extends geographically over an area of approximately 100 square miles, from San Mateo on the north to Mountain View on the south, and west to the summit of the divide. Of this area about 50 square miles is flat country and 50 square miles hills. Of the flat country, much of it is occupied by large residential estates, taking up land that was formerly very productive. This section includes such towns as San Mateo, Belmont, Redwood City, Menlo Park, and Palo Alto. The hill country is not highly cultivated on the east side of the Divide—in fact, it is largely wooded—but the west side, which drains naturally toward the railroad at Half Moon Bay, is claimed to be the largest artichoke country in the world. There are several large manufacturing establishments in the vicinity of Redwood Creek. The S. H. Frank Tannery Co. owns a plant covering 36 acres of land, bounded on the north, east, and west by the creek, and extending from the city dock to within a few hundred feet of the town (East Bradford Street). In this section are located the receiving warehouses, the tanning shop, the finishing shops, and the shipping warehouses, in addition to sheds for tan bark and quebracho, power plant, water-supply plant, wharves, and narrow-gauge plant railroad. The tannery wharf proper is located close to the city dock, about 3,000 feet northeast of town. This wharf is equipped with a derrick for unloading quebracho and tan bark. In the channel opposite this wharf there are about 3 feet of water at mean low tide. The tannery company keeps the mud dug out close to the wharf piling to a depth of about 2 feet. The company brings in in its own barge from steam schooners auchored in the deep channel opposite the codfish wharf such bulky supplies as tan bark and quebracho, and imports crude oil by the barge load, pumping into its own tanks at intervals. Most of its smaller supplies coming by water are now brought in by the Peninsula Dock & Warehouse Co., landing at a wharf farther upstream close to the shipping warehouse. Here are also received such smaller quantities of supplies that can not be economically handled by the tannery in barge lots from shipside delivery. The Tacoma Mill Co. owns extensive marshland holdings on the north and west bank of the creek close to town. It imports, mostly by rail, between 2,500,000 and 3,000,000 feet of lumber annually, valued at between $50,000 and $60,000. There are several large salt works situated on Redwood Creek, the Greco Salt Co. and Leslie Salt Co. being the largest of these. They ship annually, via Redwood Creek, large quantities of salt. Besides these concerns there are a number of other industrial plants located in the city. Of these, the Berger Tanning Co., the Horstman Chemical Works, and the Stauffer Chemical Works are the most important.

Most of the Redwood City concerns market their products through distributing stations in San Francisco. Very little of it goes to the east coast or foreign lands, but considerable is shipped by rail to the Middle West States. The raw material for these plants come mostly from west coast markets. The salt is a native product, of course, originating in the salt ponds operated by the salt works. The green hides for the tanneries are largely supplied from the San Francisco Bay district. Quebracho, used in tanning, is imported from South America, and the oak tanbark comes in coasting schooners from coast points north of San Francisco. Magnesite used in the chemical works is quarried in California, but the pure silica, the main ingredient in the manufacture of water glass, is imported from Belgium. The lumber is imported from Puget Sound by the Tacoma Mill Co. The codfish used in the codfish plant comes from Alaska in schooner lots, packed in brine.

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In addition to the industrial concerns already in operation in this section, due credit must be given to a prospective commerce that is reasonably certain to develop. The Redwood City Harbor Co. was organized about a year ago by a group of business men of recognized financial standing primarily for the purpose of providing sites on a deep-water harbor for the various business enterprises owned by themselves, secondarily as a real estate venture with the idea of attracting industries to the harbor, thirdly for the benefit of Redwood City. The backers of the enterprise are as follows: George A. Merrill, W. J. Hotchkiss, E. K. Wood, Charles de DeGuigne, jr., and A. Schilling.

The harbor engineer is Mr. A. W. Pioda. The harbor site contains about 500 acres located at the junction of Westpoint Slough and Redwood Creek. There is submitted herewith a map,[1] Exhibit C, showing the proposed harbor and trackage facilities. The railroad has already been built from a connection with the Southern Pacific at Redwood City to a point within a few hundred feet of Westpoint Slough. The embankment was built of rock excavated from the Stockton Street Tunnel, San Francisco. The outer bank of a levee inclosing this area has already been built. The map shows the proposed layout of docks and slips. The middle ground is shown dredged out. From the chart of the 1909 survey there is shown a low-water channel with a least depth of 18 feet extending from San Francisco Bay to a point nearly one-half mile up Westpoint Slough. Industrial sites have already been purchased on both Westpoint Slough and Redwood Creek above the middle ground. A tannery now located in Redwood City talks some of moving its plant to the harbor. The John Horstman Co., manufacturers of chemicals such as medical salts and water glass, intends to locate with the Harbor Co. if compelled to move out of town, and the Union Oil Co. have taken up the proposition of moving their plant to the harbor. The Redwood City Harbor Co. is apparently a live concern with the best of financial backing. They have already spent $120,000 in improvements, and construction is now under way. There is no present commerce at Redwood City Harbor, the only justification for expenditure by the United States for a local improvement would be on what future commerce can be guaranteed by the Harbor Co. The improvement of the channel from the bay to Redwood City Harbor can have no connection with the improvement of the shallower channel to the city.

PRESENT SYSTEMS OF TRANSPORTATION.

The country tributary to Redwood Creek is served by the Southern Pacific Railroad, by the Peninsula Dock & Warehouse Line, and by numerous auto-truck lines. The coast-route Southern Pacific from San Francisco to Los Angeles runs through the city, and connection is made with eastern points by the Dumbarton cut-off joining the coast route about half a mile below the city. Mr. W. C. Graves operates a daily gasoline boat and barge service between Redwood City and San Francisco. There are also a number of barges, launches, and schooners that make frequent but irregular trips to Redwood Creek. Apparently there is plenty of financial support behind the Peninsula Dock & Warehouse Co., and Mr. Graves is enthusiastic over recent increases in freight carried. He states that when the line was started over a year ago it was hard to get a substantial part of the merchants' trade, but that since the line demonstrated its ability to handle nonperishable freight even on existing unfavorable conditions of channel with a saving of 20 per cent on freight charges to the shipper, the merchants, millmen, and contractors have given him all the freight he could handle. He is planning to add a steam schooner to his line provided he can get channel depths sufficient to float a schooner at low water, thus enabling him to run on regular schedule independent of tide. In case he is able to maintain a regular daily schedule most of the perishable freight will also be carried by his line. He expects to drain an extensive area of the surrounding country, south to Mountain View; west to include the hill products not naturally drained into Half Moon Bay, and the Ocean Shore Railroad; north as far as the Spring Valley holdings. This territory is well served by auto-truck transportation companies. Mr. Graves already has traffic agreements with some of these lines and also operates a line of his own as a feeder to his boat line.

[1] Not printed.

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TERMINAL FACILITIES.

The terminal facilities of the railroad consist of the customary freight shed and side tracks and are ample to handle all railroad freight. The Peninsula Dock & Warehouse Co. owns a considerable area at the head of navigation close to the city on the south bank of the creek. Here are located a substantial warehouse and a wharf which is capable of handling all tonnage coming in and going out of the city at the present time. In case adequate depths are provided it is Mr. Graves intention to construct modern coal bunkers on his property for the economical handling of coal in large lots. The Tacoma Mill Co. has a wharf capable of handling all probable lumber imports. The S. H. Frank Co. has a wharf close to its plant where light draft barges can land cargo, at high tide, and a larger wharf near the city dock equipped with a derrick and connected with the plant by a narrow gauge track. The tannery people keep the channel at their dock dredged to 2 feet at mean low water. Close to this tannery wharf there is located what is known as deep-water wharf or the city dock. This was constructed by the city in the hope that sufficient depths could be maintained up to this point to attract light schooners and launches for both freight and passenger service with San Francisco and other Bay Points. This wharf is now in an unsafe condition, and the causeway which connects it with the city about 3,000 feet distant is in poor repair. There are also several landing places at the various salt ponds on the east bank of the creek, besides a good wharf on Westpoint Slough at the Greco Salt Works, and another at the Gloucester Cod Fishery. All of these plant wharves are in fair repair and capable of handling all business that will pass over them. The city dock, however, is not in good condition and would have to be substantially repaired before it could handle the commerce that a good channel to this point would develop.

COST OF TRANSPORTATION—FREIGHT RATES.

The Peninsula Dock & Warehouse Co. have rates of $1 per ton on first-class freight to and from San Francisco in less than carload lots, and $0.80 per ton in carload lots. Their rates on heavy commodities such as coal, cement, crushed rock, and sand are $1 per ton in less than carload lots, and $0.70 per ton in carload lots. The railroad rates are $0.20 higher on first-class freight, and $0.10 per ton lower on second-class, but the railway company does not load and unload second-class freight such as lumber, coal, crushed rock, etc. The water transportation company loads and unloads at both ends. It probably costs close to $0.15 per ton to load or unload heavy commodities by hand. The railroad rate then must be increased to about $0.90 per ton on second-class freight. This rate is also about 20 per cent higher than the boat rate. Tonnage shipped under present conditions by water from Redwood Creek makes a saving of about $0.20 per ton on all classes of freight.

PRESENT COMMERCE.

The following table furnished by masters of vessels in compliance with law shows the commercial statistics of Redwood Creek:

[Season of navigation: Opened Jan. 1, 1914; closed Dec. 31, 1914.]

Vessel classification.

Class.	American.	Total.	Net registered tonnage.
Registered:			
Gas boats[1]	216	216	6,709
Sailing[1]	85	85	6,746
Unrigged[1]	16	16	1,056
Total	317	317	14,511

[1] Trips.

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Freight traffic.

Article.	Amount in short tons.	Valuation.	Article.	Amount in short tons.	Valuation.
Building materials	416	$3,135	Hay	250	$3,750
Lumber	196	6,664	Machinery	50	7,500
Tan bark	2,691	57,856	Paints, oil, etc	552	16,235
Coal	757	7,570	Potatoes	56	3,060
Crude oil	3,455	17,275	Salt	10,000	65,300
Codfish	4,250	531,250	Shooks	158	3,978
Flour	35	2,030	Quebracho	274	34,470
Fruit	7	315	Hides, leather, glue stock, etc.	2,063	525,371
Furniture	1	200	Miscellaneous	956	153,360
Grain	86	2,580			
General merchandise	108	12,960	Total	26,367	1,457,259
Groceries	6	2,400			

Mr. George A. Merrill, mayor of Redwood City, furnishes the following statistics for the tonnage of Redwood Creek:

	1914	1915
	Tons.	*Tons.*
Alaska Codfish Co	5,000	5,000
Greco Salt Co	6,000	6,000
Peninsula Dock & Warehouse Co	.....	3,000
Frank Tanning Co	7,500	9,000
Leslie Salt Co	5,000	5,000
Tacoma Mill Co	2,320	8,400
Total	25,820	36,400

There is seen to be a difference in Mr. Merrill's report and the compilation from other sources of only 500 tons. The 1914 report included no tonnage carried by the Peninsula Dock & Warehouse Co. inasmuch as their line did little business until January, 1915. It would appear fair to take Mr. Merrill's figures of 36,400 tons for 1915 as showing present commerce by water because the increases are of a definite nature and already made in part.

From data furnished by the Southern Pacific Railroad Co., 147,000 tons of freight were received at Redwood City by rail and 15,000 tons forwarded. Of the materials received 100,000 tons consisted of crushed rock, crude oil, and building materials, all of which could have come in by water with proper channel depths. The tonnage forwarded consists largely of agricultural products. The exports went mostly to San Francisco and the imports came from San Francisco with the exception of the crushed rock and crude oil, which came from quarries and oil depots at other points on the bay.

IMPROVEMENTS DESIRED BY LOCAL INTERESTS.

The improvements desired by the Redwood City Harbor Co., and Redwood City interests are explained in the following extract from correspondence from Mr. Merrill, dated June 15, 1915:

"In compliance with your request of April 10, 1915, and in accordance with suggestions from your office from time to time, I beg to put before you the following information regarding improvements needed in Redwood City Harbor. For the sake of clearness I submit herewith a Coast and Geodetic map of the southern part of San Francisco Bay, to which I have added reference marks by way of explanation. (Exhibit "D" herewith.)[1]

"Letter A marks the practical head of navigation of Redwood Creek, in the business portion of Redwood City. Flood gates are situated at Broadway, but the creek is used very little from Broadway to East Bradford Street, two blocks north, where a lift bridge was installed a few years ago.

[1] Not printed.

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"Point B marks the location of our so-called deep-water wharf, which however is a misnomer, since the water there has a decided tendency to shoal, probably because it is in the eddy of the confluence of two creeks.

"Between points A and B there are located three large industrial plants, viz, Tacoma Milling Co., Peninsula Dock & Warehouse Co., and the Frank Tanning Co., the last being a very large concern, having as many as 40,000 hides in the vats continuously. This portion of the harbor is also used extensively by motor boats and other small craft, plying between this and other ports of Redwood Harbor and points on the San Francisco Bay.

"Point C marks the confluence of Smith Creek and Redwood Creek. Smith Creek being a considerable body of water, Redwood Creek is both wider and deeper from point C outward. The distance from C to D may be regarded as the Redwood Creek portion of the outer harbor, as contrasted with the inner or upper harbor from A to C.

"From D to E is an exceedingly good channel leading from San Francisco Bay into Redwood Harbor. This channel is kept clear because of the presence of the peninsula north of it, this peninsula acting as a barrier by which the outrushing tides are concentrated into a swift current, instead of spreading out into a mud flat, as these creeks have a tendency to do in other parts of the bay.

"The blue-pencil line on the map shows the route of the railroad under construction by the Redwood City Harbor Co., for the purpose of opening up the outer harbor for shipping and manufacturing purposes. The solid blue line indicates the portion already completed, and the blue dotted lines indicate the portions still under construction. This railroad connects with the Southern Pacific main line and traverses the salt ponds of the Leslie Salt Co. Accompanying this communication is blue print (marked "Exhibit C"), showing the manner in which manufacturers and shippers will connect with the line of the Redwood City Harbor Co. Paralleling the railroad for its length is a well-built wagon load.

"Around its property the Redwood City Harbor Co. is also constructing a levee by means of a clamshell dredger. The levee is already completed for a distance of 3 miles, shown by red-ink line from point H to point F on the map, leaving a comparatively short stretch from F to G to be completed. (Information has been received that this work has also been completed.) During the past year the harbor company has spent on its work about $120,000.

"The improvement needed can be separated into two parts:

"(I.) In order that the present business of the upper harbor and of the old established community of Redwood City may be preserved, that portion of the creek from point C to point A should be dredged to a depth equal to that now existing in the outer harbor. It is the prevailing opinion (as voiced in communications from the Frank Tanning Co., and from the Redwood City Board of Trade, submitted herewith) that this work should be done by suction dredger and not by a bucket or clamshell dredger.

"(II.) In order that full benefit may be had from the improvements now being made by the Redwood City Harbor Co., the outer harbor should be dredged from point E to point D on Redwood Creek and from point D to F and F to G on Westpoint Creek. The dredging done in the outer harbor should be to a uniform depth sufficient to accommodate the largest boats used in coastwise lumber traffic. The islands or spits in Redwood Creek near point D should be removed, to provide an area for turning boats 300 feet long. The harbor company, having constructed a retaining levee around its property, would be willing to share the expense of any suction dredging done near its property, to the extent of paying a reasonable amount for material placed on its land.

"There is little to be done on the channel connecting Redwood Harbor with the San Francisco Bay, between points D and E on the map, except at one point just south of beacon No. 1, where the depth is 17 feet. It would seem advisable to do a little dredging at that point, in order that the channel may be of uniform depth, although this improvement is less urgent that those asked for within the harbor itself."

The following two paragraphs show the desires of the S. H. Frank Tanning Co. on methods and extent of dredging:

1. That the creek be dredged with a suction dredger, for if a clam-shell, orange-peel, or other dredger be used the nature of the banks of the creek is

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such as to allow the mud to either slip back after a certain length of time or to exert such a pressure on the banks of the creek that it would force the mud in the middle of the stream to rise up, thus neutralizing most of the benefits which would otherwise accrue.

2. That the Redwood City Creek be dredged from the bridge on East Bradford Street out toward the bay until the appropriation is exhausted, instead of, as in former years, from the bay in toward the city.

EFFECT ON COST OF TRANSPORTATION, SAVINGS.

It is believed that if a suitable channel of sufficient depth to allow steam schooners drawing 12 feet to navigate the creek as far as the city dock had been available, and if the upper channel had been dredged so as to permit a regular schedule regardless of tide, 100,000 tons of crushed rock, building materials, coal, and oil brought in by rail would have been imported by water last year at a saving to the community of 20 cents per ton, or $20,000, and also that 10,000 tons of railroad freight forwarded would have been exported by water at a saving of $2,000. There would also have resulted a marked saving in the cost of transportation of present water-borne commerce, due to competition of rival companies. Sixty-five thousand tons of crushed rock were brought into the city by rail last year for distribution to the various sections of road under construction. The county has just issued a $1,250,000 bond issue for future road improvement. It is probable that the crushed rock tonnage brought into this section will be large for several years. The section is being rapidly built up, and it is probable that import tonnage of building materials and crude oil will continue as they have in the past, say about 35,000 tons by rail. The balance of the railroad imports consisted of coal, hardware, general merchandise, food, and dry goods. Eliminating the crushed rock from the annual commerce there will be an annual import tonnage by rail amounting to 82,000 tons and an annual export tonnage of 15,000 tons. None of this commerce is with foreign lands or the east coast direct. With proper channel facilities there is no reason why 75 per cent of this tonnage should not come in and go out via Redwood Creek, with a net saving to the shipper of 20 cents per ton. Much of the imports, such as crude oil, coal, raw hides, cement, lumber, tan bark, and raw materials for the chemical plants, are particularly suited to water transport. It is believed proper, then, to figure on an increase of 75 per cent of 97,000 tons, or 73,000 tons, in water-borne commerce, upon completion of adequate channel and terminal facilities. The savings to commercial interests would then be $14,600 per annum, and the total water-borne commerce 110,000 tons.

It is not possible to form any estimate of prospective commerce dependent on the development of the Redwood City Harbor Co.'s project. The work on this harbor project has been under way for some time and it is almost certain to attract large industrial concerns. However, it is not seen how tonnage to and from this place can affect the improvement of the upper creek, unless it be adversely, due to diverting commerce from the upper creek to its own docks. Considering the improvement of the creek as a whole, however, it is believed that a large industrial development would follow. All lands adjacent to Redwood Creek are tide lands but can be easily and cheaply reclaimed and made into desirable sites for manufacturing establishments.

OLD PROJECTS.

The first project for improvement was made in 1882 to obtain by dredging a channel 2 to 3 feet deep at low water and 50 to 60 feet in width. The work was completed in 1889 and cost $15,400. As the channel was not self-sustaining, an additional appropriation was made in 1890 of $8,000. In 1896 (Rept. Chief of Engineers, 1897, p. 3349) a survey and report were made in accordance with act of Congress June 3, 1896; $8,400 was appropriated by act of June 13, 1902. A channel 7 feet deep at low water and 100 feet wide was dredged through the middle ground and the creek was deepened to 5 feet in other places. The total amount removed was 72,154 yards at a cost of $8,044.60. In 1909 a preliminary examination and survey were made and a project recommended for dredging a channel 5 feet deep and 150 feet wide as far up as the city dock. This project was completed in July, 1911, at a cost of about $10,000. Local interests dredged the channel from the city dock to

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the head of navigation at East Bradford Street under the supervision of the district officer, a channel 20 to 60 feet wide and 2 to 4 feet deep being excavated.

THE REQUIREMENTS OF COMMERCE.

The least depth of channel that would be of substantial benefit to Redwood City commerce would be 3 feet at mean low water Redwood City to San Francisco. Present commerce will shortly be driven from the creek at the rate it is now shoaling, unless improvements are made. A 3-foot channel to East Bradford Street would not, however, attract all the commerce that this section can offer to suitable water facilities, inasmuch as the boat service would still be at the mercy of the tides. It is believed that an adequate channel should have a 6-foot depth from the bay to East Bradford Street, with a turning basin dredged and maintained at this point to a 12-foot depth so that steam schooners drawing up to 12 feet could navigate the creek on the tide, laying in the basin while discharging or loading. Another solution would be a 12-foot channel 150 feet wide to the city dock, with a turning basin dredged at the city dock. For the development of the Redwood City Harbor Co.'s project it is believed that a channel depth of 18 feet is sufficient. This depth is already provided to the junction with Westpoint Slough, except for a few shoaler points near the bay. There is no reason why the United States should aid in increasing the depths within their harbor, but it is believed that it would be justifiable to dredge an 18-foot channel 300 feet wide from the bay to Westpoint Slough on a suitable guarantee from the Harbor Co. that industrial sites will be built there in the near future.

3. The locality has also been visited by the district engineer officer, who is also division engineer and who concurs in general in the foregoing report of Capt. Park, reserving, however, for the present any expression of opinion as to the exact extent and character of the improvement that would be suitable at this point.

4. It is believed that some modification and enlargement of the existing project is desirable in view of the present and prospective commerce to be benefited thereby, but the extent and nature of the justifiable improvement will depend largely on the cost and upon the measure of local cooperation and these can only be determined by a survey and the preparation of plans and estimates, including Redwood City Harbor from the head of navigation at Redwood City to deep water in San Francisco Bay, and it is therefore recommended that such a survey be authorized.

5. There are no questions of floods, water power, or other related subjects that arise in connection with this improvement.

THOS. H. REES,
Lieutenant Colonel, Corps of Engineers.

[Second indorsement.]

BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
October 12, 1915.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY:

1. For reasons stated herein, the board concurs with the district officer, who is also the division engineer, in recommending a survey in order to determine the extent and advisability of the improvement.

For the board:

FREDERIC V. ABBOT,
Colonel, Corps of Engineers,
Senior Member Present.

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SURVEY OF REDWOOD CITY HARBOR, CAL.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE, FIRST DISTRICT,
San Francisco, Cal., June 29, 1917.

From: The District Engineer Officer.
To: The Chief of Engineers, United States Army.
Subject: Survey of Redwood City Harbor, Cal.

1. The river and harbor act of March 4, 1915, contained the following item under the head of preliminary examinations and surveys: Redwood City Harbor, Cal.

2. Col. Rees made the report on the preliminary examination under date of September 16, 1915, and the survey was made and completed under his direction, but he was relieved of duty in charge of this district before he was able to make his report on the survey. This survey was completed in November, 1915. The map of the survey, in three sheets,[1] is herewith, and it includes the revised depths and widths to July, 1916, made over the area dredged by the Redwood City Harbor Improvement Co. since the completion of the 1915 survey.

3. The physical features of this locality were given in considerable detail in the preliminary examination report. Redwood City Harbor is a new name for this locality, and it is understood to apply to the upper part of Redwood Creek which has been under improvement by the Government for some 35 years. This creek is a tidal stream, with a length of about 5½ miles to the head of the tidal reach. It empties into San Francisco Bay, about 25 miles south of the city of San Francisco. The survey map herewith shows depths of about 16 feet at mean lower low water, and ample widths of channel from San Francisco Bay up to the junction of Redwood Creek with Steinberger Slough (about 1½ statute miles above the junction of Redwood Creek and Westpoint Slough), and these depths and widths hold fairly well through the dredged area, extending for about a mile in length along the western boundary of the property owned and being reclaimed by the Redwood City Harbor Improvement Co. From this point, where their dredging ceased, and distant about 1.4 statute miles in a southerly direction, is the municipal wharf or city dock of Redwood City. This wharf marks the upper limit of the existing project for the improvement of Redwood Creek to obtain and maintain a channel 5 feet deep at mean lower low water and 150 feet wide. The whole territory tributary to Redwood Creek contains perhaps 15,000 people. A strip of marshland 2 miles wide and 12 miles long, containing 25 square miles cut up by sloughs, separates the waters of San Francisco Bay from the upland. This marshland is capable of reclamation for industrial and other purposes.

4. The local interests at Redwood City desire to have a channel 12 feet deep and 150 feet wide, with a turning basin at the upper end near the municipal wharf; thence a channel 6 feet deep and 60 feet wide for a length of 5,000 feet to East Bradford Street in Redwood City, with a turning basin at the upper end of this channel.

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[1] Only one sheet printed.

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5. Col. Rees states in his report that upon completion of an adequate channel and terminal facilities the annual commerce of Redwood Creek should be increased by 73,000 tons, with a consequent saving to local shippers of $14,600 annually. This increase would make the total commerce of this waterway about 110,000 tons per annum. Redwood City is served by railroad as well as by the waterway, and the freight received by rail in the calendar year 1915 is given as 146,000 tons, with a total of 15,000 tons sent out by rail. It is claimed that 100,000 tons of this amount could have been handled by water with proper channel depths. The commerce carried on Redwood Creek for the calendar year 1914 was reported as a little in excess of 26,000 tons, and for 1915 the reported tonnage was slightly in excess of 36,000 tons, the increase being attributed to the fact that the Peninsula Dock & Warehouse Co., engaged in water transportation, did little or no business prior to January, 1915. For the year 1916 the amount of commerce carried is reported at 41,827 tons, valued at $1,998,450.

6. The present project for this waterway was adopted by the river and harbor act of June 25, 1910, and provides for dredging a channel 150 feet wide and 5 feet deep at mean lower low water up to the municipal wharf, about three-quarters of a mile below Redwood City. Under this project the creek was dredged in 1911 and again in 1916. In this dredging a minimum depth of 5 feet was made, but in 1916 much of it was dredged to a depth of 7 feet (2 feet over depth). In neither case was it possible to make a width of 150 feet, because when a width of 125 feet was reached or exceeded the banks commenced to slough in and the full width of 150 feet as contemplated in the project could not be secured. Prior to the work under the present project, channels originally 2 to 4 feet in depth at low water were dredged several times, partly at Government expense, but principally at private expense. These channels were not maintained for even reasonable time. The dredged material was removed by a bucket machine with a very long boom, and the spoils were thrown back as far as practicable from the banks, which were so soft and yielding that the pressure probably squeezed or forced up the creek bottom. This can possibly be avoided in the future by the use of a suction pipe-line dredge and by depositing the dredged material over a larger area. The total amount expended by the United States on this waterway to June 30, 1916, has been $46,177.50.

7. At the time that the creek was dredged in 1911 a channel was dredged above the municipal wharf 60 feet wide, 4 feet deep, for a distance of 1,700 feet; thence for the next 300 feet the depth was 3 feet with the same width, and the remainder of the channel was dredged to a depth of 2 feet.

8. The opportunities for industrial plants and development on the property being reclaimed and improved by the Redwood City Harbor Improvement Co. on its tract are excellent. Their site has a channel depth of 16 feet for nearly a mile in length on Redwood Creek and for about three-quarters of a mile on Westpoint Slough. There is also a railroad and wagon road connection through this tract with Redwood City. The nearest point of this deep water, however, is a little more than 1 statute mile distant from East Bradford Street, the upper tidal limit of Redwood Creek. The channel

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depths and widths in Redwood Creek below this point out to San Francisco Bay are believed to be ample for the present amount of commerce and such as may be expected in the near future. There is apparently sufficient room for vessels to turn at the junction of Redwood Creek and Westpoint Slough, and also additional room where the channel is 500 feet wide in Redwood Creek for turning vessels, one-third mile distant in a southerly direction above the junction of Redwood Creek and Westpoint Slough. It is also believed to be unnecessary and injudicious to remove the small island of marsh land at this point.

9. With reference to the 12-foot channel 150 feet wide as far up as the municipal wharf, desired by local interests, it is believed a channel of these dimensions is impracticable because a channel more than 10 feet deep and 100 feet wide would probably cause the banks to cave in. With a 5 to 7 foot range of tides, a channel 10 feet deep at low water and as wide as practicable (about 100 feet) would be sufficient to accommodate a commerce greatly in excess of anything heretofore handled on Redwood Creek, and would enable vessels to reach the municipal wharf without transfer of cargo at some point below. As to dredging a channel 6 feet deep from the municipal dock for a length of 4,800 feet to East Bradford Street, with a turning basin at that locality, the principal industry that might be greatly benefited thereby is the Tacoma Milling Co., which handles considerable lumber, amounting to about 6,000 tons in 1916. It is believed to be practicable to dredge to the depth mentioned, and with a width of 60 feet, or as near that width as practicable over this channel, there is opportunity to make a sufficient increase in the width just below East Bradford Street to enable such short vessels as would use the upper part of the creek to turn around.

10. Estimates have been prepared showing the quantities of excavation necessary and the cost thereof for the improvements outlined above.

For a channel 10 feet deep and 100 feet wide up to the Frank Tanning Co.'s landing, adjacent to the municipal wharf, dredging will be required as follows:	
66,130 cubic yards of material, at 12 cents	$7,935.60
Engineering expenses and contingencies, 10 per cent	793.56
Total	8,729.10
Annual cost of maintenance of this channel is estimated at $1,000.	
For a channel from that point to East Bradford Street, with a depth of 6 feet and width of about 60 feet, the following excavation will be required:	
67,564 cubic yards of material, at 12 cents	$8,107.68
Engineering expenses and contingencies, 10 per cent	810.76
Total	8,918.44
The cost of maintenance of this channel is estimated at $2,000 per annum.	

11. For work on this waterway local interests have expended about $9,000 in dredging below the city and on construction of municipal wharf. The Redwood City Harbor Improvement Co. has expended about $120,000 in dredging, levee building, and in reclamation work on their tract of land. Of the work outlined above, it is considered that local interests should be required to agree to pay for the mainte-

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nance of the section from the municipal wharf to East Bradford Street. There are no questions of water power or any subjects so related to the project proposed that they may be coordinated therewith to lessen the cost of the work in the interest of navigation.

12. As to terminal facilities, the municipal wharf is now in bad condition, and it would have to be rebuilt or require very extensive repairs to make it available for use. The railroad leading from this wharf to Redwood City, about 3,000 feet distant, has been removed, and the wagon road over this route is also in very bad condition. Immediately adjacent to the municipal wharf the Frank Tanning Co. has a landing nearly or quite 300 feet long and connected with industrial railroad tracks to their very extensive plant, and it would be to the advantage of this company, which handled about 8,000 tons of tan bark in 1916, to carry the 10-foot depth of channel to and alongside their landing. A turning basin at or near the municipal wharf, while it might be convenient, is not a necessity, as there is room at this wharf, which is at the junction of Redwood Creek and Steinberger Slough, for such vessels as can come to this wharf to turn around.

13. In my opinion, the commerce, present and prospective, warrants the further improvement of Redwood Creek to the extent of providing a channel 10 feet deep at mean lower low water, with a width of 100 feet to the Frank Tanning Co.'s landing adjacent to the municipal wharf, at an estimated cost of $8,729.10, and its maintenance at an estimated cost of $1,000 per annum. It is also my opinion that the locality is worthy of further improvement to the extent of dredging a channel 6 feet deep at mean lower low water and about 60 feet wide from the Tanning Co. landing to East Bradford Street. in Redwood City, at an estimated cost of $8,918.44, but it is considered that this section should be maintained at the expense of the local interests.

14. The recommended channel 10 feet deep and 100 feet wide terminating at the Frank Tanning Co.'s plant adjacent to the municipal wharf, is a modification of the existing approved project, while the extension of this channel 6 feet deep and 60 feet wide up to Redwood City is new work.

15. Should the project be adopted by Congress, it should be undertaken and completed in one season, and the first appropriation should be for the full amount, say $17,500, as the estimated cost of the original work.

W. H. HEUER,
Colonel, United States Army (Retired).

[For report of the Board of Engineers for Rivers and Harbors on survey, see p. 2.]

LETTER OF MESSRS. S. H. FRANK & CO.

REDWOOD CITY, CAL., *August 15, 1917.*

GENTLEMEN: Your notice of July 31 received, relative to proposed improvement of Redwood City, Cal., and we note what you say with a great deal of interest.

We believe that Redwood City was unfortunate that a company started a freighting business and, just as they were beginning to get the freight, they went out of business.

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There is a great deal of freight that comes into Redwood City that is never reported to the Government, in spite of our own endeavors to have this done.

Our own has increased considerably since the last dredging of the creek, as our reports to the Government will show; and if the creek is even kept in the condition it is in now, this freight will materially increase.

At the present writing our Government is having some supplies come in for Camp Fremont by water; that is, the contractors are bringing this freight by water to what is called the "tannery wharf," which is in the town of Redwood City, and then hauled by trucks to Camp Fremont. We are reporting this freight to the Government.

There is a project on foot at present to abandon the old so-called "city wharf" and put same at what is now called the "tannery wharf," which we earnestly believe will materially increase the freight, as at present there is a long haul from the "city wharf" to the town.

We do not think it fair that you compare the development at Petaluma with the development of Redwood City, as Redwood City is a railroad terminal for many commodities, and the rail and water hauls are competitive; whereas, in Petaluma the rail haul necessitates a long truck haul and the water haul comes right into the town; also, Petaluma is a long ways from San Francisco, and the development is much more rapid than Redwood City, which is only 30 miles from San Francisco. The factories which want to locate in or near San Francisco at the present time are going to South San Francisco or San Francisco itself, and are not locating yet as far as Redwood City, although we are certain that this development will come with proper water facilities.

We disagree with paragraph (*d*) entirely, as the men who work in the factories will have to go a distance of over 2 miles to get to the mouth of the Redwood City Creek where it is proposed that factories be installed. We recommend to the attention of your honorable body that this is only a proposal, but we have actually 8 or 10 factories in Redwood City itself, which is a concrete proposition and not on paper as the other is.

We wish to submit one thing further, which we have been complaining about ever since the Government has been dredging the Redwood City Creek; the work should have been done with a suction dredger and not with a clamshell dredger as every other job has been done on this creek excepting the last. The marsh lands bordering the Redwood City Creek are so soft that when the mud is thrown on this by a clamshell dredger it in time settles and comes into the creek again. We succeeded, I am happy to say, in persuading your engineers on the last job that this was the case, and we earnestly request that on any future work being done on the Redwood City Creek that it be done by a suction dredger and under no consideration by a clamshell dredger. One of the reasons why we are not getting more freight is there are certain places in the creek that are shallow where it is even difficult for a bay scow to come into the creek on high tide. This is due entirely to the way the dredging was performed prior to the last operation.

We sincerely hope that our remarks have not been too lengthy and that you will see the advantages to Redwood City and ourselves in doing more work on the Redwood City Creek in the future.

Thanking you for the opportunity of giving you our views, we are,

Respectfully, yours,

S. H. FRANK & Co.,
FRANK G. MARCUS, *Manager*.

The BOARD OF ENGINEERS FOR RIVERS AND HARBORS.

HEARING BEFORE THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS IN REFERENCE TO REDWOOD CITY HARBOR, CAL.

[Act of Mar. 4, 1915.]

TUESDAY, SEPTEMBER 25, 1917—10 A. M.

Brig. Gen. William T. Rossell, Col. Frederic V. Abbott, Col. H. C. Newcomer, Col. W. L. Fisk, and Col. Francis R. Shunk were present.

Mr. H. C. Tuchsen appeared before the board in reference to the above subject.

STATEMENT OF MR. H. C. TUCHSEN.

Mr. TUCHSEN. Mr. Chairman and gentlemen of the board, I am here, I might say, in response to your circular letter of July, I think it was. We have

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requested for a long time the opening up of that portion of the creek that has practically been useless to us for some time. In 1915 a committee of the Congress, the Committee on Rivers and Harbors, came to California, and we induced them to come up our way so that they might see for themselves what the conditions were.

While those gentlemen said they were not going to make any promises, yet Mr. Sparkman, at that time chairman, conveyed to us the impression that if we could get the necessary reports made there would be no question but what Congress would act, if they saw the necessity for this dredging. We were therefore led to believe that it would only be a matter of time before we would get the relief for which we asked.

I admit that you gentlemen have taken the right position in this matter, and that anyone else would do just exactly as you have done, in view of the facts which you have before you. As I understand it, dredging was done some time in between 1884 and 1888, and I believe the tonnage then amounted to $1,350,000. As to how many tons, I do not know. I do not even know that I am quite correct in the figures given, but I think I am nearly correct. At that time that was, no doubt, a good showing. At that time we had a good deal of uncut timber in the forests and Redwood City furnished all of the redwood lumber used in and around Redwood City and the neighboring towns. It also shipped a good deal of lumber to San Francisco. In addition to that we had vast fields in the valley this side of the mountains, near the bay, where we raised a good deal of hay and grain, and we also had the territory on the western slope from the top of the mountains down to the ocean, where we produced a good deal of hay and grain, all of which came over Redwood way. There were two reasons for that. In the first place, it was the nearest shipping point, and in the second place it was water shipment, which gave us cheaper rates. A railroad has been built along the ocean shore which takes care of freight from the side of the mountains, and it deprives us of that much.

In the meantime, during the years 1898 to 1908, say a period of possibly 10 years, the forests gave out; the timber that was available and easy of access was all cut, the lumber was cheap, and the mills ceased to run. They could not compete with the northern end of the county, so of course that tonnage was lost to us.

In the meantime a good deal of the land in the valley, which had been devoted to crops, was cut up into residential sites and used for residences. The tonnage from that source was lost to us. We were sort of pinching out all along the line. While we were doing that, along that line, we were of course building up along another line, and people were becoming consumers of lumber, while they were producing none, and the lumber had to come from San Francisco.

Instead of being exporters, we become importers. There must necessarily have been a period when those two conditions met, and there was a let-up While we were increasing our imports, and in that way increasing our tonnage over the creek in that way, we were losing water. The creek was filling up and no work was done up as far as we had our docks. When the timber came in we were importers of some consequence, but we were not able to land the product because of the water. We used building material and road building material. We have had some rock coming in. We have two quarries. We have one quarry located some 70 miles below Redwood City and another located probably the same distance, or a little less, at the mouth of Petaluma Creek. We use a great deal of rock. We spend a million and a quarter for building roads in our county. Redwood City probably will spend half a million on streets. We are building streets every year. That rock used to come by water. It came by water because it could be delivered for less money. The last rock that came our way by water was 14 years ago. Since then the rock which formerly came by water has come by rail.

One does not have to know anything about the inside facts. All one has to do is to go up near the depot and see the immense amount of freight that comes in by rail; car after car of lumber that should come the other way. I have seen carload after carload of lumber in the last few months, and also carloads of tan bark, coming to the tannery by rail, which means that it has to be hauled down to the tannery.

While we feel that because of the conditions outlined you could not take any other view than the one outlined here, yet we feel if you knew the facts, as I have outlined them to you, that you could probably see your way clear to recommend this matter to Congress for them to act upon as they see fit. A committee of Congress has been down there and they have seen the conditions. I

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am very sure that if you gentlemen saw the local conditions, if you saw the need for the improvement, if you saw the lack of water, the small amount of water over which we have been trying to take freight, you would, I think, agree with us that we should be given another trial. I say "another trial" because I believe our people there have not been very careful about reporting.

I noticed for the year 1916 that only 16,014 tons are reported, and I noticed that in 1912 51,495 tons were reported. I believe that the report of 51,495 tons is not correct. I think it is overdone. I do know that at one time these reports were gotten up in a somewhat haphazard way. The secretary of the chamber of commerce would go around to the different shippers to see how much they had shipped and they would give an estimate, and I do not think those estimates were correct. However, I wish to assure you that when I get back to Redwood City there is going to be a different method adopted in handling these things, a different system altogether. I will see that the town makes it its duty to know that everything is properly reported, if we have to hire a man whose sole duty it will be to make these reports. That the reports are not always right, gentlemen, I think I can show you from what I have gathered.

I have here a statement from the Fox-McNulty Lumber Co. That company reports 2,606 tons. I am very sure that is not included in the report which gives 16,014 tons. As a matter of fact, I am quite sure that the 16,014 tons is the shipments made by the Frank Henry Lumber Co. alone. Mr. Marcus, of that company, told me he was quite sure that that was their shipment alone. Unfortunately they have all become careless or have been careless in the matter of reports.

Col. NEWCOMER. I think it might help the board to understand the situation better if you will tell us where your shipments are made from. As I understand it, the present project that you have now provides for 5 feet at mean low water. You have a project now for 5 feet up to this point [indicating on plat].

Mr. TUCHSEN. Yes, sir. The city wharf is a little bit to one side here.

Col. NEWCOMER. This point here [indicating] is the limit of the present Government project, is it not?

Mr. TUCHSEN. Yes.

Col. NEWCOMER. As I understand it 5 feet at mean low water is sufficient now, is it not?

Mr. TUCHSEN. At this point?

Col. NEWCOMER. Yes.

Mr. TUCHSEN. It would be sufficient anyway; yes.

Col. NEWCOMER. I understand you have a pretty good tide, 7 or 8 feet.

Mr. TUCHSEN. Yes. It varies from 3 feet 6 inches to 6 feet 6 inches.

Col. NEWCOMER. Yes; the tide ranges about 6 feet. You were having considerable commercial development down here, were you not [indicating on plat]?

Mr. TUCHSEN. No. We haven't any in here [indicating]. The only thing we have there now is a concrete shipping plant, where they are building concrete ships.

Col. NEWCOMER. Some one told us some time ago that they had a pretty considerable commercial terminal system there now.

Mr. TUCHSEN. Conditions have changed since the fire. The fact is, I brought a map along with me. a map made on the ground by the city engineer [indicating map].

Col. NEWCOMER. This map is drawn to a smaller scale than ours?

Mr. TUCHSEN. Yes. Here [indicating] is the so-called municipal wharf. Here [indicating] would be the line of the project. This is a spur track. The red line here [indicating] indicates a spur track which runs down through the project to the Redwood Harbor Co., so-called. That company owns all of this land here down to this point [indicating]. Down here [indicating] foundation is being laid for a shipbuilding plant to build concrete ships. That is the only thing in there, outside of marshland.

Col. NEWCOMER. What do you mean by "concrete ships"? Do you mean big ships or barges?

Mr. TUCHSEN. Regular ocean-going vessels. They have already had more than one offer for the vessels they will build. Here is a road which is only wide enough to accommodate one vehicle——

Col. NEWCOMER. A wagon road?

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Mr. TUCHSEN. Yes. In places you frequently have to go around, and that is all there is in there. Everything else is prospective.

Col. NEWCOMER. But you can get down there all right, can you not? It is quite possible to improve your facilities there so as to get deeper water. You don't want deeper water. What you want is this project carried farther up [indicating].

Mr. TUCHSEN. This [indicating on map] is private property. The town hasn't any more interest in it than to see the development go on there. This [indicating] is where we would like to have the water extended to. Here [indicating] is the dock of the dock and warehouse company, which was built there in 1913. I have a picture here which shows that location [indicating photograph to the board]. This picture was taken in 1914. This street [indicating] has since been built up. It is now concrete and asphaltum. This picture doesn't show that, but that is the shipment done down there. This is the front view [indicating photograph], and here is the rear view. This shows the situation when the tide is out. It was taken at extreme low tide and shows a little bit of water in the center; but I have seen it when there wouldn't be any more than what ordinarily runs in the gutter after a rain. That is the situation under which those men have been handling freight, and they have taken in a good deal at that.

Col. NEWCOMER. You say that is the Peninsula Dock & Warehouse Co.?

Mr. TUCHSEN. Yes.

Col. NEWCOMER. Is that the one that handles most of the business there?

Mr. TUCHSEN. Yes; it did.

Col. NEWCOMER. Why couldn't they handle the business from the municipal wharf?

Mr. TUCHSEN. There is no wharf there.

Col. NEWCOMER. Why couldn't they put one in there [indicating]?

Mr. TUCHSEN. In the first place there is not enough water there.

Col. NEWCOMER. You are less than 30 or 40 feet from water here [indicating]. Why don't they use that?

Mr. TUCHSEN. Here is the proposition. Competition between rail and water companies in Redwood City is very keen and has been for a long time. To build a road in here [indicating on plat] would be almost impossible. From here on down it is marshland, and it is soft and slushy.

Col. NEWCOMER. What is this development down in here [indicating on plat]?

Mr. TUCHSEN. That is the largest tannery in the State of California.

Col. NEWCOMER. If a tannery was built there, why couldn't a road be built? The tannery has to have facilities for handling its business.

Mr. TUCHSEN. Yes. The marshland land comes in along here [indicating] and the buildings are all set up on piles, you know. I do not see how a road could be built in there unless it was of concrete, and I do not believe that the concrete would hold in that soft mud there. It might be built on the crust over the mud, but I have seen machines break through the crust there.

Col. NEWCOMER. Have any shipments been made from the municipal wharf?

Mr. TUCHSEN. Yes. In 1898, or somewhere along there, the citizens built a plank road from here [indicating] clear down to the wharf, for the purpose of having vessels come in there of greater draft. At that time we were able to get a little freight in here, and it was much more convenient because they could come in here [indicating] at that time, at any stage of the tide. A dam was thrown across here and it kept this channel open. However, the planks gave way and it was abandoned. It was slow hauling anyway. They had to go half a mile or more additional distance in hauling.

Col. NEWCOMER. How much more?

Mr. TUCHSEN. I should judge, half a mile from here [indicating].

Col. NEWCOMER. There are lots of places where they have to go more than half a mile; they have to go a mile or 2 miles from the water front in lots of cities.

Mr. TUCHSEN. Yes; but still it has been quite a handicap to us, and this plant has suffered from it.

Col. NEWCOMER. Why would they suffer from it?

Mr. TUCHSEN. Because they have no way of getting the shipments up to their wharf.

Col. NEWCOMER. They are not very far from this place [indicating].

Mr. TUCHSEN. But they would have to haul it in some way that much farther, and it means two haulings.

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Col. NEWCOMER. Has the city done any dredging above the Government project?

Mr. TUCHSEN. Yes.

Col. NEWCOMER. They have a wharf right there next to the municipal wharf, do they not?

Mr. TUCHSEN. They have the railroad there and unload freight——

Col. NEWCOMER. They have as much depth there as in the project [indicating].

Mr. TUCHSEN. They take in ocean-going vessels there.

Col. NEWCOMER. Why does not that adequately serve their needs?

Mr. TUCHSEN. I think you will find there is quite an added expense in transporting it from there by rail and unloading it again, whereas, if they had the water they could take it right off on the bank of the stream.

Col. NEWCOMER. What is shipped above this point [indicating]? We have the Peninsula Dock & Warehouse Co. there.

Mr. TUCHSEN. Yes.

Col. NEWCOMER. And a lumber yard?

Mr. TUCHSEN. Yes; right across here [indicating] is the Fox-McNulty warehouse. That is shown right here [indicating].

Col. NEWCOMER. They are the only shippers from above here [indicating].

Mr. TUCHSEN. Yes; a few years ago the board of trustees of the city put a jackknife bridge is here [indicating].

If I may get away from the particular subject for the moment, I might ask permission to close this by means of floodgates so that we could store the water in here and let it out at low tide and keep this washed out. It seems to me that in connection with any dredging project it would be a good idea to permit the city to put in floodgates to store the water at this point in this basin up here [indicating]. We are storing it up here now [indicating], but it is much narrower and if we could put in floodgates at this point it would be better.

Col. NEWCOMER. You store that water every tide?

Mr. TUCHSEN. Yes; they are presumed to do it every tide. If it isn't done somebody neglects it. It should be done every tide. Right up here a hotel was situated [indicating] and during the earthquake the side walks of that hotel fell into the stream and a mass of bricks and matter held the débris that came down during the winter season and it has cut quite a channel at this point and has washed it out fairly clean [indicating on map].

Col. NEWCOMER. There are three interests then that would be interested in getting better facilities at this point [indicating on map]?

Mr. TUCHSEN. Yes.

Col. NEWCOMER. The tannery, the lumber company, and the Peninsula Dock & Warehouse Co.?

Mr. TUCHSEN. Yes.

Col. NEWCOMER. Those are the only shippers there?

Mr. TUCHSEN. Yes.

Col. NEWCOMER. Do you know the amount of business that each one handles by water?

Mr. TUCHSEN. Last year Newman Bros. were handling the Dock & Warehouse Co. there and they did not do much business, but Mr. Graves took in 7,300 tons. I understand they only took in at high tide, and I have known when a vessel would lay out there in the mud in a storm and when the cargo was delivered the manufacturers would not agree to have it shipped that way again.

Another important matter is the inability to employ labor. A man doesn't know when he is going to work. He may work at 6 o'clock in the morning and the next day at another hour, and then again in the middle of the night, in accordance with the tide, and it is hard to keep them at work. In spite of those conditions Mr. Graves put in his money; he has two vessels; and he started the thing going.

We feel this way about it; we admit that appearances are decidedly against us, but we feel that if we had another chance we could make good. I am not going to try to argue with you gentlemen if you are not right in reaching your conclusions. I won't undertake to do that, but rather I will plead with you to give us a chance to open the matter up again. It is only a small thing to the Government, but it means the world to us. I only want to say that if you could see it as I have seen it, and as the Members of Congress have seen it, I believe that you would give us another chance.

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Col. NEWCOMER. It is an expensive proposition to maintain that channel, as it fills in very quickly.

Mr. TUCHSEN. I understand by your circular letter that one of the conditions you would make would be that the channel should be maintained by the local interests at approximately $2,000 a year cost.

Capt. WEBER. That is the district officer's recommendation.

Mr. TUCHSEN. Mr. Graves told me that while he was operating steamers in here, they gained several inches—I do not know just how much—because the churning of the wheels carried away the débris.

Col. NEWCOMER. Then the question is substantially that of providing a water channel here or building a road down here?

Mr. TUCHSEN. Yes.

Col. NEWCOMER. The question is which is going to be the cheapest to provide and maintain. This is going to cost a good deal annually, the digging of a channel.

Mr. TUCHSEN. We believe that building a road down there is not the right thing to do. We have the water there right up to within a few blocks of the center of the town——

Col. NEWCOMER. That is just the trouble. You don't have it. You want the Government to give it to you at considerable expense.

Mr. TUCHSEN. We admit that, but I do not believe that we would ever ask the Federal Government to dredge that more than once, because if you make a condition of doing it that the local interests shall maintain it, then, of course, that condition would be accepted by the local interests. If that condition is made and the work is done, I do not believe the Government will ever be asked to do any more dredging at that point.

Col. NEWCOMER. Will the municipality agree to bind itself to maintain it if the Government does the work?

Mr. TUCHSEN. Of course, I am not in a position to say that it would do that, but I believe if you made it a condition of doing it that it would be done.

Col. NEWCOMER. Yes, but the municipal authorities might not carry out their agreement. We have no means of compelling them to do it.

Col. ABBOT. I think if we put in the condition that the county should give a guaranty satisfactory to the Secretary of War that it could be done. We could make the appropriation contingent upon the county giving such guarantee.

Mr. TUCHSEN. I thought that that was perhaps the idea.

Col. NEWCOMER. Do you think it would be willing to give such a guaranty?

Mr. TUCHSEN. I would much rather that the proposition be made by you gentlemen. I believe they would do it. It looks to be a reasonable proposition.

Col. NEWCOMER. That would be satisfactory to you if we recommended it with that condition in there?

Mr. TUCHSEN. You understand my position, gentlemen? I would rather it come from you. I haven't any authority to go ahead and accept any proposition. That is one phase of the matter that I did not talk over with our people.

Col. NEWCOMER. But it is a very important phase to your people.

Mr. TUCHSEN. I know it is. I believe it is a condition that would be made.

Col. NEWCOMER. You assumed that that naturally might be a necessary condition?

Mr. TUCHSEN. I thought it was necessary. I assumed that that was the recommendation of Col. Heuer.

Col. NEWCOMER. That was his recommendation.

Mr. TUCHSEN. I do not mind saying frankly that I think it would be a good proposition to put in that condition. Personally, I have no interest in this matter, because I am not interested in water shipments in any way at all.

Col. NEWCOMER. You represent Redwood City?

Mr. TUCHSEN. I am city councilman. I have charge of public works. I was very active in presenting the matter before the Rivers and Harbors Committee, and, being familiar with the public works, I was asked by the chamber of commerce and the board of trustees to come here and present this matter to you.

Col. NEWCOMER. You have your credentials and your papers there?

Mr. TUCHSEN. Yes.

Gen. ROSSELL. You have not stated all you care to say, have you?

Mr. TUCHSEN. I do not care to take up any more time, but I will say that if authority is given for this or the work is done, that permission should be given us to put in floodgates to store that water.

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Col. ABBOT. We could give that permission anyhow.

Col. NEWCOMER. Yes; the War Department would permit that under proper application.

Mr. TUCHSEN. We applied for it at one time.

Col. NEWCOMER. Was it turned down?

Mr. TUCHSEN. Yes; it was turned down. Something was said about not wanting to put them in in a navigable stream. There is no navigable stream there.

Col. NEWCOMER. I think if you will get the assent of the property holders on that portion of the stream it might be done. They might require that, in order to allow you to put in floodgates.

I find here in detail of shipments 3,400 tons of cement. Did any of that come in by water?

Mr. TUCHSEN. That probably was taken off here at the tannery or the camp. Camp Fremont is located within 3 miles of Redwood City.

Col. FISKE. It has been decided to take that camp away from there?

Mr. TUCHSEN. There was some difficulty about the sewers, but I have a telegram from home saying that they are going ahead with the camp again.

Col. FISKE. Is that the camp from which they ordered the people to North Carolina?

Mr. TUCHSEN. I think so.

Col. NEWCOMER. I find 2,400 tons of crude oil. That would probably go to the tannery?

Mr. TUCHSEN. That would go to the tannery, and some of it be distributed to people in town.

Col. NEWCOMER. Distributed from the tannery?

Mr. TUCHSEN. Yes.

Col. NEWCOMER. Also 11,000 tons of salt.

Mr. TUCHSEN. That comes right here [indicating]. I forgot to mention these salt beds. They have not resulted in any material benefit up to this time.

Col. NEWCOMER. I see 8,000 tons of tanbark. I suppose that went to the tannery there?

Mr. TUCHSEN. Yes.

Col. NEWCOMER. In other words, the great bulk of your commerce is handled at the tannery.

Mr. TUCHSEN. They do take in some freight and they ship out from this wharf here on high tide, but they have to watch their chances to go in and out. The location of the wharf down here [indicating] would not be of as great advantage to the tannery as it would be here [indicating]. It would help the town in general and it would give us what we want.

Col. ABBOT. Wouldn't there be room enough to put in a wharf here [indicating on plat]?

Mr. TUCHSEN. No; I do not think so. The stream here [indicating] is wide enough for possibly three vessels——

Col. NEWCOMER. But this map here shows the wharf to be a little bit off [indicating].

Mr. TUCHSEN. Yes. There is another thing to be considered. If we had water up here so that we could come in a greater portion of the 24 hours, if not all the time, we would have a chance to locate some small factories along here [indicating]. We have an aviation field there and an aeroplane factory. There is a factory in here [indicating] which is now working on a contract for the Federal Government, making asbestos pipe coverings, and they would be interested in this project.

Col. ABBOT. That could be handled if you built a road?

Mr. TUCHSEN. Yes; but that would be an awful expense, and would not be as handy as if the wharf was located right here [indicating], so the factories could locate in here [indicating]. They would all be small concerns that could take their freight right from the vessels on tramways right into their factories.

Gen. ROSSELL. Does any gentleman of the board wish to ask any further questions, or do you desire to say anything further, Mr. Tuchsen?

Mr. TUCHSEN. I think that is all I care to say, Mr. Chairman.

Gen. ROSSELL. Then we are very much obliged to you for coming to us and telling us these things.

Mr. TUCHSEN. I wish to thank the board very much.

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REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 15

Statement of Brig. Gen. William M. Glasgow, Jr., Div. Eng'r,
U.S. Army Corps of Eng'rs, before the Subcommittee on Conservation and Natural Resources of the H. Committee on Government Operations
(Aug. 20, 1969)

STATEMENT OF
BRIGADIER GENERAL WILLIAM M. GLASGOW, JR.
DIVISION ENGINEER
U.S. ARMY ENGINEER DIVISION, SOUTH PACIFIC
BEFORE THE
CONSERVATION AND NATURAL RESOURCES SUBCOMMITTEE
OF THE
COMMITTEE ON GOVERNMENT OPERATIONS
HOUSE OF REPRESENTATIVES
20 AUGUST 1969

Mr. Chairman, Members of the Committee, Ladies and Gentlemen:

I am Brigadier General William M. Glasgow, Jr., Division Engineer, U.S. Army Engineer Division, South Pacific. I appreciate the opportunity to appear before this Committee in order to clarify the position of the Corps of Engineers on past actions that have been taken in the San Francisco Bay-Delta Region and on future policy.

The problems facing estuarial use -- its development and conservation -- in the San Francisco Bay Area may be a reflection of those facing the entire country, particularly in the philosophical sense. Certainly, the issues are extremely complex and include problems that involve the juxtapositioning of theories, concepts and plans that often are 180 degrees apart. We will need the wisdom, experience and participation of every level of Government -- and the public in general -- in order to attain satisfactory resolutions. The fact that your Committee is here today, Mr. Chairman, is testimony to the overall public interest in the subject.

I do not want to repeat the testimony given by the San Francisco District Engineer before your Committee in Washington on 15 May of this year. A brief recapitulation, however, may be helpful in understanding the answers we will give to the specific points I have been asked to cover. I feel this is important because the context of the time in which we live governs our attitude and action on the problems contemporary with this particular era.

We have, for example, moved dramatically from the cowboy age to the age of the astronaut. We have moved from a time when open-range opportunities seemed limitless to a time when space opportunities seem limitless; however, in the process we have found open-range opportunities are not without limits. The dramatic consequence is that now we are in an era concerned with limited terrestial resources and all the terrestial things we use must be capable of reuse or capable of disposal with a minimum of waste. This transition has been fairly abrupt. In fact, it is still taking place. One problem is that many people do not comprehend the necessity and therefore fail to relate capability to cost.

When we had a superabundance of resources, the general public had little concern for the control of resources management. This lack of concern was reflected by the character of local ordinances and State and Federal legislation. Why regulate the use of something we regarded as inexhaustible? This attitude was especially true where development for economic strength was involved because conservation appeared unnecessary in such a vast land. Therefore, the voice <u>for</u> development outweighed the whispers of Thoreau, John Muir, and others who exhibited foresight and sought the conservation of resources through persuasion. The strength of this antiphonal choir now has been reversed or at least in some instances, equalized.

Perhaps the greatest single thrust for better management and preservation of the resources of the San Francisco Bay Region came in 1960 with the publication of a study commissioned by the Corps of Engineers on "Future Development of the San Francisco Bay Area 1960 - 2020." This book was part of the comprehensive San Francisco Bay Study envisioned under Senate Resolution 119, 81st Congress, 1st Session and authorized in Section 110

of the River and Harbor Act dated 17 May 1950. It contained demographic projections on population increase, land use, and employment. It also presented the historical record of land fill around the Bay and, based on Corps' data, noted that the land originally available for reclamation in 1850, including marshlands and tide and submerged lands to the six-foot contour, totalled 568.2 square miles of which 242.8 had been reclaimed by 1958. The Corps of Engineers thus was one of the first, if not the first agency to become concerned about land reclamation, or fill, and its consequences if unregulated. For your review, we have here the display maps we published in 1959. We published maps on areas filled both by types of land -- marshlands, tideland, salt flats -- and by historical development.

Ninety-three per cent of this filled land was marshland, over which the Corps had no jurisdiction. The figures on reclaimed tide and submerged lands were not particularly alarming in themselves, but a projection of potential fill showed that 200 square miles of additional tide and submerged lands would be reclaimed by 2020. There are now about 420 square miles of such surface area remaining in the San Francisco, San Pablo and Suisun Bays. This projected figure was generally unacceptable both to the public and the Corps, and particularly to the Corps when considered relative to Federal policies established by the Fish and Wildlife Coordination Act of 1958. Not only would such an extension of fill be aesthetically and ecologically undesirable, but the results would be disastrous from an environmental standpoint. Because of our early warning and later test data, local agencies and conservation groups did move for conservation development.

In tests that followed, our Bay model gave data which showed the detrimental effect on waterway current velocities and the ability of the Bay to flush

pollutants from the Bay-Delta system with the decrease of tidal volumes and surface area should certain fill designations be allowed. Specific smaller fills, of course, need not necessarily be harmful. In 1963 at the dedication of our San Francisco Bay Model, we pointed out to all who would listen that one of the greatest assets of the Bay is the environment. With the preservation of its present advantages and the cultivation of the amenities of living, the Bay Area will remain a focal point of influence -- financial, cultural and recreational -- in California and the Nation. But pollution of air and water, uncontrolled fills in the Bay, diminution of open spaces, lack of coordinated planning and standards of varying degrees can turn the area into a dismal, uncoordinated complex of unattractive suburbs, to cities without character or natural attraction. The Save San Francisco Bay Association used our figures quite effectively in promoting regional control, out of which grew State legislation that established the Bay Conservation and Development Commission. As I am sure you know, the Corps of Engineers and the Public Health Service are the two representatives of the Federal Government on the Bay Conservation and Development Commission. The Corps of Engineers, therefore, reflecting in some instances and anticipating in others the public interest, has greatly expanded the scope of its considerations in approaching problems of the Bay. The evolution of the language embodied in the public notices issued asking for comments on, or objections to, proposals for projects affecting the Bay is illustrative of this fact.

In March 1966, the notices solicited comments or objections based upon the effect of the proposed work on navigation. In 1966, a sentence was added stating that, however, "other pertinent factors, including fish and

wildlife conservation aspects, will be accepted and made part of the record and will be considered in determining whether it would be in the best public interest to grant an extension of time." Notices today state that "all pertinent factors such as navigation, recreation, fish and wildlife conservation, water pollution, conservation of natural resources and the general public interest in such matters as aesthetics or ecology will be considered in determining whether it would be in the best public interest to grant a permit." This language demonstrates the changing interpretation of our legal authorities and responsibilities in this field. These changes in language are relevant to permits granted in the past on which data will be presented later in this testimony. For example, the historical function of the permit system was the protection of navigation where such protection was needed. It was not simply to preserve all navigable waters. Permits were granted for structures in navigable waters when no objections from navigation interests were received. Regardless of how language and interpretation may change, however, we would agree that the moral responsibility of the Corps to protect the public interest does not. We have attempted to do so as the public interest has enlarged and expanded and as Federal responsibility has been exercised in various ways. The three unique studies the Congress has authorized the Corps to conduct in the Bay-Delta Region constitute a major means of applying this moral responsibility: First, by investigating and pin-pointing problem areas and suggesting a range of alternative solution; Second, by defining the Federal interest so that the Congress if it wishes may act where a deficiency is felt; and Third, by furnishing guidelines for future development by local interests which may or may not require State or local legislation such as that governing the Bay Conservation and Development Commission. We would like to point out, however, that local, regional and

Federal interests represent the public interest and in the vast majority of instances are similar; and where they diverge, the line dividing local from Federal interest is often nebulous.

Our second area of statutory authority -- the first being the permit system -- is the establishment of pierhead and bulkhead lines, collectively known as harbor lines. The purpose of a permit is to allow some action to be taken in the Bay so long as the public interest is protected; the purpose of the establishment of harbor lines is to protect and preserve the harbor and to permit the orderly development of harbor facilities. There are instances in which this purpose has not been realized.

The Chairman of this Committee in the letter of 31 July 1969 to the Chief of Engineers advising him of this hearing raised several specific questions. To insure clarity in the public hearing record, I shall present the desired information in the same sequence as the Chairman's letter of 31 July 1969. The questions will be restated to provide ready reference.

Question No. 1. Progress of harbor-lines review in light of conservation and ecological considerations as well as direct needs of navigation and commerce.

Answer: On 9 June 1969, each Division Engineer having Civil Works responsibilities was requested to submit his views and recommendations on the matter of harbor lines. I am advised that all comments have been received in the Office, Chief of Engineers, and are presently being reviewed, and that a decision on the Federal harbor line systems is anticipated in the near future. The Committee will be kept informed by the Chief of Engineers on the progress of the review and decisions reached.

Question No. 2. With respect to Port of Oakland projects involving fill:

a. Extent and nature of consultations with the California Fish and Game Department and with the U.S. Fish and Wildlife Service, pursuant to the Fish and Wildlife Coordination Act, 16 U.S.C. (a) and (b), in connection with:

i. Metropolitan Oakland International Airport runway extension on 48-acre fill, 1960.

Answer. Both the U.S. Fish and Wildlife Service and the California Fish and Game Department were advised of the proposed runway extension by public notice No. 60-59 in accordance with our interagency agreement. Neither agency interposed objections to the application.

ii. Modification of bulkhead lines to allow 140-acre fill for Seventh Street Marine Terminal, 1965.

Answer. The U.S. Fish and Wildlife Service did not respond to our public notice No. 65-51, copies of which were distributed to them and other Federal, State and local interested parties. The California Fish and Game Department advised that the area had considerable importance in supporting valuable fish and wildlife resources and requested that the proposal be held in abeyance pending adoption of a comprehensive plan for the coordinated development of the Bay area. This objection was subsequently withdrawn by the Administrator of the California Resources Agency who advised that, while the State was deeply concerned with any loss involving marine life and habitat, it was nevertheless clear that the proposed major marine terminal would provide a substantial increase in public value and it was in the best public interest that the harbor lines be modified. He said that the State recognized that the granting of approval was a matter of considerable urgency because of contractual

obligations between the Bay Area Rapid Transit District and the Port of Oakland.

iii. Modification of bulkhead lines to allow extensive fill for proposed North Harbor, north of San Francisco - Oakland Bridge, 1965.

Answer. Both the Federal and State fish and wildlife agencies strongly objected to this proposal in response to public notice No. 65-61. The California Resources Agency subsequently objected to granting of the approval for fish and wildlife and other reasons. The permit application for the proposed modification was not approved.

iv. Metropolitan Oakland International Airport runway extension of 2,500 feet, 1969.

Answer. The California Resources Agency interposed no objection to the issuance of the permit on the basis that the public need could be best served by increasing the length of the airport runway but regretted the accompanying losses of marine invertebrates, fish, marine and game habitat. The Department of Interior did not respond to our public notice No. 69-27. Based on an agreement instituted by the local representative of the Department of the Interior, this constituted a non-objection. The Bay Conservation and Development Commission also approved the project.

b. Extent to which the Corps examined, prior to the change in bulkhead lines to allow the Seventh Street Marine Terminal fill, the following:

i. Whether the proposed fill would interfere with air traffic.

Answer. In response to our public notice No. 65-51 the Commander, Fleet Air Alameda, and the Commandant, 12th Naval District, objected to the modification of harbor lines on the grounds that structures erected on the terminal fill or high-masted ships moored adjacent thereto might cause avigation obstruction in the glide path to runway 13/31 at the Naval Air,

Station, Alameda. Realizing that any decision in this realm must be governed by FAA regulations, the Port of Oakland and the Navy reached a compromise whereby the Navy withdrew its objections after the Port agreed to abide by all FAA regulations. The Corps involvement in these negotiations consisted of bringing the various agencies together to find a common solution.

ii. Whether safety requirements in connection with air traffic would limit the uses of the proposed port expansion to barges and similar vessels rather than accommodate high-masted ships.

Answer. At the time the harbor lines were modified, it was recognized that there might be some limitation on ship heights due to safety requirements but it was also apparent that oceangoing vessels would be able to berth at several locations without interfering with approved airplane glide paths. An FAA study subsequently indicated that only the south side of the fill cannot accommodate high-masted ships while there is no restriction on the north, west and southeast sides.

iii. Whether the proposed fill would cause shoaling of channels and port areas used by the Navy.

Answer. Prior to initiation of the fill construction, the Navy requested that the shoaling pattern in the entrance channel and turning basin to the Naval Supply Center be studied in the hydraulic model of San Francisco Bay operated by the Corps. Model studies indicated that shoaling would be increased in the Navy channels but would decrease in adjacent channels in such a manner as to provide a net decrease in shoaling in the Oakland Harbor complex. It has been impossible to determine if additional shoaling has occurred since the Port of Oakland is currently using a large portion of the Naval Supply Center waterways as a borrow area to obtain additional fill material to be placed behind the previously constructed dikes.

c. Reasons . r using the procedure of a change in harbor lines to allow the Seventh Street Marine Terminal fill, and whether public hearings were held by the Corps in connection with this project.

Answer. The proposed fill for the 7th Street Marine Terminal involved a major change in the development of Oakland Harbor and, as such, the application was properly submitted and processed as a proposed harbor line modification in accordance with my previous definition. Proposed temporary or minor encroachments on harbor lines are usually considered under the permit system and, if approved, are then reflected on the harbor line maps at such time as major revisions take place. In response to our public notice which requested comments from interested parties, 80 letters of protest of a general nature were received, primarily from individuals interested in conservation. Generally, the protestants objected to the authorization of fill until a comprehensive plan for the use of San Francisco Bay had been developed. The U.S. Navy objected on the grounds that structures erected on the fill or ships moored adjacent thereto might cause avigation obstruction in the glide path to runway 13/31 at the Naval Air Station, Alameda. They also objected on the basis that the fill could cause increased shoaling in the Naval Supply Center waterways. Based on an agreement made at a meeting held in the San Francisco District Office on 7 June 1965 with Port and Navy officials in attendance, the Navy withdrew all objections according to an agreement that the Port would be governed by FAA regulations and that the Port of Oakland would assume the cost of increased dredging, should that be necessary in the Naval Supply Center waterways for a period of five years to begin at the start of construction of the fill. The Resources Agency of California, as previously noted, stated that it was in the best interest of the public to construct

the terminal. At that time, because of the resolution of these differences, it was not considered necessary that a public hearing be held.

d. Estimate of costs to be borne by the U.S. Government for any future dredging in connection with effects of the Seventh Street Marine Terminal fill.

Answer. The Navy withdrew all objections to the Seventh Street Marine Terminal fill when the Port of Oakland agreed to assume the cost of increased dredging in the Naval Supply Center waterway for a period of five years. The agreement is subject to renegotiation at the end of the five-year period to determine proportionate sharing of the increased costs. If model studies are correct, as I previously indicated, the cost to the U.S. Government for future dredging in the Oakland Harbor complex will be less than that expended prior to construction of the fill. However, the Naval Supply Center channel dredging would probably increase. The cost to the Federal Government would depend upon subsequent agreements of cost sharing between the Port of Oakland and the Navy.

Question No. 3. Extent to which zoning plans of shoreline cities are considered in decisions to alter harbor lines and in decisions to permit fill.

Answer. It is the policy of the Corps of Engineers not to grant a permit for work which would not be in accordance with local zoning laws. In this respect, the views of local authority are requested and a permit is not granted when responsible local authority objects on legal grounds. Regardless, any permit issued would not authorize any infringement of Federal, State or local laws or regulations, and would not obviate the necessity of obtaining State or local consent required by law for the work authorized. Alteration of harbor lines is governed by the same policy.

Question No. Provide a graphic portrayal of prior fill permits granted in the San Francisco Bay area; particular attention should be given to permits, if any, for filling of navigable sloughs in areas now held or once held by Leslie Salt Company or its predecessors.

Answer. Inclosed are graphic portrayals as follows:

a. Major fills resulting from Department of the Army permits in San Francisco Bay between Hunters Point and Redwood City.

b. Major fills resulting from Department of the Army permits in San Francisco Bay between San Francisco-Oakland Bay Bridge and San Leandro.

c. Dams approved by Department of the Army permits in San Francisco - Oakland Bay between San Mateo Bridge and San Jose.

Portrayals of fills have been limited to major areas associated with Department of the Army permits. Complete delineation of fills associated with all permits would require the specifics of about 50 lineal feet of permit records.

The fill permits issued to Leslie Salt Company were issued between 1923 and 1931 for building dams -- solid fill structures sealing off salt water intrusion -- as opposed to levees, structures within an area from which tidal action has been excluded. They included the following projects:

DATE	WORK AUTHORIZED
30 November 1923	A dam constructed across Guadalupe River, near Alviso, Santa Clara County, California
22 June 1931	Two dams constructed across Beard Creek, Alameda County, California.
24 April 1926	Two dams constructed across a small slough connecting Mowry Slough and Coyote Creek, Alameda County, California.

DATE	WORK AUTHORIZED
24 April 1926	A dam constructed across a small tributary slough to Albrae Slough, Alameda County, California.
24 April 1926	A dam constructed across a small tributary slough to Mowry Slough, Alameda County, California.
27 October 1925	A dam constructed across a small tributary slough to Mowry Slough, Alameda County, California.
28 December 1923	Two dams constructed across Angelo Slough, San Mateo County, California.

Question No. 5. What confusion over boundaries and restrictions on use appears to exist concerning lands and submerged lands, including the Smith Slough and lands and sloughs involved in the Leslie Salt Company-State Lands Commission exchange, in the San Francisco Bay and Delta area?

Answer. In 1959 the legislature of the State of California enacted a law (Chapter 1885, 1959 statutes) which delegates to the California State Lands Commission the power to convey all right, title and interest of the State of California in lands to be selected by the State Lands Commission in the vicinity of San Francisco Bay to any private person or corporation in exchange for other lands in the same vicinity. In January 1968 after a public hearing, the State Lands Commission transferred 420 acres of land to the Leslie Salt Company, much of which consisted of land underlying filled or blocked off sloughs. In exchange Leslie Salt Company gave the State all of its right, title and interest in 1601 acres of submerged land on which title had been clouded for almost a century.

In February 1968 the Alameda Conservation Association brought an action in the U.S. District Court for the Northern District of California against the State of California. They sought to have the exchange of lands set aside on the ground that the 1959 statute was void because it was in

violation of the State constitution imposing a public trust in the use of such submerged lands and in addition that it was in violation of the rights of citizens of the United States in the waterways and wildlife areas. The judge dismissed the action on the grounds that the conservation group had failed to allege a direct or specific injury to themselves or to their property as the result of the land deals. The United States did not become a party to the action. The exchange of lands between Leslie Salt Company and the State Lands Commission did not affect Federal jurisdiction over navigable waters.

[redacted] jurisdiction in the Bay based upon long established mean higher high waterlines. The levees [redacted] Salt Company are shoreward of such lines and no permits were therefore [redacted]. During the 1920's and early 1930's the Corps did authorize the closing of sloughs based on the consideration that such action was not detrimental to [redacted] No restrictions on the use of such filled sloughs were imposed. No objections were made to such permits. Nothing has come to the attention of the Corps that such filling is presently interfering with navigation. It is only in recent years that the conservation of natural resources has become a matter of general concern in the issuance of permits and more particularly since the amendment of the Fish and Wildlife Conservation Act in 1958. Applications for new permits in the Bay area will be fully considered in the context of effect on the general public interest including but not limited to fish and wildlife, water quality, conservation, pollution, aesthetics, and ecology as well as navigation.

Question No. 6. Advisability of Corps review of past Bay and marshland diking and fill to ascertain interests of the United States in areas once navigable and in tributary waters.

Answer. Nothing has come to the attention of the Corps of Engineers that past filling in the Bay and tributary waters is presently interfering with navigation. Therefore, initiating an overall review of past fills would not be warranted. However, the Corps would review the obstructive nature of any particular fill when brought to our attention.

Question 7. Extent to which the Corps' operations now provide for public recreational use and preservation of access to navigable waters by the public, and Corps recommendations for statutory changes, if any, to coordinate filling and dredging projects with recreational development.

Answer. All projects of the Corps of Engineers make provision for recreational development where opportunity and need exist. Our normal procedure is to encourage local development and management on project lands. When local participation is not forthcoming, certain minimum facilities may be provided by the Corps within budgetary capability. Many Corps projects, such as small boat harbors and harbors of refuge, have direct recreational benefits. Whenever Federal land is acquired, public access is preserved.

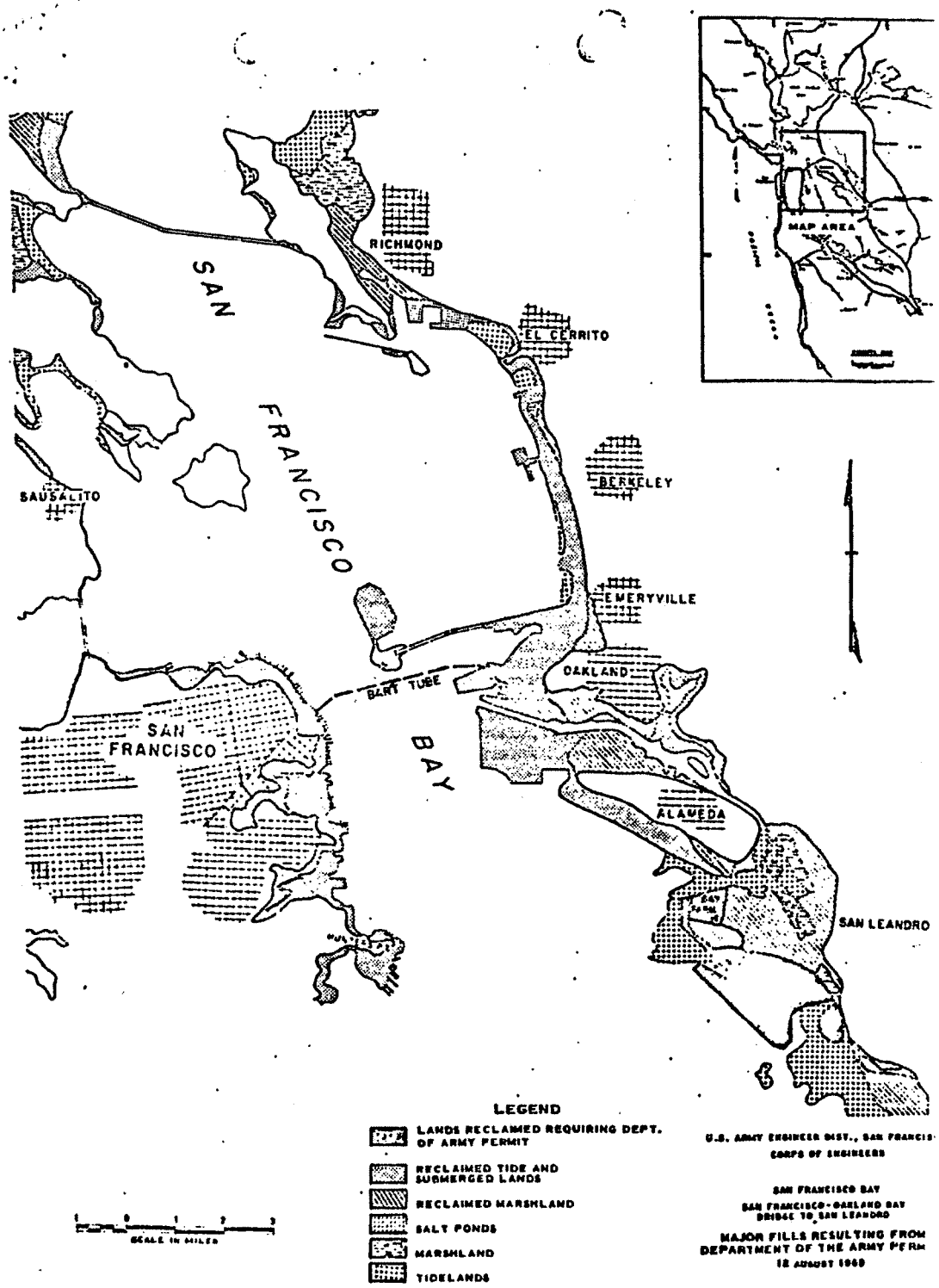
In permit actions, views of local interests submitted in response to public notices or at public hearing are considered in acting on harbor line or permit cases.

To the extent practicable scheduling of dredging operations either by the Corps or by permittee is coordinated to accommodate other known interests, including recreation. There is no apparent need for statutory changes for these purposes.

Question No. 8. Factors previously considered by the Corps in granting fill permits and in altering harbor lines, factors now considered, and Corps recommendations for statutory changes, if any, to clarify criteria to be used by the Corps in such decisions.

Answer. The Congress has granted authority to the Secretary of the Army, acting through the Corps of Engineers, to issue permits for the performance of certain work in the navigable waters of the United States. While the initial laws, originating in the past century, under which permits are issued, were administered with the view to effects upon navigation, present day ecological and environmental needs have dictated broadening considerations governing the issuance of these permits to other factors affecting the general public interest including but not limited to fish and wildlife, water quality, conservation pollution, aesthetics and ecology.

In taking these factors into account, one very important vehicle has been an interagency agreement entered into between the Secretary of the Army and the Secretary of the Interior, with respect to those items which are of primary concern to the Department of the Interior. Under this interagency agreement, any problems unresolved at field level are reviewed by the Chief of Engineers and the Under Secretary of the Interior. If this review in turn does not resolve outstanding problems, they are again reviewed by the Secretary of the Army and the Secretary of the Interior at Secretarial level. While the basic legal authority to issue or deny such a permit remains with the Secretary of the Army, there has understandably been considerable restraint in taking any action which has a significant effect upon the responsibilities of any other Federal Agency. In view of our present policies and procedures, we do not consider that there is a present need for any statutory changes. However, we recognize that some District Court decisions derogate from this position, but these cases are on appeal and we expect that the appellate courts will reverse the lower court decisions.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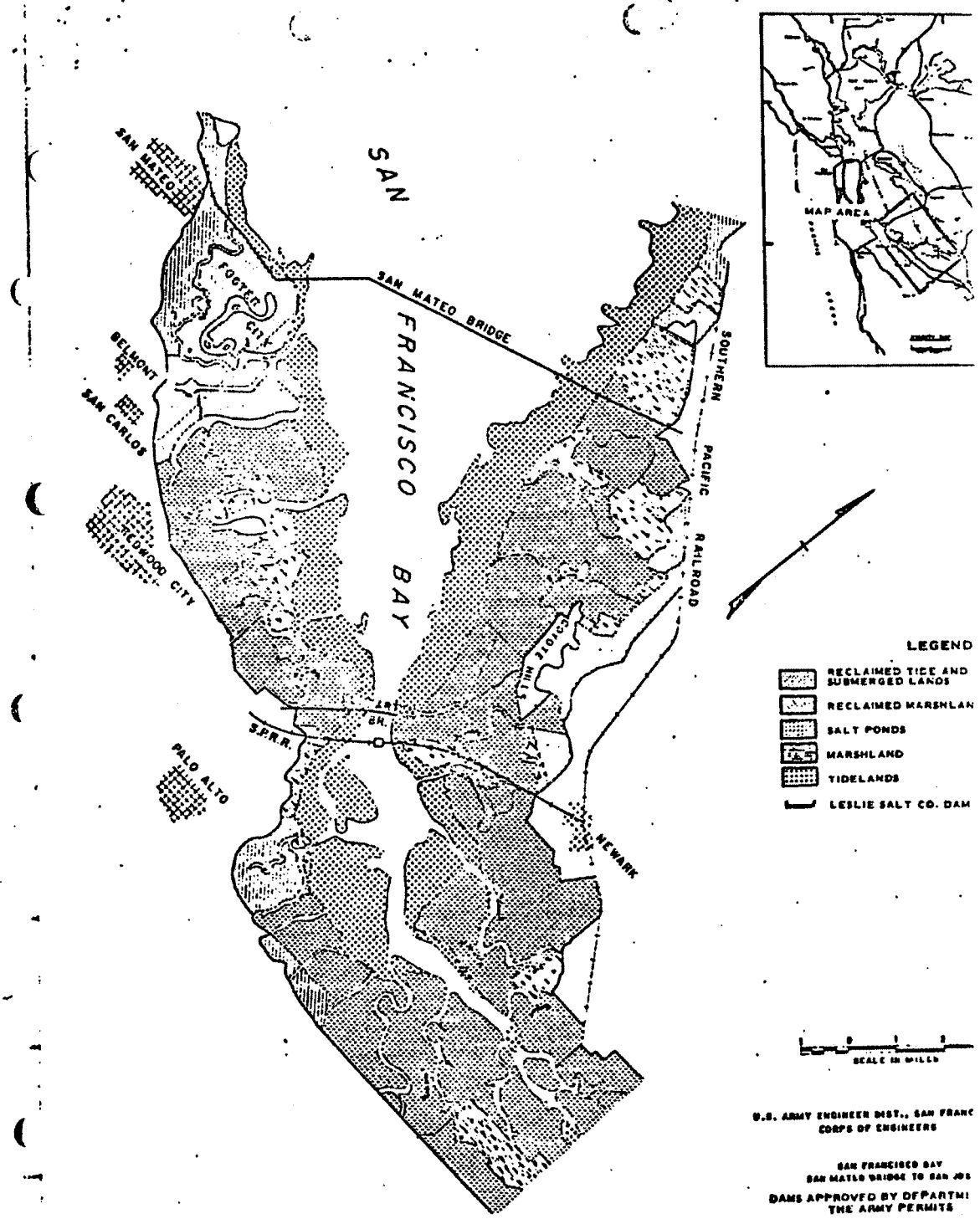
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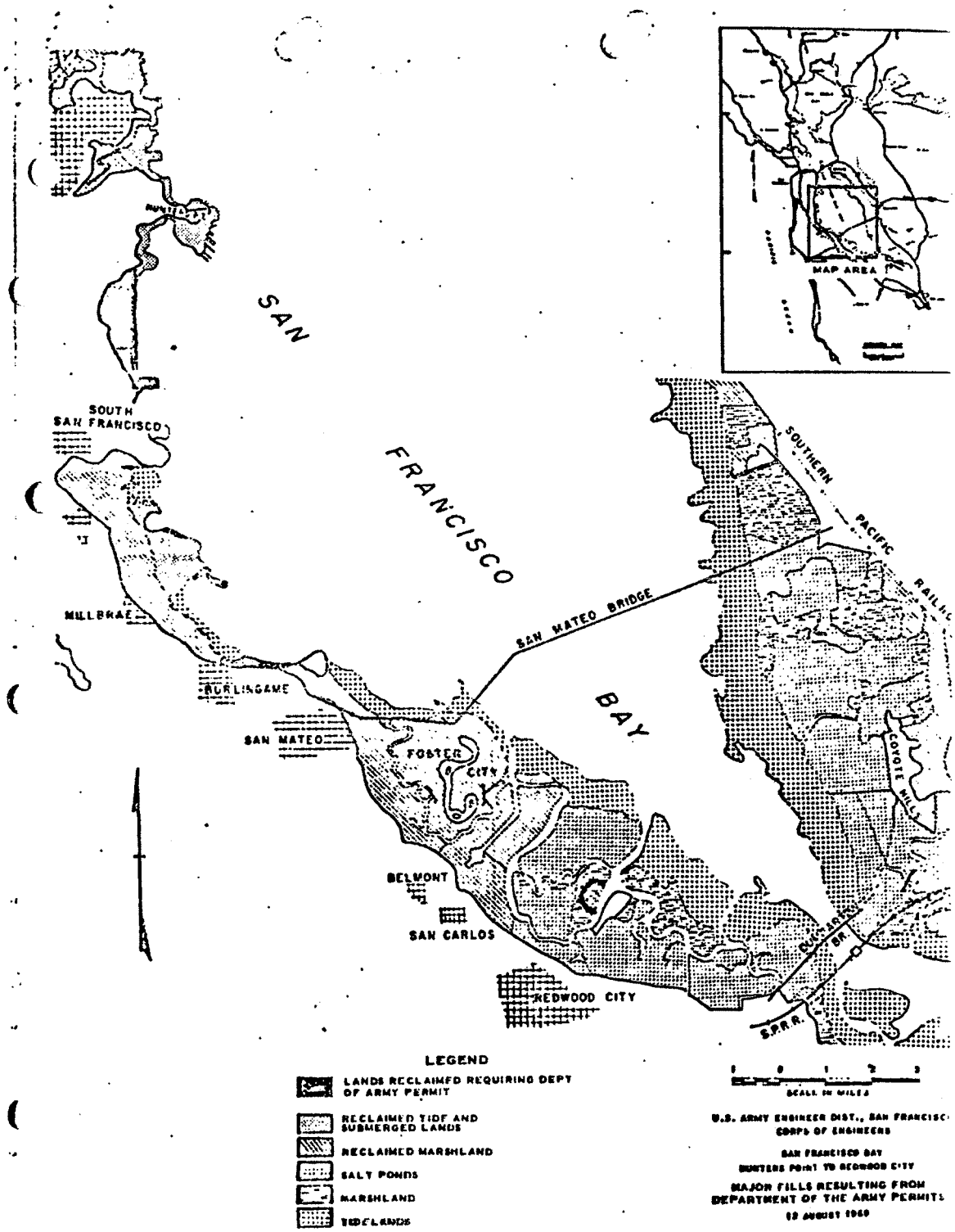
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DUMBARTON BR.
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MAP AREA
LEGEND
LANDS RECLAIMED REQUIRING DEPT OF ARMY PERMIT
RECLAIMED TIDE AND SUBMERGED LANDS
RECLAIMED MARSHLAND
SALT PONDS
MARSHLAND
TIDELANDS
SCALE IN MILES
U.S. ARMY ENGINEER DIST., SAN FRANCISCO
CORPS OF ENGINEERS
SAN FRANCISCO BAY
HUNTERS POINT TO REDWOOD CITY
MAJOR FILLS RESULTING FROM DEPARTMENT OF THE ARMY PERMITS

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 16

Letter from Col. Charles R. Roberts, Dist. Eng'r, U.S. Army Corps of Eng'rs, to San Francisco Bay Conservation and Development Commission
(Dec. 9, 1970)

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, CORPS OF ENGINEERS
100 McALLISTER STREET
SAN FRANCISCO, CALIFORNIA 94102

SPNCO

9 December 1970

San Francisco Bay Conservation
and Development Commission
507 Polk Street
San Francisco, California 94102

RECEIVED
DEC 14 1970
SAN FRANCISCO BAY CONSERVATION
& DEVELOPMENT COMMISSION

Gentlemen:

This refers to your recent letter requesting a policy statement with regard to the Leslie Salt ponds located adjacent to San Francisco Bay.

The Corps of Engineers is responsible for administering federal laws which govern work in navigable waters of the United States, which may generally be defined as those which form in their ordinary condition, by themselves or by uniting with other waters, a continued waterway under which commerce is or may be carried on with other states or foreign countries in the usual methods in which such commerce is conducted by water. San Francisco Bay is considered navigable to the line of mean higher high water. However, not all tributaries and adjacent sloughs are so considered. Certain reaches have been declared navigable only after study has indicated that they conform to the definition noted above. A list of such waterways in the San Francisco District is inclosed for your information. It should be understood that this merely represents the views of the Department of the Army, since the jurisdiction of the United States can be conclusively determined only through judicial procedures.

During the 1920s and early 1930s the Corps of Engineers authorized the closing of several sloughs on Leslie Salt Company lands by damming, based on the consideration that such action was not detrimental to navigation. No restrictions on the use of such filled sloughs were imposed. The purpose of the dams, which were approved by local and State governments, was to facilitate the reclamation of privately-owned swamp and overflow lands upon which peripheral levees had been or would be constructed shoreward of mean higher high water. Inasmuch as the Corps of

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SPNCO
San Francisco Bay Conservation
and Development Commission

9 December 1970

Engineers only has jurisdiction over navigable waters to the MHHW line, it was not necessary for the Department to permit the levee construction. Nothing has come to the attention of this office that such work is presently interfering with navigation.

In recent years the conservation of natural resources has become a matter of general concern in the issuance of permits and more particularly since the amendment of the Fish and Wildlife Act in 1958.

Today, applications for new permits for work in navigable waters are fully considered in the context of effect on the general public interest, including but not limited to fish and wildlife, water quality, conservation, pollution, aesthetics and ecology, as well as navigation.

Sincerely yours,

Charles R. Roberts

CHARLES R. ROBERTS
Colonel, CE
District Engineer

1 incl
As stated

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 17

Defendants' Admissions of Fact and Genuineness of Documents, Admission No. 16, *Leslie Salt Co. v. Froehlke*, No. C-73-2294 (N.D. Cal. Mar. 14, 1974)

#1682

JAMES L. BROWNING, JR.
United States Attorney
DAVID E. GOLAY
Assistant United States Attorney
16th Floor Federal Building - Box 36055
450 Golden Gate Avenue
San Francisco, California 94102
Telephone: (415) 556-5135

Attorneys for Defendants

ORIGINAL FILED

MAR 14 1974

CLERK, U. S. DIST. COURT
SAN FRANCISCO

UNITED STATES DISTRICT COURT FOR THE

NORTHERN DISTRICT OF CALIFORNIA

LESLIE SALT CO., a Delaware corporation, Plaintiff, v. ROBERT F. FROEHLKE, Secretary of the Army; FREDERICK J. CLARKE, Chief of Engineers, U.S. Army Corps of Engineers; JAMES L. LAMMIE, District Engineer, U.S. Army Corps of Engineers, South Pacific Region, Defendants.	CIVIL NO. C-73-2294 OJC

DEFENDANTS' ADMISSIONS OF FACT
AND GEUINENESS OF DOCUMENTS

Pursuant Federal Rule 36, for the purposes of this action, defendants respond as follows to Plaintiff Request for Admissions of Fact and Geuinesess of Documents dated January 9, 1974:

1. Defendants admit that the patents attached as Exhibit A to Plaintiff's Request for Admissions are true and correct copies of the patents numbered in Request No. 1. Defendants cannot truthfully admit or deny that these patents describe the lands included in Exhibit B to the Complaint since: (1) they lack the survey and map data which would show that the properties described in Exhibit B of the Complaint correspond to the land described in Exhibit A of the Requests and (2) they cannot readily obtain such data. For the foregoing reasons Defendants also cannot truthfully admit or deny that the lands described in Exhibit B to the Complaint were patented pursuant to the Arkansas Swamp Act. In the alternative, Defendants

EXHIBIT 3

REQUEST NO. 8: The Corps of Engineers, Department of the Army, did not require Leslie Salt Co. or its predecessors in interest to apply for permits for the construction of the dikes that currently exist on the real property described in Exhibit B to the Complaint.

8. Defendants deny that they have never required permits of, or issued the same to Leslie Salt Co. or its predecessors in interest for the construction of any of the dikes that currently exist on the real property described in Exhibit B to the Complaint. Defendants admit that they have not required permits of, or issued the same to, Plaintiff or its predecessors in interest with respect to all such dikes.

REQUEST NO. 11: Prior to the adoption of 33 C.F.R. § 209.260 as amended by regulation published on September 9, 1972 in the Federal Register at Volume 37, No. 176, Page 18289, et. seq., and the adoption of Public Notices Nos. 71-22 and 71-22(a), the Department of the Army and Corps of Engineers did not require Leslie Salt Co. to apply for a permit for new work in unfilled portions of the interior of diked areas below former mean higher high water.

11. Defendants admit Request No. 11.

REQUEST NO. 12: Prior to the adoption of 33 C.F.R. § 209.260 as amended by regulation published on September 9, 1972 in the Federal Register at Volume 37, No. 176, page 18289, et seq., and the adoption of Public Notices Nos. 71-22 and 71-22(a), the Department of the Army and Corps of Engineers considered the landward extent of its jurisdiction in the San Francisco Bay to be the line of mean higher high water except that in marshland areas it was considered to be the outer edge of the marshgrass.

12. Defendants admit that the definition of jurisdiction set forth in Request No. 12 applied immediately, but not at all times, prior to adoption of the regulations and notices to which said Request refers.

REQUEST NO. 13: Prior to the adoption of 33 C.F.R. § 209.260 as amended by regulation published on September 9, 1972 in the Federal Register at Volume 37, No. 176, Page 18289, et. seq., and the adoption of Public Notices Nos. 71-22 and 71-22(a), the Department of the Army and Corps of Engineers recognized that the solid black line on the Coast and Geodetic Survey Charts delineated either the outer edge of the marsh or the line of mean high water in the South San Francisco Bay area, and that such solid black line represented a close approximation of the extent of the jurisdiction of the Corps in the South San Francisco Bay.

13. Defendants admit that the definition of jurisdiction set forth in Request No. 13 applied immediately, but not all times, prior

REQUEST NO. 16: At no time until the adoption of 33 C.F.R. § 209.260 as amended by regulation published on September 9, 1972 in the Federal Register at Volume 37, No. 176, Page 18289, et. seq., and the adoption of Public Notices Nos. 71-22 and 71-22(a) has the Department of the Army and Corps of Engineers required Leslie Salt Co. to seek a permit for any work conducted in either filled or unfilled portions of interior diked areas either above or below higher high water.

16. Defendants admit Request No. 16.

REQUEST NO. 17: That the current policies of the Department of the Army, Corps of Engineers, San Francisco District in requiring permits for all new work in unfilled portions of interior diked areas below former mean higher high water represents a change in policy by the Corps resulting from the adoption of 33 C.F.R. § 209.260 as amended by regulation published on September 9, 1972 in the Federal Register at Volume 37, No. 176, Page 18289, et.seq., and the adoption of Public Notices Nos. 71-22 and 71-22(a).

17. Defendants admit Request No. 17.

REQUEST NO. 28: That prior to the adoption of 33 C.F.R. §209.260 as amended September 8, 1972, and the adoption of Public Notices Nos. 71-22 and 71-22(a), the Department of the Army, Corps of Engineers was aware of the construction of dikes and other facilities for the reclamation of marshlands in San Francisco Bay by Leslie Salt Company and its predecessors in interest.

28. Defendants admit Request No. 28.

REQUEST NO. 30: That the Department of the Army, Corps of Engineers, now contends that the property described in Exhibit B (to the complaint) or portions thereof are or were, in their last natural state, covered by "navigable waters of the United States" or "navigable waters" as those terms are used in 33 U.S.C. §401 and 403.

30. Defendants admit that they now contend that some portions of the property described in Exhibit B to the Complaint are or were, in their last natural state, covered by the navigable waters of the United States. Defendants cannot truthfully admit or deny that they now contend that all portions of said property are or were so covered because: (1) they lack the survey and map data necessary to determine which portions of said property are or were so covered and (2) they cannot readily obtain such data.

REQUEST NO. 31: That the Department of the Army, Corps of Engineers, now considers the property described in Exhibit B (to the complaint) or portions thereof to be used or susceptible of use as a highway for interstate or foreign commerce.

31. Defendants admit that they now consider some portions of the property described in Exhibit B to the Complaint to be used or susceptible of use as a highway for interstate or foreign commerce. Defendants deny that they now consider all of the said property to be so used or susceptible of use.

REQUEST NO. 33: That the Department of the Army, Corps of Engineers now contends that marshlands or former marshlands in San Francisco Bay located above the plane of mean high water and below the plane of mean higher high water or former mean higher high water are subject to its jurisdiction.

33. Defendants admit that they exercise jurisdiction in San Francisco Bay to the line on shore reached by the plane of the mean of the higher high water and over all new work in unfilled portions of the interior of diked areas below former mean higher high water. Except as they have thus admitted, Defendants deny Request No. 33.

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 18

Memo from the Office of the Chief of Eng'rs to Div. Eng'r, Report on Application for a Department of the Army Permit to Fill Former Marshland for the Hahn Shopping Center in San Francisco Bay, Corte Madera, California (Apr. 25, 1975); Letter from H. A. Flertzheim, Dist. Eng'r, to James L. Barrett, Esq. (May 7, 1975)

DAEN-GCZ-A/DAEN-CWZ-A (23 Jan 75) 2d Ind
SUBJECT: Report on Application for a Department of the Army Permit to Fill Former Marshland for the Hahn Shopping Center in San Francisco Bay, Corte Madera, California PN 73-24(a)

DA, Office of the Chief of Engineers, Washington, D.C. 20314 25 APR 1975

TO: Division Engineer, South Pacific

1. After review of the administrative record forwarded by preceding correspondence, the matter is returned for continuance of action as hereinafter indicated.

2. While the report itself is unclear on whether the land covered by the permit application underlies a navigable water, for the filling of which a Department of the Army permit is required, the letter dated 2 August 1972 from the San Francisco Bay Conservation and Development Commission states, "that no portion of the Hahn property is or has been touched by tidal water on or after September 17, 1965, the date this Commission acquired its 'bay' jurisdiction." Moreover, the report describes the Hahn property as being grassland, and from the furnished charts the area became grasslands decades ago when the Northwestern Pacific Railroad embankment was constructed, separating the Hahn property from bay waters and the bay ecosystem, thus converting the site covered by the permit application into dry land. The record also indicates that parts of the area have been filled in the past.

3. A determination is required as to whether the area covered by the permit application is wetland or dry land. Aside from the premise that an announced mission of the Corps of Engineers is the preservation of wetlands, not land use regulation, the threshold question is whether the Corps of Engineers has the authority to apply its permit program in areas which have lost their identity as waters of the United States. Subsequent to your transmittal of subject report, the U.S. Supreme Court, on 18 February 1975, denied a writ of certiorari in the case of United States v. Stoeco Homes, Inc., 498 F.2d 597, which leaves unchallenged the opinion of the U.S. Court of Appeals for the Third Circuit that,

> When Stoeco purchased in 1951 what then had been fast land for twenty four years the navigational servitude had long since been surrendered. We reach this conclusion as a matter of statutory interpretation of §10, mindful that though the Congressional power over the regulation of commerce is far reaching that power is limited by the due process and taking clauses of the fifth amendment. Certainly a construction which would, after government inactivity from 1890 to 1970, cast doubt upon the

> property status of thousands of acres of former tidal marshes would present problems under that amendment. Cf. United States v. Pennsylvania Industrial Chemical Corp., 411 U.S. 665, 674 (1973).
>
> We conclude, therefore, that the broad injunction against any construction whatsoever in the premises in question cannot be sustained on the theory that a §10 permit is required for such construction. That holding is limited, of course, to tidal marshlands which had become fast land prior to the change in policy of the Army Corps of Engineers. Any work undertaken in estuarine areas which were subject to the ebb and flow of the tide when the Army Corps of Engineers published its new regulations asserting the navigational servitude to its full extent, are, under the terms of these regulations, now subject to the §10 permit requirement. (emphasis added)

4. Reference is made to the Corps of Engineers regulation published at 33 C.F.R. 209.120(g)(12)(vii) providing that applications will not be required for work or structures completed before 18 December 1968 unless the District Engineer determines that the interests of navigation so require. This provision in the regulations coupled with the inaction of the Corps in respect to the construction of the railroad embankment and levees makes applicable the rationale of the Stoeco case that, "the premises in question became fast rather than tidal land."

5. Therefore you should determine whether the land covered by the permit application is fast or dry land. If you so determine, the applicant should be notified that the Corps has no jurisdiction over his proposed activity and therefore cannot interpose any objection. I can understand your feeling that a permit action is necessary, but cannot agree in the face of clear court decisions to the contrary.

FOR THE CHIEF OF ENGINEERS:

7 Incl [illegible]
nc

J. W. MORRIS
Major General, USA
Director of Civil Works

SPDOC (23 Jan 75) 3d Ind
SUBJECT: Report on Application for a Department of the Army Permit to Fill Former Marshland for the Hahn Shopping Center in San Francisco Bay, Corte Madera, California PN 73-24(a).

DA, South Pacific Division, Corps of Engineers, 630 Sansome Street, Room 1216, San Francisco, California 94111

6 May 1975

TO: District Engineer, San Francisco

Regarding the guidance and direction included in preceding indorsement, it has been determined through on-site inspections that the proposed work is within an area that is classified as dry land. Therefore, the applicant should be promptly notified in accordance with paragraph 5, preceding 2d Indorsement.

Richard M. Connell

RICHARD M. CONNELL
Brigadier General, U. S. Army
Division Engineer

SPNOC

James L. Barrett, Esq.
Barrett, Stearns, Collins, Gleason & Kinney
1150 Union Bank Building
Del Amo Financial Center
21515 Hawthorne Boulevard
Torrance, California 90503

Dear Mr. Barrett:

On 23 January 1975, your client's application for a Department of the Army permit to fill former marshland for the Mahn Shopping Center in San Francisco Bay, Corte Madera, California, was referred to the South Pacific Division and subsequently to the Office of the Chief of Engineers for decision.

Shortly thereafter on 18 February 1975, the U. S. Supreme Court denied a writ of certiorari in the case of United States vs. Stocco Homes, Inc., 498 F.2d 597 (3d Cir. 1974), thus leaving unchallenged the opinion of the U. S. Court of Appeals for the Third Circuit in this case.

Based upon the Stocco case, and the unique and specific facts surrounding your permit application, higher authority has determined that the Corps of Engineers no longer has jurisdiction over the specific area of your client's proposed activity and therefore cannot interpose any objection. Accordingly, a permit is not required, and your client's application will be terminated without action.

Sincerely yours,

H. A. FLERTZHEIM, JR.
Colonel, CE
District Engineer

Copy Furnished:
Mr. Robert J. Flahive
Mayor, Town of Corte Madera

PLTF's Exhibit 5 for Ident.
Witness COLONEL FLERTZHEIM
Reporter: WILLIAM W. GRIGGS, Date 5-29-75

PLTF's 5

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 19

Memorandum from Steven L. Stockton, Director of Civil Works, U.S. Army Corps of Engineers, to South Pacific Division Commander, The "normal circumstances" concept as applied to Cargill's plant site at Redwood City, CA consisting of salt production facilities (Oct. 2, 2009)

("Normal Circumstances Memo")

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

REPLY TO
ATTENTION OF

CECW-CO

OCT 2 2009

MEMORANDUM FOR SOUTH PACIFIC DIVISION COMMANDER

SUBJECT: The "normal circumstances" concept as applied to Cargill's plant site at Redwood City, CA consisting of salt production facilities

1. References:

a. 33 CFR 328.3(b), U.S. Army Corps of Engineers definition of "wetlands."

b. U.S. Army Corps of Engineers 1987 Wetland Delineation Manual, Part IV., Section F. "Atypical Situations."

c. U.S. Army Corps of Engineers. 2008. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region. U.S. Army Engineer Research and Development Center. ERDC/EL TR-08-13.

d. U.S. Army Corps of Engineers. 2008. Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region. U.S. Army Engineer Research and Development Center. ERDC/EL TR-08-30.

e. Memorandum to All Division and District Counsels, Attempts to Evade 404 Jurisdiction By Pumping Water from Wetlands, 10 April 1990.

f. Regulatory Guidance Letter 82-2, Clarification of "Normal Circumstances" in the Wetland Definition, 11 February 1982.

g. Regulatory Guidance Letter 86-9, Clarification of "Normal Circumstances" in the Wetland Definition (33 CFR 323.2(c)), 27 August 1986.

h. Regulatory Guidance Letter 90-7, Clarification of the Phrase "Normal Circumstances" as it pertains to Cropped Wetlands, 26 September 1990.

i. Memorandum Thru CDR, South Atlantic Division For CDR HQUSACE, Jacksonville District approach to "normal circumstances" and use of Section F of the 1987 Wetland Delineation Manual for jurisdictional determinations in the Everglades Agricultural Area, 10 March 2009.

j. Memorandum for South Atlantic Division Commander, Jacksonville District's March 10, 2009 request that CECW-CO-R review and comment on the district's approach to "normal circumstances" and application of Section F of the 1987 Wetland Delineation Manual for jurisdictional determinations in the Everglades Agricultural Area, 30 April 2009.

2. The question addressed in this memo is: How does the "normal circumstances" aspect of the Corps definition of the term "wetlands" apply to the Cargill Corporation's plant site at Redwood City, CA, which consists of salt production facilities? The question was raised by the San Francisco District Office of Counsel, at the suggestion of the District Regulatory Program staff, at a pre-application meeting between representatives of Cargill and their partners and Corps staff from the District, Division, and Headquarters levels on 9 June 2009. This question is relevant to how the Corps will process a permit application for development of the Cargill site pursuant to a "preliminary jurisdictional determination" for that site.

3. The U.S. Army Corps of Engineers (Corps) regulations define "wetlands" for purposes of Section 404 of the Clean Water Act as follows:

> The term 'wetlands' means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas. 33 CFR 328.3(b).

The regulatory definition of "wetlands" defines that term by referring to a site's conditions under "normal circumstances." The term "normal circumstances" is not formally defined in the Corps or U.S. Environmental Protection Agency (EPA) regulations for implementing the Clean Water Act Section 404 program. However, the meaning of this concept of "normal circumstances" was explained in the preamble to the 1977 rulemaking establishing the definition of "wetlands," in three subsequent regulatory guidance letters (RGLs), and other memoranda.

4. The preamble to the rule establishing the current definition of "wetlands" stated that:

> Our intent under Section 404 is to regulate discharges of dredged or fill material into the aquatic system as it exists and not as it may have existed over a record period of time. 42 Fed. Reg. 37122, 37128 (July 19, 1977).

Although the preamble indicates an intent to regulate discharges into the aquatic system as it exists, there was always the recognition that the regulations needed to protect against a landowner who might try to strategically manipulate the hydrology or vegetation of a site in

order to eliminate jurisdiction. To this end, an exception was made to the rule that you determine jurisdiction over a site based on the site conditions as they exist at the time of the jurisdictional determination. This exception was embodied in the term "normal circumstances," which the preamble explains:

> ...was included in the definition to respond to those situations in which an individual would attempt to eliminate the permit review requirements of Section 404 by destroying the aquatic vegetation .... *Id.*

This was a concern in crafting the original definition of "wetlands" and was deliberately carried over in the existing definition. *Id.*

5. There was a concurrent awareness that while it was important to address situations whereby landowners might attempt to manipulate their land out of Section 404 jurisdiction by altering one or more of the three wetland indicators (i.e., hydrophytic plant community, wetland hydrology, hydric soils), it was equally important to insure that property that had formerly been wetlands but that had legitimately been transformed into dry land was not categorized as a jurisdictional wetland.

> "We do not intend, by this clarification, to assert jurisdiction over those areas that once were wetlands and part of an aquatic system, but which, in the past, have been transformed into dry land for various purposes." *Id.*

Thus, the term "normal circumstances" was not intended to pull into CWA jurisdiction any area that had formerly been "wetlands" under the area's "natural conditions." There was a recognition that wetlands could be altered in a legitimate manner in a way that would eliminate the area's wetland properties and that this would remove the area from Section 404 jurisdiction as "wetlands."

6. After the promulgation of the 1977 rule with the current definition of "wetlands" that included the "normal circumstances" language, three RGLs were issued to further clarify the meaning of "normal circumstances." RGL 82-2 and RGL 86-9, both titled "Clarification of 'Normal Circumstances' in the Wetland Definition," reiterated the policies stated in the preamble to the 1977 rulemaking, and provided additional clarification for applying "normal circumstances." Regulatory Guidance Letter 82-2 states that:

> Many areas of wetlands converted in the past to other uses would, if left unattended for a sufficient period of time, revert to wetlands solely through the devices of nature. However, such "natural circumstances" are not what is meant

> by "normal circumstances".... "Normal circumstances" is determined on the actual, present use of an area. Regulatory Guidance Letter 82-2, Clarification of "Normal Circumstances" in the Wetland Definition, 11 February 1982 (hereinafter "RGL 82-2").

This RGL does not state what types of wetland conversions relate to the "actual, present use of an area." It focuses on the 1977 preamble language that discusses how the concept of "normal circumstances" applies to the removal of aquatic vegetation or the abnormal presence of aquatic vegetation in a non-aquatic area.

Regulatory Guidance Letter 86-9 reiterated the concept that "natural circumstances" are not what is meant by "normal circumstances." This RGL expanded on a statement made in RGL 82-2 by saying that "'[n]ormal circumstances are determined on the basis of an area's characteristics and use, at present and in the recent past." Regulatory Guidance Letter 86-9 also reinforced the Corps position that it does not intend to regulate areas that were once wetlands but "have been transformed into dry land for various purposes." Regulatory Guidance Letter 86-9, Clarification of "Normal Circumstances" in the Wetland Definition (33 CFR 323.2(c)), 27 August 1986 (hereinafter "RGL 86-9").

These two RGLs reiterate that: (1) an individual should not be allowed to "eliminate the permit review requirements of Section 404 by destroying the aquatic vegetation" and (2) that areas that had previously been legitimately converted from wetlands to some other use should not be categorized as wetlands (under the section 404 definition) on the basis of the area's former wetland status if the area no longer exhibited the attributes of a wetland.

7. The concept of "normal circumstances" is also applied in the Corps' 1987 Wetland Delineation Manual ("1987 Manual") and the Regional Supplements to the Corps Delineation Manual. Section F of Part IV of the 1987 Manual and Chapter 5 of the Regional Supplements address how to identify and delineate wetlands for purposes of Section 404 of the Clean Water Act when atypical situations exist on a site. Atypical situations are defined as wetlands in which vegetation, soils, or hydrology indicators are absent due to recent human activities or natural events. Among the situations to which these sections apply is when unauthorized activities resulting in a regulated discharge (i.e., a discharge that is subject to the "activities jurisdiction" of the CWA) alter the site conditions in a way that eliminates one or more of the three wetland parameters. The discussion of this type of situation explicitly excludes authorized, exempted activities, or "unregulated" activities (i.e., activities not subject to the "activities jurisdiction" of the CWA), that altered the site's wetland parameters, indicating that the conditions resulting from the authorized, "unregulated," or exempted activities are the normal circumstances for the site and the wetland delineation should look at the site's existing rather than former characteristics. *Id.*

8. Several official Corps memos have been written to resolve difficult questions of what "normal circumstances" are in specific cases. The first memo involved a situation where a landowner was reportedly using pumps to drain wetlands in order to eliminate one or more of the wetland parameters and thus evade Section 404 jurisdiction, Attempts to Evade 404 Jurisdiction By Pumping Water from Wetlands, 10 April 1990. At that time, it was determined that the conditions brought about by efforts to evade CWA jurisdiction by pumping do not represent the "normal circumstances" of the site even where the pumping or other activities could be accomplished without a regulated Section 404 discharge. *Id.*

9. The next guidance written regarding the application of "normal circumstances" to a specific scenario involved the application of that concept to cropped wetlands. Regulatory Guidance Letter 90-7, Clarification of the Phrase "Normal Circumstances" as it pertains to Cropped Wetlands, 26 September 1990 (hereinafter "RGL 90-7"). Aside from this RGL's focus on clarifying the term "normal circumstances" for cropped wetlands, it makes a general statement that:

> The primary consideration in determining whether a disturbed area qualifies as a section 404 wetland under "normal circumstances" involves an evaluation of the extent and relative permanence of the physical alteration of wetlands hydrology and hydrophytic vegetation. In addition, consideration is given to the purpose and cause of the physical alteration to hydrology and vegetation. *Id.* at 2.

As in the two previous RGLs, Corps personnel are to consider whether any physical alterations to vegetation or hydrology have been done in an attempt to avoid section 404 regulation.

Per the RGL, cropped wetland that has been subject to extensive and relatively permanent hydrologic modifications such that the area would no longer support a prevalence of hydrophytic vegetation, even if cropping were to cease, is not a wetland under normal circumstances. In this case, the altered/drained cropland condition constitutes "normal circumstances." *Id.* at 3. In contrast, for cropped wetland that was manipulated and cropped but still exhibited important wetland values, the cropped state was not considered to be the "normal circumstances" because hydrophytic vegetation would return if the cropping ceased. *Id.* For cropped wetlands, the distinction between what qualified as "normal circumstances" was drawn between those areas where the permanence of the alterations was sufficient to eliminate the area's capacity to support hydrophytic vegetation in the near term if cropping were ceased and those areas where the changes were not sufficiently permanent to prevent hydrophytic vegetation from returning shortly after cropping ceased.

10. The most recent memorandum written on the application of "normal circumstances" to a specific case justified the application of the "normal circumstances" analysis to the area known as the Everglades Agricultural Area (EAA). Memorandum Thru CDR, South Atlantic Division For CDR HQUSACE, Jacksonville District approach to "normal circumstances" and use of Section F of the 1987 Wetland Delineation Manual for jurisdictional determinations in the Everglades Agricultural Area, 10 March 2009 (hereinafter "District EAA Memo"). The EAA was created in part of the Everglades just to the south of Lake Okeechobee in Florida. In order to facilitate agriculture on the land, a system of ditches, canals, and pumps has been used to drain the land to varying degrees to support production of a variety of crops. District EAA Memo, at 3. Pumps are required to be used on individual farms to manipulate the level of the water table on that farm's fields, sometimes being pumped dry and other times being allowed to flood for rice farming, or while the fields are fallow, or to manage soil conditions. *Id.* at 4. Although the EAA and many of the canals and ditches in the area were established decades ago and before the enactment of the CWA, it is the variable pumping down of the water table that removes wetland hydrology from the site. The alteration of hydrology, plus vegetation management on the site to grow crops, affects application of the section 404 wetland definition. The pumping down of the water table constitutes a current, on-going manipulation of the local hydrology that is necessary to allow agricultural production of sugar cane and winter vegetables, as well as sod, to continue and which prevents wetland hydrology from being readily observed on site. Because it is on-going human activities that are preventing wetland indicators from being observed, and those activities are being undertaken specifically to alter the hydrology of the site to produce specific crops, it was deemed appropriate to apply the "normal circumstances" analysis in Section F of the 1987 Manual and to evaluate the area as it would exist if there was no active pumping. In contrast, the construction of the canals and ditches has resulted in a relatively permanent alteration of the natural hydrology of the EAA, and therefore are a component for establishing the normal circumstances for the area. Since use of water pumps is necessary to actively manage local hydrology for crop production and rotational cycles, use of those pumps does not constitute a relatively permanent change to local hydrology, and therefore is not part of the normal circumstances for the EAA. In summary, the agencies determined that normal circumstances for the site includes the canals and ditch network constructed as part of the EAA, but with no active pumping.

11. Based on the past guidance referenced above, we can summarize the general approach that the Corps has taken to apply the concept of "normal circumstances" to the section 404 definition of "wetland." First, a regulator should determine what the "normal circumstances" are at the site, by considering whether the landowner has recently altered his or her property with the intent of evading Section 404 jurisdiction. Also, a regulator should apply the "normal circumstances" analysis when continued and on-going active management of the local hydrology and/or vegetation is being done to suppress one or more wetland indicators at a site. On-going, active

management of a site is a "recent human activity," 1987 Manual, p. 83, even when it has been continuously conducted for a length of time, and it is often evidence of the fact that "physical alteration of the wetlands hydrology and hydrophytic vegetation" is not relatively permanent, RGL 90-7. Therefore, when there is active management of a site, such as using pumps to locally draw down the water table, the "Atypical Situations" section of the 1987 Manual should be used to evaluate the normal circumstances that would exist on the site if the active management ceased.

12. It is important to distinguish on-going, active management that continually alters a site's hydrology and/or vegetation from "one-time" activities that result in a relatively permanent change in the hydrology and/or vegetation. RGL 90-7, paragraph 4. These "one-time" activities tend to be more structural in nature, e.g., placement of fill material over hydric soils, placement of drainage tile, construction of levees or drainage ditches. If an activity that was either authorized under the CWA, or exempted or excluded from CWA regulation, or that occurred before the passage of the CWA, effected a one-time structural change, the normal circumstances for the site would be the site as it exists with the structural change in place. 1987 Manual, p. 83. As the 1987 Manual notes, jurisdictional wetlands may continue to exist on a site even after the site has been altered by permitted activities, but, when determining whether jurisdictional wetlands persist on sites with authorized or exempt alterations, the wetland determination must look at the site with these structural alterations in place.

13. The Cargill plant site at Redwood City, CA, consists of approximately 1400 acres of salt production facilities that comprise the final stages of the salt production process. The facility was created in an area on the south edge of San Francisco Bay that was likely formerly a complex of tidal sloughs and wetlands. The facility site was hydrologically severed from the bay by a levee constructed in the 1940s pursuant to a War Department permit issued pursuant to Section 10 of the Rivers and Harbors Act of 1899. All site construction and topographical manipulation occurred prior to the enactment of the CWA. Currently, the site consists almost entirely of roughly 17 "cells," or interior areas that are separately diked off to control the level and distribution of liquids within the site. One type of liquid at the Redwood City Cargill plant is "brine" or "pickle," which is a highly saline solution created by letting large quantities of salt water taken from the bay concentrate through evaporation by the sun and wind over a period of several years. This brine/pickle is pumped on to the Redwood City site from other evaporation cells in the south bay area after having already having been concentrated for several years through evaporation. The brine/pickle is moved to different cells on the site during the course of production through a combination of gravity and pumps. When it reaches the correct concentration, the brine/pickle is moved into the "crystallizer beds" at the Redwood City site where the sodium chloride is allowed to precipitate out, leaving a residual solution called

"bittern" that is eventually moved into a separate cell. After the bittern has been removed from the crystallizer beds, the dry salt is harvested through a mechanical process that scrapes the majority of the salt off the bed of the cell. The bittern is either recycled back into process or pumped into trucks and sold for other commercial/industrial uses. In this production process, any pumping that occurs is used to move the brine/pickle or bittern from one cell to another on site or to move the bittern off site when it is sold at the end of the process.

14. The circumstances on the Redwood City plant site are substantially different from those in the Everglades Agricultural Area. In the EAA, pumping is used to continually alter the hydrology of the site by drawing down the water table to varying degrees for the purposes of crop production. The Redwood City plant site is an industrial facility that produces salt products by the manipulation of liquids through a series of evaporation cells. On the Redwood City plant site, pumping is not used to draw down the water table or to eliminate a wetland indicator. Instead, pumping is used to move fluids through a series of evaporation cells to facilitate salt production. The actions that altered the natural hydrology of the Redwood City plant site occurred when the site was first developed decades ago through the construction of the permitted exterior levee, which severed the hydrological connection and tidal exchange between the site and the bay. Because the actions that altered the hydrology on the Redwood City plant site were "one-time" activities that were permitted and occurred before the enactment of the CWA, and because the on-site pumping is not being done to continually alter the natural site hydrology, the normal circumstances on the Redwood City plant site are to be viewed as the site exists today, with normal salt production operations. Thus, the "normal circumstances" for the Redwood City Cargill plant site are the circumstances of an industrial site for making salt, not the circumstances of the site that existed decades ago before the levees were built and before the area was converted into an industrial salt-making facility. Consistent with the direction in the 1987 Manual and the applicable Regional Supplement, to determine if wetlands exist anywhere on the Redwood City plant site, the plant site should be evaluated in its current state as a salt production facility with pumps periodically moving water between the different cells, and not based on any historical conditions at that site.

FOR THE COMMANDER:

STEVEN L. STOCKTON, P.E.
Director of Civil Works

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 20

Memorandum from Daniel W. McGovern, Regional Administrator, Region IX, EPA, Geographical Extent of Clean Water Act Jurisdiction at Bolsa Chica, Orange County, CA
(Feb. 10, 1989)

United States
Environmental Protection
Agency

Regional Administrator
215 Fremont Street
San Francisco CA 94105

Region 9
Arizona, California
Hawaii, Nevada
Pacific Islands

EPA

February 10, 1989

MEMORANDUM

SUBJECT: Geographical Extent of Clean Water Act Jurisdiction at Bolsa Chica, Orange County, CA

The Environmental Protection Agency (EPA) has completed the subject delineation and its findings are documented in a report titled "A Determination of the Geographical Extent of Clean Water Act Jurisdiction at Bolsa Chica, Orange County, CA, February 1989"; specific areas subject to jurisdiction are identified on maps therein. These findings are drawn from on-site investigations made by EPA in 1985-1988, as well as from technical data supplied by the landowner and state and federal agencies. EPA has determined that approximately 927 acres of the site are "waters of the United States" subject to regulation under Section 404 of the Clean Water Act (CWA).

Unless specifically exempted, all proposed discharges of dredged or fill material into portions of the site which EPA has determined to be "waters of the United States" require Department of Army authorization under Section 404 of the CWA (33 U.S.C. §1344); "waters of the United States" are defined at 40 CFR 230.3(s) and at 33 CFR 328.3. The District Engineer of the U.S. Army Corps of Engineers (Corps), Los Angeles District, is the responsible authority for issuance of such authorization for the Bolsa Chica properties subject to EPA's jurisdictional delineation.

EPA's delineation of CWA jurisdiction does not address the presence or absence of "navigable waters of the United States" which would be subject to regulation under the Rivers and Harbors Act of 1899 (33 U.S.C. §403). The determination of jurisdiction at Bolsa Chica under that statute is the responsibility of the District Engineer of the Corps, Los Angeles District.

EPA's jurisdictional delineation is based upon the normal circumstances now existing on the Bolsa Chica site. A change in those circumstances may alter the extent of CWA jurisdiction. Questions regarding this CWA jurisdictional delineation should be addressed to Thomas G. Yocom, EPA (W-7-2), 215 Fremont Street, San Francisco, CA 94105.

Daniel W. McGovern
Regional Administrator

A DETERMINATION OF THE GEOGRAPHICAL EXTENT OF WATERS OF THE UNITED STATES AT BOLSA CHICA, ORANGE COUNTY, CALIFORNIA

PREPARED
BY
THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
SAN FRANCISCO, CALIFORNIA

FEBRUARY 1989

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EXECUTIVE SUMMARY

This report constitutes EPA's delineation of "waters of the United States" at Bolsa Chica, near Huntington Beach, Orange County, California, as those "waters" are defined in the Clean Water Act (CWA) regulations of the U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps). Those areas so delineated are subject to regulation under the CWA. Specifically, Department of the Army permits, pursuant to Section 404 of the CWA, are required for discharges of dredged or fill material into these "waters" unless specifically exempted pursuant to Section 404(f) of the CWA.

The authority to delineate "waters of the United States" at Bolsa Chica is the responsibility of the EPA pursuant to procedures outlined in a Memorandum of Understanding (MOU) between EPA and the Corps. On October 17, 1980, EPA declared Bolsa Chica a "special case", thereby taking sole responsibility for this determination.

In reaching its determination, EPA relied primarily upon physical evidence observed on the site by EPA and its technical advisory team and topographical maps provided by Signal Landmark, Inc. (Signal), the principal landowner. EPA also considered extensive hydrological and biological data provided by Signal, as well as data from the U.S. Fish and Wildlife Service, the California Department of Fish and Game, the California Attorney General, the County of Orange, the California Coastal Commission, and the California State Lands Commission.

EPA determined that there are approximately 927 acres of "waters of the United States" at Bolsa Chica, including wetlands (see map, Figure 9, page 24). These "waters" are found within virtually all low-lying portions of Bolsa Chica. These "waters" also include areas which were, historically, below the high tide line, which remain below this elevation, and which are restorable to the ebb and flow of the tide. Accordingly, those areas found not to be "waters of the United States" were areas of higher elevation, such as mesas and dunes, and/or areas which had been filled legally to an elevation greater than the mean high tide line, such as roads, levees, and oil drilling pads.

Many of the areas of Bolsa Chica found to be "waters of the United States" meet more than one regulatory definition of these "waters"; for example, many areas are also wetlands. In determining the extent of these federally-regulated wetlands, EPA utilized standardized methods used to guide EPA and the Corps in making such determinations. These methods require positive evidence that the vegetation, soil, and hydrologic regime of a site meet certain criteria in order to qualify the site as a wetland, as defined in EPA and Corps regulations.

The majority of the "waters of the United States" at Bolsa Chica are also "special aquatic sites" as defined in EPA's 404(b)(1) Guidelines (40 CFR 230), federal regulations that, in part, govern the issuance of permits to discharge dredged or fill material under Section 404 of the CWA. These "special aquatic sites" at Bolsa Chica include 1) wetlands, 2) mudflats, 3) vegetated shallows and 4) sanctuaries and refuges.

ON-SITE PARTICIPANTS IN THE JURISDICTIONAL DETERMINATION

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION IX, SAN FRANCISCO

Judith E. Ayres, Regional Administrator (1987)
Loretta Kahn Barsamian, Wetlands, Oceans and Estuaries Branch
Thomas G. Yocom, Regional 404 Coordinator
Robert A. Leidy, Wetlands Section
Lily Wong, Wetlands Section (1985)
James E. Broadway, Wetlands Section (1985)
Cheryl Beem, Wetlands Section (1987-1988)
Steven John, Wetlands Section
Ann Nutt, Office of Regional Counsel
John Cooper, Office of Regional Counsel (1987)
Hugh Barroll, Office of Regional Counsel
Laurie Kermish, Office of Regional Counsel
Harriet Hill, EIS Review Team
Paul Helliker, California Branch

EPA'S TECHNICAL ADVISORY TEAM

Robert T. Huffman, Huffman and Associates, San Francisco
Lyndon C. Lee, EPA Office of Wetlands Protection, Washington
William Blake Parker, Hydricsoils Inc., Woodland, AL
Robert Coats, Philip William and Associates, San Francisco
William Sipple, EPA Office of Wetlands Protection, Washington

OTHER AGENCY PERSONNEL ASSISTING EPA

Cheryl Hill, U.S. Army Corps of Engineers, Los Angeles (1985)
Clifford Rader, U.S. Army Corps of Engineers, Los Angeles (1985)
T.J. Stetz, U.S. Army Corps of Engineers, Los Angeles (1985)
Sharon Lockhart, U.S. Fish and Wildlife Service, Laguna Niguel
Nancy Kaufman, U.S. Fish and Wildlife Service, Laguna Niguel
Kevin Forester, U.S. Fish and Wildlife Service, Laguna Niguel
Heather Hollis, U.S. Fish and Wildlife Service, Laguna Niguel
Sheridan Stone, National Marine Fisheries Service, Terminal Is.
Ron Hinde, California Department of Fish and Game, Long Beach
Esther Burkett, California Department of Fish and Game, Long Beach

OBSERVERS REPRESENTING THE PROPERTY OWNER, SIGNAL LANDMARK

Thomas Bilhorn, Earth Sciences Consultants, San Diego, CA
Lawrence Brose, Malkoff and Associates, Santa Ana, CA
C. Robert Feldmeth, C. Robert Feldmeth and Assoc., Claremont, CA
Keith Macdonald, Keith B. Macdonald & Associates, San Diego, CA
Melvin Malkoff, Malkoff and Associates, Santa Ana, CA
Dana Sanders, Dana Sanders and Associates, Vicksburg, MS
David Smith, David Smith and Associates, La Jolla, CA
Virginia Albrecht, Beveridge and Diamond, Washington, D.C.
William Hedeman, Beveridge and Diamond, Washington, D.C.
Harold Himmelman, Beveridge and Diamond, Washington, D.C.
Marc Zeppatello, Beveridge and Diamond, Washington, D.C.

INTRODUCTION

The U.S. Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (Corps) have been assigned agency missions of evaluating various activities that impact water quality and interstate commerce. Among the most significant is their shared responsibility in the implementation of Section 404 of the Clean Water Act (Federal Water Pollution Control Act, as amended, 33 U.S.C. 1344). The goal of the Act is to preserve and restore the biological, physical, and chemical integrity of the nation's water quality. Section 404 of the Act implements these goals by regulating the discharge of dredged and fill material into "waters of the United States". The objective of this study is to determine which portions of property at Bolsa Chica are "waters of the United States" and, therefore, subject to regulation under Section 404 of the CWA. This report describes EPA's methods and the results of its studies which determined the geographical extent of all "waters of the United States" within Bolsa Chica lands as they now exist.

In 1980, the EPA designated Bolsa Chica a "special case" under the Agency's Memorandum of Understanding (MOU) with the Corps regarding determination of the geographical extent of CWA jurisdiction. Although the MOU allows the Corps to make jurisdictional determinations in most cases, EPA remains the final authority on CWA jurisdiction. EPA can, therefore, perform jurisdictional determinations for specific sites that EPA has designated as "special cases" pursuant to the MOU.

Accordingly, EPA has the sole responsibility for determining which portions of Bolsa Chica are subject to regulation under Section 404 of the CWA. Under Section 404 of the CWA, no discharge of dredged or fill material may be made into any site that constitutes "waters of the United States" without a Department of Army permit from the Corps, unless the discharge is specifically exempted under Section 404(f) [normal farming practices]. (Note: In cases where the permitting authority has been delegated to a state, state authorization rather than Department of Army would be required).

"Waters of the United States" are defined at 40 CFR 230.3(s) (EPA Regulations) and at 33 CFR 328.3(a) (U.S. Army Corps of Engineers Regulations) as:

"1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate and foreign commerce, including all waters which are subject to the ebb and flow of the tide;

2. All interstate waters including interstate wetlands;

3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet

meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:

(i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

(ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(iii) Which are used or could be used for industrial purposes by industries in interstate commerce;

4. All impoundments of waters otherwise defined as waters of the United States under the definition;

5. Tributaries of waters identified in paragraphs [(1)-(4)] of this section;

6. The territorial sea;

7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s) (1)-(6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the Clean Water Act (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States."

Wetlands are defined by EPA and Corps regulations [40 CFR 230.3(t) and 33 CFR 328.3(b)] as:

"areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Interstate or foreign commerce as referred to in 40 CFR 230.3(s)(3) and 33 CFR 328.3(a)(3) may include, for example, waters 1) which are or would be used as habitat by birds protected by Migratory Bird Treaties, 2) which are or would be used as habitat by other migratory birds which cross state lines, 3) which are or would be used as habitat for endangered species, or 4) used to irrigate crops sold in interstate commerce.

It is these regulatory definitions that guided the jurisdictional determination for Bolsa Chica.

DESCRIPTION OF THE BOLSA CHICA PROPERTY

Bolsa Chica is a coastal property lying north of the City of Huntington Beach and south of the City of Seal Beach in Orange County, California (Figure 1). The Pacific Coast Highway forms the southwestern boundary of the property. The northwestern and southeastern boundaries are on upland mesas. The northeastern boundary runs along existing housing developments and related roadways and infrastructure. EPA's delineation of CWA jurisdiction is limited to these areas and does not include any areas with existing housing and related infrastructure. No determination of the presence or absence of jurisdiction was made in such areas adjacent to the properties investigated in this delineation effort.

The principal landowner of the properties delineated in this study is Signal Landmark Inc. (Signal), with smaller parcels owned by the W.R. Grace Company and the Metropolitan Water District of Southern California (MWD). Inasmuch as Signal has indicated that it will be seeking necessary permits to develop the entire site, EPA's delineation includes all of the parcels of property proposed for that development, including lands that Signal has indicated it intends to use to offset losses of wetlands and other "waters of the United States" resulting from its planned commercial and residential developments.

Low-lying portions of the property historically were part of a coastal tidal salt and brackish-water marsh (Figure 2). Most of the low-lying areas no longer receive any regular tidal influence, having been diked or filled for various purposes. The earliest of these developments was diking that began in 1899 for a private hunting club. Most recent developments on the site have been diking and filling for oil extraction and for adjacent housing developments. Active and passive drainage systems to protect the housing developments and oil production facilities have altered further the surface and subsurface hydrology of the site.

The currently unfilled, low-lying portions of the site consist mostly of channels and ponds, unvegetated flats, and areas supporting wetland vegetation. Surface elevations of most of these low-lying areas are at or below mean sea level (MSL). Non-filled areas generally appear to be undisturbed, and in many such areas the original meandering channels and sloughs are still discernable (Figure 3). These areas also have retained soils and vegetation characteristic of coastal salt marshes in southern California. One portion of the property owned by the MWD is presently farmed, but has not, for the most part, been filled.

More detailed descriptions of the site, chronology of the diking and filling activities, and hydrological modifications have been presented in other studies prepared for Signal (most recently by Sanders 1987). Previous studies have characterized subsections of the property with names such as "Rabbit Island" (a

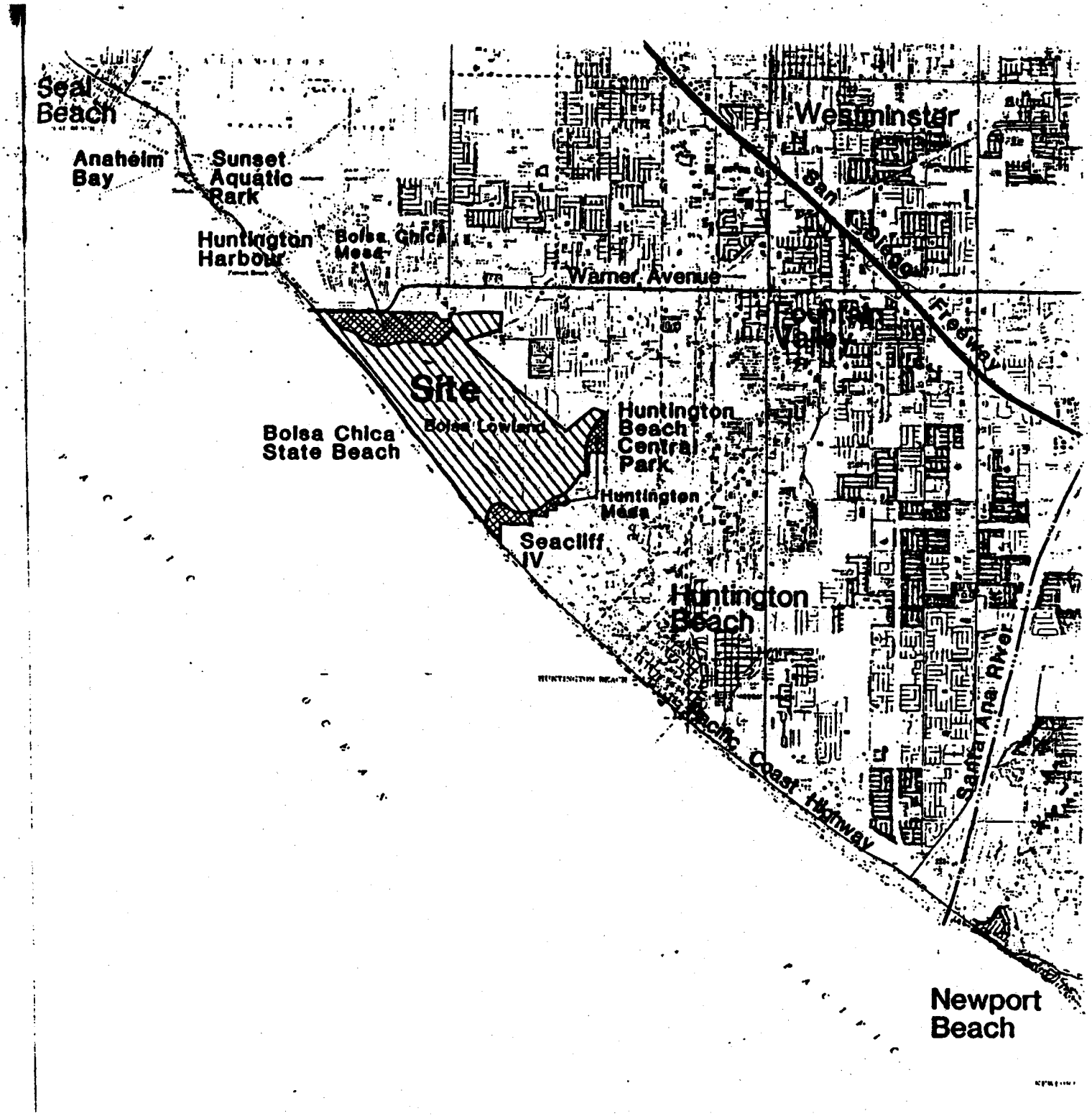


Figure 1. Location of Bolsa Chica, Orange County, California (From Sanders 1987).

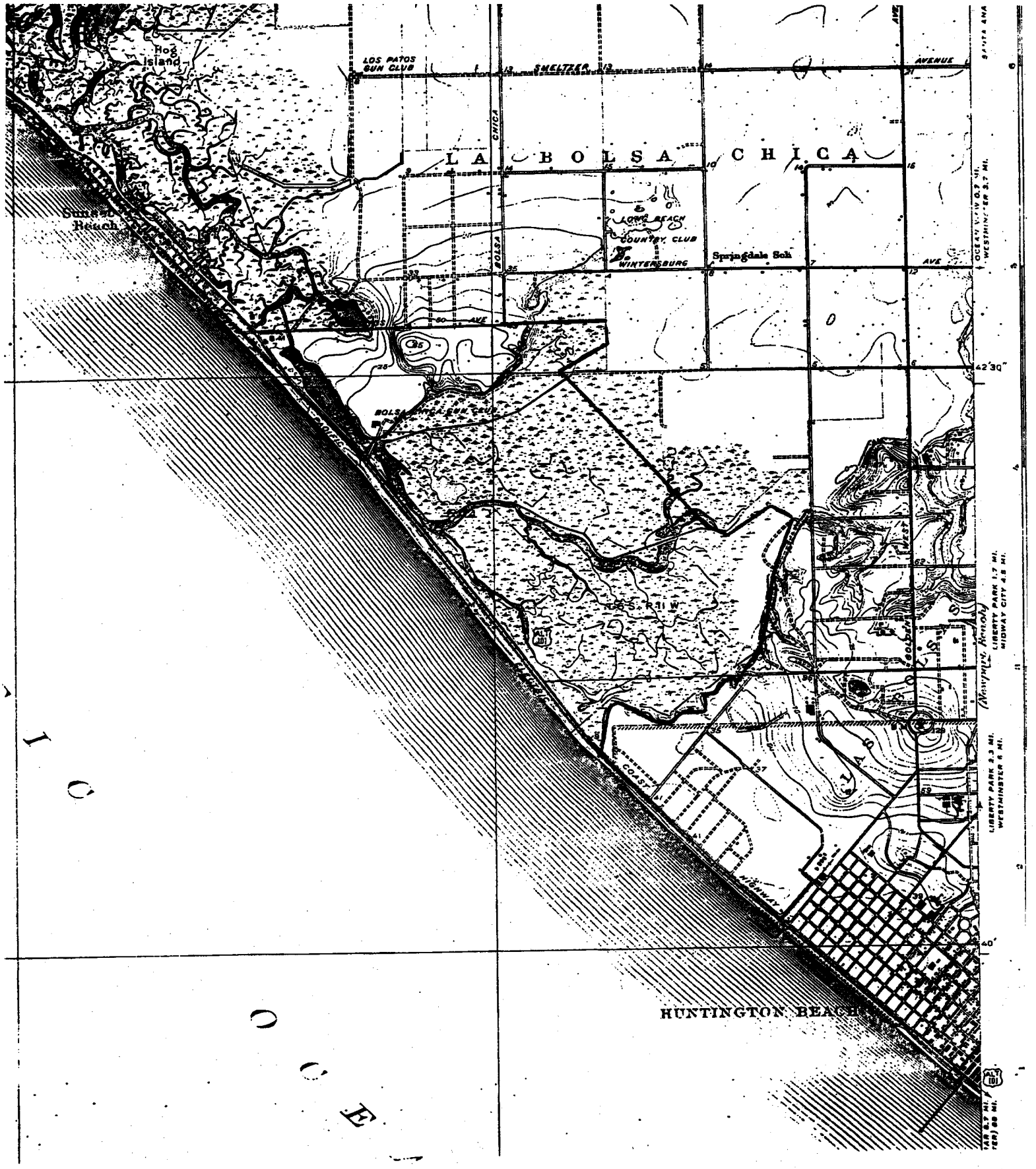


Figure 2. Bolsa Chica as depicted in 1932 by the U.S. Geological Survey. The Bolsa Chica Gun Club dike is visible as are levees along the Freeman Creek slough. A sand dune at the present Rabbit Island site is also evident.

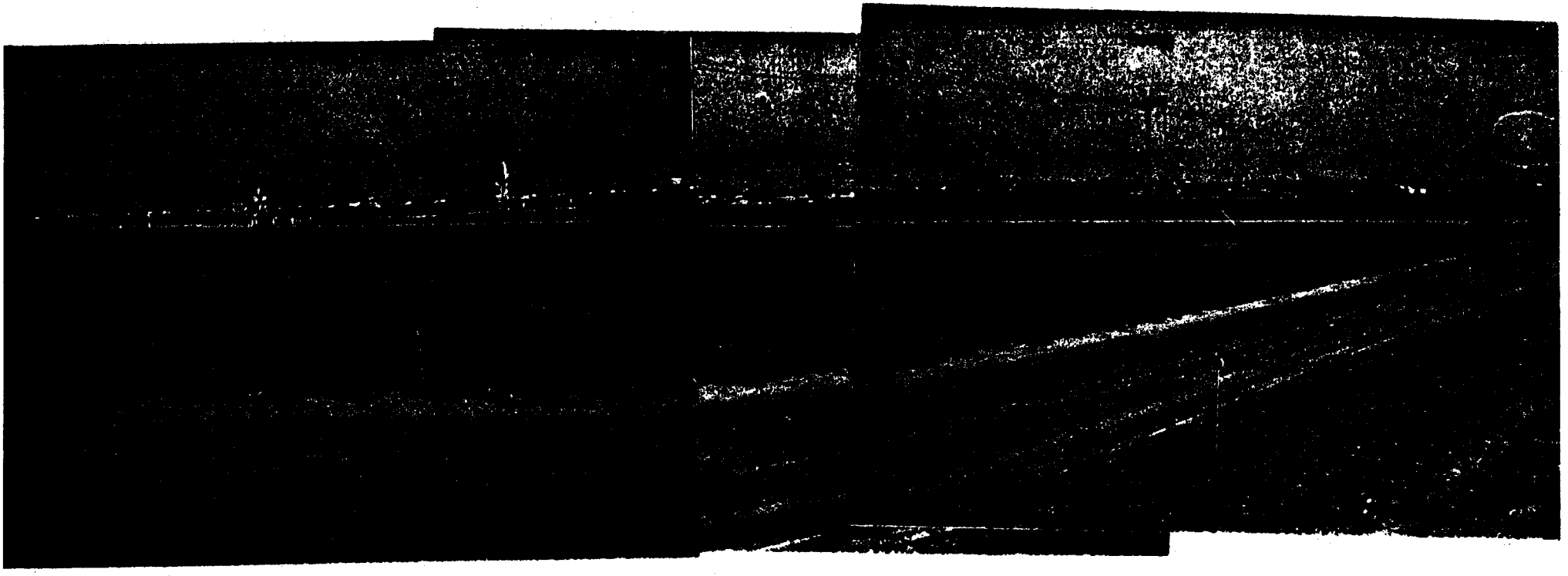


Figure 3. Photograph showing presence of historical slough channels at Bolsa Chica in February 1988. Site is within area referred to as State Lands - Non-tidal (see Figure 4).

historical sand dune) or "Edwards Thumb" (a protruding portion of the low-lying property adjacent to Edwards Street). These names are also used in this study to help provide easy references and continuity with previous work on the site [Figure 4, from Sanders (1987). In addition, the locations of the observation wells used in Signal's groundwater hydrology studies are shown in Figure 5 (from Bilhorn 1986); these well sites will be used to help pinpoint discussions of Signal's studies in this report and in Appendix A.

METHODS

Areas of Bolsa Chica which meet any of the federal definitions of "waters of the United States" are subject to regulation under Section 404 of the CWA (see **INTRODUCTION**, page 1 above for definitions). In making its final determinations, EPA relied primarily upon on-site investigations and field verifications by EPA personnel and EPA contractors, but also considered information provided by Signal and State and Federal agencies.

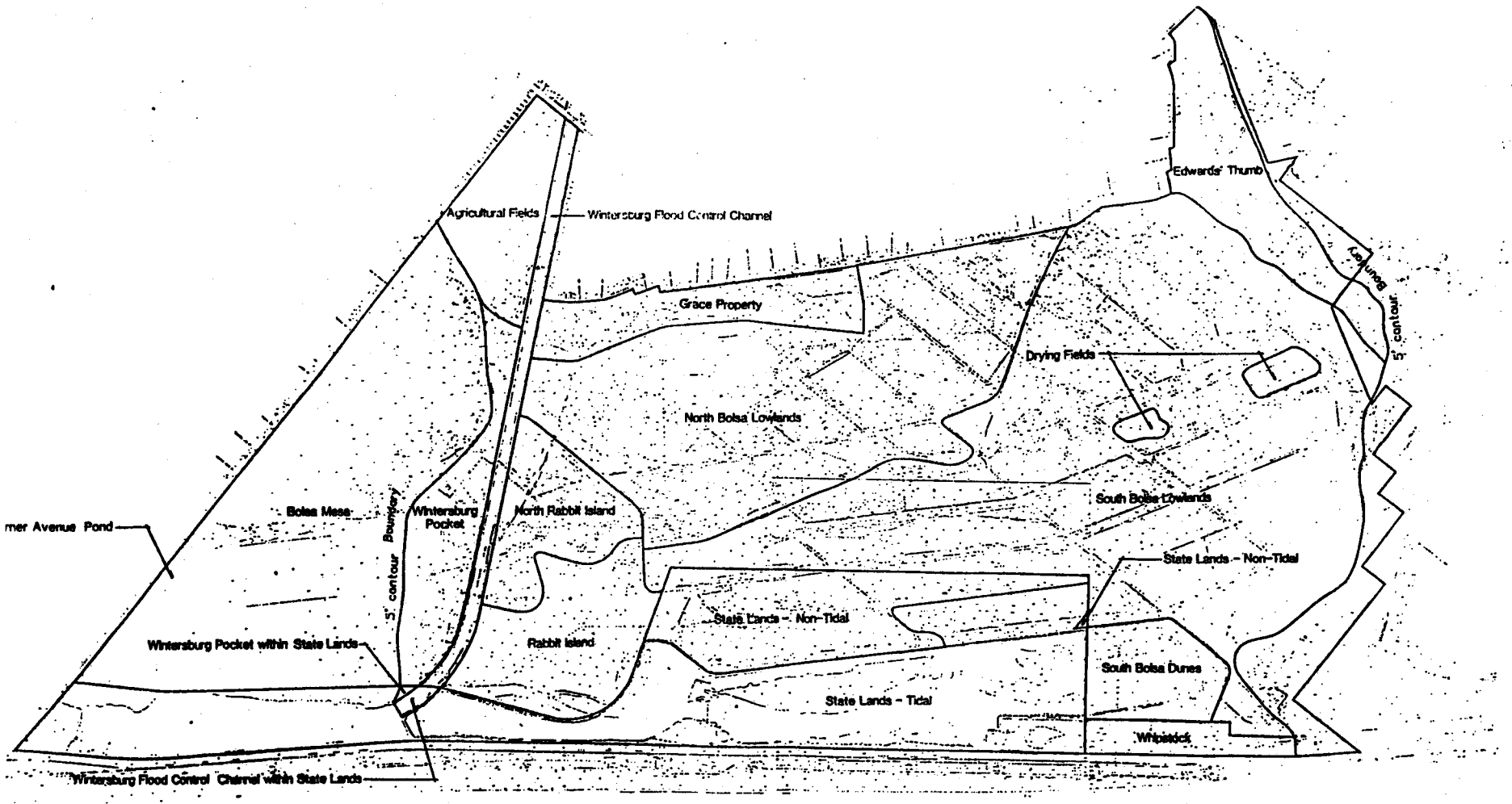
I. DELINEATION OF DIFFERENT TYPES OF "WATERS".

A. Waters of the United States as defined at 40 CFR 230.3(s)(1).

Portions of Bolsa Chica which were historically subject to the ebb and flow of the tide, which remain below the elevation of the mean high tide [referred to as mean high water (MHW)], are "waters" which were used in the past or are currently used in interstate or foreign commerce under 40 CFR 230.3(s)(1); the elevation of MHW at Bolsa Chica is 1.7 feet above mean sea level (MSL), based upon tidal datum from the National Ocean Survey. Such areas which are also restorable to tidal action are "waters" which are susceptible to use in interstate or foreign commerce under 40 CFR 230.3(s)(1). Under this definition, slough beds formed when Bolsa Chica was subject to the ebb and flow of the tides which remain below MHW (see Figure 3) are "waters of the United States".

In determining areas that are "waters of the United States" under this definition, EPA's primary data sources were 1) 1873, 1874, and 1911 topographic maps of Bolsa Chica prepared by the U.S. Coast and Geodetic Survey, 2) historical topographic and hydrologic maps, as well as historical and recent aerial photographs provided by the California State Lands Commission, 3) 1980 and 1986 topographic surveys provided by Signal, 4) estimates of subsidence made by Williams (1984), 5) maps and plans of proposed development and wetlands mitigation provided by Signal, and 6) on-site investigations by EPA and its technical advisory team.

In evaluating historical maps, EPA assumed that areas identified on these maps as marsh (through which sloughs were shown to flow) were at or above the plane of MHW and, therefore, not



SUB UNIT DESIGNATIONS
BOLSA CHICA, CALIFORNIA

Figure 4. Names of Sub-Regions of Bolsa Chica, Orange County, California (From Sanders 1987).

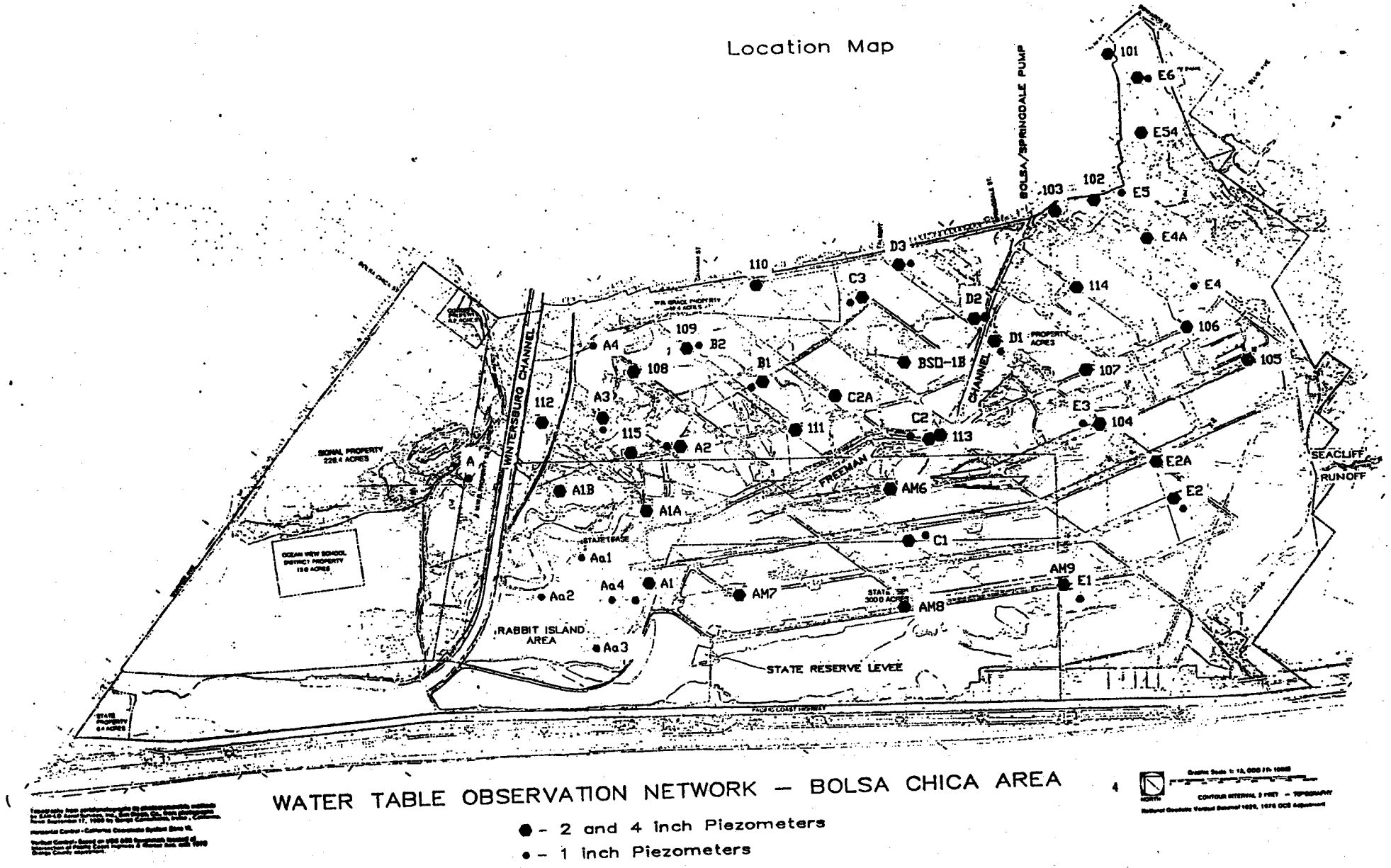


Figure 5. Locations of Signal's observation wells at Bolsa Chica.

subject to regulation under this definition. Historical slough channels, however, were assumed to be below MHW and within this definition of "waters". Based, in part, upon Williams (1984), EPA assumed that the site has subsided at least 1.7 vertical feet since 1874. If the site has subsided less than this amount, greater acreage of "waters of the United States" may be present on the site, particularly within the agricultural field and Edwards Thumb.

B. Waters of the United States as defined at 40 CFR 230.3(s)(3) and/or at 40 CFR 230.3(s)(4).

Areas which are inundated perennially or seasonally are "waters of the United States" under 40 CFR 230.3(s)(3) and/or 40 CFR 230.3(s)(4). Under 40 CFR 230.3(s)(3), these may include "waters" which are used or are susceptible to use as habitat by migratory birds or endangered species. In investigating this category of "waters", EPA relied, in part, upon evidence of such migratory bird and/or endangered species use of the site provided by the U.S. Fish and Wildlife Service (1979), the California Department of Fish and Game, and direct observation by EPA staff and contractors.

Many of the historical slough channels pond or impound surface waters at Bolsa Chica and are regulated under 40 CFR 230.3(s)(4). In determining the presence of these "waters", EPA relied upon on-site observations by EPA contractors and staff, as well as upon evidence developed for Signal by Sanders (1987, including 1988 mapping revisions).

C. Waters of the United States which are "Wetlands" as defined at 40 CFR 230.3(s)(7).

Under 40 CFR 230.3(s)(7), areas of Bolsa Chica which meet the definition of adjacent wetlands are "waters of the United States" (Note: Under 40 CFR 230.3(b), adjacent means bordering, contiguous, or neighboring. "Wetlands separated from other waters of the United States by man-made dikes or barriers, natural river berms, beach dunes, and the like are adjacent wetlands.").

Areas qualifying as CWA wetlands were delineated by EPA personnel using standardized methods used to guide Corps and EPA in making such determinations (Environmental Laboratory 1987, Sipple 1988). These methods investigate 1) the kinds and relative abundances of plant species and their classification on the wetland plant list (Reed 1988), 2) the color, classification, and other physical characteristics of soils, and 3) the hydrologic characteristics of the site. In addition to data collected on-site by EPA and its technical advisor team, EPA relied upon a variety of other data sources including published and unpublished literature, rainfall records, laboratory data, and hydrologic modeling. EPA also relied upon those portions of "wetlands" maps and sub-surface hydrological data submitted by Signal (including,

but not limited to Bilhorn 1986, Lund 1988, and Sanders 1987, including 1988 mapping revisions) that EPA was able to verify. A more detailed description of EPA's wetlands delineation methods is given in METHODS II (Emphasis on Delineation of "Wetlands"), below.

D. Waters of the United States subject to farming exemptions under Section 404(f) of the Clean Water Act.

"Waters of the United States" which are being or have been recently farmed within the meaning of Section 404(f) of the CWA (exempted farming activities in waters of the United States) generally remain "waters of the United States". Such "waters", include areas which would, in the absence of the exempted farming activities, support a prevalence of hydrophytic (wetland) vegetation in the presence of hydric-soil and wetland-hydrology criteria, and, therefore, constitute "wetlands" pursuant to 40 CFR 230.3(s)(7); in other words, the lack of a prevalence of wetlands vegetation is strictly the result of on-going, normal farming practices.

In addition, under 40 CFR 230.3(s)(1), farmed areas which were historically subject to the ebb and flow of the tide and which remain below the plane of MHW are "waters of the United States". Areas at Bolsa Chica found to meet this definition are also susceptible to interstate and foreign commerce under 40 CFR 230.3(s)(1) because they are restorable to the ebb and flow of the tide.

II. EMPHASIS ON DELINEATION OF "WETLANDS".

Special emphasis was placed upon delineation of CWA wetlands even though many wetland portions of Bolsa Chica were likely to be "waters of the United States" under 40 CFR 230.3(s)(1), as well. This emphasis was appropriate for two reasons. First, wetlands, as defined at 40 CFR 230.3(s)(7) are "special aquatic sites", which are afforded special protection under EPA's 404(b)(1) Guidelines. Differentiation of wetlands from "waters" which are not "special aquatic sites" was deemed important, given the likelihood that Signal would be seeking permits to discharge dredged or fill material into portions of Bolsa Chica which might contain special aquatic sites; this likelihood was based upon Signal's jurisdictional recommendation (Sanders 1987) and its site development plan which included developments in areas determined by Signal to be wetlands.

The second reason for EPA's emphasis on delineating wetlands was that Signal had, since at least 1982 (see Signal Landmark 1982) expended considerable efforts of its own to study the extent of CWA wetlands at Bolsa Chica. In 1986, Signal specifically asked EPA to delay release of its delineation of CWA jurisdiction until EPA had a full opportunity to review the results and the recommendations from these studies. Signal submitted the results of these studies to EPA during 1986, 1987, and 1988.

EPA's emphasis on wetlands was required in an effort to confirm Signal's extensive efforts. The methods for EPA's delineation of wetlands is described more fully below.

A. Wetlands Delineation Methodology

In determining the extent of federally-regulated wetlands, the EPA and Corps require that the site support a prevalence of hydrophytic (wetland) vegetation under "normal circumstances" (see Federal regulatory definition of wetlands in **INTRODUCTION**, page 2 above). This vegetation must be maintained by hydrologic conditions under which its soil is inundated or saturated, at least periodically during its growing season by surface or groundwater. The EPA and Corps must find evidence that:

1) the site supports a prevalence of hydrophytic vegetation [or would support such vegetation under normal circumstances or in the absence of Section 404(f) exempted farming activities];

2) the soils on the site are hydric soils (unless the site qualifies as atypical in EPA and Corps manuals); and

3) the soils are inundated or saturated frequently enough to support a prevalence of vegetation typically adapted for life in saturated soils (hydrophytic vegetation).

This method is known as the three-parameter or multiple-parameter approach (MPA) and was originally developed by Dr. Robert T. Huffman (Huffman 1981). Dr. Huffman served as a consulting scientist to EPA in this Bolsa Chica delineation effort. Use and validity of this methodology was first upheld in Bayou des Familles v U.S. Corps of Engineers (E.D. La, April 20, 1982), and has been used, and upheld subsequently, in a number of other cases nationally. Modified versions of the MPA have been adopted by the EPA (Sipple 1988) and the Corps (Environmental Laboratory 1987).

1. Vegetation

In order to qualify as a wetland plant community, the prevalent (dominant) plants associated with the community must be species typically adapted for life within habitats that have at least periodically inundated and/or saturated soil conditions during the growing season. Wetland plant species are organisms that, because of physiological or morphological adaptations, and/or reproductive strategies, have the ability to achieve maturity and reproduce in an environment where soils within portions of the root zone become anaerobic (little or no available free oxygen) during portions of the growing season (Huffman 1987).

For the vegetation at a site to qualify as wetland vegetation under the criteria of the Corps' and EPA's wetland delinea-

tion methodologies, the prevalent plants present must be typically adapted for life in saturated soil conditions. These are plants which have been classified as "hydrophytic" and have been placed in appropriate categories on wetland plant lists maintained by the U.S. Fish and Wildlife Service (Reed 1988). These lists are revised and updated periodically, as additional information on certain plant species is developed; the classification of a particular species may change if evidence is developed showing it to be found to occur more or less frequently in wetlands.

Under this classification system, plants on the U.S. Fish and Wildlife Service lists are divided into five generalized categories, depending upon the the extent to which the plant species have been observed growing in wetlands as opposed to upland conditions (Reed 1988). These categories determine which species are considered typically adapted for life in saturated soil conditions (see definition of wetlands in **INTRODUCTION**, page 2 above). These categories are:

1. **Obligate Wetland Species** - plants which are found growing in wetlands more than 99% of the time;

2. **Facultative-Wetland Species** - plants found to occur in wetlands 67 to 99% of the time;

3. **Facultative Species** - plants found in wetlands 34 to 66% of the time;

4. **Facultative Upland Species** - plants which can be found growing in wetlands from 1 to 33% of the time; and

5. **Obligate Upland Species** - plants found in wetlands less than 1% of the time.

Under EPA's wetland delineation methodology (Sipple 1988), any plants at a site that are classified under any of the first four categories above (obligate wetland species through facultative upland species) are considered hydrophytic vegetation if they occur under saturated soil conditions.

The Corps' vegetation criterion is substantially different in that an area is characterized as having hydrophytic vegetation only if more than 50% of all dominant species are among the first three categories above (obligate wetland species through facultative species -- see Environmental Laboratory 1987).

The Corps and EPA agree, however, that only if a site also meets the criteria for wetland soils <u>and</u> hydrology, is it a "wetland".

2. Soils

Soils are generally classified in the Corps' and EPA's methodologies by determining soil color (Sipple 1988, Environmen-

tal Laboratory 1987, Kollmorgen Corporation 1975) and/or by identifications of soils in surveys made by the U.S. Soil Conservation Service. These methods, as well as taxonomic classifications (such as soils with aquic moisture regimes -- see U.S. Department of Agriculture 1985), serve to determine whether or not soils have hydric or wetland characteristics. A hydric soil is a soil that is saturated, flooded, or ponded long enough during the growing season to become anaerobic in the upper part (Soil Conservation Service 1987; William Blake Parker, personal communication, November 23, 1988). The soil is considered saturated if water stands in an unlined borehole at such a shallow depth that the capillary fringe reaches the surface, except in noncapillary pores (U.S. Department of Agriculture 1985). In a sandy soil, the thickness of the capillary fringe may be only 10 to 15 centimeters; in a loamy or clayey soil, the thickness may exceed 30 centimeters (U.S. Department of Agriculture 1985).

Hydric soils generally have distinct colors (hue and chroma, see Kollmorgen Corporation 1975) which are the result of their development under prolonged periods of saturation. Thus, soils in wetlands tend to be dark, with hues which are greyish, greenish, or bluish.

In addition, wetland soils may be characterized by mottled areas which may be lighter colored than the main, or matrix, color of the soil. Such mottles are generally indicative of active water movement in that portion of the soil column. A common mottle color is orange or rust colored, and is caused by the oxidation of iron in the soil. Soil iron that has been subjected to prolongued continuous saturation is generally found in its reduced (ferrous) form whose greyish, greenish, or bluish colors are the result of the soil being under conditions of low oxygen content (anaerobic conditions).

In soil profiles which may be saturated seasonally, and dry during other portions of the year, iron that is periodically exposed to atmospheric oxygen becomes oxidized (ferric) and takes on a rusty red or orange color (see photograph - Figure 6). Because iron is found in all soils, its color can be diagnostic in evaluating the hydrologic regime of the soil (Parker 1987c). Mottling of soils is characteristic of marshes which are periodically saturated, whereas mottles are not generally found in subtidal soils which are not periodically exposed to high levels of oxygen. Mottling due to wetness is not found in upland soils.

In order for soils to meet the criteria for hydric soils, there must be evidence of one or more of the following. The soils:

a. have a chroma of 1 or less on a Munsell's soil color chart (Kollmorgen Corporation 1975) in unmottled soils;

b. are mottled and have a chroma of 2 or less on a Munsell's soil color chart;

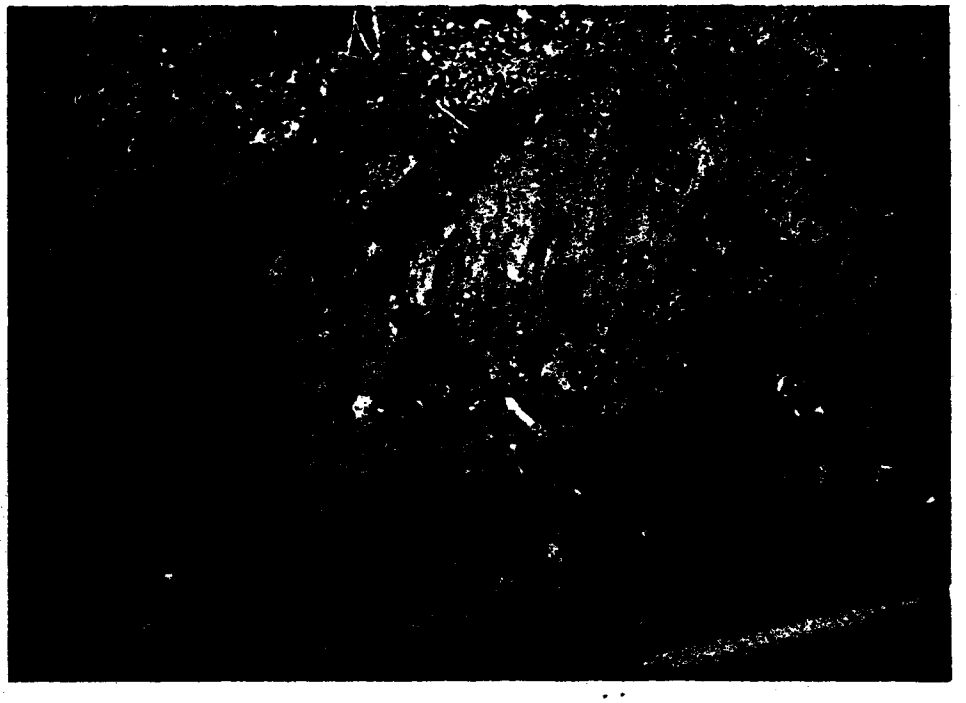


Figure 6. Soil pit at Bolsa Chica showing red-orange mottles within the soil profile. Pit is near well station B2 (see Figure 5 for location).

c. are organic (Histosols);

d. are taxonomically classified in certain suborders, subgroups, or great groups (see Sipple 1988 for criteria);

e. have a high groundwater table;

f. show the presence of accumulated sulfidic materials;

g. show the presence of iron and manganese concretions;

h. have been observed saturated within the root zone of plants or have been observed inundated during a significant part of the growing season (i.e., usually seven consecutive days, or more);

i. have organic material in certain portions of the soil profile (sandy soils -- See Sipple 1988 for criteria); or

j. develop anaerobic soil conditions as evidenced by the presence of ferrous iron.

3. Hydrology

Hydrologic conditions can be determined directly or indirectly. Direct observation could, for example, be observations of inundation of a site or observations of saturated soils in the root zone of the plants. Indirect observation includes evidence of such inundation from water marks or accumulations of floating debris or sediment left after the water has receded. EPA's and the Corps' manuals provide lists of these and other acceptable indicators (Sipple 1988, Environmental Laboratory 1987).

In order to meet the criteria for wetland hydrology, there must be evidence that the area is inundated or saturated by surface water or groundwater permanently or periodically during the growing season. According to EPA's delineation methodology, the inundation or saturation must meet or exceed a duration of 7 continuous days during the growing season in order to support hydrophytic vegetation and to exclude upland plant species (Sipple 1988).

B. Use of Indicators

The MPA methods commonly used by the Corps and EPA provide for substitution of indicators of vegetation and hydrology for actual measured or observed vegetation, inundation, or soil saturation, in order to allow for valid CWA delineations of jurisdiction during seasonally-dry or atypical situations. For example, EPA's methodology (Sipple 1988) allows:

1. Use of obligate wetland vegetation as a surrogate for hydrologic evidence in hydrologically-undisturbed areas. In

other words, if the plant community at a site is dominated by species which are essentially found only in wetland areas, it can reasonably be assumed, under EPA's methods, that the site has wetlands hydrology in order to support those obligate species (see above discussion of **VEGETATION**).

2. Use of morphological adaptations as a surrogate for hydrology in hydrologically undisturbed areas. If, for instance, a wetland tree species is found growing with buttresses to support its trunk, this adaptation can be used as evidence that the site is wet enough to require such buttressing, even if the site is not inundated or saturated at the time the site is being observed.

3. Use of soils in conjunction with long-term hydrologic information in soil surveys and/or Hydric Soils of the United States (1987) to determine the hydrologic regime expected during wetter parts of the growing season. In cases where a site may be under investigation during the dry season, such substitution can provide valid estimates of the hydrologic regimes of the site during wetter periods of the year.

Utilization of these indicators may not be valid in sites which have been physically modified (hydrologically), particularly when such modifications are recent.

In addition to these indicators above, recent historical photographs can be used as conclusive evidence of wetland vegetation, if vegetation has been removed from, or destroyed at a site. Similarly, hydrologic indicators, such as water marks, drift lines, or algal mats can be used as positive evidence of surface inundation. Other acceptable indicators are discussed in Sipple (1988), Environmental Laboratory (1987), and Huffman (1987).

EPA's delineation methodology (Sipple 1988) further allows a streamlining of the MPA at sites where the observed vegetation is dominated by "obligate wetland" species. Another requirement for use of this streamlined methodology is that there are no dominant "obligate upland" species present. Areas meeting these vegetation criteria may be defined as wetlands under EPA's methodology and no soils data need be taken. Wetland hydrology can be assumed unless there is evidence that suggests otherwise (for example, evidence that the hyrology has been recently altered legally such that it will no longer support the hydrophytic vegetation and that the vegetation present is, therefore, not indicative of present "normal circumstances").

Even though the properties at Bolsa Chica have been modified hydrologically, much of Bolsa Chica could qualify as wetlands following standard application of these streamlined methods, because these hydrological modifications are not, for the most part, recent (ie., the altered hydrologic regime has persisted long enough for the vegetation to respond). However, because of

EPA's desire to be as thorough and accurate as possible, EPA utilized the more detailed methodology. EPA, therefore, did not assert CWA jurisdiction over any areas as "wetlands" (including those areas supporting a dominance of obligate hydrophytes in the absence of any dominant obligate upland species) unless EPA found positive indicators of wetland soils and hydrology in addition to the prevalence of wetland vegetation.

III. DATA GATHERING AND ANALYSES

Methods utilized in EPA's field investigations at Bolsa Chica are summarized in Huffman (1987). These included an extensive site inspection, during which transects were established to facilitate 1) collection of representative samples from all areas within Bolsa Chica, and 2) delineation of upland and wetland boundaries in areas requiring particular attention. Vegetation, soil, and hydrologic indicators were sought at all transect sampling stations. Because most low-lying areas have wetland vegetation and soils, extrapolation of these data within individual cells or hydrologic sub-units was based on surface and sub-surface hydrology and on surface topography. For the latter data, EPA relied on topographic maps provided by Signal, utilizing 1980 and 1986 survey data.

EPA conducted the majority of its field investigations in the summer of 1985, but revisited the site in 1986, 1987, and 1988 to verify its own data and to evaluate the results and conclusions of studies submitted by Signal.

Identification of vegetation and verification of all soil color measurements in the hydric soil evaluations were made by Dr. Robert T. Huffman in 1985. Additional plant identification was made by William Sipple, Steven John, and Dr. Peggy Fiedler. Data were taken along transects in all subregions and within all cells within Bolsa Chica (see Appendix B, II). In subsequent on-site investigations in 1987, EPA examined soils and soil profiles at additional sites, concentrating in the North Bolsa lowlands, Rabbit Island, Edwards Thumb, and the South Bolsa Dunes. In these latter visits, EPA was assisted by Mr. William Blake Parker of Hydricsoils Inc. and Dr. Robert Coats of Philip Williams and Associates. These technical experts confirmed EPA's findings and conclusions regarding the extent and physical properties of hydric soils on the property.

Huffman verified all hydrologic indicators, supported by additional hydrologic analyses provided by Coats and Dr. Lee MacDonald (1988) of Philip Williams and Associates. All field work, including on-site map verification, was conducted under the observation of scientific consultants and/or attorneys representing Signal. Results of 1985 and 1986 field investigations were reported by Huffman (1987), and were provided to other federal and state agencies, the landowner, and interested parties for review and comment; all comments received were considered by EPA prior to finalizing this delineation.

EPA also considered data submitted by Signal regarding surface and subsurface hydrology, salinity, and vegetation within low-lying areas within Bolsa Chica. Huffman (1987) reviewed many of these data in his report to EPA, as did Dr. Lyndon Lee, Mr. William Blake Parker, Mr. William Sipple, and Dr. Robert Coats, members of EPA's Bolsa Chica Technical Advisory Team. Mr. James Koehler of the Statistics Department of Stanford University assisted in analyzing Signal's statistical interpretations of its data. In addition to developing and testing an empirically-based computer model to evaluate potential contributions of rainfall to soil saturation at Bolsa Chica, Dr. Lee MacDonald (1988) reviewed and commented upon portions of the hydrological data provided by Signal. Data and comments received from all parties were considered in EPA's determination of CWA jurisdiction.

Subsequent to circulation of Huffman's (1987) report, Signal submitted a recommended jurisdictional delineation prepared by its consultant (Sanders 1987 - map revised in 1988). Signal also submitted a study of surface hydrology at Bolsa Chica (Lund 1988). EPA reviewed and considered these studies in its final determination. A review of Signal's data base and recommendations concerning CWA jurisdiction on their property is provided as Appendix A.

IV. MAPPING WATERS OF THE UNITED STATES AT BOLSA CHICA

As a result of Huffman's investigations (Huffman 1987), as well as data collected by EPA staff, draft maps were prepared by delineating boundaries of waters of the United States on topographic maps provided by Signal. These boundaries were based on data collected or observations made within each of the cells of property within the leveed, low-lying areas.

Draft final maps were prepared from large-scale topographic maps provided by Signal; maps were originally provided by Signal which divided the Bolsa Chica properties into 11 separate areas at a scale of 1 inch equals 100 feet. The size of these maps proved to be too large for field use and, accordingly, EPA had them photographically reproduced and reduced to a scale of 1 inch equals 200 feet. Draft final boundaries were then field verified (and corrected and/or refined if warranted) by on-site visual inspection.

Following this field verification, final maps were drafted on maps at a scale of 1 inch equals 200 feet. Estimates of the acreage of "waters of the United States", including wetlands acreage, were made using a planimeter provided by the Corps of Engineers, San Francisco District. The planimeter was calibrated and checked against maps and acreage figures prepared by Sanders (1987) and 1988 revisions of those maps prepared by Thomas Bilhorn.

Data from these final maps was digitized and plotted by computer by the URS Corporation under contract to EPA. In addition, data from 1873 and 1874 U.S. Coast and Geodetic Survey maps was digitized and transferred to topographic maps provided by Signal. (These digitized maps are presented later as Figures 9, 10, and 11.)

RESULTS

I. DETERMINATIONS OF THE EXTENT OF WATERS OF THE UNITED STATES

EPA utilized 1873 and 1874 U.S. Coast and Geodetic Survey topographic maps, a 1927 U.S. Geological Survey topographic map, and Signal's 1980 and 1986 topographic maps of the Bolsa Chica to determine which portions of the site historically had elevations below the plane of mean high tide (MHW). These areas constitute "waters" which were used in the past in interstate and foreign commerce pursuant to 40 CFR 230.3(s)(1), and include areas shown as tidal sloughs in 1873 and 1874 surveys (see Figure 10 later in the text for their approximate location); narrow slough channels which are depicted on these surveys as single lines were not determined to be "waters" due to an absence of information regarding the actual width of such mapped features. EPA determined that these areas below MHW remain "waters" if they have not been legally filled to elevations which are above the plane of MHW, i.e., 1.7 feet above mean sea level (MSL); EPA utilized Signal's maps and aerial photography to assist in its field verification of portions of the site which have been legally filled and are no longer subject to CWA jurisdiction.

Areas presently subject to the ebb and flow of the tide, (largely limited to low-lying portions of the site within the Bolsa Chica State Ecological Reserve) are "waters of the United States" pursuant to 40 CFR 230.3(s)(1).

In determining the susceptibility of areas to use in interstate and foreign commerce under 40 CFR 230.3(s)(1), EPA relied, in part, upon maps provided by Signal showing its proposed restoration of tidal action to low-lying portions of the site as part of its proposed restoration and mitigation plans for its proposed development project. No areas were found to be "waters" under EPA's determination of such susceptibility which were not also found to qualify as "waters" based upon their historical exposure to tidal action.

Thus, all low-lying portions of the Bolsa Chica property which appear on the 1873 and 1874 topographic maps as tidal sloughs and tributary channels, which presently remain below an elevation of +1.7 MSL, and which are susceptible to tidal restoration are "waters of the United States" under 40 CFR 230.3(s)(1). EPA did not determine the acreage of such waters separately because no areas were found to constitute "waters of the United States" under 40 CFR 230.3(s)(1) alone. All areas found to be "waters" under this definition were also found to be "waters" under other definitions, as well.

II. DETERMINATIONS OF THE EXTENT OF FEDERALLY-REGULATED WETLANDS

EPA found that much of Bolsa Chica is federally-regulated wetlands. These findings are consistent with the work of Huffman (1987) and Sanders (1987), although EPA differed with conclusions

reached for particular subunits in each of these studies. EPA relied, in part, upon field data developed by Huffman (1987) and Sanders (1987),in addition to data gathered by EPA staff.

Vegetation

EPA found, as have other investigators (Huffman 1987, Signal Landmark Inc. 1982, Shapiro & Associates Inc. 1980, Sanders 1987, and others), that most, low-lying portions of Bolsa Chica are dominated by obligate wetland vegetation. Areas which were not found to support a prevalence of hydrophytic vegetation were filled areas such as the surfaces of the levee roads and drilling pads, naturally-occurring areas of higher elevation (Rabbit Island, South Bolsa Dunes), areas of standing water and seasonal ponds, and disturbed areas (cutting yard, fills near the gas plant, portions of the Grace Property, and the agricultural field).

Of these categories, EPA concluded that all areas legally filled to above mean high water elevations were not waters of the United States, and that areas not supporting a prevalence of wetland vegetation under normal circumstances were not wetlands. Thus, non-wetland areas included portions of Rabbit Island, the South Bolsa Dunes, Edwards Thumb, and ponded or seasonally-ponded areas. Some of these areas were delineated as "waters of the United Stated" under other definitions, however (see **INTRODUCTION**, page 1).

The most prominent plant species was pickleweed (Salicornia virginica, also known as Virginia samphire), an obligate hydrophyte. This perennial plant, as well as annual pickleweed (Salicornia subterminalis, also known as common glasswort), covered most of the diked cells at Bolsa Chica, and was found bordering perennially- and seasonally-ponded areas and along tidal and non-tidal sloughs and channels. In wetter areas in and near the Bolsa Chica State Ecological Reserve and in North Rabbit Island (see Figure 4), other obligate wetland plants such as salt flat grass (Monanthochloe littoralis) were common, as well. A partial list of the plant species recorded is given in Table 1 (from Huffman 1987), as are their indicator status on the wetlands plant list.

Variations in Distributions of Wetland Plant Species

Essentially two broad changes in plant communities were observed in the low-lying areas of Bolsa Chica. These changes appeared to be in response to hydrologic differences. First, the vegetation community was distinctly different in areas subject to regular or prolonged inundation, and in areas where the groundwater table was close to the surface, based upon Signal's groundwater data (Bilhorn 1986).

TABLE 1. PARTIAL LIST OF WETLAND PLANT SPECIES AT BOLSA CHICA (From Huffman 1987)

Common Name	Scientific Name	Indicator Status
Australian saltbush	Atriplex semibiccata	Facultative
Brass Buttons	Cotula coronopifolia	Facultative-Wet
Alkali Weed	Cressa truxillensis	Facultative-Wet
Salt Grass	Distichlis spicata	Facultative-Wet
Alkali Heath	Frankenia grandifolia	Facultative-Wet
Spike Rush	Juncus acutus	Facultative-Wet
Salt Flat Grass	Monanthochloe littoralis	Obligate
Sicklegrass	Parapholis incurva	Obligate
Rabbitsfoot Grass	Polypogon monspeliensis	Obligate
Widgeon Grass	Ruppia maritima	Obligate
Common Glasswort (Pickleweed)	Salicornia subterminalis	Obligate
Virginia Sampfire (Pickleweed)	Salicornia virginica	Obligate
California Bulrush	Scirpus californicus	Obligate
Sea Purslane	Sesuvium verrucosum	Facultative-Wet
Cordgrass	Spartina foliosa	Obligate
Saltmarsh Sandspurry	Spergularia marina	Obligate
California Seepweed	Suadea californica	Facultative-Wet
Cattail	Typha latifolia	Obligate

For example, in areas in or near the State Ecological Reserve, wetland species which are characteristic of intertidal marshes, such as cordgrass (Spartina foliosa), were found. These species were not observed in the low-lying cells in the North Bolsa flats. These latter areas were more typically covered with nearly monotypic stands of pickleweed.

Second, in all areas, there was a sharp change in the plant community in apparent response to changes in elevation and the related change in the surface and subsurface hydrologic regimes. Along all levee roads, at Rabbit Island, and in the South Bolsa Dunes, wetland vegetation sharply graded into facultative and upland species as one moved from lower to higher sites. Within cells in the North Bolsa lowlands, such changes in vegetation could also be observed on eroded internal levees and berms (see photograph, Figure 7), as well as along levee roads.

For example, at Bolsa Chica, pickleweed (an obligate hydrophyte) ceases to be dominant along the toes of levee roads and other raised areas and vegetation grades generally into salt grass (Distichlis spicata), a facultative-wet species, on the sides of the levees. Above this, the vegetation grades into ruderal and upland species, such as field mustard (Brassica campestris), near the top of the levees. EPA has found such sharp gradients to be typical in diked wetlands in California and indicate a hydrologic change in which upland plants can survive on the higher and better drained slopes and surfaces of the levees. In contrast, no such vegetation gradient was observed in response to subsurface hydrologic gradients reported by Signal's consultants (see Appendix A).[1]

In an effort to confirm hydrological conclusions reached by Signal, EPA observed not only the presence and relative abundance of species of hydrophytes, but also made observations of the density and physical appearance of the vegetation. EPA sought evidence of morphological responses of the vegetation at Bolsa Chica to subsurface hydrological gradients which Signal claimed would result in portions of Bolsa Chica failing to meet the

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1. Signal reported to EPA its conclusion that there is a gradient of groundwater which moves deeper from the coastal edge of the property to the housing developments on the northeast boundaries of the site. Furthermore, Signal concluded that because it believes that the hydrology of the site is primarily groundwater, a boundary between wetlands and uplands can be defined on the basis of the point at which the groundwater is at a particular depth in an average rainfall year. Signal referred to this boundary as the "hydro line" and presented a map showing its location to EPA in a report prepared by Sanders (1987). EPA rejected this concept, in part, because of the lack of any discernable differences between the vegetation and soils on either side of this "hydro line". [See Appendix A for a more detailed discussion.]

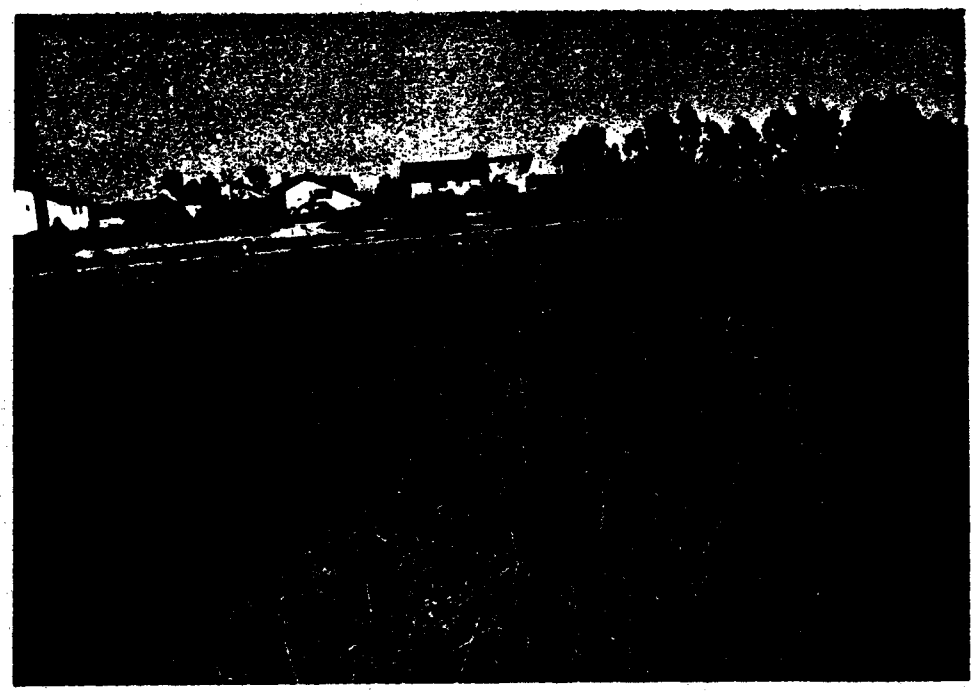


Figure 7. Photographs of internal levees within cells of the North Bolsa lowlands portion of Bolsa Chica in February 1988. Note sharp vegetation change from low-lying areas (dominated by wetland vegetation, *Salicornia virginica*) to areas with slightly higher elevation (dominated by upland species, such as field mustard, the yellow-flowered plant in the upper photo).

wetlands hydrology criterion. EPA could detect no lateral gradients in the height to which wetland vegetation grew up the sides of levees within or between individual cells.

As is discussed later, such differences might have been expected if 1) the hydrology of the site was predominantly provided by ground water and 2) the groundwater table is progressively deeper as one moves in a northerly direction across the site, as described by Bilhorn (1986). One might reasonably expect, under such conditions, that upland vegetation would be found at lower elevations on levees, for example, in northerly areas at Bolsa Chica because the alleged source of soil saturation is below the root zone of the plants. Signal's mapping of wetlands indicated no such response (Sanders 1987).

Thus, in contrast to the abrupt changes in plant communities associated with elevation changes on the toes of levees, no gradual or abrupt changes in the plant community were observed across the North Bolsa flats, in spite of Signal's evidence of a sharply dropping groundwater table. In addition, no changes in the height or density of plants was detected. This evidence strongly suggests that subsurface hydrology is not the exclusive factor and that surface hydrology may play an important role in the distribution of the plant communities at Bolsa Chica, and the extent of wetlands (see Appendix A).

Soils

EPA found that low-lying areas of Bolsa Chica have hydric soils. Remnant dunes (Rabbit Island and the South Bolsa dunes) and roadways (and other filled areas) were the only portions of the low-lying areas where such soils were not evident.

The Soil Survey of Orange County, prepared by the Soil Conservation Service (Wachtell 1978), identified three soil types within the low-lying portions of Bolsa Chica:

1. **Tidal Flats.** These soils comprise the vast majority of the low-lying portions of Bolsa Chica. Tidal Flats are defined as stratified clayey to sandy deposits which are poorly drained and are high in salts. Tidal Flats are identified in the Survey as prime areas where the vegetation, the soil, and the water are beneficial for wildlife.

2) **Thapto-Histic Fluvaquents.** These soils, found in portions of the property owned by the Metropolitan Water District of Southern California, are identified as poorly-drained soils in coastal basins adjacent to bays and lagoons. They are high in salts and are listed as being used (in 1978) for recreation and for wildlife habitat (Wachtell 1978).

3) **Bolsa Silty Clay Loam.** This soil, found primarily in the agricultural field owned by the Metropolitan Water District of Southern California, a small portion of the North Bolsa lowlands, and a portion of the W.R. Grace Property, generally occurs on large alluvial fans. The soils are somewhat poorly drained and mottled, and are listed as having good potential for supporting wetland vegetation (Wachtell 1978).

Parker (1987a) reported that soils in the North Bolsa lowlands and Edwards Thumb, which he considered to be some of the drier sites at Bolsa Chica, were all developed under reduced iron conditions as indicated by dull gray colors in the matrix. He found all the soils are "Aquents", indicating they developed under saturated conditions; these soils are hydric under the criteria developed by the Soil Conservation Service (1987). Parker's findings agree with those of Lund (1981), who classified Bolsa Chica soils as hydric in a study prepared for Signal.

In evaluating the presence of hydric soils or hydric soil indicators, EPA also relied upon use of the standard Munsell soil color chart (Kollmorgen Corporation 1975; see Figure 8) and criteria for use of this chart developed in Corps and EPA wetland delineation manuals (Environmental Laboratory 1987 and Sipple 1988). The most common soil color was 2.5Y 4/2, with mottles; under the EPA and Corps manuals, such a color (chroma 2 or less with mottles) qualifies as a hydric soil. In sand or sandy soil conditions, EPA relied primarily upon indicators described in these aforementioned manuals, such as organic streaking, mottles, or the presence of surface organic deposits.

Soil profiles at Bolsa Chica are varied. Much of the unfilled, low-lying areas are silty clays overlaying fine to medium sands and silty sands. The depth of each of these layers vary within and between subregions of Bolsa Chica. Notable exceptions are sand dunes within the ecological preserve (South Bolsa Dunes) and at Rabbit Island, which have profiles of sand with varying degrees of silt and organic accumulation.

Hydrology

Positive indicators of wetland hydrology were found by Huffman (1987) and confirmed by EPA in all low-lying areas of Bolsa Chica. These included direct observations of saturated soil, and standing water. They also included such indicators as water marks, drift lines, oxidized live root channels (on young plants), algal or ditch grass mats, and sedimentation lines.

EPA found other, indirect indicators of surface inundation in all low-lying portions of Bolsa Chica. All roads, numerous oil pipelines, and all oil pumping stations were elevated between 2 and 4 feet above normal ground level, indicating evidence of frequent high water. Vehicle tracks, which Huffman identified as having been made by a "sprite machine", were evident over much of

the area; Signal representatives pointed out that these vehicles spray frequently for mosquitos, suggesting that long standing water is not uncommon (Parker 1987a).

Parker noted reddish oxidized iron colors around the roots of live pickleweed plants (Salicornia virginica) at Signal's study sites B-2, A-4, A-2, C-3, and E-6 (Figure 5) that indicated the plants are obtaining oxygen from the atmosphere and bringing it down to the roots, rather than obtaining such oxygen from the soil. Parker (1987a) states that:

> "this is a much more complicated system of providing roots with oxygen and **only occurs** (emphasis added) in soils that are saturated and absent of soil oxygen. In my opinion from field observation of soil characteristics, plant roots, and other visual indications of standing water, these soils are still saturated for a significant period during the growing season of most years."

The specialized aerenchyma tissue in pickleweed allows passive diffusion of oxygen (O_2) to the roots, whether or not the soil is anaerobic, according to Coats (1987). He notes further that oxidized "halos" are only visible if iron in the soil matrix is reduced. These "halos" were observed over much of the Bolsa Chica site.

Additional hydrological evidence submitted by Signal

In 1986, following EPA's 1985 field investigations, Signal recommended that EPA not rely upon these hydrological indicators, suggesting that surface indicators at Bolsa Chica had been caused by an unusually wet 1983 season. Signal suggested, rather, that EPA rely instead on measurements of soil oxygen, ponding, and groundwater depths which Signal had obtained during recent studies.

EPA agreed to consider these data and not to release its determination of jurisdiction until doing so. Furthermore, subsequent to EPA's release of Huffman's jurisdictional recommendations (Huffman 1987), Signal conducted additional studies and provided these to EPA with accompanying recommendations of its own. EPA considered these data in its delineation effort, as well (see Appendix A).

A. Groundwater Hydrology

Signal provided data describing the groundwater table in low-lying portions of Bolsa Chica. The locations of its observation wells are shown in Figure 5. The scope of its studies and its conclusions are described by Bilhorn (1986). These data indicate that the groundwater table drops across the site as one moves from the ocean inland in a northerly direction (Bilhorn 1986). Bilhorn identifies the cause of the drop as surface and

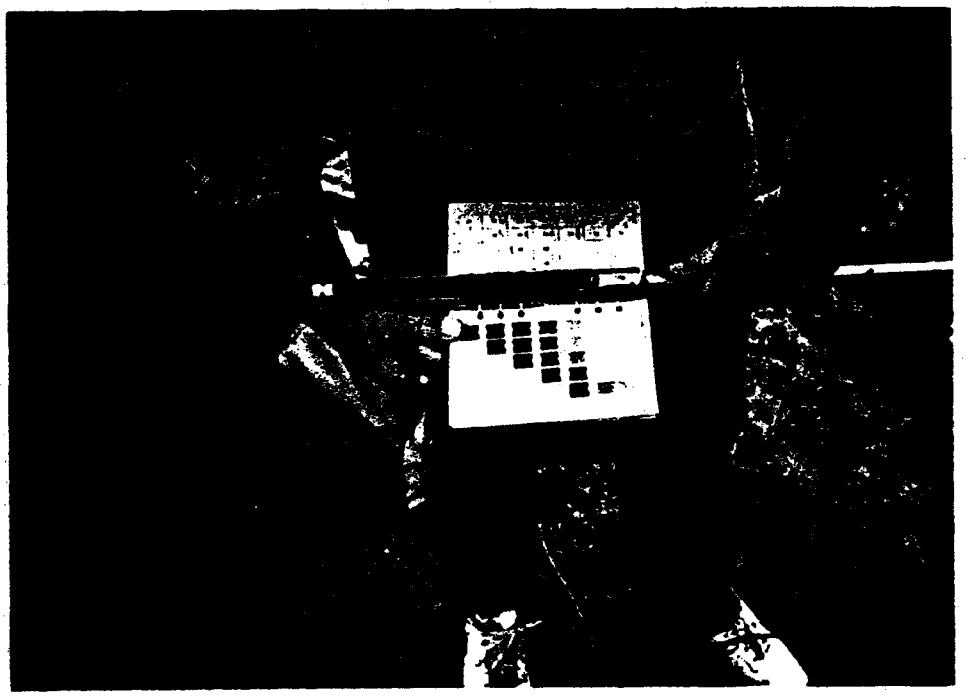


Figure 8. Use of a Munsell color chart to evaluate the presence or absence of hydric soils. Soil color is generally evaluated at 10 inches below the surface of the ground. At this site, near well site C3, the soil matrix color was 2.5Y 4/2, with mottles present. Thus, this soil qualifies as hydric (criteria: chroma 2 or less with mottles).

subsurface drainage systems associated with adjacent housing and associated with the oil production facilities at Bolsa Chica.

Signal's 1982 groundwater data (an average rainfall year with regard to total annual rainfall), when combined with EPA's observation of soil capillary rise (see below) and EPA's use of a 12-inch root zone, showed that groundwater rises in the soil profile to sufficient levels to saturate soils in the root zone of virtually all of the low-lying portions of Bolsa Chica (see analysis and discussion in Appendix A, page A-14). Furthermore, Lund (1988) found that ambient soil moisture (moisture level not affected by recent rainfall) was at or near saturation in the root zone of plants at some of the driest sites in the North Bolsa lowlands. Accordingly, EPA found that groundwater would support the prevalence of wetland vegetation observed in low-lying portions of the properties at Bolsa Chica.

EPA found that portions of the soil profile above the groundwater table are saturated by capillary rise, the process by which water rises in the soil profile by capillary action. This capillary rise can saturate soils well above the measured level of groundwater. EPA observed capillary rise to levels between 11 and 17 inches above the groundwater table at selected sites in the North Bolsa flats. These observations were not made in the rainy season at Bolsa Chica, nor during years of average or above-average rainfall, and, therefore, are likely to be conservative estimates. Parker (1987c) states that the zone of capillary rise is lowest in the dry season. Because the height of capillary rise is greatly affected by surface wetting, the zone of capillary rise may be far greater in the rainy season than in the dry season (Parker 1987c - See Appendix A, page A-7, for further discussion of capillary rise in soils at Bolsa Chica).

B. Surface Water Hydrology

In spite of the fact that EPA conducted its on-site investigations in the summer and/or during years of below-normal rainfall, EPA found substantial evidence that rainfall at Bolsa Chica is sufficient to inundate or saturate soils in the root zone of plants within the low-lying portions of Bolsa Chica in most years. This evidence consisted of many surface indicators, such as water marks, drift lines, algal mats, salt pans, surface cracking, Ruppia mats, sediment deposition, and engineering features.

EPA found that the abundance of these indicators, the distribution of the plant community, and the lack of strong contrary evidence compelled EPA to rely upon these indicators in concluding that surface water provides sufficient hydrology to qualify much of the Bolsa Chica lowlands as having wetlands hydrology (see also analysis and discussion of hydrology in Appendix A).

EPA sought additional verification of this conclusion for portions of the North Bolsa lowlands which were shown (Bilhorn 1986) to have deeper groundwater tables. This verification was sought through the development of a hydrologic model of Bolsa Chica soils (MacDonald 1988). In this study, field and laboratory data on physical properties of soils at Bolsa Chica were incorporated into a model in an effort to estimate the frequency and duration of saturation of upper layers of soil in the driest portions of the North Bolsa lowlands ('driest' areas were selected on the basis of greatest groundwater depth).

At the two sites modelled (well locations B1 and B2), MacDonald (1988) found that saturation from rainfall is likely at site B1 in most years. The 2-year storm event, delivered over a 4-day period produced saturated conditions in portions of the upper 12 inches of the soil profile which persisted for approximately 2 days. The model predicted that site B2 would not be saturated by the 2-year event and would be saturated from rainfall far less frequently than site B1. Applying 1982 rainfall and groundwater data, the model predicted that neither site was saturated from rainfall in 1982.

MacDonald (1988) cautioned that the potential responsiveness of the groundwater table to rainfall was not modelled; as rainfall is applied to the site, the modelled groundwater table remains at the same depth rather than rising as it would in a natural system. The potential for saturation of the upper portions of the soil profile at Bolsa Chica is significantly affected by the height of the groundwater table. As a groundwater table rises in response to rainfall events, the amount of water required to saturate the remaining soil profile above the water table decreases accordingly; a higher groundwater table would increase the frequency and duration of saturation for a given storm event or series of events.

Although Signal's hydrologist informed EPA that the water table rises quickly in response to rainfall events, the actual relationship has not been quantified and, therefore, was not modelled. Thus, MacDonald (1988) concluded that his model will achieve conservative estimates because the groundwater table remains at a constant level in his model; in other words, the frequency with which rainfall will saturate the upper layers of soil at Bolsa Chica is probably higher than predicted by the model.

Because the quantitative relationship between rainfall and the height of the groundwater table (including rates of change in response to a given rainfall event) is not known, EPA's modelling effort was not conclusive for the North Bolsa lowlands. It does strongly suggest that rainfall can contribute significantly to soil saturation, but indicates that rainfall alone may be insufficient to produce wetland hydrological conditions at the sites B1 and B2. MacDonald (1988), however, states his belief that

rainfall does saturate these sites in most years, given the conservative assumptions in his model.

C. Hydrologic Modifications

The hydrology of Bolsa Chica is actively manipulated by man. Much of the diking of the site long pre-dates the CWA, and some of the pumping operations are permanent features protecting the housing adjacent to the North Bolsa lowlands. EPA considers those alterations 1) which were completed prior to the Corps' asserting regulatory jurisdiction under Section 404 of the CWA or 2) which were permitted under the CWA to be part of the "normal circumstances" of the site, as the term is used in the CWA definition of wetlands (see page 2, **INTRODUCTION**).

EPA believes that the temporary pumping being conducted by the California Department of Fish and Game (CDFG) may not necessarily constitute such "normal circumstances". This pumping is carried out by CDFG under contract with Shell Oil in order to protect on-going oil extraction operations. The height to which CDFG maintains surface waters (and, indirectly, sub-surface waters) at South Bolsa is negotiated and subject to change. The relatively short-term nature of the pumping contract (10 years) is viewed by EPA as having less permanence than the drainage and pumping associated with the adjacent housing developments.

EPA believes, therefore, that the artificial hydrological regime created by this pumping agreement may not necessarily form the basis for including or excluding wetlands from federal CWA jurisdiction. The absence of such pumping, or a higher negotiated water height could create higher water-table conditions over much of the site, and subject low-lying areas to greater frequency and duration of inundation and/or soil saturation.

However, inasmuch as all low-lying areas in the North Bolsa lowlands were found by EPA to be "waters of the United States" under the existing conditions, either as wetlands or as "waters" under other definitions, EPA did not find it necessary to estimate hydrologic conditions in the absence of CDFG pumping.

III. FILLED AREAS SUBJECT TO REGULATION UNDER THE CLEAN WATER ACT

The topography of areas which had been disturbed or filled prior to the Corps' assertion of Section 404 regulatory authority is the topography that must be used for determinations of CWA jurisdiction. Activities which have raised elevations in the areas since that date may constitute CWA violations, if the areas were filled without authorization from the Corps. Changes in topography resulting from natural processes such as land slides, erosion , or subsidence are not violations of the CWA. Thus, certain areas which have been filled without authorization may still be "waters of the United States" even if they do not now meet the definition of such waters because of that fill.

EPA found a number of areas which, based on topographic maps provided by Signal, had been filled since 1980 or 1986. In most cases, these filled areas were small and appeared to be associated with expansion of existing oil drilling pads or levee construction or maintenance. EPA asserted jurisdiction over these areas as "waters of the United States" after determining from the Corps, Los Angeles District, that no records could be found at the District Office indicating that these fills were authorized under a Department of Army permit (Clifford Rader, personal communication, March 1988); the lack of CWA authorization for fills associated with the on-going oil drilling activities was later confirmed in discussions with a Shell oil company legal representative (Bradford C. Nielson, Shell Oil Company Legal Department, personal communication, December 12, 1988).

If the pre-fill topography in 1986 was below the plane of mean high water (MHW), EPA determined that the site qualified as a water of the United States under 40 CFR 230.3(s)(1). If, in addition, the elevation of the site in 1986 prior to the fill was such that it would have supported a prevalence of hydrophytic vegetation, based upon conditions at adjacent sites of similar pre-fill elevations, EPA considered the site to be a wetlands under 40 CFR 230.3(s)(7), as well. The total acreage of the areas so determined was small, (approximately 1 to 2 acres). The largest of these small filled areas were two basins in Edwards Thumb and a drilling pad and access road between the cutting yards.

IV. GEOGRAPHICAL EXTENT OF WETLANDS AT BOLSA CHICA

EPA concludes that areas at Bolsa Chica supporting a prevalence of hydrophytic (wetland) vegetation are wetlands, where there were positive indicators of hydric soils and hydrology. EPA concludes, further, that the hydrological indicators, including groundwater data, recommended by the EPA Interim Final Manual and the Corps Manuals, and utilized by Huffman, are sufficiently supported by evidence on the site to be reliable for the Bolsa Chica site.

Specifically, EPA finds that surface and sub-surface water sources inundate or saturate soils at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation in the areas EPA has determined to be wetlands. Relying upon groundwater data supplied by Signal, combined with EPA's measurements of soil capillary rise and/or an estimated 12-inch plant rooting depth, EPA concludes that subsurface sources of water are sufficient in most years to meet wetlands criteria at all sites where EPA found a prevalence of hydrophytic vegetation.

Similarly, EPA found that sources of surface water were sufficient in most years to meet the wetlands hydrology criterion. Although Signal suggested that indicators of surface hydrology were the result of a 1-in-100-year rainfall year, EPA found that sources of surface water were sufficient to contribute sig-

nificantly to wetlands hydrological conditions. In 1978 and 1983, EPA found that rainfall alone was sufficient to meet the criteria for wetlands hydrology, as heavy rainfall inundated most of the Bolsa Chica site. Furthermore, EPA found that rainfall alone, in most years, will saturate the root zone of the prevalent vegetation (MacDonald 1988).

V. GEOGRAPHICAL EXTENT OF NON-WETLAND WATERS OF THE UNITED STATES AT BOLSA CHICA

Areas which are not inundated or saturated by surface or groundwater at a frequency and duration sufficient to support and do not, under normal circumstances, support a prevalence of hydrophytic vegetation are not federally-regulated wetlands. However, if they meet other definitions of "waters of the United States under 40 CFR 230.3(s), they are waters subject to regulation under the Clean Water Act. Based upon EPA's on-site observations, EPA agreed with differentiation between wetlands and other regulated waters as mapped by Sanders (1987) in those areas where Sanders determined that such waters were present.

In other words, EPA found that where Sanders (1987) did recommend that EPA assert CWA jurisdiction, he correctly characterized the aquatic and seasonally-ponded portions of Bolsa Chica, and including those areas which are, or could be used by migratory birds or endangered species. Accordingly, in these portions of the site, EPA found the 1987 map (including 1988 revisions) of Sanders (1987) submitted by Signal to be reliable. As discussed in greater detail in Appendix A, however, EPA determined that Sanders (1987) significantly underestimated the overall extent of "waters of the United States" (including wetlands).

EPA'S DELINEATION OF CLEAN WATER ACT JURISDICTION

Waters of the United States at Bolsa Chica

Figure 9 identifies the portions of the Bolsa Chica property which are "waters of the United States", subject to jurisdiction of the Clean Water Act. The total acreage of "waters of the United States" at Bolsa Chica is approximately 927 acres. These waters are areas within the low-lying portions of Bolsa Chica that meet one or more of the following definitions of waters of the United States under 40 CFR 230.3(s):

(1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate and foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(3) All other waters such as mudflats, sand flats, wetlands, sloughs, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
   (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or

   (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

   (iii) Which are used or could be used for industrial purposes by industries in interstate commerce;

(4) All impoundments of waters otherwise defined as waters of the United States under 40 CFR 230.3(s); or

(7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in 40 CFR 230.3(s)(1-6).

All low-lying portions of Bolsa Chica which were historically below the plane of mean high tide (MHW) (see Figure 10 for the approximate location of such areas, shown as tidal sloughs and their tributaries) and which have not been legally filled to an elevation above MHW are waters of the United States under 40 CFR 230.3(s)(1); these waters are a subset of those areas shown in Figure 9. At Bolsa Chica, these "waters" include all portions of the site which were historically and which presently lie at elevations of +1.7 feet above mean sea level (MSL) or less. Areas which have been legally filled to above the plane of MHW, such as most levee roads and drilling pads, dikes, and the cutting yard are not "waters of the United States" under this definition.

Virtually all areas supporting a prevalence of wetland vegetation, including areas which would support a prevalence of

FIGURE 9. "WATERS OF THE UNITED STATES," INCLUDING WETLANDS, AT BOLSA CHICA, ORANGE COUNTY, CA. WHICH ARE SUBJECT TO REGULATION UNDER SECTION 404 OF THE CLEAN WATER ACT.

LEGEND:

AREAS MEETING ONE OR MORE DEFINITIONS OF "WATERS OF THE UNITED STATES" AT 40 CFR 230.3(s) AND 33CFR 328.3(a)

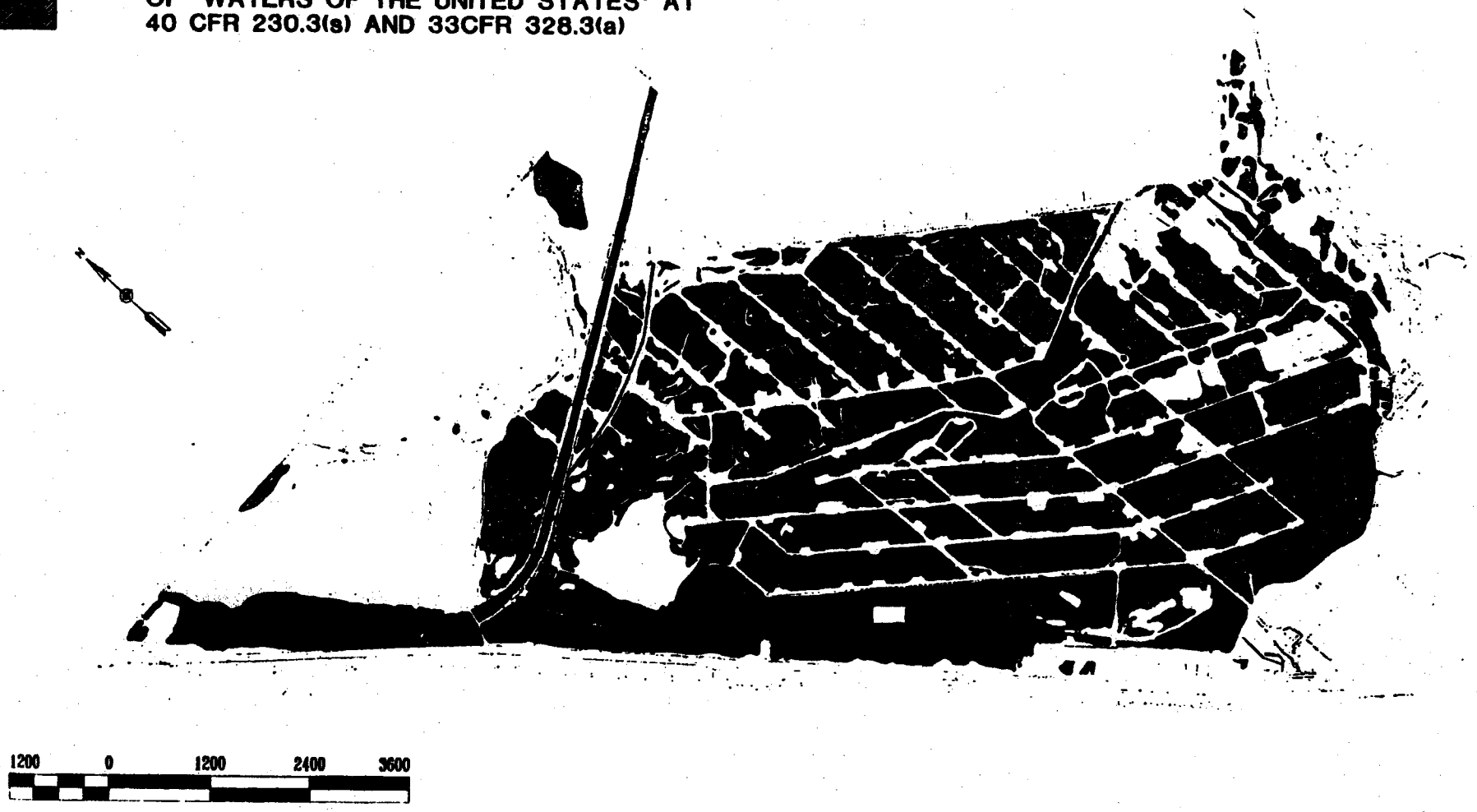
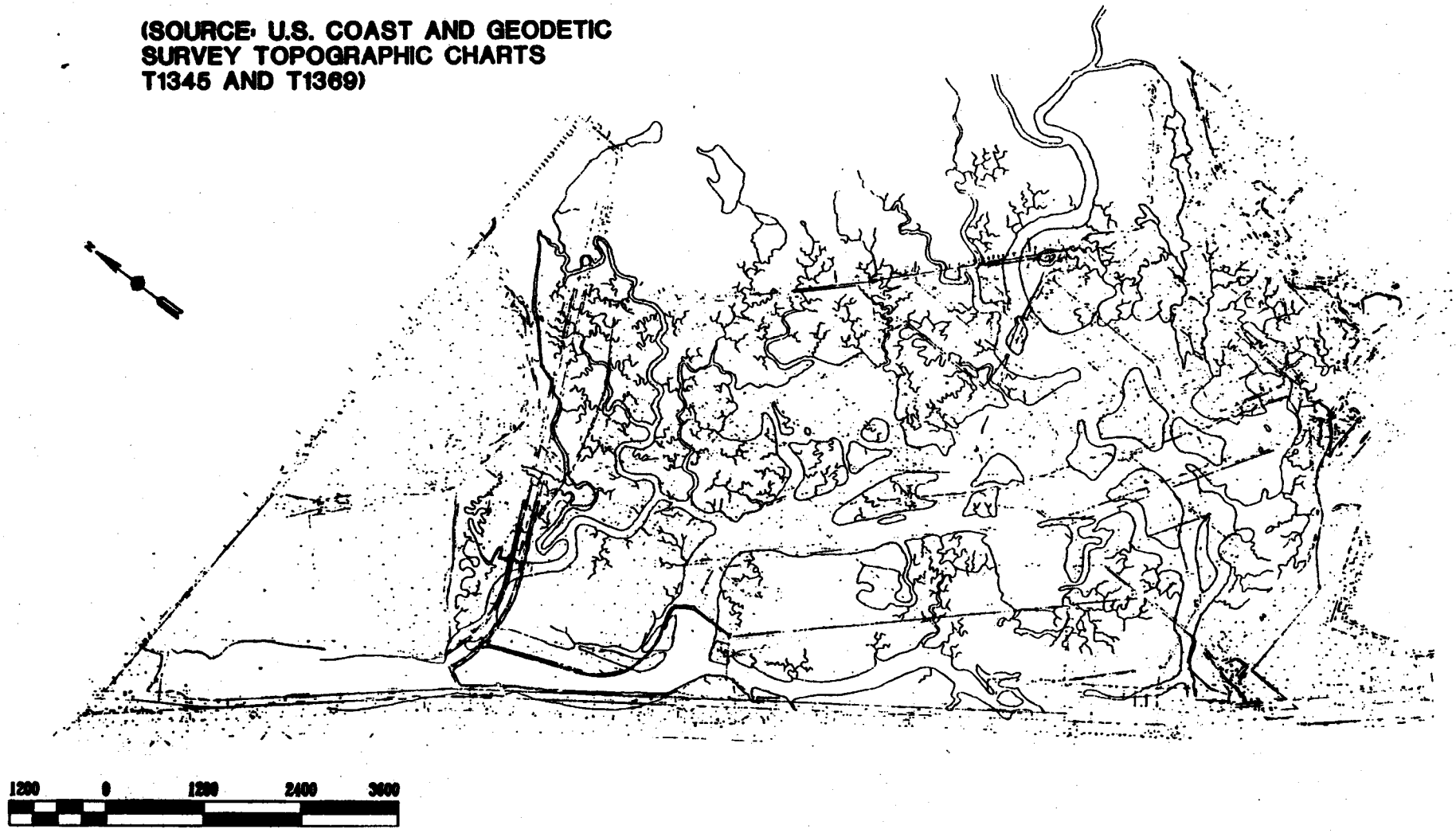


FIGURE 10. APPROXIMATE LOCATIONS OF TIDAL WATERS AT BOLSA CHICA, ORANGE COUNTY, CA IN 1873 AND 1874

(SOURCE: U.S. COAST AND GEODETIC SURVEY TOPOGRAPHIC CHARTS T1345 AND T1369)



wetland vegetation in the absence of exempted farming activities, are regulated wetlands under 40 CFR 230.3(s)(7). Similarly, areas which were found to pond water seasonally or perenially and which are used or susceptible to use by migratory birds or endangered species are waters of the United States under 40 CFR 230.3(s)(3) and/or 40 CFR 230.3(s)(4), as well. These areas are also subsets of the "waters" delineated in Figure 10 and are specifically identified in Figure 11.

Special Aquatic Sites at Bolsa Chica

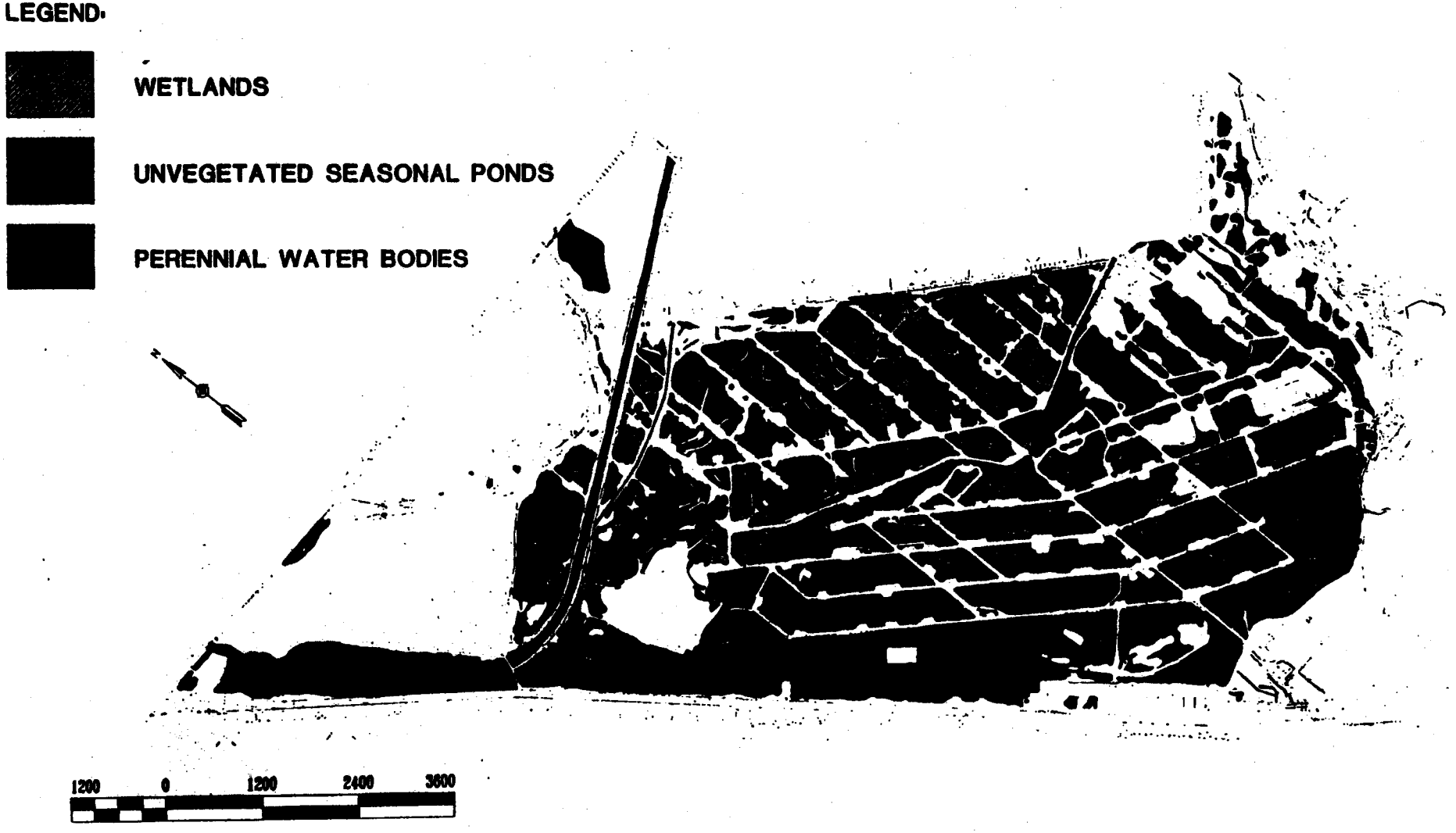
For the purpose of Section 404 permitting, it may be important to distinguish between certain "waters" at Bolsa Chica which are classified as "special aquatic sites" under EPA's 404(b)(1) Guidelines (40 CFR 230.40 - 230.45). Special aquatic sites, which for the purposes of the Bolsa Chica properties include 1) wetlands, 2) mudflats, 3) sanctuaries and refuges, and 4) vegetated shallows, are areas of special concern. Where a discharge is proposed for a special aquatic site, the 404(b)(1) Guidelines impose a higher burden of proof than would be required for applications which do not propose discharges into such areas.

To the extent practicable, Figure 11 identifies the locations of "waters of the United States" which are also special aquatic sites. The majority of such waters are 1) those "waters" meeting the Clean Water Act definition of wetlands and all "waters" (including mudflats) that are within the boundaries of the Bolsa Chica State Ecological Reserve (sanctuaries and refuges). Special aquatic sites were found in all subregions of Bolsa Chica (see Figure 4), including all cells in the North Bolsa Flats, the agricultural fields, and Edwards Thumb.

Within portions of Bolsa Chica southwest of Signal's "hydro line" (see page 19, also see discussion in Appendix A), there was substantial agreement between EPA's delineation of wetlands and other waters [40 CFR 230.3(s)(3) and 230.3(s)(7)] and that recommended by Sanders (1987). Areas of disagreement under these definitions were certain areas near Rabbit Island, Edwards Thumb, the South Bolsa Dunes, and areas north and east of the "hydro line". EPA also found that portions of the agricultural fields are not only "waters of the United States" under 40 CFR 230.3(s)(1), but are also regulated "waters" because they are wetlands under 40 CFR 230.3(s)(7); portions of the agricultural fields would be inundated or saturated at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation in the absence of 404(f)-exempted farming activities (see Bilhorn 1987) and are, therefore, wetlands subject to Section 404 regulation.

As discussed above and in Appendix A, EPA did not find Signal's "hydro line" to be a valid boundary between wetlands and uplands, nor a valid boundary between Clean Water Act wetlands and non-wetland "waters of the United States" in the North Bolsa lowlands. EPA also found sufficient evidence of wetlands

FIGURE 11. WETLAND AND OTHER AQUATIC HABITATS SUBJECT TO CLEAN WATER ACT REGULATION AT BOLSA CHICA, ORANGE COUNTY, CA.



hydrology within most low-lying areas of Edwards Thumb to assert jurisdiction over these areas as wetlands.

Some additional areas of Edwards Thumb, the W.R. Grace property, and the agricultural fields are waters of the United States, even though they do not presently support a prevalence of wetland vegetation or pond water seasonally or perennially. These include some small areas which were filled without CWA authorization (see discussion above, pgs. 23-24). Each of the geographical sub-units of the Bolsa Chica properties is discussed below.

Rabbit Island:

Rabbit Island is a sand dune encompassing some of the highest elevations found in the low-lying portions of Bolsa Chica. The soils are sandy, and Huffman (1987) reported that evidence of active water tables is found in the root zones of plants to about the +2.8-foot contour (2.8 feet above mean sea level [MSL]). Sanders (1987), on the other hand, appeared to follow the +2-foot MSL contour in delineating wetlands from uplands.

EPA field verified its map of this area in February 1988, finding that most areas above +2 feet MSL were uplands, because they lacked evidence of wetlands hydrology. Some areas, however, immediately adjacent to the Ecological Reserve property and adjacent to the Wintersburg Flood Control levee were found to be wetlands because of observed saturation within the upper 12 inches of the soil profile; along the Wintersburg flood control levee there was evidence of seepage, which could account for the higher water table observed at adjacent sites.

In areas immediately north and northeast of Rabbit Island, evidence of wetlands hydrology was generally lacking at sites with surface elevations above +1.6 feet MSL.[2] Exceptions were some slightly higher areas which formed natural drainage ways along the toes of certain levees, and some depressional areas that showed evidence of inundation.

South Bolsa Dunes:

EPA found that Huffman (1987) incorrectly delineated certain areas of the South Bolsa Dunes as waters of the United States. EPA also disagreed somewhat with the boundary delineated by Sanders (1987). Huffman (1987) mapped portions of these sand dunes as "waters of the United States", but EPA was unable to document a prevalence of hydrophytic vegetation, hydric soils

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2. This elevation should not be confused with the +1.7 feet above MSL which was used, in part, to determine the extent of "waters" under 40 CFR 230.3(s)(1). Under the existing conditions at Bolsa Chica, wetlands determinations are made based upon present hydrologic and topographic conditions, as opposed to determinations of "waters" under 40 CFR 230.3(s)(1), where subsidence is considered.

indicators, or evidence of wetlands hydrology within the higher elevation portions of these dunes, and therefore concluded that these areas are not federally-regulated wetlands. Furthermore, EPA found that the historical and present elevation of these dunes was above the plane of MHW, such that these portions of the dunes are not "waters of the United States under 40 CFR 230.3(s)(1).

Sanders (1987) boundary delineation appeared to coincide, almost exclusively, with the outermost branches of ice plant (Carpobrotus edulis), an obligate upland plant species; this reliance is reflected in his report (Sanders 1987).

Although EPA did find Carpobrotus growing at the highest elevations of these dunes, and in areas lacking evidence of wetland hydrology, EPA did not find the lower limits of the vegetation to be a reliable boundary between uplands and waters of the United States. One major reason for rejecting ice plant's presence as a definitive boundary is that the plant was not rooted at the outer limits of its branches, but rather its long branched runners were found growing down over lower, wetter areas. Thus, Carpobrotus was found growing on saturated soils at the South Bolsa Dunes. This observation is consistent with EPA's observations elsewhere where ice plant has been recorded growing in tidal salt marshes.[3]

In investigating the boundary formed by the mere presence of branches of Carpobrotus, EPA found that the lower limits of the plant varied substantially across topographic contours. Along the boundary flagged by Sanders (1987), there was nearly 2 vertical feet of difference topographically along portions of the same boundary lines. Because the soils of the South Bolsa Dunes are sand and/or sandy soils, the primary source of wetlands hydrology can be assumed to be tidal or tidally-influenced groundwater. EPA found that evidence of wetland hydrology followed topographic contours.

Thus, unless the vegetation and soils failed to meet the criteria for wetlands (Sipple 1988), EPA used topographic contours to delineate its final map. EPA field verified this mapping effort at 50 stations in the South Bolsa Dunes in February 1988. Although Carpobrotus is present in some areas delineated as wetlands by EPA (as it was in some of Sanders' delineated wetlands), at all locations, dominant wetland vegetation was also present. EPA found all areas within the South Bolsa Dunes to be waters of the United States if they had evidence of saturation within 12 inches of the soil (sand) surface.

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3. EPA believes that this species may be misclassified as "obligate upland" and will recommend that the plant's status be reviewed and revised, as appropriate. However, EPA considered Carpobrotus to be an obligate upland species for the purpose of this delineation.

Edwards Thumb:

EPA found areas with a prevalence of hydrophytic vegetation to be Clean Water Act wetlands within Edwards Thumb. EPA concluded that these areas had wetlands hydrology which inundates or saturates the hydric soils frequently enough to support the prevalence of hydrophytic vegetation found there in February 1988. This finding differs from that of Sanders (1987) who concluded that some of these areas lack sufficient hydrology, based upon groundwater data and Signal's estimates of capillary rise and plant rooting depth. Applying its observed capillary rise and its use of a 12-inch rooting depth, EPA concludes that the groundwater hydrology is sufficient to meet the wetlands criterion, and that rainfall contributes an additional significant source of wetlands hydrology (see also discussion in Appendix A and discussion of MacDonald 1988).

A portion of the wetlands delineated within Edwards Thumb was also found to be "waters of the United States" pursuant to 40 CFR 230.3(s)(1). These waters are two small sub-areas which were part of a tidally-influenced pond evident in Coast and Geodetic Survey topographic charts. One of these sub-areas presently supports a prevalence of obligate hydrophytes. The other sub-area is one of two that appear to have been filled without authorization; these are shown as basins with elevations below -2 feet mean sea level in 1986 topographic maps provided by Signal. EPA inspectors found these areas to be filled to the level of the surrounding grade in 1988.

North Bolsa Lowlands (north of the "Hydro Line"):

EPA found no evidence to support a delineation between wetlands and uplands along Signal's so-called "hydro line" (see Sanders 1987), an alleged boundary based upon a groundwater isopleth. In fact, EPA could detect no measurable differences between plant assemblages on either side of this line, nor could EPA find any differences in soil or hydrological indicators. Rather, we found that wetland plants on both sides of the line are obligate hydrophytes. We found that the concept of the line was not supported by our observations, nor was it well supported by the data provided by Signal (see Appendix A). In terms of acreage, most of the difference between EPA's findings and Signal's recommendations fall within this geographic sub-unit, where EPA determined that there were roughly 40 acres more "waters of the United States" than had been recommended by Signal.

EPA found that all low-lying portions of this geographical sub-unit had a prevalence of obligate hydrophytes, hydric soils, and evidence of surface inundation and subsurface saturation sufficient to conclude that the area is a wetland. Non-wetland portions of the site were levee roads, drilling pads, and

internal berms and dikes. Small portions of the site were seasonal ponds which were unvegetated.

Agricultural Field:

EPA found that portions of the agricultural field are wetlands because they would have saturated soil conditions sufficient to support a prevalence of hydrophytic vegetation in the absence of the farming activities (see Sanders 1987). Within this wetland area are small areas qualifying as "waters of the United States" under 40 CFR 230.3(s)(1) because historical slough beds meandered through portions of this property and their elevations remain below the plane of MHW; these portions of the site are proposed for restoration to tidal action through actions Signal has indicated it intends to take as part of its planned mitigation for developing other portions of Bolsa Chica. A narrow historical tributary slough which crosses the site (see Figure 10) was not determined to be "waters" under this definition because EPA had insufficient data to determine its precise location or its historical dimensions.

W.R. Grace Property:

EPA found that Sanders (1987) generally delineated the extent of waters of the United States correctly at the Grace property, as these waters exist in 1988. EPA delineated some additional areas which qualified as wetlands, but these areas were generally very small.

South Bolsa Lowlands (south of the "Hydro Line"):

EPA found that Huffman (1987) and Sanders (1987) correctly delineated the extent of waters of the United States for these portions of the site. In general, all low-lying areas were found to be waters of the United States. Areas which were found not to be subject to Clean Water Act jurisdiction were levee roads, drilling pads, internal berms and levées, and some filled areas adjacent to drainage ditches.

EPA noted several small sites adjacent to levee roads and drilling pads which appear to have been filled since 1980. EPA could not find evidence that these fills were permitted and, accordingly, EPA asserted CWA jurisdiction over these areas as "waters of the United States".

Other Areas:

EPA agreed with Huffman's (1987) and Sanders' (1987) delineations of "waters of the United States" within the Bolsa Chica State Ecological Reserve, the South Bolsa Lowlands, and for most "waters" delineated within properties owned by the Metropolitan Water District of Southern California.

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APPENDIX A:

ANALYSIS AND DISCUSSION OF SIGNAL'S DATABASE

PREPARED BY
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION IX
SAN FRANCISCO, CA

FEBRUARY 1989

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EXECUTIVE SUMMARY

Subsequent to EPA's field investigations of the extent of waters of the United States at Bolsa Chica in 1985, agents for the principal landowner, Signal Landmark (Signal), met with EPA and asked that EPA also consider data which had been prepared for Signal by their consultants. In making the request, Signal's agents stated their recognition of the presence of 1) a prevalence of hydrophytic vegetation and 2) hydric soils in low-lying portions of Bolsa Chica. Signal asked EPA to consider hydrologic data developed by Signal in EPA's determination of the extent of federally-regulated wetlands at Bolsa Chica.

EPA agreed to consider these data, which were subsequently provided in reports submitted in 1986, 1987, and 1988. This Appendix to EPA's delineation of Clean Water Act jurisdiction is EPA's evaluation of Signal's data and describes the rationale for EPA's adoption or rejection of these data for use in EPA's jurisdictional delineation.

EPA was unable to rely upon many of Signal's data. In some cases, Signal's data conflicted with direct observations made by EPA. In other cases, results and conclusions drawn from one data set conflicted with those of another (as in comparisons of conclusions based upon soil oxygen and soil redox potential data). In some cases, assumptions in Signal's estimates were found by EPA to be incorrect (capillary rise in sand, for example) and in some other instances, testing procedures and/or test equipment raised questions about the validity of conclusions which could be drawn from the data so gathered (as with soil oxygen and ferrous/ferric iron tests). EPA found that Signal's own jurisdictional delineation (Sanders 1987, with 1988 mapping revisions) did not rely on, and in some cases conflicted with, conclusions that were drawn by Signal from its other data sets.

EPA accepted Signal's groundwater measurements in describing the height of the groundwater table on the dates that these data were taken. However, EPA could not find sufficient justification for development of a wetland/upland boundary (Signal's "hydro line" concept) on the basis of these groundwater measurements. Rather, EPA found that if EPA's measured levels of soil capillary rise were considered along with Signal's "hydro line" assumptions, most of the low-lying areas at Bolsa Chica qualified as having wetlands hydrology. Similarly, EPA found that use of Signal's recommended rooting depth of the wetland plant, pickleweed (*Salicornia virginica*), in determining the wetland/upland boundary was insufficiently supported in terms of the 9-inch depth recommended; in addition, no justification could be found to accept Signal's implied recommendation that EPA use this depth to evaluate wetland hydrological conditions in the rooting zone of other plant species.

EPA did not find adequate justification, based upon Signal's data, to abandon its reliance upon surface and subsurface indicators of hydrology at Bolsa Chica.

INTRODUCTION

In his report to EPA, Huffman (1987) concluded that areas within the North Bolsa lowlands and Edwards Thumb supporting a prevalence of wetland vegetation were wetlands subject to Clean Water Act jurisdiction. In reaching this conclusion, Huffman relied primarily on hydrological indicators such as drift lines, water marks, algal or ditch grass mats, oxidized rhizospheres, or observations of saturated soils in the root zone of the plants. In addition, Huffman (1987) relied upon aerial and ground-level photographs of the site during winter and spring months. These indicators are used routinely in determinations of the geographical extent of wetlands subject to Clean Water Act (CWA) jurisdiction, when such determinations are made by the U.S. Army Corps of Engineers (Corps) or EPA.

Sanders (1987) conducted a jurisdictional study on behalf of Signal and reached different conclusions regarding the geographic extent of these wetlands. While generally agreeing with Huffman (and virtually all previous surveys on the site) with regard to 1) which areas of the Bolsa Chica site support a prevalence of hydrophytic vegetation and 2) the extent of hydric soils in the low-lying portions of the site, the Sanders report differed significantly with the Huffman report regarding hydrology. Sanders (1987) concluded that portions of Bolsa Chica delineated as wetlands by Huffman (1987) lack wetlands hydrology, despite the presence of a prevalence of hydrophytic vegetation.

Sanders (1987) delineated a wetland/upland boundary within the low-lying portions of Bolsa Chica (the "hydro line") based upon Signal's estimated subsurface boundary between wetland and upland hydrology (see photograph, Figure A-1). In delineating this boundary, Sanders (1987) stated that he based his conclusions upon data provided by Signal regarding 1) measurements and estimates of the surface and sub-surface hydrological conditions at the site (including the contribution made by rainfall), 2) measurements of soil oxygen, redox potential, ferrous/ferric iron, and salinity within the soil, and 3) estimates of capillary rise of water in the soil profiles within the North Bolsa and Edwards Thumb areas.

EPA reviewed Signal's data in detail, and sought expert recommendations, as well, in determining the appropriateness of EPA's accepting the recommendations of Signal and incorporating them into EPA's jurisdictional delineation. As with EPA's jurisdictional delineation report, for which this is an appendix, EPA will refer to sub-units of the Bolsa Chica properties by those names used in Sanders (1987) report for the purposes of consistency (Figure A-2). In addition, EPA will refer to specific sites with regard to their proximity to numbered well locations. These are shown in Figure A-3. In referring to Signal's hydrologic boundary between wetlands and uplands, which Signal contends exists within the North Bolsa lowlands, EPA uses the term "hydro line" as coined by Signal.

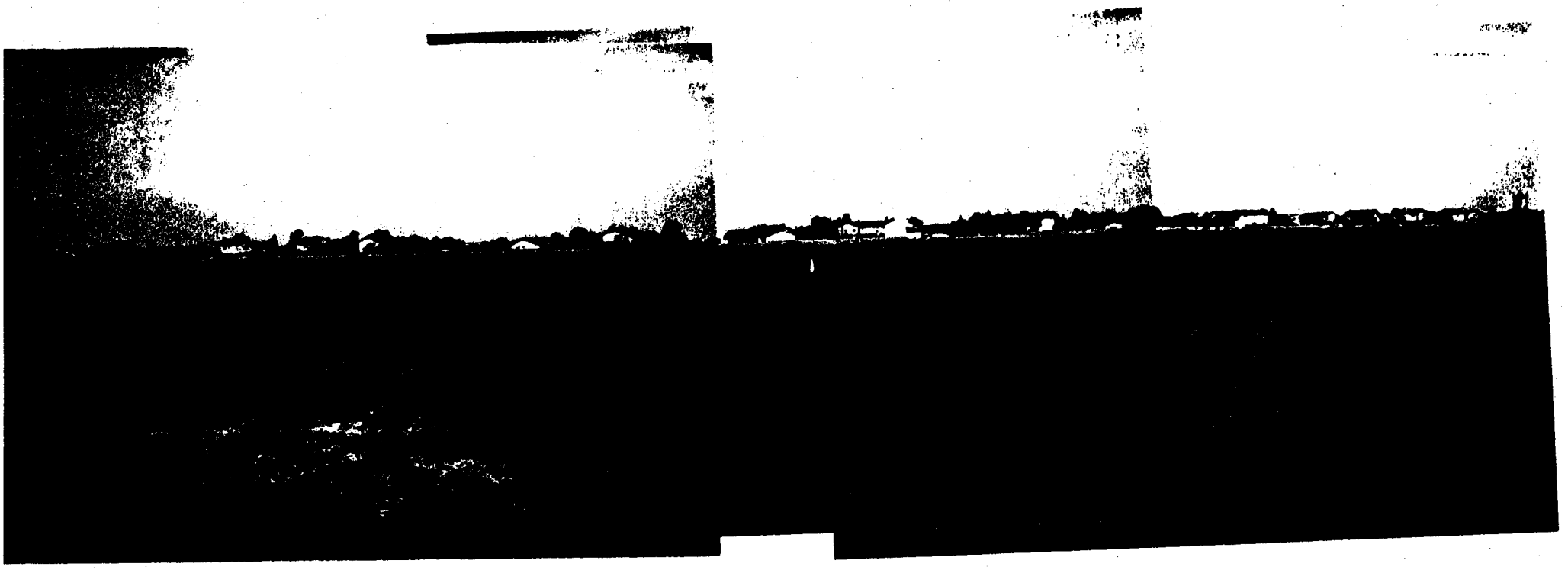

Figure A-1. Photograph of a portion of a flag line delineating wetland portions of Bolsa Chica from upland portions, according to Sanders (1987). Areas to the left of this alleged boundary are uplands, according to Sanders.

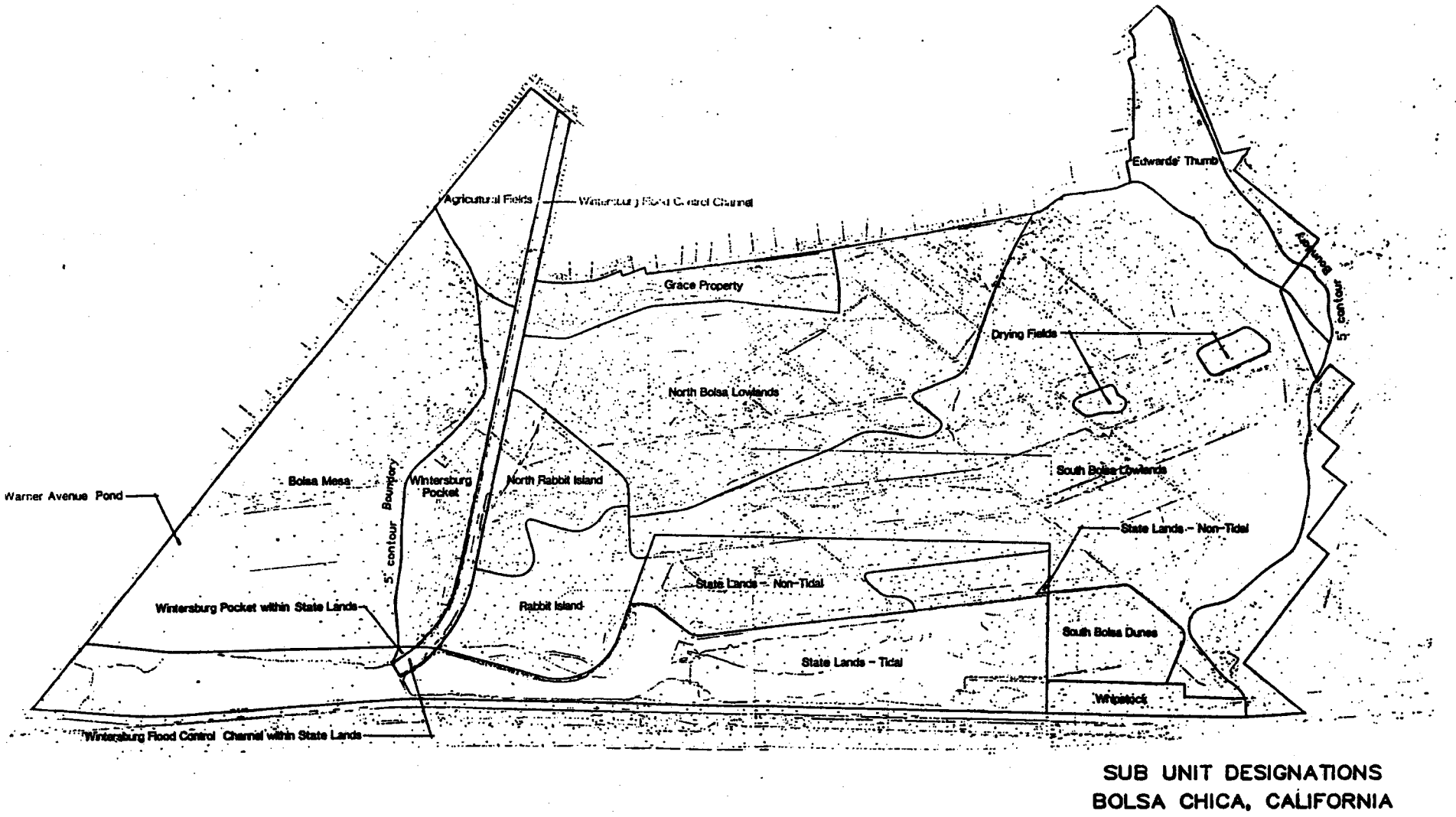

Figure A-2. Names of Sub-Regions of Bolsa Chica, Orange County, California (From Sanders 1987).

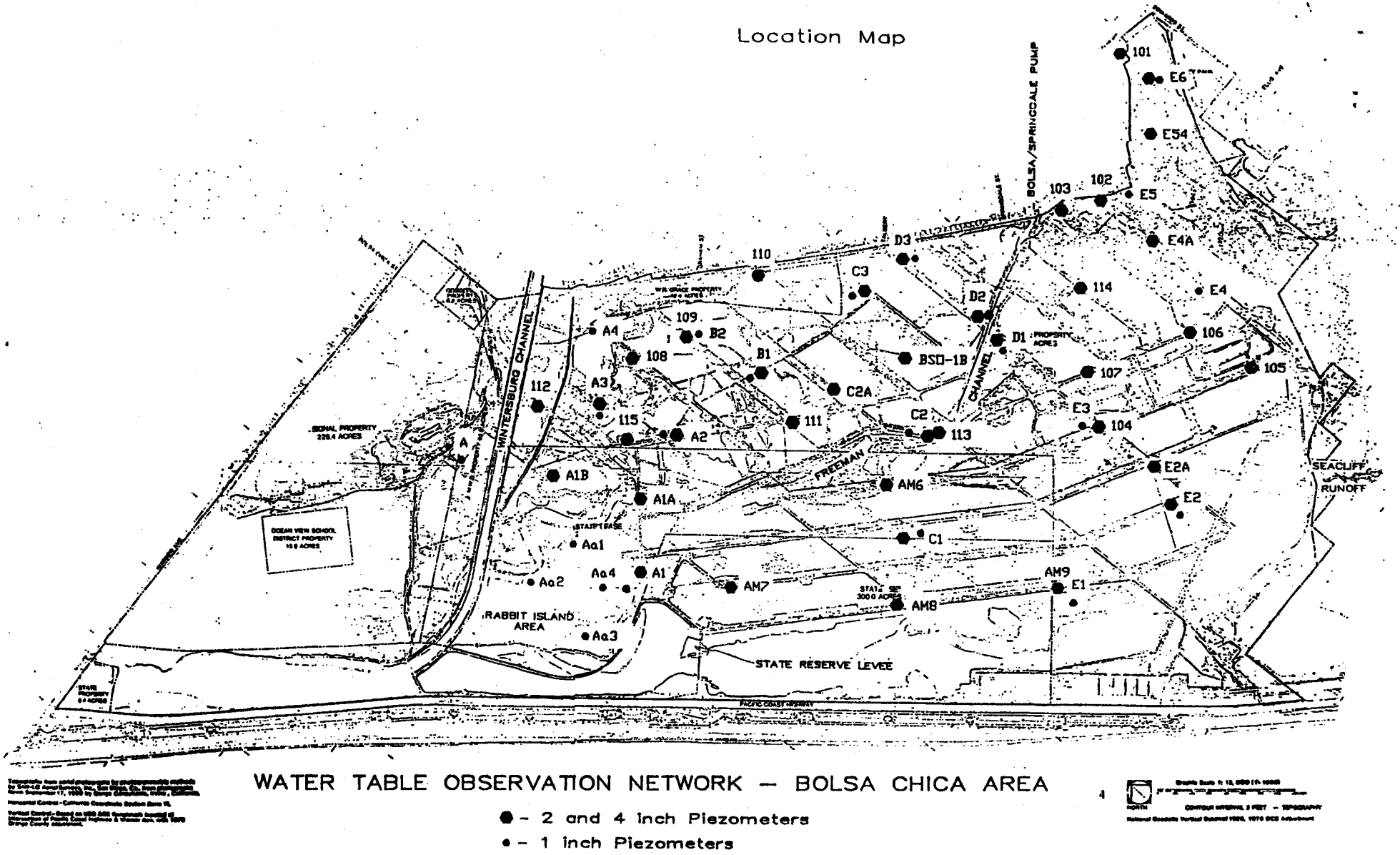

Figure A-3. Locations of Signal's observation wells at Bolsa Chica. These are also the locations of Signal's soil oxygen study chambers and Signal's redox potential probes. Figure from Bilhorn 1986.

SOIL OXYGEN DATA

Signal presented EPA with data suggesting that most of the low-lying portions of Bolsa Chica are well-oxygenated throughout the year (Macdonald 1986 and 1987a). In particular, these studies showed that the North Bolsa lowlands have oxygen levels near that found in the atmosphere. Based in part on these data, Signal suggested in 1982 (Signal Landmark, Inc. 1982) and recommended to EPA in 1986 that virtually all areas in the North Bolsa lowlands do not meet the hydrological criterion for wetlands subject to CWA jurisdiction (see Figures A-4 and A-5). Its rationale was that high oxygen levels are indicative of upland soils and that inundated or saturated soils would have low oxygen levels and/or reducing conditions.

EPA inspected a number of the soil oxygen sampling stations in 1986 and later in 1987. In the course of these inspections EPA found that soil oxygen data from some sites sharply conflicted with the physical evidence on the site. For example, Signal's sampling of site E-1 (see Figure A-3) showed high, subsurface soil oxygen levels (14 - 17%; atmospheric concentration of oxygen is approximately 21%) despite groundwater that was at or near the surface. Such saturation of soil with groundwater is typically associated with soil oxygen levels that are at or near 0%. Signal later indicated that their soil oxygen measurements were probably overestimates in those cases where the sampling chamber was below the groundwater table (Macdonald 1987a).

Signal's consultants reported that subsets of the soil oxygen chambers had been installed, and measurements taken, by three separate individuals or groups of individuals. They reported that initial testing "did not work", necessitating modifications of the standard methods developed by Patrick (1977).

These modifications were substantial, and required an elaborate system to withdraw a sample, measure its oxygen content, trap the measured sample in a balloon, and reinject the same sample into the sub-surface sampling chamber. Measurements were made using a sequential subsampling of small portions of the sample until consistent readings were observed. EPA understands that standard procedures would have been to withdraw and measure an entire sample and to not reinject that sample back into the chamber for subsequent measurements.

One of Signal's consultants reported to EPA investigators that the measurement apparatus (an oxygen meter probe, syringe, balloon, and three-way valve) was so sensitive to movement that the apparatus had to be securely mounted on a board to help stabilize the oxygen readings. On a separate occasion, another consultant reported to the same EPA investigators that when he had taken over the work in a later phase, this same apparatus had

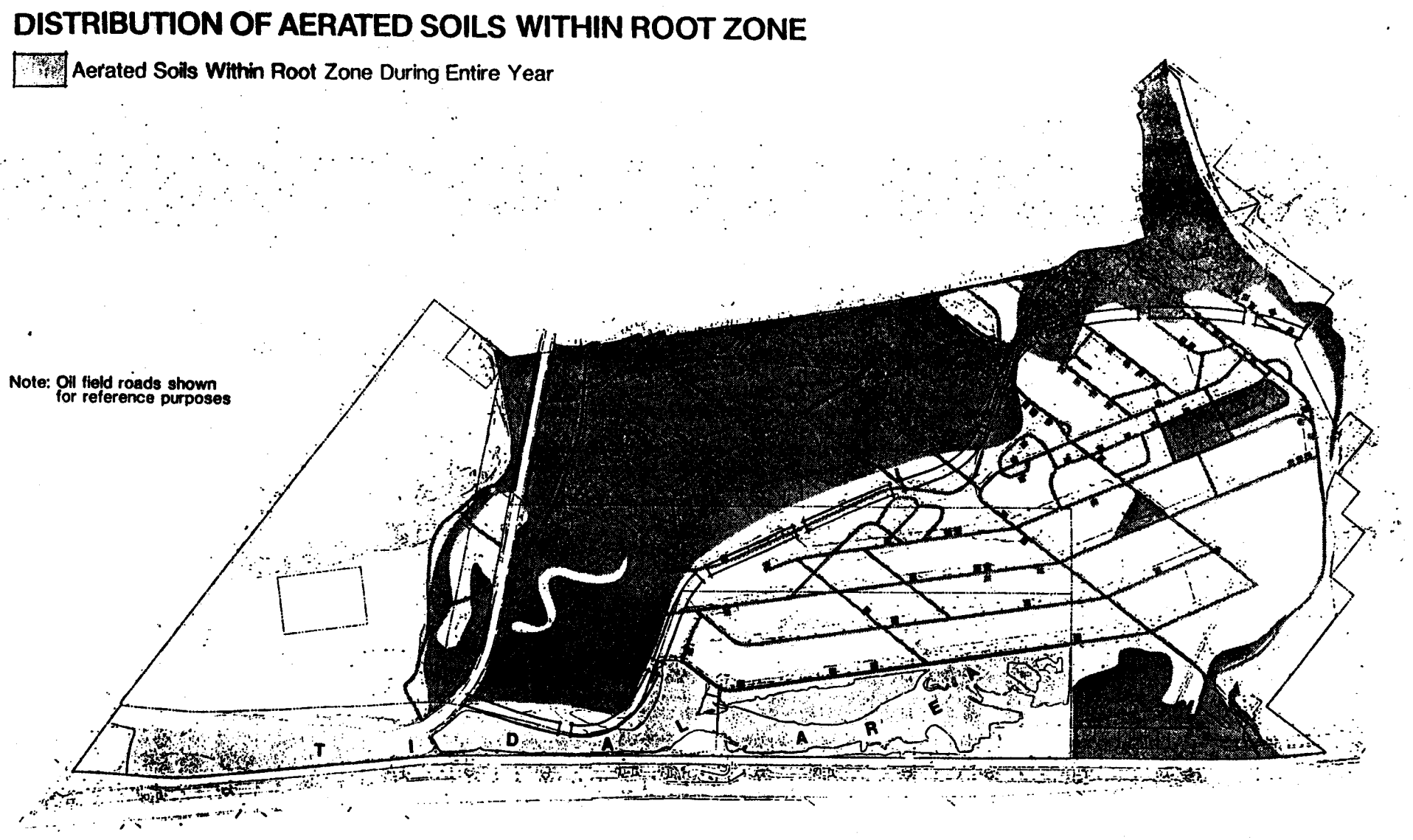

Figure A-4. A map of Bolsa Chica showing where the landowner, Signal, determined that soils in the root zone of vegetation would be aerated throughout the year. On this basis, Signal concluded that shaded areas did not qualify as federally-regulated wetlands. Conclusions are based upon soil oxygen studies. (From Signal Landmark, Inc. 1982).

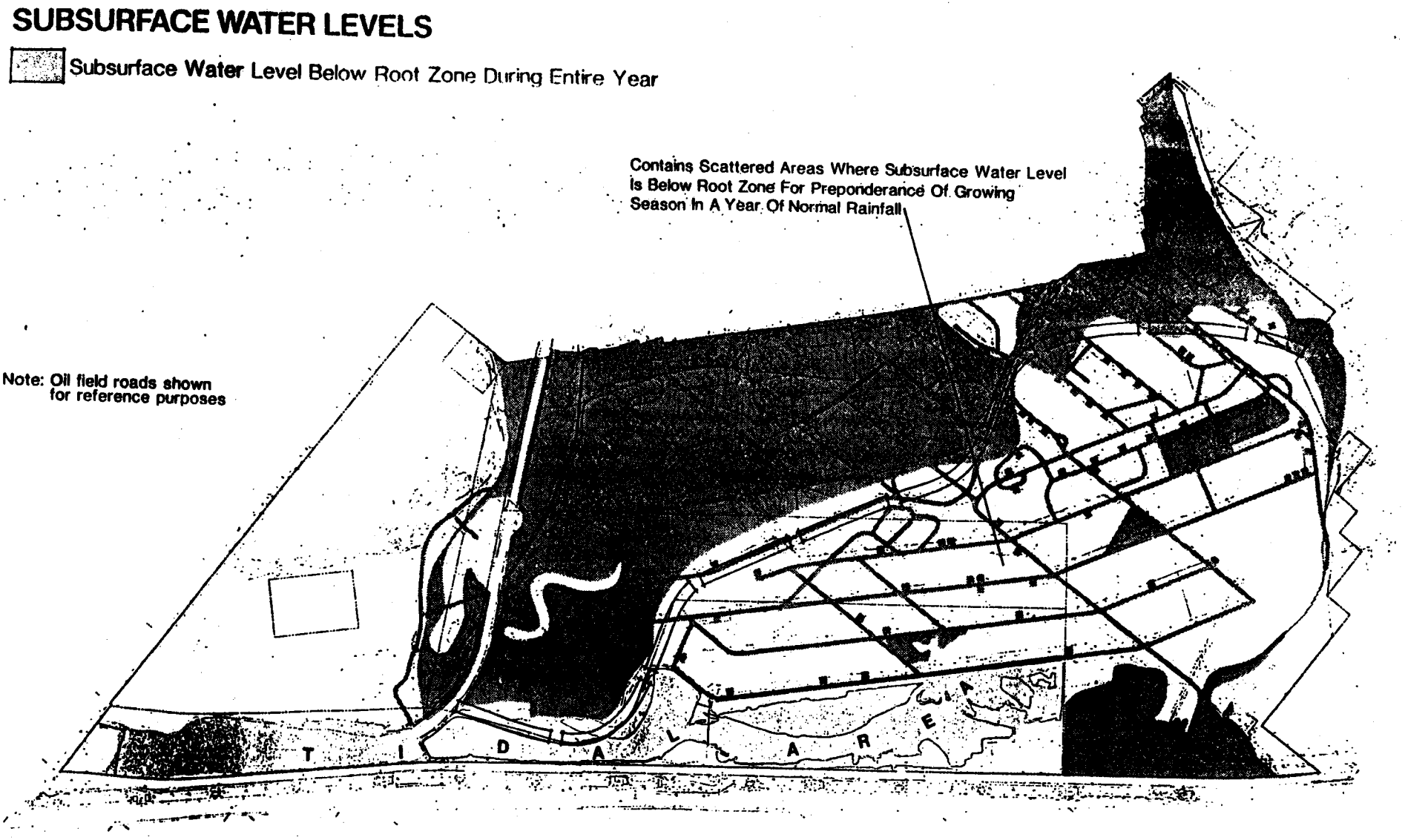

Figure A-5. A map of Bolsa Chica showing where the landowner, Signal, determined that subsurface water levels would remain below the root zone of the vegetation throughout the year. On this basis, Signal concluded that shaded areas did not qualify as federally-regulated wetlands. (From Signal Landmark, Inc. 1982)

been removed from the board and had, instead, been held together with rubber bands to facilitate transporting it to the field in his pocket for field measurements.

EPA inspected the sampling chambers that had been utilized in this study. Upon unearthing these chambers, EPA noted evidence of leakage or potential leakage. This evidence included poorly constructed or sealed chambers and oxidized soils surrounding them (Figure A-6). EPA was aware, however, that because its exhumation of these chambers took place long after the studies had been completed, evidence of leakage may not have been conclusive.

EPA's technical advisory team reported that measurements of soil oxygen are difficult procedurally under the best of conditions, and that at least three replicate samples should be collected in soil oxygen studies, to allow for detection and correction of problems, particularly if one or more of the chambers is providing faulty readings. Signal chose to take single or, in some cases, duplicate samples in their studies at Bolsa Chica.

Therefore, 1) the actual methods of collecting and measuring samples, 2) the reinjection of the same sample for later reading, 3) the design and construction of the subsurface chambers, 4) the potential for air leakage, 5) the anomalous readings (such as those for station E-1), 6) the lack of sufficient replicates or controls, and 7) the fact that the data conflicted with results of other studies conducted by Signal (such as redox potential -- see below) led EPA to conclude that there was inadequate quality assurance for EPA to rely upon the soil oxygen data for this delineation effort.

REDOX POTENTIAL DATA

Redox potential is an electrical conductivity measurement that provides an indication of whether or not soil conditions are aerated or anaerobic. Under anaerobic conditions, metals become reduced rather than oxidized, and the conductivity of the soils can provide a reasonably stable and repeatable measure of these conditions. Readings below +360 millivolts generally indicate reducing conditions, while conditions above +400 millivolts (mv) generally indicate oxidizing conditions (Parker 1987c). Representative observations of redox potential in the substrata of several southern California salt marshes are shown in Table A-1 (from Eilers 1980). These data show that redox potentials as high as +407 mv may not be unusual in southern California wetlands.

According to Patrick and Delaune (1977), oxygen (O_2) is the first soil component to be reduced, becoming undetectable below a redox potential of about +350 mv. As the redox potential drops further, nitrate is reduced to nitrite (at about +250 mv). Manganese is reduced from manganic to manganous compounds at about

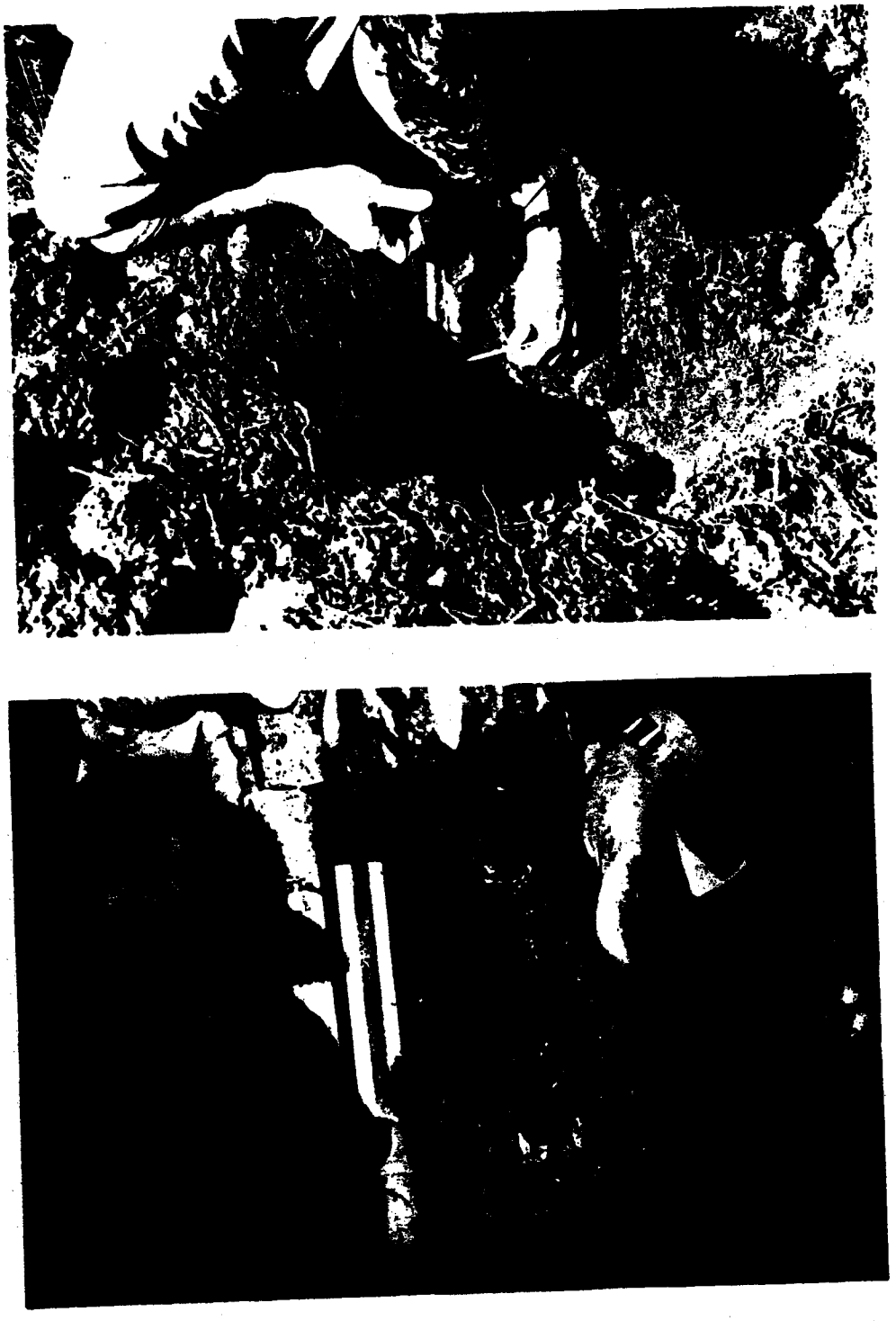

Figure A-6. Excavation of one of Signal's soil oxygen chambers in March 1987. Note oxidized soil surrounding chamber in lower photo and fractured plaster seal on top of the plastic chamber. These features indicate potential air leakage and potential anomolous soil oxygen measurements.

Table A-1. MEAN REDOX POTENTIAL OF SUBSTRATA IN FOUR SOUTHERN CALIFORNIA SALT MARSHES (Eh.mV). After Eilers (1980).

	1977-78	
	OCT/NOV	DEC/JAN
BOLSA BAY (prior to breaching dike)	+65	+307
UPPER NEWPORT BAY	+304	+407
LOS PENASQUITOS LAGOON	+382	+381
SWEETWATER RIVER ESTUARY	+369	

+200 mv, iron from ferric to ferrous at about +120 mv, and sulphur from sulfates to sulfides at about -150 mv. At any given time, there is likely to be considerable variation in redox potential between microsites in the soil (Coats 1987). Since sulfate is reduced at a relatively low redox potential, gypsum (calcium sulfate) may be present in a saturated soil (Coats 1987); gypsum was observed as white deposits in soils in the Edwards Thumb area at Bolsa Chica.

Despite Signal's statements that redox data confirmed their soil oxygen data, the data are inconclusive (Piotrowski 1982 and Macdonald 1987b). For measured soil oxygen at or near atmospheric saturation (21% O_2), Signal reported redox potentials that ranged from less than +100 mv to greater than +600 mv (Macdonald 1987b). Similarly, Signal reported a wide range of O_2 values (1% to 20%) at sites where redox potential was found to be roughly +100 mv or less (Macdonald 1987b).

Site E-1 (see Figure A-3), for example, was clearly saturated to the surface, as Sanders noted to EPA on the site in March 1987. The measured water table was the same as that under which Signal had reported soil oxygen of 17%. Site E-1 consistently was reported as highly reduced, which is likely for that site. However in nearly all samples, Signal's soil oxygen data at the 6-inch depth showed nearly atmospheric levels of O_2 at all times, whether or not the O_2 chambers were above or below the water table.

Although in 1987, Signal explained that sampling below the water table tended to overestimate O_2 levels (Macdonald 1987a), the amount of overestimation was not known, nor did Signal estimate the statistical variability of such overestimates. Rather, Signal discounted these data (reported as reliable in 1986 by Macdonald) because their values strongly conflict with what is scientifically known about O_2 concentrations in saturated soils. No such disclaimer is suggested for measurements of oxygen in soils above the water table (Macdonald 1986 and 1987a).

Such a disclaimer appears warranted, however, after inspecting some of the specific data. For example, at site C-3 in April 1982 (see Figure A-3), the water table was below the soil oxygen chambers. Thus, the anomalous overestimates of O_2 found when Signal sampled below the water table should not have been a factor. In addition, soil capillary rise (see discussion on page A-7) would have saturated the soil to above the base of the O_2 sampling chambers at the 24-inch depth, given that these chambers were only about 2 inches above the water table (Figure A-7). Because this water table depth was essentially unchanged from that measured a month earlier at C-3, there should, in theory, have been ample time for 1) the chambers to equilibrate and 2) expected microbial uptake of available oxygen within this saturated soil. The O_2 measurements should have been very low.

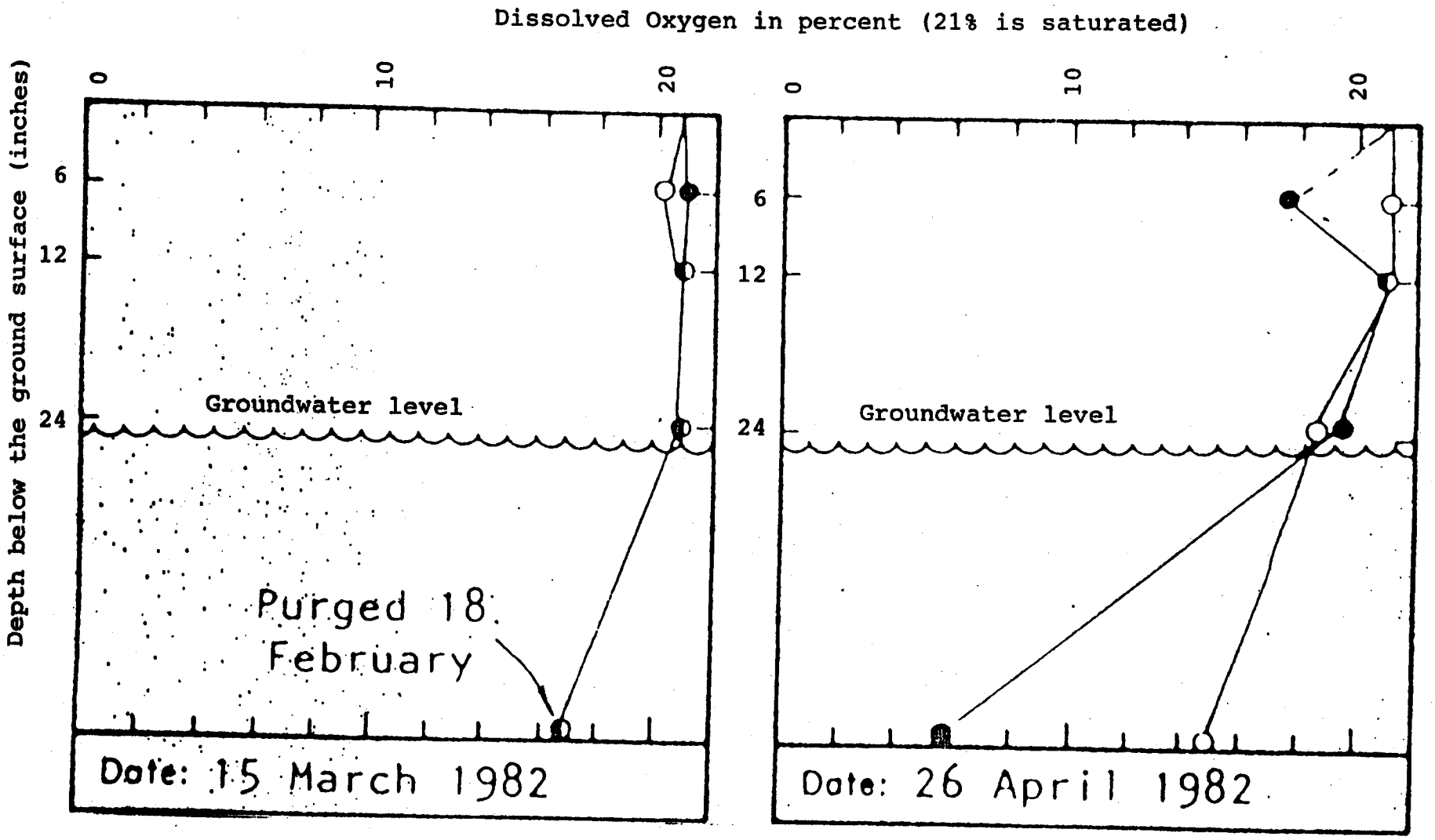

Figure A-7 . Dissolved oxygen measurements at various depths at well site C3. Bolsa Chica, Orange County, CA (Data from Macdonald 1986).

However, Signal data showed site C-3 soils to have O_2 concentrations near atmospheric saturation at 24 inches (Macdonald 1986). Signal found 19% O_2 in April and 21% O_2 a month earlier. In contrast, the redox data shows the site to be reduced, as expected under these conditions. Average redox potential values were +267 mv in April 1982, and +255 mv a month earlier.

Signal averaged data even when it varied widely, rather than attempt to determine whether one or more of its measurements were faulty. For example, in May 1982 at site E-4 (see Figure A-3), the water table was approximately 10 inches below the soil surface. It is reasonable to assume that soil capillary rise (see discussion of capillary rise on page A-7) would saturate the soils 4 inches above. Signal recorded soil oxygen measurements of roughly 10% and 20% at this replicate station (Figure A-8, from Macdonald 1986). The redox potential replicates were both +100 mv, showing the soils to be reduced (Piotrowski 1982). Signal reported the mean O_2 measurement of 15.5 (well-oxygenated) and utilized this value in their statistical analyses (Macdonald 1987b). Again, O_2 would have been expected to be low.

Macdonald (1987b) disagrees with Huffman's (1987) conclusions that there is poor agreement between Signal's redox and soil oxygen data; a strong, positive statistical correlation between these data would be expected. Both measures should provide relative indications of the extent to which soils are saturated and therefore, under anaerobic or reduced conditions. Macdonald (1987b) states that these data sets are strongly correlated statistically. However, Macdonalds' statistical analysis actually shows that although the data are correlated significantly (significantly different from no correlation between the data sets), the correlation is actually very weak.

Macdonald (1987b) is incorrect in concluding that these data support one another on the basis of this weak correlation (Koehler 1987). In fact, conclusions drawn from one data set conflict with those drawn from the other. For example, reliance only upon redox data would lead to the conclusion that all sites measured (A-2, B-2, C-3, E-1, and E-4, see Figure A-3) experienced wetlands hydrology in the 1981-1982 rainfall year. At these sites, reducing conditions were recorded at 6-inch and 24-inch depths during portions of the growing season of the wetland vegetation (Piotrowski 1982).

Relying strictly on soil oxygen data (Macdonald 1986), however, leads to conclusions that, at most, reduced or anaerobic conditions occurred at 12-inch depths at site E-1, and E-4 and at 6-inch depths at site E-4; EPA chose to use measured soil oxygen levels of 10% or less to reflect anaerobic conditions in this analysis. Using Signal's 9-inch depth criteria for root zone saturation (see discussion of root zone on page A-12), soil oxygen measurements alone lead to the conclusion that site E-4 experienced wetlands hydrology in the 1981-1982 rainfall year.

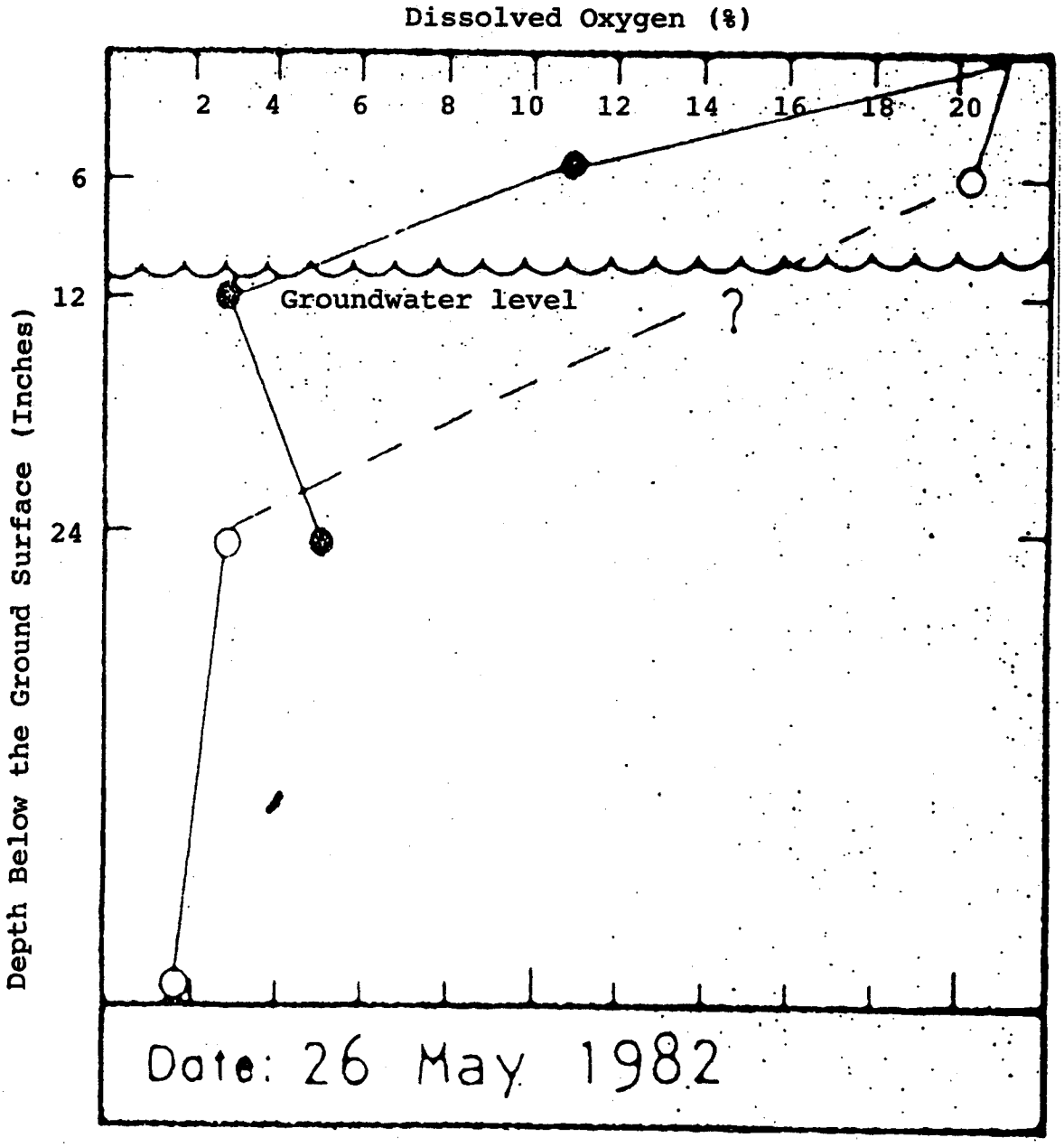

Figure A-8. Soil oxygen measurements at various depths at site E4 on May 26, 1982 (From Macdonald 1986). Paired points (open and closed circles) indicate replicates.

Thus, of the five stations where Signal conducted measurements of soil oxygen and redox potential, five experienced wetland hydrological conditions based upon the redox data, but only one experienced wetland hydrological conditions based upon the soil oxygen measurements. Koehler's (1987) evaluation that these two data sets are not strongly correlated appears correct.

It is worth noting that Signal's wetland delineation (Sanders 1987) found that all of the above sampling stations, except B-2, to be federally-regulated wetlands or inundated waters of the United States. Sanders (1987) does not appear, therefore, to rely upon the soil oxygen data. Rather, his delineation agrees more with conclusions that might have been drawn from Signal's redox data. Similarly, EPA, in its final delineation effort (EPA 1988), found that all five redox measurement sites were in waters of the United States (including wetlands), thus agreeing with conclusions that might have been drawn on the basis of redox potential data alone.

FERROUS/FERRIC IRON TEST

The ferrous/ferric iron test is a chemical field test that provides an instantaneous reading of the presence of reduced (ferrous) iron in the soil. Thus, the ferrous/ferric iron test only provides information about soil conditions as they exist at the actual time of the test. Tests made during the dry season or during a dry year would be of little value in determining what conditions exist during the wet season, when wetland soil conditions occur in diked California wetlands.

William Blake Parker, EPA soils consultant, declined EPA's request to conduct such tests in the spring of 1987 because such testing would be inappropriate. given the time of year and acknowledged dry conditions. Similarly, the Corps' wetland jurisdictional manual (Environmental Laboratory 1987) cautions against such inappropriate use of the test. Signal's test results were obtained between March 30 and April 10, 1987 in a dry year (Macdonald and Bilhorn 1987) and are not, according to Parker, reliable for the purposes of a wetland jurisdictional determination because they were conducted under inappropriate conditions.

EPA notes, as in the soil oxygen tests, that Signal modified standardized techniques. Signal utilized smaller samples with less reagent than specified in standard tests and, further, attempted to quantify their findings from these tests which are designed to merely determine presence or absence of ferrous iron (Macdonald and Bilhorn 1987). The tests are not designed to provide the type of information on the relative abundance of this ion between sample sites that Signal reported in their results (Macdonald and Bilhorn 1987).

SOIL CAPILLARY RISE

Huffman (1987) suggested that soils may become saturated in the root zone of plants at Bolsa Chica when groundwater is carried vertically by capillary action. This capillary rise may saturate soils many inches above the actual level of ground water measured in observation wells (U.S. Department of Agriculture 1985).

Signal's consultants were aware that EPA had measured capillary rise of 11 to 15 inches in silty clay soils at Bolsa Chica (near well site C-2), and noted EPA's observations in their report on hydrology of the site. However, Signal informed EPA that their measurements in other portions of the site yielded evidence of capillary rise of only 2 to 4 inches. The differences were attributed to the sand layers within the soil profile above the groundwater table in many portions of the property.

In a 1987 presentation to EPA, Signal's hydrologist stated his belief that "there is absolutely no capillary rise in sand" (see also Bilhorn 1987). Based upon this belief, Signal concluded that capillary rise could not saturate the root zone of plants above such sand layers. Signal indicated in its 1987 presentation to EPA, however, that they had arbitrarily allowed for an 8-inch capillary rise in their studies in order to "err in favor of the wetlands" (see Sanders 1987).

It is not true that there is no capillary rise in sand. According to Bouwer (1978), the air entry value (equilibrium height of capillary rise) may be 5 to 30 centimeters in coarse to medium sands and higher in fine or silty sands. On December 2, 1987, EPA observed evidence of significant capillary rise in sands at Bolsa Chica. In collecting soil cores for analysis, Dr. Robert Coats of EPA's technical advisory team, observed saturated sand approximately 17 inches above the water table near site B-1 (see Figure A-3 for location); the water table depth was recorded at 81 inches and saturated sand was recorded at a depth of 64 inches. Signal's studies of soil profiles indicated that this sand layer was continuous between these depths at this site.

Signal's selection of an 8-inch capillary rise (Sanders 1987), therefore, appears to have no scientific basis. This estimate conflicts with EPA's observed measurements as well as with Signal's alleged measurements of 2 to 4 inches. Furthermore, Signal's claim that there is no capillary rise in sand is simply incorrect.

EPA's observations of 11 to 17 inches of capillary rise are likely to be conservative. Parker (1987c) stated that the zone of capillary rise is lowest in the dry season. The height of capillary rise is greatly affected by surface wetting and, therefore, the zone of capillary rise may be far greater in the rainy

season than in the dry season. EPA's observations of 11 and 15 inches of capillary rise near site C-2 were made in the dry season. EPA's observation of 17 inches of capillary rise in sand at site B-2 was made in December 1987.

RAINFALL AND PONDING DATA

Sanders (1987) and other reports provided by Signal (see Bilhorn 1986b) conclude that rainfall at Bolsa Chica is insufficient to inundate or saturate soils within the root zone of wetland vegetation anywhere within the site, except within depressions where Sanders (1987) estimated that there may be sufficient runoff from higher areas to result in surface ponding and/or saturated soil conditions. These conclusions are based upon rainfall records from Huntington Beach, upon aerial photographs of the site, and estimates of evaporation rates (Bilhorn 1986b).

Signal incorrectly assumed that pan evaporation is the same as evapotransporation, thus overstating the significance of evaporation (Coats 1987). Signal did no quantitative water balance calculation.

Furthermore, Signal does not explain the source of surface water runoff into depressions, a concept that would appear to conflict with Signal's assertion that too little rainfall and too much evaporation preclude Bolsa Chica from functioning as a seasonal wetland (i.e., there is insufficient rainfall to saturate any portion of the upper 9 inches of the soil profile, but there is enough rainfall to cause water to runoff and collect in depressions). Most of the low-lying portions of Bolsa Chica are flat, so lateral movement of water would tend to be less likely than vertical (percolation) movement into the soil profile. In his report to Signal, Lund (1988) showed that this percolation rate may be so rapid that runoff is unlikely unless the upper layers of soil are saturated. Further discussion of this relationship between topography, percolation, and rainfall is provided by MacDonald (1988).

Signal concludes that in most years, there is insufficient rainfall to saturate soils in the root zone of plants on the site. Signal did report the extensive ponding that occurred in 1983, but dismissed this event as a 1-in-100-year flooding (Bilhorn 1986a). Sanders (1987) reported that similar ponding resulted from storm events in 1978, as well.

Signal appears to base its conclusions regarding surface water hydrology on an assumption that if there is no surface ponding, upper layer soils are not saturated. Given the capillarity of the soils on the site, this assumption may not be valid (i.e., the root zone of the plants is being saturated by groundwater sources below). Furthermore, because of this conclusion, Signal dismisses rainfall as a contributor to any soil

saturation and relies instead on groundwater as the sole source of such saturation in the North Bolsa lowlands and Edwards Thumb.

Although Williams (1982) had previously modelled the relationship between rainfall and surface ponding at Bolsa Chica, these studies were inconclusive with regard to subsurface saturation of the root zone of wetland plants. As discussed in EPA's jurisdictional delineation (EPA 1988), EPA obtained evidence that rainfall does contribute significantly to wetland hydrologic conditions at Bolsa Chica. A hydrologic model prepared for EPA showed that portions of the North Bolsa lowlands and Edwards Thumb, which were shown by Bilhorn (1986) to have deeper groundwater tables, become saturated within the root zone of the wetlands vegetation as a result of rainfall in most years (MacDonald 1988).

Signal attempted to characterize the surface water conditions at Bolsa Chica in terms of "average" hydrological conditions. Zedler (1987), a leading southern California wetland researcher, cautions that the region is characterized by its variability; Zedler suggests that discarding particularly wet years from analyses, as Signal did for 1978 and 1983 rainfall events, may not be justified; high rainfall seasons or storm events are periodic events which can affect the distribution of wetland plants (Zedler 1987).

The timing and duration of rainfall is more important than average annual rainfall in determining whether or not saturated soils will develop. As further empirical evidence, Zedler (1987) describes the presence and persistence of vernal pools in San Diego County, where lower rainfall, less severe storms, and higher evaporation rates would, using Signal's analyses, preclude their occurrence, yet the timing and duration of these storms is sufficient to maintain these wetland systems.

Finally, Zedler (1987) concludes that "normal" environmental conditions in Southern California are highly variable from year to year, from season to season, and from week to week.

> "While the annual rainfall is low for the nation, it is clearly sufficient to support wetlands, even in areas that are not fed by groundwater or runoff" (Zedler 1987).

ROOT ZONE SATURATION FROM RAINFALL

Anticipating that EPA might conclude that rainfall causes near-surface soil saturation at Bolsa Chica, Signal commissioned a study to evaluate the likelihood that rainfall saturates the upper 12 inches of soil at Bolsa Chica. Lund (1988) found that few soil samples at sites B1 and B2 (see Figure A-3) were saturated immediately following water application. He concluded that surface soils found at sites B1 and B2 are unlikely to be saturated from rainfall events typical of the Bolsa Chica area.

An attorney for Signal concluded, considering its soil oxygen and ferrous/ ferric iron data, that Lund's study shows that "near-surface soils in the North Bolsa Flats [lowlands] do not experience saturation often enough or long enough to qualify those areas as jurisdictional wetlands" (Virginia S. Albrecht, attorney for Signal in an April 11, 1988 letter to Laurie Kermish, attorney for EPA).

EPA had already evaluated these soil oxygen and ferrous/ ferric iron studies and had concluded that it would be inappropriate to rely upon them for EPA's jurisdictional delineation. Similarly, EPA found that the techniques used by Lund (1988) are unlikely to correctly characterize potential soil saturation in upper soil layers at Bolsa Chica.

Lund (1988) used a ring infiltrometer to confine water applied to the soil surface to a known area. This apparatus is a 12-inch diameter metal ring which is typically inserted only 4 inches into the soil surface (Bertrand 1965). Water can then be poured into the ring and allowed to percolate into the soil.

Lund applied water equivalent to simulate 1, 2, 4, or 6 inches of instantaneous rainfall into the ring infiltrometers, recorded the time required for the water to soak into the ground, and then sampled immediately within the ring to determine whether or not soil was saturated (at 2-inch intervals) within the upper 12 inches of the soil profile. This portion of the soil profile within the ring was sampled again after 48 hours to determine saturation.

Inherent in Lund's (1988) experimental design is the incorrect assumption that water applied within the ring will behave in soils below the ring in a manner similar to that under natural rainfall conditions. For the assumption to be valid, water applied in the ring must remain confined within an imaginary 12-inch diameter column beneath the ring whose vertical dimension is the distance from the surface of the ground to the water table below. If water moves laterally into adjacent soils that have not received the same surface wetting, the effects of the surface wetting within the ring will be underestimated.

In other words, if the water applied within a 12-inch diameter ring at Bolsa Chica moves laterally by capillary action or through surface and subsurface cracks into immediately adjacent soil, the soil column below the ring may be far less wet than it would have been had the entire surface of Bolsa Chica been wetted simultaneously, as in a normal rainfall event.

MacDonald (1988) noted that Lund (1988) had no control over the lateral boundary, and hence no information on how much of his applied water actually stayed within the 12-inch ring. MacDonald (1988) noted further that a second, and more serious problem with Lund's experiment is that it effectively had a freely-draining

lower boundary condition. Given these two factors, MacDonald (1988) concluded that under these conditions, "almost any amount of water could have been applied and saturated conditions would still have not developed."

MacDonald stated that it has long been recognized that to prevent lateral spread of water, a double-ring infiltrometer is needed. Even so, the control of lateral spreading would only be fully controlled in the top few inches. The presence of macropores and soil cracking further complicate the evaluation of lateral flow into adjacent soil (MacDonald 1988).

Lund (1988) found the soils at B2 to be cracked and that infiltration was very rapid as a result. In its inspection of site B1, EPA observed a 17-inch zone of capillary rise. Thus, these two sites would appear to be particularly susceptible to underestimates of the effects of surface water on soil saturation where a ring infiltrometer was used. Water would be especially prone to lateral movement at these sites because of the cracks and/or the potential lateral movement by capillary action.

MacDonald (1988) noted further that Lund studied a system in which the surface water could drain freely into the water table without affecting the height of the water table [see also discussion of surface water hydrology in EPA (1988)]. At sites B1 and B2, the deepest soil layer is sand, and the high hydraulic conductivity of the sand would allow nearly instantaneous dispersion of any water draining down from the ring infiltrometer (MacDonald 1988). Consideration was not given, therefore, to the fact that rainfall would be occurring across the site, and water would be draining to the water table at all points. Since drainage of the entire site is limited by the flat topography, the downward percolation of rainfall would cause a rise in the water table (MacDonald 1988). As MacDonald (1988) noted in his modelling efforts for EPA, a rise in the groundwater table significantly affects the frequency and duration of upper layer soil saturation in response to a given rainfall event; a higher groundwater table means there is a smaller portion of the soil column above the groundwater table to absorb and potentially be saturated by a given magnitude of storm.

Thus, EPA cannot agree with Signal's conclusion that upper portions of the soil profile at Bolsa Chica are not saturated by rainfall, based upon the work performed by Lund (1988). Lund (1988) does provide data, however, that EPA found useful in its delineation efforts (see discussion in MacDonald 1988). Lund found that soils near sites B1 and B2 had ambient moisture contents ranging from roughly 54% to 100% saturation within the upper 12 inches of the soil profile. Site B2 was found to be saturated at the 10- to 12-inch depth with no addition of surface water (Lund 1988). The relatively high moisture content of the soil profile reported by Lund at sites B1 and B2 under ambient conditions (83% and 82% saturation respectively) agreed with those that were predicted by EPA's modeling of these soils (see

MacDonald 1988), and served to validate EPA's model.

SALINITY

Signal reported results of soil salinity studies to substantiate its claim that the prevalence of wetland vegetation on the site is the result of the salt tolerance of the plants and not the result of wetland soil and hydrological conditions. Signal further argued that certain areas were dominated by the obligate hydrophyte, pickleweed (Salicornia sp.), because of soil salinity and not hydrology. This salinity was reported by Signal to be as much as 20 times too salty for upland vegetation to survive. Signal argued that pickleweed, a known halophyte, was growing there because nothing else could.

Signal explained the occurence of annual grasses that EPA had observed growing amongst the pickleweed by stating that this growth was from rainfall moisture which was, apparently, adequate to provide water to allow these invader species to grow in the late spring and summer, and adequate, by implication, to reduce the soil salinity to acceptable levels. However, Signal contended that such rainfall is insufficient to saturate the soils.

Signal's contention raises questions regarding the absence of certain plant species which are both salt tolerant and drought tolerant. According to Robert Radovich of the California Department of Fish And Game Division of Environmental Services (personal communication November 16, 1987), there are a number of species which should occur in the North Bolsa lowlands if conditions there are dry and salty.

Australian saltbush, Atriplex semibiccata, for example, is very tolerant to salinity and would, according to Radovich, have a competitive advantage over Salicornia under drier conditions. In other diked wetlands in southern California, such as the Ballona wetlands near Los Angeles, Atriplex was found in drier wetland portions of the site where pickleweed abundance was very low. In wetter areas, pickleweed predominated.

In low-lying areas on the upland side of Signal's "hydro line", pickleweed is abundant in monotypic stands. Salt tolerant species, including Atriplex, were found at Bolsa Chica in drier areas of slightly higher elevation, including portions of Edwards Thumb and areas north of Rabbit Island. These plants were, for the most part, not observed in most low-lying areas, where their presence might be expected if these areas are both as dry and as salty as Signal describes (Sanders 1987). Additional vegetational indicators are discussed later.

DEPTH OF THE ROOT ZONE

Signal recommended that EPA determine wetland hydrological conditions 9 inches below the ground surface at Bolsa Chica, and that EPA use findings at this specific depth as the basis for

determining the presence or absence of CWA wetlands. Signal bases these recommendations on its studies of the root profile of pickleweed (Salicornia virginica), the most abundant plant in the low-lying areas at Bolsa Chica. These studies showed that the majority of the roots of pickleweed were found at depths less than 9 inches below the surface (Winfield and Macdonald 1982). Sanders (1987) utilized this depth in his delineation work at Bolsa Chica, although in his later report at Ballona (Sanders and Straw 1987), Sanders utilized 12 inches for the rooting depth for the same species.

Dr. Joy Zedler (1987) of San Diego State University, a leading expert on the biology of pickleweed, reports that Salicornia virginica readily roots to a 2.5-foot depth, with highest biomass below 1.5 feet (the depth recommended by Huffman [1987] for evaluating root-zone hydrological conditions). Excavations of roots in the Tijuana Estuary during the 1984 non-tidal drought period indicated rooting beyond 2 feet. Zedler (personal communication, November 30, 1987) cautions against use of root biomass to characterize depths at which hydrology affects the persistence or distribution of plants. She notes that such biomass studies are complex and require separation of dead roots and rhizomes from live material. Furthermore, she states that the deepest roots of Salicornia, which can extend over a meter may be far more important in determining the presence or absence of Salicornia than the bulk of the root mass at shallower depths.

A factor inherent in Signal's recommended root depth criteria is the assumption that the variety of vegetation types found at a given site is determined strictly by the hydrological conditions within the roots and rooting depths of the plants observed there, rather than by the hydrological conditions within the rooting depths of plants that could occur there but for the hydrological conditions (Robert Coats, personal communication, December 1987). "Upland" species may be precluded from invading wetlands because the hydrological conditions within their rooting depths are too stressful; if so, the presence or absence of certain wetlands or uplands species in wetlands may be determined, at least in part, on the basis of conditions which keep species out rather than conditions which are particularly favorable to those which are found there.

Even so, Signal errs in its analysis by relying strictly on its own studies of root distribution for Salicornia virginica (Sanders 1987). It does not consider the rooting depths of any other wetland plants found at Bolsa Chica, even when these plants were abundant. Even if Signal's assertion that its 9-inch depth is critical in terms of hydrological impacts on the distribution of Salicornia were true, this reliance is not proper in areas where other wetland species, such as salt flat grass, Monanthochloe littoralis (an obligate wetland species), salt grass, Distichlis spicata (a facultative wet species), alkali heath,

Frankenia grandifolia (a facultative wet species), and California bulrush, Scirpus californicus (an obligate wetland species), are dominant.

In areas adjacent to a former tidal slough near Rabbit Island, for example (see Figure 3 for location), Monanthochloe is abundant, yet Signal chose to explain the presence of this obligate hydrophyte on the basis of the rooting depth and salt tolerance of Salicornia.

Similarly, in areas of the North Bolsa lowlands, Sanders reports areas with dominant wetland species other than Salicornia such as alkali heath (Frankenia grandiflora) and salt grass (Distichlis spicata). No data are provided on the rooting depths of these species, yet Sanders (1987) determines the presence or absence of wetlands hydrology on the basis of the rooting depth of Salicornia. EPA did not accept this rationale.

Accordingly, EPA chose not to rely strictly upon the 9-inch depth recommended by Signal and used by Sanders (1987) in his delineation effort. EPA considered and analyzed a range of depths, including the 12-inch depth recommended by the Corps delineation manual (Environmental Laboratory 1987) and the 18-inch depth recommended by Huffman (1987) and Zedler (1987). This analysis follows.

GROUNDWATER HYDROLOGY

Signal's conclusions about wetlands hydrology at Bolsa Chica rely heavily upon Signal's measurements of the elevation of the groundwater table. It is clear from the shape of their "hydro line", the alleged hydrologic boundary between wetlands and uplands in the North Bolsa lowlands, that groundwater estimates were the primary factor considered (Figure A-9). The shape of the line is very similar to some groundwater isopleths described by Bilhorn (1986a).

To further evaluate the potential contribution of groundwater to the saturation of soils within the root zone of pickleweed (Salicornia), EPA developed a matrix that considered a range of capillary rise in soils from that used by Signal (8 inches) to levels actually observed by EPA (11 to 17 inches - see capillary rise discussion on page A-7), recognizing that the actual rise could exceed that observed by EPA.

The other variable in the matrix was the depth of the root zone of Salicornia, within which soil saturation must occur in federally-regulated wetlands. For this evaluation, we chose four depths ranging from 9 inches to 30 inches. The former depth is that used by Signal, the latter are from recommendations from the Corps Waterways Experiment Station, Huffman (1987), and reports concerning the depths reached by roots of Salicornia (Zedler 1987). The matrix provided a means for evaluating where on the

Bolsa Chica site groundwater may saturate soils in the root zone of Salicornia, under those varying assumptions of capillary rise and root zone depth.

Table A-2 and Figure A-10 show which of Signal's well stations met the various matrix criteria in the 1982 rainfall year (groundwater data from Bilhorn 1986a), a year which Signal contends represents an average groundwater year. At 37 of the stations (blue), groundwater rose in 1982 to within 17 inches of the ground surface, such that an 8-inch capillary rise could have saturated soils to within 9 inches of the surface or higher (Figure A-10). These levels were observed in all stations in the South Bolsa lowlands and most stations in the southern 2/3 of the North Bolsa lowlands. Not surprisingly, the distribution of these stations roughly approximated Signal's "hydro line".

At an additional seven stations (green), roots were saturated at a depth of 9 inches in 1982, if the zone of capillary rise was at least 11 inches or to a depth of 12 inches, if the zone of capillary rise was 8 inches. These include two stations within the "hydro line" (wells A-4 and B-2[mini]) and one station in Edwards Thumb (E6 [mini]).

If the zone of capillary rise was 15 inches, as observed by EPA near the C2 wells, soils at an additional seven stations (orange) would have been saturated in 1982 to within 9 inches or less of the surface. These included three additional stations north of the "hydro line" (wells 108, 109, and 110) and two additional stations within Edwards Thumb (wells E5A and E6).

Three stations (yellow) did not have measured groundwater in 1982 that would have reached the deepest roots of Salicornia with a greater than 17-inch capillary rise (groundwater deeper than 47 inches). These included two, higher elevation stations on Rabbit Island (wells Aa1 and Aa3) and one station adjacent to the housing development in the Edwards' Thumb corner (well 101).

Therefore, ignoring 1) probable sources of soil saturation from rainfall and 2) likely increases in the height of the zone of capillary rise resulting from surface wetting, groundwater levels were recorded in 53 of the 61 Bolsa Chica observation wells in 1982 (Bilhorn 1986) that could have saturated soils to within 9 inches of the surface, if capillary rise was 17 inches as observed by EPA in December 1987 (Table A-2). Furthermore, if the root zone were considered to be as deep as the 18" recommended by Huffman (1987), only the five stations shown in brown and yellow in Figure A-10 would not have experienced saturated soil conditions in the root zone of the vegetation.

EPA did not attempt in this analysis to determine the length of potential soil saturation. Rather it sought to examine the reasonableness of Signal's assertions regarding the contribution of groundwater to saturated soil conditions at Bolsa Chica. EPA

TABLE A-2. CUMULATIVE NUMBER AND PERCENTAGE OF TOTAL WELL STATIONS AT BOLSA CHICA AT WHICH GROUNDWATER COULD HAVE SATURATED THE ROOT ZONE OF PLANTS BY CAPILLARY RISE IN THE 1982 RAINFALL YEAR (61 STATIONS TOTAL). [GROUNDWATER DATA FROM BILHORN 1986.]

ROOT ZONE DEPTHS (INCHES)	ZONE OF CAPILLARY RISE (INCHES)			
	8 (Sanders 1987)	11 (EPA 1987)	15 (EPA 1987)	17 (EPA 1987)
9 (Sanders 1987)	37 Stations[1] (61 %)	44 Stations[2] (72 %)	51 Stations[3] (84 %)	53 Stations[4] (87 %)
12 (Environmental Laboratory 1987)	44 Stations[2] (72 %)	46 Stations[3] (80 %)	54 Stations[4] (89 %)	54 Stations[4] (89 %)
18 (Huffman 1987)	53 Stations[4] (87 %)	54 Stations[4] (89 %)	55 Stations[5] (90 %)	56 Stations[5] (92 %)
30 (Zedler 1987)	57 Stations[6] (93 %)	58 Stations[6] (95 %)	58 Stations[6] (95 %)	58 Stations[6] (95 %)

[1] Well sites meeting this 17-inch criterion are shown in blue on Figure A-10.
[2] Additional wells meeting this 20-inch criterion are shown in green on Figure A-10.
[3] Additional wells meeting these 23- or 24-inch criteria are shown in orange on Figure A-10.
[4] Additional wells meeting these 26- or 27-inch criteria are shown in red on Figure A-10.
[5] Additional wells meeting these 33- or 35-inch criteria are shown in pink on Figure A-10.
[6] Additional wells meeting these 38- or 41-inch criteria are shown in brown on Figure A-10.

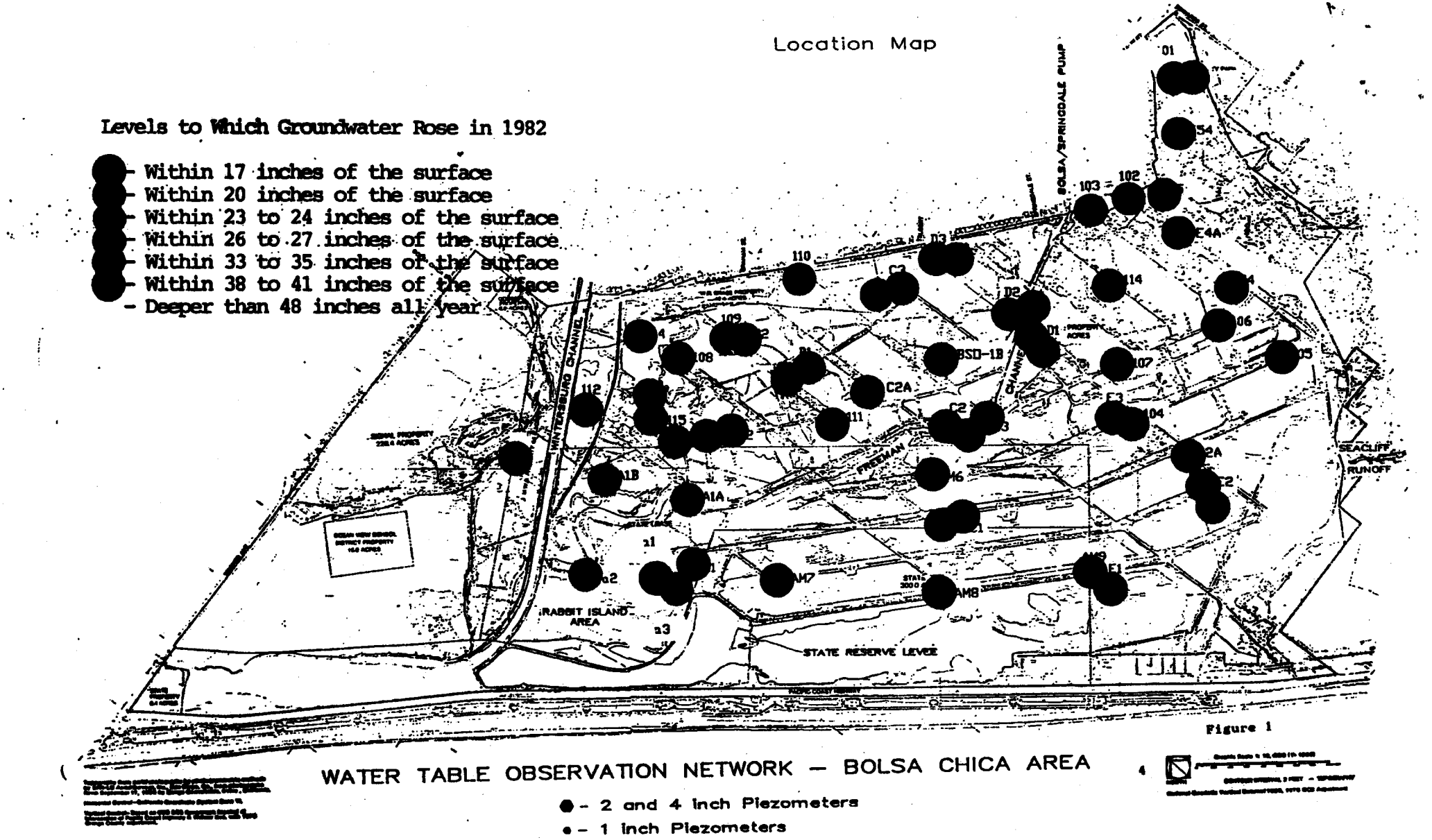

Figure A-10. A map showing where groundwater could have saturated the root zone of wetland plants in the 1982 rainfall year, for various possible rooting depths (9 to 30 inches) and for various possible zones of soil capillary rise (8 to 17 inches). See Table A-2 for specific criteria.

did not conclude, as Signal did, that Signal's data support rejection of groundwater as a legitimate present-day source of wetlands hydrology throughout the North Bolsa lowlands or portions of Edwards Thumb. Instead, substitution of 1) actual observations of the zone of capillary rise and 2) root-zone depths which considered species besides Salicornia led EPA to conclude that groundwater alone may sufficiently saturate soils throughout low-lying areas at Bolsa Chica to support the prevalence of hydrophytic (wetland) vegetation observed there. Additional contributions from rainfall to this hydrologic regime would add to the frequency and duration of this soil saturation.

THE "HYDRO LINE" CONCEPT

As noted earlier, Signal proposed that there is a boundary ("hydro line") between waters of the United States and unregulated areas at Bolsa Chica which is defined by subsurface hydrology (see Figure A-9). Signal suggests that on one side of this line, groundwater rises to sufficient height to saturate the roots of wetland plants at a frequency and duration to support a prevalence of such vegetation. On the other side of the line, Signal asserts that groundwater levels remain too deep to support a prevalence of wetland vegetation.

Signal contends that this boundary is a smooth, curved line as shown in Figure A-9. If the level of groundwater in a "normal" year rose to within 24 inches of the ground surface, Signal considered the area to have sufficient groundwater hydrology to qualify as a wetland, assuming, of course, that the area had wetland vegetation and wetland soils. According to Signal, the basis for this 24-inch figure is threefold:

1. Water could saturate soils as much as 8 inches above the groundwater table by capillary rise;

2. The depth of the major portion of the root mass of pickleweed (Salicornia virginica), the predominant plant at Bolsa Chica, is 9 inches or less below the ground surface; and

3. The groundwater table could rise an additional 7 inches in about one in three years.

Therefore, if 1) the capillary rise of water in soils at Bolsa Chica is 8 inches or less, 2) the root zone of the wetland plant community is 9 inches or less, 3) there is insufficient rainfall to inundate or saturate soils in the upper 9 inches of soil in all but unusually wet years, and 4) the groundwater table has the shape and depth depicted by Signal during the growing season of most years, this "hydro line" could form a true boundary between areas regulated and areas not regulated under the CWA.

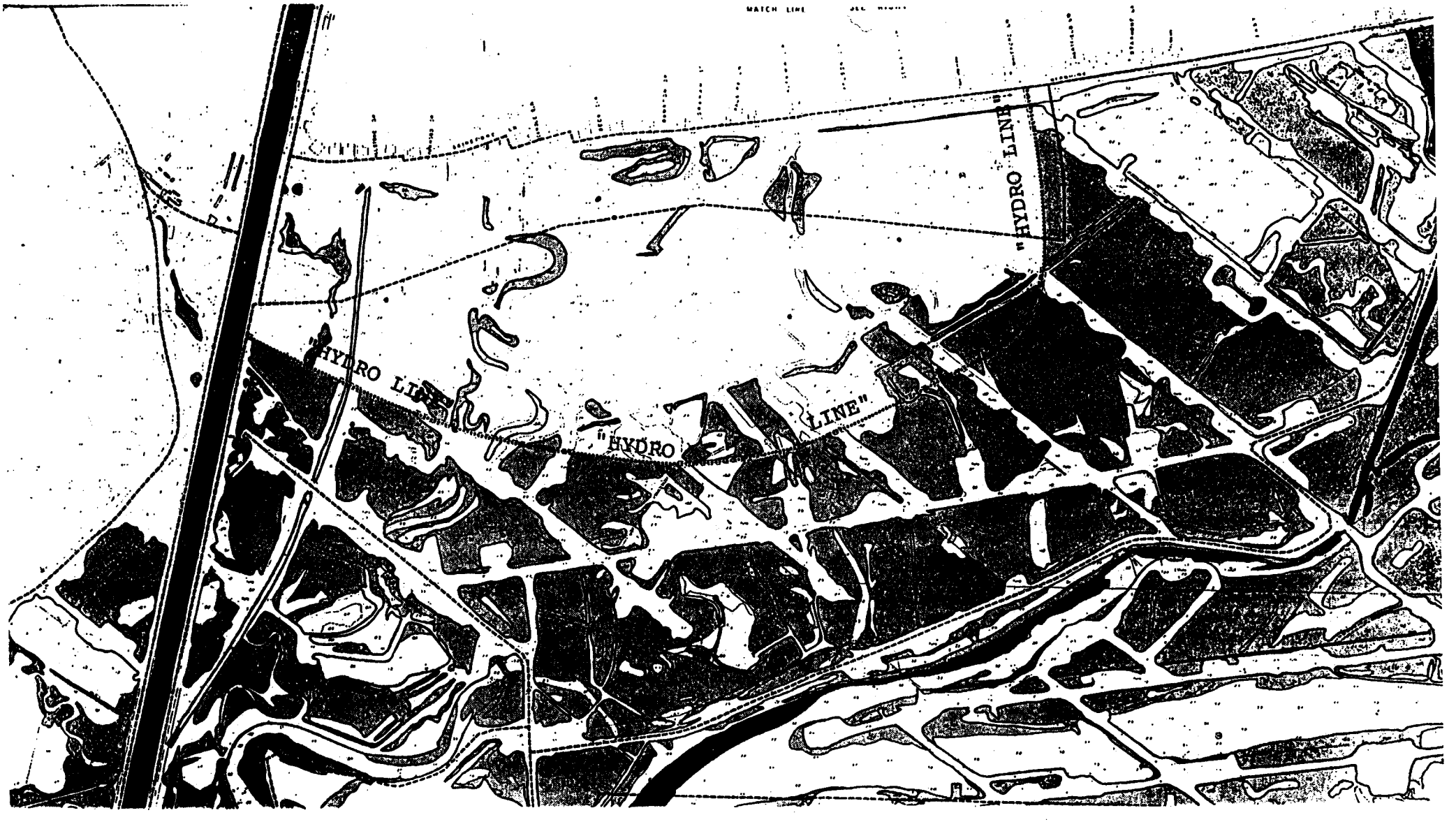

Figure A-9. A portion of a wetland delineation prepared for Signal Landmark, Inc. by Sanders (1987). The roughly semi-circular line in the upper region of the map is the alleged "hydro line", which Sanders contends in a hydrological boundary between Clean Water Act wetlands and non-wetlands (uplands). According to Sanders, this line is based, almost exclusively upon groundwater measurements.

As stated earlier, EPA found the above criteria for soil capillary rise, root zone depth, and contribution of rainfall were not valid. In addition, EPA found little to support the location and shape of the "hydro line", even if the other three criteria had been met. For example, Bilhorn (1986a) shows that the depths and shapes of the hydrologic contours vary significantly from month to month and from season to season (Figure A-11). In addition, Macdonald and Bilhorn (1987) state that the soil profiles, in terms of types of soils found at different depths, are extremely variable at Bolsa Chica. Thus, the selection of a single, smooth groundwater contour to describe a wetland and upland boundary is questionable, given the lack of corroborating evidence from vegetation, soils (including differences in capillary rise), or surface hydrology.

Even if the groundwater contour that forms Signal's "hydro line" was fully supportable, the surface contours of the site do not appear to have been considered adequately. For example, at some points on the "hydro line", EPA noted surface elevations at mean sea level (MSL), while at nearby points on the line the surface elevation was nearly 10 inches below MSL. Such areas of lower surface elevation are 10 inches closer to the water table as are, presumably, the roots of the vegetation growing there. Thus, the shape of the "hydro line" should have responded to changes in the microtopography of the site, but did not appear to.

INDIRECT HYDROLOGIC EVIDENCE PROVIDED BY THE WETLAND VEGETATION

In addition to evaluating the data and recommendations in the Huffman (1987) and Sanders (1987) reports, EPA considered direct and indirect evidence provided by the plant community at Bolsa Chica. All investigators agree that all unfilled portions of the North Bolsa lowlands and significant portions of Edwards Thumb contain a prevalence of hydrophytic vegetation, much of which is classified as obligate wetland vegetation (see EPA 1988, page 6). In many cases, this vegetation community alone would be adequate justification for EPA to assert CWA jurisdiction over these areas as wetlands (Sipple 1988 - see also EPA 1988, pages 10-11).

Although Signal contends to the contrary, there is no question whether pickleweed can, in fact, operate strictly as an obligate halophyte (Zedler and Covin 1987). Furthermore, it is clear that pickleweed is operating as an obligate hydrophyte at Bolsa Chica because the plant is carrying oxygen to its root systems, rather than obtaining oxygen from the soil. This activity is evidenced by oxidized roots and rhizomes in the North Bolsa lowlands, indicating the plants are presently obtaining insufficient oxygen in the soil due to anaerobic conditions (Parker 1987a). The finding of such oxidation in very young plants is indicative of present or very recent low-oxygen conditions in the root zones of the plants.

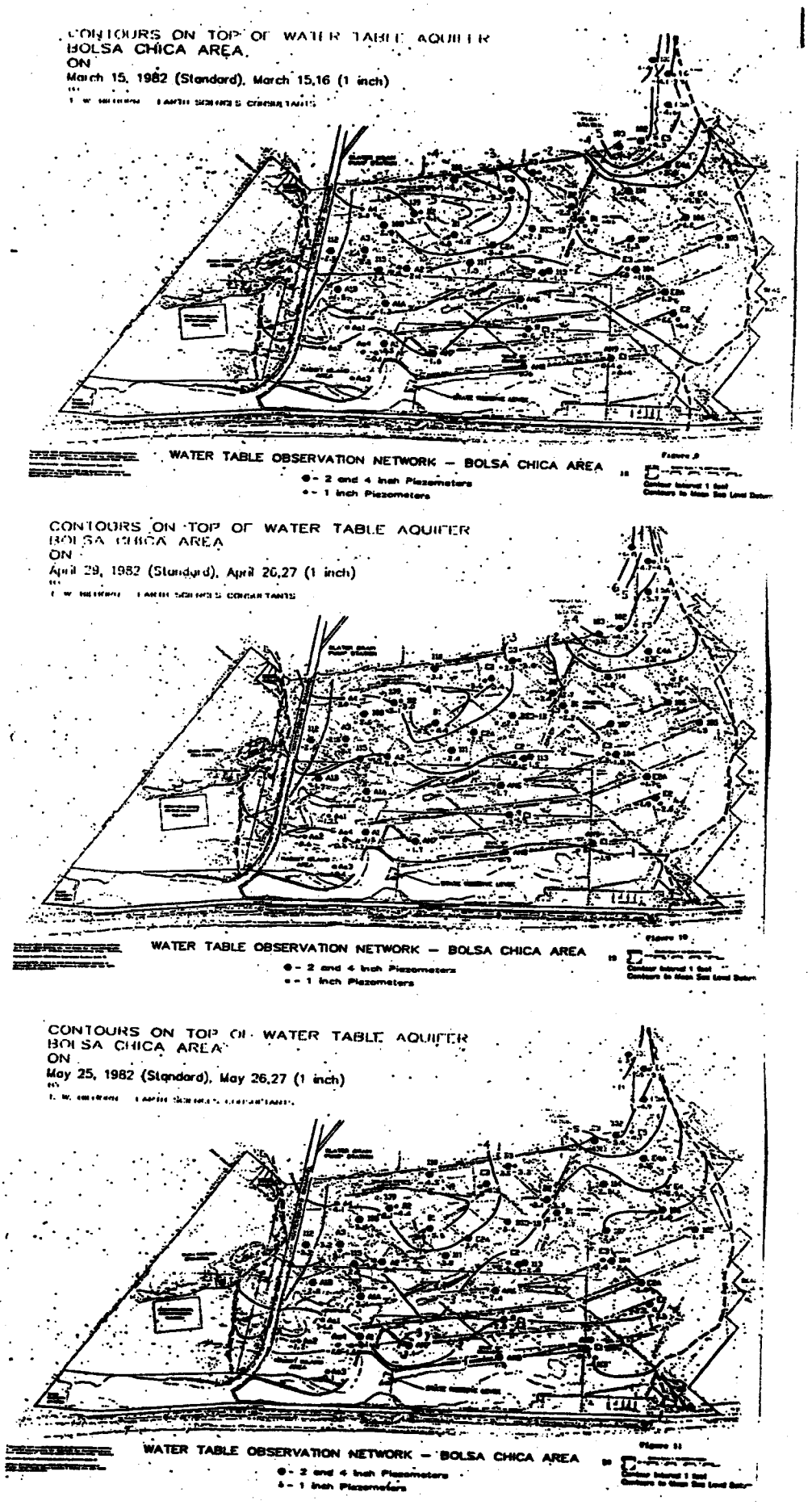

Figure A-11. A comparison of groundwater contours at Bolsa Chica in March, April, and May, 1982. (from Bilhorn 1986)

The physiology and morphology of the plants also seem to conflict with many of Signal's assertions. For example, the roots of the plants on either side of the "hydro line" do not appear to be different, although EPA did not systematically investigate rooting depths. Nor do the heights of plants on one side of the "hydro line" appear to be different from the heights of plants on the other side. Such differences in physiological response would be expected if the hydrological conditions are changing significantly with regard to criteria that differentiate wetlands from uplands (Zedler and Covin 1987).

Furthermore, if (as Signal asserts) 1) the height of capillary rise is insignificant (2 to 4 inches) and 2) there is insufficient rainfall to saturate upper portions of the soil profile in most years, plants might be expected to have deeper roots seeking water from the underlying groundwater supply. Signal found, however, that the root mass of pickleweed (Salicornia virginica) is distributed largely in the upper layers of the soil profile at Bolsa Chica as it is in other, nearby tidal salt marshes such as at Anaheim Bay, immediately north of Bolsa Chica (Winfield and Macdonald 1982).

Thus, EPA observed no significant shifts in the density, species composition, or morphology of wetland vegetation across the hydrological gradient alleged by Signal in the development of their "hydro line". EPA expected some readily observable changes moving from areas that allegedly had sufficient wetlands hydrology to areas that Signal alleged were both dry and hypersaline. This expectation was reasonable given that 1) such changes are generally observed in diked, seasonal wetlands in California which are dominated by pickleweed, and that 2) results of recent experiments conducted on pickleweed in southern California, show that pickleweed does respond morphologically to such gradients.

Zedler and Covin (1987) found that pickleweed growth, survival, and morphology (the physical appearance of the plant, including its roots and rhizomes) do, in fact, vary with salinity and period of soil saturation. Under experimental conditions, they found that Salicornia virginica grew best at salinities approaching that of seawater and that plant height declined as salinity rose or dropped from that of sea water (30 parts per thousand). Similarly, they found that hydroperiod (the amount of time that the plant is exposed to continuous soil saturation) affected the height of the plants, the depths of their roots, and the survival of young plants.

Specifically, Salicornia grew tallest when subjected to periods of soil saturation of 8 weeks or greater and were substantially shorter when this period of saturation was 6 weeks or less. Survival of young plants was also significantly affected by hydroperiod, with roughly 10 times as many plants successfully germinating after 8 weeks of soil saturation than after 4 weeks.

Zedler and Covin (1987) conclude that Salicornia virginia and Salicornia bigelovii are:

> "obligate hydrophytes, as evidenced by the failure of 13-week-old plants to survive even three weeks without saturated soils. While plants may have lived longer in heavy clay soils that lose moisture more slowly, the high water requirement is clear. Both species are also obligate halophytes. Their improved growth in impoundments where salts were added indicated that they are not merely tolerant of salinity, but can grow better in salt marshes than in freshwater wetlands."

EPA concludes that pickleweed is functioning as an obligate hydrophyte in the North Bolsa lowlands and Edwards Thumb.

OVERALL EVALUATION OF SIGNAL'S HYDROLOGICAL ANALYSES

EPA performed no additional detailed analyses of soils or hydrological indicators on either side of the line, in part because Sanders informed EPA during its December 1987 site visit that it would find no differences. Sanders also informed EPA during this visit that the "hydro line" was an estimate based solely upon the landowners' observation well data on groundwater and Signal's estimates of capillary rise. Furthermore, Sanders stated that he did not use Signals' soil oxygen or redox data in developing the "hydro line" because of potential problems with the data.

It is important to note that these statements conflict with statements in Sanders' jurisdictional delineation (Sanders 1987). In his review of Signal's other studies, Sanders (1987) concluded that:

> "the studies conducted by Bilhorn (1986a, b, and c), Macdonald (1986), and Feldmeth (1986a and b) were technically valid. Thus, it was appropriate to use their results and conclusions in my delineation study."

In fact, Sanders' (1987) findings conflict with the conclusions that were previously drawn by Signal, based upon its soil oxygen data, groundwater data, surface ponding estimates, and vegetation studies. Had Sanders (1987) actually accepted these data as technically valid, as his above statements imply, he would have, presumably, delineated the extent of waters of the United States at Bolsa Chica differently, as Signal did in 1982 (see Figures A-4 and A-5, from Signal Landmark Inc. 1982). Furthermore, Sanders (1987) concluded that some areas are wetlands because they would pond water in a normal rainfall year, in spite of the data presented by Bilhorn (1986b) that these areas do not pond water.

ACCURACY OF SIGNAL'S MAP

The quality of topographic maps provided to EPA by Signal was excellent, and greatly facilitated EPA's delineation effort. Similarly, the wetlands map provided by Sanders and Bilhorn (Sanders 1987), with minor exceptions, correctly depicted the location of the flag lines placed by Sanders in his study.

EPA inspected portions of these flag lines in March 1987, December 1987, and in February 1988. In the March inspection, EPA identified a number of areas which should have been classified as wetlands under Sanders' (1987) criteria (recognizing that EPA did not necessarily accept these criteria as valid.) Sanders noted these omissions and corrected all but one of these on his final map.

In EPA's December 1987 inspection, EPA identified 6 additional areas which had either been flagged as wetlands but were not mapped, or which had not been flagged but should have been (again under Sanders', not EPA's, criteria). Signal corrected all but one of these omissions in a revised map submitted to EPA by Signal in January 1988.

In EPA's field verification of its own map in February 1988, EPA identified a number of additional, but minor errors in Sanders and Bilhorn's revised map. These included, but were not limited to, 1) a levee road in North Rabbit Island which had been incorrectly mapped as a wetland and 2) an unvegetated seasonal pond, also in North Rabbit Island, that had been incorrectly mapped as an upland. Signal representatives confirmed these as errors in the preparation of their map (Dana Sanders, Thomas Bilhorn, and Marc Zeppatello representing Signal; February 17, 1988).

In addition to these minor errors, EPA noted many locations (not including EPA's disagreement with the "hydro line" boundary) where Sanders' flag line failed to reflect the actual boundary between federally-regulated wetlands and uplands, based upon the presence of saturated soils. In general, these errors tended to underestimate the amount of wetlands and varied from a few feet to as much as 40 feet from where EPA determined the boundary to be. However, most of these differences were small and most fell within what EPA considered to be an acceptable range of error, given the scale and detail of the maps with which Sanders and EPA worked.

In some cases, for example, the width of an area (such as an internal berm or levee) was nearly impossible to map accurately, because the boundary lines drawn on the map were, themselves, nearly as wide or wider in scale than the area being delineated. Therefore, EPA viewed the boundaries on Signal's map (Sanders 1987, revised) and the associated acreage figures to be estimates, as they are on EPA's map (see Figure 9 in EPA 1988).

EPA noted many areas where the actual topography of the site was different from that depicted on topographic maps provided by Signal. Signal's maps were based upon 1980 and 1986 topographies compiled from aerial photography. EPA alerted Signal's representatives that some of these topographical changes could represent CWA violations, if they resulted from unauthorized discharges of fill into waters of the United States. Most of the areas of concern were in the general vicinity of Edwards Thumb, although a number of smaller sites adjacent to drilling pads and levee roads in the North Bolsa and South Bolsa lowlands were also identified. At two of these sites, EPA found evidence of waste oil buried near inactive well sites.

WETLAND AREAS DELINEATED INCORRECTLY BY SIGNAL

Over much of the site, EPA reached similar conclusions to Sanders (1987) regarding the geographic extent of federally-regulated waters of the United States and non-regulated (upland) areas. However, there were a number of sites where EPA reached substantially different conclusions. Each of these are discussed below.

North Bolsa lowlands:

As discussed earlier, EPA did not find sufficient evidence to accept Sanders' (1987) "hydro line" concept and, rather, relied upon surface and subsurface indicators of hydrology to conclude whether or not an area met the criteria for CWA wetlands hydrology. Thus, EPA (1988) found that virtually all low-lying areas in the North Bolsa lowlands on both side of the "hydro line" are waters of the United States, if they supported a prevalence of wetland vegetation, given the presence of hydric soils throughout the low-lying portions of the site. These delineation differences in the North Bolsa lowlands comprise the majority of the acreage where EPA (1988) disagreed with Sanders (1987).

EPA (1988) did not assert jurisdiction over internal berms and levees within the North Bolsa lowlands. These areas of topographic relief showed the same sharp gradient from obligate wetland plants at their base to a prevalence of predominantly upland plants on their upper surfaces that was evident along all of the levee roads throughout Bolsa Chica. This gradient was observed on such areas of topographic relief in areas well north and well south of the "hydro line" boundary (see photographs, Figure A-12).

This observed vegetation gradient would not be expected, if all areas north of the "hydro line" are uplands hydrologically, as Signal asserted. Were Signal's "hydro line" a valid delineation of the boundary between wetland and upland hydrology, even

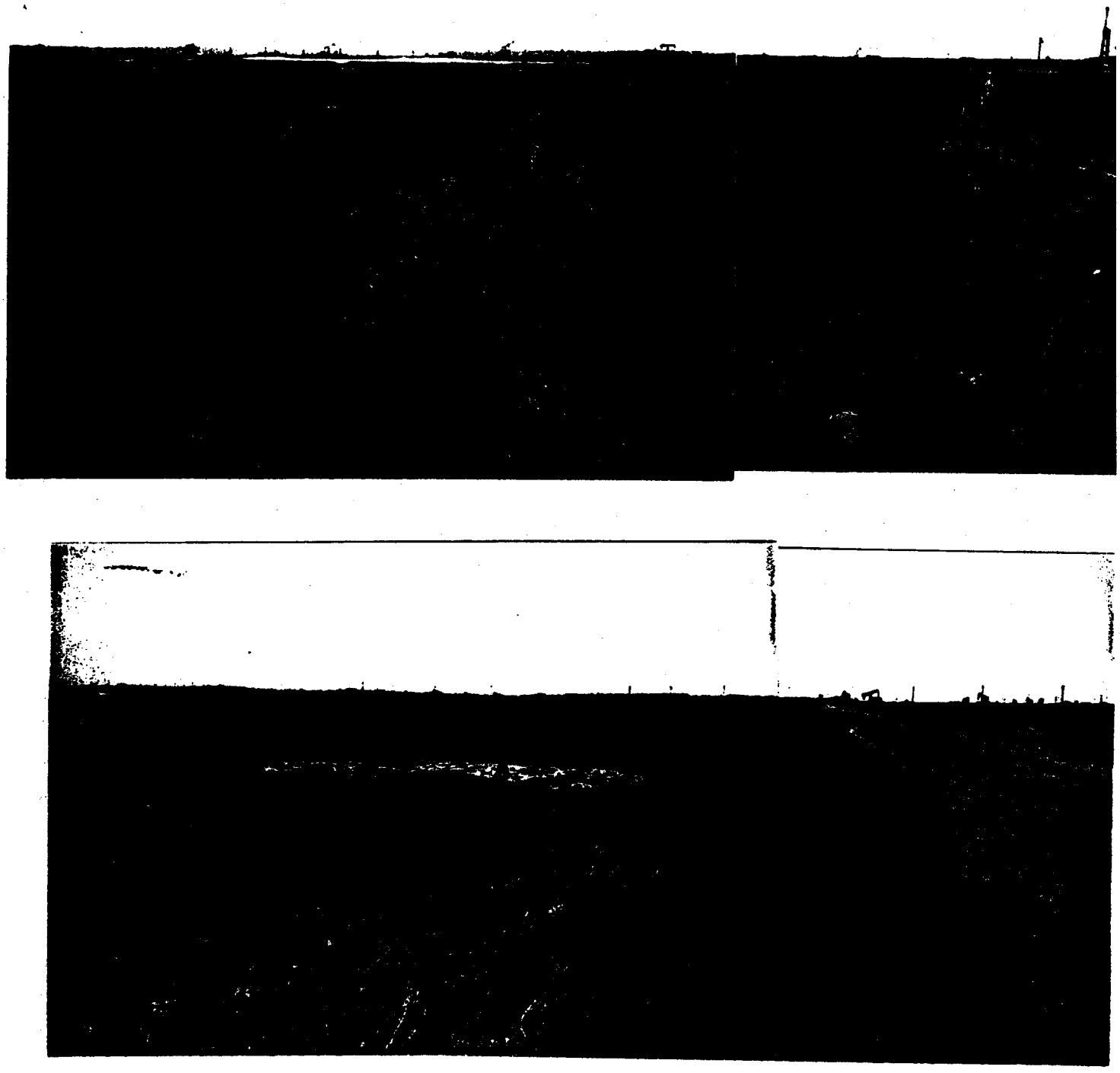

Figure A-12. Photographs showing vegetation changes between low-lying areas and areas of slightly higher elevation at a site in North Rabbit Island (upper photographs) and in the North Bolsa lowlands (lower photographs). In each case, the predominant vegetation in the low-lying areas is pickleweed (*Salicornia virginica*), an obligate wetland species.

Signal's assertions about soil salinity appear insufficient to explain this response of vegetation to topographic relief observed on both sides of the "hydro line".

EPA found a number of areas where Sanders' own criteria did not appear to have been applied consistently. EPA inspected areas on the upland side of the "hydro line" which Sanders had classified as wetlands, which had insufficient sources of runoff from surrounding areas to significantly increase their hydrologic input. Sanders (1987) had concluded that depressional areas north of the "hydro line" were wetlands (had wetlands hydrology) because they allegedly collected runoff from surrounding areas. Similarly, EPA found low areas in the North Bolsa lowlands, surrounded by hydrologically-isolated areas of slightly higher elevation which should have qualified under Sanders (1987) criteria but which Sanders mapped as uplands.

Edwards Thumb:

For reasons similar to those for the North Bolsa lowlands, EPA (1988) did not accept Sanders' (1987) assertions regarding the lack of wetlands hydrology in areas of Edwards Thumb which support a prevalence of hydrophytic vegetation. As discussed earlier, EPA believes that the data provided by Signal (Bilhorn 1986a) show that groundwater alone may saturate the root zone of these plants in most years, sufficient to conclude that the areas delineated as waters of the United States by EPA are federally-regulated wetlands.

In his field investigations of Edwards Thumb, Sanders (1987) found some areas to be underlain by hardpan, which he concluded would block any capillary rise. This assertion was not supported with evidence. Even if it were valid, Sanders did not consider how this hardpan might result in a perched water table wherein rainfall would be trapped in upper soil layers; these conditions were observed at the Ballona wetlands (Sanders and Straw 1987). Some areas he concluded would pond water and others, with seemingly better basins he concluded would not.

EPA found that low-lying areas supporting a prevalence of pickleweed (Salicornia virginica) or California bulrush (Scirpus californicus) were wetlands (EPA 1988).

Rabbit Island and North Rabbit Island:

EPA (1988) concluded that much of the delineation done by Sanders (1987) at Rabbit Island correctly identified federally-regulated waters of the United States and unregulated upland areas. In addition, a number of additional sites, where EPA questioned Sanders' (1987) findings, proved to be mapping errors which were corrected, or identified as errors by Sanders in EPA's February 1988 field verifications.

EPA (1988) did reach different conclusions than Sanders (1987) at some additional sites which Sanders had concluded, lack wetlands hydrology. In field verifying EPA's maps, EPA observed evidence of saturated soils within the root zone, or evidence of surface ponding at a number of sites, most along a large slough bed that meanders through the North Rabbit Island property. In addition, EPA observed soil saturation in the root zone of plants at some higher elevation sites adjacent to the Wintersburg Flood Control Channel, which appeared to have resulted from seepage through or under the Flood Control levee. EPA (1988) concluded that these areas met all three criteria as CWA wetlands. It is noteworthy that Sanders informed EPA during its February 1988 field visit that he might have delineated Rabbit Island and North Rabbit Island sites differently had he performed his field investigations of Rabbit Island during the winter months, rather than in the spring of a dry year.

Mr. William Sipple of EPA's technical advisory team noted that Sanders (1987) referred to Mesembryanthemum nodiflorum, as an obligate upland species presumably because it was not listed in the National List of Plants that Occur in Wetlands (Reed 1988). However, M. nodiflorum is actually synonomous with Gasoul nodiflorum (classified in Reed 1988 as a facultative upland species) and is considered by EPA to be a component of a CWA wetland plant community in areas which meet the criteria for wetlands soils and hydrology (Sipple 1988).

South Bolsa Dunes:

EPA (1988) found that Huffman (1987) incorrectly delineated portions of this sub-unit of the Bolsa Chica properties. Sanders (1987) found that portions of the property lack sufficient indicators of wetlands hydrology or wetlands vegetation to qualify as federally-regulated wetlands. EPA agrees; however, EPA's (1988) boundary between wetlands and uplands was somewhat different than Sanders' (1987) along portions of the dunes.

Sanders' (1987) flagged boundary on the dunes appears to rely almost exclusively upon the presence or absence of ice plant (Carpobrotus edulis), an obligate upland species. EPA found that, in many instances, the presence of ice plant did not reflect the area where the plant was rooted. The presence or absence of branches of ice plant tended to give a false boundary with regard to whether or not the roots of the plants were actually experiencing wetlands hydrologic conditions. Thus, along some boundaries flagged by Sanders, elevations varied by nearly 2 vertical feet (see EPA 1988 for further discussion). This variation reflects the boundary formed by branches of ice plant, rather than the subsurface hydrologic regime which would be expected to follow topographic contours for wetlands in sand.

EPA investigated the soils (sand) along these boundaries and found them saturated to within a few inches of the surface at

lower areas, to a foot or more below the surface at higher elevations. Following the Corps and EPA manuals, EPA relied upon a boundary determined by areas at which EPA observed saturation or evidence of saturation within the top 12 inches of soil. Utilizing this criteria, EPA found that virtually all areas with a dominance of hydrophytic vegetation were wetlands, while areas dominated by rooted ice plant were generally, as expected, found in areas lacking positive indicators of wetlands soils and hydrology.

EPA (1988) believes that ice plant (Carpobrotus edulis) may be misclassified as an obligate upland plant, as EPA has observed this species growing in tidal salt marshes. However, for the purposes of this delineation effort, EPA relied upon the existing wetland plant classification list (Reed 1988) and treated this species as an upland plant.

Agricultural Fields:

EPA generally agreed with Bilhorn (1987) with regard to those areas of the agricultural fields that would support a prevalence of wetland vegetation in the absence of exempted farming activities [under Section 404(f) of the CWA]. Sanders' (1987) conclusion, however, that these areas are not waters of the United States, because they do not now support such a prevalence is incorrect.

Such areas are waters of the United States (EPA 1988); normal farming of the area does not require authorization under Section 404 of the CWA, as defined in Section 404(f). Non-exempted activities which would result in the discharge of dredged or fill material into areas of the agricultural fields, found to be waters of the United States by EPA (1988), are regulated under Section 404 and require a permit from the U.S. Army Corps of Engineers.

W.R. Grace Property:

EPA generally agreed with the delineation prepared by Sanders (1987) for this sub-unit of the Bolsa Chica properties. However, EPA found some small areas which were omitted by Sanders, which had a prevalence of wetland vegetation, hydric soils, and evidence of wetlands hydrology.

CONCLUSIONS

1. Aside from the lack of any observable differences in vegetation or soils on either side of Signal's "hydro line" (Sanders 1987), EPA concludes that the the data supporting its validity as a wetland/upland boundary are insufficient.

2. The soil oxygen data and conclusions drawn from these data were suspect. The test procedures were modified, the soil probes may have leaked, the tests were conducted and probes implanted by different parties, there were insufficient replicates, data conflicted with redox data, and there were poor correlation between replicates and individual data points that clearly indicated sampling problems.

3. Redox potential data appeared to be somewhat more reliable than soil oxygen data and indicated reducing conditions at sites determined by Signal to be both wetlands and non-wetlands. However, Signal apparently chose not to rely upon these data.

4. The ferrous-ferric iron test was improperly applied, utilized unproven modifications of standard procedures, and was further modified in attempts to make this qualitative test quantitative.

5. Signal's dismissal of rainfall as a source of soil saturation was insufficiently supported and conflicted with surface and subsurface evidence, as well as modelling conducted by EPA.

6. Signal's estimates of soil capillary rise were roughly half that observed by EPA, and relied upon the incorrect premise that water does not rise by capillary action in sand. Thus, even if Signal's other data had proven reliable or verifiable, the placement of its "hydro line" should be closer to the Grace property by virtue of the observed capillary rise.

7. Signal's assertions about the effect of salinity on vegetation in North Bolsa was not borne out by any observable changes in that vegetation. EPA does not contend the strong likelihood that salinity plays a strong role in the plant community in Bolsa Chica, as it does in most coastal and diked, seasonal salt marshes. However, EPA believes the hydrologic and vegetational evidence on the site is sufficient to conclude that the vegetation is functioning as hydrophytic vegetation, and that the wetlands delineated by EPA are wetlands subject to CWA jurisdiction.

8. Although EPA (1988) agreed with Sanders' (1987) characterization of the geographical extent of waters of the United States for much of the site, EPA differed significantly with Sanders at a number of locations. However, the largest area of disagreement was in the North Bolsa lowlands, north of the so-called "hydro line".

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REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 21

Excerpts, Preliminary Jurisdictional Determination Form for Redwood City Salt Production Facility submitted by DMB Saltworks to U.S. Army Corps of Eng'rs
(Jan. 21, 2010)

("PJD Form")

wra
ENVIRONMENTAL CONSULTANTS

January 26, 2010

Ms. Katerina Galacatos
US Army Corps of Engineers
Regulatory Division
U.S. Army Corps of Engineers
1455 Market Street, 16th Floor
San Francisco, California 94103-1398

Dear Ms. Galacatos:

At the request of David Smith of DMB Associates, I am forwarding a hard copy of the revised PJD submittal for the Saltworks project based on our joint site visit of December 17, 2009 as well as an electronic version of the revised submittal on the attached CD. We understand Mr. Smith provided you the original, signed version of the revised submittal at a meeting at EPA Region IX on Tuesday, January 26, 2010.

Please feel free to contact me or Mr. Smith should you have any questions.

Sincerely yours,

Michael Josselyn, PhD PWS
Principal

cc. David Smith, DMB Associates
Andree Breaux-Greenburg, RWQCB
Jason Brush, USEPA Region IX

2169-G East Francisco Blvd., San Rafael, CA 94901 (415) 454-8868 tel (415) 454-0129 fax info@wra-ca.com www.wra-ca.com

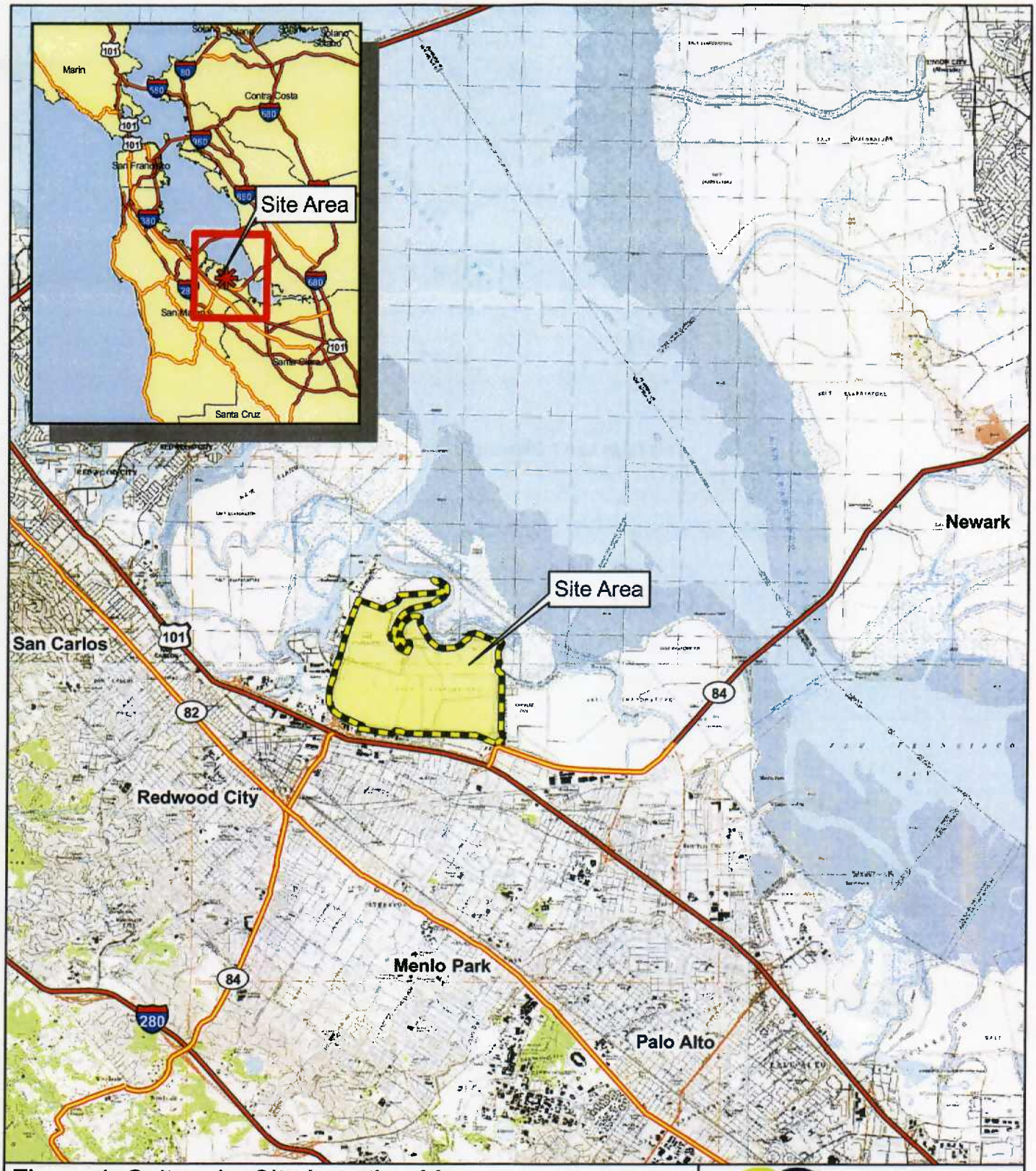

Figure 1. Saltworks Site Location Map

Figure for use under RGL No.08-02 only; all rights reserved

N
W E
S

0 0.75 1.5 Miles

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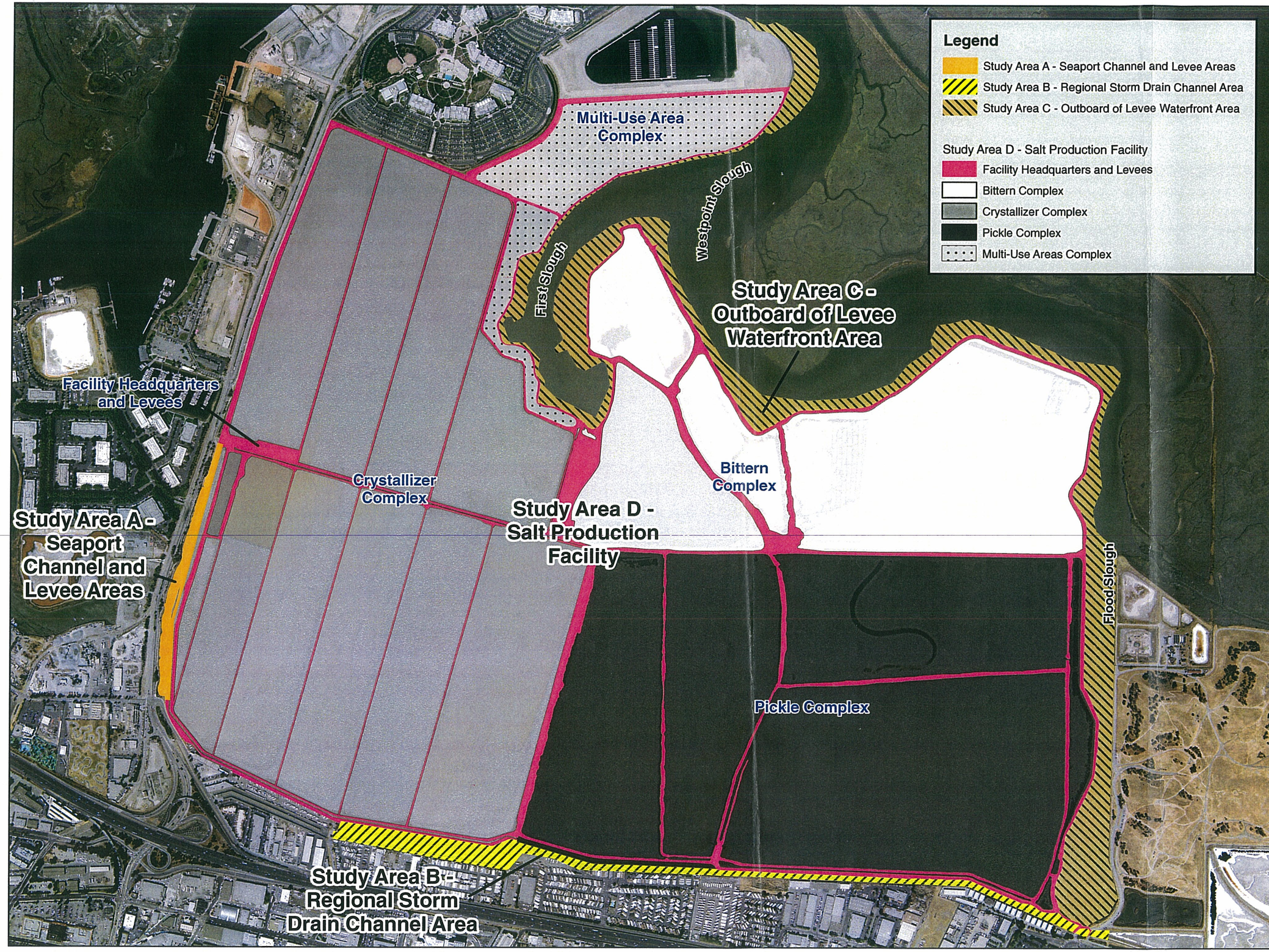
DMB Redwood City Saltworks
San Mateo County, California

Basemap: USGS Topo Quad
Map By: Sundaran Gillespie
Filepath: L:\Acad 2000 Files\07000\7062\gis\arcmap\Nov 09 Updated Report\Figure 1.mxd



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ENVIRONMENTAL CONSULTANTS
2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

DMB Redwood City Saltworks

San Mateo County, California

Figure 2. Saltworks Site Study Areas

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This map is representational only, and not meant for use in detailed design.

N
W E
S

0 500 1,000 2,000
Feet

Image Date: August 2008
Image Source: Redwood City Industrial Salt Works
Map By: Sundaran Gillespie
Filepath: L:\Acad 2000 Files\07000\7062\gis\arcmap\Dec 09 Update\Figure 2.mxd

STUDY AREA D: SALT PRODUCTION FACILITY

PRELIMINARY JURISDICTIONAL FORM

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PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

District Office: San Francisco District | File/ORM #: | PJD Date: Jan 21, 2010

State: CA | City/County: Redwood City/San Mateo County

Nearest Waterbody: South San Francisco Bay

Location: TRS, LatLong or UTM: Saltworks Study Area D: Salt Production Facility (lat/long 37.49, -122.19)

Name/ Address of Person Requesting PJD: DMB Redwood City Saltworks
DMB Saltworks, LLC
1700 Seaport Boulevard Suite 200
Redwood City, California 94603

Identify (Estimate) Amount of Waters in the Review Area:

Non-Wetland Waters: n/a linear ft | n/a width | 1275.7 acres | Stream Flow: N/A

Wetlands: none acre(s) | Cowardin Class: see Note 1 following page

Name of Any Water Bodies on the Site Identified as Section 10 Waters: Tidal: none | Non-Tidal: none

☐ Office (Desk) Determination
☑ Field Determination: Date of Field Trip: Dec 17, 2009

SUPPORTING DATA: Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- ☑ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: Figure D-1 (WRA 2009)
- ☑ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps
- ☐ Corps navigable waters' study:
- ☑ U.S. Geological Survey Hydrologic Atlas:
  - ☐ USGS NHD data.
  - ☑ USGS 8 and 12 digit HUC maps.
- ☑ U.S. Geological Survey map(s). Cite quad name: Redwood Point (1993), Palo Alto (1991)
- ☑ USDA Natural Resources Conservation Service Soil Survey. Citation: USDA 1991. Soil Survey of San Mateo Cnty (East). (see Note 2, following page)
- ☑ National wetlands inventory map(s). Cite name: Redwood Point, Palo Alto (see Note 1, following page)
- ☐ State/Local wetland inventory map(s):
- ☑ FEMA/FIRM maps: 06325 0012B, 060325 0009B
- ☐ 100-year Floodplain Elevation is:
- ☑ Photographs: ☑ Aerial (Name & Date): Aerial provided by saltworks, dated August 2008
  - ☐ Other (Name & Date):
- ☐ Previous determination(s). File no. and date of response letter:
- ☑ Other information (please specify): See Note 3

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

Signature and Date of Regulatory Project Manager (REQUIRED)

Signature and Date of Person Requesting Preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "preconstruction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

SOIL

Sampling Point P1

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-8	10YR 2/2	100					gravelly loam	saline soil, not absorbing water

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Could not dig below 8". Soil comprised of gravelly railroad bed material. No hydric soil indicators are present. Hydric soil criterion not met.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No hydrology indicators observed. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site Saltworks Salt Production Facility City Redwood City County San Mateo Sampling Date 10/8/2009

Applicant/Owner DMB Saltworks, LLC State CA Sampling Point P2

Investigator(s) Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range 15, T5S, R3W

Landform (hillslope, terrace, etc.) Levee Local Relief (concave, convex, none) none Slope(%) <1

Subregion(LRR) LRR C (Medit. CA) Lat: 37 deg 30' 29.08" N Long: 122 deg 11' 58.15" W Datum: WGS 84

Soil Map Unit Name Novato Clay, 0 to 1 percent slopes, ponded NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Hydric Soil Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No

Is the Sampled Area within a Wetland? ☐ Yes ☒ No

Remarks: None of the wetland criteria met; sample point is not within a wetland. Sample point located in a vegetated area adjacent to the levee road.

VEGETATION (use scientific names)

TREE STRATUM Plot Size:	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			

SAPLING/SHRUB STRATUM Plot Size:			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			

HERB STRATUM Plot Size:			
1. *Bromus diandrus*	70	Y	NL
2. *Carduus pycnocephalus*	15		NL
3. *Grindelia stricta var. angustifolia*	10		FACU
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	95		

WOODY VINE STRATUM Plot Size:			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum 5 % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	0	(A)
Total number of dominant species across all strata?	1	(B)
% of dominant species that are OBL, FACW, or FAC?	0	(A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:	
OBL species		x1	
FACW species		x2	
FAC species		x3	
FACU species	10	x4	40
UPL species	85	x5	425
Column Totals	95 (A)		465 (B)

Prevalence Index = B/A = 4.9

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Vegetation is predominantly upland non-native species. Wetland vegetation criterion not met.

SOIL

Sampling Point P2

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-12	10YR 2/2	96	10YR 2/1	2	C	M	gravelly clay loam	
			10YR 4/4	2	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Soil comprised of spoil material used to build road beds. Soil profile does not meet any of the hydric soil indicators. Insufficient abundance of redoximorphic features to meet indicator F6. Hydric soil criterion not met.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No hydrology indicators observed. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site Saltworks Salt Production Facility City Redwood City County San Mateo Sampling Date 10/8/2009

Applicant/Owner DMB Saltworks, LLC State CA Sampling Point P3

Investigator(s) Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range 15, T5S, R3W

Landform (hillslope, terrace, etc.) Levee Local Relief (concave, convex, none) none Slope(%) <1

Subregion(LRR) LRR C (Medit. CA) Lat: 37 deg 30' 33.04" N Long: 122 deg 11' 43.87" W Datum: WGS 84

Soil Map Unit Name Novato Clay, 0 to 1 percent slopes, ponded NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes ☒ No	**Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No**
Hydric Soil Present?	☐ Yes ☒ No	
Wetland Hydrology Present?	☐ Yes ☒ No	

Remarks: Sample point is on a levee road comprised of imported soil material. Sample point is not within a wetland.

VEGETATION (use scientific names)

TREE STRATUM **Plot Size:**	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			
SAPLING/SHRUB STRATUM **Plot Size:**			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			
HERB STRATUM **Plot Size:**			
1. *Salsola tragus*	10	Y	FACU
2. *Distichlis spicata*	5	Y	FACW
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	15		
WOODY VINE STRATUM **Plot Size:**			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum 85 % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	1	(A)
Total number of dominant species across all strata?	2	(B)
% of dominant species that are OBL, FACW, or FAC?	50	(A/B)

Prevalence Index Worksheet

Total % cover of:			Multiply by:
OBL species		x1	
FACW species	5	x2	10
FAC species		x3	
FACU species	10	x4	40
UPL species		x5	
Column Totals	15 (A)		50 (B)

Prevalence Index = B/A = 3.3

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Majority of the sample point area is bare ground with no dominant wetland vegetation. Wetland vegetation criterion not met.

SOIL

Sampling Point P3

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-6	5Y 4/1	100	7.5YR 3/3	2	C	M	gravelly loam	
6-12	5Y/3/1	75					gravelly loam	
	7.5YR 3/3	15						
	5YR 5/4	10						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Soil comprised of freshly graded road bed material comprised of dredge material. Soil indicators not representative of current conditions, but are relict features as defined in the Arid West Manual (page 97-98) due to use of dredged materials from the Bay for creation of levees. They do not represent current conditions and do not meet the definition of a hydric soil. Hydric soil is not present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No hydrology indicators observed. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site Saltworks Salt Production Facility City Redwood City County San Mateo Sampling Date 10/8/2009

Applicant/Owner DMB Saltworks, LLC State CA Sampling Point P4

Investigator(s) Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range 15, T5S, R3W

Landform (hillslope, terrace, etc.) Levee Local Relief (concave, convex, none) none Slope(%) <1

Subregion(LRR) LRR C (Medit. CA) Lat: 37 deg 30' 03.54" N Long: 122 deg 11' 49.55" W Datum: WGS 84

Soil Map Unit Name Novato Clay, 0 to 1 percent slopes, ponded NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Hydric Soil Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No

Is the Sampled Area within a Wetland? ☐ Yes ☒ No

Remarks: None of the three wetland criteria met; sample point is not within a wetland.

VEGETATION (use scientific names)

TREE STRATUM Plot Size:	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			

SAPLING/SHRUB STRATUM Plot Size:			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			

HERB STRATUM Plot Size:			
1. *Salsola tragus*	10	Y	FACU
2. *Carduus pycnocephalus*	5		NL
3. *Lolium multiflorum*	20	Y	FAC
4. *Grindelia stricta var. angustifolia*	10	Y	FACU
5. *Brassica nigra*	10	Y	NL
6.			
7.			
8.			
Herb Stratum Total Cover:	55		

WOODY VINE STRATUM Plot Size:			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum 50 % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	1	(A)
Total number of dominant species across all strata?	4	(B)
% of dominant species that are OBL, FACW, or FAC?	25	(A/B)

Prevalence Index Worksheet

Total % cover of:			Multiply by:
OBL species		x1	
FACW species		x2	
FAC species	20	x3	60
FACU species	20	x4	80
UPL species	15	x5	75
Column Totals	55 (A)		215 (B)

Prevalence Index = B/A = 3.9

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Wetland vegetation criterion not met.

SOIL

Sampling Point P4

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-12	2.5Y 4/2	60					rocky clay loam	
	5Y 3/1	20						
	10YR 4/6	15						
	10YR 2/1	5						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Rocky soil with mixed matrix comprised of material from nearby soil material repository. Hydric soil criterion not met. No indications are present showing that soils meet the definition of a hydric soil.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No hydrology indicators observed. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site Saltworks Salt Production Facility City Redwood City County San Mateo Sampling Date 10/8/2009

Applicant/Owner DMB Saltworks, LLC State CA Sampling Point P5

Investigator(s) Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range 15, T5S, R3W

Landform (hillslope, terrace, etc.) Levee Local Relief (concave, convex, none) none Slope(%) <1

Subregion(LRR) LRR C (Medit. CA) Lat: 37 deg 30' 14.34" N Long: 122 deg 11' 35.85" W Datum: WGS 84

Soil Map Unit Name Novato Clay, 0 to 1 percent slopes, ponded NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Hydric Soil Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No

Is the Sampled Area within a Wetland? ☐ Yes ☒ No

Remarks: Sample point on levee in vegetated area adjacent to bittern facility. None of the wetland criteria met; sample point is not within a wetland.

VEGETATION (use scientific names)

TREE STRATUM Plot Size:	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			
SAPLING/SHRUB STRATUM Plot Size:			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			
HERB STRATUM Plot Size:			
1. *Mesembryanthemum crystallinum*	40	Y	NL
2. *Hordeum murinum*	20	Y	NL
3. *Dittrichia graveolens*	2		NL
4. *Carduus pycnocephalus*	5		NL
5. *Bromus hordeaceus*	20	Y	FACU
6. *Vulpia myuros*	5		FACU
7.			
8.			
Herb Stratum Total Cover:	92		
WOODY VINE STRATUM Plot Size:			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum 10 % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	0	(A)
Total number of dominant species across all strata?	3	(B)
% of dominant species that are OBL, FACW, or FAC?	0	(A/B)

Prevalence Index Worksheet

Total % cover of:			Multiply by:
OBL species		x1	
FACW species		x2	
FAC species		x3	
FACU species	25	x4	100
UPL species	67	x5	335
Column Totals	92 (A)		435 (B)

Prevalence Index = B/A = 4.7

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Vegetation is comprised of upland non-native species. Wetland vegetation criterion not met.

SOIL

Sampling Point P5

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-10	10YR 2/2	100					rocky clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Soil profile does not meet any of the hydric soil indicators. Hydric soil criterion not met.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No hydrology indicators observed. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site: Saltworks Salt Production Facility City: Redwood City County: San Mateo Sampling Date: 10/8/2009

Applicant/Owner: DMB Saltworks, LLC State: CA Sampling Point: P6

Investigator(s): Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range: 15, T5S, R3W

Landform (hillslope, terrace, etc.): Levee Local Relief (concave, convex, none): none Slope(%): <1

Subregion(LRR): LRR C (Medit. CA) Lat: 37 deg 29' 51.11" N Long: 122 deg 11' 24.78" W Datum: WGS 84

Soil Map Unit Name: Novato Clay, 0 to 1 percent slopes, ponded NWI classification: _____

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes ☒ No	**Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No**
Hydric Soil Present?	☐ Yes ☒ No	
Wetland Hydrology Present?	☐ Yes ☒ No	

Remarks: Sample point on levee adjacent to pickle facility. Imported soil material is not reflective of current soil conditions. Sample point is not within a wetland.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: _____	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			

SAPLING/SHRUB STRATUM Plot Size: _____			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			

HERB STRATUM Plot Size: _____			
1. *Mesembryanthemum crystallinum*	2	Y	NL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	2		

WOODY VINE STRATUM Plot Size: _____			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum: 95 % cover of biotic crust: _____

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	0	(A)
Total number of dominant species across all strata?	1	(B)
% of dominant species that are OBL, FACW, or FAC?	0	(A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:	
OBL species		x1	
FACW species		x2	
FAC species		x3	
FACU species		x4	
UPL species	2	x5	10
Column Totals	2 (A)		10 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Majority of the sample point area is bare ground. Wetland vegetation criterion not met.

SOIL

Sampling Point P6

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-12	2.5Y 4/1	85	5YR4/4	15	C	M	silty loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Soil indicator (hydric soil indicator F3) is not representative of current conditions, but is a relict feature as defined in the Arid West Manual (page 97-98) due to use of dredged materials from the Bay for creation of levees. Soil indicator does not represent current conditions and soils do not meet the definition of a hydric soil. Therefore, hydric soils are not present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No hydrology indicators observed. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site Saltworks Salt Production Facility City Redwood City County San Mateo Sampling Date 10/8/2009

Applicant/Owner DMB Saltworks, LLC State CA Sampling Point P7

Investigator(s) Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range 15, T5S, R3W

Landform (hillslope, terrace, etc.) Levee Local Relief (concave, convex, none) none Slope(%) <1

Subregion(LRR) LRR C (Medit. CA) Lat: 37 deg 30' 03.04" N Long: 122 deg 10' 43.40" W Datum: WGS 84

Soil Map Unit Name Novato Clay, 0 to 1 percent slopes, ponded NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes ☒ No	**Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No**
Hydric Soil Present?	☐ Yes ☒ No	
Wetland Hydrology Present?	☐ Yes ☒ No	

Remarks: Sample point on levee adjacent to bittern facility. Imported soil material is not reflective of current soil conditions. Sample point is not within a wetland.

VEGETATION (use scientific names)

TREE STRATUM **Plot Size:**	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			

SAPLING/SHRUB STRATUM **Plot Size:**			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			

HERB STRATUM **Plot Size:**			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:			

WOODY VINE STRATUM **Plot Size:**			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum 100 % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	0	(A)
Total number of dominant species across all strata?	0	(B)
% of dominant species that are OBL, FACW, or FAC?	0	(A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:	
OBL species		x1	
FACW species		x2	
FAC species		x3	
FACU species		x4	
UPL species		x5	
Column Totals	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is <= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: No vegetation present in sample point area.

SOIL

Sampling Point P7

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-12	2.5Y 5/1	75	2.5Y 5/3	20			silty loam	mixed matrix
			5Y 5/4	5				

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Soil indicator (hydric soil indicator F3) is not representative of current conditions, but is a relict feature as defined in the Arid West Manual (page 97-98) due to use of dredged materials from the Bay for creation of levees. Soil indicator does not represent current conditions and soils do not meet the definition of a hydric soil. Therefore, hydric soils are not present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No hydrology indicators observed. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site Saltworks Salt Production Facility City Redwood City County San Mateo Sampling Date 10/8/2009

Applicant/Owner DMB Saltworks, LLC State CA Sampling Point P8

Investigator(s) Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range 15, T5S, R3W

Landform (hillslope, terrace, etc.) Levee Local Relief (concave, convex, none) none Slope(%) <1

Subregion(LRR) LRR C (Medit. CA) Lat: 37 deg 29' 20.96" N Long: 122 deg 10' 46.44" W Datum: WGS 84

Soil Map Unit Name Novato Clay, 0 to 1 percent slopes, ponded NWI classification

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes ☒ No	**Is the Sampled Area within a Wetland?** ☐ **Yes** ☒ **No**
Hydric Soil Present?	☐ Yes ☒ No	
Wetland Hydrology Present?	☐ Yes ☒ No	

Remarks: None of the wetland criteria met; sample point is not within a wetland.

VEGETATION (use scientific names)

TREE STRATUM Plot Size:	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			

SAPLING/SHRUB STRATUM Plot Size:			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			

HERB STRATUM Plot Size:			
1. *Mesembryanthemum crystallinum*	30	Y	NL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	30		

WOODY VINE STRATUM Plot Size:			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum 70 % cover of biotic crust

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	0	(A)
Total number of dominant species across all strata?	1	(B)
% of dominant species that are OBL, FACW, or FAC?	0	(A/B)

Prevalence Index Worksheet

Total % cover of:			Multiply by:
OBL species		x1	
FACW species		x2	
FAC species		x3	
FACU species		x4	
UPL species	30	x5	150
Column Totals	30 (A)		150 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Majority of the sample point area is bare ground. Vegetation is a non-native upland species. Wetland vegetation criterion not met.

SOIL

Sampling Point P8

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-12	10YR 2/2	100	7.5YR 4/6	3	C	M	silty loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Soil profile does not meet any of the hydric soil indicators. Insufficient abundance of redoximorphic features to meet indicator F6. There are no indicators that the area supports hydrology that would cause soils to meet the definition of a hydric soil. Hydric soil is not present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: Cracked soil surface present due to very high soil salinity, and is not a hydrology feature. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site: Saltworks Salt Production Facility City: Redwood City County: San Mateo Sampling Date: 10/8/2009

Applicant/Owner: DMB Saltworks, LLC State: CA Sampling Point: P9

Investigator(s): Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range: 15, T5S, R3W

Landform (hillslope, terrace, etc.): Levee Local Relief (concave, convex, none): none Slope(%): <1

Subregion(LRR): LRR C (Medit. CA) Lat: 37 deg 29' 27.72" N Long: 122 deg 11' 29.72" W Datum: WGS 84

Soil Map Unit Name: Novato Clay, 0 to 1 percent slopes, ponded NWI classification: ____

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Hydric Soil Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No

Is the Sampled Area within a Wetland? ☐ Yes ☒ No

Remarks: None of the wetland criteria met; sample point is not within a wetland.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: ____	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			

SAPLING/SHRUB STRATUM Plot Size: ____			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			

HERB STRATUM Plot Size: ____			
1. *Mesembryanthemum crystallinum*	20	Y	NL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	20		

WOODY VINE STRATUM Plot Size: ____			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum: 80 % cover of biotic crust: ____

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	0	(A)
Total number of dominant species across all strata?	1	(B)
% of dominant species that are OBL, FACW, or FAC?	0	(A/B)

Prevalence Index Worksheet

Total % cover of:			Multiply by:
OBL species		x1	
FACW species		x2	
FAC species		x3	
FACU species		x4	
UPL species	20	x5	100
Column Totals	20 (A)		100 (B)

Prevalence Index = B/A = 5.0

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Wetland vegetation criterion not met.

SOIL

Sampling Point P9

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-6	10YR 3/2	100	10YR 3/3	3	C	M	clay loam	
6-12	2.5Y 4/1	85					clay loam	
	7.5YR 4/6	15						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Soil profile does not meet any of the hydric soil indicators. Hydric soil criterion not met. Soil profile below 6 inches contained dry and decaying vegetation with a color of 7.5YR 4/6. This color does not represent a redoximorphic feature. Insufficient abundance of redoximorphic features to meet indicator F6. Hydric soil is not present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No hydrology indicators observed. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site: Saltworks Salt Production Facility City: Redwood City County: San Mateo Sampling Date: 10/8/2009

Applicant/Owner: DMB Saltworks, LLC State: CA Sampling Point: P10

Investigator(s): Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range: 15, T5S, R3W

Landform (hillslope, terrace, etc.): Partition Local Relief (concave, convex, none): convex Slope(%): 2

Subregion(LRR): LRR C (Medit. CA) Lat: 37 deg 29' 23.80" N Long: 122 deg 12' 12.56" W Datum: WGS 84

Soil Map Unit Name: Novato Clay, 0 to 1 percent slopes, ponded NWI classification: _____

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Hydric Soil Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No

Is the Sampled Area within a Wetland? ☐ Yes ☒ No

Remarks: Sample point is on a wooden partition in the south end of the crystallizer facilities. None of the wetland criteria met; sample point is not within a wetland.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: _____	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			

SAPLING/SHRUB STRATUM Plot Size: _____			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			

HERB STRATUM Plot Size: _____			
1. *Mesembryanthemum crystallinum*	15	Y	NL
2. *Distichlis spicata*	2		FACW
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	17		

WOODY VINE STRATUM Plot Size: _____			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum: 80 % cover of biotic crust: _____

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	0	(A)
Total number of dominant species across all strata?	1	(B)
% of dominant species that are OBL, FACW, or FAC?	0	(A/B)

Prevalence Index Worksheet

Total % cover of:			Multiply by:
OBL species		x1	
FACW species	2	x2	4
FAC species		x3	
FACU species		x4	
UPL species	15	x5	75
Column Totals	17 (A)		79 (B)

Prevalence Index = B/A = 4.6

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Majority of the sample point area is bare ground. Vegetation is predominantly an upland non-native species. Wetland vegetation criterion not met.

SOIL

Sampling Point P10

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-2	10YR 3/2	100					clay loam	
2-8	10YR 3/1	100	10YR 3/4	1	C	M	clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Could not dig below 8". Very sparse redox below 2 inches. Hydric soil criterion not met. There are no indicators that the area supports hydrology that would cause soils to meet the definition of a hydric soil. Hydric soil is not present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: Cracked soil surface present due to soil salinity-not a hydrology feature. Hydrology criterion not met.

Wetland Determination Data Form - Arid West Region

Project/Site: Saltworks Salt Production Facility City: Redwood City County: San Mateo Sampling Date: 10/8/2009

Applicant/Owner: DMB Saltworks, LLC State: CA Sampling Point: P11

Investigator(s): Justin Semion, Amy Langston, Mike Josselyn Section,Township,Range: 15, T5S, R3W

Landform (hillslope, terrace, etc.): Terrace Local Relief (concave, convex, none): none Slope(%): <1

Subregion(LRR): LRR C (Medit. CA) Lat: 37 deg 30' 02.05" N Long: 122 deg 12' 35.13" W Datum: WGS 84

Soil Map Unit Name: Novato Clay, 0 to 1 percent slopes, ponded NWI classification: _____

Are climatic/hydrologic conditions on-site typical for this time of year? ☒ Yes ☐ No (If no, explain in remarks)

Are any of the following significantly disturbed? ☐ Vegetation ☐ Soil ☐ Hydrology Are "Normal Circumstances" present? ☒ Yes ☐ No

Are any of the following naturally problematic? ☐ Vegetation ☐ Soil ☐ Hydrology (If needed, explain any answers in remarks)

SUMMARY OF FINDINGS - Attach site map showing sample point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	☐ Yes	☒ No
Hydric Soil Present?	☐ Yes	☒ No
Wetland Hydrology Present?	☐ Yes	☒ No

Is the Sampled Area within a Wetland? ☐ Yes ☒ No

Remarks: Sample point is adjacent to facility headquarters located on an upland parking and equipment storage area.

VEGETATION (use scientific names)

TREE STRATUM Plot Size: _____	Absolute % cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Tree Stratum Total Cover:			
SAPLING/SHRUB STRATUM Plot Size: _____			
1.			
2.			
3.			
4.			
Sapling/Shrub Stratum Total Cover:			
HERB STRATUM Plot Size: _____			
1. *Bassia hyssopifolia*	20	Y	FAC
2. *Hordeum murinum*	10	Y	NL
3.			
4.			
5.			
6.			
7.			
8.			
Herb Stratum Total Cover:	30		
WOODY VINE STRATUM Plot Size: _____			
1.			
2.			
Woody Vines Total Cover:			

% Bare ground in herb stratum: 70 % cover of biotic crust: _____

Dominance Test Worksheet

Number of Dominant Species that are OBL, FACW, or FAC?	1	(A)
Total number of dominant species across all strata?	2	(B)
% of dominant species that are OBL, FACW, or FAC?	50	(A/B)

Prevalence Index Worksheet

Total % cover of:		Multiply by:	
OBL species		x1	
FACW species		x2	
FAC species	20	x3	60
FACU species		x4	
UPL species	10	x5	50
Column Totals	30 (A)		110 (B)

Prevalence Index = B/A = 3.7

Hydrophytic Vegetation Indicators

- ☐ Dominance Test is >50%
- ☐ Prevalence Index is </= 3.0[1]
- ☐ Morphological adaptations (provide supporting data in remarks)
- ☐ Problematic hydrophytic vegetation[1] (explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present ? ☐ Yes ☒ No

Remarks: Wetland vegetation criteria not met.

SOIL

Sampling Point P11

Profile description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[1]	Texture	Remarks
0-8	2.5Y 4/1	90	7.5Y 3/4	10			gravelly loam	shells intermixed in matrix

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)(LRR C)
- ☐ 1cm Muck (A9)(LRR D)
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☒ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1cm Muck (A9) (LRR C)
- ☐ 2cm Muck (A10)(LRR B)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Other (explain in remarks)

[3]Indicators of hydric vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present ? ☐ Yes ☒ No

Remarks: Soil indicator (hydric soil indicator F3) is not representative of current conditions, but is a relict feature as defined in the Arid West Manual (page 97-98) due to use of dredged materials from the Bay for creation of levees. Soil indicator does not represent current conditions and soils do not meet the definition of a hydric soil. Therefore, hydric soils are not present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)(Nonriverine)
- ☐ Sediment Deposits (B2)(Nonriverine)
- ☐ Drift Deposits (B3)(Nonriverine)
- ☐ Surface Soil Cracks (B6)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Biotic Crust (B12)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in PLowed Soils (C6)
- ☐ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ☐ Water Marks (B1)(Riverine)
- ☐ Sediment Deposits (B2)(Riverine)
- ☐ Drift Deposits (B3)(Riverine)
- ☐ Drainage Patterns (B10)
- ☐ Dry-Season Water Table (C2)
- ☐ Thin Muck Surface (C7)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)

Field Observations:

Surface water present? ☐ Yes ☒ No Depth (inches): _____

Water table present? ☐ Yes ☒ No Depth (inches): _____

Saturation Present? (includes capillary fringe) ☐ Yes ☒ No Depth (inches): _____

Wetland Hydrology Present ? ☐ Yes ☒ No

Describe recorded data (stream guage, monitoring well, aerial photos, etc.) if available.

Remarks: No hydrology indicators observed. Hydrology criterion not met.

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 22

Letter from Jane M. Hicks, Chief, Regulatory Division, U.S. Army Corps of Engineers, to David Smith, DMB Redwood City Saltworks
(Apr. 14, 2010)
(with accompanying attachments)

("Hicks Letter")

DEPARTMENT OF THE ARMY
SAN FRANCISCO DISTRICT, U.S. ARMY CORPS OF ENGINEERS
1455 MARKET STREET
SAN FRANCISCO, CALIFORNIA 94103-1398

APR 14 2010

Regulatory Division

SUBJECT: File Number 26726S

Mr. David Smith
DMB Associates, Inc.
DMB Redwood City Salt Works
1700 Seaport Boulevard, Suite 200
Redwood City, California 94603

Dear Mr. Smith:

This letter is written in response to your initial submittal of November 12, 2009, and revised submittal of January 26, 2010, requesting a preliminary jurisdictional determination of the extent of areas that may be waters of the U.S. at your project site, the Redwood City salt production facilities and adjacent areas located north of US 101 and east of Seaport Boulevard in the City of Redwood City, San Mateo County, California.

Enclosed are maps showing the extent and location of waters and wetlands, entitled "USACE File # 26726S, Preliminary Jurisdictional Determination, DMB Redwood City Saltworks" in four sheets, dated February, 22, 2010. We have based this preliminary jurisdictional determination on the current conditions on the site as verified during a site visit performed by our staff on December 17, 2009. A change in those conditions may also change the extent of waters and wetlands that may be subject to our regulatory jurisdiction under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. This preliminary jurisdictional determination issued pursuant to the Regulatory Guidance Letter, RGL 08-02, can be used only to determine that wetlands or other water bodies that exist on your project site may be jurisdictional waters of the United States under Section 404 of the Clean Water Act (33 U.S.C. Section 1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. Section 403). The findings of this preliminary jurisdictional determination will be used to process an application for a Department of the Army permit to install structures or conduct work in navigable waters of the United States and/or discharge dredged or fill material into waters of the United States.

For purposes of computations of impacts, compensatory mitigation requirements and other resource protection measures, a permit decision made on the basis of a preliminary jurisdictional determination will treat all waters and wetlands on the site as if they are jurisdictional waters. Application for Corps authorization should be made to this office using the application form in the enclosed pamphlet. To avoid delays it is essential that you enter the file number at the top of

this letter into Item No. 1 of the application. The application must include plans showing the location, extent and character of the proposed activity, prepared in accordance with the requirements contained in this pamphlet. You are advised that preliminary jurisdictional determinations may not be appealed (see 33 C.F.R. Section 331.5(b)(9)). However, you may request an approved jurisdictional determination, which may be appealed, that precisely identifies the limits of Corps jurisdiction subject to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. You may also provide new information for further consideration by the Corps to reevaluate this preliminary jurisdictional determination.

Should you have any questions regarding this matter, please call Katerina Galacatos of our Regulatory Division at 415-503-6778. Please address all correspondence to the Regulatory Division and refer to the File Number at the head of this letter. If you would like to provide comments on our permit review process, please complete the Customer Survey Form available online at http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

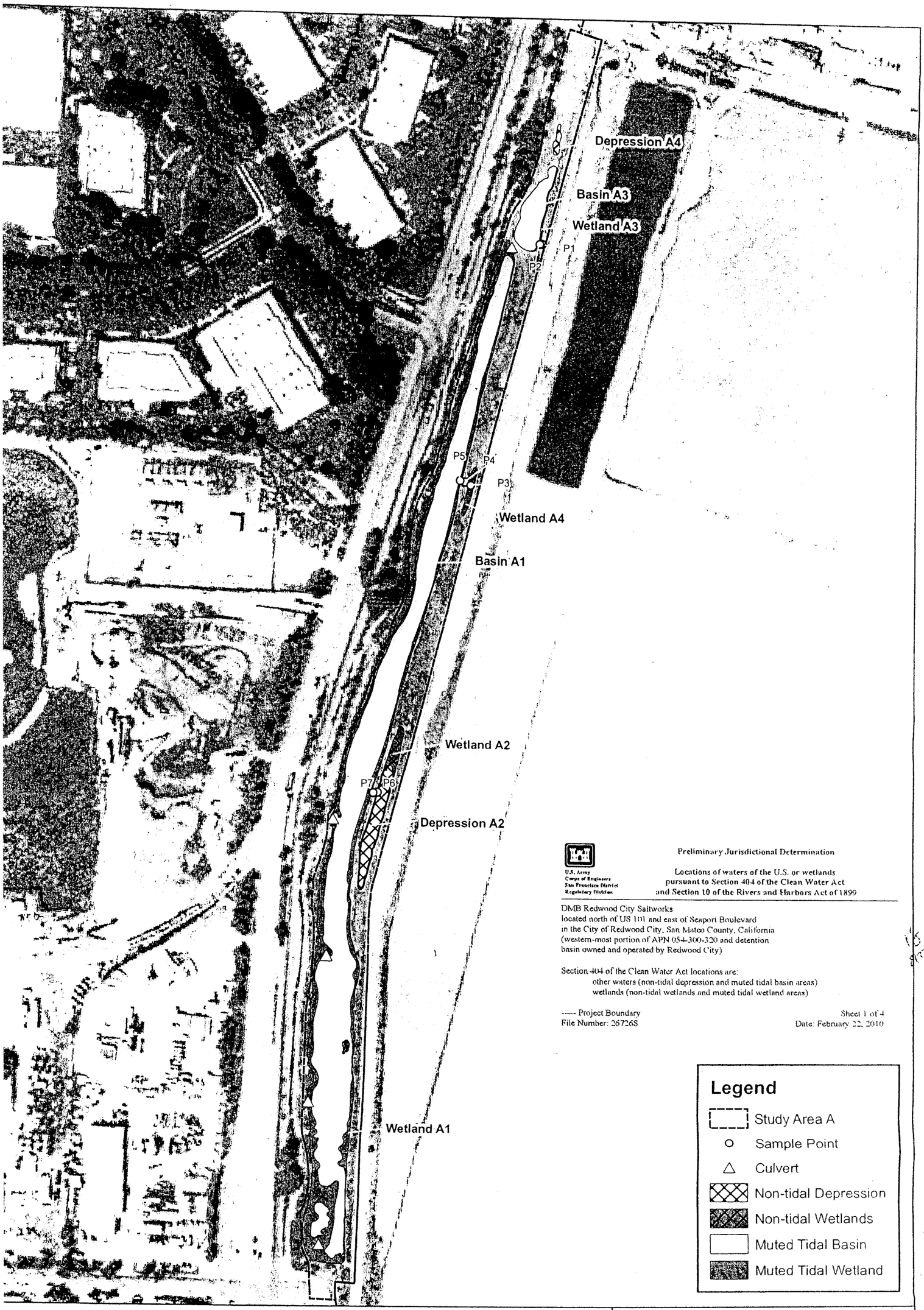
Jane M. Hicks

Jane M. Hicks
Chief, Regulatory Division

Enclosures

Copies Furnished without enclosures:

CA RWQCB, Oakland, CA
CA SWRCB, Sacramento, CA



gure A-1: Preliminary Jurisdictional
etermination Map for Study Area A

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ights reserved

MB Redwood City Saltworks
in Mateo County, California

N
W E
S

0 100 200 400 Feet

wra
ENVIRONMENTAL CONSULTANTS

Image Date: August 2008
Image Source: Redwood City Industrial Salt Works
Map By: Sundaran Gillespie
Filepath: L:\Acad 2000 Files\07000\7062\gis\arcmap\Dec 09 Update\Figure A-1.mxd

Preliminary Jurisdictional Determination

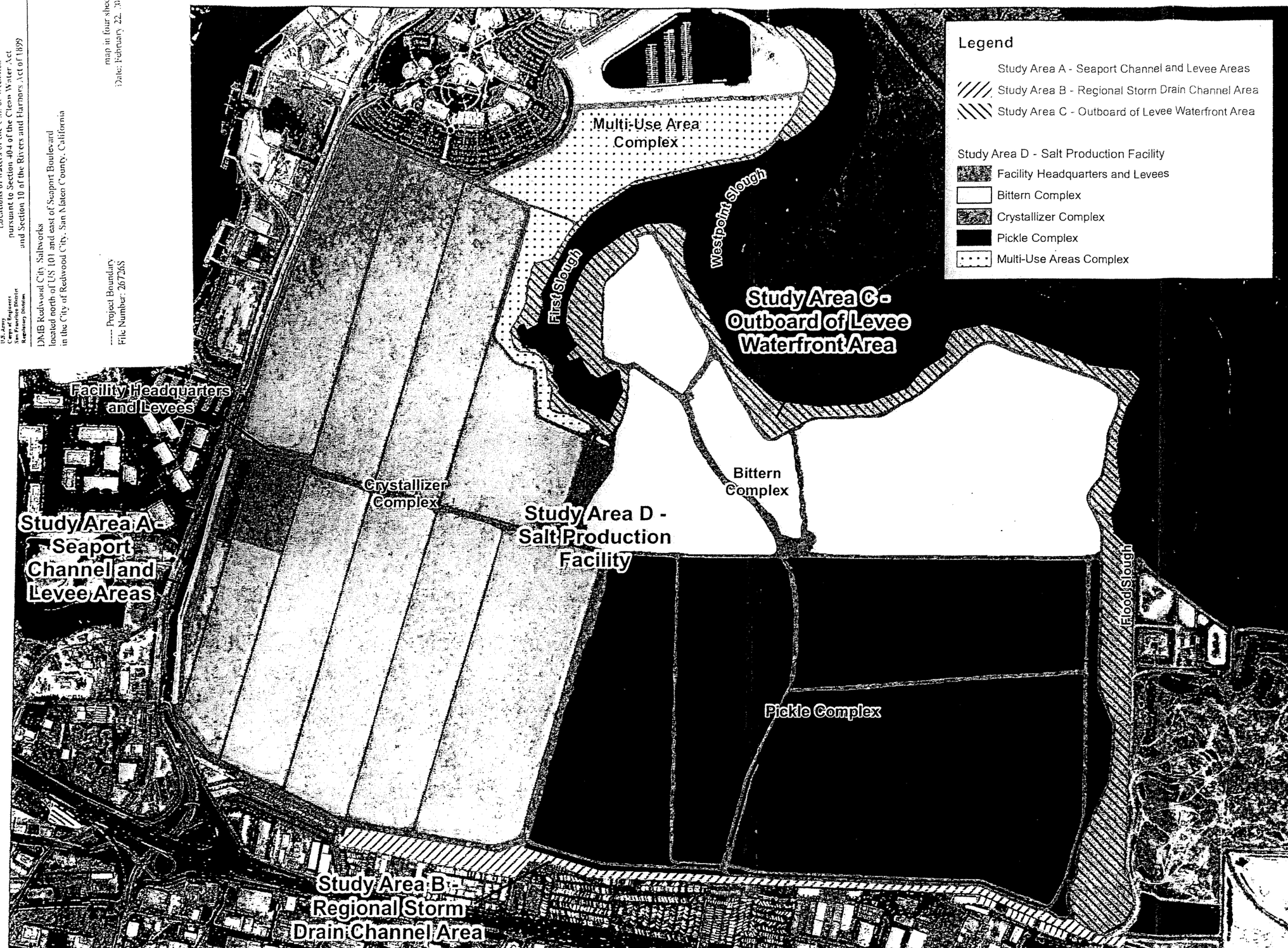
U.S. Army Corps of Engineers San Francisco District Regulatory Division

Locations of waters of the U.S. or wetlands pursuant to Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899

DMB Redwood City Saltworks
located north of US 101 and east of Seaport Boulevard
in the City of Redwood City, San Mateo County, California

map in four sheets
Date: February 22, 2010

----- Project Boundary
File Number: 26726S



wra

ENVIRONMENTAL CONSULTANTS
2169-G East Francisco Blvd.
San Rafael, CA 94901
(415) 454-8868 Phone
(415) 454-0129 Fax

DMB Redwood City Saltworks

San Mateo County, California

Figure 2. Saltworks Site Study Areas

Figure for use under RGL No.08-02 only; all rights reserved

This map is representational only, and not meant for use in detailed design.

N
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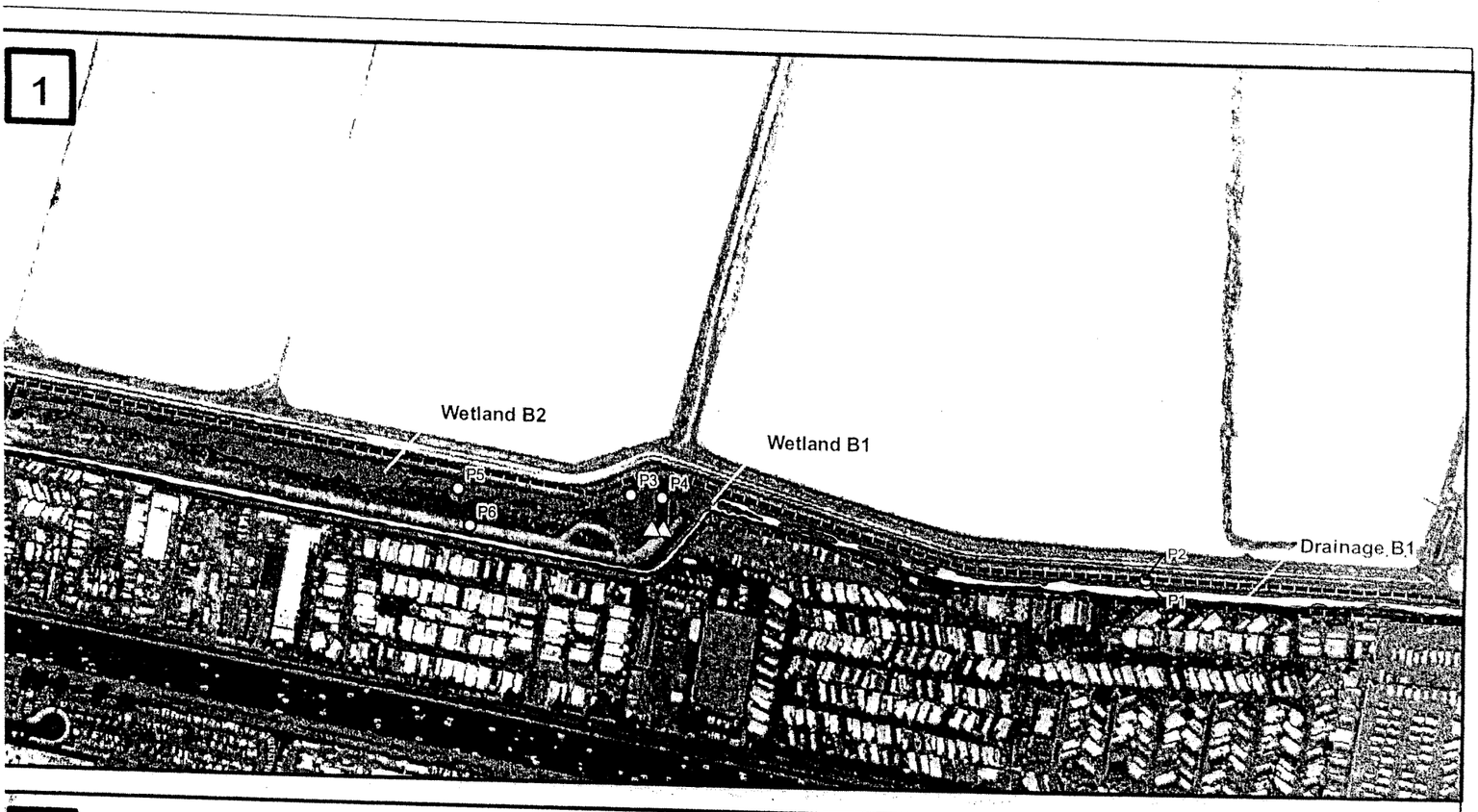
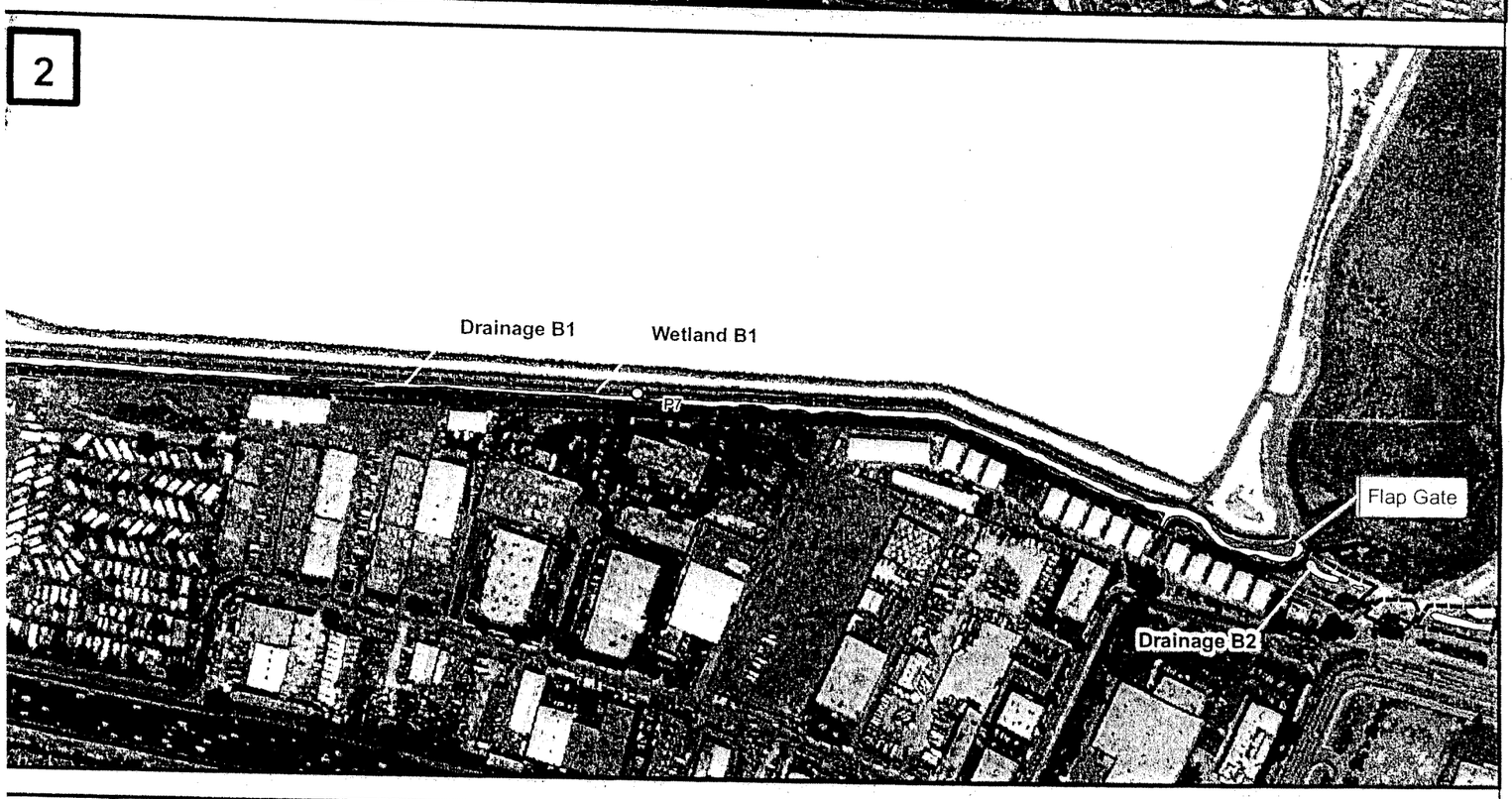
0 500 1,000 2,000
Feet

Image Date: August 2008
Image Source: Redwood City Industrial Salt Works
Map By: Sundaran Gillespie
Filepath: L:\Acad 2000 Files\07000\7062\gis\arcmap\Nov 09 Updated Report\Figure 2.mxd





U.S. Army
Corps of Engineers
San Francisco District
Regulatory Division

Preliminary Jurisdictional Determination

Locations of waters of the U.S. or wetlands
pursuant to Section 404 of the Clean Water Act
and Section 10 of the Rivers and Harbors Act of 1899

DMB Redwood City Saltworks
located north of US 101 and east of Seaport Boulevard
in the City of Redwood City, San Mateo County, California
(a portion of APN 054-310-160 and 054-121-160,
APN 054-121-120 and 122 OR 258, Parcel 2)

Section 404 of the Clean Water Act locations are:
other waters (non-tidal waters) and wetlands (non-tidal wetlands)

----- Project Boundary
File Number: 26726S

Sheet 2 of 4
Date: February 22, 2010

Legend

- Study Area B
- Sample Point
- Culvert
- Non-tidal Waters
- Non-tidal Wetlands

gure B-1: Preliminary Jurisdictional
etermination Map for Study Area B
ure for use under RGL No.08-02 only;
rights reserved

MB Redwood City Saltworks
n Mateo County, California

N
W E
S

0 200 400 800 Feet

wra
ENVIRONMENTAL CONSULTANTS

Image Date: August 2008
Image Source: Redwood City Industrial Salt Works
Map By: Sundaran Gillespie
Filepath: L:\Acad 2000 Files\07000\7062\
gis\arcmap\Dec 09 Update\Figure B-1.mxd

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 23

Michael Josselyn, Ph.D., Special Aquatic Habitat Assessment
for Redwood City Plant Site
(June 2002)

("Josselyn 2002 Special Aquatic Habitat Assessment")

Special Aquatic Habitat Assessment

Cargill Redwood City Plant Site

Redwood City, California

Prepared For:

Cargill Salt, Western Division
7220 Central Avenue
Newark, California 94560-4206

Prepared By:

Wetlands Research Associates, Inc.
2169 East Francisco Blvd., Suite G
San Rafael, California 94901
Contact: Mike Josselyn
(415) 454-8868

June 2002

Introduction

On June 19, 2002, Wetlands Research Associates, Inc (WRA) biologists conducted a survey of the Cargill Redwood City Plant site (Figure 1). The purpose of this survey was to determine the presence or absence of "special aquatic sites." Special aquatic sites are defined in the Environmental Protection Agency Section 404(b)(1) Guidelines[1], Sec. 230.3(q-1) as "geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values."

Project Site

The Cargill Plant site is located in Redwood City, San Mateo County, and is bordered by Greco Island to the north, commercial development to the south and east, and the Bayfront Park to the west. The production of salt by solar evaporation at the Plant site requires the isolation of saline water within a series of ponds; crystallizer ponds, bittern/desalting ponds, and pickle ponds represent different stages of this process (Figures 1 and 2). The ponds in this plant are bordered by a large levee that separates them from adjacent tidal action. Identification of potential special aquatic sites was made on Cargill salt processing lands inside this large levee ("Study Area") as shown in Figures 1 and 2.

Special Aquatic Habitat Background

The following are types and definitions of special aquatic sites:

1. "*Sanctuaries and refuges* consist of areas designated under State and Federal laws or local ordinances to be managed principally for the preservation and use of fish and wildlife resources." (Sec. 230.40)

2. "*Wetlands* consist of areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." "Where wetlands are adjacent to open water, they generally constitute the transition to upland. The margin between wetland and open water can best be established by specialists familiar with the local environment, particularly where emergent vegetation merges with submerged vegetation over a broad area in such places as the lateral margins of open water, headwaters, rainwater catch basins, and groundwater seeps. The landward margin of wetlands also can best be identified by specialists familiar with the local environment when vegetation from the two regions merges over a broad area."

---

[1]Federal Register / Vol. 45, No. 249; December 24, 1980

"Wetland vegetation consists of plants that require saturated soils to survive (obligate wetland plants) as well as plants, including certain trees, that gain a competitive advantage over others because they can tolerate prolonged wet soil conditions and their competitors can not. In addition to plant populations and communities, wetlands are delimited by hydrological and physical characteristics of the environment. These characteristics should be considered when information about them is needed to supplement information about vegetation, or where wetland vegetation has been removed or is dormant." (Sec. 230.41).

3. "*Mud flats* are broad flat areas along the sea coast and in coastal rivers to the head of tidal influence and in inland lakes, ponds, and riverine systems. When mudflats are inundated, wind and wave action may resuspend bottom sediments. Coastal mud flats are exposed at extremely low tides and inundated at high tides with the water table at or near the surface of the substrate. The substrate of mud flats contains organic material and particles smaller in size than sand. They are either unvegetated or vegetated only by algal mats." (Sec. 230.42)

4. "*Vegetated shallows* are permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as turtle grass and eelgrass in estuarine or marine systems as well as a number of freshwater species in rivers and lakes." (Sec. 230.43)

5. "*Coral reefs* consist of the skeletal deposit, usually of calcareous or silicaceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef." (Sec. 230.44)

6. "Steep gradient sections of streams are sometimes characterized by *riffle and pool complexes*. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a coarse substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. Pools are characterized by a slower stream velocity, a steaming flow, a smooth surface, and a finer substrate. Riffle and pool complexes are particularly valuable habitat for fish and wildlife." (Sec. 230.45)

Methods

The Study Area is privately owned and is not located in a federal or state Sanctuary or Refuge. The Study Area does not support coral reefs or riffle and pool complexes. The crystallizers, desalting ponds, bittern ponds, and pickle ponds are filled with brine liquids or salts either throughout the year or seasonally depending upon the salt making process. They are not subject to tidal influence and the bottoms are maintained artificially in order to retain brine liquids or to produce salt. As part of an industrial process in which the basins are regularly filled and drained

for salt production, the crystallizers, desalting ponds, bittern ponds, and pickle ponds are not considered "mudflats" as defined by the EPA.

Therefore, the only potential special aquatic sites that might occur within the Study Area are "wetlands" and " vegetated shallows". The field work consisted of qualified wetland biologists with training in the delineation of wetlands and vegetated shallows traversing the levees surrounding each basin on foot, looking for the presence of the criteria used to identify wetlands or vegetated shallows.

For wetlands, the criteria consist of the three parameters–dominance by hydrophytic plants, presence of hydric soils, and saturated or inundated areas. The 1987 Corps of Engineers Manual provided the criteria and indicators used to assess whether all three of these parameters were present in any one location and thereby signifying that jurisdictional wetlands may be present. There is no manual for designation of vegetated shallows. The 1987 Corps manual states that "areas < 6.6 ft mean annual depth that support only submergent aquatic plants are vegetated shallows". Therefore, investigation for the presence of this special aquatic site involved the observation of any areas where submergent aquatic plants, such as widgeon weed, *Ruppia maritima*, may be present.

Photographs were taken at each pond to document the presence/absence of any of these two special aquatic habitats.

Results

The Study Area was characterized by barren salt deposits, brine ponds, and bare levees. For the most part vegetation was absent. A photograph was taken at each pond to document existing conditions (Appendix A).

Wetlands

No wetlands were found within the Study Area. The crystallizers, bittern ponds, and pickle ponds were characterized by salty brines and extensive salt deposits; a hypersaline environment that does not support wetland vegetation. The desalting pond, the final stage in solar salt production, was a dry, salt-encrusted flat with small areas of brine pooling. The soils in the plant site are highly disturbed and saline in nature. The San Mateo County soil survey mapped the soils as Novato clay, a hydric soil. The soil type is an indicator of its historic condition as a tidal marsh and therefore, its hydric nature is based on the conditions that developed prior to its use in salt production. The Corps Manual states that:

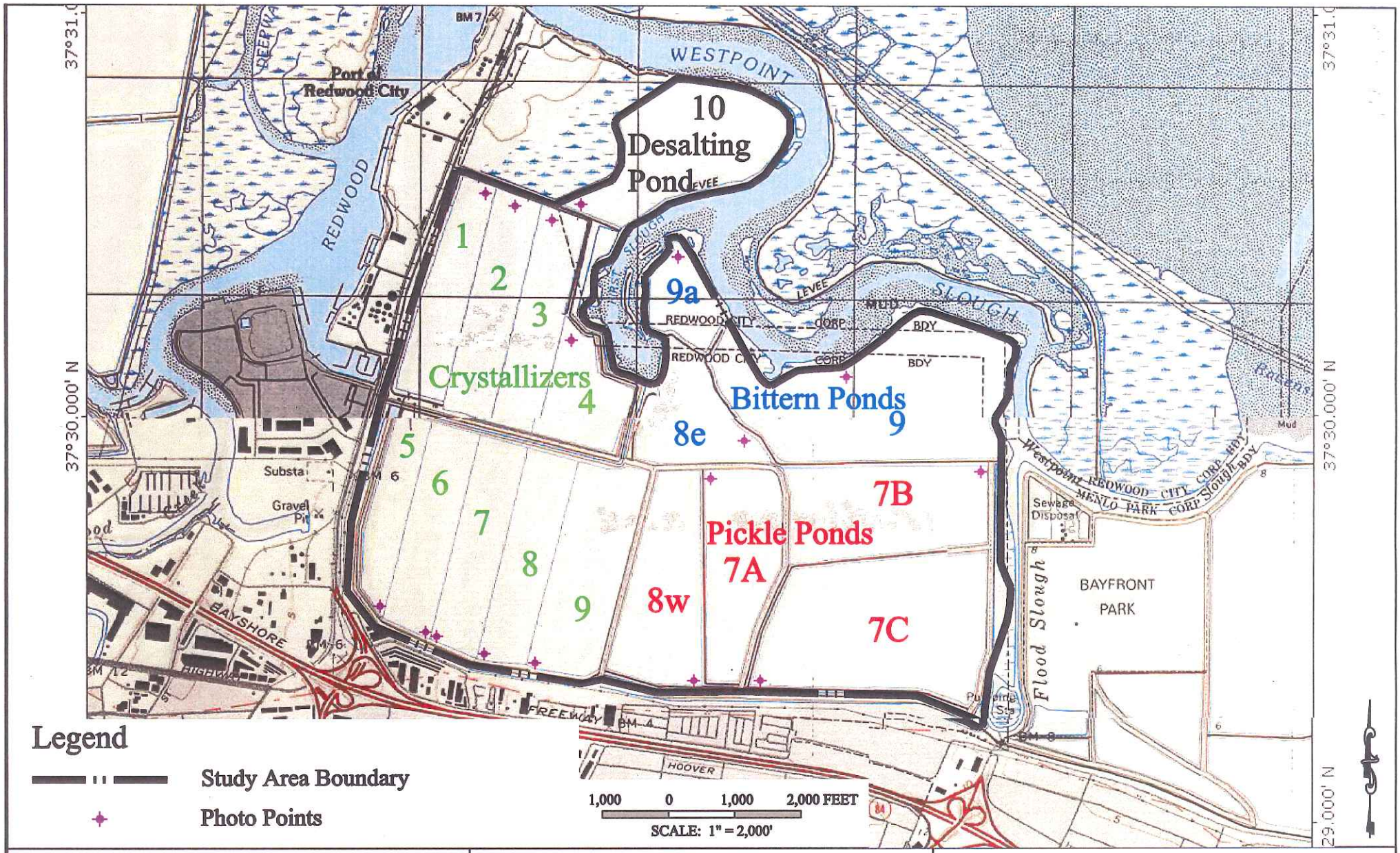
> "Not all areas having hydric soils will qualify as wetlands. Only when a hydric soil supports hydrophytic vegetation and the area has indicators of wetland hydrology may the soil be referred to as a "wetland soil".

Vegetation was largely absent from the plant site. Some weedy vegetation, upland vegetation, were present on some of the levees. The species present included slender leaved iceplant, *Mesembryanthemum nodiflorum,* slender wild oat, *Avena barbata*, and various mustard species, *Brassica* spp. Pickleweed, *Salicornia virginica*, was absent from the site except for a few levee locations where salt concentrations in high ground soils facilitated their growth. In the locations where pickleweed was observed, hydrologic indicators necessary for a determination of a jurisdictional wetland were not present. No vegetation was present in any of the basin bottoms.
Vegetated shallows

No areas of vegetated shallows were observed within the Study Area. No submerged vegetation was observed.

Conclusion

Based on the June 19, 2002 survey, no Special Aquatic Sites exists on the Cargill Redwood City Plant Study Area shown in Figures 1 and 2. The hypersaline environment within the Plant site is inhospitable to wetland and aquatic vegetation and is unsuitable for all other categories of Special Aquatic Sites.



Legend

Study Area Boundary

Photo Points

FIGURE 1

SITE MAP

Basemap: National Geographic Topo 2000

Wetlands Research Associates, Inc.

2169-G East Francisco Blvd.
San Rafael, CA 94901
Contact: Michael Josselyn
Phone: 415-454-8868
Fax: 415-454-0129

SPECIAL AQUATIC SITE HABITAT ASSESSMENT

LOCATION: Redwood City, California
COUNTY: San Mateo
DATE: June 2002
FILE: 7062\dwg\wra\special-aquatic-pondmap.dwg

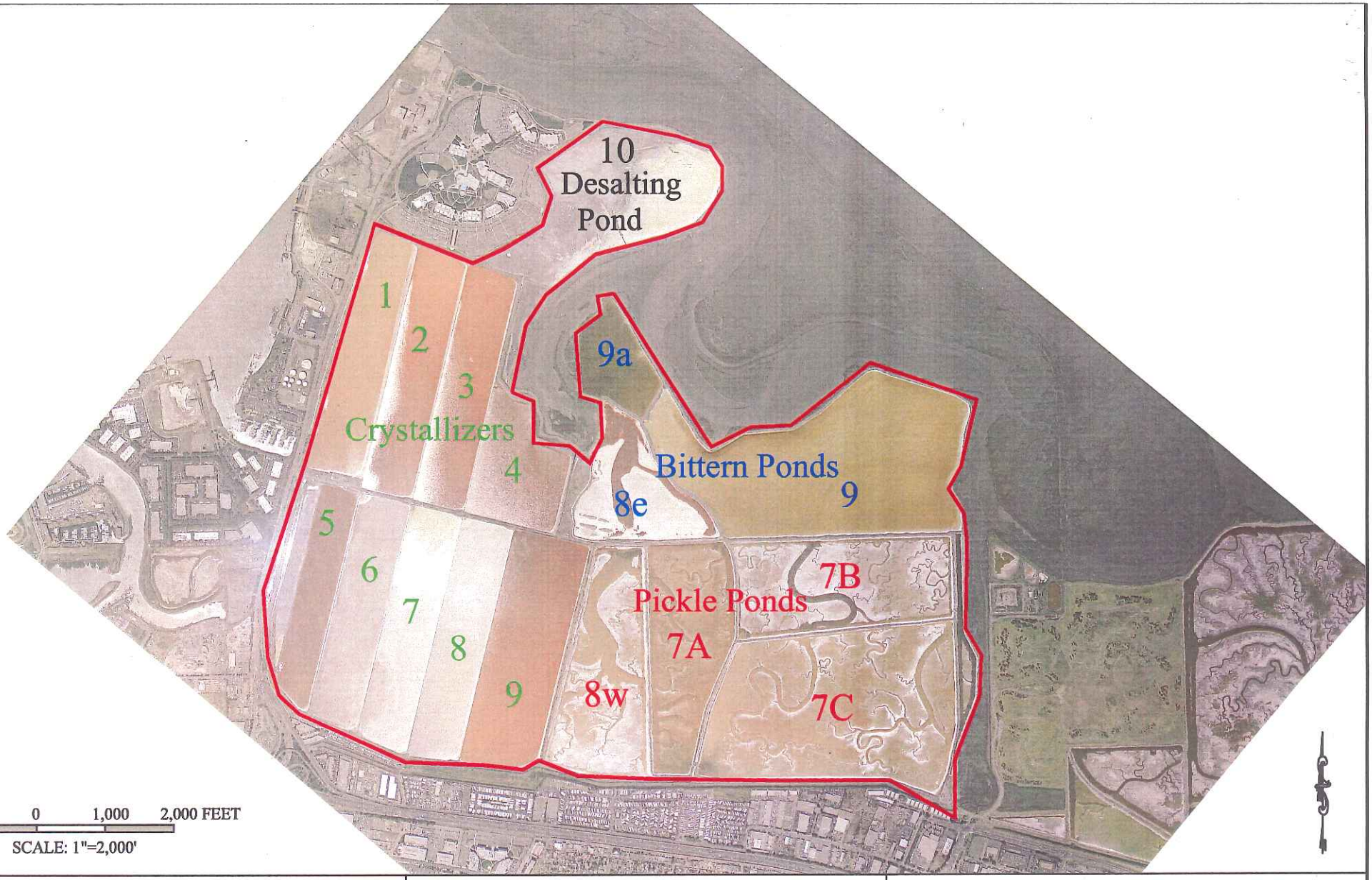


FIGURE 2

SITE MAP

Aerial Source: Pacific Aerial Surveys, Inc.

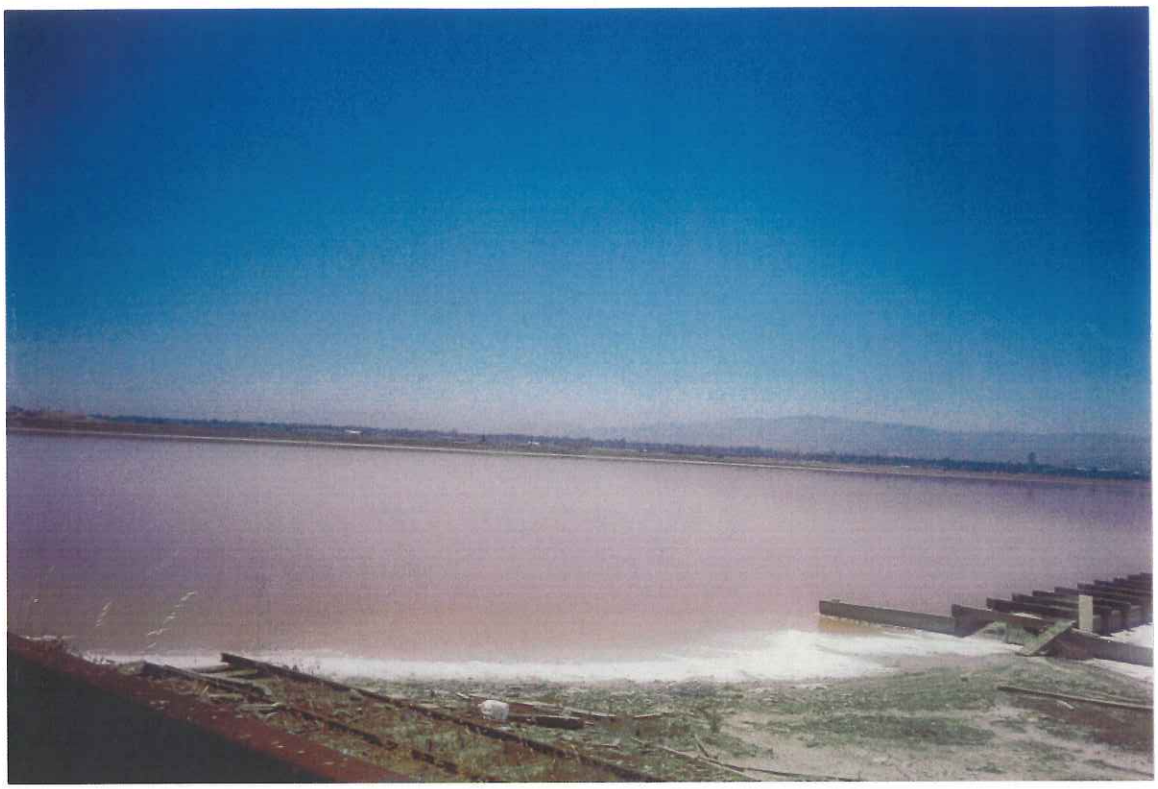
Wetlands Research Associates, Inc.
2169-G East Francisco Blvd.
San Rafael, CA 94901
Contact: Michael Josselyn
Phone: 415-454-8868
Fax: 415-454-0129

SPECIAL AQUATIC SITE HABITAT ASSESSMENT

LOCATION: Redwood City, California
COUNTY: San Mateo
DATE OF PHOTO: 6-19-02
FILE: 7062\dwg\wra\special-aquatic-site.dwg

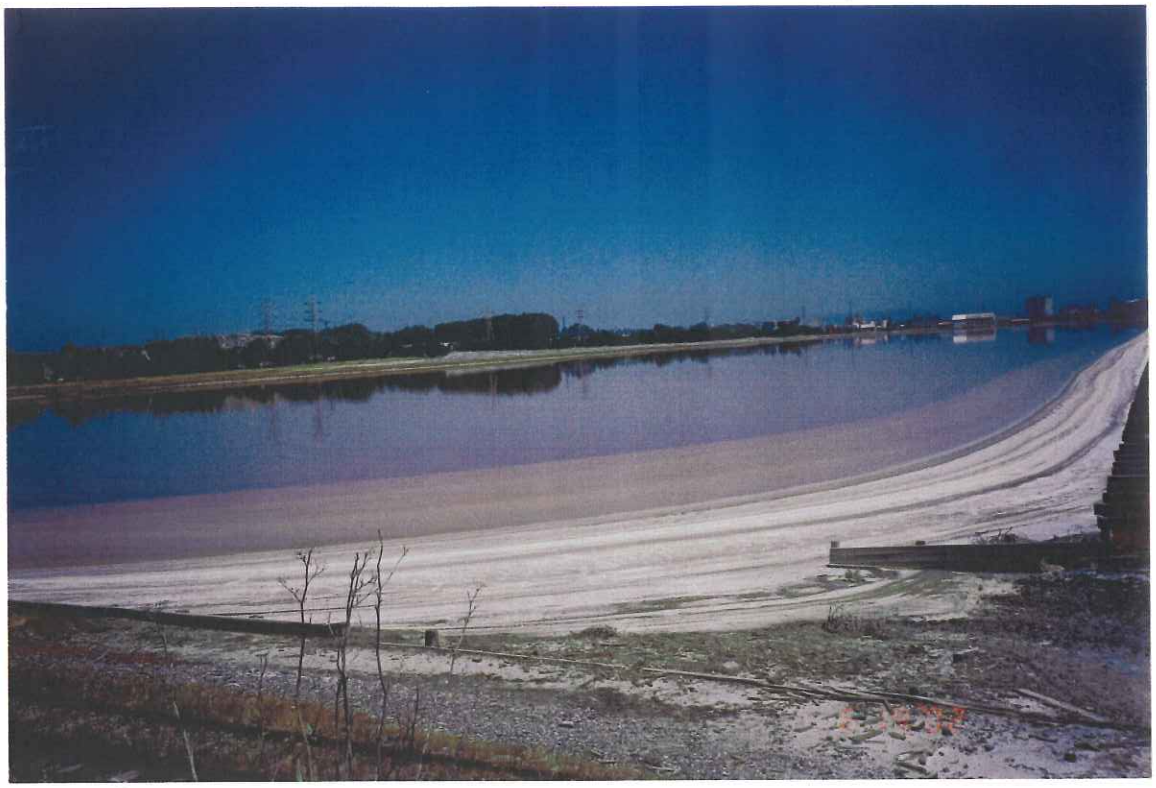
Appendix A. Top: Crystallizer #1. Bottom: Crystallizer #2.

Wetlands Research Associates, Inc.



Appendix A. Top: Crystallizer #3. Bottom: Crystallizer #4.

Wetlands Research Associates, Inc.

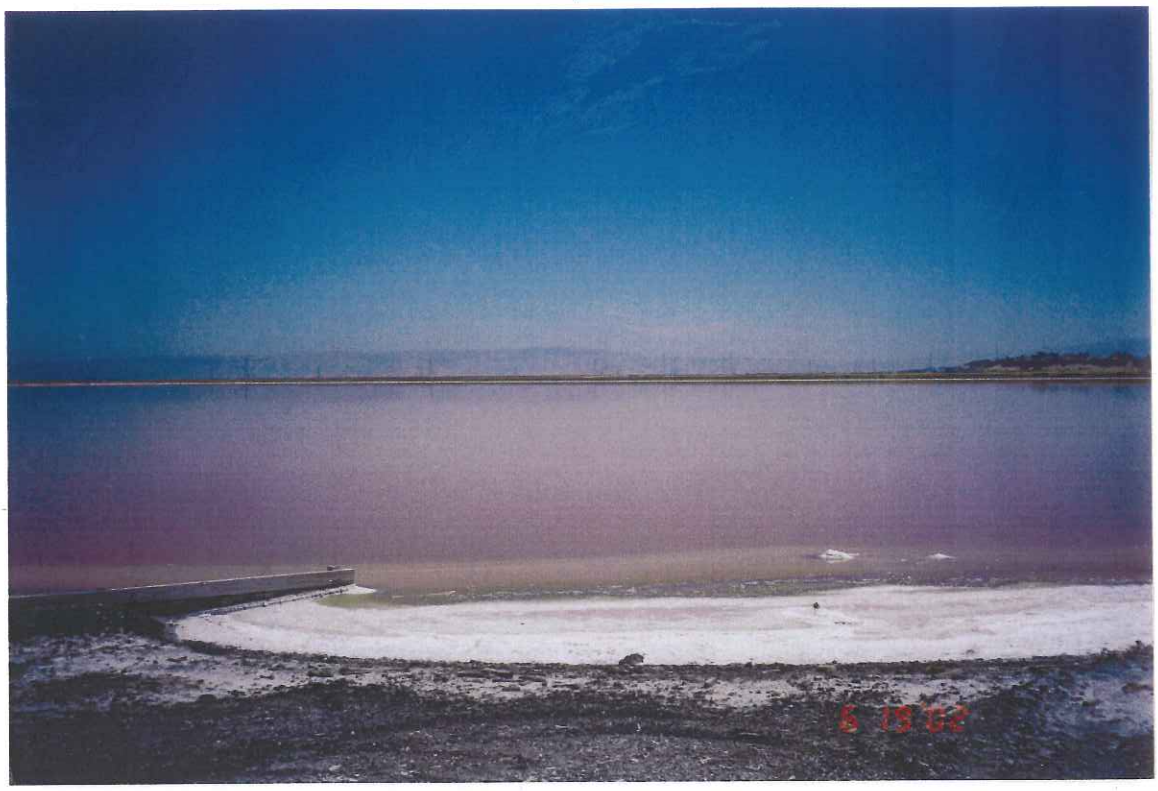


Appendix A. Top: Crystallizer #5. Bottom: Crystallizer #6.

Wetlands Research Associates, Inc.

Appendix A. Top: Crystallizer #7. Bottom: Crystallizer #8.

Wetlands Research Associates, Inc.



Appendix A. Top: Crystallizer #9. Bottom: Desalting Pond #10.

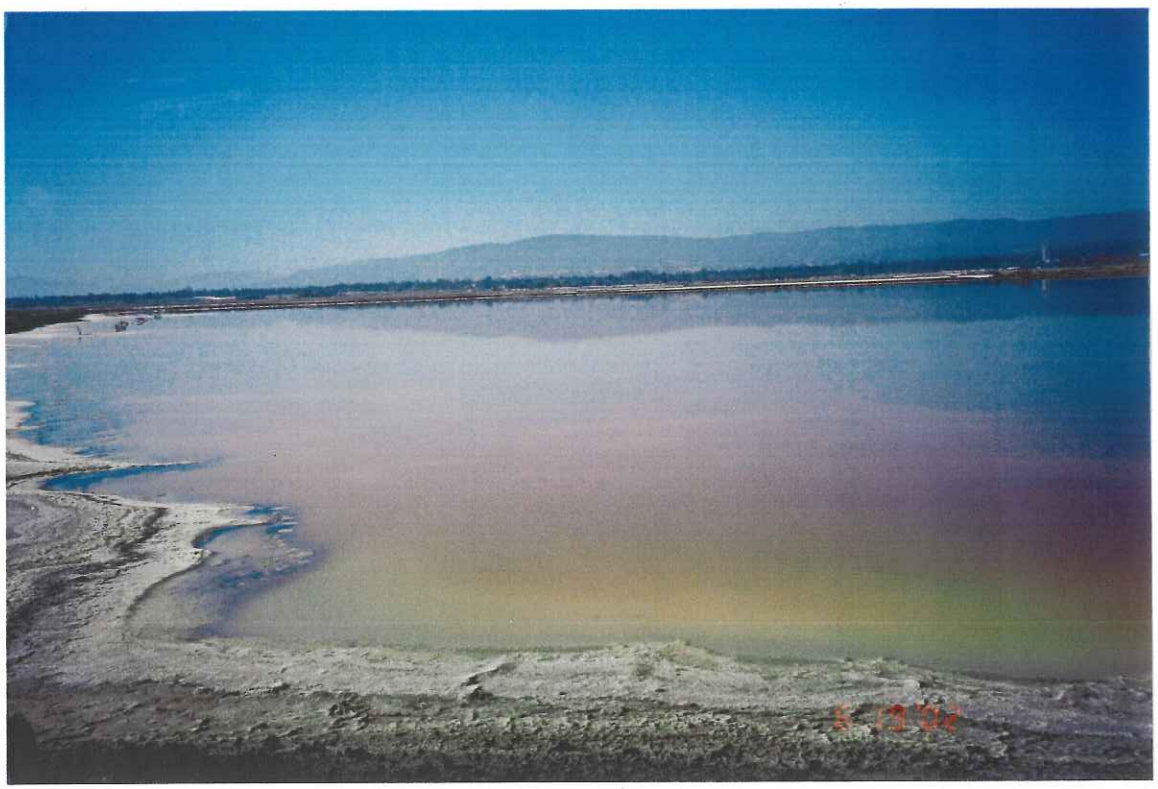
Wetlands Research Associates, Inc.

Appendix A. Top: Pickle Pond #7A. Bottom: Pickle Pond #7B.

Wetlands Research Associates, Inc.

Appendix A. Top: Pickle Pond #7C. Bottom: Pickle Pond #8W.

Wetlands Research Associates, Inc.



Appendix A. Top: Bittern Pond #8E. Bottom: Bittern Pond #9A.

Wetlands Research Associates, Inc.

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 24

WRA, Inc., Evaluation of Saltworks Hydrologic, Physical, Chemical, and Biological/Ecological Functions and Effects on Surrounding Areas (Feb. 27, 2012)

("Significant Nexus Analysis")

Memorandum

To: Virginia Albrecht
Hunton and Williams LLP

From: Michael Josselyn, PhD
PWS
Justin Semion

Date: February 27, 2012

Subject: Exhibit 24: Evaluation of Saltworks Hydrologic, Physical, Chemical, and Biological/Ecological Functions and Effects on Surrounding Areas

The following table presents an analysis of the hydrologic, physical, chemical, and biological/ecological functions of the solar salt production cells at the Redwood City Salt Plant. The analysis was developed to evaluate the extent to which the salt production cells might contribute to the integrity of surrounding waters and wetland areas.

In summary, the salt production cells do not affect the hydrologic, physical, and chemical integrity of the surrounding wetland and water areas. The salt production cells were constructed and are maintained to support the salt production process by excluding hydrologic, physical and chemical connectivity with surrounding wetland and water areas. The cells are basins of compact clay and salt layers, some underlain by gypsum, a mineral precipitate of the salt production process that forms hard and impermeable layers (ENGEO 2010). This substrate beneath the cells prevents exchange with underlying groundwater. The salt production cells are separated from surrounding areas by levees that are constructed and are maintained specifically to exclude any surface connection with surrounding areas. The salt production cells do not affect the chemical integrity of the surrounding wetlands and waters because there is no physical and hydrologic connectivity with those areas.

The salt production cells do not provide substantial value for mammals, reptiles, amphibians, fish, or invertebrates. The salt production cells are used on a relatively limited basis by birds, which primarily use the areas for roosting. Based on data collected by WRA and others, birds use the salt production cells much less than they use tidal wetlands and lower salinity salt evaporators at the margins of San Francisco Bay.

Redwood City Salt Plant Evaluation of Hydrologic, Physical, Chemical and Biological Functions		
Function	**Analysis**	**Conclusion**
Hydrologic/Physical Factors		
Groundwater Recharge	Salt production cells contain compact clays and salts to retain brines on the surface to harvest salt. No groundwater was indicated in geotechnical borings at Saltworks (ENGEO 2010)	No hydrologic influence on underlying groundwater or other "waters" or wetlands
Groundwater Discharge	Salt production cells are closed systems underlain with substrate that prevents exchange with groundwater. No groundwater was indicated in geotechnical borings at Saltworks (ENGEO 2010)	No discharge of underlying groundwater enters the salt production cells.
Floodflow alteration	Salt production cells are leveed and stormwater does not enter or discharge from these systems. Stormwater from surrounding areas is intercepted by ditches outside of the salt production facility and does not enter the facility. The salt production cells have no influence over floodflow entering the Bay.	The salt production cells do not affect or alter floodflows.
Surface flow/discharge	Salt production cells are self-contained and do not discharge into other water bodies.	There is no surface flow from Saltworks to other waters or wetlands
Proximity to another water body	Salt production cells are separated by levees from Westpoint Slough, First Slough, and Flood Slough. Salt production cells were created and are maintained to prevent hydrologic exchange with these surrounding areas to maintain the integrity of the salt production process.	The salt production facility has no surface or groundwater connectivity with, surrounding waters and wetlands.
Watershed integrity	The salt production cells are leveed, with stormwater and other runoff from surrounding areas routed around the facility. Rainfall that falls on the site is retained on the site.	The salt production facility does not contribute to the integrity of the surrounding watershed.

Redwood City Salt Plant Evaluation of Hydrologic, Physical, Chemical and Biological Functions		
Function	**Analysis**	**Conclusion**
Chemical Factors		
Sediment Stabilization	Salt production cells are leveed and stormwater containing sediment does not enter or discharge from these system. Brines entering the system do not contain sediments.	The salt production cells do not provide sediment stabilization.
Chemical Composition	Brines entering the system are totally retained within the system. Brines that are transported to the salt production cells have typically been in the salt production system for two to five years. Through the process of solar evaporation, water is removed from the brines and concentration of salts increases. However, since there is no discharge of the brines to the Bay, the brines have no influence on the chemical composition of the Bay.	The salt production cells are not affected by nor do they affect the chemical composition of the Bay.
Nutrient Removal/Transformation	Salt plant basins do not intercept nutrient laden waters and therefore do not remove nutrients. These functions are largely dependent on plant growth and productivity, and no plants are present in the salt production cells. The high salinity of the brines does not allow for the typical microbial communities involved in nutrient transformation processes.	The salt production cells do not remove or transform nutrients.
Biological/Ecological Factors		
Organic Matter Production Export	There is no discharge of water or flushing of organic matter from the Saltworks site to the Bay. The plant site basins are unvegetated and therefore do not result in notable organic material production and do not contribute to organic matter to the Bay.	The salt production cells do not contribute to production export to surrounding wetlands and waters.
Aquatic Diversity/Abundance	No fish can survive high salinities found in salt production cells (Stenzel et al. 2002). Invertebrates in the cells are limited to brine flies, and periodic occurrences of brine shrimp. The high salinities limit both the diversity and abundance of aquatic wildlife.	The salt production cells do not support high aquatic resources diversity or abundance.

Redwood City Salt Plant Evaluation of Hydrologic, Physical, Chemical and Biological Functions		
Function	**Analysis**	**Conclusion**
Wildlife Diversity/Breeding	Brines within salt production cells provide limited habitat value for wildlife due to high salinities and lack of suitable food supplies. Observed wildlife use is primarily roosting during high tides with very limited breeding value. The salt production cells do not provide breeding and diversity for amphibians and fish. For mammals, reptiles, and invertebrates, the salt production cells are used only by a limited number of species accustomed to human disturbance.	Wildlife diversity and breeding is limited primarily to roosting birds at high tide, with very limited breeding and foraging value for birds.

References

ENGEO, Inc. 2010 Preliminary Geotechnical Exploration and Summary of Geologic Constraints. The Redwood City Saltworks. Redwood City, California. Prepared for DMB Redwood City Saltworks. September 2010.

Stenzel, L.E., C.M. Hickey, J.E. Kjelmyr, and G.W. Page. 2002. “Abundance and distribution of shorebirds in the San Francisco Bay Area.” Western Birds. Volume 33: 69-98.

REDWOOD CITY SALT PLANT
APPROVED JURISDICTIONAL DETERMINATION SUBMISSION
May 30, 2012

EXHIBIT 25

Letter from John Paul Bruno, Redwood City Saltworks, to the Honorable Alicia Aguirre, Mayor, City of Redwood City (May 4, 2012)

Redwood City
Saltworks

May 4, 2012

The Honorable Alicia Aguirre
Mayor
THE CITY OF REDWOOD CITY
City Hall
1017 Middlefield Road
Redwood City, California 94063

Re: Withdrawal of Pending Saltworks "50/50 Balanced Plan" Project Proposal, May 2009

Dear Mayor Aguirre,

We are aware the Redwood City City Council intends to review and discuss potential options regarding the Saltworks proposal on Monday, May 7. So as to avoid any unnecessary confusion, we write to clarify the status of the pending application, our intentions procedurally moving forward, and the revisions we intend for the future proposal.

Initially, we commend the City for its consistent and unyielding commitment to conduct an open, transparent, and fact-based environmental investigation of our proposal for the future of the Saltworks site, our "50/50 Balanced Plan," filed with the City in May 2009. As you publicly committed, you have managed a fair, exhaustive, and balanced process fully consistent with and, indeed, exceeding the mandates of state law. We find it saddening and ironic that those efforts have resulted in intense criticism of the City Council and staff, collectively and individually, from outside interests.

Your thorough and inclusive process produced a wealth of input, feedback, criticism, and vision from the community, stakeholders and regulators. As you know, in light of that tremendous response, we have been working for the last five months on a revised proposal for the Saltworks. In our efforts to complete that revised plan, we continue to explore the related process with the federal agencies.

There has been a great deal of speculation about the timing and direction of our revised proposal for the Saltworks. In evaluating a revised vision for the Saltworks, we have focused on the very unique history and character of this site. Activities ranging from agricultural production to disposal of dredge spoils from the initial digging for the Port of Redwood City fashioned the most highly disturbed and engineered nature of the

westerly most part of the site (within the present-day crystallizer beds) as early as the late 1800s. This area is the most heavily manipulated and has not been in any significant way a functioning part of San Francisco Bay for over 100 years. The easterly portion, however, remained largely undisturbed until much later and was constructed pursuant to a 1940 federal permit.

Reflective of this history, our revised plan for the Saltworks will be focused on a much more limited footprint restricted to the area of greatest historic disturbance. Accordingly, we anticipate that the revised proposed development footprint will be approximately half the acreage of that proposed in the May 2009 50/50 Plan submittal. Importantly, this area also is fully contained within the portion of the site currently designated "Urban Reserve" under the City's General Plan which, as you know, is for "land to be preserved for future use to *expand the limits of the urbanized area of the City*." (Redwood City General Plan, The Built Environment, Urban Form and Land Use, Page BE-41 [adopted October 11, 2010], *emphasis* added.)

The magnitude of change in the focus and footprint of this revised proposal is such a significant departure from the existing 50/50 proposal, and is so foundationally derived from the disturbance history of the site, that it must be considered in light of federal regulatory parameters. Accordingly, we feel any specific proposal back to the City would be premature until we better understand the regulatory implications of our revised vision.

Mayor Aguirre, we could not be more appreciative of the professional and courteous relationship with Redwood City – its citizens, City Staff, and its elected and appointed officials – that has matured over these past few years. The City's staff and officials have shown great commitment to the integrity of the process in evaluating the appropriate future use of this site. Given the critical importance of this site for the future of Redwood City, we also remain committed to being thoughtful and thorough in bringing our revised Saltworks proposal to the City.

To be clear, and to avoid any unnecessary confusion or distraction by the City, we hereby withdraw the May 2009 50/50 Balanced Plan proposal currently on file with the City in its entirety.

Should you or the City staff have any questions regarding this matter, please feel free to contact me.

Sincerely,

John Paul Bruno
General Manager and Senior Vice President

cc: City Council
Bob Bell, City Manager
Pamela Thompson, City Attorney
Bill Ekern, Community Development Director
Blake Lyon, Senior Planner
City Clerk