TURLOCK IRRIGATION DISTRICT
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Don Pedro Dam and Powerhouse

May 22, 2006

Ms. Erin Mustain
Division of Water Quality
1001 I Street, 15th Floor
Sacramento, CA 95814

Dear Ms. Mustain,

RE: Submittal of Supplemental Environmental Impact Report Documentation for the Turlock Irrigation District's Aquatic Pesticide Application Program (Water Quality Order No. 2004-0009-DWQ)

As previously discussed both via telephone and email, the Turlock Irrigation District has completed the CEQA process for its Aquatic Pesticide Application Program. On January 3, 2006 the Turlock Irrigation District Board of Directors certified the Revised Final Focused Environmental Impact Report and approved the Project. Following that action, the Turlock Irrigation District submitted a request to the court to discharge the Modified Writ. A copy of the court proceedings related to the CEQA process was forwarded to you via email on May 3, 2006. A copy of the Judgment was sent via email earlier today.

As per your request, please find attached a copy of the Draft Focused Environmental Impact Report, and the Revised Final Focused Environmental Impact Report for your records.

Should you have any questions, please do not hesitate to contact me at (209) 883-8428.

Sincerely,

Debra C. Liebersbach, P.E.
Water Planning Department Manager

TID

REVISED FINAL FOCUSED ENVIRONMENTAL IMPACT REPORT

AQUATIC PESTICIDE APPLICATION PROGRAM FOR UNLINED AND PARTIALLY LINED CANALS

Prepared for

Turlock Irrigation District
333 East Canal Drive
Turlock, C A 95381

December 2005

URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94612

26815137.00600

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On December 9, 2005, TID published a Final EIR that contained the comments and recommendations provided by Stanislaus County and Shute, Mihaly & Weinberger (including a copy of the Stanislaus County comment letter), responses to those comments and recommendations, and Appendix F which contained the Modified Preemptory Writ of Mandate in *Deltakeeper v. Turlock Irrigation District* (Sacramento County Sup. Court No. 04CS00222) (November 24, 2004). This document revises that Final EIR. The Revised Final EIR includes all of the information provided in the Final EIR, responses to the comments provided by the San Joaquin Raptor Rescue Center and Protect Our Water, and copies of the written comments submitted by Shute, Mihaly & Weinberger, the San Joaquin Raptor Rescue Center, and Save Our Water. The Revised Final EIR supersedes the previous Final EIR.

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**NOT LICENSED IN CALIFORNIA

November 7, 2005

VIA ELECTRONIC AND OVERNIGHT MAIL

Debra Liebersbach
Turlock Irrigation District
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Turlock, CA 95381-0949

Received
11/7/05 via email
11/8/05 via Fed Ex.
DL

Re: **Draft Focused EIR, Aquatic Pesticide Application Program for Unlined and Partially Lined Canals**

Dear Ms Libersbach:

On behalf of San Francisco Baykeeper and its Deltakeeper Chapter ("Deltakeeper"), we submit these comments to the Turlock Irrigation District ("District") on the September 2005 Draft Focused EIR ("DEIR") for its Aquatic Pesticides Program ("Program"). The District has prepared this DEIR in an attempt to comply with the court ruling setting aside its January 30, 2004 approval of the Program on the basis of a negative declartion. However, after careful review of the DEIR, we have determined that the DEIR fails to address most of the defects contained in the initial study and negative declaration ("IS/ND").[1] The DEIR fails to adequately analyze and mitigate numerous potentially significant impacts, and therefore fails to comply with the requirements of the California Environmental Quality Act ("CEQA"), Public Resources Code § 21000 et seq., and the CEQA Guidelines, California Code of Regulations, title 14, § 15000 et seq.) ("CEQA Guidelines").

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[1]Deltakeeper submitted comments on the IS/ND to the District dated January 21, 2004 and January 26, 2004. Those comments are in the administrative record on the IS/ND. The entire record, which is in the District's possession, is incorporated by reference herein.

I. The District Failed to Give Adequate Opportunity to Comment on the DEIR.

CEQA provides that the minimum notice period for a DEIR submitted to the State Clearinghouse should be at least 45 days. Pub. Res. § 21091 (a). The District initially released the DEIR for public review on September 22, 2005 and indicated that the public comment period would close on November 5, 2005. Not only is November 5th a Saturday, and therefore an unlawful deadline for submitting comments, it is also only the 44th day of the lawful review period. Code of Civil Procedure § 12. The public comment period on the DEIR cannot close before November 7, 2005.

Moreover, pursuant to Galante Vineyards v. Monterey Peninsula Water Management District, 57 Cal. App. 4th 13 (1997), and Public Resources Code section 21177, the District must accept comments on the DEIR up until the close of the public hearing on the Pesticide Program. Therefore, Deltakeeper reserves the right to submit further comments on the adequacy of the DEIR.

II. The District's Environmental Review of the Proposed Project Fails to Comply With CEQA.

A. The District Improperly Limited its Analysis to Groundwater Impacts.

The District improperly limited the scope of its EIR to the impact of acrolein applications to unlined canals on groundwater, apparently because it believes that the groundwater analysis is all that is required of it as a result of the court's ruling in Deltakeeper et al. v. Turlock Irrigation Dist., et al., Sacramento County Superior Court No. 04CS00222). To the contrary, the court rejected the District's request to limit the remedy for its CEQA violation to requiring the District to prepare only a focused EIR studying groundwater impacts. Instead, the court set aside the aquatic pesticide program in its entirety, and the District must reapprove the Program in its entirety. See DEIR 1-2 and App. B. Even though the District Board previously determined that there was no evidence of significant impacts when it approved the negative declaration, the District now has a new record of evidence before it. Based on this evidence, detailed below, the DEIR must analyze and mitigate potentially significant impacts to water quality and biological resources due to acrolein and glyphosate applications to its unlined and partially lined canals.

B. The DEIR's Project Description and Discussion of the Environmental Setting Is Inadequate And Fails to Include Information Necessary to Analyze the Project's Significant Impacts.

The DEIR provides a legally inadequate analysis of the potential impacts of the project because it is based on an incomplete project description. "An accurate, stable and finite

project description is the sine qua non of an informative and legally sufficient EIR." San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus, 27 Cal.App.4th 713, 730 (1994), quoting County of Inyo v. City of Los Angeles, 71 Cal.App.3d 185, 193 (1977). As a result, courts have found that even if an environmental document is adequate in all other respects, the use of a "truncated project concept" violates CEQA and mandates the conclusion that the lead agency did not proceed in a manner required by law. San Joaquin Raptor, 27 Cal.App.4th at 730. Furthermore, "[a]n accurate project description is necessary for an intelligent evaluation of the potential environmental effects of a proposed activity." Id. at 730 [citation omitted]. The DEIR's project description does not provide sufficient information to allow for an evaluation of the project's environmental impacts.

First, the DEIR omits entirely any discussion of glyphosate, which, as the District indicated in its IS/ND, it applies to bankside vegetation along canals and laterals. This omission is especially significant because the District has never meaningfully analyzed the environmental impacts of the surfactants, which must be used in conjunction with glyphosate. As described below, surfactants are persistent in the environment and toxic to aquatic life. The DEIR must analyze the potentially significant impacts from the District's use of this toxic chemical.

Further, the DEIR's description of the environmental setting is incomplete and inaccurate. CEQA requires that an EIR describe the environmental setting of a project site to provide a baseline to assess the environmental impacts of a proposed project. CEQA Guidelines § 15125. "[A]ccurate and complete information pertaining to the setting of the project and surrounding uses" is critical to an evaluation of a project's impact on the environment. San Joaquin Raptor/Wildlife Center v. Stanislaus County, 27 Cal.App.4th 713, 728 (1994); see also Friends of the Eel River v. Sonoma County Water Agency, 108 Cal.App.4th 859, 875 (2003) ("incomplete description of the Project's environmental setting fails to set the stage for a discussion of" significant effects).

The invalidated IS/ND identified nine special status species that may be affected by applications of pesticides to TID's canals, including the snowy egret tri-colored blackbird, the snowy egret, Swainson's hawk, the giant garter snake, the northwestern pond turtle, Sanford's arrowhead, the slender-leaved pondweed, Kern brook lamprey, San Joaquin roach, and the hardhead. The DEIR, by contrast, nowhere identifies or analyzes impacts to these species. Instead, the DEIR concludes without analysis that the Program will have no impact on wildlife because the unlined and partially lined canals purportedly have no natural resource value. DEIR 3-3. The DEIR contains only conclusory assertions, and no evidence, to support this claim. In fact, all of the evidence before the district suggests that the canals do have significant biological value.

The District's own consultants performed a "Canal Reconnaissance Survey" and determined that the canals contain common pondweed and California arrowhead. DEIR, App. C

at 2. On this basis, the consultant further concluded that the canals could support slender-leaved pondweed and Sanford's arrowhead. Id. Indeed, the entire purpose of the aquatic pesticide program is to kill plants, so it is simply illogical to conclude that no plants exist in the treated facilities. Nonetheless, the DEIR did not disclose its consultant's conclusion or discuss the potential impacts to these sensitive species.

Sensitive fishes, such as the Kern brook lamprey, San Joaquin roach, and the hardhead also exist in project area. As the comments of Diane Renshaw, an expert ecologist, demonstrate, irrigation canals can contain fish and provide substantial riparian habitat for terrestrial species. Renshaw at 2, attached to SMW's 1/26/04 letter. The trial court's ruling recognized that "native fish species may occupy some of the water conveyance facilities." DEIR, App. B at 4. Moreover, the District's own consultants admonished the District to conduct surveys to determine the presence or absence of riparian habitat and sensitive species, including fish.[2]

Moreover, the plant species that the Program is designed to eliminate – Pondweed (family *Potamogetonaceae*) (DEIR 2-5) – itself provides biological value. According to the U.S. Army Corps of Engineers, Pondweed "provides benefits by providing shelter and structure for fish and is a food source for a variety of waterfowl and shorebirds, which can provide habitat for fish." **Exhibit 1.**

Further, the DEIR makes no mention of the beneficial uses of its irrigation canals, which will almost certainly be impaired by the application of pesticides. These canals are waters of the United States and of the state. Headwaters, Inc. v. Talent Irrigation District, 243 F.3d 526 (9th Cir. 2001). Under the "tributary rule," beneficial uses that apply to water bodies that are specifically identified in the Water Quality Control Plan ("Basin Plan") for the region also apply to tributaries to those waters. Cal. Code Regs., tit. 23, § 3940(d). The Basin Plan identifies beneficial uses of the waters to which the irrigation canals are tributary, such as the Tuolomne and San Joaquin Rivers as agricultural, recreational, freshwater habitat, spawning habitat, and migration. Moreover, all water bodies that do not have officially designated beneficial uses are automatically assigned a "Municipal and Domestic Supply" (MUN) designation. Thus, because the irrigation canals are designated for a variety of uses that include recreation and spawning habitat, the project's proposed pesticide application on canal waters directly impacts the viability of these uses. In addition, beneficial uses always include "existing uses" of the water body. 40 C.F.R. §§ 131.3(e), 131.10(g-h). Irrigation canals are often used for fishing and swimming, regardless of whether or not the District discourages such uses. All of these beneficial uses must be protected. The DEIR fails to acknowledge such beneficial uses and therefore fails to evaluate the impacts of the project on the beneficial uses of the canals.

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[2] Email correspondence between District staff and consultants in response to comments on the District's initial study and negative declaration were included in the administrative record for the IS/ND, and must also be included in the record for the EIR.

C. The DEIR Fails to Adequately Analyze Numerous Significant Environmental Impacts.

1. The District Must Analyze the Substantial Adverse Impacts of Pesticides on Species and Habitat that are Present in the Irrigation Canals.

a. Impacts of Acrolein.

If the District intends to apply acrolein to its unlined canals, it must first obtain an exemption from the discharge limitations established by the U.S. Environmental Protection Agency's numeric criteria for priority toxic pollutants in California (also known as the "CTR" or the "California Toxics Rule") and the State Board's Policy for Implementation of the CTR. 40 C.F.R. § 131.38. Indeed, obtaining an exemption from water quality standards was what prompted the District to do CEQA review of its Program in the first instance. These water quality standards, designed to protect the environment are established for acrolein at 21, 320 and 780 parts per billion (ug/l). **Exhibit 2 at 12 (Fact Sheet, Water Quality Order No. 2004-0009-DWQ)).** The District proposes to apply acrolein in concentrations of up to 15 parts per million ("ppm"), which is as much as 714 times the level permitted by the water quality standards. DEIR at 2-6. The exceedence of water quality standards itself is a significant impact that must be analyzed in the EIR. See CEQA, App. G. This dramatic exceedence of water quality standards also demonstrates the potential harm to species and habitat that may be present in the irrigation canals when pesticides are applied.

The DEIR fails to provide any information about the impacts of Magnacide H other than its potential to leach to groundwater. Instead, the DEIR seems to assume that because Magnacide H has been registered by the United States EPA and approved by the California Department of Pesticide Regulation ("DPR"), it will have no impacts on the aquatic resources at stake. DEIR at 2-4. As we noted in our January 21, 2004 comments on the District's initial study and negative declaration for the Program, the District's approach is not sound. As one expert stated in comments to the State Water Quality Control Board during its consideration of the impacts of pesticide use:

> "A critical review of the process used by the US EPA Office of Pesticide Programs (OPP) in registering pesticides shows that, while the US EPA requires that pesticides be evaluated with respect to their toxicity to some forms of aquatic and terrestrial life, there is no requirement to evaluate the fate, transport and impacts on non-target organisms associated with pesticides used in accordance with the label restrictions. Further, the US EPA OPP includes a variety of factors in its registration of pesticides, such as economic considerations and their assessment of the benefits of using the pesticide, versus not using it. The US EPA OPP allows for adverse impacts to

> non-target organisms, provided that this impact is considered by the OPP to be of acceptable significance. . . .
>
> It is important to understand that a registered pesticide for aquatic application is not adequately evaluated as part of registration with respect to its potential to be adverse to non-target aquatic life outside of the zone of application (treatment area). This situation mandates that the local agency (in California, the Regional Boards) responsible for protection of water quality from the adverse impacts of registered pesticides used in accordance with the label requirements, require evaluation of the pesticide's impacts on water quality and beneficial uses with respect to the site-specific conditions of the use. This evaluation requires a comprehensive, detailed monitoring program associated with each application, to determine whether the application causes violations of Clean Water Act requirements for the control of toxicity and other adverse impacts on the beneficial uses of the waterbody receiving the pesticide application and other waterbodies connected to this water body."

Lee, G. F., "Comments on SWRCB November 26, 2003, Preliminary Draft Water Quality Order No. 2004-__-DWQ Statewide General National Pollutant Discharge Elimination System Permit for Discharge of Aquatic Pesticides for Aquatic Weed Control in Irrigation Systems, Drinking Water Canals, and Surface Water Impoundments that are Waters of the United States," submitted to CA State Water Resource Control Board, by G. Fred Lee & Associates El Macero, CA December (2003) (hereinafter "Lee 2003") (submitted with SMW's 1/21/04 comments on the IS/ND).

Thus, compliance with EPA registration requirements does not demonstrate that Magnacide H will not have any significant impacts on the aquatic resources and wildlife of the canals. Indeed, the California Courts have specifically determined that compliance with the regulatory standards of another agency does not demonstrate that a project will not have a significant effect on the environment. Protect The Historic Amador Waterways v. Amador Water Agency, 116 Cal. App. 4th 1099, 1109 (2004); Communities for a Better Environment v. Resources Agency, 103 Cal. App. 4th 98 (2002).

There is no dispute that Magnacide H is highly toxic to fish and other species even at very low levels. The Initial Study conceded that the proposed application of aquatic pesticides could cause potential adverse effects to nine different special-status species, including "loss of foraging or breeding habitat due to removal of aquatic vegetation, disturbance of nesting or breeding habitat during application of the treatments, or mortality and/or reduced survival of individuals caused by exposure to toxic concentrations of chemicals associated with the treatments." The DEIR failed to analyze any of these potentially significant impacts.

The District proposes several best management practices ("BMPs") associated with acrolein applications. DEIR at 2-8. Only one of these addresses impacts to biological

resources within the canals: annual training of District personnel in identifying special-status species. Id. Although this BMP requires pesticide applicators to document any such species found, they are not required to proactively survey the treated facilities for special-status species. Moreover, even if species are documented, the BMP only requires that pesticide applications be postponed until impacts are evaluated. Id. It does not require that any measures be taken to ensure that special-status species are not harmed by the pesticides. This BMP is facially inadequate to protect species within and near the canals.

b. Impacts of Glyphosate/Surfactants.

Because the DEIR does not acknowledge the District's use of glyphosate, it also fails to discuss the pesticide's significant impacts. Glyphosate and its associated surfactant (in the case of Roundup, the surfactant is POEA) can have lethal and sublethal effects on aquatic and terrestrial species.[3] As detailed in the attached scientific articles by Dr. Rick A. Reyla, surfactants are lethal to amphibians, even when used in accordance with label instructions. See **Exhibit 3.** Glyphosate-containing herbicides may also cause genetic damage in fish. **Exhibit 4 at 14; see also Exhibit 5.**

Further, the purpose of the District's glyphosate applications is to eliminate bankside vegetation. This vegetation provides cover, nesting and foraging habitat for birds and terrestrial species, which will be clearly harmed by its removal. See Renshaw at 3. All of these potentially significant impacts must be studied in the DEIR.

2. The DEIR Fails to Analyze the Project's Significant Impacts to the Natural Waterways Receiving Treated Water.

The DEIR indicates that the irrigation canals drain into the Merced, Tuolumne, and San Joaquin Rivers. DEIR at 2-2. The DEIR fails altogether to analyze the Program's impacts to these rivers and the aquatic species within them. The DEIR does, however, list several BMPs apparently designed to mitigate such impacts. DEIR at 2-8. In the case of acrolein, these BMPs include: (1) closing gates at release locations prior to treatment; (2) making arrangements to "irrigate out the treated water"; and (3) conducting the "Magnacide H Baker Petrolite Field Test" at release locations. Id. Evidence suggests that the these precautions alone are not sufficient to prevent any adverse impacts to the above waters and their beneficial uses.

First, as noted by the National Oceanic and Atmospheric Administration ("NOAA") in its comments on the IS/ND, "the control structures on the irrigation channels are

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[3]Roundup, which is a brandname of a glyphosate/surfactant formulation similar to that used by the District, has also been associated with human health impacts such as increased incidence of non-Hodgkin's Lymphoma and miscarriages. See **Exhibit 5.** The DEIR fails to analyze any human health effects of its pesticide use.

not water tight and that there is the potential for some treated water to pass over or through the irrigation system." **Exhibit 6** (letter from NOAA on IS/ND). Additional evidence submitted with our January 21, 2004 comments on the IS/ND, which the District has in its possession, demonstrate that similar gates in other irrigation systems have been known to leak. The District must establish a monitoring program to systematically and frequently test its gates for leaks. Simply stating that it will "verify that gates [are] . . . not leaking prior to treatment" does not ensure adequate and enforceable monitoring.

Second, the DEIR indicates that water might be "irrigated out" before gates are opened. This does not protect natural rivers and creeks because there is no guarantee that all water will be irrigated out of the system. Moreover, water contaminated with Magnacide H will contaminate soils, which in turn can lead to further water contamination due to storm water or irrigation water runoff. See Exhibit 1 to 1/21/04 comments of SMW.

Third, the field tests performed by the District fail to ensure that acrolein treated water will not be released to rivers and creeks at concentrations that are harmful to aquatic species and birdlife. The test kits are only accurate to 0.1 ppm; acrolein is harmful to species at levels as low as 7 ppb (µg/L – or .007 ppm)). Therefore, a test kit that samples only to 0.1 ppm will not detect acrolein at concentrations which are known to be harmful. See also DEIR, App. E (8/4/05 letter from NOAA).

The District has also apparently removed the BMP requiring it to hold acrolein-treated water for 6 days prior to releasing it. Although Deltakeeper does not believe that 6 days is a sufficient amount of time to allow acrolein to fully degrade or dissipate from treated water (see **Exhibit 6** [NOAA letter stating that a 10-day holding period is necessary]); see also DEIR, App. E (8/4/05 letter from NOAA)), the elimination of this measure altogether without additional analysis is completely inappropriate. Napa Citizens for Honest Gov't v. Napa County Bd. of Supervisors, 91 Cal. App. 4th 342, 358-359 (2001); Lincoln Place Tenants Ass'n v. City of Los Angeles, 130 Cal. App. 4th 1491, 1509 (2005). The removal of this mitigation must be accompanied by a determination in the EIR, based on substantial evidence, that the measure is infeasible.[4] Lincoln Place, 130 Cal.App.4th at 1509.

Although the DEIR does not address glyphosate use, the IS/ND earlier indicated that glyphosate treated water flows uncontrolled into natural rivers and creeks. As described

[4]Although the original project approval was set-aside, effectively nullifying the mitigation upon which it was based, the District has chosen to proceed as though only the groundwater aspect of its prior analysis was invalidated. Because it is relying on its prior finding that the BMPs are sufficient to ensure no impacts to natural creeks and rivers, it must justify the removal of this BMP in the current EIR. In the alternative, the District is required to prepare a supplemental EIR to analyze this significant change to the Project. Eller Media Co. v. Cmty. Redevelopment Agency, 108 Cal.App.4th 25, 39-40 (2003).

above, glyphosate is harmful to aquatic life and has been found to contaminate rivers and streams well beyond it application window. **Exhibit 4 at 13.** The DEIR must study this potentially significant impact.

3. The DEIR Fails to Adequately Analyze Cumulative Impacts.

CEQA requires a discussion of the environmental impacts, both direct and indirect, of the proposed project in combination with all "closely related past, present and reasonably foreseeable probable future projects." CEQA Guidelines § 15355(b); see also Pub. Res. Code § 21083(b); CEQA Guidelines §§ 15021(a)(2), 15130(a), 15358. The discussion of cumulative impacts must "reflect the severity of the impacts and the likelihood of their occurrence" (CEQA Guidelines § 15130(b)), and must document its analysis with references to specific scientific and empirical evidence. Mountain Lion Coalition v. California Fish & Game Comm'n, 214 Cal.App.3d 1043, 1047, 1052 (1989).

The DEIR provides only the most perfunctory discussion of cumulative impacts and fails to address the full impacts of both the proposed project and other projects in the vicinity. Among other deficiencies, the DEIR fails to address the historical impacts of pesticide spraying on the irrigation canals, the natural waters that it will impact, and the biological resources that currently rely or historically relied on the irrigation canals. With the exception of its cursory discussion of cumulative impacts to groundwater, the DEIR also fails to provide any evidence about the combined effect of spraying planned not just by the Turlock Irrigation District and those listed in the cumulatives analysis, but also any other irrigation and flood control districts that are currently seeking planning pesticide programs in the San Joaquin Valley.

Nor does the DEIR discuss cumulative impacts to sensitive species, such as salmon, for which the San Joaquin River serves as habitat. These species are already severely impacted by pesticide use up and down the Delta, yet the DEIR fails to acknowledge the potential impacts of this project on these species.

D. The DEIR Does Not Contain a Mitigation Monitoring Program.

The DEIR states that no mitigation for potentially significant impacts is necessary, but fails to acknowledge that BMPs are mitigation measures. As a result, there is no enforceable mechanism to ensure that the BMPs will be implemented and effective. CEQA requires agencies to adopt a mitigation monitoring and reporting program at the time a project is approved. Pub. Resources Code § 21081.6. The purpose of mitigation monitoring is to "ensure compliance during project implementation." Id. The DEIR did not contain a description of the mitigation monitoring plan and it has not otherwise been provided to the public. The District cannot certify an EIR until it first prepares a mitigation monitoring and reporting program for its BMPs and allows the public an adequate opportunity to review and comment on that document.

CONCLUSION

As detailed above, the DEIR fails to comply with CEQA's most fundamental requirements for the disclosure and mitigation of the significant impacts of the Pesticide Program. Until the District prepares and recirculates an EIR that addresses the project's impacts, the Pesticide Program cannot be approved.

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP

Jenny Harbine

Jenny K. Harbine

cc: Sejal Choksi, San Francisco Baykeeper

Response to Shute, Mihaly & Weinberger Letter on Aquatic Pesticide Application Program Draft EIR dated November 7, 2005

1. On behalf of San Francisco Baykeeper and its Deltakeeper Chapter ("Deltakeeper"), we submit these comments to the Turlock Irrigation District ("District") on the September 2005 Draft Focused EIR ("DEIR") for its Aquatic Pesticides Program ("Program"). The District has prepared this DEIR in an attempt to comply with the court ruling setting aside its January 30, 2004 approval of the Program on the basis of a negative declaration. However, after careful review of the DEIR, we have determined that the DEIR fails to address most of the defects contained in the initial study and negative declaration ("IS/ND"). The DEIR fails to adequately analyze and mitigate numerous potentially significant impacts, and therefore fails to comply with the requirements of the California Environmental Quality Act ("CEQA"), Public Resources Code § 21000 et seq., and the CEQA Guidelines, California Code of Regulations, title 14, § 15000 et seq.) ("CEQA Guidelines").

Response: This comment sets forth the commenter's position with respect to the adequacy of the Draft EIR. The comment consists of a legal conclusion. Turlock Irrigation District (TID) disagrees with this conclusion. Because the comment does not provide specifics, no further response is required. For an explanation of the scope of the analysis in the Draft EIR, please see pages ES-1 to ES-2 and response to Shute, Mihaly & Weinberger comment 5 below. Please note that the Negative Declaration adopted by TID in January 2004 was included in and circulated with the Draft EIR (See Draft EIR, Appendix A).

2. Deltakeeper submitted comments on the IS/ND to the District dated January 21, 2004 and January 26, 2004. Those comments are in the administrative record on the IS/ND. The entire record, which is in the District' possession, is incorporated by reference herein.

Response: Ordinarily, in order to include documents in the record of proceedings for a project, a commenter must provide copies of those documents to the agency. General references to incorporated documents are insufficient. However, in this case, the comment is correct that TID has already prepared a record of proceedings for the January 2004 Negative Declaration. At the request of the commenter, the record of proceedings for that Negative Declaration will be included in the record of proceedings for this project. The record of proceedings was prepared in connection with *Deltakeeper v. Turlock Irrigation District* (Sacramento County Sup. Court No. 04CS00222).

3. CEQA provides that the minimum notice period for a DEIR submitted to the State Clearinghouse should be at least 45 days. Pub. Res. § 21091 (a). The District initially released the DEIR for public review on September 22, 2005 and indicated that the public comment period would close on November 5, 2005. Not only is November 5th a Saturday, and therefore an unlawful deadline for submitting comments, it is also only the 44th day

of the lawful review period. Code of Civil Procedure § 12. The public comment period on the DEIR cannot close before November 7, 2005.

Response: The public review period was initiated by the State Clearinghouse on September 21, 2005; therefore, a 45-day comment period was provided to the public. Comments were received from Stanislaus County on November 2, 2005, and Shute, Mihaly & Weinberger on behalf of the Deltakeeper on November 7, 2005. All of these comments have been responded to in the Final EIR.

4. Moreover, pursuant to Galante Vineyards v. Monterey Peninsula Water Management District, 57 Cal. App. 4th 13 (1997), and Public Resources Code section 21177, the District must accept comments on the DEIR up until the close of the public hearing on the Pesticide Program. Therefore, Deltakeeper reserves the right to submit further comments on the adequacy of the DEIR.

Response: If TID receives correspondence or other comments on the project prior to the close of the public hearing on the project, then TID will include all such correspondence or other comments in the record of proceedings.

5. The District improperly limited the scope of its EIR to the impact of acrolein applications to unlined canals on groundwater, apparently because it believes that the groundwater analysis is all that is required of it as a result of the court's ruling in Deltakeeper et al. v. Turlock Irrigation District., et al., (Sacramento County Superior Court No. 04CS00222). To the contrary, the court rejected the District's request to limit the remedy for its CEQA violation to requiring the District to prepare only a focused EIR studying groundwater impacts. Instead, the court set aside the aquatic pesticide program in its entirety, and the District must reapprove the Program in its entirety. See DEIR 1-2 and App. B. Even thought the District Board previously determined that there was no evidence of significant impacts when it approved the negative declaration, the District now has a new record of evidence before it. Based on this evidence, detailed below, the DEIR must analyze and mitigate potentially significant impacts to water quality and biological resources due to acrolein and glyphosate applications to its unlined and partially lined canals.

Response: TID believes the scope of the Draft EIR is appropriate. The Draft EIR focuses on potential impacts to groundwater in connection with the application of acrolein to unlined and partially lined portions of the District's canal system. This scope is consistent with the Trial Court's Ruling on Submitted Matter in *Deltakeeper v. Turlock Irrigation District* (Sacramento County Sup. (Court No. 04CS00222) (November 24, 2004).

As the text of the Draft EIR states, TID prepared the EIR to respond to the Trial Court's ruling on the Negative Declaration adopted by the District for the Aquatic Pesticide Application Program on January 30, 2004. The Court's ruling on the petition for writ of mandate concluded

that TID had to prepare an EIR to analyze the following potential impacts of the District's Aquatic Pesticide Application Program: (1) impacts to groundwater from the application of acrolein to unlined or partially lined canals, and (2) impacts from application of copper to French Pit Reservoir. A copy of the Court's ruling appears at Appendix B to the Draft EIR.

The Draft EIR does not address the second impact: impacts from application of copper to French Pit Reservoir. TID has ceased application of copper to French Pit Reservoir. TID will not resume such treatment unless the District conducts an environmental analysis in accordance with CEQA requirements.

The Draft EIR does analyze the first impact: impacts to groundwater from the application of acrolein to unlined or partially lined canals. That is the specific issue the Trial Court directed TID to consider in an EIR.

The comment requests TID to analyze impacts that were not cited by the Trial Court as requiring additional analysis. The comment states TID must reconsider all the potential impacts of the Aquatic Pesticide Application Program based on the record of proceedings currently before the District.

The District disagrees. The Court held TID should prepare an EIR analyzing the "potential for acrolein to leach into groundwater." (Court Ruling, p. 4.) The Court did not find a "fair argument" with respect to other issues, and did not direct TID to analyze other issues.

Unless a court in a CEQA case reaches an issue raised by petitioners and finds merit in it, the argument is rejected. As the Court stated in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373, 1387:

> [Public Resources Code] Section 21005, subdivision (c) [1] thus requires only that *if we find* other respects in which the EIR was defective we should describe them for the guidance of the parties. We have examined all of appellant's other contentions and find them to be *without merit*. . . . Section 21005, subdivision (c) does not require us to lengthen this opinion by addressing in detail why we *reject* appellant's other contentions.

(Italics in original.)

Public Resources Code section 21168.9 states that any court order for noncompliance with CEQA include "only those mandates which are necessary to achieve compliance with [CEQA] and only those specific project activities in noncompliance with [CEQA]"; a court order must be limited to the portion of an agency's project activity that is in noncompliance if the court finds that "(1) the portion or specific project activity or activities are severable, (2) severance will not prejudice complete and full compliance with [CEQA], and (3) the court has not found the

1/ Public Resources Code section 21005, subdivision (c), provides as follows:

> It is further the intent of the Legislature that any court, which finds, or, in the process of reviewing a previous court finding, finds, that a public agency has taken an action without compliance with [CEQA], shall specifically address each of the alleged grounds for noncompliance.

remainder of the project to be in noncompliance with [CEQA]." (Pub. Resources Code, § 21168.9, subd. (b) (emphasis added); *Anderson First Coalition v. City of Anderson* (2005) 130 Cal.App.4th 1173, 1179-1182 (upholding Trial Court's decision to sever portion of project).)

In this case, the Trial Court concluded the record contained a "fair argument" concerning the potential for groundwater impacts due to seepage from the unlined and partially lined portions of TID's canal system. The judgment directed TID to prepare an EIR analyzing this issue. The judgment does not require TID to address other potential impacts in an EIR. TID has taken this directive at face value, and has addressed the specific issue identified by the Court in the exercise of its authority under Public Resources Code section 21168.9.

The comment states the judgment set aside the Aquatic Pesticide Application Program in its entirety. That statement is incorrect. The Trial Court did sign a Modified Judgment directing TID to rescind its approval of the Aquatic Pesticide Application Program, and to not resume that program, until the District complied with CEQA. (Modified Judgment (May 19, 2005).) The modified judgment, however, authorized TID to continue acrolein treatments on the fully-lined portions of its canal system. A copy of the modified judgment is attached at Appendix F to the Final EIR.

The Modified Judgment enjoined TID from treating unlined and partially lined portions of its canal system. The Modified Judgment therefore severed portions of the project, and focused its order on only those portions for which a "fair argument" existed. No party appealed the Trial Court's exercise of its discretion under section 21168.9. The Modified Judgment is therefore binding on the parties to the *Deltakeeper* litigation.

In the Modified Judgment, the Trial Court did not allow acrolein treatment of unlined and partially lined sections of the canal system because, as set forth in the Trial Court's ruling, a "fair argument" existed that such treatment could have a significant adverse impact on groundwater. Under CEQA, on remand from the Trial Court, the scope of review may be limited to the specific issues identified by the Court that require further analysis. If issues were not raised in the prior proceeding, then they cannot be raised now. Similarly, if issues were raised in the prior proceeding, but were resolved against the petitioners, then they cannot be relitigated in a subsequent proceeding. (See *Federation of Hillside & Canyon Assns. v. City of Los Angeles* (2005) 126 Cal.App.4th 1180, 1202-1205.)

In adopting the Negative Declaration, TID concluded the project would not have a significant impact on groundwater, surface water, biological resources, or other aquatic resources. In the prior litigation, Deltakeeper stated that TID had to prepare an EIR because the record contained a "fair argument" regarding the impacts of the project. The Trial Court agreed and granted the Petition for Writ of Mandate with respect to impacts due to the potential for acrolein to leach into groundwater. The Trial Court's ruling does not state a "fair argument" existed with respect to any other impacts. In light of this fact, it was appropriate to focus the EIR on the specific issue identified by the Trial Court in its ruling.

6. The DEIR provides a legally inadequate analysis of the potential impacts of the project because it is based on an incomplete project description. "An accurate, stable and finite project description is the sine qua non of an informative and legally sufficient EIR." San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus, 27 Cal. App. 4th 713, 730 (1994), quoting County of Inyo v. City of Los Angeles, 71 Cal. App. 3d 185, 193 (1977). As a result, courts have found that even if an environmental document is adequate in all

other respects, the use of a "truncated project concept" violates CEQA and mandates the conclusion that the lead agency did not proceed in a manner required by law. San Joaquin Raptor, 27 Cal. App. 4th at 730. Furthermore, "[a]n accurate project description is necessary for an intelligent evaluation of the potential environmental effects of a proposed activity." Id at 730 [citation omitted]. The DEIR's project description does not provide sufficient information to allow for an evaluation of the project's environmental impacts.

Response: The comment states the Draft EIR contains an incomplete description of the Aquatic Pesticide Application Program, and summarizes CEQA case law addressing this subject. TID agrees with this summary of case law. However, TID disagrees with the assertion that the Draft EIR's project description is improperly truncated. The Draft EIR contains a complete description of the District's irrigation canal operations, its application of acrolein, its implementation of Best Management Practices, and its monitoring activities. (See Draft EIR, section 2.) In the *Deltakeeper* litigation, the Trial Court ruled that TID's description of the project in the Initial Study/Negative Declaration was adequate. The project description in the Draft EIR is narrower than the project description in the Initial Study/Negative Declaration because TID does not propose certain activities that were part of the Aquatic Pesticide Application Program at the time TID approved the Initial Study/Negative Declaration (specifically, copper treatment of French Pit Reservoir and the use of glyphosate as an aquatic pesticide.) Because no specifics are provided in this comment, no further response is required.

7. First, the DEIR omits entirely any discussion of glyphosate, which, as the District indicated in its IS/ND, it applies to bankside vegetation along canals and laterals. This omission is especially significant because the District has never meaningfully analyzed the environmental impacts of the surfactants, which must be used in conjunction with glyphosate. As described below, surfactants are persistent in the environment and toxic to aquatic life. The DEIR must analyze the potentially significant impacts from the District's use of this toxic chemical.

Response: TID has ceased the use of glyphosate as an aquatic pesticide. TID will not resume the use of glyphosate for aquatic weed control unless it completes an environmental review of such treatment in accordance with CEQA requirements. Because glyphosate is not part of TID's Aquatic Pesticide Application Program, it is not addressed in the EIR.

8. Further, the DEIR's description of the environmental setting is incomplete and inaccurate. CEQA requires that an EIR describe the environmental setting of a project site to provide a baseline to assess the environmental impacts of a proposed project. CEQA Guidelines § 15125. "[A]ccurate and complete information pertaining to the setting of the project and surround uses" is critical to an evaluation of a project's impact on the environment. San Joaquin Raptor/Wildlife Center v. Stanislaus County, 27 Cal. App. 4th 713, 728 (1994); see also Friends of the Eel River v. Sonoma County Water Agency, 108 Cal. App. 4th 859, 875 (2003) ("incomplete description of the Project's environmental setting fails to set the stage for a discussion of" significant effects).

Response: The comment states the Draft EIR contains an incomplete description of the environmental setting, and summarizes CEQA case law addressing this subject. TID agrees with this summary of case law. However, TID disagrees with the assertion that the Draft EIR's description of the environmental setting is inadequate. Chapter 2 of the Draft EIR includes a description of the environmental setting of the project. Additional information on the environmental setting is set forth in section 3.3.2 of the Draft EIR, and in the Negative Declaration attached at Appendix A to the Draft EIR. Because no specifics are provided in this comment, no further response is required.

9. The invalidated IS/ND identified nine special status species that may be affected by applications of pesticides to TID's canals, including the snowy egret, tri-colored blackbird, Swainson's hawk, the giant garter snake, the northwestern pond turtle, Sanford's arrowhead, the slender-leaved pondweed, Kern brook lamprey, San Joaquin roach, and the hardhead. The DEIR, by contrast, nowhere identifies or analyzes impacts to these species. Instead, the DEIR concludes without analysis that the Program will have no impact on wildlife because the unlined and partially lined canals purportedly have no natural resource value. DEIR 3-3. The DEIR contains only conclusory assertions, and no evidence, to support this claim. In fact, all of the evidence before the district suggests that the canals do have significant biological value.

Response: The comment states the Draft EIR should be revised to address the potential impacts of the Aquatic Pesticide Application Program on special status species.

The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on biological resources in the District's unlined and partially lined canals. The Draft EIR focused on the specific issues identified by the Trial Court. For further information on the scope of the analysis in the Draft EIR, please see response to Shute, Mihaly & Weinberger comment 5 above.

The Negative Declaration adopted by TID analyzed the project's potential impacts on the biological resources in the unlined and partially lined canals identified by the commenter. The Negative Declaration concluded the Aquatic Pesticide Application Program would have an insignificant impact on biological resources. (Negative Declaration, pp. 16-25 [no significant impact on special status species], 34-39 [no significant impact on biological resources].) The Trial Court did not find that the record contained a "fair argument" with respect to potential impact on biological resources in the canals from acrolein treatment. Accordingly, the District need not reconsider this issue in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. For clarification, the snowy egret and Swainson's hawk are not special status species that would be expected to occupy TID's unlined and partially lined canals. (Draft EIR; Appendix A, Negative Declaration, page 16.) The IS/ND identified eight special-status species whose range includes the project site and could potentially use the area: tricolored blackbird, Kern brook lamprey, San Joaquin roach, hardhead, western pond turtle, giant garter snake, Sanford's arrowhead, and slender-leaved pondweed. The Draft EIR does not state that TID's unlined and partially lined canals have no natural resource value. The page referenced in this comment (page 3-3) states:

> "The unlined and partially lined sections of the TID canal system do not constitute important habitat for any special status species. These canals are man-made facilities

constructed in uplands. They are designed, operated, and maintained to deliver water seasonally for irrigation of agricultural land. They are not operated and maintained to provide wildlife habitat."

As discussed in Appendix C of the Draft EIR, a biological field reconnaissance below Turlock Lake determined that TID's unlined and partially lined canals do not provide suitable habitat to sustain tricolored blackbird, Kern brook lamprey, San Joaquin roach, hardhead, western pond turtle, or giant garter snake. The unlined and partially lined canals could support Sanford's arrowhead and slender-leaved pondweed. However, based on a biological survey of the unlined and partially lined canals down-canal of Turlock Lake, these species are not present. This analysis and data confirms the conclusion set forth in the Negative Declaration.

10. The District's own consultants performed a "Canal Reconnaissance Survey" and determined that the canals contain common pondweed and California arrowhead. DEIR, App. C at 2. On this basis, the consultant further concluded that the canals could support slender-leaved pondweed and Sanford's arrowhead. Id. Indeed, the entire purpose of the aquatic pesticide program is to kill plants, so it is simply illogical to conclude that no plants exist in the treated facilities. Nonetheless, the DEIR did not disclose its consultant's conclusion or discuss the potential impacts to these sensitive species.

Response: The comment states the Draft EIR should be revised to address the potential impacts of the Aquatic Pesticide Application Program on slender-leaved pondweed and Sanford's arrowhead.

The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on biological resources in the District's unlined and partially lined canals. The Draft EIR focused on the specific issues identified by the Trial Court. For further information on the scope of the analysis in the Draft EIR, please see response to Shute, Mihaly & Weinberger comment 5 above.

The Negative Declaration adopted by TID analyzed the project's potential impacts on the biological resources in the unlined and partially lined canals identified by the commenter. This analysis addressed potential impacts to common pondweed and California arrowhead, and concluded impacts to such plants would not be significant. (See Negative Declaration, pp. 24-25.) The Trial Court did not find that the record contained a "fair argument" with respect to the project's potential impact on biological resources in the canals. Accordingly, the District need not reconsider this issue in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. As stated in Appendix C to the Draft EIR (page 3), slender-leaved pondweed and Sanford's arrowhead were not found in TID's unlined and partially-lined canals during a biological survey of these canals below Turlock Lake. This information and data confirms the conclusion in the Negative Declaration that impacts to these species would not be significant. (Negative Declaration, pp. 24-25.) Because of the way they are operated and maintained, these canals do not provide important habitat to sustain these sensitive species or other aquatic plants. The canals are intermittently dry for up to several months each year, substantially inhibiting the development of aquatic plants. In addition, aquatic vegetation is systematically and regularly removed from the canals so that it does not interfere with the movement of water. Aquatic vegetation inhibits the movement of water thus interfering with TID's principal mission of delivering irrigation water in a timely and water-efficient manner. In addition, aquatic vegetation

can cause safety problems by creating obstructions in the canals leading to overtopping, which causes flooding of adjacent lands and can physically damaging the canals. As described in Chapter 4 of the Draft EIR (section 4.1, page 4-1), aquatic vegetation is removed from the unlined and partially lined canals by mechanical means under the No Project Alternative. Because the canals are intermittently dry each year and aquatic vegetation is systematically removed from them, the canals do not provide important habitat for aquatic plants with or without the Aquatic Pesticide Application Program. Modifying the District's maintenance and operating procedure to promote the development of a well-established and diverse plant community is inconsistent with the function of these canals which is the timely and water-efficient delivery of irrigation water. Biological resources present in the unlined and partially lined canals are incidental to the primary use of these canals.

11. Sensitive fishes, such as the Kern brook lamprey, San Joaquin roach, and the hardhead also exist in project area. As the comments of Diane Renshaw, an expert ecologist, demonstrate, irrigation canals can contain fish and provide substantial riparian habitat for terrestrial species. Renshaw at 2, attached to SMW's 1/26/04 letter. The trial court's ruling recognized that "native fish species may occupy some of the water conveyance facilities." DIER, App. B at 4. Moreover, the District's own consultants admonished the District to conduct surveys to determine the presence or absence of riparian habitat and sensitive species, including fish.

Response: The comment states the Draft EIR should be revised to address the potential impacts of the Aquatic Pesticide Application Program on sensitive fish species.

The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on biological resources in the District's unlined and partially lined canals. The Draft EIR focused on the specific issues identified by the Trial Court. For further information on the scope of the analysis in the Draft EIR, please see response to Shute, Mihaly & Weinberger comment 5 above.

The Negative Declaration adopted by TID analyzed the project's potential impacts on the biological resources in the unlined and partially lined canals identified by the commenter. The Trial Court did not find that the record contained a "fair argument" with respect to the project's potential impact on biological resources in the canals. Accordingly, the District need not reconsider this issue in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. TID's irrigation canals are not operated or maintained to sustain plant and wildlife communities. TID's canal system is drained each year. Therefore, it is not possible for fish to complete their life cycles in the canals so those canals cannot provide important habitat for any fish species. TID removes vegetation from the banks of the unlined and partially lined canals on a regular and systematic basis; therefore, it is not possible for "substantial riparian habitat" to develop along the canals. This conclusion is consistent with the analysis set forth in the Negative Declaration. (See Negative Declaration, pp. 22-23 [canal system does not contain suitable habitat for fish species].)

The consultant recommendation for fish surveys referenced in this comment was for French Pit Reservoir and not TID's irrigation canals downstream of that reservoir. Because TID has stopped using copper in French Pit Reservoir, there is no need for fish surveys there. TID conducted a biological survey of its unlined and partially lined canals below Turlock Lake. The results of that

survey are provided in Appendix C of the Draft EIR. The fish species identified by the commenter were not observed during this survey.

The commenter states the Trial Court found the water conveyance systems may contain native fish species. This finding is quoted out of context. The Trial Court's reference to native fish species addressed that portion of the District's program involving copper treatment of French Pit Reservoir. French Pit Reservoir is located approximately seven canal miles above Turlock Lake. Copper treatment of French Pit Reservoir is no longer part of the District's Aquatic Pesticide Application Program.

12. Moreover, the plant species that the Program is designed to eliminate – Pondweed (family *Potamogetonaceae*) (DEIR 2-5) – itself provides biological value. According to the U.S. Army Corps of Engineers, Pondweed "provides benefits by providing shelter and structure for fish and is a food source for a variety of waterfowl and shorebirds, which provide habitat for fish." **Exhibit 1**.

Response: The comment states the Draft EIR should be revised to address the potential impacts of the Aquatic Pesticide Application Program on common pondweed in TID's unlined and partially lined canals. This is not the special-status slender-leaved pondweed mentioned in Shute, Mihaly & Weinberger comment 10 above.

The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on common pondweed. The Draft EIR focused on the specific issues identified by the Trial Court. For further information on the scope of the analysis in the Draft EIR, please see response to Shute, Mihaly & Weinberger comment 5 above.

The Negative Declaration adopted by TID analyzed the project's potential impacts on the biological resources in the unlined and partially lined canals identified by the commenter. The analysis concluded that the unlined and partially lined canals have limited value as riparian habitat. (Negative Declaration, p. 38.) The Trial Court did not find that the record contained a "fair argument" with respect to the project's potential impact on biological resources in the canals. Accordingly, the District need not reconsider this issue in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. TID's unlined and partially lined canals are drained annually and left intermittently dry for up to several months each year. The canals are regularly and systematically cleaned of vegetation throughout the year. These operating and maintenance practices make the establishment of stable and complex plant and animal communities impossible. While some aquatic plants, such as pond weed, can be persistent, TID controls their growth and spread in the unlined and partially lined canals because if they develop into mature stands or mats of vegetation they impede the flow of water which interferes with TID's principal mission of timely and water-efficient delivery of irrigation water. Because TID's operating and maintenance program is designed to control aquatic plants, they do not mature into well-established stands of vegetation and therefore do not provide a base for the development of complex fish and wildlife communities. As explained in the Draft EIR, these operating and maintenance procedures would continue with or without the Aquatic Pesticide Application Program (see page 4-1 of the Draft EIR). As explained in the response to Shute, Mihaly & Weinberger comment 10, above, modifying the District's maintenance and operating procedures to promote the development of a well-established and diverse plant community is inconsistent with the function of these canals, which is the timely and

water-efficient delivery of irrigation water. The presence of plants inhibits the movement of water and can impede the District's ability to deliver water in a timely and water-efficient manner. Plant growth can create safety hazards by creating obstructions, which increases the risk of overtopping or breaching canal banks. In addition, the presence of plant material in irrigation water can clog advanced irrigation systems.

13. Further, the DEIR makes no mention of the beneficial uses of its irrigation canals, which will almost certainly be impaired by the application of pesticides. These canals are waters of the United States and of the state. Headwaters, Inc. v. Talent Irrigation District, 243 F.3d 526 (9th Cir. 2001). Under the "tributary rule," beneficial uses that apply to water bodies that are specifically identified in the Water Quality Control Plan ("Basin Plan") for the region also apply to tributaries to those waters. Cal. Code Regs., tit. 23, § 3940(d). The Basin Plan identifies beneficial uses of the waters to which the irrigation canals are tributary, such as the Tuolumne and San Joaquin Rivers as agricultural, recreational, freshwater habitat, spawning habitat, and migration. Moreover, all water bodies that do not have officially designated beneficial uses are automatically assigned a "Municipal and domestic Supply" (MUN) designation. Thus, because the irrigation canals are designated for a variety of uses that include recreation and spawning habitat, the project's proposed pesticide application on canal waters directly impacts the viability of these uses. In addition, beneficial uses always include "existing uses" of the water body. 40 C.F.R. §§ 131.3(e), 131.10(g-h). Irrigation canals are often used for fishing and swimming, regardless of whether or not the District discourages such uses. All of these beneficial uses must be protected. The DEIR fails to acknowledge such beneficial uses and therefore fails to evaluate the impacts of the project on the beneficial uses of the canals.

Response: The comment states the Draft EIR should be revised to set forth the beneficial uses of water in the canal, and to analyze the project's impacts on those beneficial uses.

The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on the beneficial uses cited by the comment. The Draft EIR focused on the specific issues identified by the Trial Court. For further information on the scope of the analysis in the Draft EIR, please see response to Shute, Mihaly & Weinberger comment 5 above.

The Negative Declaration adopted by TID analyzed the project's potential impacts on beneficial uses of the canal, including the beneficial uses identified by the commenter. The Trial Court did not find that the record contained a "fair argument" with respect to the project's potential impact on beneficial uses. Accordingly, the District need not reconsider this issue in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District refers the commenter to the Negative Declaration adopted by the District in 2004, which includes a discussion of this issue raised in this comment. The discussion appears at Exhibit C to the Negative Declaration. (See responses to DeltaKeeper comments, January 28, 2004, pp. 4-5; responses to DeltaKeeper comments, January 21, 2004, pp. 2-3.)

14. If the District intends to apply acrolein to its unlined canals, it must first obtain an exemption from the discharge limitations established by the U.S. Environmental Protection Agency's numeric criteria for priority toxic pollutants in California (also known as the "CTR" or the "California Toxics Rule") and the State Board's Policy for Implementation of the CTR. 40 C.F.R. § 131.38. Indeed, obtaining an exemption from

water quality standards was what prompted the District to do CEQA review of its Program in the first instance. These water quality standards, designed to protect the environment are established for acrolein at 21, 320 and 780 parts per billion ($\mu g/l$). **Exhibit 2 at 121 (Fact Sheet, Water Quality Order No. 2004-0009-DWQ).** The District proposes to apply acrolein in concentrations of up to 15 parts per million ("ppm"), which is as much as 714 times the level permitted by the water quality standards. DEIR at 2-6. The exceedence of water quality standards itself is a significant impact that must be analyzed in the EIR. See CEQA, App. G. This dramatic exceedence of water quality standards also demonstrates the potential harm to species and habitat that may be present in the irrigation canals when pesticides are applied.

Response: The comment states the Draft EIR should be revised to address water quality criteria set forth in the California Toxics Rule. The California Toxics Rule does not apply to groundwater.

The Trial Court's ruling did not direct the District to prepare an EIR to address the project's impact on water quality in TID's canals. The Trial Court did not find that the record contained a "fair argument" with respect to this issue. Accordingly, the District need not reconsider this issue in the context of the Draft EIR. The Draft EIR focused on the specific issues identified by the Trial Court. For further information on the scope of the analysis in the Draft EIR, please see response to Shute, Mihaly & Weinberger comment 5 above.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District refers the commenter to the Negative Declaration adopted by the District in 2004, included in the Draft EIR as Appendix A, which includes an analysis of the issue of water quality impacts in the District's canals. The Negative Declaration concluded the project would have a less-than-significant impact with respect to potential violations of water quality standards. (Draft EIR, Appendix A; see Negative Declaration, pp. 44-48.)

In addition, although the District need not consider issues other than those identified in the Court's Ruling on Submitted Matter, the District refers the commenter to the General Permit and the "Fact Sheet" for the adoption of that General Permit by the State Water Resources Control Board (CWRCB). Although the California Toxics Rule ("CTR") includes numeric criteria for acrolein, the "Fact Sheet" explains:

> Title 40, CFR section 122.44 states that if a discharge causes, has the reasonable potential to cause, or contributes to an excursion (Reasonable Potential) of a numeric or narrative water quality criterion, the permitting authority must develop effluent limits as necessary to meet water quality standards. Title 40, CFR section 122.44(k)(3) allows these effluent limits to be requirements to implement BMPs if numeric effluent limits are infeasible. It is infeasible for the State Water Board to establish numeric effluent limitations in this General Permit because:
>
> 1. The application of aquatic pesticides is not necessarily considered a discharge of pollutants according to the *Talent* decision. The regulated discharge is the discharge of pollutants associated with the application of aquatic pesticides. These include over-applied and misdirected pesticide product and pesticide residue. At what point the pesticide becomes a residue is not precisely known and varies depending on such things as target weed, water chemistry, and

flow. Therefore, in the application of aquatic pesticides, the exact effluent is unknown;

2. It would be impractical to treat the numerous short duration intermittent pesticide releases to surface waters from many different locations; and
3. Treatment, in many cases, may render the pesticide useless for aquatic weed control. (SWRCB Fact Sheet, page 9.)

The General Permit adopted by the SWRCB adopts narrative effluent limitations applicable to these exceptions, in lieu of the numeric standards set forth in the CTR.

In order to qualify for an exception under the General Permit, the discharger (here, the District) must comply with the narrative standards. The narrative standards are set forth in section D of the General Permit. The District's Aquatic Pesticide Application Program incorporates the SWRCB's narrative standards into the project as BMPs. (See Draft EIR, §§ 2.4.4, 2.4.5.) Thus, the numeric standards cited by the comment are inapplicable to the District's Aquatic Pesticide Application Program.

15. The DEIR fails to provide any information about the impacts of Magnacide H other than its potential to leach to groundwater. Instead, the DEIR seems to assume that because Magnacide H has been registered by the United States EPA and approved by the California Department of Pesticide Regulation ("DPR"), it will have no impacts on the aquatic resources at stake. DEIR at 2-4. As we noted in our January 21, 2004 comments on the District's initial study and negative declaration for the Program, the District's approach is not sound. As one expert stated in comments to the State Water Quality Control Board during its consideration of the impacts of pesticide use:

"A critical review of the process used by the US EPA Office of Pesticide Programs (OPP) in registering pesticides shows that, while the US EPA requires that pesticides be evaluated with respect to their toxicity to some forms of aquatic and terrestrial life, there is no requirement to evaluate the fate, transport and impacts on non-target organisms associated with pesticides used in accordance with the label restrictions. Further, the US EPA OPP includes a variety of factors in its registration of pesticides, such as economic considerations and their assessment of the benefits of using the pesticide, versus not using it. The US EPA OPP allows for adverse impacts to non-target organisms, provided that this impact is considered by the OPP to be of acceptable significance.

It is important to understand that a registered pesticide for aquatic application is not adequately evaluated as part of registration with respect to its potential to be adverse to non-target aquatic life outside of the zone of application (treatment area). This situation mandates that the local agency (in California, the Regional Boards) responsible for protection of water quality from the adverse impacts of registered pesticides used in accordance with the label requirements, require evaluation of the pesticide's impacts on water quality and beneficial uses with respect to the site-specific conditions of the use. This evaluation requires a comprehensive, detailed monitoring program associated with each application, to determine whether the application causes violations of Clean Water Act requirements for the control of toxicity and other adverse impacts on the beneficial uses of the water body receiving the pesticide application and other water bodies connected to this water body."

Lee, G.F., "Comments on SWRCB November 26, 2003, Preliminary Draft Water Quality Order No. 2004-_-DWQ State General National Pollutant Discharge Elimination System Permit for Discharge of Aquatic Pesticides for Aquatic Weed Control in Irrigation Systems, Drinking Water Canals, and Surface Water Impoundments that are Waters of the United States," submitted to CA State Water Resources Control Board, by G. Fred Lee & Associates El Macero, CA December (2003) (hereinafter "Lee 2003") (submitted with SMW's 1/21/04 comments on the IS/ND).

Response: The comment states the Draft EIR should analyze the impacts of acrolein on aquatic resources. The comment states the Draft EIR appears to assume that the Aquatic Pesticide Application Program will not have an adverse impact on aquatic resources because acrolein has been registered by the U.S. Environmental Protection Agency.

The comment is correct that the Draft EIR did not analyze the impacts of acrolein on aquatic resources (other than the potential for acrolein to leach into groundwater from unlined and partially lined canals). The reason the Draft EIR focused on this issue is that the Trial Court's ruling did not direct the District to prepare an EIR to address the project's impact on water quality. The Draft EIR focused on the specific issues identified by the Trial Court. For further information on the scope of the analysis in the Draft EIR, please see response to comment Shute, Mihaly & Weinberger comment 5 above.

The District has considered the project's potential to have an adverse impact on aquatic resources. The Negative Declaration adopted by the District analyzed the potential to cause such impacts. The Negative Declaration concluded the project would have a less-than-significant impact with respect to impacts on such resources. The Negative Declaration reached this conclusion because, among other things, the District would apply acrolein in accordance with label instructions. (Negative Declaration, p. 45.) The Draft EIR included the Negative Declaration. (See Draft EIR, Appendix A.) The Trial Court did not find that the record contained a "fair argument" with respect to this issue. Accordingly, the District need not reconsider this issue in the context of the Draft EIR.

Although the Draft EIR need not reconsider potential impacts other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment.

The comment states the District cannot cite to the pesticide registration process in support of the conclusion that application in accordance with labeling instructions will not result in significant adverse impacts on aquatic resources and wildlife, citing *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099 and *Communities for a Better Environment v. Resources Agency* (2002) 103 Cal.App.4th 98.

In *Protect the Historic Amador Waterways*, the Court stated significance thresholds "cannot be used to determine automatically whether a given effect will or will not be significant. . . . [¶] . . . Thus, in preparing an EIR, the agency must consider and resolve every fair argument that can be made about the possible significant environmental effects of a project, irrespective of whether an established threshold of significance has been met with respect to any given effect. Once the agency has determined that a particular effect will not be significant, however, the EIR need not address that effect in detail. Instead, the EIR need only 'contain a statement briefly indicating the reasons for determining that various effects on the environment of a project are not significant and consequently have not been discussed in detail in the environmental impact

report.' ([Pub. Resources Code,], § 21100, subd. (c); see also [CEQA] Guidelines, § 15128.)" (116 Cal.App. at pp. 1108-1109; see also *Communities for a Better Environment*, *supra*, 103 Cal.App[.4th at p. 114.)

In this case, the District's analysis of the project's impact on aquatic resources is set forth in the Negative Declaration and in the responses to comments on the Negative Declaration. The District's significance thresholds for aquatic resources are based on Appendix G to the State CEQA Guidelines. Among other things, the significance thresholds consider whether the project would "[h]ave a substantial adverse effect, either directly or through habitat modification," on special-status species, "[h]ave a substantial adverse effect on any riparian habitat or other sensitive natural community," or "[v]iolate any water quality standards or waste discharge requirements." (Negative Declaration, pp. 34, 43.)

The Negative Declaration analyzes whether the project will result in a significant impact on aquatic resources in light of these significance thresholds. In performing this analysis, the Negative Declaration notes that acrolein will be applied in accordance with label instructions. (See Negative Declaration, pp. 35, 45.) The project description requires following label instructions in the application of acrolein. (Draft EIR, p. 2-4.) The BMPs incorporated into the project also require the District to follow label instructions. (Draft EIR, p. 2-7.)

The Negative Declaration does not rely exclusively on compliance with label instructions to conclude the project will not result in an adverse impact on aquatic resources. Rather, compliance with label instructions is noted as one factor, among several, in reaching this conclusion. (See Negative Declaration, responses to comments of Central Valley Save Environment Network, January 21, 2004, p. 3.) This conclusion is appropriate. Pesticide label instructions and registration requirements developed by the U.S. Environmental Protection Agency and the California Department of Pesticide Registration are developed in order to address, among other things, the potential effects of the pesticide on the environment. Compliance with these requirements constitutes substantial evidence that adverse impacts will not occur with respect to such use. (See *Ebbetts Pass Forest Watch v. Department of Forestry and Fire Protection* (2004) 123 Cal.App.4th 1331.)

TID's unlined and partially lined canals do not provide suitable habitat to sustain the tricolored blackbird, western pond turtle, giant garter snake, Kern brook lamprey, San Joaquin roach, and hardhead. (See Appendix C of Draft EIR; see also Draft EIR, Appendix A, Negative Declaration, pp. 22-24.) Tricolored blackbirds and giant garter snakes rely upon dense cattails and tules for cover and reproduction. The unlined and partially lined canals are systematically and regularly maintained to remove cattails and tules and dense stands of this vegetation are not present in the canals. Maintenance activities to remove this vegetation would continue with or without the Aquatic Pesticide Application Program. Pond turtles require sandy soils for nesting and they need structures such as logs and rocks for basking. Sandy soils and basking structures are not present along or within the unlined and partially lined canals. The principal foods for the giant garter snake, fish and amphibian species, also do not exist in adequate abundance within the TID canals to support populations of this snake. The Kern brook lamprey, San Joaquin roach, and hardhead rely upon a year-round source of freshwater for normal life cycle events. Because the canals are drained each year, they cannot support the full life cycles of these species.

Because TID's unlined and partially lined canals are operated and maintained to deliver irrigation water on a seasonal basis, they do not support mature, complex plant and animal

communities. The canals are intermittently dry for up to several months every year and vegetation is regularly and systematically removed. Vegetation would continue to be removed from the unlined and partially lined canals throughout the year with or without the Aquatic Pesticide Application Program. For these reasons, it is very unlikely that any plant, fish, or wildlife species can dependably complete their life cycles in the canals. Therefore, the canals are not important for the maintenance of plant, fish, or wildlife populations in the project area, including the slender-leaved pondweed and Sanford's arrowhead. In addition, no slender-leaved pondweed and Sanford's arrowhead were identified in the unlined and partially lined canals during a biological survey of these canals below Turlock Lake (see Appendix C of Draft EIR).

TID's unlined and partially lined canals are man-made structures built in upland soils. The aquatic habitat that is present is only there because TID operates and maintains the canals on a continuous basis. If TID were to cease delivering irrigation water or were to use another method of delivery, and the canals were abandoned, then the canals would revert back to upland habitat within a year or two and the aquatic habitat would no longer be present. Moreover, as explained above, the canals do not provide significant aquatic habitat.

16. Thus, compliance with EPA registration requirements does not demonstrate that Magnacide H will not have any significant impacts on the aquatic resources and wildlife of the canals. Indeed, the California Courts have specifically determined that compliance with the regulatory standards of another agency does not demonstrate that a project will not have a significant effect on the environment. Protect The Historic Amador Waterways v. Amador Water Agency, 116 Cal. App. 4th 1099, 1109 (2004); Communities for a Better Environment v. Resources Agency, 103 Cal. App. 4th 98 (2002).

Response: Please see response to Shute, Mihaly & Weinberger comment 15.

The comment states the U.S. Environmental Protection Agency's pesticide registration program does not consider certain potential impacts of pesticide use on the environment. Pesticides used in California are also subject to the registration requirements adopted by the Department of Pesticide Registration. This program is a "certified regulatory program," and compliance with this program is equivalent to CEQA review. (See CEQA Guidelines, § 15251, subd. (i).) In registering pesticides for use in California, DPR evaluates the impacts of pesticides on the total environment, including impacts on water quality. (*City of Sacramento v. State Water Resources Control Board* (1992) 2 Cal.App.4th 960, 973.) Thus, the statement that the pesticide registration process ignores impacts on non-target species is incorrect.

17. There is no dispute that Magnacide H is highly toxic to fish and other species even at very low levels. The Initial Study conceded that the proposed application of aquatic pesticides could cause potential adverse effects to nine different special-status species, including "loss of foraging or breeding habitat due to removal of aquatic vegetation, disturbance of nesting or breeding habitat during application of the treatments, or mortality and/or reduced survival of individuals caused by exposure to toxic concentrations of chemicals associated with the treatments." The DEIR failed to analyze any of these potentially significant impacts.

Response: The Negative Declaration adopted by the District analyzed the project's potential impacts on the eight special-status species that could have any potential to be present in the project area. The Negative Declaration concluded the project would have a less-than-significant

impact on special status species].) The Draft EIR included the Negative Declaration. (See Draft EIR, Appendix A.) The Trial Court did not find that the record contained a "fair argument" with respect to these impacts. Accordingly, the District need not reconsider this issue in the context of the Draft EIR. Also, please see the response to Shute, Mihaly and Weinberger comments 9 and 11 above.

18. The District proposes several best management practices ("BMPs") associated with acrolein applications. DEIR at 2-8. Only one of these addresses impacts to biological resources within the canals: annual training of District personnel in identifying special-status species. Id. Although this BMP requires pesticide applicators to document any such species found, they are not required to proactively survey the treated facilities for special-status species. Moreover, even if species are documented, the BMP only requires that pesticide applications be postponed until impacts are evaluated. Id. It does not require that any measures be taken to ensure that special-status species are not harmed by the pesticides. This BMP is facially inadequate to protect species within and near the canals.

Response: TID pesticide applicators are qualified to determine the presence or absence of a special-status species prior to application of acrolein; therefore, additional pre-application surveys are not necessary. In the event that a threatened and endangered species is present in the proposed treatment area, application of acrolein would be postponed until potential impacts to the threatened and endangered species are evaluated by TID. That evaluation would include consultation with the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG) if a California-listed species is involved. In the event that the evaluation concludes that the application of acrolein could result in a take, TID would seek a permit for that take from the USFWS and CDFG (if appropriate) before treating the canal section in question.

Available information indicates that special-status species are not present in the canals. The BMP cited by the commenter is a means of providing further assurance that significant impacts to special-status species will not occur.

19. Because the DEIR does not acknowledge the District's use of glyphosate, it also fails to discuss the pesticide's significant impacts. Glyphosate and its associated surfactant (in the case of Roundup, the surfactant is POEA) can have lethal and sublethal effects on aquatic and terrestrial species. As detailed in the attached scientific articles by Dr. Rick A. Reyla, surfactants are lethal to amphibians, even when used in accordance with label instructions. See **Exhibit 3.** Glyphosate-containing herbicides may also cause genetic damage in fish. **Exhibit 4 at 14; see also Exhibit 5.**

Further, the purpose of the District's glyphosate applications is to eliminate bankside vegetation. This vegetation provides cover, nesting and foraging habitat for birds and terrestrial species, which will be clearly harmed by its removal. See Renshaw at 3. All of these potentially significant impacts must be studies in the DEIR.

Response: The comment states the Draft EIR should analyze the impacts of glyphosate and its associated surfactant on bankside vegetation and aquatic resources. The project addressed in the Negative Declaration and the Draft EIR is the Aquatic Pesticide Application Program. These CEQA documents have been prepared in support of TID's application of aquatic pesticide under the Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Discharge of Aquatic Pesticides for Aquatic Weed Control in Irrigation Systems, Drinking Water

Canals, and Surface Water Impoundments that are Waters of the United States. TID no longer uses glyphosate as an aquatic pesticide in the water column of its irrigation canals. Because it is not used by TID as an aquatic pesticide, it does not need to be addressed in the Draft EIR. In the event that TID chooses to use glyphosate as an aquatic pesticide, the proposed action would be addressed by an environmental review in accordance with CEQA requirements.

20. The DEIR indicates that the irrigation canals drain into the Merced, Tuolumne, and San Joaquin Rivers. DEIR at 2-2. The DEIR fails altogether to analyze the Program's impacts to these rivers and the aquatic species within them. The DEIR does, however, list several BMPs apparently designed to mitigate such impacts. DEIR at 2-8. In the case of acrolein, these BMPs include: (1) closing gates at release locations prior to treatment; (2) making arrangements to "irrigate out the treated water"; and (3) conducting the "Magnacide H Baker Petrolite Field Test: at lease locations. Id. Evidence suggests that these precautions alone are not sufficient to prevent any adverse impacts to the above waters and their beneficial uses.

Response: The comment states the Draft EIR should be revised to address the project's impacts to water quality in the Merced, Tuolumne, and San Joaquin rivers. The comment also states that evidence suggests that proposed BMPs are not adequate to prevent adverse impacts to these rivers.

The Trial Court's ruling did not direct the District to prepare an EIR to address the project's impact on the water quality of these rivers. The Draft EIR focused on the specific issues identified by the Trial Court. For further information on the scope of the analysis in the Draft EIR, please see response to comment Shute, Mihaly & Weinberger comment 5 above.

Below Fremont Ford, water quality generally improves at successive confluences with tributary rivers, particularly at those with the Merced, Tuolumne, and Stanislaus rivers. However, in the relatively long reach between the Merced and Tuolumne rivers, mineral concentrations tend to increase due to agricultural drainwater return flows, other wastewater discharges, and groundwater discharges into the river (U.S. Bureau of Reclamation, Central Valley Project Improvement Act Programmatic Draft Environmental Impact Statement, July, 2000).

Section 303(d) of the Clean Water Act requires states to identify and include on the 303(d) list water bodies that are threatened or are not meeting water quality standards despite controls on point source discharges. Pollutants listed for water bodies within the San Joaquin River Basin and downstream of aquatic pesticide treatment areas are shown in the table below.

Impaired Water Bodies and Listed Pollutants

Water Body	Pollutant/Stressor	Potential Source
Lower Merced River	Chlorpyrifos	Agriculture
	Diazinon	Agriculture
	Group A Pesticides	Agriculture
San Joaquin River from Merced River to South Sacramento-San Joaquin River Delta Boundary	Boron	Agriculture
	Chlorpyrifos	Agriculture
	DDT	Agriculture

River Delta Boundary	Diazinon	Agriculture
	Electrical Conductivity	Agriculture
	Group A Pesticides	Agriculture
	Mercury	Resource Extraction
	Unknown Toxicity	Source Unknown
Tuolumne River from Don Pedro Reservoir to San Joaquin River	Diazinon	Agriculture
	Group A Pesticides	Agriculture
	Unknown Toxicity	Source Unknown
Harding Drain	Diazinon	Agriculture
	Chlorpyrifos	Agriculture
	Ammonia	Agriculture, Municipal
	Unknown Toxicity	Source Unknown

Source: Central Valley Regional Water Quality Control Board. 2002. Clean Water Act Section 303(d) list of water quality limited segments. Approved by U.S. Environmental Protection Agency in July 2003.

DDT = dichlorodiphenyltrichloroethane

Water quality sampling is performed by TID in accordance with the Statewide General NPDES Permit. Evaluation of the information obtained through the monitoring program, including sampling and analysis, indicates that TID has not discharged acrolein to the Merced, Tuolumne, or San Joaquin rivers.

The label directions for the application of Magnacide H state: "Water treated with Magnacide H herbicide must be used for irrigation of fields, either crop bearing, fallow or pasture, where the treated water remains on the field OR held for 6 days before being released into fish bearing waters or where it will drain into them." (See Appendix D of Draft EIR.) TID conducts its pesticide application program so that all of the water containing Magnacide H is irrigated out to farm fields.

As described in section 2.4.2 of the Draft EIR (pages 2-4 and 2-5), TID has conducted dye-tracing studies to determine how water flows within its canal system. These studies together with hydrologic calculations are used to determine when Magnacide H has been irrigated out of the system. Flow times have been developed based on these studies and calculations, and are used by TID's field staff as a guideline for canal operations. Monitoring data collected as a requirement of the use of the pesticide, as well as field test kit information, is used to verify the accuracy of these flow times. Only when enough time has passed and after enough water has been irrigated out of the system, does TID allow water to be discharged from the canal system. As an additional precaution, TID closes the gates at all potential release points down-canal of the point of application, and checks to ensure the gates are not leaking prior to treatment. The gates are kept closed until Magnacide H applied to the irrigation water has been irrigated out of the canal system and is therefore no longer present in the system.

The commenter states there is evidence that these precautions are insufficient to avoid adverse impacts to the rivers identified by the commenter. No evidence is provided in support of this statement.

21. First, as noted by the National Oceanic and Atmospheric Administration ("NOAA") in its comments on the IS/ND, "the control structures on the irrigation channels are not water tight and that there is the potential for some treated water to pass over or through the irrigation system." **Exhibit 6** (letter from NOAA on IS/ND). Additional evidence submitted with our January 21, 2004 comments on the IS/ND, which the District has in its possession, demonstrate that similar gates in other irrigation systems have been known to leak. The District must establish a monitoring program to systematically and frequently test its gates for leaks. Simply stating that it will "verify that gates [are] … not leaking prior to treatment" does not ensure adequate and enforceable monitoring.

Response: The Negative Declaration adopted by the District and the response to comments on the Negative Declaration addressed this issue and concluded the project would have a less-than-significant impact water quality on the Merced, Tuolumne, and San Joaquin rivers. The Draft EIR included the Negative Declaration and responses to comments on the Negative Declaration. (See Draft EIR, Appendix A; see Response to comments, Deltakeeper (1/21/04, pp. 11-12.) The Trial Court did not find that the record contained a "fair argument" with respect to this issue. Accordingly, the District need not reconsider this issue in the context of the Draft EIR. Although the District need not consider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. The District provides this information in the interest of providing a full response to this comment, even though the District need not reconsider this issue.

The comment letter provided by NOAA assumed that TID prevented the discharge of acrolein-treated water into receiving waters by holding that treated water in the District's canals for six days. This is not how TID prevents the discharge of acrolein-treated water. Treated water is irrigated out to farm fields as discussed in Section 2.4.2 of the Draft EIR and above in the response to Shute, Mihaly & Weinberger comment 20.

The BMP of closing gates and keeping them closed until Magnacide H is no longer present in the system is adequate. This BMP provides redundancy to TID's practice of irrigating out all acrolein-treated water. The irrigation system is operated so that treated water is typically irrigated out before the last gate upstream of receiving waters. Irrigation gates are regularly maintained, gates are checked for leakage prior to application, and repairs are made as necessary to protect down-canal waters when utilizing aquatic pesticides.

22. Second, the DEIR indicates that water might be "irrigated out" before gates are opened. This does not protect natural rivers and creeks because there is no guarantee that all water will be irrigated out of the system. Moreover, water contaminated with Magnacide H will contaminate soils, which in turn can lead to further water contamination due to storm water or irrigation water runoff. <u>See</u> Exhibit 1 to 1/21/04 comments of SMW.

Response: The Negative Declaration adopted by the District and the response to comments on the Negative Declaration addressed this issue and concluded the project would have a less-than-significant impact to water quality in the Merced, Tuolumne, and San Joaquin rivers. The Draft EIR included the Negative Declaration and responses to comments on the Negative Declaration. (See Draft EIR, Appendix A.) The Trial Court did not find that the record contained a "fair argument" with respect to this issue. Accordingly, the District need not reconsider this issue in the context of the Draft EIR. Although the District need not consider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following

information in response to this comment. The District provides this information in the interest of providing a full response to this comment, even though the District need not reconsider this issue.

As described in section 2.4.2 of the Draft EIR and explained in the response to Shute, Mihaly & Weinberger comments 20 and 21, TID has conducted studies to determine flow conditions in the District's canals, including dye-studies and hydrologic calculations. These studies in combination with decades of operating experience ensure that all water treated with Magnacide H is irrigated out to farm fields.

Studies have shown that acrolein applied to farm fields degrades too quickly to cause contamination of receiving waters from storm water or irrigation runoff. Laboratory and field studies have shown that major factors determining the speed at which acrolein degrades in water are pH, temperature, and TDS. As these three factors increase, acrolein degrades faster (Baker Petrolite Corporation, 2004, Magnacide H Herbicide: Summary of Environmental Impact on Groundwater, Nordone, A.J., T.A. Dotson, M.F. Kovacs, R. Doane, and R.C. Biever, 1998, The Metabolism of [^{14}C] Acrolein (Magnacide H Herbicide): Nature and Magnitude of Residues in Freshwater Fish and Shellfish [Environ. Toxicol. Chem. 17: 276-281], and Smith, A.M., J. Moa, R. Doane, and M. Kovacs, 1995, Metabolic Fate of [^{14}C] Acrolein under Aerobic and Anaerobic Aquatic Conditions [J. Agric. Food Chem. 43: 2497-2503.Smith et al. 1995]). For example, the hydration half-life of acrolein under laboratory conditions was reported as 3.5 days at pH 5, 1.5 days at pH 7, and 4 hours at pH 10 (Baker Petrolite Corporation, 2004, Magnacide H Herbicide: Summary of Environmental Impact on Groundwater). Soils in the San Joaquin Valley are typically neutral (pH 7.3) to moderately alkaline (pH 8.0). (See Professional Soil Scientists Association of California website on the history and description of the State Soil at http://www.pssac.org/stasoil2.htm.) When irrigation water is applied to a field, the temperature of the water generally increases as the water spreads out and is heated by the ground and sun. As the water flows over the fields, it picks up salts from the soil, increasing both the TDS and pH of the water. Other factors that also increase the rate at which acrolein degrades when treated water is applied to farm fields include absorption onto organic matter in the soil, microbial transformation, and mineralization.

A monitoring study was conducted in Kern County, California to measure the dissipation of acrolein across fields irrigated with treated water (Baker Petrolite Corporation, 2004, Magnacide H Herbicide: Summary of Environmental Impact on Groundwater). Both flood and furrow irrigation were investigated. In the furrow irrigation study, the acrolein concentration dropped from an initial value of 10.9 ppm to non-detectable (<10 ppb) at 600 feet down the furrow. In a flood irrigated field, the acrolein concentration dropped from the initial concentration of 4.2 ppm to non-detectable (<10 ppb) at 400 feet down the field.

23. Third, the field tests performed by the District fail to ensure that acrolein treated water will not be released to rivers and creeks at concentrations that are harmful to aquatic species and birdlife. The test kits are only accurate to 0.1 ppm; acrolein is harmful to species at levels as low as 7 ppb (μg/L – or .007 ppm). Therefore, a test kit that samples only to 0.1 ppm will not detect acrolein at concentrations which are known to be harmful. See also DEIR, App. E (8/4/05 letter from NOAA).

Response: There are no other tests available for use in the field with a lower level of detection. TID does not rely on these test results for ensuring that treated water is not discharged to down-

canal receiving waters. As described in the response to Shute, Mihaly & Weinberger comment 20 and section 2.4.2 of the Draft EIR, flow times developed on dye-tracer studies and hydrologic calculations are used by TID's field staff as a guideline for canal operations. Monitoring data collected as a requirement of the use of the pesticide, as well as the field test kit information, is used to verify the accuracy of these flow times. Only when enough time has passed and after enough water has been irrigated out of the system, does TID allow water to be discharged from the canal system. As an additional precaution, TID closes the gates at all potential release points down-canal of the point of application, and checks to ensure the gates are not leaking prior to treatment. The gates are kept closed until Magnacide H is no longer present in the system.

24. The District has also apparently removed the BMP requiring it to hold acrolein-treated water for 6 days prior to releasing it. Although Deltakeeper does not believe that 6 days is a sufficient amount of time to allow acrolein to fully degrade or dissipate from treated water (see **Exhibit 6** [NOAA letter stating that a 10-day holding period is necessary]); see also DEIR, App. E (8/4/05 letter from NOAA)), the elimination of this measure altogether without additional analysis is completely inappropriate. Napa Citizens for Honest Gov't v. Napa County Bd. Of Supervisors, 91 Cal. App. 4th 342, 358-359 (2001); Lincoln Place Tenants Ass'n v. City of Los Angeles, 130 Cal. App. 4th 1491, 1509 (2005). The removal of this mitigation measure must be accompanied by a determination in the EIR, based on substantial evidence, that the measure is infeasible. Lincoln Place, 130 Cal. App. 4th at 1509.

Response: The response to comments on the Negative Declaration addressed the issue of holding acrolein-treated water for six days. (See Draft EIR, Appendix A; response to Deltakeeper comments of January 21, 2005, page 12 and response to Shute, Mihaly & Weinberger comments of January 21, 2005, page 5.) The Trial Court did not find that the record contained a "fair argument" with respect to this issue. The District need not consider issues other than those identified in the Court's Ruling on Submitted Matter in the Draft EIR.

The BMPs evaluated in the Draft EIR include a requirement to: "Follow all pesticide label instructions" (Draft EIR page 2-7). The label for Magnacide H states: "Water treated with MAGNACIDE H Herbicide must be used for irrigation of fields, either crop bearing, fallow or pasture, where the treated water remains on the field OR held for 6 days before being released into fish bearing waters or where it will drain into them." (See specimen Magnacide H label in Appendix D of Draft EIR.) The BMPs listed in the Initial Study (section 2.2.2.2, Appendix A) are redundant because they include the requirement to follow all pesticide label instructions as well as the statement that treated water is to be held for six days prior to being released to down-canal receiving waters, which is a part of the label instructions. To minimize any confusion regarding how TID complies with the label requirements, the redundant statement that treated water is held six days prior to down-canal release was eliminated from the Draft EIR. TID irrigates out all treated water as described in section 2.4.2 of the Draft EIR. Because treated water is irrigated out of the canal system to farmland, it need not be held for six days or any other length of time. However, since the BMPs contain the requirement to comply with label instructions, they continue to include the requirement to hold treated water for six days should the District not be able to irrigate the water out onto farmland.

25. Although the DEIR does not address glyphosate use, the IS/ND earlier indicated that glyphosate treated water flows uncontrolled into natural rivers and creeks. As described above, glyphosate is harmful to aquatic life and has been found to contaminate rivers and

streams well beyond its application window. **Exhibit 4 at 13.** The DEIR must study this potentially significant impact.

Response: TID has ceased the use of glyphosate as an aquatic pesticide. TID will not resume the use of glyphosate for aquatic weed control unless it conducts an environmental review of such treatment in accordance with CEQA requirements. Because glyphosate is not part of TID's Aquatic Pesticide Application Program, it is not addressed in the EIR. Please see response to Shute, Mihaly & Weinberger comments 7 and 19.

26. CEQA requires a discussion of the environmental impacts, both direct and indirect, of the proposed project in combination with all "closely related past, present and reasonably foreseeable probably future projects." CEQA Guidelines §§ 15021(a), 15130(a), 15358. The discussion of cumulative impacts must "reflect the severity of the impacts and the likelihood of their occurrence" (CEQA Guidelines § 15130(b)), and must document its analysis with references to specific scientific and empirical evidence. Mountain Lion Coalition v. California Fish & Game Comm'n, 214 Cal. App. 3d 1043, 1047, 1052 (1989).

Response: This comment provides a description of the obligation under CEQA to address cumulative impacts. No further response is necessary.

27. The DEIR provides only the most perfunctory discussion of cumulative impacts and fails to address the full impacts of both the proposed project and other projects in the vicinity. Among other deficiencies, the DEIR fails to address the historical impacts of pesticide spraying on the irrigation canals, the natural waters that it will impact, and the biological resources that currently rely or historically relied on the irrigation canals. With the exception of its cursory discussion of cumulative impacts to groundwater, the DEIR also fails to provide any evidence about the combined effect of spraying planned not just by the Turlock Irrigation District and those listed in the cumulative analysis, but also any other irrigation and flood control districts that are currently seeking planned pesticide programs in the San Joaquin Valley.

Response: The Negative Declaration adopted by the District and the response to comments on the Negative Declaration addressed this issue and concluded the project would have a less-than-significant cumulative impact on biological resources. The Draft EIR included the Negative Declaration and responses to comments on the Negative Declaration. (See Draft EIR, Appendix A; see Negative Declaration, pp. 55-56.) The Trial Court did not find that the record contained a "fair argument" with respect to this issue. Accordingly, the District need not reconsider this issue in the context of the Draft EIR. Although the District need not consider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. The District provides this information in the interest of providing a full response to this comment, even though the District need not reconsider this issue.

As described in section 5 of the Draft EIR (page 5-1) and the response to Shute, Mihaly & Weinberger comment 22, laboratory and field studies show that acrolein degrades to levels that are less than detectable within a matter of hours after they are irrigated out to farm fields. Acrolein was found to be non-detectable in treated water that had traveled only 600 feet down the furrow in a monitoring study conducted in Kern County, California (Baker Petrolite

Corporation, 2004, Magnacide H Herbicide: Summary of Environmental Impact on Groundwater). Because acrolein degrades so quickly in the environment, its use by TID in combination with its use by other irrigation districts in the San Joaquin River drainage would not have a cumulative impact on receiving water quality.

As described in the response to Shute, Mihaly & Weinberger comment 15, TID's unlined and partially lined canals are operated and maintained to deliver irrigation water on a seasonal basis; therefore, they do not support mature, complex plant and animal communities. The canals are intermittently dry for up to several months every year and vegetation is regularly and systematically removed. Vegetation would continue to be removed from the unlined and partially lined canals throughout the year with or without the Aquatic Pesticide Application Program. For these reasons, it is very unlikely that any plant, fish, or wildlife species can dependably complete their life cycles in the canals. Therefore, the canals are not important for the maintenance of plant, fish, or wildlife populations in the project area.

TID's canals are man-made structures excavated in uplands. If they ceased to be used, they would revert to upland habitat. They have always been operated and maintained to deliver irrigation water. Therefore, the canals do not provide habitat necessary for the maintenance of regional populations of any plant, wildlife, or fish species.

28. Nor does the DEIR discuss cumulative impacts to sensitive species, such as salmon, for which the San Joaquin River serves as habitat. These species are already severely impacted by pesticide use up and down the Delta, yet the DEIR fails to acknowledge the potential impacts of this project on these species.

Response: The Negative Declaration adopted by the District and the response to comments on the Negative Declaration addressed this issue and concluded the project would have a less-than-significant cumulative impact on biological resources. The Draft EIR included the Negative Declaration and responses to comments on the Negative Declaration. (See Draft EIR, Appendix A; see Negative Declaration, pp. 55-56.) The Trial Court did not find that the record contained a "fair argument" with respect to this issue. Accordingly, the District need not reconsider this issue in the context of the Draft EIR. Although the District need not consider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. The District provides this information in the interest of providing a full response to this comment, even though the District need not reconsider this issue.

The issue addressed in the Negative Declaration and the Draft EIR is the application of acrolein. Therefore, the cumulative impact analyses provided in the Negative Declaration and the Draft EIR address the use of acrolein by TID and other irrigation districts in the San Joaquin River drainage. The cumulative impact of the past, present, and foreseeable future use of acrolein on water quality and biological resources was found to be less-than-significant. TID does not allow acrolein to be discharged down-canal into the San Joaquin River. All treated water is irrigated out into farm fields, as required by label instructions. As discussed in section 5.0 of the Draft EIR and the response to Shute, Mihaly & Weinberger comment 22, laboratory and field studies have shown that acrolein rapidly degrades in farm fields. It does not contaminate soil and result in subsequent contamination of groundwater or storm water runoff that may enter the San Joaquin River. Therefore, TID's use of Magnacide H does not cumulatively contribute to pesticide contamination in the San Joaquin River.

29. The DEIR states that no mitigation for potentially significant impacts is necessary, but fails to acknowledge that BMPs are mitigation measures. As a result, there is no enforceable mechanism to ensure that the BMPs will be implemented and effective. CEQA requires agencies to adopt a mitigation monitoring and reporting program at the time a project is approved. Pub. Resources Code § 21081.6. The purpose of mitigation monitoring is to "ensure compliance during project implementation." Id. The DEIR did not contain a description of the mitigation monitoring plan and it has not otherwise been provided to the public. The District cannot certify an EIR until it first prepares a mitigation monitoring and reporting program for its BMPs and allows the public an adequate opportunity to review and comment on that document.

Response: The Negative Declaration adopted by the District and the response to comments on the Negative Declaration addressed the issue of mitigation. The Draft EIR included the Negative Declaration and responses to comments on the Negative Declaration. (See Draft EIR, Appendix A; see responses to Deltakeeper comments 1/21/04, p. 7.) The Trial Court found that BMPs may be properly considered as part of the project and do not need to be set out as mitigation measures in a mitigated negative declaration. Accordingly, the District need not reconsider this issue in the context of the Draft EIR. Although the District need not consider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. The District provides this information in the interest of providing a full response to this comment, even though the District need not reconsider this issue.

The BMPs described in section 2.4.4 of the Draft EIR along with the monitoring and reporting program described in section 2.4.5 of the Draft EIR are part of the project and not mitigation measures. The proposed project, which includes the BMPs and monitoring and reporting program, would not result in potentially significant impacts. Therefore, mitigation measures are not required for the project and correspondingly, no mitigation monitoring program is required.

The enforceable mechanism to ensure that the BMPs are implemented is the Statewide NPDES Permit for Discharge of Aquatic Pesticides for Aquatic Weed Control in Irrigation Systems, Drinking Water Canals, and Surface Water Impoundments that are Waters of the United States. As described in section 2.4.5 of the Draft EIR, that permit requires a monitoring and reporting program for the application of aquatic pesticides. As required by the permit, TID must provide the Central Valley Regional Water Quality Control Board with an annual report on the results of the monitoring program. This report also includes an assessment of compliance with the NPDES permit, identification of BMPs and a discussion of their effectiveness, specific information on aquatic pesticide applications and the timing of gate closures and reopenings, and recommendations to improve the monitoring program, BMPs, and the aquatic pesticide application plan. Thus, TID will maintain records concerning its compliance with the BMPs, and the NPDES permit will provide an enforcement mechanism to ensure the BMPs are carried out.

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November 7, 2005

Via facsimile and email

Re: Draft Environmental Impact Report for Aquatic Pesticide Application Programs for Unlined and Partially Lined Canals.

Dear Ms. Liebersbach,

These comments are timely submitted. The Notice of Availability lists the date for close of comments as November 5, 2005, a Saturday. The statutes provide for the close of comments to be extended to the next business day, in this case Monday November 8.

We feel strongly that this DEIR is woefully inadequate for the purposes of CEQA.

What remains unaddressed in this document is the fact that the TID canals are not inaccessible holding tanks, but water ways fully available and highly impacting to both humans and wildlife. They run through populated urban areas. People do, and have for years, use the canals for fishing, swimming and other recreational uses. When the water contains acrolein, which completely removes oxygen, it has negative impacts to those people. Likewise, the wildlife and vegetation which have this water resource, are impacted. those impacts, both proposed and historical, must be addressed. Without relevant analysis and review, this document is inadequate, incomplete, and fails woefully to satisfy the legal requirements of the California Environmental Quality Act.

This document fails to adequately and specifically describe the application and disbursal of Magnacide H in the TID canal system: how much is applied, when and where; what are travel times; what is the strength at various points along the travel routes at various points, etc. This information is basic to analyzing and understanding the potential impacts of the application. Failure to provide it is a critical flaw in the draft EIR. The DEIR does not adequately describe the effects to all beneficial uses. The TID canals are waters of the United States, bringing in to the analysis a host of State and Federal regulatory and statutory requirements and considerations. These are not adequately presented in the document.

TID fails to identify wetlands habitat associated with seepage areas of unlined and partially lined canals.

This DEIR fails to address the issues raised by Central Valley Save Environment Network letter that was submitted originally, during the comment period on the Negative Declaration. Therefore, we wish to reincorporate all comment letters, expert letters, and agency letters from the Negative Declaration comment and review period.

Attachments:

- Letter of January 16, 2003 to Rudy Schnagl, Regional Water Quality Control Board regarding CEQA review of Aquatic Pesticide Application Programs.
- Letter dated July 18, 2001 to State Water Resources Control Board re: Proposed Statewide General National Pollutant Discharge Elimination System (NPDES) Permit For Discharges Of Aquatic Pesticides To Surface Waters Of The United States (General Permit).
- Letter from Central Valley Safe Environment Network.
- Portions of "Developing Water Quality Monitoring Programs Associated with the Use of Herbicides in the Control of Aquatic Weeds", by G. Fred Lee, PhD, PE, DEE and Anne Jones-Lee, PhD.
- "Avian Uses of Vernal Pools and Implications for Conservation Practice" by Joseph G. Silveira, US Fish and Wildlife Service.

We disagree with Table 3-1 (Special Status Species) because the biological surveys were inadequate.

We disagree with the following area in the CEQA Initial Study Environmental Review Checklist: 6.1; 6.2; 6.3; 6.4; 6.5; 6.6; 6.7; 6.8; 6.9; 6.12; 6.14; 6.16; 6.17.

We also disagree with Table 6-1 (Beneficial Uses).

TID canals are running through land with agricultural and conservation easements.

We disagree with TID Best Management Practices because there is no examination of the consequences of creating a toxic soup of pesticides, both in TID practices and in combination with whatever TID farming customers are adding to it.

Therefore we find the Mitigation and Monitoring Plan and BMP are nothing more than plans to make plans.

Following are examples of flaws we found with sections 1-10 of the DEIR.
ES 1-2: Needlessly complicated description of what this document is. Is it a focused DEIR or isn't it? The public, from the start, is unclear what it is reading. In fact, because it is not a proper focused EIR within the meaning of CEQA, it is artificially over-focused by TID. 1-1 begins, "This document is a focused Environmental Impact Report ..." but we know it isn't.

ES 3: To focus the EIR solely on Magnacide-leach through unlined canals into groundwater, while ignoring leach through farm fields is absurd.

ES-3-4 Mechanical removal of aquatic weeds is referred to on page 3 as being considered under the No Project Alternative. It is not specifically considered there. Increased maintenance and operational costs to TID are not, in and of themselves, adequate reasons for dismissing the mechanical alternative as a no-project alternative. CEQA does allow for alternatives do be found infeasible solely on economic grounds.

1-1 Line 12: Where is the evidence that "TID has safely applied aquatic pesticides ... since 1975"?

2-2: ES-3 Lined canals and laterals, "which comprises about 76 percent of the canal system" is INCONSISTENT WITH PROJECT DESCRIPTION, 2.4.1 (PP. 2-1, 2-2: " Of this total, about 183 miles, or about 83 percent are fully lined with concrete and about 38 miles or 17 percent are either partially lined or unlined."

If the majority of the land within TID service area is flood irrigated, what's the problem? (p.2-2) What percent of TID users actually use sprinkler, drip and micro-irrigation systems? In other words, what is the real benefit?

"More than 90 percent of the canals are concrete lined. Most of the land within TID is flood irrigated, but the district also serves the needs of growers with drip and micro irrigation systems." -- www.tid.com.

So, what is it: 90 percent, 83 percent, or 76 percent? Since this is the focus of the focused EIR, why these inconsistencies? The CEQA IS gives a figure of 44 miles unlined out of 250, for 17.6 percent unlined.

If water is released into one of the three rivers, in part through "agricultural drains that flow into the rivers," where is the control of the Magnacide on these releases? (p. 2-2) If not released directly to adjoining rivers, what prevents it from seeping into them from riverside farms?

P. 2-4: If all the Magnacide H is contained in water, all of which is delivered for irrigation, how much of it flows out of "agricultural drains that flow into rivers"? Are the crops irrigated by Magnacide -laced canal water grown in asphalt, so that no pesticide escapes into groundwater under the fields?

p. 3-3: "The unlined and partially lined sections of the TID canal system do not constitute important habitat for any special status species. These canals are man-made facilities constructed in uplands. They are designed, operated and maintained to deliver water seasonally for irrigation of agricultural land. They are not operated and maintained to provide wildlife habitat. Therefore, the application of Magnacide H to the water in unlined and partially lined sections of the TID canal system would not have a significant impact on special status species."

This is absurd reasoning in an effort to establish a categorical denial of the existence of natural habitat. Did wildlife petition TID to build a canal system in its habitat? Because the canals are man-made and men do not operate them as wildlife habitat, ergo they aren't habitat? Would that mean you were walking in a pasture, you wouldn't use a cow trail through a pasture because it was cow-made? Because they were designed for irrigation, not habitat, there is no human responsibility for the wildlife that use them? Therefore, pesticide application would have no significant impact on special status species? This is third-rate legal sophistry.

3-2 (line 20): Because application sites are away from population centers, "sensitive receptors would not be exposed to substantial concentrations of acrolein." This totally negates the reality that TID canals, in addition to being wildlife habitat, are human habitat for swimmers. Evidently, because the TID was built to convey irrigation water, not be a swimming pool, these swimmers don't exist, like the wildlife. The Draft Focused EIR does not give distances in which "Magnacide H an acutely toxic and hazardous material" can sicken human swimmers -- i.e. more mere legal sophistry.

3-8 "No state or federal drinking water standards (Maximum Contaminant Levels) exist for acrolein." Then why not wait until there are some before continuing to put it in surface waters of the US?

"A predicted exceedance of the threshold of 3.5 ppb does not necessarily mean that a significant impact would occur; it indicates only that a significant impact is possible under certain conditions, and further evaluation would be warranted. Because 3.5 ppb is the lowest RfD reported by IRIS, it can be inferred with a high degree of confidence that as long as the maximum predicted concentration of acrolein in groundwater is below this threshold, no significant impact is likely to occur."

This sort of sophistry leads the public to conclude this irrigation district is definitely playing with our health.

4.1 (p. 4-1): Mechanical means" of aquatic weed control is very expensive and labor intensive. It can cause damage to the structural integrity of the canals ..." Canal construction began in 1887. Until 30 years ago, TID used means other than chemical to control vegetation. TID's own history refutes this sophistry.

5.1 The "study" in Kern County relied upon to show that Magnacide dissipates beyond danger in fields and in the ground was produced by Baker Petrolite Corporation in 2004, the manufacturers of Magnacide. Based on this manufacturer's study, the consultants conclude: "Therefore, it is unlikely to be detectable within a few feet of the point where it first enters the groundwater table. Because of this, there would be no cumulative groundwater quality impact from percolation of treated water from irrigated fields and treated water from TID's unlined and partially lined canals" (in conjunction with similarly treated water in Merced ID unlined canals."

Has Baker Petrolite, a subsidiary of petroleum-equipment manufacturer giant, Barker-Hughes, yet filed its records to the SJVRWQB on its Taft repackaging plant?

Why should the public or the court believe a manufacturer's "study" uncorroborated by independent research?

6-1: Reliance upon the Merced County General Plan for any consistency of plan or policy is not wise judicial or public policy. The county general plan is out of date, has been amended so many times it no longer possesses any coherence, and has been the subject of a number of lawsuits in recent years.

There are no "Mandatory elements" of the Merced General Plan because there is no effective county monitoring or enforcement. The de facto policy in the county today is that if an amendment cannot be bought and defended in court, the general plan is just violated on a "catch me if you can" basis.

7.2 (p. 7.1): Any supply of water into rapidly developing Stanislaus and Merced counties is growth-inducing. To argue that the proposed project won't induce growth because it "would not change the use of TID's water from farmland irrigation," belies the underlying reality that agricultural land is being converted daily to urban use in TID's district and that, like Modesto and Merced IDs, TID is deeply involved in urban water management planning at this moment.

TID should be included in the development of the Merced County Water Supply Plan because it plays such an important role in supplying water to Merced County.

7.3: The consultants switch studies on us. The studies they wish you would remember is the one that was cited on the previous page, by Baker Petrolite, not the ones that appeared in Journal of Agricultural and Food Chemistry cited in Section 2.4.3, which do not argue that Magnacide H has a half-life of between 5.5 and 30 hours in water. The difference between 5.5 and 30 hours in a moving canal is significant and does not agree with other estimates of the half-life of the product (see US Department of Commerce (NOAA) letter, Aug. 4, 2005 to Debra C. Leibersbach, TID Water Planning Department Manager, from Rodney R. McInnis, NOAA Regional Administrator – the last page of the DFEIR).

The consultants' strategy here is to put forth evidence, primarily from the manufacturer, of how quickly Magnacide dissipates, without ever telling us how far the plume is supposed to effectively travel down the canal, killing algae and weeds.

In fact, why bother to read the TID Draft Focused EIR, when you can read the original at the Baker Petrolite website: http://www.bakerhughes.com/bakerpetrolite/agriculture/aquatic.htm

MAGNACIDE H Aquatic Herbicide

Controls Weeds and Algae in Canals and Reservoirs

MAGNACIDE H Aquatic Herbicide provides excellent control of both vascular aquatic weeds and algae providing more effective results than mechanical cleaning. A single application generally restores canal flow capacity within 24 hours; weeds disintegrate over a 5 to 10 day period. MAGNACIDE H Aquatic Herbicide has no effect on canal structures and is not corrosive to irrigation equipment.

Easy Application Without Interruption of Irrigation Schedules

MAGNACIDE H Aquatic Herbicide is easily applied using a closed system that can be operated by one person; the application process is designed to protect both the applicator and the environment. The treated water can be applied directly to crops thereby allowing water delivery to proceed without interruption.

MAGNACIDE H Herbicide Assists in Maintaining Drip, Micro and Sprinkler Irrigation Systems

When MAGNACIDE H Aquatic Herbicide treatments control aquatic weeds and algae in irrigation systems, the intervals between filter system backwashing is lengthened, and fouling of water conserving irrigation systems is reduced.

Active Ingredient Biodegrades Quickly, Leaving No Residue

MAGNACIDE H Aquatic Herbicide mixes thoroughly with water and is not visible during application. The active ingredient in MAGNACIDE H Herbicide is acrolein, a unique material that gives fast, predictable and measurable results. Acrolein is biodegradable, breaking down to carbon dioxide and water. It does not contain heavy metals and does not leave residues in crops, water or soil. In addition, acrolein does not leach through soil into ground water and does not bioaccumulate in animal tissue.

Industry Standard for Product Stewardship

Baker Petrolite sets the industry standard for product stewardship with the MAGNACIDE H Aquatic Herbicide program. During 40 years of marketing MAGNACIDE H Aquatic Herbicide, Baker Petrolite has conducted comprehensive field and laboratory research dedicated to maximizing the benefits of this product.

The MAGNACIDE H Aquatic Herbicide stewardship program includes complete customer training programs for safe application and handling of the product. The program includes guidelines and advice for optimizing treatments, developing safety programs, as well as product storage and use. Baker Petrolite sells and services standardized equipment necessary for effective applications.

In closing, we repeat: the DEIR is flawed, inadequate and fails to fully comply with the California Environmental Quality Act.

Please provide us with written notice of all future actions regarding this project.
Sincerely,

Lydia McMiller Steve Burke

Lydia Miller

Steve Burke

Central Valley Safe Environment Network
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Merced CA 95341
cvsen@bigvalley.net

Cc: Donald Mooney, Law Offices of Donald Mooney
William Hatch, Badlands Journal
Other interested parties

We disagree with the Initial Study, the Environmental Checklist, and the related conclusions and findings. The "fair argument" standard cannot be met, under the CEQA statutes. An EIR is required.

Thank you for your attention to this matter.

Sincerely,

Lydia Miller Steve Burke

Lydia Miller

Steve Burke

Central Valley Safe Environment Network
cvsen@bigvalley.net

Cc: Jeff McLain, US Fish and Wildlife Service
Karen Harvey, US Fish and Wildlife Service
Chris Nagano, US Fish and Wildlife Service
Madeline Martinez, National Oceanic and Atmospheric Administration
William Loudermilk, California Department of Fish and Game
Paula Landis, Department of Water Resources
Rhonda Reed, CalFed
Randy Mager, Department of Water Resources
Bill Jennings, DeltaKeeper
Ms. Sejal Choksi Esq., WaterKeepers
Natural Resources Defense Council
Ms. Ellison Folk Esq., Shute Mihaly and Weinberger
Interested parties

Response to Comments from San Joaquin Raptor Rescue Center and Protect Our Water

1. These comments are timely submitted. The Notice of Availability lists the date for close of comments as November 5, 2005, a Saturday. The statutes provide for the close of comments to be extended to the next business day, in this case Monday November 8.

Response: For clarification, the Monday following the date of the close of comments was November 7. The public review period was initiated by the State Clearinghouse on September 21, 2005; therefore, a 45-day comment period was provided to the public. Comments were received from Stanislaus County on November 2, 2005, and the San Joaquin Raptor Rescue Center and Protect Our Water on November 7, 2005. All of these comments have been responded to in the Final EIR.

2. We feel strongly that this DEIR is woefully inadequate for the purposes of CEQA.

Response: This comment expresses the commenter's opinion. Because the comment does not provide specifics, no further response is required.

3. What remains unaddressed in this document is the fact that the TID canals are not inaccessible holding tanks, but water ways fully available and highly impacting to both humans and wildlife. They run through populated urban areas. People do, and have for years, used the canals for fishing, swimming and other recreational uses. When the water contains acrolein, which completely removes oxygen, it has negative impacts to those people. Likewise, the wildlife and vegetation which have this water resource, are impacted. Those impacts, both proposed and historical, must be addressed. Without relevant analysis and review, this document is inadequate, incomplete, and fails woefully to satisfy the legal requirements of the California Environmental Quality Act.

Response: TID believes the scope of the Draft EIR is appropriate. The Draft EIR focuses on potential impacts to groundwater in connection with the application of acrolein to unlined and partially lined portions of the District's canal system. This scope is consistent with the Trial Court's Ruling on Submitted Matter in *Deltakeeper v. Turlock Irrigation District* (Sacramento County Sup. Court No. 04CS00222, November 24, 2004).

The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on the uses cited by the comment. The Draft EIR focused on the specific issues identified by the Trial Court. For further information on the scope of the analysis in the Draft EIR, please see response to Shute, Mihaly & Weinberger comment 5.

The Negative Declaration adopted by TID analyzed the project's potential impacts on beneficial uses of the canals, including the uses identified by the commenter. The Trial Court did not find that the record contained a "fair argument" with respect to the project's potential impact on beneficial uses. Accordingly, the District need not reconsider this issue in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District refers the commenter to the Negative Declaration adopted by the District in 2004 and responses to comments on that Negative Declaration, which includes a discussion of this issue raised in this comment. The Negative Declaration is provided in Appendix A of the Draft EIR. In addition, please see response to Shute, Mihaly & Weinberger comment 13.

4. This document fails to adequately and specifically describe the application and disbursal of Magnacide H in the TID canal system: how much is applied, when and where; what are travel times; what is the strength at various points along the travel routes at various points, etc. This information is basic to analyzing and understanding the potential impacts of the application. Failure to provide it is a critical flaw in the Draft EIR. The DEIR does not adequately describe the effects to all beneficial uses. The TID canals are waters of the United States, bringing in to the analysis a host of State and Federal regulatory and statutory requirements and considerations. These are not adequately presented in the document.

Response: The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on water quality in TID's canals or uses cited by the comment. The Draft EIR focused on the specific issues identified by the Trial Court. The Negative Declaration adopted by TID analyzed the project's potential impacts on water quality and beneficial uses. The Trial Court did not find that the record contained a "fair argument" with respect to the project's potential impacts to water quality in the canals or beneficial uses. Accordingly, the District need not reconsider these issues in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. Section 2.4.2 of the Draft EIR (pages 2-4 and 2-5) provide a description of the application of Magnacide H to the District's canal system including the amount applied and when and where it is applied. The Negative Declaration adopted in January 2004 also described the application of Magnacide H. (See CEQA Initial Study, pp. 5-8 attached at Appendix A to the Draft EIR. Application locations and times can vary from week-to-week and from season-to-season due to such things at temperature, weed growth, and flow rate in the canals. Therefore, it is not possible to describe every application location and subsequent down-canal plume resulting from an application.

As described in section 2.4.2 of the Draft EIR, Magnacide H is injected into the water at a turbulent location, like a canal drop, to ensure maximum mixing and relatively even distribution of the pesticide within the canal cross-section. During pesticide application, the canals are operated to ensure no water spills from the canal system until treated water has been irrigated out of the system.

The Magnacide H blends with the water in the canal and flows in a discrete plume down the canal at the same rate of flow as the water. TID schedules irrigation deliveries down-canal of an application to ensure all of the water in the canal is delivered to irrigation customers while Magnacide H may be present. This process results in water containing Magnacide H being completely diverted from the canal system at various locations down-canal of an application. The water diverted for irrigation is then replaced by freshwater flows from up-canal. Finally, prior to releasing water from the canal, field tests are conducted to provide additional information to determine whether Magnacide H is present.

The District refers the commenter to the Negative Declaration adopted by the District in 2004 and responses to comments on that Negative Declaration, which includes a discussion of project impacts on beneficial uses. The Negative Declaration is provided in Appendix A of the Draft EIR.

5. TID fails to identify wetlands habitat associated with seepage areas of unlined and partially lined canals.

Response: The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on wetlands cited by the comment. The Draft EIR focused on the specific issues identified by the Trial Court. The Negative Declaration adopted by TID analyzed the project's potential impacts on wetlands. The Trial Court did not find that the record contained a "fair argument" with respect to the project's potential impacts to wetland habitat. Accordingly, the District need not reconsider these issues in the context of the Draft EIR. (There are wetlands nearby the Main Canal but we were unable to determine whether these wetlands resulted from seepage or not. I didn't want to go there.) In addition, as set forth in the responses to Shute, Mihaly & Weinberger comments 14 and 15, the project will not have an adverse impact on sensitive habitat.

6. This DEIR fails to address the issues raised by Central Valley Safe Environment Network letter that was submitted originally, during the comment period on the Negative Declaration. Therefore, we wish to reincorporate all comment letters, expert letters, and agency letters from the Negative Declaration comment and review period.

Attachments:

1. Letter of January 16, 2003 to Rudy Schnagel, Regional Water Quality Control Board regarding CEQA reviews of Aquatic Pesticide Application Programs.

2. Letter dated July 18, 2001 to State Water Resources Control Board re: Proposed Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Discharges of Aquatic Pesticides to Surface Waters of the United States (General Permit).

3. Letter from Central Valley Safe Environment Network.

4. Portions of "Developing Water Quality Monitoring Programs Associated with the Use of Herbicides in the Control of Aquatic Weeds," by G. Fred Lee, PhD, PE, DEE and Anne Jones-Lee, PhD.

5. "Avian Uses of Vernal Pools and Implications for Conservation Practice" by Joseph G. Silveira, US Fish and Wildlife Service.

Response: Appendix A of the Draft EIR contains the Negative Declaration adopted by the District in 2004. Responses to the letter cited in this comment are contained in the Negative Declaration. The Trial Court did not find that the record contained a "fair argument" with respect to issues other than the potential groundwater quality impact of Magnacide H leaching from TID's unlined and partially lined canals. Accordingly, the District need not reconsider other issues raised in this letter in the context of the Draft EIR. The District will include in the record of proceedings documents submitted with comments on the Negative Declaration (Shute, Mihaly & Weinberger comment 2).

7. We disagree with Table 3-1 (Special Status Species) because the biological surveys were inadequate.

Response: The comment provides no evidence that the biological survey of TID's canals was inadequate; therefore, no further response is required. In addition, as set forth in responses to Shute, Mihaly & Weinberger comments 9 and 10, the project will not have an adverse impact on sensitive species.

8. We disagree with the following areas in the CEQA Initial Study Environmental Review Checklist: 6.1; 6.2; 6.3; 6.4; 6.5; 6.6; 6.7; 6.8; 6.9; 6.12; 6.14; 6.16; 6.17.

Response: This comment expresses the commenter's opinion. Because the comment does not provide specifics, no further response is required.

9. We also disagree with Table 6-1 (Beneficial Uses).

Response: This comment expresses the commenter's opinion. Because the comment does not provide specifics, no further response is required.

10. TID canals are running through land with agricultural and conservation easements.

Response: The Trial Court's ruling did not direct TID to prepare an EIR to address the issue cited by the comment. The Draft EIR focused on the specific issues identified by the Trial Court. Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment.

This comment is an information statement that identified no specific adverse impact. The comment is correct; TID's canals pass through agricultural areas. It is assumed the comment is alluding to potential impacts associated with the Williamson Act. The Initial Study (see Section 6.2) developed for the Negative Declaration addressed potential agricultural impacts and found that no changes of land use would result from the application of Magnacide H; therefore, no conflicts with the Williamson Act are expected. The Williamson Act program is a property tax incentive program to discourage premature conversion of agricultural land to other uses. TID does not propose to cancel a Williamson Act contract.

11. We disagree with TID Best Management Practices because there is no examination of the consequences of creating a toxic soup of pesticides, both in TID practices and in combination with whatever TID farming customers are adding to it.

Therefore, we find the Mitigation and Monitoring Plan and BMP are nothing more than plans to make plans.

Response: The comment identifies no specific adverse impact. The Trial Court's ruling did not direct TID to prepare an EIR to address the issue cited by the comment. The Draft EIR focused on the specific issues identified by the Trial Court. Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment.

As discussed in section 2.4.3 of the Draft EIR (page 2-6), acrolein does not persist in the environment and therefore does not combine with other agricultural chemicals that may inadvertently be present in TID's canals as a result of adjacent farming practices.

Acrolein begins decomposing as soon as it comes into contact with water through hydrolysis. The initial degradation products are ephemeral in nature and all of these products rapidly undergo further degradation. EPA-mandated studies using radioactive labeled acrolein indicate that the degraded acrolein adds to the naturally present carbon pool used by bacteria and

ultimately mineralized to carbon dioxide. For further information, please see the response to Shute, Mihaly and Weinberger comment 5.

The BMPs are specific measures implemented by TID in carrying out the Aquatic Pesticide Application Program. The BMPs are not plans to undertake further planning efforts. The BMPs are based on the narrative standards adopted by the SWRCB when it approved the General Permit. For further information, please see the responses to Shute, Mihaly & Weinberger comments 14 and 15.

12. Following are examples of flaws we found with sections 1-10 of the DEIR.

ES 1-2: Needlessly complicated description of what this document is. Is it a focused DEIR or isn't it? The public, from the start, is unclear what it is reading. In fact, because it is not a proper focused EIR within the meaning of CEQA, it is artificially over-focused by TID. 1-1 begins, "This document is a focused Environmental Impact Report..." but we know it isn't.

Response: As indicated on page 1-2, TID prepared the Draft EIR to analyze the potential environmental impacts on groundwater from the application of an aquatic pesticide to the District's unlined and partially lined canal sections to address the issues identified in the Court's November 24, 2004, ruling on *Deltakeeper v. Turlock Irrigation District* (Sacramento County Sup. Court No. 04CS00222). The Court held TID should prepare an EIR analyzing the "potential for acrolein to leach into groundwater." (Court Ruling, p. 4.) The Court did not find a "fair argument" with respect to other issues, and did not direct TID to analyze other issues.

Unless a court in a CEQA case reaches an issue raised by petitioners and finds merit in it, the argument is rejected. As the Court stated in *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal. App. 4th 1373, 1387:

[Public Resources Code] Section 21005, subdivision (c)[1] thus requires only that *if we find* other respects in which the EIR was defective we should describe them for the guidance of the parties. We have examined all of appellant's other contentions and find them to be *without merit*.... Section 21005, subdivision (c) does not require us to lengthen this opinion by addressing in detail why we *reject* appellant's other contentions.

(Italics in original.)

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[1] Public Resources Code section 21005, subdivision (c), provides as follows: It is further the intent of the Legislature that any court, which finds, or, in the process of reviewing a previous court finding, finds, that a public agency has taken an action without compliance with [CEQA], shall specifically address each of the alleged grounds of noncompliance.

Public Resources Code section 21168.9 states that any court order for noncompliance with CEQA include “only those mandates which are necessary to achieve compliance with [CEQA] and only those specific project activities in noncompliance with [CEQA]”; a court order must be limited to the portion of an agency's project activity that is in noncompliance if the court finds that “(1) the portion or specific project activity or activities are severable, (2) severance will not prejudice complete and full compliance with [CEQA], and (3) the court has not found the remainder of the project to be in noncompliance with [CEQA].” (Pub. Resources Code, at 21168.9, subd. (b) (emphases added); *Anderson First Coalition v. City of Anderson* (2005) 130 Ca. App. 4th 1173, 1179-1182 (upholding Trial Court's decision to sever portion of project).)

In this case, the Trial Court concluded the record contained a “fair argument” only with respect to the potential for groundwater impacts due to seepage from the unlined and partially lined portions of TID's canal system. The judgment does not directed TID to address other potential impacts in an EIR. TID has addressed the specific issue identified by the Court in the exercise of its authority under Public Resources Code section 21168.9. The EIR clearly identifies that it uses the term “focused” in the common-sense meaning of the term, in that the EIR is focused on the specific issue identified by the Trial Court.

13. ES 3: To focus the EIR solely on Magnacide-leach through unlined canals into groundwater, while ignoring leach through farm fields is absurd.

Response: Please see the response to San Joaquin Raptor Rescue Center and Protect Our Water comment 12. The Trial Court's ruling did not direct TID to prepare an EIR to address the potential impact cited by the comment. The Draft EIR focused on the specific issues identified by the Trial Court. Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment.

As discussed in section 5.0 of the Draft EIR, treated water applied to agricultural fields in the District in combination with the application of Magnacide H to TID's unlined and partially lined canals would not result in cumulative impacts to groundwater quality. Laboratory and field studies have shown that major factors determining the speed at which acrolein degrades in water are pH, temperature, and TDS. As these three factors increase, acrolein degrades faster. When irrigation water is applied to a field, the temperature of the water generally increases as the water spreads out and is heated by the ground and sun. As the water flows over the fields, it picks up salts from the soil, increasing both the TDS and pH of the water. Other factors that also increase the rate at which acrolein degrades when treated water is applied to farm fields include absorption onto organic matter in the soil, microbial transformation, and mineralization. In a monitoring study conducted in Kern County, California, the concentration of acrolein in a flood irrigated field dropped from the initial concentration of 4.2 ppm to non-detectable at 400 feet down the field. (We haven't found any other studies that relate to leaching through farm fields.)

14. ES-3-4. Mechanical removal of aquatic weeds is referred to on page 3 as being considered under the No Project Alternative. It is not specifically considered there. Increased maintenance and operational costs to TID are not, in and of themselves, adequate reasons for dismissing the mechanical alternative as a no-project alternative. CEQA does allow for alternatives found infeasible solely on economic grounds.

Response: As indicated in the Executive Summary of the Draft EIR (page ES-3) and section 4.1 (page 4-1), the No Project Alternative consists of not applying Magnacide H to the unlined and partially lined sections of its canals. Aquatic weeds would be controlled in these sections of the canal system by mechanical means. Magnacide H would continue to be used to control aquatic weeds and algae in the contiguous fully lined canals and laterals, which comprises about 83 percent of the irrigation system, all of which are down-canal of the unlined and partially lined canal sections. (Please see the response to San Joaquin Raptor Rescue Center and Protect Our Water comment 16.)

The No Project Alternative would not improve environmental conditions relative to the proposed project because the proposed project would not result in significant impacts. However, the No Project Alternative would decrease the efficiency of system operations and increase maintenance and operational costs to TID and many of its irrigation customers.

With respect to the criteria that the lead agency may rely upon in evaluating the feasibility of alternatives or mitigation measures, CEQA states:

"[I]n the event specific economic, social, or other conditions make infeasible such project alternatives or such mitigation measures, individual projects may be approved in spite of one or more significant effects thereof."

(Pub. Resources Code, § 21002.)

"'Feasible' means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors."

(Pub. Resources Code, § 21061.1.)

In this instance, because the project will not result in significant adverse impacts to the environment, the District need not adopt specific findings concerning the feasibility of project alternatives. (See Pub. Resources Code, § 21081.)

15. 1-1 Line 12: Where is the evidence that "TID has safely applied aquatic pesticides ... since 1975"?

Response: TID has applied aquatic pesticides since 1975. TID has also performed water quality monitoring. Analysis of available data indicates that aquatic pesticides used by TID have not resulted in the release of water containing Magnacide H from the canal system to local rivers or drains. No evidence has been submitted to TID during the public review of the Negative Declaration or the Draft EIR on the Aquatic Pesticide Application Program that would indicate that TID's application of aquatic pesticides has resulted in significant environmental impacts.

16. 2-2: ES-3 Lined canals and laterals, "which comprise about 76 percent of the canal system" is INCONSISTENT WITH PROJECT DESCRIPTION, 2.4.1 (pp. 2-1, 2-2: "Of this total, about 183 miles, or about 83 percent are fully lined with concrete and about 38 miles or 17 percent are either partially lined or unlined."

If the majority of the land within TID service area is flood irrigated, what's the problem? (p. 2-2) What percent of TID users actually use sprinkler, drip and micro-irrigation systems? In other words, what is the real benefit?

"More than 90 percent of the canals are concrete lined. Most of the land within TID is flood irrigated, but the district also serves the needs of growers with drip and micro irrigation systems." - www.tid.com.

So, what is it: 90 percent, 83 percent, or 76 percent? Since this is the focus of the focused EIR, why these inconsistencies? The CEQA IS gives a figure of 44 miles unlined out of 250, or 17.6 percent unlined.

Response: Based on the most recent measurements, there are approximately 220 miles of canals and laterals in TID's canal system. Of this total, about 183 miles or about 83 percent are fully lined with concrete and about 38 miles or 17 percent are either partially lined or unlined.

The problems associated with drip and micro systems referenced within the Draft EIR (page 2-1) are secondary, but real impacts for growers that utilize drip and micro irrigation system. Vegetation in the water can clog these on-farm irrigation systems.

A larger concern with aquatic weeds in the canal system is the interference with "conveyance of irrigation water by clogging waterways and causing overtopping of canals." Overtoppings can create safety hazards with water flooding adjacent roadways. Canals are not designed to overflow. As a result, water flowing over the banks is likely to result in significant damage to

the canal system itself, as well as to adjacent buildings and other facilities that may be in the path of the flowing water.

The reference to 90 percent provided at the TID website to all canal lining, whether partial or complete. Therefore, this percentage includes sections that are partially lined. It may also include those portions of the canal system upstream of Turlock Lake where water is not treated with pesticide.

17. If water is release into one of the three rivers, in part through "agricultural drains that flow into the rivers," where is the control of the Magnacide on these releases? (p.2-2) If not release directly to adjoining rivers, what prevents it from seeping into them from riverside farms?

Response: The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on water quality in down-canal receiving waters cited by the comment. The Draft EIR focused on the specific issues identified by the Trial Court. The Negative Declaration adopted by TID analyzed the project's potential impacts on water quality of down-canal receiving waters. The Trial Court did not find that the record contained a "fair argument" with respect to the project's potential impacts to the quality of receiving waters. Accordingly, the District need not reconsider these issues in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. As described in section 2.4.2 of the Draft EIR, Magnacide H is injected into the water at a turbulent location, like a canal drop, to ensure maximum mixing and relatively even distribution of the pesticide within the canal cross-section. During pesticide application, the canals are operated to ensure no water spills from the canal system until treated water has been irrigated out of the system.

The Magnacide H blends with the water in the canal and flows in a discrete plume down the canal at the same rate of flow as the water. TID schedules irrigation deliveries down-canal of an application to ensure all of the water in the canal is delivered to irrigation customers while Magnacide H may be present. This process results in water containing Magnacide H being completely diverted from the canal system at various locations down-canal of an application. The water diverted for irrigation is then replaced by freshwater flows from up-canal. Finally, prior to releasing water from the canal, field tests are conducted to provide additional information to ensure, to the extent possible in the field, that Magnacide H is not present.

Please see the response to San Joaquin Raptor Rescue Center and Protect Our Water comment 13 with regard to seepage from agricultural fields.

18. P. 2-4: If all the Magnacide H is contained in water, all of which is delivered for irrigation, how much of it flows out of "agricultural drains that flow into rivers"? Are the crops irrigated by Magnacide-laced canal water grown in asphalt, so that no pesticide escapes into groundwater under the fields?

Response: Please see the response to San Joaquin Raptor Rescue Center and Protect Our Water comment 13. TID makes arrangements with customers to irrigate out the treated water to appropriate sites before each treatment. As part of that arrangement, TID verifies that there will be no potential for field runoff or drainage discharges. This operational procedure is part of the BMPs for the project.

19. p. 3-3: "The unlined and partially lined sections of the TID canal system do not constitute important habitat for any special status species. These canals are man-made facilities constructed in uplands. They are designed, operated and maintained to deliver water seasonally for irrigation of agricultural land. They are not operated and maintained to provide wildlife habitat. Therefore, the application of Magnacide H to the water in unlined and partially lined sections of the TID canal system would not have a significant impact on special status species."

This is absurd reasoning in an effort to establish a categorical denial of the existence of natural habitat. Did wildlife petition TID to build a canal system in its habitat? Because the canals are man-made and men do not operate them as wildlife habitat, ergo they aren't habitat? Would that mean you were walking in a pasture, you wouldn't use a cow trail through a pasture because it was cow-made? Because they were designed for irrigation, not habitat, there is no human responsibility for the wildlife that use them? Therefore, pesticide application would have no significant impact on special status species? This is third-rate legal sophistry.

Response: The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on biological resources in the District's unlined and partially lined canals. The Draft EIR focused on the specific issues identified by the Trial Court.

The Negative Declaration adopted by TID analyzed the project's potential impacts on the biological resources in the unlined and partially lined canals identified by the commenter. The Negative Declaration concluded the Aquatic Pesticide Application Program would have an insignificant impact on biological resources. (Negative Declaration, pp. 16-25 [no significant impact on special status species], 34-39 [no significant impact on biological resources].) The Trail Court did not find that the record contained a "fair argument" with respect to potential impacts on biological resources in the canals from acrolein treatment. Accordingly, the District need not reconsider this issue in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment.

TID's unlined and partially lined canals are drained annually and left intermittently dry for up to several months each year. The canals are regularly and systematically cleaned each year. These operating and maintenance practices make the establishment of stable and complex plant and animal communities impossible. While some aquatic plants, such as pond weed, can be persistent, TID controls their growth and spread in the unlined and partially lined canals because if they develop into mature stands or mats of vegetation they impede the flow of water which interferes with TID's principal mission of timely and water-efficient delivery of irrigation water. Because TID's operating and maintenance program is designed to control aquatic plants, they do not mature into well-established stands of vegetation and therefore do not provide a basis for the development of complex fish and wildlife communities. As explained in the Draft EIR, these operating and maintenance procedures would continue with or without the Aquatic Pesticide Application Program (see page 4-1 of the Draft EIR). Modifying the District's maintenance and operating procedures to promote the development of a well-established and diverse plant community is inconsistent with the function of these canals, which is the timely and water-efficient delivery of irrigation water. The presence of plants inhibits the movement of water and can impede the District's ability to deliver water in a timely and water-efficient manner. Plant growth can create safety hazards by creating obstructions, which increases the risk of over topping or breaching canal banks.

The analysis in TID's Negative Declaration recognized that, although the canals are man-made, the canals have the potential to serve as wildlife habitat. The Negative Declaration did not conclude that impacts to biological resources were irrelevant due to the man-made character of the canals. Instead, the Negative Declaration focused on the physical character of the canals, and on how the canals are managed, to evaluate whether the canals provide habitat for wildlife. TID has also conducted surveys for special status plants and animals to determine whether the canals are used as habitat for such species. These surveys found no evidence that special status species are using the canals as habitat. The survey results appear at Appendix C to the Draft EIR. Please see responses to Shute, Mihaly & Weinberger comments 14 and 15.

20. 3-2 (line 20): Because application sites are away from population centers, "sensitive receptors would not be exposed to substantial concentrations of acrolein." This totally negates the reality that TID canals, in addition to being wildlife habitat, are human habitat for swimmers. Evidently, because the TID was built to convey irrigation water, not be a swimming pool, these swimmers don't exist, like the wildlife. The Draft Focused EIR does not give distances in which "Magnacide H an acutely toxic and hazardous material" can sicken human swimmers - i.e., more mere legal sophistry.

Response: The Trial Court's ruling did not direct TID to prepare an EIR to address the project's impact on swimmers in the District's unlined and partially lined canals. The Draft EIR focused on the specific issues identified by the Trial Court.

The Negative Declaration adopted by TID analyzed the project's potential impacts on the uses identified by the commenter. The Trial Court did not find that the record contained a "fair

argument" with respect to potential impacts on biological resources in the canals from acrolein treatment. Accordingly, the District need not reconsider this issue in the context of the Draft EIR.

Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment. For clarification, the referenced statement in the Draft EIR is in regard to people coming into contact with odors associated with acrolein applications.

Canals themselves are dangerous to swim in, irrespective of the proposed project. As a result, TID has an active program designed to educate the public on the dangers associated with swimming in Canals. TID has signs posted on all its canals warning against their use for swimming. TID provides funding to the Stanislaus Sheriff's Department to patrol the canal banks. Therefore, the canals are not regularly used for swimming. TID staff applying acrolein survey the canal section to be treated prior to treatment. Any swimmers in these sections would be escorted from the canals and warned against their use for swimming. TID is unaware of any circumstances in which swimmers have used canals that have been treated, or of any incidents in which swimmers have been exposed to acrolein.

21. 3-8 "No state or federal drinking water standards (Maximum Contaminant Levels) exist for acrolein." Then why not wait until there are some before continuing to put it in surface waters of the US?

Response: As discussed on page 3-8, the concentration used in the impact analysis for acrolein is its oral reference dose (RfD) of 3.5 parts per billion (ppb) that is reported in the EPA Integrated Risk Information System (IRIS). Health assessment information on a chemical substance is included in IRIS only after a comprehensive review of chronic toxicity data by EPA health scientists. The RfD is an estimate with uncertainty spanning perhaps an order of magnitude of a daily oral exposure to the human population (including susceptible subgroups) that is likely to be without an appreciable risk of adverse health effects over a lifetime. It is derived from a Benchmark Dose Limit, No-Observable-Adverse-Effect Level, Lowest-Observed-Adverse-Effect Level or another suitable point of departure, with uncertainty/variability factors applied to reflect limits of the data used.

Many chemicals used throughout the United States do not have specific state or federal drinking water standards. When those standards are not present, health assessment information is used as discussed above.

22. "A predicted exceedance of the threshold of 3.5 ppb does not necessarily mean that a significant impact would occur; it indicates only that a significant impact is possible under certain conditions, and further evaluation would be warranted. Because 3.5 ppb is the lowest

RfD reported by IRIS, it can be inferred with a high degree of confidence that as long as the maximum predicted concentration of acrolein in groundwater is below this threshold, no significant impact is likely to occur."

This sort of sophistry lead the public to conclude this irrigation district is definitely playing with our health.

Response: This comment provides no evidence that would support a finding of an adverse impact. The EPA defines "Reference Dose" (RfD) as, "An estimate of a daily oral exposure for a given duration to the human population (including susceptible subgroups) that is likely to be without an appreciable risk of adverse health effects over a lifetime." (http://www.epa.gov/iris/gloss8.htm#r) The fact that concentrations of acrolein are conservatively estimated to be below the lowest oral reference dose reported by EPA indicates a high degree of confidence that these concentrations of acrolein would not impact human health or the environment. The comment questions this analysis, but does not provide data or other specific information addressing this issue.

23. 4.1 (p. 4-1): Mechanical means "of aquatic weed control is very expensive and labor intensive. It can cause damage to the structural integrity of the canals..." Canal construction began in 1887. Until 30 years ago, TID used means other than chemical to control vegetation. TID's own history refutes this sophistry.

Response: Please refer to the response to San Joaquin Raptor Rescue Center and Protect Our Water comment 14.

The commenter is correct. Thirty years ago TID used other means to control vegetation in the canal system. At that time, there were different plants than there are now. TID has no data indicating the pond weed now found in the canals was present at that time.

Many other things are not as they were 30 years ago. For example, irrigation delivery and scheduling has changed. Irrigation water used to be provided on a rotation-basis, which provided more of a constant flow in the canal system. Today, in an effort to use water more efficiently, growers order water based on crop needs. This has resulted in more variable canal flows, and in some cases, higher flows than experienced in the past. Some growers have moved to drip and micro systems, technology which was not available 30 years ago. Advanced irrigation systems, like drip and micro, require clean water, free from plant debris that can clog these systems. In addition, some parcels that were historically grazing land have been planted with various crops, providing additional demands on the system. As a result of the changing requirements on the canal system, it is not appropriate to compare the current practices and needs with those of 30 years ago.

As discussed in section 4.1 of the Draft EIR, mechanical vegetation removal often results in generation of high levels of turbidity and plant debris in the water. It can also cause damage to the structural integrity of the canals, and the Main, Turlock Main, and Highline canals are principal arterials that convey water to the rest of the irrigation system. These problems do not occur with the use of Magnacide H. Because the application of Magnacide H does not result in significant environmental impacts, replacing it with mechanical vegetation removal would not improve environmental conditions and it would decrease the efficiency of system operations.

24. 5.1 The "study" in Kern County relied upon to show that Magnacide dissipates beyond danger in fields and in the ground was produced by Baker Petrolite Corporation in 2004, the manufacturers of Magnacide. Based on this manufacturer's study, the consultants conclude: "Therefore, it is unlikely to be detectable within a few feet of the point where it first enters the groundwater table. Because of this, there would be no cumulative groundwater quality impact from percolation of treated water from irrigated fields and treated water from TID's unlined and partially lined canals in conjunction with similarly treated water in Merced ID unlined canals."

Has Baker Petrolite, a subsidiary of petroleum-equipment manufacturer giant, Barker-Hughes, yet filed its records to the SJVRWQB on its Taft repackaging plant?

Why should the public or the court believe a manufacturer's "study" uncorroborated by independent research?

Response: The quote from the Draft EIR provided in this comment is not accurate. The Draft EIR at page 5-1 states: "Because of this, there would be no cumulative groundwater quality impact from percolation of treated water from irrigated fields and treated water from TID's unlined and partially lined canals."

TID does not have information regarding the status of a Taft repackaging plant, and the commenter supplies no such information. TID does not have information regarding the filing of records by Baker Petrolite with the San Joaquin Valley Regional Water Quality Control Board, and the commenter supplies no such information. No evidence has been provided by the commenter concerning any field study done by Baker Petrolite. The information cited in the EIR constitutes evidence concerning the potential for Magnacide H to dissipate. The commenter's concern regarding the reliability of an industry-sponsored study is noted; however, the commenter provides on data that suggests the results of the study are incorrect.

The Draft EIR did not rely exclusively on the Baker Petrolite to reach the conclusions regarding the rapid degradation of acrolein in the environment. Other scientific information on the chemistry of acrolein and its mobility and degradation in the environment was used to reach these conclusions. That information was published by independent researchers in Chemosphere,

Environmental Toxicological Chemistry, and the Journal of Agricultural Food Chemistry, among others. Please see section 10 of the Draft EIR for references used in the analysis.

25. 6-1: Reliance upon the Merced County General Plan for any consistency of plan or policy is not wise judicial or public policy. The county general plan is out of date, has been amended so many times it no longer possesses any coherence, and has been the subject of a number of lawsuits in recent years.

There are no "Mandatory elements" of the Merced General Plan because there is no effective county monitoring or enforcement. The de facto policy in the county today is that if an amendment cannot be bought and defended in court, the general plan is just violated on a "catch me if you can" basis.

Response: This comment sets forth the commenter's opinion of land use planning in Merced County. Under CEQA, an agency is directed to consider policies set forth in adopted plans. (CEQA Guidelines, § 15125.) The Merced County General Plan is the adopted land use plan in Merced County. No further response is required.

26. 7.2 (p. 7.1): Any supply of water into rapidly developing Stanislaus and Merced counties is growth-inducing. To argue that the proposed project won't induce growth because it "would not change the use of TID's water from farmland irrigation," belies the underlying reality that agricultural land is being converted daily to urban use in TID's district and that, like Modesto and Merced IDs, TID is deeply involved in urban water management planning at this moment.

TID should be included in the development of the Merced County Water Supply Plan because it plays such an important role in supplying water to Merced County.

Response: The Trial Court did not find that the record contained a "fair argument" with respect to the project's potential to be growth-inducing. Accordingly, the District need not reconsider this issue in the context of the Draft EIR. Although TID need not reconsider issues other than those identified in the Court's Ruling on Submitted Matter, the District provides the following information in response to this comment.

The Negative Declaration considered the Aquatic Pesticide Application Program's potential to induce growth. The project will not result in TID controlling any more or any less water than it currently does, and the project itself would not change the use of TID's water from farmland irrigation.

Whether TID should be included in the development of the Merced County Water Supply Plan is not relevant to the project addressed in the Draft EIR.

27. 7.3 The consultants switch studies on us. The studies they wish you would remember is the one that was cited on the previous page, by Baker Petrolite, not the ones that appear in Journal of Agricultural Food Chemistry cited in Section 2.4.3, which do not argue that Magnacide H has a half-life of between 5.5 and 30 hours in water. The difference between 5.5 and 30 hours in a moving canal is significant and does not agree with other estimates of the half-life of the product (see US Department of Commerce (NOAA) letter, Aug. 4, 2005 to Debra C. Liebersbach, TID Water Planning Department Manager, from Rodney R. McInnis, NOAA Regional Administrator - the last page of the DFEIR).

The consultants' strategy here is to put forth evidence, primarily from the manufacturer, of how quickly Magnacide dissipates, without ever telling us how far the plume is supposed to effectively travel down the canal, killing algae and weeds.

In fact, why bother to read the TID Draft Focused EIR, when you can read the original at the Baker Petrolite website: http://www.bakerhughes.com/bakerpetrolite/agriculture/aquatic.htm

Response: Please refer to the response to San Joaquin Raptor Rescue Center and Protect Our Water comment 24.

As discussed in section 2.4.3 of the Draft EIR (page 2-6), the half-life of acrolein is dependent on water temperature, pH, total dissolved solids (TDS) concentration, weed conditions, water flow rate, and other factors. Any individual study will provide a different range of half-lives for this compound depending on all these factors. What all studies have found is that the half-life of acrolein is measured in a few hours to a few days. As studies in the Draft EIR have shown, half-life decreases dramatically as temperature, pH, and TDS increase. As discussed in section 5.0 of the Draft EIR, all of these factors increase substantially as treated water is irrigated out to farm fields, thus accelerating the degradation of acrolein.

28. In closing, we repeat: the DEIR is flawed, inadequate and fails to fully comply with the California Environmental Quality Act.

Response: This comment expresses the commenter's opinion. Because the comment does not provide specifics, no further response is required.

Stanislaus County
Striving to be the Best

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STANISLAUS COUNTY ENVIRONMENTAL REVIEW COMMITTEE

Received
11/2/05
DL

October 28, 2005

Debra Liebersbach
Turlock Irrigation District
P.O. Box 949
Turlock, CA 95381

SUBJECT: **ENVIRONMENTAL REFERRALS-TURLOCK IRRIGATION DISTRICT-DRAFT EIR AQUATIC PESTICIDE APPLICATION PROGRAM FOR UNLINED AND PARTIALLY LINED CANALS**

Ms. Liebersbach:

The Stanislaus County Environmental Review Committee (ERC) has reviewed the subject project and has the following comment(s).

- Acorlein is one of the regulated RMP substances. 500 lbs. is the State limit and 5,000 lbs. is the Federal limit. Contact the Department of Environmental Resources (DER) to incorporate into the RMP with DER, if not already included.

The ERC appreciates the opportunity to comment on this project.

Sincerely,

Raul Mendez, Senior Management Consultant
Environmental Review Committee

cc: ERC Members

TURLOCK IRRIGATION DISTRICT
333 EAST CANAL DRIVE
POST OFFICE BOX 949
TURLOCK, CALIFORNIA 95381
(209) 883-8300

Don Pedro Dam and Powerhouse

December 9, 2005

Mr. Raul Mendez
Stanislaus County Environmental Review Committee
1010 10th Street, Suite 6800
Modesto, CA 95354

Dear Mr. Mendez,

SUBJECT: Response to Comment on Turlock Irrigation District Aquatic Pesticide Application Program Draft EIR

In your letter of October 28, 2005, regarding the review of the subject Draft EIR, you recommended that acrolein be incorporated into the District's Risk Management Plan (RMP). Acrolein has already been included in the RMP and the District has provided a copy of the plan to Stanislaus County.

Turlock Irrigation District appreciates your interest in the project and your comments on the Draft EIR.

Sincerely,

Debra C. Liebersbach, P.E.
Water Planning Department Manager

TID

Appendix F

Modified Peremptory Writ Of Mandate

#70

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Attorneys for Respondents
TURLOCK IRRIGATION DISTRICT

Exempt from filing fees
Pursuant to Government Code
Section 6103

ENDORSED
MAY 20 2005
By C. Lewis, Deputy

SUPERIOR COURT OF THE STATE OF CALIFORNIA

IN AND FOR THE COUNTY OF SACRAMENTO

DELTAKEEPER, a Project of Waterkeepers, Northern California; SAN JOAQUIN RAPTOR RESCUE CENTER; PROTECT OUR WATER; and CENTRAL VALLEY SAFE ENVIRONMENTAL NETWORK,

Petitioners and Plaintiffs,

v.

TURLOCK IRRIGATION DISTRICT and BOARD OF DIRECTORS OF TURLOCK IRRIGATION DISTRICT,

Respondents and Defendants.

Case No. 04CS00222
(Consolidated with Case No. 04CS00188)

NOTICE OF ENTRY OF MODIFIED PEREMPTORY WRIT OF MANDATE

Filing date of action:
February 25, 2004
Judgment entered: March 24, 2005

Department 11
Judge: Hon. Gail D. Ohanesian

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NOTICE IS HEREBY GIVEN that on MAY 19, 2005, the Court entered its Modified Peremptory Writ of Mandate in the above-entitled matter. The Writ is attached as Exhibit "A".

Dated: May 20, 2005

REMY, THOMAS, MOOSE and MANLEY, LLP

Whitman F. Manley

Whitman F. Manley

Attorney for Respondents
TURLOCK IRRIGATION DISTRICT

50520070.003.wpd

EXHIBIT A

SUPERIOR COURT OF CALIFORNIA

COUNTY OF SACRAMENTO

DELTAKEEPER, a Project of Waterkeepers, Northern California; SAN JOAQUIN RAPTOR RESCUE CENTER; PROTECT OUR WATER; and CENTRAL VALLEY SAFE ENVIRONMENTAL NETWORK, Petitioners and Plaintiffs, v. TURLOCK IRRIGATION DISTRICT; BOARD OF DIRECTORS OF TURLOCK IRRIGATION DISTRICT; GOVERNOR'S OFFICE OF PLANNING AND RESEARCH; JAN BOEL, in his official capacity as the Acting Director of the Office of Planning and Research; TERRY ROBERTS, in her official capacity as the Director of the State Clearinghouse; the STATE CLEARINGHOUSE; and DOES 1-40, Respondents and Defendants.	Case No. 04CS00222 Dept. 11 (Consolidated to Case No. 04CS00188) MODIFIED PEREMPTORY WRIT OF MANDATE

TO: RESPONDENT TURLOCK IRRIGATION DISTRICT AND ITS BOARD OF DIRECTORS ("RESPONDENT"):

The Court having entered a judgment in this proceeding directing that a peremptory writ of mandate issue from this Court,

YOU ARE HEREBY COMMANDED to comply with the following:

a. Respondent shall set aside its January 30, 2004 approval of its Aquatic Pesticide Program and of the Negative Declaration prepared in connection with the Aquatic Pesticide Program.

b. Respondent shall not reapprove the same Aquatic Pesticide Program and, with the exception of acrolein applications to those fully lined concrete sections of its canals as shown on Exhibit 1 to the stipulation filed on April 27, 2005, which may proceed pursuant to Turlock's General NPDES permit, shall suspend and not undertake any and all activities to implement the Aquatic Pesticide Program unless and until it has fully complied with the California Environmental Quality Act, Public Resources Code §21000, *et seq.* ("CEQA") and adopted an Environmental Impact Report or Reports; but nothing in this writ or in the judgment shall otherwise limit or control the discretion legally vested in respondent Turlock.

c. Respondent shall file a return to the Peremptory Writ of Mandate within 60 days after service of the writ demonstrating compliance with the terms of this Writ.

DATED: MAY 19 2005

C. LEWIS

CLERK OF THE SACRAMENTO SUPERIOR COURT

50508070.001.wpd

Deltakeeper, et al. v. Turlock Irrigation District, et al.
Sacramento Superior Court Case No. 04CS00222, consolidated with 04CS00188

PROOF OF SERVICE

I am employed in the City and County of Sacramento. My business address is 455 Capitol Mall, Suite 210, Sacramento, California 95814. I am over the age of 18 years and not a party to the above-entitled action.

I am familiar with Remy, Thomas, Moose and Manley, LLP's practice whereby the mail is sealed, given the appropriate postage and placed in a designated mail collection area. Each day's mail is collected and deposited in a U.S. mailbox after the close of each day's business.

On May 20, 2005, I served the following:

NOTICE OF ENTRY OF MODIFIED PEREMPTORY WRIT OF MANDATE

____ on the parties in this action by causing a true copy thereof to be delivered via Federal Express to the following person(s) or their representative at the address(es) listed below; or

✓ on the parties in this action by causing a true copy thereof to be placed in a sealed envelope with postage thereon fully prepaid in the designated area for outgoing mail addressed as follows; or

____ on the parties in this action by causing a true copy thereof to be delivered by facsimile machine number (916) 443-9017 or (916) 553-4927 to the following person(s) or their representative at the address(es) and facsimile number(s) listed below; or

____ on the parties in this action by causing a true copy thereof to be hand-delivered to the following persons(s) or their representative at the address(es) listed below:

Lisa Trankley Office of the Attorney General 1300 "I" Street Sacramento, CA 95814	Counsel for Governor's Office of Planning and Research and Jan Boel, as its Acting Director; State Clearinghouse and Terry Roberts, as its Director
Donald B. Mooney Law Offices of Donald B. Mooney 129 C Street, Suite 2 Davis, CA 95616	Attorneys for Petitioners San Joaquin Raptor Rescue Center, Protect Our Water, Central Valley Safe Environmental Network
Ellison Folk Jenny Harbine Shute, Mihaly & Weinberger LLP 396 Hayes Street San Francisco, CA 94102	Attorneys for Petitioners San Joaquin Raptor Rescue Center, Protect Our Water, Central Valley Safe Environmental Network

(Continued on next page. . .)

Deltakeeper, et al. v. Turlock Irrigation District, et al.
Sacramento Superior Court Case No. 04CS00222, consolidated with 04CS00188

Timothy O'Laughlin O'Laughlin & Paris 2571 California Park Dr., #210 Chico, CA 95928	Attorneys for Defendants Oakdale Irrigation District and South San Joaquin Irrigation District
Stephen L. Kostka Marc R. Bruner Bingham, McCutchen 1333 N. California Blvd., Suite 210 P.O. Box V Walnut Creek, CA 94596-1270	
William E. Gnass Michael Mason Mason Robbins et al. LLP P.O. Box 2067 Merced, CA 95344	Attorneys for Defendants Merced Irrigation District
Joy A. Warren Modesto Irrigation District 1231 - 11th Street Modesto, CA 95354	Attorneys for Defendants Modesto Irrigation District

I declare under penalty of perjury that the foregoing is true and correct and that this Proof of Service was executed this 20th day of May, 2005, at Sacramento, California.

TERESA QUINN
Teresa Quinn

DRAFT FOCUSED
ENVIRONMENTAL IMPACT REPORT

AQUATIC PESTICIDE APPLICATION PROGRAM FOR UNLINED AND PARTIALLY LINED CANALS

Prepared for

Turlock Irrigation District
333 East Canal Drive
Turlock, C A 95381

September 2005

URS

URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94612

26815137.00200

DRAFT FOCUSED
ENVIRONMENTAL IMPACT REPORT

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List of Tables, Figures and Appendices

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Appendices

BMDL	Benchmark Dose Level
BMPs	Best Management Practices
C_3H_4O	acrolein
CAC	County Agricultural Commissioner
CDFG	California Department of Fish and Game
Central Valley RWQCB	Central Valley Regional Water Quality Control Board
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act of 1984
CNPS	California Native Plant Society
CTR	California Toxics Rule
DBCP	Dibromochloropropane
DPR	California Department of Pesticide Regulation
DWR	California Department of Water Resources
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
IRIS	Integrated Risk Information System
LOAEL	Lowest Observed Adverse Effect Level
µg/L	micrograms/liter (equal to parts per billion)
mg/L	milligrams/liter (equal to parts per million)
MUN	Municipal beneficial use designation
NMFS	National Marine Fisheries Service
NOAEL	No Observed Adverse Effect Level
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
PCA	California Pest Control Advisor
ppb	parts per billion (equal to µg/L)
ppm	parts per million (equal to mg/L)
RfD	Reference Dose
RWQCB	(see Central Valley RWQCB)
SIP	Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California
SJVAPCD	San Joaquin Valley Air Pollution Control District
TID	Turlock Irrigation District's

TDS	Total dissolved solids
USFWS	U.S. Fish and Wildlife Service
VS2DT	U.S. Geological Survey computer model used to simulate flow and solute transport in variably saturated porous media

PURPOSE OF ENVIRONMENTAL IMPACT REPORT

Aquatic weeds and algae growing in Turlock Irrigation District's (TID's) irrigation canals and laterals interfere with the conveyance of irrigation water by clogging waterways and causing overtopping of canals. In addition, many of TID's farmers use sprinkler, drip, and micro-irrigation systems that must use clean water free of vegetation debris to prevent clogging of on-farm irrigation systems. For these reasons, TID has had an on-going program to control aquatic weeds. For at least the past three decades, that program has included the application of an aquatic pesticide, Magnacide H, whose active ingredient is an organic compound called acrolein.

The State Water Resources Control Board (State Board) currently regulates aquatic pesticide applications under a statewide General National Pollutant Discharge Elimination System (NPDES) permit (State Board Order No. 2004-0009). Public agencies such as TID wishing to continue the application of aquatic pesticides must complete an application for this NPDES permit. To obtain the permit, applicators are prohibited from exceeding water quality criteria for Priority Pollutants, which include acrolein, outside of the treatment area for the pesticide. Public entities unable to meet the water quality criteria outside the treatment area can apply for a variance or categorical exemption (5.3 Exception). In order to obtain a categorical exemption, public entities must prepare a CEQA document analyzing the effects of the aquatic pesticide application.

On January 30, 2004, TID's Board of Directors adopted a Negative Declaration and authorized the staff to apply for a General NPDES Permit for Discharges of Aquatic Pesticides with the State Board that would allow TID to apply aquatic pesticides to the following District water facilities: (1) fully concrete lined irrigation canals and laterals; (2) unlined and partially lined irrigation canals and laterals; and (3) the French Pit Reservoir, which is the small water supply reservoir for the Town of La Grange and which is managed and operated by the District on behalf of TID and the Modesto Irrigation District (Modesto ID). In adopting a Negative Declaration, the TID Board of Directors found that the project would not have a significant adverse impact on the environment.

A Petition for Writ of Mandate was filed alleging TID, in adopting the Negative Declaration, should have prepared an Environmental Impact Report (EIR) (*Deltakeeper v. Turlock Irrigation District*, Sacramento County Sup. Court No. 04CS00222). On November 24, 2004, the trial court ruled that there was a fair argument that application of copper-containing products in the French Pit Reservoir may have a significant environmental impact and that TID did not adequately respond to evidence of the potential for Magnacide H to leach into the groundwater from unlined canals.

This EIR focuses on responding to the issue of Magnacide H leaching from TID's unlined and partially lined canals into the groundwater. TID is no longer applying copper to the French Pit Reservoir; therefore, this EIR does not address that activity.

This is a "focused EIR." The California Environmental Quality Act (CEQA) Guidelines identify a "focused EIR" as an EIR prepared to analyze certain types of projects where a Master EIR has been certified (see CEQA Guidelines § 15179.5). In this case, no Master EIR has been prepared, and thus this analysis is not a focused EIR within the meaning of CEQA Guidelines Section 15179.5. Rather, this EIR is termed a focused EIR because it focuses on the specific issue identified by the trial court in the *Deltakeeper* decision. The use of the term focused EIR is also consistent with a settlement agreement entered into between the petitioners and TID following the trail court's decision in the *Deltakeeper* litigation; the settlement agreement provided that TID would "prepare a focused EIR for the application of pesticides to its unlined and partially lined canals."

The trial court in the *Deltakeeper* litigation identified one issue requiring further analysis in an EIR: the potential for Magnacide H to leach into the groundwater from unlined and partially lined canals. The trial court did not identify other issues requiring further analysis. With the exception of the issue identified by the trial court, the conclusions set forth in the Negative Declaration adopted in January 2004 remain valid, and this EIR does not re-analyze those impacts (Pub. Resources Code, § 21005, subd. (c); *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373). For information purposes, the following documents are included in appendices to this EIR:

- Appendix A Aquatic Pesticide Application Program for the Turlock Irrigation District Initial Study/Negative Declaration (January 2004)
- Appendix B Trial Court Rulings on Submitted Matters (November 24, 2004)

PROJECT DESCRIPTION

Magnacide H is applied throughout TID's irrigation system below Turlock Lake. The pesticide is injected into the water at a turbulent location, like a canal drop, to ensure maximum mixing and relatively even distribution of the pesticide within the canal cross-section. During pesticide applications, TID operates the canals to prevent discharges to any river below the canal system until such time as the pesticide has been irrigated out to farmland and replaced by freshwater flows from up-canal. Magnacide H applied in one location blends with the water in a canal and flows down-canal. Meanwhile, growers are simultaneously using the water from the canal for irrigation purposes. TID schedules irrigation deliveries down-canal of an application to ensure all of the water in a canal is delivered to irrigation customers during the times that Magnacide H may be present. This process results in water containing Magnacide H being completely diverted from the canal system at various locations down-canal of an application. The water diverted for irrigation is then replaced by freshwater flows from up-canal. Finally, prior to releasing water from the canal, field tests are conducted to ensure that Magnacide H is not present in canal water at the end of the canal system. In this manner, canal water containing Magnacide H is entirely irrigated out of the canal reach before unused irrigation water is released from the canal system. In addition, samples of canal water are collected both during and following each Magnacide H application at two representative sites and then analyzed by a certified laboratory pursuant to TID's NPDES permit requirements. This information is used to further evaluate the application process to ensure that all treated water is irrigated out of the canals and laterals.

Magnacide H is applied to the canals during the irrigation season which generally runs from mid-March through mid-October. At the beginning of each year a proposed Magnacide H application schedule is developed and used as a guideline for the aquatic weed control program. However, the need for aquatic pesticide application to canals can vary from week-to-week and from season-to-season due to such things as temperature, weed growth, and flow rate in the canals.

ENVIRONMENTAL IMPACTS

The active ingredient of Magnacide H is acrolein. The potential migration of acrolein into groundwater from unlined and partially lined canals was estimated using a U.S. Geologic Survey computer model that simulates water flow and solute transport in the soil layer between the ground surface and the surface of the groundwater table (vadose zone). Groundwater elevations and soil types for the modeling were collected from seven borings made in 2005 along the unlined and partially lined segments of TID's canal system. These borings were developed into monitoring wells. Modeling was done for those locations with the shallowest groundwater elevations (24.3 to 34.5 feet below ground surface) and soils that were fairly representative of other areas that are crossed by the canal sections that are unlined or partially lined. This provided worst case scenarios in terms of the potential for acrolein to leach from the canals to the underlying groundwater. In modeling the movement of acrolein from the canals into soil, the rapid degradation and volatilization of acrolein in canal water was not considered, although dilution of the chemical in the canal water was taken into account. This provided a maximum concentration of acrolein in water at the point it begins infiltrating the ground below the canal.

The results of the modeling provided an acrolein concentration in the vadose zone water just above the surface of the groundwater table ranging from 0.0006 to 2.0 parts per billion (ppb) depending on the application scenario and the specific location. Because these concentrations are located in water immediately above the groundwater table, they represent concentrations higher than would occur after vadose zone water mixes with groundwater. The modeled concentrations of acrolein in the vadose zone are less than the oral reference dose for acrolein of 3.5 ppb that is reported in the EPA Integrated Risk Information System. Therefore, application of Magnacide H to the water in unlined and partially lined sections of the TID canal system would not have a significant impact on groundwater used for drinking water.

Groundwater beneath portions of the unlined and partially lined canals has the potential to ultimately discharge to either the Tuolumne or Merced rivers. The EPA has proposed a chronic (four-day average exposure not exceeded more than once very three years) acrolein water quality criterion for the protection of freshwater organisms of 2.9 ppb. Modeling has indicated that the worst-case concentration of acrolein in the vadose zone is below this criterion even before vadose zone water mixes with groundwater. By the time the vadose zone water has diluted in groundwater, and acrolein has further degraded as the groundwater moves down-gradient, it would be undetectable in the groundwater discharging into either the Tuolumne or Merced rivers.

PROJECT ALTERNATIVES

Under the No Project Alternative, TID would not apply Magnacide H to the unlined and partially lined sections of its canals. The aquatic pesticide would continue to be used to control aquatic weeds and algae in lined canals and laterals, which comprises about 76 percent of the canal system. The No Project Alternative would not improve environmental conditions relative to the proposed project since the proposed project would not result in significant impacts. However, the No Project Alternative would decrease the efficiency of system operations and increase maintenance and operational costs to TID and many of its irrigation customers.

Dyes that block ultraviolet light are sometimes used to control the growth of aquatic weeds. The dyes must remain in the water for long periods of time to be effective; therefore, this method is only practical in water bodies that have little or no current. It is not practical to use these materials in TID's irrigation system because of the high flow rates required for water distribution.

TID uses manipulation of water level as much as possible to control the growth of aquatic weeds. However, during the irrigation season, it is not possible to keep portions of the canal system dry for a long enough period of time to completely kill aquatic weeds. Therefore, this is not a practical alternative for aquatic weed control throughout the irrigation system.

No other aquatic pesticide has been identified by TID that can be used for this purpose as safely and effectively as Magnacide H. Other aquatic pesticides that TID has considered in the past are either less effective at controlling the aquatic weeds that are present in TID's canals or the permitted uses of the water following application restricts TID's ability to efficiently operate its canal system, or both.

No other alternatives have been identified to control the growth of aquatic weeds in TID's unlined and partially lined canals. Mechanical removal of aquatic weeds is not considered as a separate alternative because such removal is considered in connection with the No Project Alternative. No off-site alternative is considered because the canal system is already constructed.

1.1 PURPOSE OF THIS DOCUMENT

This document is a focused Environmental Impact Report (EIR) evaluating the potential impact on groundwater from the continued application of aquatic pesticide to unlined and partially lined sections of Turlock Irrigation District's (TID) canal system. This EIR is prepared pursuant to the California Environmental Quality Act (CEQA) (Governor's Office of Planning and Research 1995, as amended). TID is the Lead Agency under CEQA for the EIR. A Notice of Preparation for this EIR was issued on June 23, 2005, and a scoping meeting was held on July 28, 2005, to solicit comments from agencies and the public on issues to be addressed in the document. A single written comment letter was received, and no members of the public or government agency attended the scoping meeting.

1.2 PROJECT BACKGROUND

TID has safely applied aquatic pesticides to its irrigation canals and laterals to control aquatic weeds and algae since at least 1975. The District proposes to continue this practice.

The State Water Resources Control Board (State Board) currently regulates aquatic pesticide applications under a statewide General National Pollutant Discharge Elimination System (NPDES) permit (State Board Order No. 2004-0009). This general permit requires strict compliance with water quality criteria contained in the California Toxics Rule (CTR), the State Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (SIP), and applicable Basin Plans (the Central Valley Basin in the case of TID). Collectively, these plans and policies are designed to protect and maintain the existing beneficial uses of natural water bodies.

The SIP provides an implementation mechanism for all priority pollutant criteria and objectives for point source, non-ocean water discharges. It requires dischargers to develop and implement Best Management Practices for weed control and pesticide applications. It also contains monitoring requirements to assess compliance with receiving water limits. Under the general NPDES permit requirements, concentrations of priority pollutants cannot exceed the numeric thresholds set forth in the CTR outside designated treatment areas.

Public agencies wishing to continue the application of aquatic pesticides must complete an application for an NPDES permit. To obtain an NPDES permit, applicators are prohibited from exceeding water quality criteria for Priority Pollutants outside of the treatment area for the pesticide. Public entities unable to meet the water quality criteria outside the treatment area can apply for a variance or categorical exception (5.3 Exception). In order to obtain a categorical exception, public entities must prepare a CEQA document analyzing the effects of the aquatic pesticide application.

On January 30, 2004, TID's Board of Directors adopted a Negative Declaration, which is included as Appendix A to this document, and authorized staff to apply for a General NPDES Permit for Discharges of Aquatic Pesticides with the State Board that would allow the District to apply aquatic pesticides to the following District water facilities: (1) fully concrete lined irrigation canals and laterals; (2) unlined and partially lined irrigation canals and laterals; and (3) the French Pit Reservoir, which is the small water supply reservoir for the Town of La Grange and which is managed and operated by the District on behalf of TID and the Modesto Irrigation

District (Modesto ID). In adopting a Negative Declaration, the TID Board of Directors found that the project would not have a significant adverse impact on the environment.

A Petition for Writ of Mandate was filed alleging TID, in adopting the Negative Declaration, should have prepared an EIR (*Deltakeeper v. Turlock Irrigation District*, Sacramento County Sup. Court No. 04CS00222). On November 24, 2004, the trial court ruled that there was a fair argument that application of copper-containing products in the French Pit Reservoir may have a significant environmental impact and that TID did not adequately respond to evidence of the potential for Magnacide H to leach into the groundwater from unlined canals (Appendix B). The Court rejected all other challenges to TID's adoption of the Negative Declaration. TID and the petitioners later entered into a stipulation modifying the court's judgment and directing the District to set aside its January 30, 2004 approval of the aquatic pesticide application program and of the Negative Declaration, provided that the District could continue to apply Magnacide H to its fully lined canal sections as shown on Exhibit 1 referenced in the modified judgment.

TID is preparing this EIR to analyze the potential environmental impacts on groundwater from of the application of an aquatic pesticide to the District's unlined and partially lined canal sections to address the issues identified in the Court's November 24, 2004, ruling. The District is no longer applying copper to the French Pit Reservoir; therefore, this EIR does not address that activity. If the District later decides to resume treatment with copper, it will comply with CEQA prior to treatment.

TID's applications of acrolein, the active ingredient in Magnacide H, are subject to review for compliance with the prescribed water quality standards under the statewide general NPDES permit. Sections of TID's unlined and partially lined canals would be considered the designated treatment areas under the statewide general NPDES permit. The SIP provides a categorical exception (also known as a "5.3 exception") from the CTR for dischargers who conduct resource or pest management programs in order to fulfill statutory requirements, and to protect beneficial uses of water and public health.

TID has coverage of its aquatic pesticide application program for unlined and partially lined canal sections under the State Board's general NPDES permit. TID will seek a categorical exception for its use of Magnacide H. TID will comply with all terms and conditions of the general permit.

This is a "focused EIR." The State CEQA Guidelines identify a focused EIR as an EIR prepared to analyze certain types of projects where a Master EIR has been certified (see CEQA Guidelines, § 15179.5). In this case, no Master EIR has been prepared, and thus this analysis is not a focused EIR within the meaning of CEQA Guidelines Section 15179.5. Rather, this EIR is termed a focused EIR because it focuses on the specific issue identified by the trial court in the *Deltakeeper* decision. The use of the term focused EIR is also consistent with a settlement agreement entered into between the petitioners and TID following the trial court's decision in the *Deltakeeper* litigation; the settlement agreement provided that the TID would "prepare a focused EIR for the application of pesticides to its unlined and partially lined canals."

The trial court in the *Deltakeeper* litigation identified one issue requiring further analysis in an EIR: the potential for Magnacide H to leach into the groundwater from unlined and partially lined canals. The trial court did not identify other issues requiring further analysis. With the exception of the issue identified by the trial court, the conclusions set forth in the Negative Declaration adopted in January 2004 remain valid, and this EIR does not re-analyze those impacts (Pub. Resources Code, § 21005, subd. (c); *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373).

1.3 REPORT ORGANIZATION

The EIR is organized into a summary section and 10 chapters. This chapter, *Chapter 1.0: Introduction*, briefly describes the project and the background leading to the preparation of this EIR. It is preceded by an *Executive Summary* of the EIR, which identifies issues of concern, significant and potentially significant impacts of the project, and proposed mitigation measures. *Chapter 2.0: Description of the Proposed Project* provides a description of the aquatic pesticide application program, its location, and project facilities and operating procedures. *Chapter 3.0: Environmental Setting, Impacts, and Mitigation Measures* is the main body of the EIR, and provides a description of the regulatory and environmental settings for the issue areas addressed in the document, an evaluation of potential project impacts, and where those impacts are significant, mitigation measures designed to reduce or eliminate those impacts. *Chapter 4.0: Alternatives to the Proposed Project* discusses a range of alternatives to the project, including a "no project" alternative, as required by CEQA Guidelines Section 15126. *Chapter 5.0: Cumulative Impacts* discusses the impacts of the aquatic pesticide application program in relation to past, present, and probable future projects in the region. *Chapter 6.0: Consistency with Adopted Plans and Policies* reviews the project in the context of policies that could be relevant. *Chapter 7.0: Other CEQA Considerations* identifies various impact conclusions required by CEQA. *Chapter 8.0: Consultation and Coordination* lists the persons and agencies contacted during the project impact analysis and the scoping process for the project. A list of the EIR authors and contributors is provided in *Chapter 9.0: List of Preparers and Contributors*. References used in developing the EIR are provided in *Chapter 10.0: References*. The EIR also includes the following appendices:

- Appendix A Aquatic Pesticide Application Program for the Turlock Irrigation District Initial Study/Negative Declaration
- Appendix B Trial Court Ruling on Submitted Matters
- Appendix C Biological Resources
- Appendix D Water Quality
- Appendix E Public Involvement

2.1 INTRODUCTION

This chapter begins with a description of the project location (Section 2.2), followed by a discussion of project objectives (Section 2.3). Project facilities and operating procedures are then described (Section 2.4).

2.2 PROJECT LOCATION

The Turlock Irrigation District (TID) was organized in 1887 under the provisions of the Wright Act (California Water Code §20500 et seq.). TID's irrigation district boundaries cover portions of Stanislaus, Merced, and Tuolumne counties and TID supplies water to over 5800 irrigation customers in a 307.5 square mile irrigation service area (irrigating approximately 150,000 acres) in the San Joaquin Valley (Figure 2-1). The irrigation service area is generally bordered on the north by the Tuolumne River, on the south by the Merced River, and on the west by the San Joaquin River. TID's canal system begins at La Grange Dam on the Tuolumne River where water is diverted into TID's Upper Main Canal for conveyance to Turlock Lake which acts as a canal regulating reservoir. From Turlock Lake, water is released into TID's Main Canal for distribution to down-canal growers for irrigation purposes.

This EIR addresses pesticide application to the unlined and partially lined sections of TID's canal system, all of which are down-canal of Turlock Lake. Those sections are located on the TID Main Canal, the Turlock Main Canal (from the end of the Main Canal down-canal to East Avenue), the Highline Canal (from its junction with the Main Canal down-canal to approximately ½ mile west of Griffith Road), and Cross Ditch #1 (from its junction with the Highline Canal to East Avenue) (Figure 2-1).

2.3 PROJECT OBJECTIVES

Aquatic weeds and algae growing in TID's irrigation canals and laterals interfere with the conveyance of irrigation water by clogging waterways and causing overtopping of canals. In addition, many of TID's farmers use sprinkler, drip, and micro-irrigation systems that must use clean water free of vegetation debris to prevent clogging of on-farm irrigation systems. Those systems use filtration devices that can filter out low levels of vegetation debris in the water, but high levels of debris will repeatedly clog the filtration systems and/or the water emitters or orifices. For these reasons, TID has had an on-going program to control aquatic weeds. For at least the past three decades, that program has included the application of an aquatic pesticide. The objective of the proposed project is to continue the use of an aquatic pesticide, Magnacide H, to help TID control aquatic weeds and algae in the unlined and partially lined sections of TID's canal system.

2.4 PROJECT DESCRIPTION

2.4.1 Irrigation Canal Operations

TID owns and operates approximately 220 miles of canals and laterals. Of this total, about 183 miles or about 83 percent are fully lined with concrete and about 38 miles or 17 percent are either partially lined or unlined. All of the canals and laterals are owned and operated by TID and are man-made, constructed waterways in uplands. The system is constructed so that water flows by gravity through the canals.

The majority of the land within the TID service area is flood irrigated. TID also provides water to a significant number of growers with sprinkler, drip, and micro-irrigation systems. Water that is not used for irrigation purposes is released from the canal system through spill gates or weirs located at the end of each canal, and at several median locations. There are a total of 15 spill locations from the canal system (Figure 2-1). This water is released to the Tuolumne River at three locations, the San Joaquin River at four locations, and the Merced River at two locations. Releases of water are made either directly to one of the rivers or into agricultural drains that flow to the rivers.

In addition to irrigation flows, the canal system down-canal of Turlock Lake transports storm water and agricultural drainage. Storm water is pumped from municipal sources, and pumped or gravity fed from agricultural areas, into the canal system where it is transported and discharged to the rivers. Agricultural drainage from TID-owned drainage wells, as well as from private and improvement district-owned tile drains, also discharge into the canal system. During the irrigation season, storm water and drainage water flows are blended with the irrigation water present and used as much as possible for irrigation, with the remainder being discharged to the rivers.

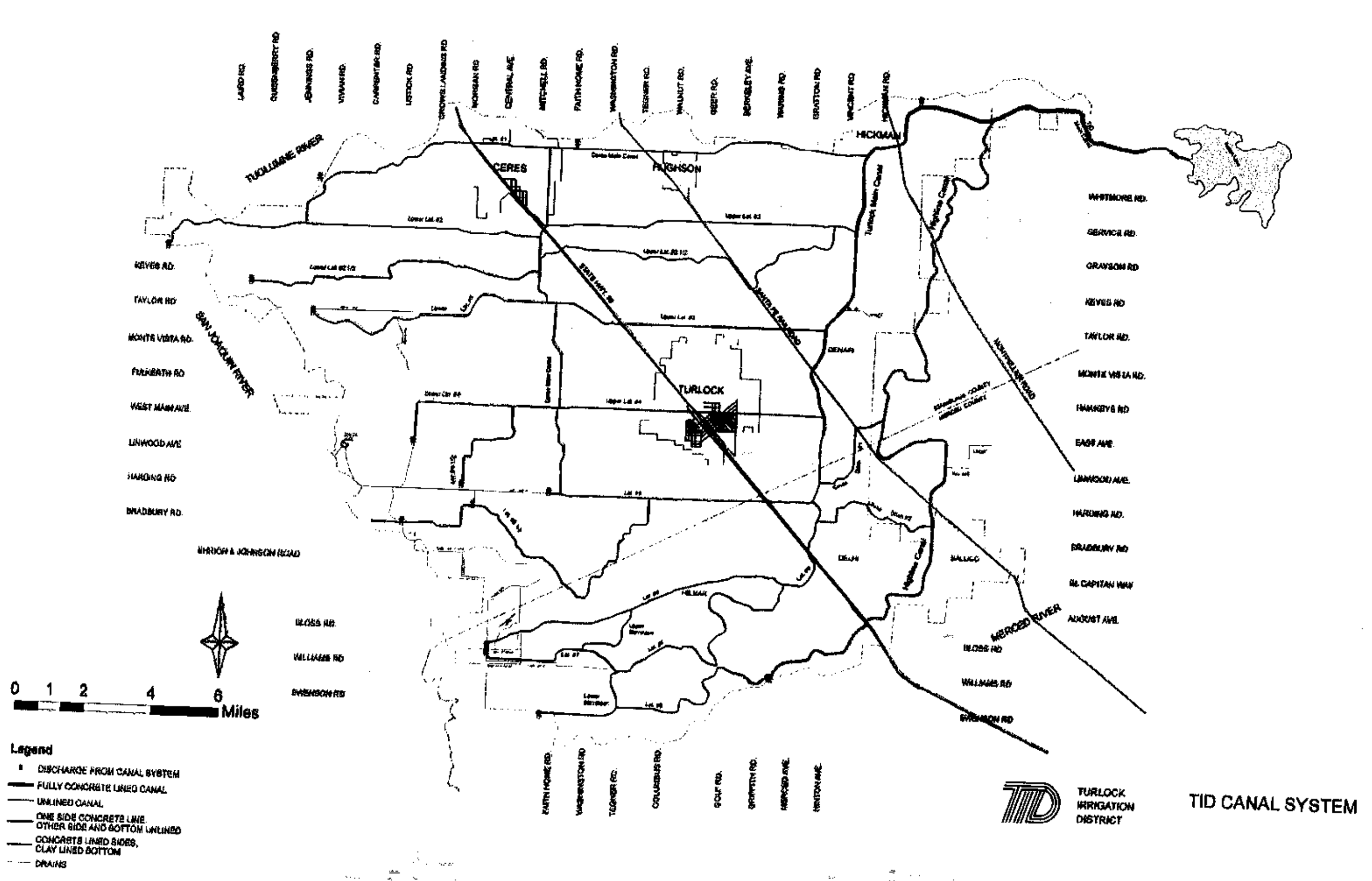
Each year the start of the irrigation season is established based on weather conditions and grower needs. The typical season runs from mid-March through mid-October. However, irrigation water has been made available as early as January and as late as November. Water from Turlock Lake is not normally released to the canal system outside the irrigation season (the "off-season") and the canal system is dewatered at the end of each irrigation season. In the off-season, the upper portion of the canal system in some years may occasionally contain water diverted around the Tuolumne River salmon spawning reaches near LaGrange and then released back to the river to minimize fluctuations in river water levels in the spawning reach. The canals also intermittently contain both agricultural and urban storm water flows. Canal maintenance also takes place in the off-season.

2.4.2 Pesticide Application

TID uses a combination of methods to control the growth of aquatic weeds within the irrigation system. These methods are mechanical removal, manipulation of water levels, and application of an aquatic pesticide, Magnacide H.

Mechanical vegetation removal includes raking and chaining aquatic weeds out of canals and laterals. This method is used to a limited extent by TID in specific circumstances such as a small area of heavy vegetation growth in a canal reach that is otherwise relatively free of aquatic weeds, or when chemical applications are not feasible. This method is very expensive and labor intensive and can cause damage to the structural integrity of TID irrigation facilities. In addition, mechanical vegetation removal often results in generation of high levels of turbidity and floating plant debris in the water that can clog on-farm irrigation systems.

Figure 2-1. Project Location



1 Note: The portions of the canal system evaluated in this EIR have been emphasized with a heavier line for the convenience of the reviewer.

Manipulation of water level can also be an effective method of controlling aquatic vegetation. However, for this method to work, canals must be kept dry for a long enough period of time to completely kill the vegetation. During the irrigation season, this method is usually not feasible because water must be kept flowing in the canals. However, there are occasionally times, especially during low flows, when irrigation requests dwindle to the point where this type of water level manipulation can be used at the end of the canal system. The process also occurs when canals are dewatered at the end of the irrigation season. TID uses this alternative control measure whenever possible.

Application of Magnacide H is the principal method TID uses to control aquatic weeds. Magnacide H is registered for use as an aquatic pesticide with the California Department of Pesticide Regulation (DPR). Before a pesticide can be used for a specific type of application in California, DPR thoroughly evaluates it during the registration process to ensure that no unacceptable risk to human health or the environment exists. For a pesticide to be evaluated for registration, the pesticide producer must submit data on the product's toxicology, fate and transport characteristics, hazards to non-target organisms, effects on fish and wildlife, degree of worker exposure, and chemistry (DPR 2005).

Magnacide H is applied only to irrigation canals and laterals that, as indicated in Section 2.4.1, are constructed agricultural waterways. Magnacide H is applied throughout TID's canal system below Turlock Lake. The pesticide is injected into the water at a turbulent location, like a canal drop, to ensure maximum mixing and relatively even distribution of the pesticide within the canal cross-section. During pesticide application, the canals are operated to ensure no water spills from the canal system until treated water has been irrigated out of the system.

The Magnacide H blends with the water in the canal and flows in a discrete plume down the canal at the same rate of flow as the water. TID schedules irrigation deliveries down-canal of an application to ensure all of the water in the canal is delivered to irrigation customers while Magnacide H may be present. This process results in water containing Magnacide H being completely diverted from the canal system at various locations down-canal of an application. The water diverted for irrigation is then replaced by freshwater flows from up-canal. Finally, prior to releasing water from the canal, field tests are conducted to provide additional information to ensure, to the extent possible in the field, that Magnacide H is not present. In this manner, TID ensures that canal water containing Magnacide H is irrigated out of the canal reach in accordance with label directions before unused irrigation water is released from the canal system.

In accordance with the label instructions for Magnacide H, there are no restrictions on the types of crops that may be irrigated with treated canal water. The directions for its use specify that "water treated with Magnacide H herbicide must be used for irrigation of fields, either crop bearing, fallow or pasture, where the treated water remains on the field or held for 6 days before being released into fish bearing waters or where it will drain into them" (Baker Petrolite Corporation undated, see Appendix D). Instead of holding water containing Magnacide H in a canal for the period prescribed in the instructions, TID conducts its pesticide application program so that all of the water containing Magnacide H is irrigate out to farm fields.

TID has conducted dye-tracing studies to determine how water flows within its canal system. These studies together with hydrologic calculations are used to determine when Magnacide H has been irrigated out of the system. Flow times have been developed based on these studies and calculations, and are used by TID's field staff as a guideline for canal operations. Monitoring data collected as a requirement of the use of the pesticide (see Section 2.4.5), as well as field test kit information, is used to verify the accuracy of these flow times. Only when enough time has passed and after enough water has been irrigated out of the system, does TID allow water to be discharged from the canal system.

At the beginning of each year a proposed Magnacide H application schedule is developed and used as a guideline for the aquatic weed control program. However, the need for aquatic pesticide application to canals can vary from week-to-week and from season-to-season due to such things as temperature, weed growth, and flow rate in the canals. Therefore, the actual date of application varies from the annual schedule based on need and field conditions. Table 2-1 details the length, surface area, and types of canals treated.

Table 2-1
Water Bodies Treated with Magnacide H

Treated Water Bodies	Estimated Total Length Treated	Estimated Total Surface Area Treated	Estimated Typical Range of Flow Rates
Unlined or partially lined canals	37.6 miles	191 acres	15 to 1,800 cfs
Fully Lined canals	182.5 miles	544 acres	15 to 1,800 cfs

TID targets aquatic weeds for treatment at early stages of growth, when lower concentrations of the pesticide are required to achieve the desired effect. As a result, applications are scheduled frequently, at low doses to control aquatic growth, thereby reducing the amount of pesticide required for each application.

The assessment of the quantity (dosage) necessary for a given Magnacide H application is based on site-specific information, such as water flow, temperature, and weed condition. The label's application guide referenced to weed condition is provided in Table 2-2.

Table 2-2
Weed Growth Condition Chart for Temperatures above 60° F

Condition Code	Magnacide H gallon/cfs (Dosage)
A. Little algae and pondweed less than 6 inches long	0.17
B. Algae (non-floating) and Pondweed less than 12 inches long	0.25
C. Algae (some floating) and Pondweed 12 to 24 inches long	0.50
D. Algae (some floating) and Mature pondweed (over 24 inches)	1.0
E. Choked Condition	1.5

The condition codes are used to describe the general treatment level. Each treatment requires that an application rate be determined. The rate (gallons/hour) to be applied to a canal depends on the condition dosage, temperature factor, canal rate of flow, and contact time. Equations and/or rate tables in the label instructions are used to determine the rate at the time of treatment. The resulting concentration in parts per million (ppm) is a function of the dosage and application time, and is another indicator of general treatment levels. In accordance with label instructions, application concentrations never exceed 15 ppm in any combination of dosage and application time.

Magnacide H is transported to the application site in a portable skid tank mounted on a flatbed truck. Most applications, with the exception of larger canals, are completed in one to two hours. For larger canals the applications typically last longer, in some cases up to six hours. An orifice is used to control the flow of Magnacide H as it leaves the container. The Magnacide H is forced from the container with oxygen-free nitrogen gas set at a specific pressure to deliver the chemical at a steady rate through a hose that is placed in the canal. Once the amount of Magnacide H to be applied to the canal is determined as described above, the applicator will consult a chart to determine the proper orifice size and nitrogen pressure to use to deliver the pesticide to the canal over the application period.

The total amount of Magnacide H applied to TID canals and laterals varies from season-to-season depending on a variety of factors. Between 2000 and 2004, TID used an average of about 4100 gallons per year of Magnacide H, ranging from a low of about 3300 gallons per year in 2001 and 2004 to a high of 5233 gallons in 2002.

2.4.3 Magnacide H

The active ingredient of Magnacide H, approximately 92 to 98 percent, is acrolein (C_3H_4O). An additional 0.1 to 1 percent of the pesticide is acetaldehyde. Inert ingredients, including water, make up the remainder of the product.

The chemical of concern in Magnacide H is acrolein. Acrolein is highly reactive and is a general cell toxicant that reacts with the enzyme systems in plants (Smith and Mao 1995). The amount of acetaldehyde in the pesticide is too small to pose a significant health risk. Acetaldehyde is a compound commonly used as a flavoring agent and adjuvant in food. It is an important component of food flavorings added to milk products, baked goods, fruit juices, candy, desserts, and soft drinks; the concentration of acetaldehyde in food is usually up to 0.047 percent (National Safety Council 2005).

Studies of the application of acrolein to irrigation canals has shown that it does not persist in the environment (Smith et al. 1995, Nordone et al. 1996, and Preus and Kissel 1982). Acrolein begins decomposing as soon as it comes into contact with water through hydrolysis. The initial degradation products are ephemeral in nature and include 3-hydroxypropanal, acrylic acid, allyl alcohol, propionic acid, propanol, and 3-hydroxypropionic acid. All of these degradation products rapidly undergo further degradation (Smith et al. 1995). EPA-mandated studies using radioactive labeled acrolein indicate that the degraded acrolein adds to the naturally present carbon pool used by bacteria and is ultimately mineralized to carbon dioxide (Nordone et al. 1996). Acrolein half-life[1] has been measured in hours, ranging from 4 to 30 hours depending on water temperature, pH, total dissolved solids (TDS) concentration, weed conditions, water flow rate, and other factors (Smith et al. 1995, Nordone et al. 1996, and Baker Petrolite 2004).

No bioaccumulation is likely to occur with acrolein because of its high water solubility and chemical reactivity and its low experimentally determined log *n*-octanol-water partition coefficient of 0.9 (IPSC 2004). Nordone et al. (1998) tested the bioaccumulation of acrolein

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[1] Half-life is the amount of time it takes for the initial treatment concentration to reduce by half.

applied as Magnacide H in two fish species, the bluegill sunfish (*Lepomis macrochirus*) and the channel catfish (*Ictalurus punctatus*), and two freshwater shellfish species, a unionacean clam (*Elliptio complanata*) and the northern crayfish (*Orconectus virilis*). Neither acrolein nor its major oxidative and reductive metabolites, acryclic acid and allyl alcohol, were tested in tissue residues. The authors concluded that there is no evidence of a propensity for acrolein to enter and persist in aquatic food chains.

2.4.4 Best Management Practices

Best Management Practices (BMPs) are methods, measures, or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and non-point source discharges. TID has developed BMPs to maximize the efficacy of the control efforts and minimize impacts to the environment. The following BMPs are used by TID for aquatic pesticide applications and are part of the proposed project:

- Implement the following process for each application.
  1. <u>Preliminary site evaluations</u>. Verify the need for treatment, options to treatment (including non-toxic and less toxic alternatives), and suitability of the site for treatment.
  2. <u>Secondary site evaluations and pre-treatment monitoring</u>. Determine the type and intensity of treatment needed. Includes measurement and analysis of indicators to provide information on potential efficacy and water quality impacts.
  3. <u>Alternative Control Measures</u>. Evaluate other available BMPs and alternative control measures to determine if there are feasible alternatives to the selected aquatic pesticide application project that could reduce potential water quality impacts.
  4. <u>Treatment</u>. Immediately prior to treatment, examine a series of indicators and modify treatment plans accordingly. These indicators may include day length, precipitation, sunlight, water depth, water flows, water turbidity, and wind.
  5. <u>Post-treatment</u>. Assess control efficacy and water quality impacts.
- Obtain an annual permit from the County Agricultural Commissioner (CAC) and submit a Notice of Intent to the CAC and the County 24 hours before applying a restricted pesticide.
- File a Notice of Intent form, including an annual application schedule, with Region 4 of the California Department of Fish and Game (CDFG).
- Follow all pesticide label instructions.
- Comply with DPR and Department of Health Services regulations, and Use Permits issued by the CAC.
- Ensure that all personnel applying restricted aquatic herbicides are trained and licensed (State of California Qualified Applicator Certificates from DPR).
- Obtain a written recommendation from a licensed State of California Pest Control Advisor (PCA) prior to each application.
- Treat aquatic vegetation frequently when vegetation is small, to minimize buildup of vegetation and potential dissolved oxygen depletion due to decaying vegetation.

- Evaluate options to treatment (including nontoxic and less toxic alternatives).
- Verify need for treatment and suitability of the site for treatment prior to each application.
- TID personnel who apply aquatic pesticides are scheduled to receive annual training, prior to the application of aquatic pesticides, which includes the identification of special status species issues within the vicinity of TID. Applicators are required to keep a copy of the training materials available for reference prior to each application event. Applicators document location, date, and time of any identified species; Magnacide H applications within the proposed treatment area will be postponed until potential impacts are evaluated.
- Verify that gates at all potential release points down-canal of the point of application are closed and not leaking prior to treatment, and are kept closed until Magnacide H is no longer present in the system.
- Prior to each treatment, make arrangements to irrigate out the treated water to appropriate sites. Verify that there will be no potential for crop damage, or for field runoff or drainage discharges to waters of the state (all irrigation water must be retained on site).
- Prior to opening gates, conduct the Magnacide H Baker Petrolite Field Test at potential release points.
- Schedule applications at times that avoid changes in canal flow at the treatment site. Flows are monitored occasionally during treatment with applications adjusted, as needed, should flows change.
- Nitrogen tank pressure gauges are calibrated as needed to ensure accurate measurement[2].

2.4.5 Monitoring and Reporting Program

The general NPDES permit requires a monitoring and reporting program for the application of aquatic pesticides. TID has developed a program for its entire canal system, encompassing the fully lined, unlined, and partially lined canals in the system. The general NPDES permit requires monitoring of 10 percent of the total sites where applications are made. TID applies Magnacide H at approximately 23 areas in its entire canal system. Therefore, two representative sampling sites are used to monitor Magnacide H applications. As required and further described below, each application made to either one of the representative sites is monitored for compliance with the permit requirements.

For the purpose of the NPDES permit, a “treatment event” is the period of time that starts with the initiation of the application of Magnacide H in a targeted canal, or targeted portion thereof, and proceeds until the concentration of the aquatic pesticide is below that which can kill the target weed in the canal. The “application area” is the entire length of the targeted canal/canals, or targeted portion thereof, treated during one treatment event. Depending on need, there may be multiple points where Magnacide H is injected into the canal system within an application area during a single treatment event (TID 2005).

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[2] TID has three complete sets of gauges for the pesticide application program. One set is used to start the season. Another set replaces the first set when it is sent in for recalibration during the season. The third set is available at all times as a backup in case there is any problem with the set being used.

The section within the canal system that is treated by the Magnacide H to control weeds is considered the treatment area for the purpose of the NPDES permit. This area consists of the area between the furthest up-canal application point to the furthest point where the treated canal water is able to flow to a control structure.

Within the TID canal system there are essentially two types of applications. The first type is referred to as an "upper canal application" where water is treated in a larger, or upper canal, such as the Main, Turlock Main, Ceres Main or Highline canals. Flows from this type of canal move down-canal through a variety of laterals to control structures within the canal system. For this type of application, the treatment area for each treatment event is defined as that area between the furthest up-canal application point within the application area and the furthest down-canal control structures. Both the furthest up-canal and down-canal locations can vary with each treatment event, depending upon how the canal system is being operated, the aquatic weed growth and need for treatment, as well as the location where the last irrigation head or heads are being delivered.

The second type of application is referred to as a "lower canal application," which takes place in the laterals off of TID's main canals such as Lower Lateral 2 ½, Upper Lateral 3 or Cross Ditch #1. This application represents the situation where the application area and treatment area are the same, and flows from the treatment area are not allowed to leave the canal until all treated water has been irrigated out to agricultural fields. For this type of application, the treatment area for each treatment event is defined to be the area between the furthest up-canal application point and the last control structure in the canal below which the canal can be dewatered or otherwise operated to prevent treated water from flowing outside the treatment area. Both the furthest up-canal and down-canal locations can vary with each treatment event, depending upon how the canal is being operated, the aquatic weed growth and need for treatment, as well as the location where the last irrigation head is being delivered.

As required by the NPDES permit, for each application made to two representative sites, samples are collected and sent to a certified laboratory for analysis. The representative sites include the Ceres Main Canal (representing an upper canal application) and the Lower Lateral 2 ½ (representing a lower canal application). These sampling sites are representative of all types of applications to TID's canal system, including the unlined and partially lined canal sections.

TID has endeavored to standardize the sampling sites. However, due to the nature of the pesticide application program, and changing weed growth conditions, the actual treatment area for a canal may vary between applications. As a result, the specific sampling locations may vary. TID reports the specific sampling sites to the Central Valley RWQCB in their annual report on the aquatic pesticide application program (TID 2005).

TID has developed procedures for pre-monitoring preparation, water sampling, sample preservation and delivery, monitoring equipment calibration and maintenance, quality assurance of field and laboratory sampling and analysis activities, data validation, maintenance of field records, and annual reporting which have been provided to the Central Valley RWQCB. All staff members involved in the monitoring program are trained in water quality field monitoring (including instrument calibration, data recording procedures, and interpretation of collected data) and water sample collection (including proper sampling procedures, quality assurance/quality control, completing laboratory chains of custody, ordering correct laboratory analyses, and proper handling of water samples).

For each application at a representative site, background water samples are taken at an appropriate location up-canal of the furthest up-canal injection point during a particular treatment event. At the time of treatment, TID documents field conditions and verify that water is not allowed to flow outside of the treatment area. Water samples are taken near the end of the treatment area in flowing waters prior to allowing water to be released down-canal outside of the treatment area.

In order to evaluate precision and the potential for field contamination, several samples are collected in the field in addition to the environmental samples. These samples will include equipment blanks, trip blanks, and field duplicates. Equipment blanks are used to verify that sampling equipment is not a source of contamination. Trip blanks are used to determine if sample contamination is introduced during sample transport and delivery. Field duplicates are used to assess variability attributable to sample collection, handling, and matrix heterogeneity.

In the laboratory, several types of samples are used to evaluate precision, accuracy, and the potential for laboratory contamination. These samples include method blanks, laboratory control spikes, and matrix spikes. Method blanks are prepared by the laboratory from reagent-grade deionized water. These blanks are analyzed to determine the potential for laboratory contamination. Laboratory control spikes are prepared by adding a known concentration of the target analyte, in this case acrolein, to distilled water. These blanks are used to analyze the accuracy of laboratory analytical procedures. Matrix spikes are prepared by adding a known concentration of the target analyte to a portion of the environmental sample. This is used to evaluate accuracy of the laboratory analysis and the potential for the sample matrix to interfere with recovery of the target analyte.

As required by the permit, TID provides the Central Valley RWQCB with an annual report on the results of the monitoring program. This report also includes an assessment of compliance with the general NPDES permit, identification of BMPs and a discussion of their effectiveness, specific information on aquatic pesticide applications and the timing of gate closures and reopenings, and recommendations to improve the monitoring program, BMPs, and the aquatic pesticide application plan.

3.1 INTRODUCTION

This focused EIR provides a project-level analysis of the impacts of the continuation of TID's pesticide application program in the unlined and partially lined sections of its canal system. As discussed in *Chapter 1.0: Introduction*, the pesticide application program in the fully lined portions of the canal system was addressed in the Initial Study/Negative Declaration adopted in 2004 and included in Appendix A. Because no significant environmental impacts from the application of Magnacide H to TID's fully lined canals were found by the trial court, that application is not addressed in this EIR.

With respect to pesticide application in unlined and partially lined canals, the trial court in the *Deltakeeper* litigation identified one issue requiring further analysis: the potential for Magnacide H to leach into the groundwater from unlined and partially lined canals. The trial court did not identify other issues requiring further analysis. With the exception of the issue identified by the trial court, the conclusions set forth in the Negative Declaration adopted in January 2004 remain valid, and this EIR does not re-analyze those impacts (Pub. Resources Code, § 21005, subd. (c); *Friends of the Santa Clara River v. Castaic Lake Water Agency* (2002) 95 Cal.App.4th 1373).

This chapter of the EIR discusses the environmental setting, impacts, and mitigation measures in each of the environmental areas that could potentially be impacted by the aquatic pesticide application program in the unlined and partially lined canals and laterals of TID's irrigation system. In accordance with CEQA Guidelines, criteria are provided for each environmental factor that define the threshold for judging when an impact would be considered significant. All impacts identified for the project are evaluated relative to these significance criteria. The significance of impacts is classified as follows:

- A significant impact is one where it can be stated with certainty that an established threshold or significance criterion would be clearly exceeded.
- A potentially significant impact is one where an established threshold/significance criterion may be exceeded; however, based on the information available it cannot be established conclusively.
- A less than significant impact is one where an established threshold/significant criterion would clearly not be exceeded.

Mitigation measures are provided for all significant and potentially significant impacts, and the significance of the residual impact following mitigation is described.

3.2 FOCUS OF EIR

The Initial Study/Negative Declaration adopted by TID in January 2004 evaluated all environmental factors addressed by CEQA. The Initial Study determined that many areas of the environment would not be significantly impacted by the application of aquatic pesticide to the unlined and partially lined sections of TID's canal system. For information purposes, a copy of the Initial Study/Negative Declaration is provided in Appendix A.

The Initial Study/Negative Declaration concluded the project would not have a significant adverse impact on special status species. The trial court in the *Deltakeeper* litigation did not rule that TID had to analyze further this issue in an EIR. For this reason, this focused EIR does not analyze the project's potential impacts on special status species. TID has performed a follow-up special –status species survey of the unlined and partially lined portions of its canal system. This survey confirms the absence of special status species. For information purposes, a copy of this survey appears at Appendix C.

The following discussion summarizes the conclusions of TID's Initial Study/Negative Declaration with respect to impacts other than potential effects on groundwater due to seepage from unlined or partially lined canals.

TID has been applying Magnacide H to its canals and laterals for at least three decades. Continuation of this program would require no construction or other physical disturbance to irrigation facilities or adjacent lands and application procedures would not change. For these reasons, the project would have no impact on aesthetics, agricultural resources, cultural resources, geology and soils, land use and planning, mineral resources, or noise.

The project would not change TID's existing water supply or conveyance systems; therefore, it would not provide for additional agricultural production in the TID service area. For these reasons, it would not induce population growth, alter public service requirements or utilities and service systems, increase the use of existing recreational facilities, induce expansion or creation of new recreational facilities, or increase traffic.

The application sites for Magnacide H are typically located in undeveloped areas away from population centers with sensitive land uses such as residential, community care, and schools. Therefore, sensitive receptors would not be exposed to substantial concentrations of acrolein.

Magnacide H is registered for use in California as an aquatic pesticide. The DPR evaluates all registered pesticides including their fate and transport characteristics in water, soil, and air to ensure that no unacceptable risk to the environment occurs when the pesticide is used in accordance with label instructions. The application of Magnacide H would be temporary in nature and would not affect any of the pollutants measured for air quality in the San Joaquin Valley; therefore, its use by TID would not conflict or obstruct attainment of any applicable air quality plan. At present, the manufacturer of Magnacide H in coordination with the San Joaquin Valley Air Pollution Control District (SJVAPCD) is field testing the air quality effects of pesticide application. The SJVAPCD may or may not require controls on application procedures following this testing. In the event that controls are required, TID would comply with SJVAPCD's requirements.

During an application of Magnacide H, an objectionable odor can be detected at distances up to about 100 yards from the application site. The odor is temporary and dissipates quickly following application of the pesticide. As indicated above, application sites are typically remote from sensitive receptors. In addition, TID staff is present during the entire application process, and if necessary, direct people away from the immediate area should someone come near the treatment site.

Magnacide H is an acutely toxic and hazardous material. In accordance with state law, all personnel applying Magnacide H are trained and licensed pesticide applicators. Magnacide H is applied in accordance with label instructions, which have been approved by DPR to ensure that risks to human health and the environment are avoided. The material is transported in accordance with U.S. Department of Transportation regulations to minimize the potential for accidental release to the environment. Packaging materials are disposed of in an approved, licensed landfill.

For these reasons, routine transport and use of Magnacide H and disposal of pesticide packaging does not result in significant hazards to the public or the environment.

As discussed in *Chapter 2.0: Description of the Proposed Project*, the TID canals are operated to ensure no water spills from the canal system until treated water has been irrigated out of the system. When it is applied, Magnacide H blends with the water in the canal and flows in a discrete plume down the canal at the same rate of flow as the water. TID schedules irrigation deliveries down-canal of an application to ensure all of the water in the canal is delivered to irrigation customers while Magnacide H may be present. This process results in water containing Magnacide H being completely diverted from the canal system at various locations down-canal of an application. The water diverted for irrigation is then replaced by freshwater flows from up-canal. Prior to releasing water from the canal, field tests are conducted to provide additional information to ensure, to the extent possible in the field, that Magnacide H is not present. As required by the NPDES permit, samples are also collected at two representative application sites and sent to a certified laboratory for analysis, providing further verification that the process used to irrigate out the Magnacide H is working effectively. For these reasons, the project would not result in the discharge of Magnacide H to any river.

The unlined and partially lined sections of the TID canal system do not constitute important habitat for any special status species. These canals are man-made facilities constructed in uplands. They are designed, operated, and maintained to deliver water seasonally for irrigation of agricultural land. They are not operated and maintained to provide wildlife habitat. Therefore, the application of Magnacide H to the water in unlined and partially lined sections of the TID canal system would not have a significant impact on special status species.

In its ruling on the Petition of Writ of Mandate, the trial court ruled that TID did not adequately respond to evidence of the potential for Magnacide H to leach into the groundwater from TID's unlined and partially lined canals. This EIR focuses on responding to this issue.

3.3 HYDROGEOLOGY AND GROUNDWATER WATER QUALITY

3.3.1 Regulatory Setting

The Porter-Cologne Water Quality Control Act is the primary California regulation that addresses groundwater quality. The requirements of the act are implemented by the SWRCB at the state level and the RWQCB at the regional level. Under the provisions of the Porter-Cologne Act and the federal Clean Water Act, the Central Valley RWQCB regulates groundwater quality in the Central Valley. The Water Quality Control Plan for the Central Valley Basin (Basin Plan) describes the water-quality control measures that contribute to the protection of the beneficial uses of the groundwaters encompassed by the region. The Basin Plan identifies beneficial uses for groundwater, water quality objectives for the reasonable protection of those beneficial uses, and an implementation plan for achieving those objectives. Beneficial uses of groundwater in the Central Valley identified in the Basin Plan include:

- Municipal and domestic water supply
- Industrial process water supply
- Industrial service supply

- Agricultural water supply

The SWRCB has established a policy of non-degradation for the protection of water quality in the state, including groundwater (Resolution 68-16). The policy states, in relevant part, that whenever the existing quality of water is better than the quality established in policies as of the date on which such policies became effective, such existing water quality will be maintained until it has been demonstrated to the state that any change will be consistent with the maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies. The California legislature has stated, "each regional board shall establish such water quality objectives in water quality control plans as in its judgment will ensure the reasonable protection of beneficial uses and the prevention of nuisance; however, it is recognized that it may be possible for the quality of water to be changed to some degree without unreasonably affecting beneficial uses" (Water Code Section 13241). The SWRCB has also established the policy that unless certain criteria are met, groundwaters are considered either existing or potential sources of municipal or domestic supply (Resolution 88-63). The exemption criteria potentially applicable to the groundwaters of the Turlock Subbasin of the San Joaquin Valley are:

- TDS exceed 3000 milligrams/liter (mg/L), and it is not reasonably expected by Regional Water Quality Control Boards to supply a public water system
- There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable practices
- The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day

3.3.2 Environmental Setting

3.3.2.1 Groundwater Hydrology

The Central Valley aquifer system, which covers the entire Central Valley of California, has recently been defined as a single heterogeneous aquifer system. Roughly the southern third of the aquifer is defined as the San Joaquin Valley groundwater basin. This basin is a structural trough up to 200 miles long and 70 miles wide. It is filled with up to 32,000 feet of marine and continental sediments deposited during periodic inundation by the Pacific Ocean and by erosion of the surrounding mountains. Continental deposits from the mountains form an alluvial wedge that thickens from the valley margins towards the axis of the structural trough. This depositional axis is below to slightly west of the rivers, lakes, sloughs, and marshes that mark the current and historic axis of surface drainage in the San Joaquin Valley (DWR 2004).

For purposes of management, DWR has divided the San Joaquin Valley groundwater basin into subbasins. TID lies within the Turlock Subbasin, which is located between the Tuolumne and Merced rivers and is bounded on the west by the San Joaquin River and on the east by crystalline basement rock of the Sierra Nevada foothills. The following description of groundwater hydrology in the subbasin is from DWR Bulletin 118 (2004).

"The primary groundwater units in the Turlock Subbasin consist of consolidated and unconsolidated sedimentary deposits. The consolidated deposits include the Ione Formation of Miocene age, the Valley Springs Formation of Eocene age, and the Mehrten Formation deposited during the Miocene to Pliocene epochs. The consolidated deposits lie in the eastern portion of the subbasin and generally yield small quantities of water to wells except for the Mehrten Formation which is an important aquifer. This formation is composed of up to 800 feet of sandstone, breccia, conglomerate, siltstone, and claystone.

Unconsolidated deposits include continental deposits, older alluvium, younger alluvium, and flood-basin deposits. Lacustrine and marsh deposits, which constitute the Corcoran or E-clay barrier to groundwater flow (aquitard), underlie the western half of the subbasin at depths ranging between about 50 and 200 feet. The continental deposits and older alluvium are the main water bearing units in the unconsolidated deposits. The lacustrine and marsh deposits and the flood deposits yield little water to wells. In most places, the younger alluvium probably yields only moderate quantities of water.

Groundwater in the consolidated rocks is semi-confined to confined. Groundwater beneath the E-clay in the western part of the subbasin is confined. Groundwater flow is primarily to the southwest, following the regional dip of basement rock and sedimentary units. Based on groundwater measurements done by DWR in 2000, a paired groundwater mound and depression appear beneath the city of Turlock and to the east, respectively. The lower to middle reaches of the Tuolomne River and the reach of the San Joaquin River in the subbasin appear to be gaining streams (i.e., streams being recharged by groundwater). No faults have been identified that affect the movement of groundwater.

On the average the water level in the Turlock Subbasin has declined nearly seven feet between 1970 and 2000. The period from 1970 through 1992 showed a generally steep decline totaling about 15 feet. From 1992 to 1994, water levels stayed near this low level. From 1994 to 2000, water levels rebounded about eight feet, bringing them to approximately seven feet below the 1970 levels. Water level declines have been more severe in the eastern portion of the subbasin after 1982.

Estimations of the total storage capacity of the subbasin and the amount of water in storage as of 1995 were calculated using an estimated specific yield of 10.1 percent and water levels collected by DWR and cooperators. According to these calculations, the total storage capacity of the subbasin is about 15.8 million acre-feet to a depth of 300 feet and 30 million acre-feet to the base of fresh groundwater.

Natural recharge of the subbasin was estimated to be 33,000 acre-feet by DWR. Applied water recharge was calculated to be 313,000 acre-feet. Annual municipal and agricultural extraction was calculated at 65,000 and 387,000 acre-feet, respectively."

3.3.2.2 Groundwater Quality

The groundwater of the Turlock Subbasin is predominantly of the sodium-calcium bicarbonate type, with sodium bicarbonate and sodium chloride types at the western margin and a small area in the north-central portion of the subbasin. Total dissolved solids (TDS) ranges from 100 to 8300 mg/L, with a typical range of 200 to 500 mg/L (DWR 2004). Groundwater with a TDS greater than about 1000 mg/L is generally not palatable and as indicated in Section 3.3.1, groundwater with a TDS greater than 3000 mg/L is generally not considered suitable for domestic or municipal water supplies in the Central Valley Basin Plan.

There are localized areas of groundwater that contain high concentrations of nitrate, chloride, boron, and DBCP. Some sodium chloride type water of high TDS is found along the west side of the subbasin. Two wells in the city of Turlock have been closed, one for nitrate and one for carbon tetrachloride (DWR 2004).

Seven groundwater monitoring wells were developed adjacent to the unlined and partially lined portions of TID canals in 2005 (Figure 3-1). Groundwater from each well was sampled for acrolein in July 2005. No acrolein was detected in the groundwater samples collected on July 6 and 7, 2005 (reporting limit of 20 μg/L or 20 parts per billion [ppb]). The laboratory reports are provided in Appendix D. These results provide evidence that groundwater is not currently contaminated with acrolein; however, since no Magnacide H has been applied to the unlined or partially lined canal sections in 2005, these sampling results do not conclusively show that acrolein would not reach groundwater after application to the unlined and partially lined canals. As described below, modeling was conducted to analyze the potential impacts.

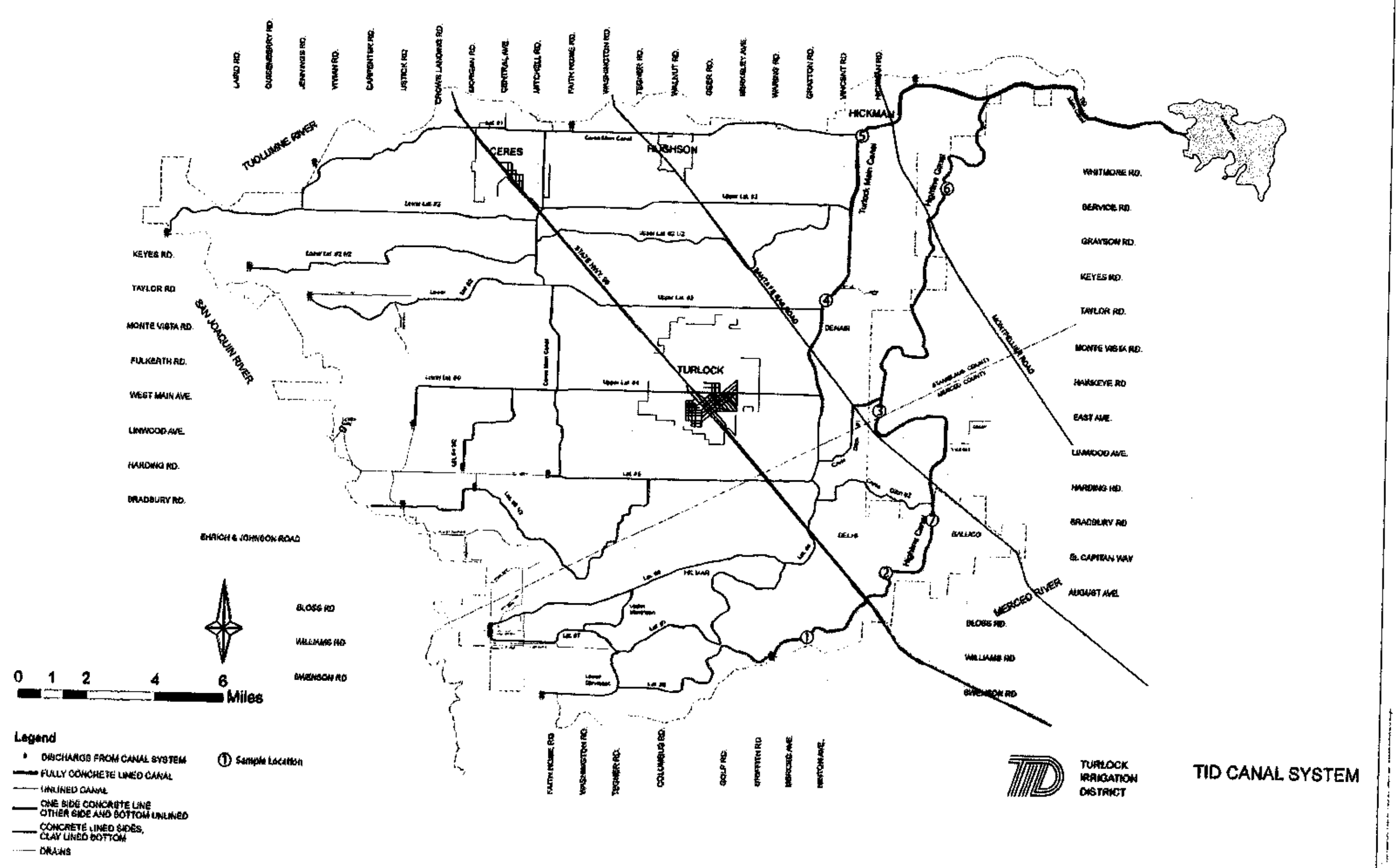
3.3.3 Impact Assessment Methodology

Operation of the TID irrigation system is dictated by hydrologic conditions and the irrigation water delivery schedule established by TID and its farm customers. The application of Magnacide H does not drive these operations and therefore has no impact on groundwater hydrology. For this reason, the impact assessment focuses on groundwater quality.

Potential impacts to groundwater quality from seepage of acrolein through unlined and partially lined sections of canals was evaluated using the computer model VS2DT. This model was developed by the U.S. Geologic Survey to simulate flow and solute transport in variably saturated porous media, and can estimate the movement of chemicals through the vadose zone (i.e., the soil layer between the surface of the ground and the surface of the groundwater table) into the groundwater.

The potential migration of acrolein into groundwater from unlined and partially lined canals was modeled at three locations (Sites 1, 2, and 4 on Figure 3-1). Groundwater elevations and soil types for the modeling were collected from seven borings developed into monitoring wells in 2005. Modeling was done for those locations with the shallowest groundwater elevations (24.3 to 34.5 feet below ground surface) and soils that were fairly representative of other areas that are crossed by the canal sections that are unlined or partially lined. This provided worst case scenarios in terms of the potential for acrolein to leach from the canals to the underlying groundwater. In modeling the movement of acrolein from the canals into soil, the rapid degradation and volatilization of acrolein in canal water was not considered, although dilution of the chemical in the canal water was taken into account. This provided a maximum concentration of acrolein in water at the point it begins infiltrating the ground below the canal. Degradation of acrolein in the vadose zone was taken into consideration in modeling. A description of the modeling study, including modeling assumptions, is provided in Appendix D.

Figure 3-1. Groundwater Study Sites



Note: The portions of the canal system evaluated in this EIR have been emphasized with a heavier line for the convenience of the reviewer.

Significance Criteria

Water quality impacts would be considered significant if concentrations of acrolein in groundwater exceed levels expected to cause chronic health effects if the groundwater is used as drinking water. The chronic threshold was used for the measure of significance rather than concentrations that would cause acute health effects because the concentration for chronic health effects is lower. Concentrations of acrolein that would not result in chronic health effects would also not result in acute health effects.

No state or federal drinking water standards (Maximum Contaminant Levels) exist for acrolein. The Central Valley RWQCB has reported a literature-based taste and odor threshold of 110 ppb for acrolein and the EPA National Ambient Water Quality Criteria for sources of drinking water is 290 ppb for acrolein. The concentration used in this analysis is the oral reference dose (RfD) for acrolein of 3.5 parts per billion (ppb) that is reported in the EPA Integrated Risk Information System (IRIS) (EPA 2005). Health assessment information on a chemical substance is included in IRIS only after a comprehensive review of chronic toxicity data by EPA health scientists. The RfD is an estimate with uncertainty spanning perhaps an order of magnitude of a daily oral exposure to the human population (including susceptible subgroups) that is likely to be without an appreciable risk of adverse health effects over a lifetime (EPA 2005). It is derived from a Benchmark Dose Limit (BMDL)[3], No-Observed-Adverse-Effect Level (NOAEL), Lowest-Observed-Adverse-Effect Level (LOAEL) or another suitable point of departure, with uncertainty/variability factors applied to reflect limitations of the data used (EPA 2005). A predicted exceedence of the threshold of 3.5 ppb does not necessarily mean that a significant impact would occur; it indicates only that a significant impact is possible under certain conditions, and further evaluation would be warranted. Because 3.5 ppb is the lowest RfD reported by IRIS, it can be inferred with a high degree of confidence that as long as the maximum predicted concentration of acrolein in groundwater is below this threshold, no significant impact is likely to occur.

3.3.4 Potential Project Impacts

Potential Impact 3.3-1:	Magnacide H applied to the water in unlined and partially lined sections of the TID canal system could percolate into underlying groundwater resulting in contamination of drinking water supplies.
Significant:	Less than significant
Mitigation:	None warranted

As described in Section 3.3.3 above and in Appendix D, groundwater quality modeling was done at three locations adjacent to the unlined and partially lined sections of the TID canal system where groundwater was shallow, ranging from 24.3 to 34.5 feet below the ground surface (20.2 to 30.7 feet below the bottom of the canal). In conducting the modeling, it was assumed that

[3] A Benchmark Dose Limit is a statistical lower confidence limit on the dose that produces predetermined change in response rate of an adverse effect compared to background (EPA 2005).

acrolein did not degrade or volatilize when it was in the canal. In actuality, acrolein begins to rapidly degrade as soon as it is introduced to water. The results of the modeling provided an acrolein concentration in the vadose zone water at the surface of the groundwater table ranging from 0.0006 to 2.0 ppb depending on the application scenario and the specific location. Because these concentrations are located in water immediately above the groundwater table, they represent concentrations higher than would occur after vadose zone water mixes with groundwater. As the acrolein mixes with groundwater, it would be diluted and the concentration of the pesticide would become substantially less. Because the maximum concentration of acrolein modeled for groundwater using worst case assumptions (e.g., maximum impact) is below the screening threshold, the use of Magnacide H in unlined and partially lined sections of the TID canal system would have a less-than-significant impact.

Groundwater beneath portions of the unlined and partially lined canals has the potential to ultimately discharge to either the Tuolumne or Merced rivers. As indicated in the NMFS comment letter on the Notice of Preparation (NOP) (Appendix E), the EPA has proposed a chronic (four-day average exposure not exceeded more than once very three years) acrolein water quality criterion for the protection of freshwater organisms of 2.9 ppb. Modeling has indicated that the worst-case concentration of acrolein in the vadose zone is below this criterion even before vadose zone water mixes with groundwater. By the time the vadose zone water has diluted in groundwater, and acrolein has further degraded as the groundwater moves down-gradient, it would be undetectable in the groundwater discharging into either the Tuolumne or Merced rivers.

Where a significant or potentially significant environmental impact is found to exist, CEQA requires an EIR to describe and evaluate a range of reasonable alternatives to the proposed project. The purpose of the analysis is to evaluate alternatives that may eliminate significant environmental impacts while at least partially meeting project objectives. This is done to foster informed decision-making and public participation in the environmental process.

As discussed in *Chapter 3.0: Environmental Setting, Impacts, and Mitigation*, no significant impacts have been identified for the continuation of the TID program to apply Magnacide H to the unlined and partially lined sections of its canal system. However, to foster informed decision-making and public participation in the environmental process, TID has nonetheless considered alternatives to this project and in accordance with the general NPDES permit will continue to evaluate alternatives to the use of Magnacide H.

4.1 NO PROJECT ALTERNATIVE

Under the No Project Alternative, TID would not apply Magnacide H to the unlined and partially lined sections of its canals. The aquatic pesticide would continue to be used to control aquatic weeds and algae in the contiguous fully lined canals and laterals, which comprises about 76 percent of the irrigation system, all of which are down-canal of the unlined and partially lined canal sections.

In 2005, TID did not apply Magnacide H to the unlined and partially lined sections of the canal system. Instead, TID removed weeds from these canal sections using mechanical methods. Therefore, it can be expected that under the No Project Alternative TID would continue to use mechanical means to remove aquatic weeds from portions of the Main Canal, Turlock Main Canal, and Highline Canal and a small section of Cross Ditch #1. During the irrigation season, this would be done by such methods as raking or chaining the canals. In the winter, weeds that had become established during the irrigation season could be excavated from the canals.

This method of aquatic weed control is very expensive and labor intensive. It can cause damage to the structural integrity of the canals, and the Main, Turlock Main, and Highline canals are principal arterials that convey water to the rest of the irrigation system. Mechanical vegetation removal often results in generation of high levels of turbidity and plant debris in the water. For sprinkler, drip, and micro-irrigation systems, this will result in the clogging of filters, emitters, and orifices creating inefficiencies in water use and application. Continual use of mechanical cleaning could discourage and even prevent farmers that divert water from those canals from using or installing these low head irrigation systems.

As indicated in *Chapter 3.0: Environmental Setting, Impacts, and Mitigation*, the No Project Alternative would not improve environmental conditions relative to the proposed project since the proposed project would not result in significant impacts. However, the No Project Alternative would decrease the efficiency of system operations and increase maintenance and operational costs to TID and many of its irrigation customers.

4.2 DYES

Dyes that block ultraviolet light are sometimes used to control the growth of aquatic weeds. The dyes must remain in the water for long periods of time to be effective; therefore, this method is only practical in water bodies that have little or no current. It is not practical to use these materials in TID's irrigation system because of the high flow rates required for water distribution.

4.3 WATER LEVEL MANIPULATION

As indicated in Section 2.4.1, TID uses manipulation of water level as much as possible to control the growth of aquatic weeds. However, during the irrigation season, it is not possible to keep portions of the canal system dry for a long enough period of time to completely kill aquatic weeds. Therefore, this is not a practical alternative for aquatic weed control throughout the irrigation system.

4.4 OTHER AQUATIC PESTICIDES

Environmental factors were considered by TID in the selection of Magnacide H. It is effective at suppressing aquatic weeds and algae and it degrades quickly so that TID can control it within the irrigation system. No other aquatic pesticide has been identified by TID that can be used for these purposes as safely and effectively as Magnacide H. Other aquatic pesticides that TID has considered in the past are either less effective at controlling the aquatic weeds that are present in TID's canals or the permitted uses of the water following application restricts TID's ability to efficiently operate the irrigation system, or both.

4.5 OTHER ALTERNATIVES

A potential alternative consists of exclusive reliance on mechanical removal of weeds from unlined and partially lined canals. This alternative is already encompassed by the No Project Alternative, as described above.

No other alternatives have been identified to control the growth of aquatic weeds in TID's unlined and partially lined canals. No off-site alternative is considered because the canal system is already constructed.

The Merced Irrigation District to the south of TID is the only other irrigation district that has canals that could potentially be treated with Magnacide H in the Turlock Subbasin. The proposed project in combination with the application of aquatic pesticides by Merced Irrigation District, would not be expected to result in cumulative impacts to groundwater quality. As discussed in Section 3.3.4, the concentration of acrolein in water seeping from TID's unlined and partially lined canals would be substantially below the reference dose for health effects and the EPA proposed chronic water quality criteria for the protection of aquatic life before it mixes with groundwater. The acrolein would be undetectable shortly after entering groundwater because of dilution and continued rapid degradation. Therefore, it would not cause a cumulative impact to groundwater quality in combination with the activities of Merced Irrigation District.

Treated water applied to agricultural fields in the District in combination with the application of Magnacide H to TID's unlined and partially lined canals would not result in cumulative impacts to groundwater quality. Laboratory and field studies have shown that major factors determining the speed at which acrolein degrades in water are pH, temperature, and TDS. As these three factors increase, acrolein degrades faster (Baker Petrolite Corporation 2004, Nordon et al. 1996, and Smith et al. 1995). For example, the hydration half-life of acrolein under laboratory conditions was reported as 3.5 days at pH 5, 1.5 days at pH 7, and 4 hours at pH 10 (Baker Petrolite Corporation 2004). All of the agricultural land that is irrigated by water from TID has a pH greater than 7. When irrigation water is applied to a field, the temperature of the water generally increases as the water spreads out and is heated by the ground and sun. As the water flows over the fields, it picks up salts from the soil, increasing both the TDS and pH of the water. Other factors that also increase the rate at which acrolein degrades when treated water is applied to farm fields include absorption onto organic matter in the soil, microbial transformation, and mineralization.

A monitoring study was conducted in Kern County, California to measure the dissipation of acrolein across fields irrigated with treated water (Baker Petrolite Corporation 2004). Both flood and furrow irrigation were investigated. In the furrow irrigation study, the acrolein concentration dropped from an initial value of 10.9 ppm to non-detectable (<10 ppb) at 600 feet down the furrow. In a flood irrigated field, the acrolein concentration dropped from the initial concentration of 4.2 ppm to non-detectable (<10 ppb) at 400 feet down the field.

The studies show that acrolein quickly degrades to concentrations below 10 ppb as it is applied to agricultural fields. This degradation would continue as the treated water infiltrates the soil. If there were any acrolein remaining when the water reached the groundwater table, even where the water table is only a few feet below the ground surface, it would be diluted by an order of magnitude or more as it mixed with the groundwater. Movement of groundwater down-gradient takes many hours or days even in sandy soils. Any acrolein present in the water would further degrade as it moved down-gradient in the groundwater table. Therefore, it is unlikely to be detectable within a few feet of the point where it first enters the groundwater table. Because of this, there would be no cumulative groundwater quality impact from percolation of treated water from irrigated fields and treated water from TID's unlined and partially lined canals.

Land uses along the lower San Joaquin River consist primarily of rural residential and agricultural areas until the river enters the Sacramento-San Joaquin River Delta near the community of Vernalis, below the confluence with the Stanislaus River. Land use in the Tuolumne River watershed is primarily agriculture. Urban land uses in the lower reaches of the Tuolumne River watershed include the cities of Turlock, Modesto, Hughson, and Ceres, and the communities of Denair and Keyes. Land use in the Merced River watershed is primarily open space (foothill pasture) within the upper reaches and agriculture in the lower reaches. A few rural communities are located within the watershed with the largest being the towns of Hilmar and Delhi.

The proposed project directly affects TID's canal system, thereby indirectly affecting the beneficiaries of the water, primarily agricultural land uses within TID's irrigation boundaries and adjacent land uses. To the extent that water resources and habitats could be affected by the application of Magnacide H in the unlined and partially lined sections of the TID canal system, local general plan policies are of interest. The relevant plans are the Merced County and Stanislaus County general plans.

Mandatory elements of these general plans that have bearing on the proposed project are land use, agriculture, fish and wildlife habitat, water resources, and conservation. The goals and policies of these elements for both counties are listed in Table 6-1.

Table 6-1
County General Plan Policy Summary

County	Goals and Objectives
Merced	▪ Appropriately designate rural areas to meet the agricultural, grazing, wildlife habitat, recreational, natural resource, and open-space needs of the county. ▪ Protect rare and endangered species from urban development and recognize them in rural areas. ▪ Protect surface and groundwater resources from contamination, evaporation, and inefficient use. ▪ Support measures to protect and improve water quality.
Stanislaus	▪ Conserve water resources and protect water quality in the county. ▪ Provide for the long-term conservation and use of agricultural land. ▪ Protect fish and wildlife species in the county. ▪ Protect the natural resources that sustain agriculture in the county.

Source: Merced County 1990 and Stanislaus County 1994.

The proposed project is consistent with the policies listed in Table 6-1. Because land uses would not be physically altered, local zoning and related land use controls are not an issue. The project would not directly or indirectly result in the following actions:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use.
- Conflict with existing zoning for agricultural use or a Williamson Act contract.

- Involve other changes in the existing environment, which, due to their location or nature, could result in conversion of farmland to non-agricultural use.

As discussed in *Chapter 3.0: Environmental Setting, Impacts, and Mitigation* the proposed project would not impact groundwater quality.

7.1 SIGNIFICANT UNAVOIDABLE ADVERSE IMPACTS

The proposed project would have no significant impacts. Therefore, it would not have significant unavoidable adverse impacts.

7.2 GROWTH-INDUCING IMPACTS OF THE PROJECT

The proposed project would not alter the amount of water available to TID or its agricultural customers. The project would not change the use of TID's water from farmland irrigation. Therefore, the project would have no growth-inducing impacts.

7.3 IRREVERSIBLE CHANGES/IRRETRIEVABLE COMMITMENT OF RESOURCES

As discussed in Section 2.4.3, Magnacide H is not persistent in the environment, with a half-life in water of 5.5 to 30 hours. Acrolein, the active ingredient of Magnacide H, also does not bioaccumulate. For these reasons, its continued use in the unlined and partially lined sections of the TID canal system would not result in irreversible changes or irretrievable commitments of resources.

8.1 PERSONS AND AGENCIES CONTACTED

On June 22, 2005, TID mailed a Notice of Preparation (NOP) announcing the preparation of this Draft EIR to the California State Clearinghouse, SWRCB, CDFG, National Marine Fisheries Service (NMFS), DeltaKeeper, Protect Our Water, and San Joaquin Raptor Rescue Center. The NOP, which is provided in Appendix E, provided a brief description of the project and solicited comments on the issues that should be addressed in the document. The NOP also announced a public scoping meeting to be held at TID on July 28, 2005. A single response was received on the NOP. That response was provided by NMFS and is included in Appendix E.

8.2 SCOPING

TID convened a public scoping on July 28, 2005, to solicit comments from the public and interested agencies on the issues that should be addressed in the EIR. No member of the public or government agency attended the meeting.

TID

Preparer / Contributor	Degree(s) / Years of Experience	Experience and Expertise	Role in Preparation
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URS

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Griffith and Masuda

Preparer / Contributor	Degree(s) / Years of Experience	Experience and Expertise	Role in Preparation
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Morales, G.	J.D., Law BS, Civil Engineering 9 years	Water Quality CEQA Compliance	Legal Counsel

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Appendix A

Aquatic Pesticide Application Program for the Turlock Irrigation District Initial Study/Negative Declaration

NEGATIVE DECLARATION

Pursuant to Section 21000 et. Seq. of the Public Resources Code, State of California, a Negative Declaration is adopted for the following project.

1. **Project Name:** **Aquatic Pesticide Application Program for the Turlock Irrigation District**

2. **Project Location, Description and Alternatives:**

The Proposed Project is located in the San Joaquin Valley, in the counties of Stanislaus and Merced.

Cities: Project area includes cities of Ceres, South Modesto, Turlock, and Hughson and communities of Denair, Keyes, Ballico, Hilmar, Delhi and La Grange

Counties: Stanislaus and Merced

The Proposed Project is the continuation of an aquatic pesticide application program conducted by Turlock Irrigation District since 1975. The program has been regulated since 2002 under the State Water Resources Control Board (SWRCB) Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Discharges of Aquatic Pesticides (Water Quality Order No. 2001-12-DWQ, General Permit No. CAG990003). The proposed project would occur under a new General Permit in 2004 and is expected to be equivalent to the current program. The proposed program would be implemented for a period of approximately 5 years, or for the term of the new General Permit.

Turlock Irrigation District applies aquatic pesticides to its facilities to control weeds and algae that interfere with irrigation conveyance, clog waterways and pumps, and cause canal overtoppings. To conserve water and maximize the efficiency of irrigation, many landowners currently use sprinkler, drip, or micro-irrigation systems. These systems require irrigation water to be clean and free of vegetative debris that will clog machinery. Aquatic weeds can also cause treatment problems for municipal water supplies.

The proposed project includes the Best Management Practices/Standard Operating Procedures listed in Section 2.2.2.2 of the Initial Study. In addition, the District will implement special-status species awareness training seasonally for District personnel, prior to the application of aquatic pesticides.

A variety of alternative measures were considered in the analysis, including the No Project alternative, as well as other control measures.

3. **Project Sponsor:**

Turlock Irrigation District
333 East Canal Drive
P.O. Box 949
Turlock, CA 95381

4. Preparation of Environmental Documents and Public Review

This Negative Declaration was prepared by the Turlock Irrigation District. Copies may be obtained at the following address:

Turlock Irrigation District
333 East Canal Drive
Turlock, CA 95380

Contacting the Water Resources and Regulatory Affairs Administration at: (209) 883-8428.

Materials used in preparation of the Initial Study are available for review at this address during the following hours:

Monday - Friday, 8:30 am to 4:00 pm

The public review period concluded on January 21, 2004. Comments were submitted to Debra C. Liebersbach, Turlock Irrigation District, P.O. Box 949, Turlock, CA 95381; fax (209) 656-2180. No additional public review is required.

5. Finding of No Significant Effect on the Environment

Pursuant to the California Environmental Quality Act (CEQA) of 1970, as amended, an Initial Study for the Aquatic Pesticides Application Program has been conducted to identify any significant environmental effects of the project and to determine whether an Environmental Impact Report or Negative Declaration should be prepared.

Based on the attached Initial Study (IS), the summary of comments received during the public review period and shortly thereafter, and responses to those comments, and with an opportunity for additional public comments at a meeting on January 30, 2004, it is determined that:

An Environmental Impact Report is not required. There is no substantial evidence, in light of the whole record before the District, that the Proposed Project may have a significant effect on the environment. There would be no new construction or alteration of facilities; no new irrigation of lands; and no substantial changes in the operation of the irrigation water conveyance and water storage facilities. The proposed treatments are not likely to have a substantial adverse effect, either directly or through habitat modifications, on special-status species over existing conditions.

Based on the finding that no significant impacts were identified for the project, it is concluded that a Negative Declaration is the appropriate CEQA action.

Larry Weis

Larry Weis, General Manager
Turlock Irrigation District
CEQA Lead Agency

Date: 1/30/04

Notice of Determination

To: X Office of Planning and Research
1400 Tenth Street, Room 121
Sacramento, CA 95814

X County Clerk
County of: San Joaquin___ Stanislaus X Merced X Mariposa___

From: Turlock Irrigation District
333 East Canal Drive
Turlock, , CA 95380

Subject: Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.

Project Title: Aquatic Pesticide Application Program for the Turlock Irrigation District

State Clearinghouse Number	Lead Agency Contact Person	Area Code/Telephone/Extension
2003122100	Debra C. Liebersbach	(209) 883-8428

Project Location *(include county)*
San Joaquin Valley in Stanislaus and Merced Counties

Project Description:
The Proposed Project is the continuation of an aquatic pesticide application program conducted by Turlock Irrigation District since 1975. The program has been regulated since 2002 under the State Water Resources Control Board (SWRCB) Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Discharges of Aquatic Pesticides (Water Quality Order No. 2001-12-DWQ, General Permit No. CAG990003). The proposed program would occur under a new General Permit in 2004 and is expected to be equivalent to the current program. The proposed program would be implemented for a period of approximately 5 years, or for the term of the new General Permit.

Turlock Irrigation District applies aquatic pesticides to its facilities to control weeds and algae that interfere with irrigation conveyance, clog waterways and pumps, and cause canal overtoppings. To conserve water and maximize the efficiency of irrigation, many landowners currently use sprinkler, drip, or micro-irrigation systems. These systems require irrigation water to be clean and free of vegetative debris that will clog machinery. Aquatic weeds can also cause treatment problems for municipal water supplies.

The proposed project includes the Best Management Practices/Standard Operating Procedures listed in Section 2.2.2.2 of the Initial Study. In addition, the District will implement special-status species awareness training seasonally for District personnel, prior to the application of aquatic pesticides.

A variety of alternative measures were considered in the analysis, including the No Project alternative, as well as other control measures

This is to advise that the Turlock Irrigation District
Lead Agency *Responsible Agency*
as the lead CEQA agency has approved the above described project on January 30, 2004 and has made the following determinations regarding the above described project.

1. The project [☐ will ■ will not] have a significant effect on the environment.
   A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
2. An Environmental Impact Report was not prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [☐were ■ were not] made a condition of the approval of the project.
4. A Statement of Overriding Considerations [☐ was ■ was not] adopted for this project.
5. A final Negative Declaration was prepared and certified for this project by the Turlock Irrigation District pursuant to the provisions of CEQA.

This is to certify that the Negative Declaration and supporting Initial Study with comments and record of project approval is available to the General Public at:

Turlock Irrigation District, 333 East Canal Drive, P.O. Box 949, Turlock, CA 95381 (209) 883-8428

Signature: Larry Weis, Turlock Irrigation District — January 30, 2004 (*Date*) — General Manager (*Title*)

Date received for filing and posting at OPR: __________

AQUATIC PESTICIDE APPLICATION PROGRAM FOR THE TURLOCK IRRIGATION DISTRICT

CEQA INITIAL STUDY

Prepared for
Turlock Irrigation District
P.O. Box 949
333 E. Canal Drive
Turlock, CA 95381

December 23, 2003

URS

URS Corporation
500 12th Street, Suite 200
Oakland, California 94607

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Tables

Figures

Acronyms

BMPs	best management practices
CAC	County Agricultural Commissioner
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
DDT	dichlorodiphenyltrichloroethane
DFG	California Department of Fish and Game
DPR	California Department of Pesticide Regulation
EC	electrical conductivity
gpm	gallons per minute
ID	Irrigation District
NPDES	National Pollutant Discharge Elimination System
ppm	part(s) per million
Reclamation	Bureau of Reclamation
SWRCB	California State Water Resources Control Board
USFWS	U.S. Fish and Wildlife Service
WQOs	Water Quality Objectives

1 BACKGROUND

Project Title:	**Aquatic Pesticides Application Program**
Application Number:	Not applicable
Project Location:	Regional Location: San Joaquin Valley in central California District: The Proposed Project applies to the Turlock Irrigation District facilities, located within Stanislaus and Merced counties (east of the San Joaquin River, south of the Tuolumne River and north of the Merced River).
Assessor Parcel No.(s):	Not applicable
Lead Agency:	Turlock Irrigation District
Project Sponsor's Name and Address:	Larry Weis, General Manager Turlock Irrigation District 333 East Canal Drive P.O. Box 949 Turlock, California 95381-0949
Other Agencies Whose Approval is Required:	State Water Resources Control Board
General Plan Designation:	The Stanislaus and Merced County General Plan (Land Use Element) applies to the District's entire service area (project site); therefore all the County's general plan land use designations are applicable. Where incorporated areas are included in the District, the cities of Hughson, Ceres, Modesto, and Turlock land use plans would apply and govern if there are any differences between the county and city general plans.
Zoning Designation:	Since the location of the Proposed Project is the entire service area of the Turlock Irrigation District, specific zoning designations are those contained in the Stanislaus and Merced county General Plan(s) (Land Use Element) for unincorporated areas and the general/land use plans for the Cities of Hughson, Ceres, Modesto and Turlock for the incorporated areas
Project Description:	The Proposed Project is the continuation of an aquatic pesticide application program by Turlock Irrigation District since 1975. The program was previously regulated in 2002 and 2003 under the State Water Resources Control Board (SWRCB) Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Discharges of Aquatic Pesticides (Water Quality Order No. 2001-12-DWQ, General Permit No. CAG990003). The proposed program would occur under a new General Permit in 2004 and is expected to be equivalent to the current program. The proposed program would be implemented for a period of approximately 5 years, or for the term of the new General Permit. Turlock Irrigation District applies aquatic pesticides to its facilities to control weeds and algae that interfere with irrigation conveyance, cause canal overtoppings, and clog waterways and pumps. To conserve water and maximize the efficiency of irrigation, many landowners currently use sprinkler, drip, or micro irrigation systems. These systems require irrigation water to be clean and free of vegetative debris that will clog machinery. Aquatic weeds can also cause treatment problems for municipal water supplies.
Surrounding Land Uses:	The affected areas within the District are surrounded by predominantly agricultural and related land uses.

2 PROJECT DESCRIPTION

This section describes a proposed aquatic pesticide application program for the Turlock Irrigation District. The District has been applying aquatic pesticides since 1975. The program was previously regulated in 2002 and 2003 under the State Water Resources Control Board (SWRCB) Statewide General National Pollutant Discharge Elimination System (NPDES) Permit for Discharges of Aquatic Pesticides (Water Quality Order No. 2001-12-DWQ, General Permit No. CAG990003). The proposed program would occur under a new General Permit and is expected to be equivalent to the current program. The proposed program would be implemented for a period of approximately 5 years, or for the term of the new General Permit. The No Project condition assumes that no chemical control measures will be implemented to manage aquatic plants and algae in District facilities, and this condition is likely to result in safety concerns due to canal overtoppings, clogged pumps, taste and odor problems in municipal water supplies and economic losses.

2.1 PROJECT OBJECTIVES

The Turlock Irrigation District applies aquatic pesticides to its irrigation conveyance system to control weeds and algae that interfere with irrigation conveyance, cause canal overtoppings, clog waterways and pumps, and cause treatment problems for municipal water supplies. Some of the most problematic weeds include American pondweed, yellow primrose, and curly moss. To conserve water and maximize the efficiency of irrigation, many landowners currently use sprinkler, drip, or micro irrigation systems. These systems require irrigation water to be clean and free of vegetative debris that will clog machinery.

2.2 PROJECT CHARACTERISTICS

2.2.1 Project Location

2.2.1.1 Regional Location

The Proposed Project is located in the San Joaquin Valley (Figure 2-1) in central California. The project area and vicinity are characterized by the San Joaquin River and its tributaries located in Fresno, Madera, Mariposa, Merced, San Joaquin, Stanislaus, and Tuolumne counties. The major cities in the valley are Modesto, Merced, and Fresno.

2.2.1.2 District Location

Turlock Irrigation District is located in Stanislaus and Merced counties, and its service area is shown on Figure 2-2. Additional information regarding the location of the District in relation to the larger San Joaquin River watershed area is shown in Figure 6-1. The District supplies irrigation water to approximately 150,000 acres. The irrigation service area is bordered on the north by the Tuolumne River, on the south by the Merced River, and on the west by the San Joaquin River. The District's canal system begins at La Grange Dam on the Tuolumne River where water is diverted into the District's Upper Main Canal for conveyance to Turlock Lake,

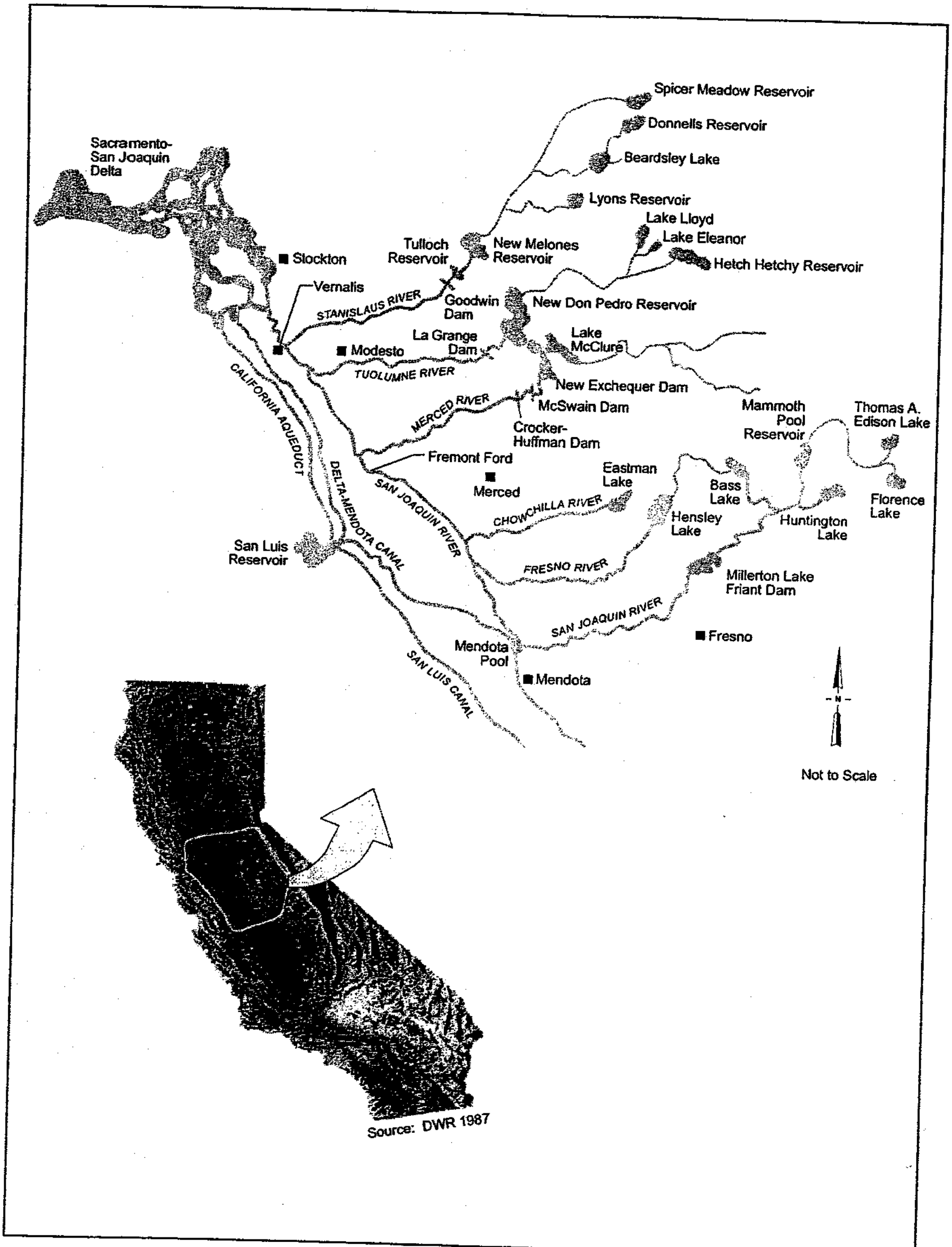

Figure 2-1. Map of San Joaquin Valley project area and vicinity

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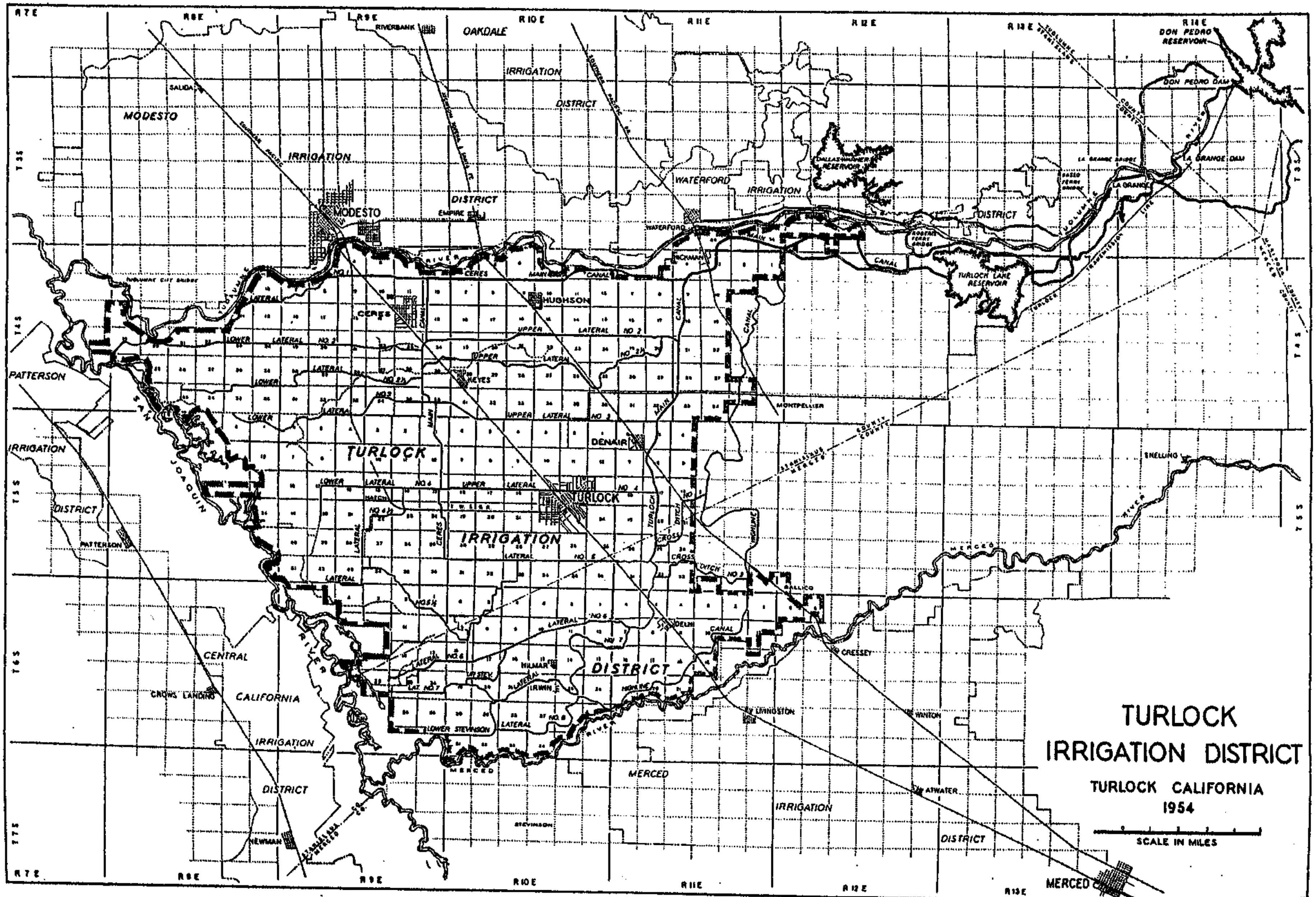
Turlock Irrigation District Service Area and Facilities

Figure 2-2



which acts as a canal regulating reservoir. From Turlock Lake, water is released into the Main Canal for distribution to downstream growers for irrigation purposes. In addition, the District supplies municipal water to the small community of La Grange, California. Surface water is diverted from the Upper Main Canal into a small retention reservoir, downstream of Highway 132, from which water is pumped, treated, and later deposited in storage tanks for future delivery to municipal customers.

The District owns and operates approximately 250 miles of canals and laterals, most of which have been lined. Water that is not utilized for irrigation purposes is released from the canal into the river system through spill gates or weirs located at the end of each canal, and at several median locations throughout the system. Releases are either discharged directly to the river or into a drain that flows to the river. There are a total of 15 spill locations from the canal system, some of which are consolidated into 9 points that discharge to the river system. Each of the canals, laterals and drains owned and operated by the District are man-made, constructed waterways designed and utilized for this purpose. The water from these man-made canals and drains comes in contact the natural waterways with designated beneficial uses, when water is released to either the Tuolumne, Merced or San Joaquin river.

2.2.2 Project Features

2.2.2.1 Proposed Pesticide Application

All pesticides applied to surface water by the District are registered for use in California as aquatic pesticides. Before a pesticide can be used for a specific type of application in California, the Department of Pesticide Regulation (DPR) evaluates it thoroughly during the registration process to ensure that no unacceptable risk to human health or the environment exists. For a pesticide to be evaluated for registration, the applicant must submit data on the product's toxicology, fate and transport characteristics, hazards to nontarget organisms, effects on fish and wildlife, degree of worker exposure, and chemistry. The California DPR sometimes denies registration to products approved by the United States Environmental Protection Agency based on stricter requirements, or may impose use restrictions and mitigation measures beyond those listed on labels.

Turlock Irrigation District applies the following aquatic herbicides and algaecides to water distribution facilities:

Magnacide H (acrolein)

Rodeo/AquaMaster (glyphosate)

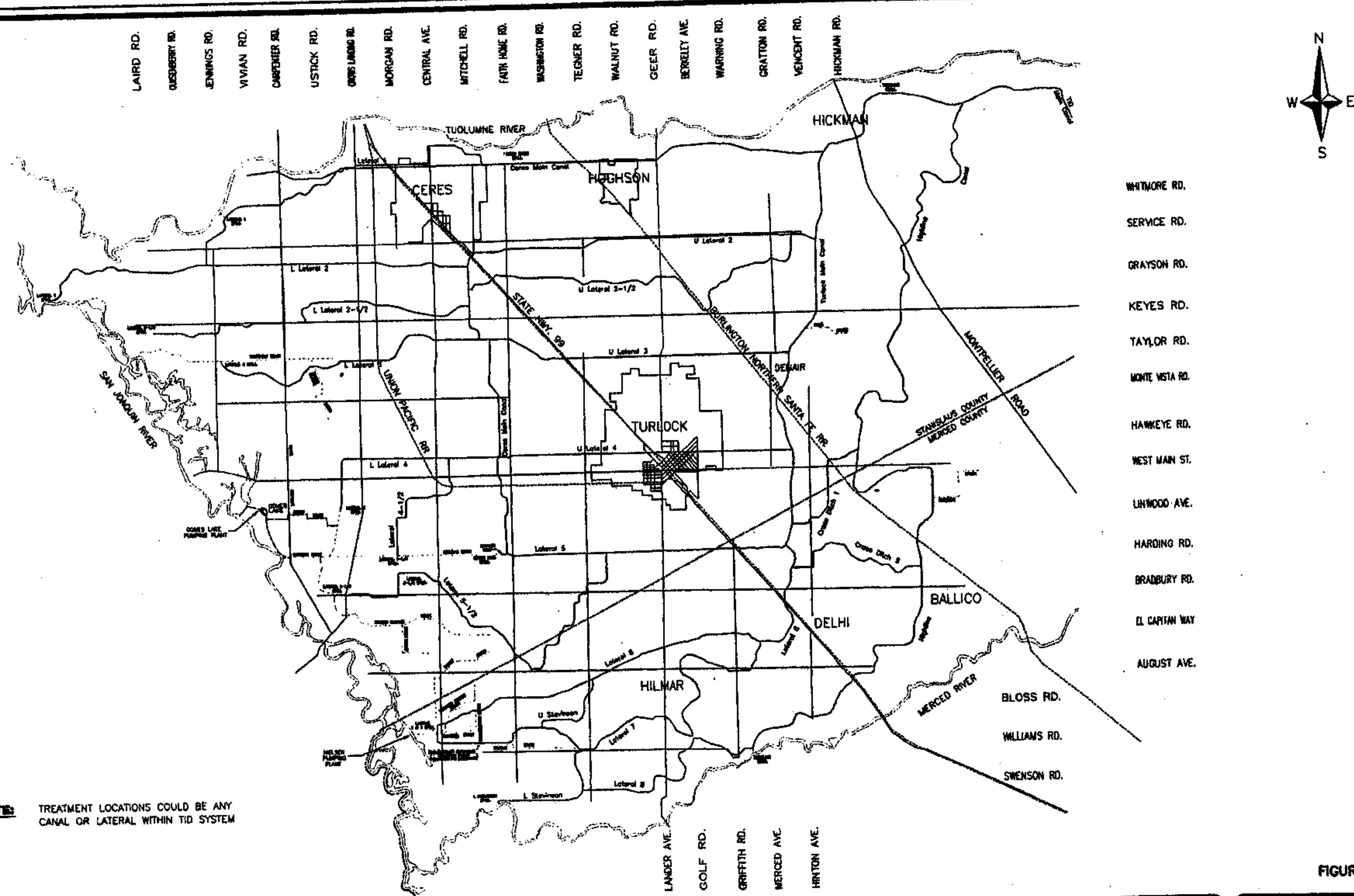
K-Tea (copper-triethanolamine complex)

Komeen (copper-ethylenediamine complex)

Cutrine-plus (copper-ethanolamine complex)

Magnacide H (acrolein)

During the irrigation season, Magnacide H (acrolein) is applied to the canal system below Turlock Lake (see Figure 2-3) to control a variety of weeds and algae that interfere with the operation of the canal system and the delivery of irrigation water. Table 2-1 details the length, surface area, and types of canals treated. At the beginning of each year a proposed Magnacide H



NOTE: TREATMENT LOCATIONS COULD BE ANY CANAL OR LATERAL WITHIN TID SYSTEM

FIGURE 2–3

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Turlock Irrigation District
333 East Canal Drive
Turlock, California 95380

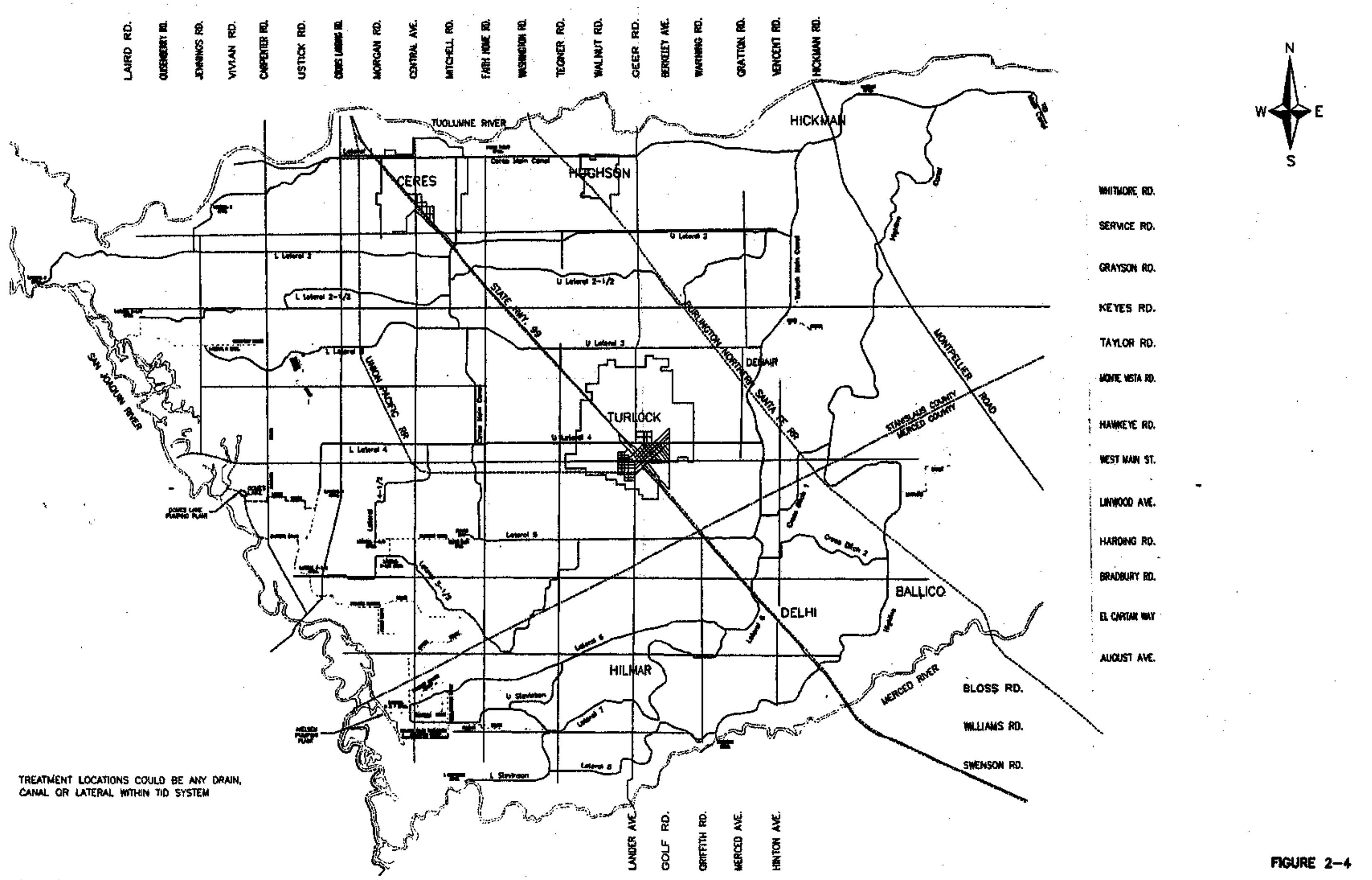
REV	DATE	DESCRIPTION	DR	CHK	APP

TURLOCK IRRIGATION DISTRICT
TID

Application Locations for Magnacide H

Statewide General NPDES Permit for Discharges of Aquatic Pesticides

DATE:	11/25/03	FILE:	
DRAWN:	FJL	DESIGN:	
CHECKED:		APPROVED:	
DWG #:		SHEET	1



NOTE: TREATMENT LOCATIONS COULD BE ANY DRAIN, CANAL OR LATERAL WITHIN TID SYSTEM

FIGURE 2–4

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Turlock Irrigation District
333 East Canal Drive
Turlock, California 95380

REV	DATE	DESCRIPTION	DR	CHK	APP

Application Locations for Rodeo / Aquamaster

Statewide General NPDES Permit for Discharges of Aquatic Pesticides

DATE:	11/25/03	FILE:	
DRAWN:	FJL	DESIGN:	
CHECKED:		APPROVED:	
DWG #:		SHEET: 1 OF: 1	

application schedule is developed and utilized as a guideline. However, the actual date of application may vary based on need and field conditions.

The District applies a preventative maintenance approach to Magnacide H use. Aquatic weeds are targeted at earlier stages of growth, when lower concentrations of the pesticide are required to achieve the desired effect. As a result, applications are scheduled frequently, at lower dosages to control aquatic growth, thereby reducing the pesticide concentrations in the water.

Magnacide H is applied throughout the canal system below Turlock Lake. Applications are made directly to the water in the canal. The pesticide is injected into the water at a turbulent location, like a canal drop to ensure the maximum mixing and relatively even distribution of the pesticide within the canal cross-section. In addition, applications are made starting at the bottom of the canal or lateral, and working up the system. This approach provides the maximum control of the water, while minimizing the potential for a buildup of the pesticide as the water flows downstream.

Table 2-1

Water Bodies Treated with Magnacide H

Treated Water Bodies	Estimated Total Length Treated	Estimated Total Surface Area Treated	Estimated Typical Range of Flow Rates
Unlined canals	44 miles	107 acres	300–600 cfs
Lined canals	206 miles	500 acres	15–1,800 cfs

Determinations of Magnacide H applications are made in terms of rates (gallons/hour) based on site-specific information, such as flow, temperature, and weed condition. Weed condition is standardized in the label's application guide as follows:

Table 2-2

Weed Growth Condition Chart for Temperatures above 60° F

Condition Code	Magnacide H gallon/cfs (Dosage)
A. Little algae and pondweed Less than 6 inches long	0.17
B. Algae (nonfloating) and Pondweed less than 12 inches long	0.25
C. Algae (some floating) and Pondweed 12 to 24 inches long	0.50
D. Algae (some floating) and Mature pondweed (over 24 inches)	1.0
E. Choked Condition	1.5

The Condition Codes are used to describe the general treatment level. Each treatment requires that an application rate be determined. The rate (gallons/hour) to be applied to a canal depends on the condition dosage, temperature factor, canal rate of flow, and contact time. Equations and/or rate tables in the label instructions are used to determine the rate at the time of treatment. The resulting concentration (in ppm) is a function of the dosage and application time, and is another indicator of general treatment levels. Label instructions indicate that 15 ppm should not be exceeded by any combination of dosage and application time.

Rodeo/AquaMaster (glyphosate)

Turlock Irrigation District utilizes Rodeo/AquaMaster to control aquatic weeds in the canals and drains (see Figure 2-4). Applications are made in accordance with label instructions. Rodeo/AquaMaster is applied annually along the banks of the drains to control weed growth. In addition, Rodeo/AquaMaster is applied, as needed, to the drains if they are dry during the non-irrigation season. These types of applications would not be considered a direct application of the pesticide to the water body (since the pesticide is not being applied to vegetation in the water). These types of applications are not covered under the permit requirements. Only those applications of Rodeo/Aquamaster applied to the plants growing in the water is regulated by the permit.

The District does apply Rodeo/AquaMaster to plants growing within the drains while water is present. This type of application would be covered by the permit requirements. This type of application is on an as-needed basis, typically in the fall when the aquatic weed growth is greatest. In addition, during the nonirrigation season when stormwater flows may be present, Rodeo/AquaMaster is applied, as needed, to weeds growing in the canal system. These types of applications are also made in accordance with label instructions. Pro-spreader/Activator is an adjuvant used with the pesticide in these applications.

Table 2-3

Water Bodies Treated with Rodeo/AquaMaster

Treated Water Bodies	Estimated Total Length Treated Annually	Estimated Total Area Treated	Estimated Typical Range of Flow Rates	Applied to Vegetation in Water?
Unlined canals	Varies	Varies	10–50 cfs	As Needed
Lined canals	Varies	Varies	10–50 cfs	As Needed
Drains	Varies	Varies	10–50 cfs	As Needed

Rodeo/Aquamaster is applied using a backpack sprayer or a spray rig. Applications are directly applied to the specific weed growth, and not to a general area. In this manner, the District is able to minimize the amount of product used, the contact with water, and any potential spray drift.

Weed growth is the determining factor with respect to application rates. Rodeo/AquaMaster is typically applied at a rate of 4 quarts/acre, mixed with a quart of Pro-spreader/Activator, a surfactant, and blended with water. However, if weed growth is minimal, the Rodeo/AquaMaster rate is reduced to 3 quarts/acre.

Copper Compounds
The District applies K-Tea (copper-triethanolamine complex), Komeen (copper-ethylenediamine complex), and Cutrine-Plus (copper-ethanolamine complex) to a small 3-acre municipal water supply retention reservoir along the Upper Main Canal near La Grange, California, where water is stored prior to treatment (Figure 2-5). Copper compounds are applied once or twice per year, as needed, based on aquatic plant growth.

Table 2-4

Water Bodies Treated with Copper Compounds (K-Tea, Komeen and Cutrine-plus)

Treated Water Bodies	Total Length Treated	Total Area Treated	Typical Flow Rates	Designated Beneficial Uses
Reservoirs	N/A	3	None	None

Copper compounds are applied directly to the water, in accordance with label instructions. Pesticides are applied using a small boat with an outboard motor. K-Tea is applied to control algae at a rate of between 0.2 to 0.5 ppm. In addition, either Komeen or Cutrine-plus is applied to control aquatic plant growth in the reservoir at a rate of between 0.5 to 1.0 ppm.

2.2.2.2 Best Management Practices

The following general best management practices (BMPs) are utilized for all aquatic pesticide applications:

Obtain an annual permit from the County Agricultural Commissioner (CAC) and submit a Notice of Intent to the CAC and the County 24 hours before applying a restricted pesticide.

File a Notice of Intent form, including an annual application schedule, with Region 4 of the California Department of Fish and Game (DFG). If a deviation of the schedule occurs or another treatment site is identified, duly notify both the DFG and CAC offices at least 24 hours prior to treatment.

Follow all pesticide label instructions.

Comply with DPR and Department of Health Services regulations, and Use Permits issued by the CAC.

Ensure that all personnel applying restricted aquatic herbicides are trained and licensed (State of California Qualified Applicator Certificates from DPR).

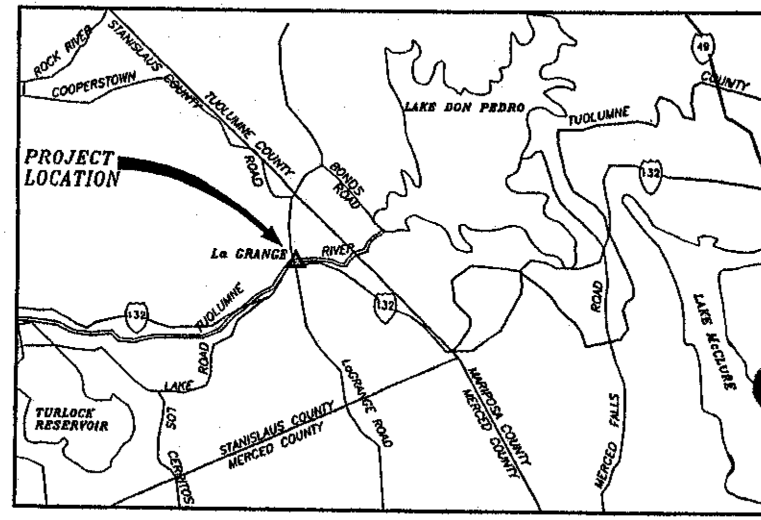
Obtain a written recommendation from a licensed State of California Pest Control Advisor prior to each application.

Treat aquatic vegetation frequently when vegetation is small, to minimize buildup of vegetation and potential dissolved oxygen depletion due to decaying vegetation.

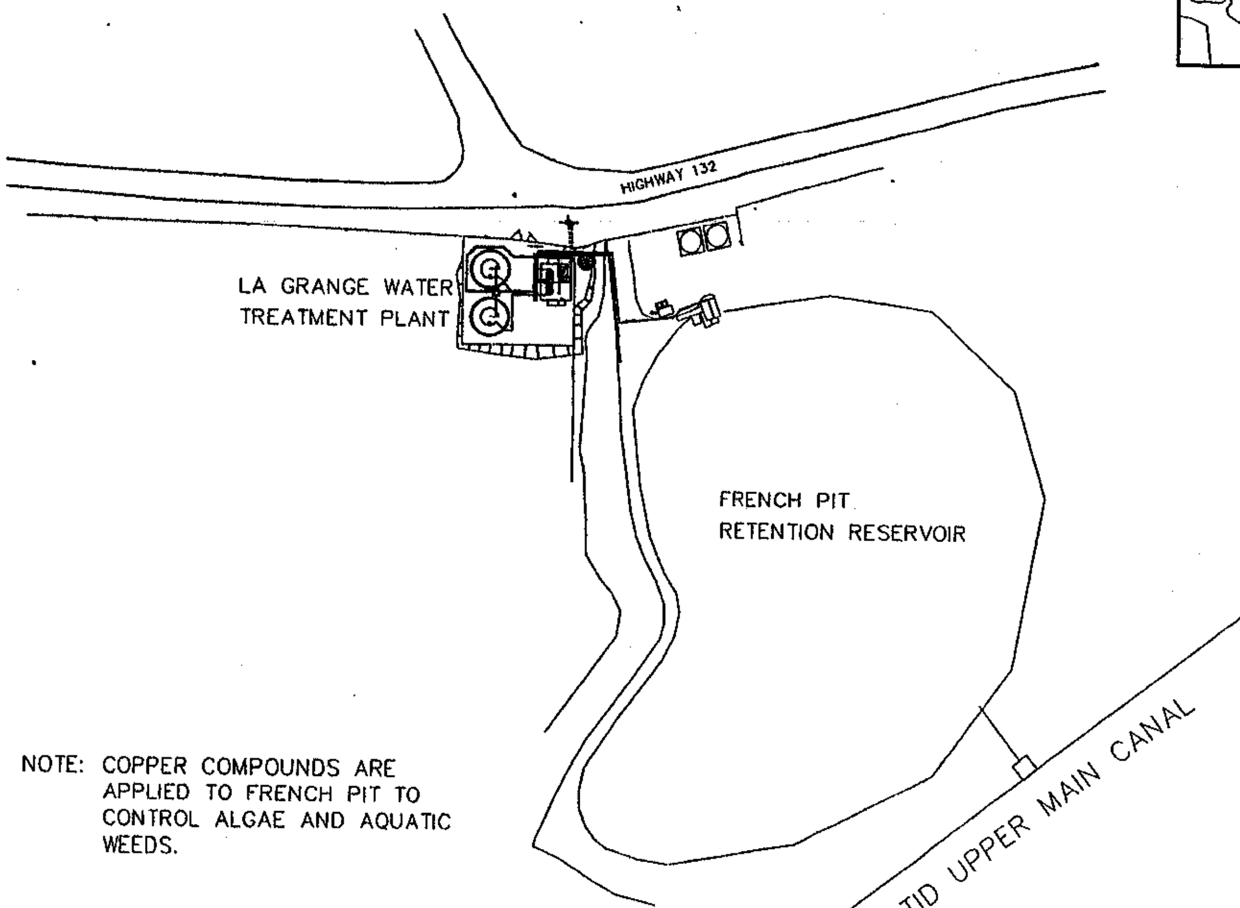
Evaluate options to treatment (including nontoxic and less toxic alternatives).

Verify need for treatment and suitability of the site for treatment prior to each application.

SITE MAP FOR RETENTION RESERVOIR AT LA GRANGE



LOCATION MAP



NOTE: COPPER COMPOUNDS ARE APPLIED TO FRENCH PIT TO CONTROL ALGAE AND AQUATIC WEEDS.

FIGURE 2–5

The following sections describe the specific BMPs utilized for each type of pesticide, including BMP checklists to be completed with each application project:

Magnacide H

Verify that gates at all potential release points downstream of the point of application are closed prior to treatment, and are kept closed until Magnacide H is no longer in the system.

Prior to each treatment, make arrangements to irrigate out the treated water to appropriate sites. Verify that there will be no potential for crop damage, or for field runoff or drainage discharges to waters of the state (all irrigation water must be retained on site).

If treated water is not irrigated out, hold water for a minimum of 6 days before releasing, per label instructions.

Prior to opening gates, conduct the Magnacide H Baker Petrolite Field Test at potential release points.

Complete a BMP checklist with each pesticide application.

Rodeo/AquaMaster

Apply only when wind speed is between 0 to 10 mph. If wind speed is above 10 mph, reschedule treatment.

Set up equipment to produce a large droplet size to avoid pesticide drift.

Design application schedule so that small areas are treated at one time, to avoid large amounts of decaying vegetation and potential depletion of dissolved oxygen.

Apply pesticide starting at downstream end and traveling upstream, to avoid concentration of pesticide in water.

When treating vegetation in water, consider treating the area in strips to avoid oxygen depletion due to decaying vegetation.

When practical, reduce or eliminate the flow of water in the treatment area during application.

Complete a BMP checklist with each pesticide application.

Copper Compounds

When practical, coordinate discharges into the canal system with periods when canal flows are greatest.

Apply the copper compounds in a manner to ensure relatively uniform distribution to reduce the potential for high concentration zones.

Allow a minimum of 3 days contact time prior to releasing reservoir water into the Upper Main Canal.

Complete a BMP checklist with each pesticide application.

2.2.2.3 Monitoring and Reporting Program

Turlock Irrigation District has selected three representative monitoring projects for application of Magnacide H, one representative monitoring project for application of Rodeo/AquaMaster, and one representative project for application of K-Tea, Komeen, and Cutrine-plus. Each of these locations is monitored once for projects with one or two applications per year, and twice for projects with three or more applications per year.

This monitoring is conducted to comply with the existing SWRCB Statewide General NPDES Permit for Discharges of Aquatic Pesticides (General Permit). This permit specifies that monitoring must include at least one representative project for each aquatic pesticide applied. The District plans to continue the current Monitoring and Reporting Program that includes the following activities:

1. Document compliance with the requirements of the General Permit.
2. Support the development, implementation, and effectiveness evaluation of BMPs.
3. Demonstrate the full restoration of water quality and protection of beneficial uses for the receiving waters following completion of resource or pest management projects.
4. Identify and characterize the aquatic pesticide application projects conducted by the discharger.
5. Ensure that the plan provides for monitoring of projects that are representative of all pesticides and all application methods used by the discharger.

The current General Permit is due to expire in January 2004, and it is expected that a new General Permit will be issued. Monitoring and reporting requirements under the new General Permit may be modified from current requirements, and if so Turlock Irrigation District's monitoring program will be modified accordingly.

2.2.2.4 Alternatives to Proposed Project

The weed and algae control methods used by Turlock Irrigation District were selected based on many factors, including the following:

- Potential environmental impacts
- Effectiveness in controlling the targeted pests
- Cost-effectiveness
- Practicality of implementation in irrigation facilities

Turlock Irrigation District has experimented with various methods of weed control. Mechanical vegetation removal, such as raking and chaining, has been used in the past and is still used to a limited extent; however, it is significantly more costly (and less effective) than herbicide use. In addition, mechanical vegetation removal often results in generation of high levels of turbidity in the water. When highly turbid water is released to natural water bodies, fish and other aquatic organisms may be adversely affected. Mechanical vegetation removal can result in sedimentation and clogging in irrigation equipment, as well as damage to the structural integrity of irrigation facilities, which can result in costly maintenance requirements.

Several other alternative control methods have been considered. For example, dyes that block ultraviolet light are sometimes used to control growth of aquatic weeds. However, it is usually not practical to use these materials in irrigation facilities because of the high flow rates required for water distribution. These dyes must remain in the water for long periods of time to be effective.

Manipulation of water level may also be an effective method of controlling aquatic vegetation. However, for this method to work, canals must be kept dry for a long enough period of time to completely kill the vegetation. During the irrigation season, this dry period is usually not feasible because water must be kept flowing in the canals.

However, there are occasionally times especially during low flows, when irrigation requests dwindle to the point where this type of water-level manipulation can be utilized at the end of the canal system. The District utilizes this alternative control measure when possible.

Removal of aquatic weeds attached to the canal bank or floating on the canal surface is implemented, when practical, during the irrigation season. Examples of these types of weeds are water primrose and cattails. Removal is accomplished by manually cutting the weed, pulling it out of the water, and transporting the weed to a place where it can be properly disposed of. This alternative control measure is utilized, during the irrigation season, on floating aquatic weeds in lieu of using Rodeo/AquaMaster. This method is best when implemented when weeds are a smaller size and located in relatively low concentrations. For larger areas, mechanical removal must be implemented.

Environmental factors were considered in the selection of herbicides used by Turlock Irrigation District. Acrolein, the active ingredient in Magnacide H, degrades quickly. Glyphosate, the active ingredient in Rodeo/AquaMaster, is quickly bound to soil and sediment and remains immobilized until degradation takes place. Copper, the active ingredient in K-Tea, Komeen, and Cutrine-Plus, does not remain in the water column for long periods of time because it precipitates and settles out. All pesticides applied to surface water are registered with DPR for use as aquatic pesticides.

3 ENVIRONMENTAL SETTING

The environmental setting for the Proposed Project is described herein, focusing on biological and hydrologic resources contained within the District (project area) and vicinity that could be affected by the use of the proposed materials in the District's facilities.

3.1 BIOLOGICAL RESOURCES

This section describes the environmental setting for biological resources in the Proposed Project vicinity. The Proposed Project is located in the San Joaquin Valley in central California. This area overlaps a mix of habitat types defined by the DFG's Wildlife Habitat Relationship system. These habitat types include "natural habitat types" such as riverine, annual grasslands, valley foothill riparian, and valley oak woodland. Agricultural development of the San Joaquin Valley over the past century has resulted in the conversion of natural habitat types to developed habitat types such as irrigated hayfields, irrigated grain and seed crops, dryland grain and seed crops, evergreen orchards, deciduous orchards, vineyard, pasture and urban (DFG 2002).

3.1.1 Environmental Setting

Most of the uplands within the project area have been converted to commercial agricultural production supplied by irrigation water. These converted habitat types can support a wide variety of wildlife species depending upon specific regional characteristics (adjacent habitat types) and management practices. For example, irrigated hayfield habitat usually consists of a monoculture field of alfalfa or grass hay types that rotates back to bare ground directly after harvest. Alfalfa usually exists unplowed for approximately 3 years and is typically followed by a cereal grain crop for 1 to 4 years followed by another alfalfa crop. This habitat type can provide high quality seasonal resources for Botta's pocket gopher (*Thomomys bottae*), mourning dove (*Zenaida macroura*), gray fox *(Urocyon cinereoargenteus)*, gopher snake (*Pituophis melanoleucus*), California king snake (*Lampropeltis gentulus californiae*), American kestrel (*Falco sparverius*), barn owl (*Tyto alba*), sandhill crane (*Grus Canadensis*), and San Joaquin pocket mouse (*Perognathus inornatus inoratus*). However, where harvesting is constant in the irrigated hayfield, reproduction value for ground-nesting species is reduced to zero (DFG 2002).

Similarly, wildlife occurring in deciduous orchard habitat (consisting of single-species crops such as almond, apple, apricot, cherry, fig, nectarine, peach, pear, pecan, pistachio, prune, and walnut) will vary based upon the tree type, pruning methods, and harvest timing. Generally, orchards provide habitats for species that forage on cultivated nuts and fruit and utilizing cover from adjacent habitat types. Typical wildlife found in deciduous orchards are the American crow (*Corvus brachyrhynchos*), northern flicker (*Colaptes auratus*), California ground squirrel (*Spermophilus beecheyi*), western scrub jay (*Aphelocoma californica*), black-tailed hare (*Lepus californicus*), and Virginia opossum (*Didelphis virginiana*).

Riparian forest habitats in the project area are characterized by willow (*Salix spp.*), cottonwood (*Populus fremontii*), alder (*Alnus rhombifolia*), and Oregon ash (*Fraxinus latifolia*). Valley oak (*Quercus lobata*) is common above the active river floodplains. Forests along river and stream corridors provide cover for a number of common animal species, such as raccoons (*Procyon lotor*), bobcats (*Lynx rufus*), black-tailed deer (*Odocoileus hemionus*), mink (*Mustela vison*), bullfrogs (*Rana catesbeiana*), red-tailed hawks (*Buteo jamaicensis*), red-shouldered hawks (*Buteo lineatus*), belted kingfishers (*Ceryle alcyon*), and black phoebes (*Sayornis nigricans*). The nearshore waters of creeks and streams within riparian habitats provide invertebrate forage for avian species including the black-necked stilt (*Himantopus mexicanus*), common merganser (*Mergus merganser americanus*), mallard (*Anas platyrhnchos*), great blue heron (*Ardea herodias*), black rail (*Laterallus jamaicensis*), snowy egret (*Egretta thula*), common snipe (*Gallinago gallinago*) and killdeer (*Charadrius vociferus*).

3.1.2 Special-Status Species

Table 3-1 presents the special-status species that are known to occur in the project area vicinity (CNDDB 2003). These species are listed, proposed, or candidates under the federal or California Endangered Species Acts or designated as "species of concern" by the U.S. Fish and Wildlife Service (USFWS) or the DFG, or included on the California Native Plant Society (CNPS) inventory of rare, threatened, or endangered plants (CNPS 2001).

Table 3-1
Special-Status Species Known to Occur in the Project Area[1]

Scientific Name/Common Name	Federal Status[2]	State Status[2]	DFG[3]/ CNPS/ R-E-D[4]	Potential to Utilize Aquatic Habitat Associated With Water Conveyance Facilities
AMPHIBIANS				
Ambystoma californiense California tiger salamander	Proposed Threatened	--	SC	No
Spea (=Scaphiopus) hammondii western spadefoot	Species of Concern	--	SC	No
Rana aurora draytonii California red-legged frog	Threatened	--	SC	No
Rana boylii foothill yellow-legged frog	Species of Concern	--	SC	No
BIRDS				
Egretta thula snowy egret	Species of Concern	--	--	No
Botaurus lentiginosus American bittern	Migratory Nongame Birds of Management Concern	--	--	No
Branta canadensis leucopareia Aleutian Canada goose	Species of Concern	--	--	No
Circus cyaneus northern harrier	--	--	SC	No
Buteo swainsoni Swainson's hawk	Species of Concern	Threatened	--	No
Falco mexicanus prairie falcon	--	--	SC	No
Coturnicops noveboracensis yellow rail	--	--	SC	No
Laterallus jamaicensis coturniculus California black rail	Species of Concern	Threatened	--	No
Charadrius montanus mountain plover	--	--	SC	No

Table 3-1 (continued)
Special-Status Species Known to Occur in the Project Area[1]

Scientific Name/Common Name	Federal Status[2]	State Status[2]	DFG[3]/ CNPS/ R-E-D[4]	Potential to Utilize Aquatic Habitat Associated With Water Conveyance Facilities
Coccyzus americanus occidentalis western yellow-billed cuckoo	Candidate	Endangered	--	No
Athene cunicularia burrowing owl	Species of Concern	--	SC	No
Eremophila alpestris actia California horned lark	--	--	SC	No
Icteria virens yellow-breasted chat	--	--	SC	No
Agelaius tricolor tricolored blackbird	Species of Concern	--	SC	Yes
FISH				
Oncorhynchus tshawytscha Central Valley Fall-Run Chinook Salmon	Candidate	--	--	No
Oncorhynchus mykiss Central Valley Steelhead	Threatened	--	SC	No
Lampetra ayresi river lamprey	Species of Concern	--	SC	No
Lampetra tridentata Pacific lamprey	Species of Concern	--	SC	No
Lampetra hubbsi Kern brook lamprey	Species of Concern	--	SC	Yes
Lavinia symmetricus ssp. 2 San Joaquin roach	--	--	SC	Yes
Mylopharodon conocephalus hardhead	--	--	SC	Yes
Pogonichthys macrolepidotus Sacramento splittail	--	--	SC	No
MAMMALS				
Myotis yumanensis Yuma myotis	Species of Concern	--	--	No
Corynorhinus townsendii townsendii Townsend's western big-eared bat	Species of Concern	--	SC	No
Antrozous pallidus pallid bat	--	--	SC	No
Eumops perotis californicus western mastiff bat	Species of Concern	--	SC	No
Sylvilagus bachmani riparius riparian brush rabbit	Endangered	Endangered	--	No
Ammospermophilus nelsoni San Joaquin antelope squirrel	Species of Concern	Threatened	--	No
Perognathus inornatus inornatus San Joaquin pocket mouse	Species of Concern	--	--	No
Dipodomys heermanni dixoni Merced kangaroo rat	Species of Concern	--	--	No
Dipodomys ingens giant kangaroo rat	Endangered	Endangered	--	No

Table 3-1 (continued)
Special-Status Species Known to Occur in the Project Area[1]

Scientific Name/Common Name	Federal Status[2]	State Status[2]	DFG[3]/ CNPS/ R-E-D[4]	Potential to Utilize Aquatic Habitat Associated With Water Conveyance Facilities
Neotoma fuscipes riparia riparian (=San Joaquin Valley) woodrat	Endangered	--	SC	No
Vulpes macrotis mutica San Joaquin kit fox	Endangered	Threatened	--	No
REPTILES				
Emys (=Clemmys) marmorata western pond turtle	Species of Concern	--	SC FP	Yes
Anniella pulchra pulchra silvery legless lizard	Species of Concern	--	SC	No
Gambelia sila blunt-nosed leopard lizard	Endangered	Endangered	--	No
Phrynosoma coronatum (frontale) Coast (California) horned lizard	Species of Concern	--	SC	No
Masticophis flagellum ruddocki San Joaquin whipsnake	Species of Concern	--	SC	No
Thamnophis gigas giant garter snake	Threatened	Threatened	--	Yes
INVERTEBRATES				
Branchinecta conservatio Conservancy fairy shrimp	Endangered	--	--	No
Branchinecta longiantenna longhorn fairy shrimp	Endangered	--	--	No
Branchinecta lynchi vernal pool fairy shrimp	Threatened	--	--	No
Branchinecta mesovallensis midvalley fairy shrimp	Species of Concern	--	--	No
Linderiella occidentalis California linderiella	Species of Concern	--	--	No
Lepidurus packardi vernal pool tadpole shrimp	Endangered	--	--	No
Desmocerus californicus dimorphus valley elderberry longhorn beetle	Threatened	--	--	No
Lytta moesta Moestan blister beetle	Species of Concern	--	--	No
Lytta molesta molestan blister beetle	Species of Concern	--	--	No
Eucerceris ruficeps redheaded sphecid wasp	--	--	--	No
PLANTS				
Eryngium racemosum Delta button-celery	Species of Concern	Endangered	1B/2-3-3	No
Eryngium spinosepalum spiny-sepaled button-celery	Species of Concern	--	1B/3-2-3	No
Lilaeopsis masonii Mason's lilaeopsis	Species of Concern	Rare	1B/2-3-3	No

Table 3-1 (continued)
Special-Status Species Known to Occur in the Project Area[1]

Scientific Name/Common Name	Federal Status[2]	State Status[2]	DFG[3]/ CNPS/ R-E-D[4]	Potential to Utilize Aquatic Habitat Associated With Water Conveyance Facilities
Lomatium observatorium Mt. Hamilton lomatium	Species of Concern	--	1B/3-2-3	No
Aster lentus Suisun Marsh aster	Species of Concern	--	1B/2-2-3	No
Blepharizonia plumosa ssp. *Plumosa* big tarplant	Species of Concern	--	1B/3-3-3	No
Calycadenia hooveri Hoover's calycadenia	Species of Concern	--	1B/2-1-3	No
Cirsium fontinale var. *campylon* Mt. Hamilton thistle	Species of Concern	--	1B/2-2-3	No
Cirsium crassicaule slough thistle	Species of Concern	--	1B/3-3-3	No
Coreopsis hamiltonii Mt. Hamilton coreopsis	Species of Concern	--	1B/3-2-3	No
Madia radiata showy madia	Species of Concern	--	1B/2-3-3	No
Pseudobahia bahiifolia Hartweg's golden sunburst	Endangered	Endangered	1B/2-3-3	No
Senecio aphanactis rayless ragwort	--	--	2/3-2-1	No
Trichocoronis wrightii var. *wrightii* Wright's trichocoronis	--	--	2/3-3-1	No
Amsinckia grandiflora large-flowered fiddleneck	Endangered	Endangered	1B/3-3-3	No
Plagiobothrys uncinatus hooked popcorn-flower	Species of Concern	--	1B/2-2-3	No
Streptanthus insignis ssp. *Lyonii* Arburua Ranch jewel-flower	Species of Concern	--	1B/3-2-3	No
Tropidocarpum capparideum caper-fruited tropidocarpum	Species of Concern	--	1A/ *	No
Campanula sharsmithiae Sharsmith's harebell	Species of Concern	--	1B/3-2-3	No
Downingia pusilla dwarf downingia	--	--	2/1-2-1	No
Legenere limosa legenere	Species of Concern	--	1B/2-3-3	No
Atriplex cordulata heartscale	Species of Concern	--	1B/2-2-3	No
Atriplex coronata var. *notatior* San Jacinto Valley crownscale	Endangered	--	1B/3-3-3	No
Atriplex joaquiniana San Joaquin saltbush	Species of Concern	--	1B/2-2-3	No
Atriplex vallicola Lost Hills crownscale	Species of Concern	--	1B/2-2-3	No
Atriplex depressa brittlescale	Species of Concern	--	1B/2-2-3	No

Table 3-1 (continued)
Special-Status Species Known to Occur in the Project Area[1]

Scientific Name/Common Name	Federal Status[2]	State Status[2]	DFG[3]/ CNPS/ R-E-D[4]	Potential to Utilize Aquatic Habitat Associated With Water Conveyance Facilities
Atriplex minuscula lesser saltscale	Species of Concern	--	1B/3-3-3	No
Atriplex persistens vernal pool smallscale	Species of Concern	--	1B/2-2-3	No
Atriplex subtilis subtle orache	Species of Concern	--	1B/2-2-3	No
Chamaesyce hooveri Hoover's spurge	Threatened	--	1B/3-2-3	No
Astragalus tener var. *tener* alkali milk-vetch	Species of Concern	--	1B/3-2-3	No
Lathyrus jepsonii var. *jepsonii* Delta tule pea	Species of Concern	--	1B/2-2-3	No
Lotus rubriflorus red-flowered lotus	Species of Concern	--	1B/3-3-3	No
Erodium macrophyllum round-leaved filaree	--	--	2/2-3-1	No
Phacelia ciliata var. *opaca* Merced phacelia	Species of Concern	--	1B/3-1-3	No
Phacelia phacelioides Mt. Diablo phacelia	Species of Concern	--	1B/3-2-3	No
Monardella leucocephala Merced monardella	Species of Concern	--	1A/ *	No
Scutellaria galericulata marsh skullcap	--	--	2/2-2-1	No
Scutellaria lateriflora blue skullcap	--	--	2/3-2-1	No
Hesperolinon sp. nov. *"serpentinum"* Napa western flax	Species of Concern	--	1B/3-2-3	No
Hibiscus lasiocarpus rose-mallow	--	--	2/2-2-1	No
Malacothamnus hallii Hall's bush mallow	Species of Concern	--	1B/3-2-3	No
Clarkia rostrata beaked clarkia	Species of Concern	--	1B/2-1-3	No
Eschscholzia rhombipetala diamond-petaled California poppy	Species of Concern	--	1B/3-3-3	No
Navarretia nigelliformis ssp. *Radians* shining navarretia	--	--	1B/2-2-3	No
Navarretia prostrata prostrate navarretia	Species of Concern	--	1B/2-3-3	No
Navarretia myersii ssp. *Myersii* pincushion navarretia	Species of Concern	--	1B/3-3-3	No
Delphinium californicum ssp. *Interius* Hospital Canyon larkspur	Species of Concern	--	1B/3-2-3	No
Delphinium recurvatum recurved larkspur	Species of Concern	--	1B/2-2-3	No

Table 3-1 (concluded)
Special-Status Species Known to Occur in the Project Area[1]

Scientific Name/Common Name	Federal Status[2]	State Status[2]	DFG[3]/ CNPS/ R-E-D[4]	Potential to Utilize Aquatic Habitat Associated With Water Conveyance Facilities
Castilleja campestris ssp. *Succulenta* succulent owl's-clover	Threatened	Endangered	1B/2-2-3	No
Cordylanthus mollis ssp. *Hispidus* hispid bird's-beak	Species of Concern	--	1B/2-3-3	No
Cordylanthus palmatus palmate-bracted bird's-beak	Endangered	Endangered	1B/3-3-3	No
Gratiola *heterosepala* Boggs Lake hedge-hyssop	Species of Concern	Endangered	1B/1-2-2	No
Limosella subulata Delta mudwort	--	--	2/2-3-1	No
Sagittaria sanfordii Sanford's arrowhead	Species of Concern	--	1B/2-2-3	Yes
Carex comosa bristly sedge	--	--	2/3-3-1	No
Eleocharis quadrangulata four-angled spikerush	--	--	2/3-2-1	No
Allium sharsmithiae Sharsmith's onion	Species of Concern	--	1B/2-1-3	No
Fritillaria falcata talus fritillary	Species of Concern	--	1B/3-2-3	No
Agrostis hendersonii Henderson's bent grass	Species of Concern	--	3/3-2-2	No
Neostapfia colusana Colusa grass	Threatened	Endangered	1B/2-3-3	No
Orcuttia pilosa hairy orcutt grass	Endangered	Endangered	1B/2-3-3	No
Orcuttia inaequalis San Joaquin Valley orcutt grass	Threatened	Endangered	1B/2-3-3	No
Tuctoria greenei Greene's tuctoria	Endangered	Rare	1B/2-3-3	No
Potamogeton filiformis slender-leaved pondweed	--	--	2/3-2-1	Yes

Notes:
[1] Occurrences documented in the California Natural Diversity Data Base (CNDDB) for San Joaquin, Stanislaus and Merced counties (DFG 2003).
[2] Federal and state status designations as published in DFG (2003).
[3] DFG status abbreviations:
SC – species of special concern
FP – fully protected species under the California Fish and Game Code (no take allowed)
[4] California Native Plant Society (CNPS) and R-E-D status abbreviations:
1A – List 1A (plants presumed extinct)
1B –List 1B (plants rare or threatened in California and elsewhere)
2 – List 2 (plants rare or threatened in California but more common elsewhere)
3 – List 3 (plants that require additional information)
4 – List 4 (plants of limited distribution)
R-E-D indicates level of rarity, endangerment, and distribution: a 3 in each category indicates a species that has a high level of rarity, endangerment, or limited distribution, while a 1 in each category indicates a lower level of rarity, endangerment, or a more widespread distribution. The CNPS does not provide R-E-D codes for species presumed to be extinct (List 1A).

Application of the proposed aquatic pesticides to irrigation conveyance systems and municipal water supply reservoirs would potentially affect nine special-status species that utilize aquatic habitats associated with these facilities:

- Tricolored blackbird (*Agelaius tricolor*)
- Kern brook lamprey (*Lampetra hubbsi*)
- San Joaquin roach (*Lavinia symmetricus* ssp. 2)
- Hardhead *(Mylopharodon conocephalus)*
- Western pond turtle (*Emys* [=*Clemmys*] *marmorata*)
- Giant garter snake (*Thamnophis gigas*)
- Sanford's arrowhead (*Sagittaria sanfordii*)
- Slender-leaved pondweed (*Potamogeton filiformis*)

Special-status terrestrial species that could be affected by the Proposed Project are those that utilize the water conveyance systems for foraging, movement, or breeding. Potential effects could include direct exposure to various chemical compounds or indirect effects associated with physical disturbance and/or disruption of food web dynamics. The nine special-status species potentially affected by the Proposed Project are described below:

- **Tricolored blackbird.** The tricolored blackbird is nearly endemic to California. This species historically nested throughout the Central Valley and along the coast from Sonoma County to Mexico. California's population of tricolored blackbirds has been reduced by an estimated 64 percent from its historic numbers due to the loss of freshwater wetland habitat, human disturbance, and competition for nesting space with red-winged blackbirds (San Francisco Estuary Project 1992).

  This species nests in dense colonies in thick stands of cattails or tules, and in other areas with a permanent water source (San Francisco Estuary Project 1992). Tricolored blackbirds have also been observed nesting in riparian vegetation such as willows, thistles, blackberry, and wild rose plants, when freshwater emergent vegetation is not available. Nesting season occurs between March 1 and August 30. Nest sites are generally in close proximity to foraging areas, which often include flooded rice fields, pond margins, and other grassy sites (San Francisco Estuary Project 1992).

  District canals do not provide suitable nesting habitat for this species as the preferred and alternate vegetation are not allowed to grow along or inside the canals.

- **Kern brook lamprey.** This nonparasitic, nonanadromous lamprey occurs in the southern San Joaquin drainage and in the Kings River. It takes the name Kern from the location of its original discovery, Friant-Kern Canal. Like the other species of lamprey, ammocetes of this species are filter feeders. Adults, however, do not feed, they simply metamorphose, spawn, and die. The ammocete usually remains buried in the soft substrate of backwater pools or low-flow areas in the rivers it lives in, with only its mouth exposed for filter feeding. After some number of years the ammocetes metamorphose into the adult form, and probably require coarse gravel/rubble substrate for spawning.

District canals do not provide adequate habitat for this fish as the water velocities are high and sediment accumulation is low.

- **San Joaquin roach.** A subspecies of the California roach, the San Joaquin roach's range is limited to the San Joaquin river system and inhabits headwater pools, creeks, and small to medium streams with rocky substrates. Known as a habitat generalist, it is usually found in small, warm, intermittent tributaries to larger streams, but also can occur in cold trout streams, human-modified habitats, and in the main channels of rivers. Dense populations are often found in isolated, well-shaded pools. The San Joaquin roach is capable of withstanding extreme environmental conditions, and is most abundant in pools and slow waters of the low to mid-elevation streams with high pH, conductivity, and temperature and with little cover or canopy. Spawning occurs in shallow, flowing areas with a substrate of small rocks. Adhesive eggs stick to rocks. Newly hatched fry stay in rock crevices or vegetation until large enough to move around actively (NatureServe 2003).

  District canals are drained and sediment is removed each year during the non-irrigation season, which generally runs from November through February. The canals therefore do not privide suitable habitat for this fish.

- **Hardhead.** The hardhead is a freshwater fish native to California with a distribution limited to the Sacramento-San Joaquin and Russian river systems. Usually found in water systems with clear, deep pools with sand-gravel-boulder bottoms and slow water velocity. Spawning occurs as early as May and June in the valley and may extend to August in the foothill regions of the upper San Joaquin River. Spawning substrate may include sand, gravel, and decomposed granite areas. Juvenile hardhead inhabit both shallow regions and deeper lakes and reservoirs, and may be also be found in various temperature gradients such as Millerton Lake. Juvenile hardhead feed on plankton and cladocerans and on insects and small snails. They also take filamentous algae in the intermittent pools of upper San Joaquin River, particularly in the fall months. Hardhead reach maturity at the end of their second year (UC Berkeley 2003).

  District canals are drained and sediment is removed each year during the non-irrigation season, which generally runs from November through February. The canals therefore do not provide suitable habitat for this fish.

- **Western pond turtle.** (DFG species of concern). The western pond turtle is a freshwater turtle with a carapace that measures 4 to 8 inches in diameter when fully grown. Typically associated with calm waters such as streams, pools, and irrigation canals with vegetated banks and containing basking areas with downed logs or large rocks. Food consists mainly of animal matter such as aquatic invertebrates, small amphibians, and fish, but can also include aquatic plants. When disturbed, the western pond turtle usually retreats into the nearest waterway. Females lay 5 to 11 eggs between May and August, in buried nests in sunny, sandy areas near water. Hatching time is approximately 73 to 80 days. Juveniles will remain in the nest until the following spring. (DFG 2002)

  District canals do not have the preferred habitat of this turtle, vegetated banks with logs or rocks for basking so it is unlikely that this animal will be found in District canals.

- **Giant garter snake.** The giant garter snake is considered one of the largest garter snakes reaching lengths of approximately 63 inches and weighing up to 1.5 pounds. The giant garter snake typically inhabits agricultural wetlands and other waterways such as irrigation and drainage canals, sloughs, ponds, small lakes, low gradient streams, and adjacent uplands in the Central Valley. Its food consists primarily of small fish, amphibians, and amphibian larvae. The giant garter snake dens in small mammal burrows and other soil crevices above prevailing flood elevations throughout its winter dormancy period. Giant garter snakes typically select burrows with sunny exposure along south- and west-facing slopes. When disturbed, the giant garter snake usually retreats into the nearest waterway. Its breeding season extends through March and April, and females give birth to live young from late July through early September (USFWS 2003; DFG 2002).

Giant garter snakes are historically known from the central and western portions of the San Joaquin Valley. An aquatic garter snake (*T. couchii* or *T. gigas*) has never been collected from the eastern San Joaquin Valley, between the Sierra Nevada foothills and the marshes on the Valley floor (Hansen 1980). It has been suggested that the ranges of these two species were once divided by extensive riparian forests that occurred along the river corridors of streams that flowed from the foothills of the Sierra Nevada mountains to the San Joaquin River (Hansen 1980; USFWS 1999). Between the foothills of the Sierra, and the marshes and sloughs that typified the habitats of the bottomlands of the San Joaquin Valley, river corridors were shaded by dense riparian forests. These shaded river corridors lacked suitable basking sites for aquatic garter snakes, and prey items may also have been less abundant than in sloughs and marshes of the bottomland regions. This type of riparian habitat is not suitable for giant garter snakes (Brode 1988). Consequently, habitats suitable for aquatic garter snakes (including the giant garter snake) appear to be absent from the eastern portions of San Joaquin, Stanislaus, and Merced counties.

- **Sanford's arrowhead.** Sanford's arrowhead is included on CNPS List 1B and it is designated a species of concern by the USFWS. This perennial herb in the water plantain family (*Alismataceae*) is widely distributed in California from Del Norte County on the north coast to Ventura and Orange counties in Southern California. However, this species is now extirpated from Southern California and many parts of the Central Valley. Typical habitat is shallow freshwater marsh at elevations between 0 and 2,000 feet and many of the existing occurrences of Sanford's arrowhead are documented from irrigation channels and drainage ditches. This species blooms from May to October.

  The majority of District canals are concrete lined. The canals are drained and sediment is removed each year during the non-irrigation season, which generally runs from November through February. Additionally, the herbicide treatment has been ongoing in the District canals since 1975. As a result, the canals do not provide suitable habitat for this plant.

- **Slender-Leaved Pondweed.** Slender-leaved pondweed is included on CNPS List 2. This perennial herb in the pondweed family (*Potamogetonaceae*) is widely distributed in the northern hemisphere but is rare in California. Slender-leaved pondweed has submersed stems and leaves less than 6 inches long and less than 0.12 inch wide. This pondweed species typically occupies the shallow-water zones of lakes and drainage channels in the San Joaquin Valley, Sierra Nevada, San Francisco Bay, and Modoc Plateau regions of California (DFG 2003).

  The majority of District canals are concrete lined and are typically operated with a minimum of two to three feet of water depth which is not the preferred shallow water habitat of this plant. Additionally, the canals are drained and sediment is removed each year during the non-irrigation season, which generally runs from November through February. This, combined with the herbicide treatment that has been ongoing in the District canals since 1975, make the canals unsuitable habitat for this plant.

3.2 HYDROLOGY AND WATER QUALITY

This section describes the environmental setting for water resources in the Proposed Project vicinity. The San Joaquin River Basin is contained within the southern portion of the Central Valley of California. The basin extends approximately 250 miles north to south, encompasses about 32,000 square miles, and is bounded by the Sierra Nevada mountains on the east and the Diablo Range on the west. Extensive water supply, hydroelectric, and flood-control efforts during the past century have resulted in the construction of dams and reservoirs that now control the flow on nearly all major streams in the San Joaquin River Basin. The primary sources of surface water to the San Joaquin River Basin are rivers that drain the western slope of the Sierra Nevada. Each of these rivers, the San Joaquin, Merced, Tuolumne, Stanislaus, Calaveras, Mokelumne, and Cosumnes, drains large areas of high-elevation watershed that supply snowmelt runoff during the late spring and early summer months.

3.2.1 Surface Water Hydrology

3.2.1.1 San Joaquin River

The San Joaquin River originates in the Sierra Nevada at an elevation above 10,000 feet and flows into the San Joaquin Valley at Friant Dam. Along the valley floor, the San Joaquin River receives additional flow from the Merced, Tuolumne, and Stanislaus rivers. Flows in the upper San Joaquin River are regulated by the Central Valley Project's Friant Dam, which was completed in 1941 to store and divert water to the Madera and Friant-Kern canals for irrigation and municipal and industrial water supplies in the eastern portion of the San Joaquin Valley. Releases from Friant Dam are generally limited to those required to satisfy downstream water rights. Millerton Lake, formed by Friant Dam, has a capacity of 520,000 acre-feet.

The lower San Joaquin River is the section of river from the confluence with the Merced River (below Fremont Ford) to Vernalis, which is generally considered the southern limit of the Sacramento-San Joaquin River Delta (Delta). It is characterized by the combination of flows from tributary streams, major rivers, groundwater accretions, and agricultural drainwater. The drainage area of the San Joaquin River above Vernalis is approximately 13,356 square miles. However, little water is contributed from the upper San Joaquin River, except during flood events. Therefore, flows in the lower San Joaquin River are primarily governed by the tributary inflows from the Merced, Tuolumne, and Stanislaus rivers.

3.2.1.2 Merced River

The Merced River drains an area of approximately 1,273 square miles east of the San Joaquin River, and produces an average unimpaired runoff of approximately 1 million acre-feet. The major water supply reservoir on the river is Lake McClure, with a capacity of 1,024,000 acre-feet. It is formed by New Exchequer Dam, completed in 1967, which regulates releases to the lower Merced River. New Exchequer Dam is owned and operated by the Merced Irrigation District for power production, irrigation, and flood control.

3.2.1.3 Tuolumne River

The Tuolumne River drains a watershed of approximately 1,540 square miles, and produces an average annual unimpaired runoff of approximately 1.8 million acre-feet. Flows in the lower portion of the Tuolumne River are controlled primarily by the operation of New Don Pedro Dam, which was constructed in 1971 jointly by the Turlock Irrigation District and Modesto Irrigation District with participation by the City and County of San Francisco. The 2.03-million-acre-foot reservoir stores water for irrigation, hydroelectric generation, fish and wildlife enhancement, recreation, and flood-control purposes.

3.2.1.4 Stanislaus River

The Stanislaus River drains a watershed of approximately 900 square miles, and produces an average unimpaired runoff of approximately 1.056 million acre-feet. Flows in the lower Stanislaus River are controlled by releases from the New Melones Reservoir, which has a capacity of 2.4 million acre-feet, and is operated by the Bureau of Reclamation (Reclamation) as part of the Central Valley Project. The main water diversion point on the Stanislaus River is Goodwin Dam, which provides for delivery to Oakdale and South San Joaquin irrigation districts.

3.2.2 Surface Water Quality in the San Joaquin River Basin

Surface water quality in the San Joaquin River Basin is affected by several factors, including natural runoff, agricultural return flows, biostimulation, construction, logging, grazing, operations of flow-regulating facilities, urbanization, and recreation. In addition, irrigated crops grown in the western portion of the San Joaquin Valley have accelerated the leaching of minerals from soils, altering water quality conditions in the San Joaquin River system.

Water quality in the San Joaquin River varies considerably along the stream's length. In the reaches above Millerton Lake, water quality is generally excellent. However, several reaches of the river below Friant Dam are often dry due to groundwater percolation. From Salt Slough to Fremont Ford, most of the flow in the river is derived from water deliveries to the wildlife refuges and irrigation return flows and discharges (e.g., Grassland Bypass Project) carried by Salt and Mud sloughs. This reach of the San Joaquin River typically has the poorest water quality of any reach of the river.

As the San Joaquin River progresses downstream from Fremont Ford, water quality generally improves at successive confluences, specifically at those with the Merced, Tuolumne, and Stanislaus rivers. In the relatively long reach between the Merced and Tuolumne rivers, however, mineral concentrations tend to increase due to agricultural drainwater return flows, other wastewaters, and groundwater discharging into the river (DWR 1965 as cited in Reclamation 2000).

Section 303(d) of the Clean Water Act requires states to identify and include on the 303(d) list water bodies that are threatened or are not meeting water quality standards despite controls on point source discharges. Pollutants listed for water bodies within the San Joaquin River Basin and downstream of aquatic pesticide treatment areas are shown in Table 3-2.

Table 3-2
Impaired Water Bodies and Listed Pollutants

Water Body	Pollutant/Stressor	Potential Source
Merced River, Lower	Chlorpyrifos	Agriculture
	Diazinon	Agriculture
	Group A Pesticides	Agriculture
San Joaquin River (Merced River to South Delta Boundary	Boron	Agriculture
	Chlorpyrifos	Agriculture
	DDT	Agriculture
	Diazinon	Agriculture
	EC	Agriculture
	Group A Pesticides	Agriculture
	Mercury	Resource Extraction
	Unknown Toxicity	Source Unknown
Tuolumne River, Lower (Don Pedro Reservoir to San Joaquin River)	Diazinon	Agriculture
	Group A Pesticides	Agriculture
	Unknown Toxicity	Source Unknown
Harding Drain	Diazinon	Agriculture
	Chlorpyrifos	Agriculture
	Unknown Toxicity	Source Unknown
	Ammonia	Agricultural, Municipal

Source: Central Valley Regional Water Quality Control Board. 2002. Clean Water Act Section 303(d) list of water quality limited segments. Approved by U.S. Environmental Protection Agency in July 2003.

EC = electrical conductivity, DDT = dichlorodiphenyltrichloroethane

3.2.3 Turlock Irrigation District Facilities

The Turlock Irrigation District's water conveyance and other facilities are described in Section 2.2.1.2 of this Initial Study. Water leaving Turlock Irrigation District's system of canals and drains is discharged into the Tuolumne, Merced and San Joaquin rivers. Water bodies that are treated with pesticides or may be affected by pesticides are listed in Section 2.2.2.1.

4 AGENCIES WHOSE APPROVAL IS REQUIRED (RESPONSIBLE, TRUSTEE, AND AGENCIES WITH JURISDICTION)

Application of aquatic pesticides by public entities is currently regulated in 2002 and 2003 under the SWRCB Statewide General NPDES Permit for Discharges of Aquatic Pesticides (Water Quality Order No. 2001-12-DWQ, General Permit No. CAG990003). Dischargers eligible for coverage under this General Permit are public entities that conduct resource or pest management control measures, including local, state, and federal agencies responsible for control of algae, aquatic weeds, and other organisms that adversely impact operation and use of drinking water reservoirs, water conveyance facilities, irrigation canals, and natural water bodies. This permit is set to expire in January 2004, and the proposed pesticide application program would occur under a new General Permit. The SWRCB requires California Environmental Quality Act (CEQA) documentation to be complete before a discharger can be covered under the new General Permit.

In addition to compliance with the General Permit, the aquatic pesticide programs are also regulated under a Memorandum of Understanding that involves the U.S. Environmental Protection Agency, DPR, and CACs. Under this Memorandum of Understanding, the DPR and the CACs work together to regulate pesticide use throughout California. Irrigation districts must obtain State of California Qualified Applicator Certificates from DPR for all applicator personnel applying restricted chemicals. Districts are also required to obtain an annual permit from the CAC and must obtain a written recommendation from a licensed California Pest Control Advisor, and submit a written Notice of Intent to the CAC and the County 24 hours before applying a restricted pesticide. In addition, irrigation districts are required to file Notice of Intent forms with the DFG annually. Each CAC is required to inspect 5 percent of its cases. Monthly use reports must be submitted to the CAC and must include monthly totals for chemical use. The CAC forwards these forms to the DPR, which manages a database of chemical applications. The General Permit supplements these existing regulatory programs with additional requirements that are regulated and managed by the SWRCB and the Regional Water Quality Control Board.

5 CONSISTENCY WITH EXISTING GENERAL PLAN, ZONING, AND OTHER APPLICABLE LAND USE CONTROLS

Land uses along the San Joaquin River consist primarily of rural residential and agricultural areas until the river enters the Delta near the community of Vernalis, below the confluence with the Stanislaus River. Land use in the Tuolumne River watershed is primarily agriculture. Urban land uses in the lower reaches of the Tuolumne River watershed include the cities of Modesto, Hughson and Ceres and the community of La Grange. Land use in the Merced River watershed is primarily open space (foothill pasture) within the upper reaches and agriculture in the lower reaches. A few rural communities are located within the watershed with the largest being the towns of Hilmar and Delhi. The communities of Turlock, Denair and Keyes are also located in the vicinity.

The Proposed Project directly affects the District's water conveyance and storage facilities, thereby indirectly affecting the beneficiaries of the water, primarily agricultural land uses, and adjacent water and land habitats within the watershed of the Tuolumne, Merced and San Joaquin rivers. To the extent that water resources and habitats could be affected by the application of aquatic pesticides, local general plan policies are of interest.

Each county and city in California is required by Section 65300 of the California Government Code to have a comprehensive, long-term general plan for the physical development of the county or city. Mandatory elements of the general plan that have bearing on the Proposed Project are land use, agriculture, fish and wildlife habitat, water resources, and conservation. This section summarizes key goals and policies contained in the existing general plans for the Stanislaus and Merced counties in which the Proposed Project is located. Since the Proposed Project does not involve urban development, the key issue is whether the application of aquatic pesticides to District conveyance and storage facilities is consistent with county policies for resource conservation and the support of agriculture.

The goals and policies of each county relevant to the Proposed Project are summarized in Table 5-1.

Table 5-1
County General Plan Policy Summary

County	Goals and Objectives
Merced	• Appropriately designate rural areas to meet the agricultural, grazing, wildlife habitat, recreational, natural resource, and other open-space needs of the county. • Protect rare and endangered species from urban development and recognize them in rural areas. • Protect surface and groundwater resources from contamination, evaporation, and inefficient use. • Support measures to protect and improve water quality.

Table 5-1 (concluded)
County General Plan Policy Summary

County	Goals and Objectives
Stanislaus	• Conserve water resources and protect water quality in the county. • Provide for the long-term conservation and use of agricultural lands. • Protect fish and wildlife species in the county. • Protect the natural resources that sustain agriculture in the county.

Sources: Merced County 1990; Stanislaus County 1994.

The Proposed Project is consistent with the policies above. Because land uses would not be physically altered, local zoning and related land use controls are not an issue. Furthermore, it would not directly or indirectly result in the following actions:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use.
- Conflict with existing zoning for agricultural use, or a Williamson Act contract.
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use.

6 ENVIRONMENTAL REVIEW CHECKLIST

The following environmental review uses the Environmental Checklist Form contained in the CEQA Guidelines, Appendix G, dated October 26, 1998. A brief explanation or reference for all answers follows each environmental question. Additional information for other issues not on the checklist is provided as appropriate. The evaluation of environmental impacts takes account of the whole action involved, including off-site as well as on-site, cumulative as well as project-level, and indirect as well as direct impacts. No construction impacts occur, but operational impacts are considered.

6.1 AESTHETICS

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Have a substantial adverse effect on a scenic vista?				✓
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?				✓
c. Substantially degrade the existing visual character or quality of the site and its surroundings?				✓
d. Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?				✓

Discussion:

a. The Proposed Project consists of the application of aquatic pesticides to the irrigation water conveyance system, and municipal water supply reservoir and does not include any actions at scenic vistas. Therefore, the Proposed Project would not have any impact on scenic vistas.

b. The application of aquatic pesticides to irrigation conveyance systems and a municipal water supply reservoir does not affect any scenic views, vistas, or scenic highways.

c. The application of aquatic pesticides would remove aquatic vegetation from irrigation conveyance systems, including encroaching vegetation on canal banks. This removal would allow the water to flow more freely, and as such, would be more pleasing in visual character. This impact, while beneficial, is not significant.

   The application of the aquatic pesticides to the municipal water supply reservoir would remove aquatic vegetation from the facility, providing a more pleasing visual character. This impact, while beneficial, is not significant.

d. The application of aquatic pesticides would occur during daylight hours and would not create a new source of substantial light or glare or affect nighttime views in the area.

6.2 AGRICULTURAL RESOURCES

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use?				✓
b. Conflict with existing zoning for agricultural use, or a Williamson Act contract?				✓
c. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use?				✓

Discussion:

a. The Proposed Project consists of the application of aquatic pesticides to the irrigation conveyance system and the municipal water supply reservoir and does not include any alterations to Prime Farmland, Unique Farmland, or Farmland of Statewide Importance.

b. The application of aquatic pesticides to irrigation conveyance systems and a municipal water supply reservoir does not conflict with any zoning of lands for agricultural use or Williamson Act contracts because no change in land use occurs.

c. The application of aquatic pesticides to irrigation conveyance systems occurs primarily on lands that are currently in agricultural use and would not result in the conversion of the lands to nonagricultural uses.

   The application of aquatic pesticides in the municipal water supply reservoir at La Grange will not alter the water supply levels or encourage development in the area and has no impact on the conversion of lands to nonagricultural uses.

6.3 AIR QUALITY

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Conflict with or obstruct implementation of the applicable air quality plan?				✓
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?			✓	
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an			✓	

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?				
d. Expose sensitive receptors to substantial pollutant concentrations?			✓	
e. Create objectionable odors affecting a substantial number of people?			✓	

Discussion:

a. Air quality in the San Joaquin Valley is not dominated by emissions from one large urban area. Instead, a number of moderately sized urban areas are located throughout the valley. On-road vehicles are the largest contributor to carbon monoxide emissions as well as a large contributor to nitrogen oxide. PM_{10} emissions primarily result from paved and unpaved roads, agricultural operations, and waste burning.

Both the state and federal governments have established health-based Ambient Air Quality Standards for the following six air pollutants: ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. The State of California has also established standards for hydrogen sulfide, sulfates, and visibility-reducing particles.

The pesticides that would be used are all registered for use in California as aquatic pesticides. The DPR evaluates the pesticide, including fate and transport characteristics of the pesticide in water, soil, and air, to ensure that no unacceptable risk to the environment occurs when used as instructed. The application of aquatic pesticides would be temporary in nature and would not affect any of the pollutants measured for air quality in the San Joaquin Valley; therefore, no conflict or obstruction of the applicable air quality plan would occur.

b. All the aquatic pesticides except Rodeo/Aquamaster are applied directly to the water and would not be airborne; therefore, no impacts would occur to air quality standards. The application of Rodeo/Aquamaster to canal banks is typically by backpack sprayer or spray rig. BMPs for Rodeo/Aquamaster application include applying Rodeo/Aquamaster only when wind speeds are between 0 to 10 mph, and the application equipment is to be set up to produce a large droplet size to avoid pesticide drift. Thus, with the use of BMPs for the application of Rodeo/Aquamaster, impacts on air quality due to the application of aquatic pesticides would not be significant.

c. Because all the aquatic pesticides except Rodeo/Aquamaster are applied directly to the water, no increases in airborne pollutants would occur. Again, the application of Rodeo/Aquamaster would follow BMPs and would not result in a net cumulative increase of air pollutants.

d. The application sites where the aquatic pesticides are applied to irrigation conveyance systems are typically located in undeveloped areas away from population centers or sensitive land uses such as residential, community care, and schools. In addition, the Magnacide H (an aquatic pesticide which is toxic if inhaled at high concentrations) is very volatile. As a result, the pesticide is applied directly to the water. Thus, sensitive receptors would not be exposed to substantial concentrations of the chemicals.

The Turlock Irrigation District applies copper compounds to a municipal water supply reservoir, also known as French Pit, to control aquatic weed growth. The reservoir is located in the town of La Grange. The chemicals are applied directly to the water and are not toxic if inhaled. Thus, sensitive receptors would not be exposed to substantial concentrations of the chemicals.

e. Rodeo/Aquamaster or the copper compounds do not have an odor that would be noticeable beyond the application point, and dissipates quickly once applied. In addition, the aquatic pesticide application is designed to remove existing vegetation that clogs irrigation water conveyance systems. The accumulation of this vegetation can often create smells that may be objectionable. However, these irrigation conveyance systems are typically located in rural areas away from substantial numbers of people. Removal of this vegetation would be beneficial or help to minimize some objectionable odors.

During an application of Magnacide H, an objectionable odor can be detected. The odor would generally not be detectable at distances over approximately 100 yards from the point of application. The odor is temporary, and dissipates quickly following the application. Magnacide H application sites are typically located in remote areas, away from significant numbers of people. In addition, District staff are present during the entire application process, and if necessary direct people away from the immediate area should someone come near the treatment site.

6.4 BIOLOGICAL RESOURCES

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the DFG or USFWS?			✓	
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the DFG or USFWS?			✓	
c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?			✓	

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?			✓	
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?				✓
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				✓

Discussion:

a. Table 3-1 identifies special-status species that could potentially utilize aquatic habitats associated with water conveyance facilities in Turlock Irrigation District. Application of aquatic pesticides could adversely affect nine special-status species if these species are present in conveyance facilities where the treatments are applied. Potential effects for wildlife species could include loss of foraging or breeding habitat due to removal of aquatic vegetation, disturbance of nesting or breeding habitat during application of the treatments, or mortality and/or reduced survival of individuals caused by exposure to toxic concentrations of chemicals associated with the treatments. Potential effects for special-status plants could include mortality of plant populations and the loss of habitat. The two special-status plant species that could be present would be extremely vulnerable to the proposed applications, but these species are unlikely to occur in most of the water conveyance facilities proposed for treatment.

Under the Proposed Project, pesticide application procedures in Turlock Irrigation District would be essentially equivalent to practices that have occurred for the past 2 years during which time water quality monitoring has been conducted and BMPs implemented as required by the existing General Permit (existing conditions). Turlock Irrigation District complies with label instructions and does not release treated water from irrigation facilities while the pesticide remains in the water. When applying herbicides directly to the water, Turlock Irrigation District uses the practice of closing all gates at potential release points during and after application to ensure that streams or wetlands are not affected.

When Rodeo/Aquamaster is applied to drains that discharge to natural water bodies, there is no mechanism to control flow out of the drains. However, it can be demonstrated that the active ingredient (glyphosate) is not mobile or highly toxic and, therefore, unlikely to impact the environment.

All reported bioaccumulation factor values for glyphosate in aquatic organisms are well below 100 (Ebasco 1993; Heyden 1991; Wang et al. 1994). The Hazardous Waste Identification Rule (USEPA 1999) identifies compounds that are recognized as having a low, medium, or high potential for bioaccumulation. For bioaccumulation in aquatic systems, rankings were determined using bioaccumulation factors in fish or log K_{ow} (octanol-water partitioning coefficient) values for organic compounds. Bioaccumulation potential is defined as follows:

Bioaccumulation potential	Bioaccumulation Factor (BAF)	log K_{ow}
High	BAF >= 10,000	log K_{ow} >= 4.0
Medium	10,000 > BAF >= 100	4.0 > log K_{ow} >= 2.0
Low	BAF < 100	log K_{ow} < 2.0

The highest bioaccumulation factor of 65.5 was reported for tilapia in fresh water (Wang et al. 1994). Other studies report much lower bioaccumulation factors in the range of 0.03 to 1.6 for fish (Ebasco 1993). Most studies report rapid elimination and depuration from aquatic organisms after exposure stops (Ebasco 1993). Therefore, bioaccumulation of glyphosate is considered to be low and food-web transfer is not considered to be a significant exposure route. Little or no data exist on bioaccumulation of surfactants and other herbicide mixture additives.

Glyphosate is a nonselective herbicide, meaning that it kills all vascular plants indiscriminately, rather than selectively affecting certain types of plants, such as grasses or broad-leaf herbs. Plants vary in their sensitivity to glyphosate exposure, mostly by variation in how easily it is absorbed and internally transported by plant tissues. Its action is systemic, meaning that it is transported within plant tissues from surfaces it contacts to affect remote parts of the plant, such as roots and rhizomes. Despite its high toxicity to plants, it is relatively low in toxicity to animals due to its chemical nature and the physiological basis for its activity. Glyphosate is chemically similar to certain types of amino acids (components of proteins) found in plants, but not in animals. When glyphosate interacts with the physiological processes of manufacturing proteins in plants, it profoundly disrupts all protein synthesis. Proteins are essential to all physiological processes in plants and, thus, glyphosate exposure is generally highly lethal to plants. Glyphosate does not poison protein synthesis in animals, because it does not act as an analogue of amino acids metabolized in animals. Glyphosate does have other effects on animals, however, and so do some of the additives included with it in spray mixes. Glyphosate is an acid, like amino acids, but is most commonly used in salt form (isopropylamine salt), which is soluble in water. Its chemical name is N-(phosphonomethyl) glycine. The overall effect of glyphosate solutions depends on both the active ingredient and the surfactant. The only formulations of glyphosate currently approved for use in aquatic habitats omit surfactants. Certain surfactants approved for use in aquatic habitats must be added to aquatic-approved glyphosate formulations.

One ecologically significant feature of glyphosate is that it is strongly adsorbed by organic matter and fine sediment, such as clay or silt. Sediment films on plant surfaces strongly interfere with uptake and activity of glyphosate. In its chemically bound, adsorbed state glyphosate is chemically intact, but physiologically inactive. Actual decomposition of glyphosate in the soil or sediment is distinct from its inactivation by adsorption. Glyphosate also desorbs (releases) from soil particles, but its strong affinity for fine mineral and organic particles maintains the predominantly bound, inactivated form (EXTOXNET; Ebasco 1993; Giesy et al. 2000).

The primary breakdown product of glyphosate is aminophosphoric acid (AMPA), which is generally reported to be nontoxic to animals (EXTOXNET; Ebasco 1993). Glyphosate is decomposed by microbial activity in the soil. The reported rates of glyphosate decomposition and persistence in soil vary a great deal: most studies suggest rapid decomposition, while others detect persistence in the soil for more than a year (Ebasco 1993). Rates of decomposition by soil microbes vary with factors such as temperature, oxygen, and pH. Glyphosate may be used as a food substrate by bacteria and can stimulate bacterial activity. It has been found to kill or inhibit the growth of some soil fungi in pure cultures, however. Little is known about how glyphosate affects the microflora in realistic soil environments, where important interactions such as soil adsorption can occur (Ebasco 1993).

Laboratory tests of glyphosate generally indicate it to be nontoxic or low in toxicity to mammals and birds, particularly at the concentrations or doses that occur in field conditions (EXTOXNET). Most information about glyphosate toxicity to mammals comes from experiments on rats, mice, and rabbits, and some on dogs. Little information is available on toxicity of glyphosate or its breakdown products on most wildlife species. Toxic effects of glyphosate are usually achieved in laboratory animals at very high doses (hundreds or many thousands of times the exposure expected from concentrations and doses applied in field conditions) comparable to portions of animal diets, are often required to generate acute effects (EXTOXNET; Ebasco 1993; Giesy 2000).

Three patented surfactants are approved for use with glyphosate in aquatic environments. They are known by trade names LI-700, Agridex, and R-11. Toxic effects of spray mixes of glyphosate are due primarily to surfactants rather than the active herbicide. These surfactants are nonionic, meaning they do not dissociate into electrically charged particles in water, as salts do. They contain nonylphenol polyethoxylante (NPE) ingredients, which are made from nonylphenol.

Rodeo/Aquamaster is classified as "practically nontoxic to aquatic invertebrates, exhibiting an LC_{50} of 930 mg/L, which represents the concentration that has been found to result in lethal effects to 50 percent of the test organisms (USDA/FS 1997). Giesy et al. (2000) reviewed the data available on glyphosate toxicity to fish. Acute toxicity LC_{50} values for glyphosate tested as isopropylamine salt ranged from 97 to greater than 1,000 mg/L, and NOEC values ranged from <97 to 1,000 mg/L. Data compiled by Ebasco (1993) on 1-day acute toxicity tests indicate EC 50 (concentration resulting in adverse effects to 50 percent of the test organisms) values ranging from 12.8 to 240 mg/L.

Acute toxicity of X-77, R-11, ad LI-700 to fish can be moderate. Threshold LC_{50} for an anadromous salmonid fish tested (Atlantic salmon, *Salmo salar*) was as low as 0.13 parts per million, and young fish or eggs are generally found to be more sensitive than adults. Despite the low threshold for concentrations of surfactant causing significant mortality, actual concentrations to which fish are likely to be exposed in actual estuarine environments are orders of magnitude lower. Research in Willapa Bay found that the highest average maximum concentrations of surfactant in water dispersed from sprayed estuarine mud with the first flooding tide – the highest concentration for exposure, a "worst-case scenario" for fish swimming into freshly sprayed sites – was 16 parts per billion (Paveglio et al. 1996).

Effects of glyphosate on birds have been tested on mallard ducks (dabbling ducks that ingest wetland sediment along with seeds, insects, and vegetation) and bobwhite quail. As with mammals, very high dietary concentrations of glyphosate (a 4,640 mg/kg dietary concentration) resulted in no adverse reactions such as weight loss or mortality (Ebasco 1993). Little or no data are available on toxicity of surfactants to birds.

Ebasco (1993) compiled data on glyphosate toxicity to mammals commonly used in laboratory tests and found that LD 50 values (the dose resulting in lethal effects to 50 percent of test organisms) ranged between 3,800 mg/kg body weight. Glyphosate is considered to be practically nontoxic to mammals. The toxicity of the aquatic-approved surfactants to mammals is reported to be very low: greater than 5 grams per kilogram body weight oral dosage of Agri-dex and LI-700 is the threshold for LC_{50}, the level at which 50 percent mortality occurs in laboratory rat tests. The corresponding LC_{50} for R-11 is reported to be 2 to 4 grams per kilogram body weight (USDA/FS 1997).]

No impacts to special-status species are known to have occurred due to pesticide use by Turlock Irrigation District and are not expected to occur in the future. Therefore, the proposed treatments are not likely to have a substantial adverse impact, either directly or through habitat modifications, on the special-status species identified in Table 3-1. In addition, the District will also implement awareness training for personnel that apply the pesticides to further reduce any less-than-significant potential impacts to special-status species. District personnel will receive training seasonally, prior to the application of aquatic pesticides, that will summarize the special-status species issues associated with water conveyance facilities in Turlock Irrigation District and the sensitivity of aquatic resources that receive discharges from these conveyance facilities.

b. The water conveyance facilities proposed for treatment with aquatic pesticides have very limited riparian habitat because the facilities are typically lined with concrete and maintained to reduce obstructions to water flow. Therefore, the Proposed Project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the DFG or USFWS. Turlock Irrigation District implements operational procedures that prevent treated water from entering natural streams, wetlands, or other natural aquatic habitats.

   The municipal water supply reservoir proposed for treatment with aquatic pesticides has very limited riparian habitat. Therefore, the Proposed Project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the DFG or USFWS. Turlock Irrigation District implements operational procedures that prevent treated water from entering natural streams, wetlands, or other natural aquatic habitats.

c. As described for item "b" above, the Proposed Project would not have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act through direct removal, filling, hydrological interruption, or other means.

d. The Proposed Project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. Turlock Irrigation District implements operational procedures that prevent treated water from entering natural streams, wetlands, or other natural aquatic habitats that support native resident or migratory fish and wildlife species.

e. The Proposed Project does not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Turlock Irrigation District's aquatic pesticide program complies with the local policies and ordinances intended to protect biological resources.

f. The Proposed Project does not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

6.5 CULTURAL RESOURCES

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Cause a substantial adverse change in the significance of a historical resource as defined in 15064.5?				✓
b. Cause a substantial adverse change in the significance of an archaeological resource pursuant to 15064.5?				✓
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?				✓
d. Disturb any human remains, including those interred outside of formal cemeteries?				✓

Discussion:

a. The application of aquatic pesticides is typically in irrigation water conveyances or other facilities that are man-made. Although some of these structures may be more than 50 years old, the application does not involve any physical disturbance of them so no impacts would occur to historical resources.

b. Application of the aquatic pesticides does not involve any physical disturbance of the irrigation water conveyance system or the municipal water supply reservoir, so no impacts would occur to archeological resources.

c. The aquatic pesticide application does not involve any digging or other physical disturbance of the irrigation water conveyance system or the municipal water supply reservoir.

d. Application of aquatic pesticides is typically in irrigation water conveyances or a municipal water supply reservoir, all of which are man-made. Again, the application would not involve any digging or physical disturbances, so it would not disturb human remains.

6.6 GEOLOGY AND SOILS

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.				✓
ii. Strong seismic ground shaking?				✓
iii. Seismic-related ground failure, including liquefaction?				✓
iv. Landslides?				✓
b. Result in substantial soil erosion or the loss of topsoil?				✓
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?				✓
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?				✓
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?				✓

Discussion:

a. Application of the aquatic pesticides does not involve any physical disturbance of the irrigation water conveyance system or municipal water supply reservoir, so no impacts would occur from rupture of a known earthquake fault, strong ground shaking, ground failure, or landslides as a result of the Proposed Project.

b. Application of the aquatic pesticides does not involve any digging or other physical disturbance of the irrigation water conveyance system or municipal water supply reservoir, so no soil erosion or loss of topsoil would occur. Use of aquatic pesticides reduces the need to implement mechanical cleaning measures. As a result, the use of aquatic pesticides can be a benefit by reducing the digging or other physical disturbance associated with mechanical cleaning methods.

c. The Proposed Project does not involve any digging or other physical disturbance of the irrigation water conveyance system, and the affected canals and reservoirs have been in place for many years. Application of the aquatic pesticides would not result in on- or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse.

d. The Proposed Project includes canals and reservoirs that have been in place for many years and does not include any construction. Thus, no activities on expansive soils could be a risk to life or property.

e. The Proposed Project does not include the need for septic tanks or other wastewater disposal systems.

6.7 HAZARDS AND HAZARDOUS MATERIALS

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			✓	
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			✓	
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within ¼ mile of an existing or proposed school?			✓	
d. Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				✓
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				✓
f. For a project within the vicinity of a private airstrip, would the project result in a safety				✓

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
hazard for people residing or working in the project area?				
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?				✓
h. Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				✓

Discussion:

a. The pesticides that would be used are all registered for use in California as aquatic pesticides. The DPR evaluates the pesticide and to ensure that no unacceptable risk occurs to the environment. Although Magnacide H is an acutely toxic and hazardous material, standard practices will be used to ensure that risks to human health and the environment are avoided or minimized. Because the pesticides have been approved for use as aquatic pesticides, Department of Transportations (DOT) requirements will be followed during transport, and BMPs are required during application, no significant hazard would occur to the public or the environment in their routine transport, use, or disposal. All personnel applying the restricted aquatic herbicides must be trained and licensed. In addition, no significant spills, impacts, or injuries are known to have occurred during past use of these pesticides by the Turlock Irrigation District.

b. BMPs are required with the use of any of these pesticides. All personnel applying the restricted aquatic herbicides must be trained and licensed. However, the possibility exists that an accidental spill of the pesticides that would be hazardous could occur. It is unlikely that trained personnel would cause an accidental spill. Therefore, a spill is considered an infrequent/rare event and a less-than-significant impact. A spill would most likely affect primarily the personnel applying or handling the material rather than the environment or the community.

c. The application of these aquatic pesticides would typically occur in undeveloped locations and would not be within ¼ mile of a school. District staff is present and observant at all times during the application when pesticides are active. If persons enter the vicinity of application, District personnel instruct unauthorized persons to leave the application area. As a result, the impact would be considered less-than-significant.

   The municipal water supply reservoir at La Grange is fenced to protect the drinking water supply for the town, eliminating access to the public. Application of the pesticide would not be accessible to local school children, and therefore the impact is expected to be less-than-significant.

d. The facilities that receive the aquatic pesticides are not hazardous materials sites. During application of pesticides, precautions are taken to prevent the release of treated water to natural water bodies with designated beneficial uses. Turlock Irrigation District complies with pesticide label instructions and all other regulatory requirements. No impacts to significant hazards to the public or the environment are known to have occurred due to pesticide use by Turlock Irrigation District and are not expected to occur in the future.

e. The application of these aquatic pesticides does not involve any land use changes, construction of buildings, or use of equipment that would interfere with operations of any public airport. It does not create habitat that would attract birds and would not contribute to any bird aircraft strike hazard.

f. The application of these aquatic pesticides would not affect any private airstrip for the same reasons identified in item e above.

g. The Proposed Project involves application of aquatic pesticides to irrigation water conveyance systems. Application equipment is typically located on District-owned canal banks, or in undeveloped or rural areas. As such, no construction or obstruction of roads would impair or physically interfere with any emergency response or evacuation plans.

The Proposed Project involves the application of aquatic pesticides to a municipal water supply reservoir, including water needed to fight fires. The use of the pesticides is conducted on Turlock Irrigation District property, away from public roadways. As such, the use of pesticides will not cause the construction or obstruction of roads that would impair or physically interfere with any emergency. It does, however, reduce the aquatic weed growth in the reservoir, that if left unchecked, can clog water pumps used to provide fire flows. As a result, the use of pesticides can be a benefit to emergency response efforts.

h. The irrigation water conveyance systems are primarily located in agricultural areas and are not adjacent to or mixed with wildlands where wildfires could occur.

6.8 HYDROLOGY AND WATER

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Violate any water quality standards or waste discharge requirements?			✓	
b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that a net deficit would occur in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?				✓
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or				✓

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
river, in a manner that would result in substantial on- or off-site erosion or siltation?				
d. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in on- or off-site flooding?				✓
e. Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?				✓
f. Otherwise substantially degrade water quality?				✓
g. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				✓
h. Place structures that would impede or redirect flood flows within a 100-year flood hazard area?				✓
i. Expose people or structures to a significant risk of loss, injury, or death involving flooding, including flooding as a result of the failure of a levee or dam?				✓
j. Inundation by seiche, tsunami, or mudflow?				✓

Discussion:

a. All treated waters in irrigation facilities do not have officially designated beneficial uses, as listed in the Water Quality Control Plan (Basin Plan) prepared by the California Regional Water Quality Control Board, Central Valley Region (1998). In general, potential impacts to water quality would only occur if treated water is released to a water body that has designated beneficial uses. No waste discharge requirements exist for application of aquatic pesticides.

During application of pesticides, precautions are taken to prevent the release of treated water to natural water bodies with designated beneficial uses. Table 6-1 identifies beneficial uses of water bodies treated with each pesticide, and water bodies that may potentially receive treated water if a release occurs.

Table 6-1
Beneficial Uses of Potentially Affected Water Bodies

Potentially Affected Water bodies	Treated Directly? [Yes] or [No]	Number of Potential Release Locations	Estimate Range of Flow Rates	Designated Beneficial Uses (based on Central Valley RWQCB Basin Plan)
TID Canals & Drains	Yes	9	15-1800 cfs	None
Tuolumne River (Below La Grange Dam)	No	3	Varies	MUN, AGR, REC-1&2, WARM, COLD, MIGR(COLD), SPWN, WILD
San Joaquin River (Below Merced River)	No	4	Varies	MUN, AGR, PROC, REC-1&2, WARM, MIGR, SPWN(WARM), WILD
Merced River (Below McSwain Reservoir)	No	2	Varies	MUN, AGR, PROC, IND, POW, REC-1&2, WARM, COLD, MIGR, SPWN, WILD
French Pit	Yes	1	250 gpm	None

Turlock Irrigation District complies with label instructions and does not release treated water from facilities while the pesticide remains in the water or until allowed by the label instructions. When applying herbicides directly to the water, Turlock Irrigation District uses the practice of closing all gates at potential release points during and after application to ensure that beneficial uses are not impacted. No impacts to water quality are known to have occurred due to pesticide use by Turlock Irrigation District and are not expected to occur in the future.

Magnacide H

Magnacide H is applied only to irrigation canals with no designated beneficial uses. When Magnacide H is applied to irrigation canals, the main concern would be impacts to water quality due to release of the treated water from the canals. During all applications, release gates are kept closed until Magnacide H is no longer in the system. Due to operational requirements, many times the gates will remain closed longer than needed. Further ensuring any water, containing pesticides, has been irrigated onto agricultural lands.

Rodeo/Aquamaster

Generally, Rodeo is applied only to banks of irrigation facilities and drains with no designated beneficial uses. Rodeo is generally not applied directly to the water but is applied to vegetation growing along the banks of irrigation canals and drains. However, in some cases, Rodeo is applied to vegetation growing in water, or some overlap occurs onto the water surface when the pesticide is applied to vegetation growing on the banks. Glyphosate, the active compound in Rodeo, is quickly immobilized by adsorption to soil/sediment particles and organic matter, and remains immobilized until degradation occurs. Therefore, glyphosate is not expected to be transported significantly in water.

Copper Compounds

Copper compounds are applied directly to French Pit, a man-made reservoir, used specifically for water supply for a local community. The pesticide label instructions allow for the use of treated water, for drinking water purposes, immediately after treatment, when concentrations are expected to be at their highest. As a result, no impact to the municipal water supply is anticipated.

As a part of the treatment process and pursuant to the pesticide label requirements, water is pumped from French Pit into the Turlock Irrigation District's Upper Main Canal after a specified holding time. Pesticide applications and the potential release date are scheduled during the summer months, when irrigation demands are greatest, and therefore canal flows are at their highest. Releases from French Pit are scheduled to coincide with the date and time of the highest scheduled canal flows. The Upper Main Canal, where the water is discharged, is a part of the Turlock Irrigation District's canal system, and has no specifically designated beneficial uses.

The dissolved copper ion (the most toxic and bioavailable form) generally does not remain in the water column at high concentrations, but copper can form hydroxide and sulfide compounds, precipitate out of solution, adsorb to sediment particles, and accumulate in sediments with repeated applications. Half-lives of copper compounds used for algae control range from about 2 to 6 days, depending on factors such as hardness and alkalinity. The half-life represents the amount of time it takes for the copper concentration in the water column to decrease to half of the initial concentration (Murray-Gulde et al. 2002)

The facility configuration minimizes any potential movement of sediment from French Pit into the canal system. Water is pumped out of French Pit, into the canal system, from a stationary pump, with the intake located within the reservoir at a level that minimizes the movement of sediments.

When copper compounds are applied to French Pit, the main concern would be impacts to water quality downstream when the water from the Upper Main Canal flows into Turlock Lake. However, the small amount of water discharged from French Pit, when diluted by the water within the Upper Main Canal, is not expected to impact the water quality or uses within Turlock Lake or other downstream water bodies.

<u>Water Quality Monitoring</u>

During the irrigation seasons of 2002 and 2003, water quality samples were taken for Magnacide H and copper compound applications. Rodeo/Aquamaster was not utilized during these years, and as a result, no sampling was conducted. Water quality samples were collected at discharge locations before the gates were opened, or water was otherwise released to water bodies with designated beneficial uses. Pesticide application projects selected for water quality monitoring are representative of typical application procedures conducted by Turlock Irrigation District. Individual sampling locations were chosen to represent worst-case conditions (i.e., those potential release points where pesticide concentration is expected to be highest).

Magnacide H

During the irrigation seasons of 2002 and 2003, twenty-four samples were collected during eight events. Twenty-three samples showed no detected levels of acrolein. There was one sample, during the last sampling event in 2002, in which acrolein was detected. During that event, low concentrations of acrolein were detected (78 µg/l of acrolein) upstream of the Highline Spill. At that time, virtually no flows were coming down the Highline Canal to dilute the pesticide, because there were no irrigation orders downstream. As a result, the small amount of water in the canal was held until it was diluted by irrigation flows. The water was then either irrigated out or flowed down the canal where it was diluted further by flows from the Lower Stevinson and pump water from Lateral 8 before spilling to the Merced River. Therefore, the sample was taken prematurely, before the District planned to discharge from the Highline Spill. As a result, although acrolein was detected in the sample, due to the District's standard operational practices, no impacts to water quality occurred due to the pesticide application.

The detection, however, illustrated the point that amount of flow in the canal system impacts the time it takes for water containing pesticides to move through the canal system and effectively irrigated onto adjacent lands. During times when there are low flows in the canal system, there is also a significantly reduced need to utilize operational spills. As a result, the water can be held longer, as needed, to accommodate the additional time needed to irrigate water onto local fields. A dye-tracing study was implemented in 2003 to better understand how herbicides applied to the canal water travels through the various segments of the canal system, under various flow regimes, as irrigation demand changes. The information obtained from the study was used to further refine the District's understanding of how canal flows and irrigation orders relate to the speed at which the pesticide is irrigated out. The information has been used to refine the District's operational practices and sampling protocols when utilizing aquatic pesticides.

No impacts to water quality are believed to have occurred due to the application of Magnacide H by the Turlock Irrigation District. With the District's BMPs, refined by the dye-tracing studies and in compliance with state and federal pesticide use requirements, future applications of aquatic pesticides are expected to have a less-than significant impact on water quality.

Copper Compounds

During 2002 and 2003, two water quality samples were taken for copper compound applications. No copper was detected in water quality samples collected during either of the sampling events. Therefore, no impacts to water quality are believed to have occurred as a result of pesticide application by Turlock Irrigation District. The project selected for monitoring is representative of typical copper compound application project, with the sampling location represented the worst-case scenario, and standardized BMPs were implemented consistently for all copper compound applications. Therefore, no significant impacts to water quality are expected to occur in the future, assuming that equivalent practices will be used.

In comparison to No Project conditions, water quality would not be significantly impacted because monitoring data indicate that pesticide applications will not result in exceedances of applicable WQOs.

Under the Proposed Project, pesticide application procedures and sampling practices would be essentially equivalent, if not better, than the practices that have occurred for the past 2 years during which time monitoring has been conducted and BMPs implemented as required by the existing General Permit (existing conditions). Therefore, no change to water quality is expected as compared to Existing Conditions.

b. The Proposed Project will not alter groundwater recharge or supplies.

c. The Proposed Project will not alter existing drainage patterns or stream or river courses.

d. The Proposed Project will not alter existing drainage patterns or stream or river courses because existing facilities are not being structurally modified.

e. The Proposed Project will not affect quantity or quality of surface water runoff.

f. Potential effects to water quality are discussed under item (a).

g. The Proposed Project will not create housing or change delineation of flood hazard areas.

h. The Proposed Project will not involve creation of new structures.

i. The Proposed Project will have no effect on the integrity of any levee or dam, and will have no effect on flood flows.

j. The Proposed Project will have no effect on water flows.

6.9 LAND USE AND PLANNING

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Physically divide an established community?				✓
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				✓
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?				✓

Discussion:

a. The Proposed Project does not involve any construction, and as such, would not divide an established community.

b. The objective of the Proposed Project is to control weeds and algae that interfere with irrigation conveyance and treatment of municipal water supplies. Agricultural land uses are all part of the counties' land use goals and objectives (see Section 5). The application of aquatic pesticides in the municipal water supply reservoir at La Grange will not alter the water supply levels or encourage development in the area and has no impact on the conversion of lands to nonagricultural uses. The Proposed Project would not change the land use in the county.

c. The facilities in which the pesticides are used are primarily located in agricultural areas with agricultural land uses. The application of aquatic pesticides to control weeds and algae would not be in conflict with habitat conservation plans or natural community conservation plans.

6.10 MINERAL RESOURCES

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?				✓
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?				✓

Discussion:

a. Because the application of aquatic pesticides would be to existing facilities and no change in land use or stream flow would occur, no loss of known mineral resources would occur from excavation/construction activity or erosion.

b. The Proposed Project would not involve any change in land use as specified by any local general plan, specific plan, or other land use plan.

6.11 NOISE

Would the project result in:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?				✓
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?				✓
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				✓
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity			✓	

Would the project result in:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
above levels existing without the project?				
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				✓
f. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				✓

Discussion:

a. The application of aquatic pesticides would occur in remote locations in mainly agricultural areas. Existing noise from pumps or tractors may occur in the vicinity of the application site, but the application activity would not cause discernable increases over this background level. Consequently, the Proposed Project would not generate noise levels in excess of established standards.

b. No groundborne vibration or groundborne noise would be generated by the Proposed Project because application of the pesticides is either by backpack sprayer or is applied directly to the water without the use of noisy equipment.

c. The application of the aquatic pesticides is a periodic event that occurs on an as-needed basis or as a preventative measure at the beginning of the irrigation season.

d. The application of the aquatic pesticides is a temporary event but because the irrigation water conveyance systems are primarily located in agricultural areas, existing background noise from pumping or tractor use could occur. No increase in ambient noise would occur as a result of the Proposed Project.

   The application of copper compounds to the municipal supply reservoir in La Grange would occur on the water treatment plant property. A boat with a small outboard motor is utilized to apply and distribute the pesticide. The application would not cause discernable increases noise levels above ambient noise levels, or beyond the water treatment plant site. As a result, the application is expected to create a less-than-significant increase in ambient noise levels.

e. The application of these aquatic pesticides does not involve land use changes, construction of buildings, or use of equipment that would interfere with operations of any public airport.

f. The application of these aquatic pesticides would not affect any private airstrip for the same reasons identified in item e above. Although water treated with pesticides may flow past private airstrips, it would not impact noise levels near local airports.

6.12 POPULATION AND HOUSING

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				✓
b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				✓
c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				✓

Discussion:

a. The application of aquatic pesticides is to control weeds and algae primarily for agricultural irrigation purposes or municipal water supply purposes. However, the Proposed Project does not expand water supply or conveyance systems to serve urban development. Therefore, it would not induce substantial population growth.

b. No building or other construction activities would be part of the Proposed Project, so no displacement of existing housing or construction of replacement housing would occur.

c. The Proposed Project would not involve any changes in land use or construction that would displace substantial numbers of people.

6.13 PUBLIC SERVICES

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:				
Fire protection?				✓
Police protection?				✓
Schools?				✓
Parks?				✓

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
Other public facilities?				✓

Discussion:

a. No building or other construction activities would be part of the Proposed Project, so no alteration of existing government facilities or need for new government facilities would occur. With no new development being proposed, no impacts would occur to the response times or other performance objectives for fire protection, police protection, schools, parks, or other public facilities.

6.14 RECREATION

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				✓
b. Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?				✓

Discussion:

a. No increase in population growth would occur as a result of the Proposed Project. Therefore, no increase in the use of existing recreational facilities would occur.

b. The Proposed Project includes the application of aquatic pesticides to irrigation water conveyance systems. At the municipal water supply reservoir, public access is strictly prohibited. As a result, the Proposed Project would not include the need for construction of or expansion of recreational facilities.

6.15 TRANSPORTATION/TRAFFIC

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Cause an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a				✓

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections)?				
b. Exceed, either individually or cumulatively, a level-of-service standard established by the county congestion management agency for designated roads or highways?				✓
c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				✓
d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?				✓
e. Result in inadequate emergency access?				✓
f. Result in inadequate parking capacity?				✓
g. Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				✓

Discussion:

a. No increase in population growth would occur as a result of the Proposed Project. Therefore, no increase in existing traffic load or capacity would occur. Turlock Irrigation District would use 1-2 vehicles on county roads primarily during noncommute hours.

b. Because no increase in traffic would occur, no exceedence of service standard levels for designated roads or highways would occur as a result of the Proposed Project.

c. No change in air traffic would be associated with the Proposed Project.

d. The Proposed Project would occur in primarily agricultural areas and would involve the periodic application of aquatic pesticides. No changes in design features of roads would be a part of the Proposed Project. The applicators of the aquatic pesticides utilize 1-2 vehicles and would be careful to avoid any encounters with farm equipment.

e. The application of aquatic pesticides would occur in agricultural areas and, as such, would not interfere with emergency access.

f. No parking would be required with the periodic application of aquatic pesticides because this event would be temporary, and would involve temporary parking primarily on District property.

g. No conflict would occur with programs supporting alternative transportation because the Proposed Project would involve periodic trips to the irrigation water conveyance systems or municipal water supply reservoir to apply the pesticides.

6.16 UTILITIES AND SERVICE SYSTEMS

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				✓
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				✓
c. Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				✓
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?				✓
e. Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				✓
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?				✓
g. Comply with federal, state, and local statutes and regulations related to solid waste?				✓

Discussion:

a. All release points for the irrigation water would be closed prior to treatment, and the treated water would be either applied to selected fields or held according to the required time on the pesticide label. BMPs for the application of Rodeo include starting downstream and spraying upstream to avoid concentrations of the pesticide in water. Releases from the municipal supply reservoir are not anticipated to result in detectable levels of copper in downstream waters. No wastewater would be generated by the Proposed Project.

b. No wastewater would be generated by the Proposed Project, nor would construction of water or wastewater facilities be needed.

c. The treated irrigation water would be either applied to pre-approved fields or held in place according to the required time on the pesticide label. In addition, the application of pesticides in the municipal water supply reservoir would not result in stormwater flows. Therefore, construction of new stormwater facilities would not be needed.

d. No additional water supplies would be needed to apply the aquatic pesticides to the irrigation water conveyance or municipal water supply facilities.

e. No wastewater would be generated by the Proposed Project. Therefore, a wastewater treatment provider would not be required.

f. No solid waste would be generated in the application of aquatic pesticides to the irrigation water conveyance or municipal supply facilities; therefore, no landfill would be needed.

g. No solid waste would be generated in the application of aquatic pesticides to the irrigation water conveyance or municipal water supply facilities.

6.17 MANDATORY FINDINGS OF SIGNIFICANCE

Would the project:	Potentially Significant Impact	Less-Than-Significant with Mitigation Incorporation	Less-Than-Significant Impact	No Impact
a. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?			✓	
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			✓	
c. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?				✓

Discussion:

a. The Proposed Project would not result in increased use of aquatic pesticides compared to historical usage and is not expected to result in increased concentrations of these chemicals in the treated water conveyance and municipal water supply facilities.

The temporary applications of pesticides to irrigation system facilities does not require any physical alteration or construction of any facilities at the point of application or elsewhere. Aquatic species and their habitats would only be affected temporarily during pesticide application. Turlock Irrigation District does not release treated water from irrigation facilities while the pesticide is present.

The application of copper compounds in the municipal water supply reservoir in La Grange is conducted according to pesticide label requirements, with releases scheduled to coincide with the highest canal flows. Water quality monitoring of past applications have shown no detectable levels of copper in the canal water downstream of the discharge.

Therefore, the Proposed Project would not degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory.

b. At least five districts in the project area and vicinity have used and are proposing to continue to use aquatic pesticides as shown on Figure 6-1, Cumulative Analysis Study Area.

When combined with similar activities of these five districts (including the project proponents) and potentially other districts, in the project area[1] the Proposed Project would not be expected to result in cumulatively considerable impacts to water quality. The relevant water bodies listed in Table 3-2 (Impaired Water Bodies and Listed Pollutants) are currently not listed as impaired for any of the chemicals applied under the Proposed Project. In addition, the use of these chemicals is not expected to increase over historical usage and is not expected to result in increased concentrations in these water bodies.

The Proposed Project is not expected to result in cumulatively considerable impacts to sensitive biological resources when combined with similar activities of the five districts (including the project proponents) within the Cumulative Analysis Study Area. As discussed above for water quality, the use of these chemicals is not expected to increase over historical usage and is not expected to result in increased concentrations in the treated water bodies. The aquatic pesticides applied to the facilities do not remain active beyond the treatment areas and do not bioaccumulate in higher levels of the food chain. Therefore, no cumulative toxicity effects are anticipated for special-status species or other wildlife populations. Although special status species or other native fish species may occupy some of the treated water conveyance facilities, the cumulative effect of aquatic pesticide applications within the five districts is not expected to degrade habitat or result in increased mortality of these species compared to existing conditions.

c. As discussed in Sections 6.3 (d) and Section 6.7, no substantial adverse effects on humans would be expected to result from the Proposed Project. Implementation of BMPs and DOT transport requirements are sufficient to substantially avoid adverse effects to humans.

[1] URS has contacted the SWRCB to obtain list of districts in the San Joaquin River Basin that have permits to apply aquatic pesticides.

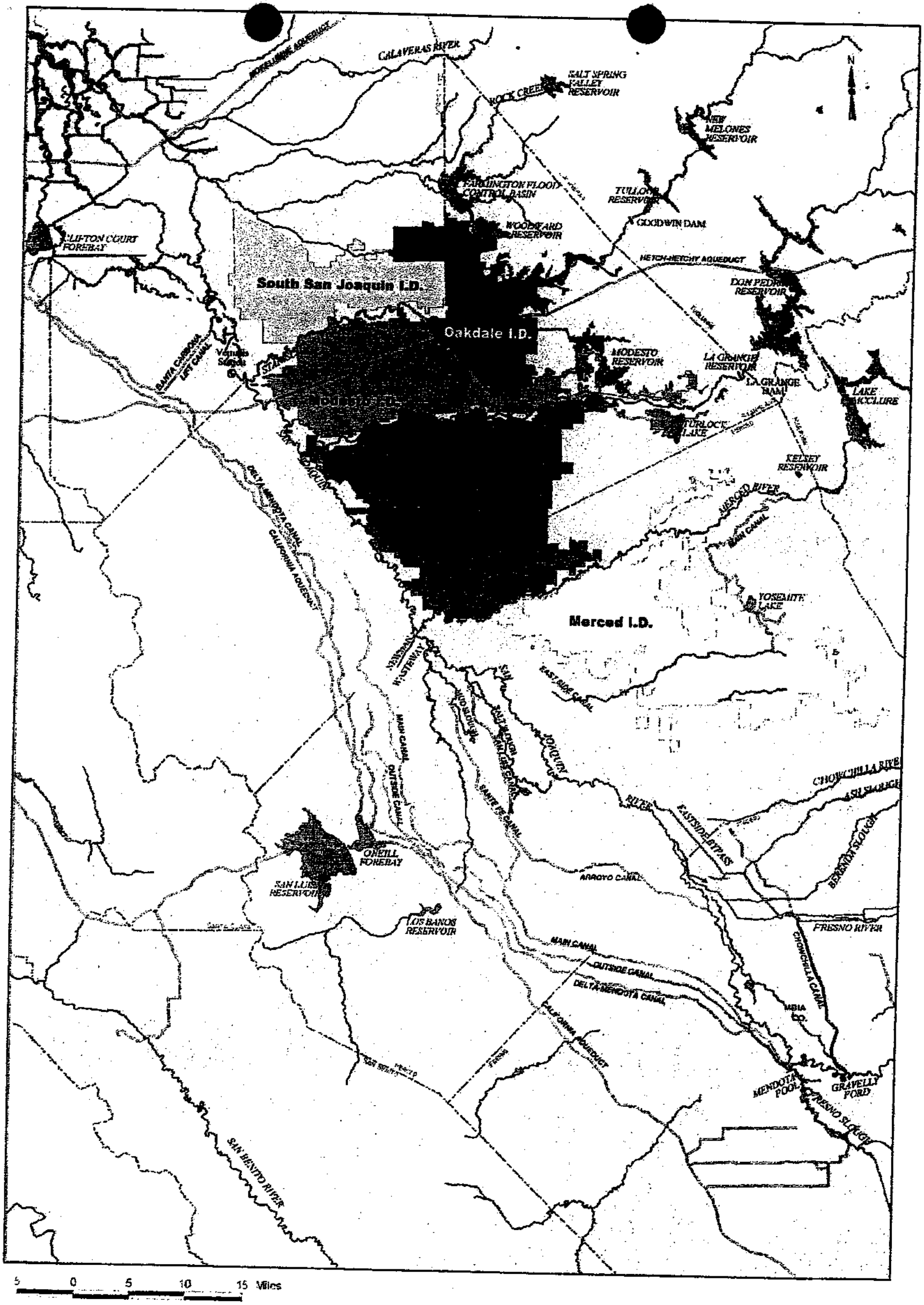


Figure 6-1 Cumulative Analysis Study Area

7 LIST OF PREPARERS

The following personnel were directly involved in the preparation of this Initial Study:

Larry Weis	General Manager
Robert M. Nees	Assistant General Manager, Water Resources and Regulatory Affairs
Debra C. Liebersbach	Project Manager
Tim Ford	Biologist
Steve Marklund	Pest Control & Facilities Manager (District Agricultural Pest Control Adviser)
Griffith and Masuda	Legal Counsel

Technical and support personnel from URS Corporation who were involved in document preparation are listed in Table 7-1.

Table 7-1
List of Technical and Support Personnel

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role in Preparation
URS			
Hootkins, S.	MUP, Urban and Regional Planning BA, Human Biology 30 years	CEQA Compliance	Project Manager, Senior Environmental Planner
Hunt, L.	MS, Environmental Engineering BS, Environmental Systems Engineering 8 years	Hydrology and Water Quality, Permitting, Monitoring	Environmental Risk Assessor
Leach, S.	MA, Vegetation Ecology BS, Physical Geography 11 years	Biological Resources	Lead, Biological Resources
Weinberg, D.	BA, Biological Sciences 12 years	Biological Resources	Biological Resources
Davidson, S.	BS, Forest Management Science 20 years	Other Impacts	Resource Planner

Table 7-1 (concluded)
List of Technical and Support Personnel

Preparers	Degree(s)/Years of Experience	Experience and Expertise	Role in Preparation
URS			
Dillon, R.	MA, Medieval History and Literature BA, History 20 years	Technical Editing, Report Production	Technical Editor
Goss, F.	23 years	Report Production	Graphic Artist

8 SUPPORTING INFORMATION SOURCES AND REFERENCES

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9 ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

None of the environmental factors listed below would be potentially affected by the Proposed Project as indicated by the checklist on the preceding pages in Section 6.

☐ Aesthetics	☐ Agriculture Resources	☐ Air Quality
☐ Biological Resources	☐ Cultural Resources	☐ Geology /Soils
☐ Hazards & Hazardous Materials	☐ Hydrology / Water Quality	☐ Land Use / Planning
☐ Mineral Resources	☐ Noise	☐ Population / Housing
☐ Public Services	☐ Recreation	☐ Transportation/Traffic
☐ Utilities / Service Systems	☐ Mandatory Findings of Significance	

10 DETERMINATION

On the basis of the information available to it in the record and the boxes checked in Section 6 of this Initial Study, Turlock Irrigation District finds:

- ☒ I find that the Proposed Project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- ☐ I find that although the Proposed Project could have a significant effect on the environment, a significant effect would not occur in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- ☐ I find that the Proposed Project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- ☐ I find that the Proposed Project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (a) has been adequately analyzed in an earlier document pursuant to applicable legal standards and (b) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
- ☐ I find that although the Proposed Project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION pursuant to applicable standards and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL IMPACT REPORT or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the Proposed Project, nothing further is required.

This disposition constitutes the official action of the Turlock Irrigation District.

Larry Weis

Larry Weis, General Manager
Turlock Irrigation District

12/17/03
Date

EXHIBIT C
TURLOCK IRRIGATION DISTRICT
AQUATIC PESTICIDE APPLICATION PROGRAM
SUMMARY OF COMMENTS AND RESPONSES
FOR THE
DRAFT NEGATIVE DECLARATION / INITIAL STUDY

INTRODUCTION

The Turlock Irrigation District (TID, Lead Agency under CEQA) distributed the *Draft Negative Declaration/Initial Study, Aquatic Pesticide Application Program* on December 19, 2003. The Draft Negative Declaration/Initial Study was sent to the State Clearinghouse as required by CEQA (SCH# 2003122100). The Clearinghouse distributed the document to selected State agencies and commissions. Additional copies were distributed directly to a comprehensive list of federal, state and local agencies and other interested parties.

Comments were received from the following agencies and organizations:

- State Clearinghouse (Terry Roberts, Director)
- Stanislaus County Planning and Community Development, Department of Environmental Resources (John Aud)
- DeltaKeeper (Bill Jennings)
- Water Keepers (Ellison Folk, Shute, Mihaly & Weinberger LLP)
- Central Valley Safe Environment Network (Lydia Miller, San Joaquin Raptor Rescue Center; Steve Burke, Protect Our Water)
- San Joaquin Valley Air Pollution Control District (John Cadrett)

In addition, Jeff Stewart from the National Marine Fisheries Service (NMFS) contacted the District to review the proposed project in relation to NMFS issues. Jeff Stewart visited the District on January 21st and was given a tour of the facilities. Following the visit, staff had the impression that he was satisfied with the information he had received. No written comments were received from NMFS.

This report summarizes several key or broad comments from each agency or organization and provides the Lead Agency's brief responses. Following this summary report are copies of the comment letters and attachments along with detailed responses by the District to all of those specific comments. All of this material (summary report, comment letters and attachments, and detailed responses and attachments) comprises Exhibit C. The Draft Initial Study together with this report comprise the Final Initial Study to support TID's Negative Declaration on their proposed Aquatic Pesticide Application Program.

1. SUMMARY COMMENTS AND RESPONSES

State Clearinghouse

Terry Roberts reported that the State Clearinghouse received the proposed Negative Declaration and Initial Study and that the public review period was December 22, 2003 through January 20, 2004. Following the completion of the review period, the Clearinghouse reported that no comments were received.

Stanislaus County Planning and Community Development

Comments were provided by John Aud, Sr., R.E.H.S., Department of Environmental Resources.

Comment: Mr. Aud concluded that the project could have a significant effect on the environment and requested discussion on potential impacts to drinking water supplies and beneficial uses of waterways and reservoirs.

Response: Mr Aud's conclusion appears to be based on a misunderstanding about use of District facilities and drinking water supplies. With the exception of French Pit reservoir in La Grange, the District does not treat any surface water supplies used for drinking purposes (municipal use) and does not release treated water into reservoirs or other water bodies used for drinking water or other human contact activities, in concentrations that could exceed the water quality requirements established to protect its beneficial uses. Release points for the irrigation water are closed prior to treatment, and the treated water would be either applied to selected agricultural crops (and not to organic farms) or held according to the required time on the pesticide label to allow the active ingredients to degrade. Integral features of the Aquatic Pesticide Application Program are the Best Management Practices described in Section 2.2.2.2, and the Monitoring and Reporting Program described in Section 2.2.2.3 of the Initial Study.

The District has applied these materials since 1975, and monitoring has been conducted since 2001 consistent with the monitoring plan approved by the Central Valley Regional Water Quality Control Board (RWQCB) that is referenced in Section 2.2.2.3. Monitoring results indicate that the active ingredient of Magnacide H, acrolein, was not released to the receiving waters outside of TID's canals. The monitoring plan and recent monitoring reports (Annual Reports) will be provided upon request. (See Attachments 1, 2 and 3 for the Individual Monitoring Plan, 2002 Annual Report, and 2003 Annual Report, respectively.)

The only District facility utilized for municipal (drinking water) purposes is French Pit reservoir in La Grange. The District has been applying copper compounds in French Pit since the early 1980's. Sampling conducted pursuant to the Department of Health Services and Stanislaus County requirements have indicated no exceedances of copper in water sampled from the reservoir, or water processed through the District's treatment plant. There is no indication of any potential impacts to drinking water supplies as a result of the use of these pesticides. Monitoring downstream of the discharge from

French Pit into the Upper Main Canal has resulted in no detectable traces of copper in the waters being discharged from the Upper Main Canal into Turlock Lake. In addition, an analysis of the potentially worse case concentrations of copper that could be anticipated in the Upper Main Canal, as a result of the discharge from French Pit, shows that with the District's operational practices for such discharges, the concentrations would be below the water quality objectives established for protection of beneficial uses. (See Attachment 4 – Memo on La Grange Water System – French Pit Aquatic Chemical Use).

DeltaKeeper

Comments were provided by Bill Jennings on behalf of DeltaKeeper, WaterKeepers Northern California, California Sportfishing Alliance, and San Joaquin Audubon Society.

Comment 1: Under CEQA, if substantial evidence in the record supports a "fair argument" that a project may have a significant effect on the environment, the lead agency may not rely on a negative declaration and must prepare a full EIR. CEQA's fair argument standard creates a "low threshold" for requiring preparation of an EIR. We believe that "low threshold" requiring an EIR has clearly been crossed as there is more than a "reasonable possibility" for the project to have significant adverse effects on the environment.

Response 1: At issue is whether the comment letter and attachments presented by DeltaKeeper, and by the other commenters (WaterKeepers and the Central Valley Safe Environmental Network), present substantial evidence in support of a fair argument that an EIR must be prepared. The CEQA Guidelines define the term "substantial evidence" as *enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion*, even though other conclusions might also be reached.... Substantial evidence shall include *facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts*. (CEQA Guidelines, Sec. 15384, subds. (a), (b); Sec. 15064, subd. (f)(5).) Evidence that, if viewed in isolation, might seem to give rise to a fair argument may ultimately prove insubstantial after all if other information in the record shows that the evidence is *inaccurate or misleading*. *Fears and desires* of project opponents do not qualify as substantial evidence. *Unsubstantiated opinions, concerns, and suspicions* about a project do not rise to the level of substantial evidence supporting a fair argument of significant environmental effect; and *speculation and conjecture* regarding a project's potential impacts do not amount to substantial evidence. Furthermore, the *absence of evidence in the record* on a particular issue does not automatically give rise to a fair argument that a project may have a significant impact on the environment. (Remy et al, Guide to the California Environmental Quality Act, 1999). These criteria are applied to the specific comments and the results are included in the detailed responses.

For example, comment 4 includes the following assertion: "Multiple applications of acrolein and other herbicides throughout a growing season, year after year, will assuredly and irreparably degrade the non-target aquatic communities and recreational values that comprise the beneficial uses of the subject waterways." This statement represents conjecture by the commenter and is also misleading. The conjecture that multiple applications year after year will degrade non-target areas is not supported by the fact that the District has applied herbicides over the past 25 years and has not observed evidence of harm to non-target communities within the District in the form of fish kills or complaints from farmers or recreationists. The comment is misleading because it implies that viable aquatic communities or intensive recreational use in other District facilities is being adversely affected. Turlock Lake is the only District facility with natural resource and recreational values. It has not been closed or otherwise adversely affected in the past 25 years of operation. Recent monitoring data indicates that the District has been successful in avoiding impacts to non-target facilities

In summary, several of the comments by Mr. Jennings fail to meet these criteria for substantial evidence that the specific aquatic pesticide program of the District poses significant adverse impacts on the environment. The District understands the fears and concerns of the public over the use of highly toxic materials to control undesirable vegetation in some of the District's irrigation canals, and has demonstrated responsible use of these materials consistent with current regulations and District policies to protect water resources within the District.

Comment 2: The canals, laterals, and waterways within the project area are waters of the nation and have designated beneficial uses. The Negative Declaration assumes incorrectly that there are no beneficial uses associated with the canals.

Response 2: The District has concluded that the tributary language in the Basin Plan does not apply to agricultural canals or drains. The Regional Board has previously interpreted the language to exclude constructed agricultural drains, based upon the provision's limited application to "tributary streams." See Memorandum from Elizabeth Miller Jennings to Dennis W. Westcot, March 3, 1994, re: Application of the Tributary Footnote in the Water Quality Control Plan for the RWQCB, Central Valley Region, Basins 5A, 5B, and 5C.

The Basin Plan directs that water bodies without designated beneficial uses are assigned the designation of Municipal (MUN) and Domestic Supply, in accordance with State Water Board Resolution No. 88-63, the State Board Sources of Drinking Water Policy. However, Resolution No. 88-63 contains an exception for waters "in systems designed or modified for the primary purpose of conveying or holding agricultural drainage waters, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards." State Board Resolution No. 88-63, 2.b.

Swimming is not an authorized use of TID canals. Canals typically have fast flowing water, making the siphons, trash grates and other facilities in the canal system extremely dangerous. TID has a long established program of posting canals and canal right-of-ways, prohibiting public traffic and warning of the dangers of swimming. Both District personnel and the county sheriff's department enforce these rules. During treatment periods, canals are closely monitored to ensure there is no public contact with the water. The District spends thousands of dollars each year on public education and school programs to discourage individuals from illegally trespassing near or swimming in the canals.

The canals are not used for municipal supply purposes. With the control measures utilized by the District, treated water will not be allowed to leave the canal. In addition, glyphosate is unlikely to impact municipal water supplies located downstream in the San Joaquin River system because it is strongly adsorbed by organic matter and fine sediment, both of which are typically found in agricultural drains. Lastly, the copper compounds utilized in French Pit reservoir (a drinking water supply reservoir) are registered for use in municipal water supplies. Monitoring of water quality in the reservoir and of the treated water has shown no exceedances of copper objectives to date. The commenter has provided no evidence to establish an adverse environmental impact.

The canal system does provide agricultural supply water. The District has been applying these chemicals since 1975, with no significant impacts to agricultural uses. Magnacide H is applied to reaches of canal. The treated water is then utilized further downstream to irrigate crops. Growers are informed, as necessary, about the presence of the pesticide in the water they are receiving. Irrigation customers are allowed to discontinue service during such treatments if there is any possibility that the applied material will harm the irrigated crops. In addition, the District's experience with the application of glyphosate and copper compounds has shown no impacts to downstream agricultural uses. The commenter has provided no evidence to establish an adverse environmental impact.

Fishing is not a beneficial use of the TID canal system because normally there are no fish in the canals. Flows from Turlock Lake typically pass through the Turlock Lake power plant before discharging into the Main Canal. Thereby reducing the potential for fish from Turlock Lake finding their way into the canal system. In addition, the canal system is raised above, and separate from the rivers. As a result, fish do not typically enter the canals from upstream or downstream waters. In any event, the canals are drained each fall following the conclusion of the irrigation season. Therefore, the canals cannot provide continuous or suitable habitat for fish. The commenter has provided no evidence to establish an adverse environmental impact.

Comment 3: Acrolein is very highly toxic and has been identified as having varying accumulation, avoidance, behavior, ecosystem process, growth, intoxication, morphology, mortality, physiology, population level and reproduction effects. An EIR must analyze and discuss potential acute and sublethal effects that may result from the use of these herbicides in the site-specific setting.

Response 3: We are not debating the toxicity of acrolein or copper. However, as documented on page 35 of the Initial Study, it can be demonstrated that the active ingredient (glyphosate) is not mobile or highly toxic and, therefore, unlikely to impact the environment. At issue is the application and use of the materials by District personnel in District facilities and the potential for direct and indirect impacts both within and outside of the District's service area.

Acrolein is acutely toxic to organisms such as mammals and fish at certain concentrations. Copper can be toxic to invertebrates and fish. However, in order for significant adverse environmental effects to occur, receptors must be present and exposure pathways must be complete. Because no viable populations of sensitive species are known to exist within the treated facilities (which have been treated for more than 25 years), no significant adverse effects are expected to occur. In addition, acrolein degrades quickly. Neither copper nor acrolein is released to natural surface waters in detectable concentrations.

Comment 4: The Negative Declaration ignores potential impacts to groundwater. Concrete liners leak, and some of the District's waterways are unlined.

Response 4: The majority of the District's canals are concrete lined. Although the Initial Study indicates that the District has 44 miles of unlined canals and 206 miles of lined canals (pg. 7). These were approximate numbers of miles. Further analysis indicates that 35 miles of unlined canals are located downstream of Turlock Lake, the facilities which would be potentially treated with Magnacide H. The unlined canals have impervious clay bottoms. Evaluations conducted for the Agricultural Water Management Plan and other purposes indicate that very little seepage occurs from our canal system.

Leakage from concrete lined sections is minimal. In light of the relatively short duration of Magnacide H in the canals, and the proportionately small amount of Magnacide H in the water at any given time, it is extremely unlikely that seepage of Magnacide H into the groundwater would ever rise to a level of significance. To the District's knowledge, Magnacide H has never been detected in the groundwater.

While little information is available on the potential for acrolein to leach to groundwater, the soil beneath irrigation canals is unlikely to be sufficiently permeable to allow for significant leaching. Because acrolein dissipates rapidly from surface water, and water moves quickly down the canal during application, there is unlikely to be sufficient time for leaching to occur before removal of acrolein takes place.

Comment 5: It is inappropriate to employ a Negative Declaration to approve a project that must comply with speculative requirements of a future permit that has yet to be publicly circulated.

Response 5: The District has taken a conservative position in performing a CEQA analysis on its proposed Aquatic Pesticide Application Program. Technically, the SWRCB only requires CEQA documentation for agencies that use aquatic herbicides that contain Priority Pollutants such as acrolein (Magnacide H) or copper and who need a "categorical exception" from the State Implementation Policy (SIP) to exceed discharge limitations. While the District does not anticipate exceeding discharge limitations based on recent monitoring results, the District decided it was prudent and in the public interest to proceed with a CEQA analysis. The SWRCB requires that CEQA documentation be completed by dischargers prior to the time the new draft permit is distributed for public review. Therefore, the District does not have the option to wait until the future permit requirements are circulated before preparing the environmental document.

Concerning the SWRCB's new general permit, the District does not expect the application component of its current program to change. The application of the herbicides is the key component that results in a physical change in the environment. Rather, we expect new monitoring and reporting provisions. The District does not anticipate monitoring and reporting to directly cause a physical change in the environment unless it identifies exceedences that would lead to changes in the application component of the program to avoid impacts and to comply with permit requirements. The Initial Study (Section 2.2.2.3) indicates that the District will modify its monitoring program to comply with the new monitoring requirements of the new permit. In the unlikely event that new monitoring requirements would result in potential adverse impacts on the environment, additional CEQA analysis would be appropriate.

WaterKeepers (Ellison Folk, Shute, Mihaly & Weinberger LLP)

Mr. Ellison Folk with the firm of Shute, Mihaly & Weinberger LLP provided 2 sets of comments (dated January 21, 2004 and January 26, 2004) that include the following.

Comment 1: The IS/ND's project description and discussion of environmental setting is inadequate and fails to include information necessary to analyze the project's significant impacts.

Response 1: The project description (Section 2) and environmental setting (Section 3) are adequate for the technical preparers of the Initial Study to complete resource-specific analyses and for persons unfamiliar with District facilities to understand project features and the environmental context. These sections of the Initial Study avoid extensive technical information and jargon that would confuse most of the non-specialist members of the public likely to review the material.

Section 2 clearly states the project objectives. The location of the District is clearly explained in the text and figures. The affected portions of District facilities are identified. Concerning project features, the key components are explained: pesticide application, best management practices, and monitoring and reporting. Concerning pesticide application, the text explains the timing of application, methods, target concentration, and areas treated. Applications are made in terms of rates (gallons/hour, quarts/acre, and parts per million) based on site-specific information and the pesticide being applied.

Additional information is available in the Individual Monitoring Plan prepared and submitted to the Regional Board for approval in February 2002, as well as the 2002 and 2003 Annual Reports. (See Attachments 1,2 and 3) In response to your request, in 2003, thirteen tanks (at 350 gallons per tank) of Magnacide H were applied. Over the same timeframe, the District applied 51.44 gallons of copper (6.44 gallons of Cutrine-plus, 10 gallons of K-Tea and 35 Gallons of Komeen). No Rodeo/Aquamaster was applied under the permit requirements in 2003.

Section 3 focuses on biological and hydrologic resources, as these are the primary resources that could be affected by the proposed pesticide application. However, the checklist in Section 6 provides additional information as necessary to support the conclusions. In addition, the District emphasizes in this response that the beneficial uses of fishing and swimming do not apply to the affected canals, as these activities are prohibited by the District. Prohibitions are reinforced by signs, local sheriff/police enforcement, and District public education programs. Concerning fishing, the District's canal system does not provide continuous or even temporary habitat to support fish. The canals do not contain sufficient aquatic plants and macro invertebrates to support fish.

Comment 2: CEQA requires preparation of an EIR because the pesticide project will result in significant environmental impacts that have not yet been analyzed. The District must prepare an EIR when it is presented with a fair argument that the project may have a significant impact.

Response 2: At issue is whether the comment letter and attachments presented by WaterKeeper, and by the other commenters, present substantial evidence in support of a fair argument that an EIR must be prepared. See response 1 to DeltaKeeper above.

Comment 3: The IS/ND does not identify adequate measures to mitigate the pesticide program's adverse impacts.

Response 3: The Best Management Practices that are described in Section 2.2.2.2 are an integral component of the project and represent sufficient mitigation measures to minimize or avoid potential impacts. When combined with the monitoring and reporting program contained in Section 2.2.2.3, the potential for adverse impacts range from no impact to less than significant. These measures were incorporated into the impact analyses in subsequent sections of the Initial Study. To clarify that the Negative Declaration finding is appropriate, the final Negative Declaration will incorporate a reference to the BMPs in the summarized version of the project description.

Comment 4: At issue is the relevance of a trial court decision. Mr. Ellison Folk references the decision and indicates that a "public agency cannot avoid reviewing the impacts of a project by simply listing species that might be present; rather the agency must conduct at least some surveys of an area that will be impacted by a proposed project."

Response 4: The trial court decision states that "the crux of the matter is whether GPA 96-03 brings us to an ecological point of no return" (page 5, lines 13-14). The Board of Supervisors was utterly reliant on the EIR for information sufficient to take into account environmental consequences, and better information was needed. The court concluded that the County needed to prepare a focused analysis on lands the County can reasonably expect to be impacted.

In contrast, the proposed pesticide application program does not represent an irreversible impact to natural resources. There is no permanent alteration of land. Rather the aquatic pesticides remove vegetation in waterways and the application must be repeated several times per year because the effectiveness of the action is short term and temporary.

Biological surveys are typically performed if a proposed action would remove or substantially degrade sensitive habitats such as wetlands or habitats potentially utilized by special-status species. Site-specific surveys were not performed for this project because the proposed action is a continuation of current management practices. Therefore, the potential difference between the biological resource baseline condition and the post-project condition are anticipated to be less than significant. Surveys would not provide information that would influence the determinations of significance for individual or cumulative impacts provided in the IS/ND.

Comment 5: The Initial Study "fails to include any surveys of the affected area." "As detailed in the attached comments by Diane Renshaw, the irrigation canals do provide significant natural resource value, which will be adversely impacted by the Aquatic Pesticide Program. Therefore, the IS/ND's conclusion that there will be no significant impacts to biological resources is not supported by substantial evidence."

Response 5: Riparian habitats, wetlands, and other sensitive biological resources are potentially present in some of the conveyance facilities that would be treated with aquatic pesticides. However, these resources are present despite previous applications of the same aquatic pesticides at the same locations evaluated in the IS/ND. Therefore, the presence of the biological resources described in the comment letter demonstrates that the proposed treatments would not significantly reduce the area or degrade the quality of these resources. The proposed project would not significantly affect nesting birds or wildlife that utilize vegetation in the conveyance facilities for cover, nesting, food, or perches because there will be no significant reduction or degradation of these habitats compared to the existing conditions. Standard Best Management Practices (BMP) implemented by the District are implemented to prevent overspray and drift of aquatic pesticides during application.

Central Valley Safe Environment Network

Lydia Miller of the San Joaquin Raptor Rescue Center, and Steve Burke of Protect Our Water provided comments on behalf of the Network.

Comment 1: There is substantial evidence before you in light of the whole record that a significant impact may occur; therefore, an EIR must be prepared.

Response 1: At issue is whether the comment letter and attachments presented by the Network, and by the other commenters, present substantial evidence in support of a fair argument that an EIR must be prepared. See response 1 to DeltaKeeper above.

Comment 2: These areas are used for fishing, swimming, and other recreational uses, both in rural and urban portions. The public health and safety considerations and impacts are not addressed.

Response 2: The District emphasizes in this response that the beneficial uses of fishing and swimming do not apply to the affected canals, as these activities are prohibited by the District. Prohibitions are reinforced by signs, local sheriff/police enforcement, and District public education programs. Concerning fishing, the District's canal system does not provide continuous or even temporary habitat to support fish. See response 1 to WaterKeepers above. Because the potential for the public to be exposed to the pesticides is negligible, and this impact is discussed in Section 6.7 of the Initial Study, no additional information is provided.

San Joaquin Valley Air Pollution Control District

John Cadrett, Environmental Planner for the San Joaquin Valley Air Pollution Control District provided the following comment. "Based on the information provided, it appears that this project will have a less-than-significant impact on the ambient air quality. Therefore, the District has no further comment at this time."

1. Commenter indicates trial court decision is relevant because a "public agency cannot avoid reviewing the impacts of a project by simply listing species that might be present; rather the agency must conduct at least some surveys of an area that will be impacted by a proposed project."

   Response: The trial court decision states that "the crux of the matter is whether GPA 96-03 brings us to an ecological point of no return" (page 5, lines 13-14). The Board of Supervisors was utterly reliant on the EIR for information sufficient to take into account environmental consequences, and better information was needed. The court concluded that the County needed to prepare a focused analysis on lands the County can reasonably expect to be impacted.

   In contrast, the proposed pesticide application program does not represent an irreversible impact to natural resources. There is no permanent alteration of land. Rather the aquatic pesticides remove vegetation in waterways and the application must be repeated several times per year because the effectiveness of the action is short term and temporary.

   Biological surveys are typically performed if a proposed action would remove or substantially degrade sensitive habitats such as wetlands or habitats potentially utilized by special-status species. Site-specific surveys were not performed for this project because the proposed action is a continuation of current management practices. Therefore, the potential difference between the biological resource baseline condition and the post-project condition are anticipated to be less than significant. Surveys would not provide information that would influence the determinations of significance for individual or cumulative impacts provided in the IS/ND.

2. Commenter states that the IS/ND "fails to include any surveys of the affected area." "As detailed in the attached comments by Diane Renshaw, the irrigation canals do provide significant natural resource value, which will be adversely impacted by the Aquatic Pesticide Program. Therefore, the IS/ND's conclusion that there will be no significant impacts to biological resources is not supported by substantial evidence."

   Response: Riparian habitats, wetlands, and other sensitive biological resources are potentially present in some of the conveyance facilities that would be treated with aquatic pesticides. However, these resources are present despite previous applications of the same aquatic pesticides at the same locations evaluated in the IS/ND. Therefore, the presence of the biological resources described in the comment letter demonstrates that the proposed treatments would not significantly reduce the area or degrade the quality of these resources. The proposed project would not significantly affect nesting birds or wildlife that utilize vegetation in the conveyance facilities for cover, nesting, food, or perches because there will be no significant reduction or degradation of these habitats compared to the existing conditions. Standard Best Management Practices (BMP) implemented by the District are implemented to prevent overspray and drift of aquatic pesticides during application.

3. In the Renshaw report attached to the comments, Ms. Renshaw indicates that Magnacide H application locations are not defined in detail.

   Response: Application locations are chosen based on the need for vegetation control, and cannot be precisely determined until pre-treatment surveys are conducted. Representative sampling locations are selected in compliance with the General Permit monitoring requirements. Routine best management practices (BMPs) are implemented to prevent releases of aquatic pesticides into the natural systems referred to in the comment. In addition, water quality monitoring is conducted to verify that releases do not occur.

   As described in the Initial Study, beneficial uses of specific water bodies are designated by the California Regional Water Quality Control Board in the Water Quality Control Plan (Basin Plan). Beneficial uses of potentially affected water bodies are identified in Table 6-1 of the Initial Study.

4. In the Renshaw report attached to the comments, Ms. Renshaw indicates that Rodeo/Aquamaster (glyphosate) application would include a variety of locations to control terrestrial and aquatic vegetation. There is no monitoring or enforcement to verify that these substances are applied according to the BMP's.

   Response: The California Department of Pesticide Regulation and the State Water Resources Control Board do require implementation of pesticide label requirements and BMPs, and Turlock Irrigation District requires employees to follow these practices.

   As documented on page 35 of the Initial Study, it can be demonstrated that the active ingredient (glyphosate) is not mobile or highly toxic and, therefore, unlikely to impact the environment. Glyphosate is strongly adsorbed by organic matter and fine sediment, such as clay or silt. In its chemically bound, adsorbed state glyphosate is chemically intact, but physiologically inactive. Bioaccumulation of glyphosate is considered to be low and food-web transfer is not considered to be a significant exposure route. Little or no data exist on bioaccumulation of surfactants and other herbicide mixture additives. Rodeo is classified as "practically nontoxic to aquatic invertebrates" (USDA/FS 1997). Laboratory tests of glyphosate generally indicate it to be nontoxic or low in toxicity to mammals and birds, particularly at the concentrations or doses that occur in field conditions (EXTOXNET).

TID Response to Comments – Shute, Mihaly & Weinberger, LLP

General Comment:

The commenter states, "the District must prepare an Environmental Impact Report to analyze the impacts of this project."

Response:
Please see the response to the DeltaKeeper comments – General Comment.

Specific Comments:

I. Commenter indicates that the comment period should have extended until January 22nd. Based on case law, they state, "the District must accept comments on the IS/ND up until the close of the public hearing on the Pesticide Program. Therefore, DeltaKeeper reserves the right to submit further comments on the adequacy of the IS/ND."

Response:
The commenter's comments received on January 21, 2004 and January 26, 2004 were accepted as being received during the public comment period, therefore the public hearing date is a not a valid issue.

II.

A. The commenter states:
1) The "project description does not provide sufficient information to allow for an evaluation of the project's environmental impacts…"
2) "…the document does not identify the amount of Magnacide H that will be used or how frequently it is applied. The IS/ND also fails to provide any information about the impacts of Magnacide H."
3) "…the IS/ND seems to assume that because Magnacide H has been registered by the USEPA and approved by the California DPR it will have no impacts on the aquatic resources."
4) "It is important to understand that a registered pesticide for aquatic application is not adequately evaluated as part of registration with respect to its potential to be adverse to non-target aquatic life outside of the zone of application (treatment area)."
5) "This situation mandates that the local agency (in California, the Regional Boards) responsible for protection of water quality from the adverse impacts of registered pesticides used in accordance with the label requirements, require evaluation of the pesticide's impacts on the water quality and beneficial uses with respect to the site-specific conditions of the use. This… requires a comprehensive, detailed monitoring program associated with each application…"
6) "…the IS/ND fails to provide information regarding the application of Rodeo, Komeen, Cutrine, and K-Tea… Such information should include, at a minimum, application amounts, rates, and times."

Response:

1) Information in Section 2.0 of the Initial Study describes the proposed project in sufficient detail. The project description (Section 2) and environmental setting (Section 3) are adequate for the technical preparers of the Initial Study to complete resource-specific analyses and for persons unfamiliar with District facilities to understand project features and the environmental context. These sections of the Initial Study avoid extensive technical information and jargon that would confuse most of the non-specialist members of the public likely to review the material.

   Section 2 clearly states the project objectives. The location of the District is clearly explained in the text and figures. The affected portions of District facilities are identified. Concerning project features, the key components are explained: pesticide application, best management practices, and monitoring and reporting. Concerning pesticide application, the text explains the timing of application, methods, target concentration, and areas treated. Applications are made in terms of rates (gallons/hour, quarts/acre, and parts per million) based on site-specific information.

   Additional information is available in the Individual Monitoring Plan prepared and submitted to the Regional Board for approval in February 2002, as well as the 2002 and 2003 Annual Reports. (Attachments 1, 2, and 3)

2) Specific amounts of Magnacide applied to TID canals vary for each application and for every year. Application amounts are determined by a number of variable conditions at the application site, as well as seasonal weather variations. In 2003, 13 tanks (at 350 gallons per tank) of Magnacide were applied.

   The specific amounts of pesticides used vary depending on the conditions found in the field. For example, the duration and rate at which Magnacide H is applied varies depending on the conditions at the site, including the flow, temperature and weed condition. The actual number of applications per year are also dependent on the conditions. As described in the Initial Study (pg. 10), prior to applying the pesticide, the District verifies the need and suitability of the site for treatment. Scheduled applications can be delayed or cancelled if the conditions are not suitable for treatment. As a result, the exact time or amount of pesticide to be used is not predetermined. Instead, the project description focuses on the methods used, areas to be treated, general timeframes in which the treatments would take place, etc. Reference to Delta Keeper Comments/Responses should be enough. The impacts of Magnacide H are discussed in the response to DeltaKeeper comments number 2, 3, 4, 5, 6, 7, 8, 9, and 10.

3) The commenter is correct that Magnacide H has been registered by the United States Environmental Protection Agency (USEPA) and approved by the California Department of Pesticide Regulation (DPR), however, TID relies upon its operating practices outlined in the Initial Study, and further described in the Individual Monitoring Plan and Annual Reports, to ensure project will have no significant impacts to non-target aquatic resources.

4) Applications are conducted in accordance with the District's standard operating practices and procedures, referenced in II-A-3 above, to ensure Magnacide H does not migrate in harmful quantities beyond the "zone of application (treatment area)".
5) As stated by the commenter, the Regional Board is responsible for the protection of water quality, including the adverse impacts of registered pesticides used in accordance with label requirements. The District has and will continue to follow the conditions and requirements of the NPDES permit for the use of aquatic pesticides. The District has conducted monitoring, in accordance with a monitoring and reporting program approved by the Regional Board. Future pesticide use, and monitoring will comply with future permit conditions. However, these conditions are anticipated to be as stringent, or more so than the program regulated under the existing permit.
6) As with the Magnacide H, the Initial Study provides information on the use of the other pesticides mentioned by the commenter. (See Initial Study pgs. 8 and 10). Additional information is available in the District's Individual Monitoring Plan, dated February 2002, that was submitted and approved by the Regional Board, and the 2002 and 2003 Annual Reports submitted to the Regional Boards. The actual amounts, and times will vary. (See discussion in II-A-2 above.) In 2003, the District applied 51.44 gallons of copper (6.44 gallons of Cutrine-plus, 10 gallons of K-Tea and 35 Gallons of Komeen). No Rodeo/Aquamaster was applied under the permit requirements in 2003.

II. B The commenter states:
1) "The IS/ND description of the environmental setting is incomplete and inaccurate."
2) "The IS/ND assumes that the irrigation canals do not serve any beneficial uses. These canals, however, are waters of the United States… As such, these waters do have beneficial uses for fishing and swimming under the Clean Water Act. Moreover… all waters are assumed to have municipal beneficial uses…the IS/ND fails to evaluate the impacts of the project on the beneficial uses of the canals."
3) "The IS/ND does not provide sufficient information about the natural resource value of the irrigation canals… Thus, it is impossible to assess the natural resource value of the canal system or the impacts of the Pesticide Project on that system."

Response:
1) The environmental setting is discussed in detail in Section 3.0 of the Initial Study, which focuses on biological and hydrologic resources, as these are the primary resources that could be affected by the proposed pesticide application. However, the checklist in Section 6 provides additional information as necessary to support the conclusions.
2) As described under the response to the DeltaKeeper comments (see specific comments #1), the beneficial uses of fishing, swimming and municipal supply do not apply to the canals. The commenter is inaccurate in the statement that "people often use the irrigation canals for swimming and fishing."
3) The technical personnel conducting the biological resource evaluations are familiar with the District's facilities and resources in the project area from other studies and resource inventories, and understand the habitat requirements of the sensitive species identified. For reasons detailed above, the TID canal system cannot provide

continuous or suitable habitat for non-target species. Consequently, detailed, canal-by-canal surveys were not required in order to make a professional judgment that impacts were less than significant.

II. C. 1) Commenter states "the District must prepare an EIR when it is presented with a fair argument that the project may have a significant impact." The commenter lists a variety of reasons why an EIR is required.

Response:
Based on the findings of the IS and the references utilized to prepare the Initial Study and these responses, there is no substantial evidence of significant impacts from this project. (See the response to DeltaKeeper Comment 1 in the Summary of Comments and Responses.) TID's standard operating procedures ensure the project will not result in significant environmental impacts that would need mitigation. The Best Management Practices that are described in Section 2.2.2.2 are an integral component of the project and represent sufficient mitigation measures to minimize or avoid potential impacts. When combined with the monitoring and reporting program contained in Section 2.2.2.3, the potential for adverse impacts range from no impact to less than significant. These measures were incorporated into the impact analyses in subsequent sections of the Initial Study. To clarify that the Negative Declaration finding is appropriate, the final Negative Declaration will incorporate a reference to the BMPs in the summarized version of the project description.

II. C. 2) a. The commenter states, "CEQA requires preparation of an EIR to analyze the project's significant impacts to the beneficial uses of the canals."

Response:
Please see the response to comment II-B-2 above.

b. (i) The commenter states, "CEQA requires preparation of an EIR to analyze significant impacts associated to natural waterways."

(ii) The commenter states, "…the IS/ND indicates that water might be "irrigated out" prior to the 6-day holding period. Water contaminated with Magnacide H will contaminate soils, which in turn can lead to further contamination due to storm water and irrigation water runoff."

(iii) "The IS/ND also fails to address the potential for leakage from the irrigation canals, but instead assumes there will be no leakage."

(iv) "The IS/ND also provides no discussion of the existing standards for Magnacide H, which indicate that Magnacide H is toxic at extremely low levels and harmful at even lower levels… Indeed, the IS/ND indicates that the highest concentrations… will be applied in areas where water moves slowly and therefore the dissipation time of the chemical will be longest. IS/ND at 8."

(v) "The IS/ND fails to provide information regarding the levels of copper that will remain in the irrigation canals or be discharged to other waters…. (T)here is no indication as to what levels will remain in the water after treatments… (T)he IS/ND fails to disclose the concentration levels of copper that will be applied." "The IS/ND should also discuss the impacts of treatments on the designated beneficial use of French Pit for drinking water. At a minimum, the IS/ND should discuss potential exceedances of the maximum contaminant limit for copper."

(vi)"(T)he IS/ND fails to support its conclusions that no pesticides are discharged from irrigation systems to other waters... Given the large number of applications that must occur every season (the document fails to provide even this number), it is impossible to tell if the monitoring program was representative or monitored a sufficient number of discharges to be effective. Moreover, even where monitoring was conducted, the IS/ND does not support its conclusion that no pesticides were discharged. For example, the IS/ND does not indicate how samples were taken and what the detection limits of the monitoring test are. If these tests were not sensitive enough to detect pesticides at very low levels... the information these test (sic) yield would not be conclusive."

Response:

(i) Please see the response to comment II-B-2 above.

(ii) The District does not rely solely on holding water for six-days or using the field-test kits to ensure that treated water is not released to receiving waters. District personnel use a combination of holding times, field test kits and flow calculations to ensure that the Magnacide has been irrigated from the system before gates are opened to receiving waters.

The product is volatile and reactive in the environment and degrades quickly so it will not accumulate in the soil. Information provided by the commenter states, "Acrolein is metabolized easily in soil, being mineralized to CO^{2}" Pesticide Fact Sheet, Royal Society of Chemistry. In addition, information provided to TID from Magnacide's manufacturer states: "EPA mandated studies utilizing radioactive-labeled acrolein indicate that the degraded acrolein adds to the naturally present carbon pool used by bacteria and is ultimately mineralized to carbon dioxide. Studies indicate that there is no bioaccumulation as result of the use of acrolein. Any acrolein, which binds to soil, reacts with the organic material in the soil. Acrolein half-life has been measured in hours, ranging from 5.5 to 30 hours depending on the conditions of the treatment (i.e., temperature of water, weed condition, flow rate, etc.). The overall conclusion based on the half-life information of acrolein is that it is not persistent in the environment." (See also response to Delta Keeper comments 8 and 12).

(iii)The District maintains its gates and spills so they do not leak during Magnacide applications. Leakage through the concrete liners, or the impermeable clay layers on unlined canals is minimal. See also response to DeltaKeeper comments 9, 11 and 12-a.

(iv) Magnacide is toxic at low concentrations. That is the nature of a herbicide. However, treated water containing Magnacide is never released from the canals into receiving waters. A copy of the Magnacide Material Safety Data Sheet and FIFRA label has been included as Attachment 9 and 10.

(v) Copper containing pesticides are applied to French Pit reservoir at concentrations that, when blended with flows in the Upper Main Canal do not exceed the water quality objective. Sampling of the water downstream has shown that no detectable concentrations of copper (with a reporting limit of 2 µg/l copper). The District has been applying the copper compounds to French Pit since the 1980's. Ongoing sampling required by the Department of Health Services has shown no exceedances of the maximum contaminant levels for copper in either French Pit, or the treated water (processed through the treatment plan – sampled prior to being discharged into storage tanks housed on site). (See Memo on La Grange Water System - French Pit Aquate Chemical Use, Attachment 4)

(vi) As stated in the response to DeltaKeeper (comment # 3d) the monitoring plan, including the QAPP required by the emergency permit was submitted to and approved by the Central Valley RWQCB. Sampling was conducted pursuant to the monitoring plan, and analyzed to the specified detection limits necessary to determine the potential impacts to downstream waters. Data collected was analyzed with respect to the potential impacts to downstream waters and incorporated into Annual Monitoring Plans, submitted to the Central Valley RWQCB. Future sampling will comply with all of the requirements of the new NPDES permit once it has been adopted by the SWRCB.

c. "CEQA requires preparation of an EIR to analyze the project's significant biological resource impacts."

Response:
Fish, including salmon, do not naturally occur in the TID canals. As indicated in the DeltaKeeper response to comment number 3a, fish are not likely to enter the canals from Turlock Lake or from the downstream outlets. In addition, the treated sections of canals are drained each fall following the conclusion of the irrigation season. Therefore, the canals cannot provide continuous or suitable habitat for fish. TID canals do not provide suitable habitat for birds due to deep and swiftly running water during nesting and fledging season. Aquatic foraging is unlikely, as there has been no evidence of sustainable food source populations within the canals.

Section 3 of the Initial Study includes an analysis of the biological resources that could be impacted by the proposed project. The response to DeltaKeeper comment number 10 provides additional discussion regarding the potential for Sanford Arrowhead and the slender-leaved pondweed to be present in areas impacted by the proposed project.

The reference to "nine special status species" was a typographical error. The actual number of special status species is eight; the same number that are analyzed in the discussion.

d. "The IS/ND fails to adequately analyze cumulative impacts."

Response:
Most irrigation districts in California implement the same Magnacide application program. Neither TID *nor any other irrigation district* has identified past or current adverse environmental impacts as a result of this program. Therefore, the cumulative effects of the identified programs on San Joaquin Valley waterways are less-than-significant based on historical practices and observations of the districts.

While the SWRCB has a list of agencies using aquatic pesticides, this list did not indicate the materials being used. Adequate information is not currently available to comprehensively address the potential cumulative effects of multiple agricultural sources and other sources that may affect water quality in the receiving waters. However, under the recently issued Central Valley Region Regional Water Quality Control Board's Resolution No. R5-2003-0105 Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Ag Waiver), additional water quality monitoring will be required. This monitoring will be focused on identification of sources and determination of loads of multiple agricultural pollutants from specific sources. Once this information is obtained, a rigorous cumulative analysis can be performed.

III. A. 1. "It is clear that the IS/ND relies on mitigation measures to reduce the potential impacts of the Pesticide Program below a level of significance.

Response:
As indicated in response to DeltaKeeper comment # 16 the practices implemented by the District and described in the Initial Study are "Project Features" and a part of the District's standard operating practices. As such, they are not mitigation measures. Utilizing these standard practices, no significant impacts have been identified, therefore no mitigation is necessary.

1. "The IS/ND…implies throughout that impacts will be reduced because the pesticide will be used according to labeling instructions. The IS/ND does not provide a full list of measures that will be taken, nor does it indicate how they will be successful at reducing the potential impacts of Magnacide H or the other pesticides proposed for use… In fact, there is no indication that any monitoring will be conducted in the future. It is impossible to assess the impacts of the program without an adequate monitoring program."

Response:

In the Initial Study, there is a list of practices (Section 2.2.2.2) that are followed as a part of TID's standard operating procedures that ensure no significant environmental impacts as a result of the project. (Additional information on the District's operational practices, and monitoring plan are included in Attachments 1, 2, 3 and 4). As indicated in the response to DeltaKeeper comments #3, 12, 13, and 15, monitoring has been conducted pursuant to an Individual Monitoring Plan (dated February 2002) that was submitted to, and approved by the Regional Board. Future monitoring will be conducted in accordance with the requirements of a new permit to be generated by the State Water Resources Control Board. However, future monitoring will be no less than the monitoring conducted under the existing permit.

B. "The District improperly failed to prepare a mitigated negative declaration."

Response:
The BMPs discussed in the Initial Study are part of District standard operating procedures and an integral component of the aquatic pesticide program. They are not mitigation measures. As a result, the use of BMPs does not automatically require the finding of a Mitigated Negative Declaration. See also response to comment II-C-1 above.

TID Response to Comments – Central Valley Safe Environment Network

General Comment:

The commenter states, "A Negative Declaration is woefully inadequate for the purposes of CEQA, and a full Environmental Impact Report is needed."

Response:
Please see the response to the DeltaKeeper comments – General Comment.

Specific Comments or "Issues of Concern" raised by the commenter include:

1. "Lack of adequate biological assessment, including study and analysis, i.e. the effects of de-oxygenated water on habitat and species."

   Response: An adequate biological assessment was performed during the course of the Initial Study, see Sections 3.1 and 6.4, by qualified professionals, see Section 7. The use of Magnacide in District canals does cause decreases in dissolved oxygen in the canal water where the material is applied. However, these changes are expected to be short in duration. Non-chemical, or physical cleaning methods, such as chaining, would be used in lieu of Magnacide and may have a greater adverse impact on water quality.

   Many factors contribute to low dissolved oxygen in parts of the San Joaquin River downstream of Turlock Irrigation District, and development of a Total Maximum Daily Load (TMDL) for dissolved oxygen in these segments is currently underway. Turlock ID is participating in separate efforts to monitor upstream sources of oxygen depleting materials and evaluate linkages to depletion of oxygen downstream. For more information, see the following website: www.sjrtmdl.org.

2. "Failure to adequately assess alternatives. CEQA does not provide for findings of infeasibility based on economic grounds. Economic analysis must also be on a broad basis, including costs of environmental cleanup and mitigation due to the pesticide application programs, which is borne by the taxpayers. How do the publicly financed reclamation and enhancement programs, as well as those in partnership with other entities, of the Districts conflict with the pesticide programs?"

   Response: Alternatives to the use of aquatic pesticides were addressed in the Initial Study, Section 2.2.2.4, and found to be less effective and potentially more harmful to the environment than the use of Magnacide. Additional information on the alternatives considered to the project can be found in the Individual Monitoring Plan and the Annual Reports (See Attachments 1, 2 and 3). Economics were not considered during this evaluation.

3. "Synergistic effects on species and habitat of the pesticides used, as well as other chemicals proximately applied, both in time and space."

   Response: The District's aquatic pesticide program is such that one pesticide applied would be removed before another pesticide would be utilized. For example, the only overlapping application area is the canal system, in which Magnacide is applied in the irrigation season (March – October) and Rodeo/Aquamaster could be applied in the non-irrigation season. The District's operational practices are such that water containing Magnacide is not allowed to discharge from the canal system. In addition, canals are drained at the end of the irrigation season. Rodeo/Aquamaster is not applied to the water, but is applied to aquatic weeds potentially located below the water line in the canal system, during the non-irrigation season. Because Rodeo/Aquamaster is applied in the canal during the dry season, and directly to the weed being targeted, there is very little likelihood for synergistic impacts due to these applications. (Material System Data Sheets and FIFRA label information on Magnacide and Rodeo/Aquamaster can be found in Attachments 9, 10, 13, and 14).

   The District has been applying these pesticides since 1975. No adverse impacts have been observed as a result of the application of these pesticides.

4. "Protection of species, including the effects of pesticide application on both migratory and resident birds. The affected canals are within the eastern corridor migration flyway and migration corridor from the Sierras to the Valley floor, and serve as feeding habitat for numerous species of birds. We disagree with the checklist's statements that the pesticide program has no effect on species mentioned. Additionally, many affected species are not even listed, such as the ferruginous hawk, rough-legged hawk, peregrine falcon, short-eared owl, long-eared owl, nighthawks, etc."

   Response: The irrigation conveyance facilities do not provide significant foraging opportunities for resident or migratory birds because normal management of these facilities for water conveyance substantially limits the establishment of aquatic plants, macro invertebrates and fish that might be consumed by avian species.

   On the basis of the high water solubility and chemical reactivity of acrolein and its low experimentally determined log *n*-octanol-water partition coefficient of 0.9, no bioaccumulation would be expected (IPCS 2004). Nordone et al. (1998) tested the bioaccumulation of acrolein (applied as Magnacide H) in two fish species, the bluegill sunfish (*Lepomis macrochirus*) and the channel catfish (*Ictalurus punctatus*), and two freshwater shellfish species, a unionacean clam (*Elliptio complanata*) and the northern crayfish (*Orconectes virilis*). Neither acrolein nor its major oxidative and reductive metabolites, acrylic acid and allyl alcohol, were detected in tissue residues. The authors concluded that there is no evidence of a propensity for acrolein to enter and persist in aquatic food chains. (See References below)

5. "Effects on wetlands. The canals feed both annual and seasonal wetlands. This is not addressed."

Response: Treated water is not released from the District canals into either annual or seasonal wetlands. Moreover, as indicated in the response to comment 9 below, there is very little, if any, seepage from the canal. There are no known wetlands, adjacent to the canal system, that could potentially be impacted by the minimal amount of seepage that might occur.

6. "Beneficial uses are not adequately defined, nor the effects of the pesticide application on the beneficial uses adequately studied."

   Response: The beneficial uses of District facilities where these pesticides are used are extremely limited; therefore impacts to the beneficial uses do not occur. Please see response to DeltaKeeper comment # 1.

7. "Impacts on agricultural practices, i.e. what are the impact on organic agriculture such as to microbial action in the soil that organic agriculture depends on? Issues related to Williamson Act statues are not addressed."

   Response:
   a. Water customers are notified when applications of Magnacide are applied. All users are allowed to discontinue service during such treatments if there is any possibility that the applied material will harm the irrigated crops.
   b. Section 6.2 of the Initial Study addressed potential agricultural impacts and found that no changes of land use would result from the application of Magnacide, therefore no conflicts with the Williamson Act are expected. The Williamson Act program is a property tax incentive program to discourage premature conversion of agricultural land to other uses.

8. "FIFRA labeling requirements do not insure compliance with the Clean Water Act."

   Response: While strict reliance on FIFRA labeling alone may not insure compliance with the Clean Water Act, District practices, which include BMPs, following of FIFRA labeling and compliance with permit requirements, do insure that the Clean Water Act is not violated.

9. "Groundwater impacts, i.e. the effect of seepage from the canals, both lined and unlined, are not addressed, including the effects of deoxygenated water."

   Response: The majority of the District's canals are lined, the remainder have an impervious clay bottom. (Please see response to DeltaKeeper comment #9.) Due to the canal lining or clay bottom construction of the canal system, there is very little likelihood that seepage could occur. In addition, while little information is available on the potential for acrolein to leach to groundwater, the soil beneath irrigation canals is unlikely to be sufficiently permeable to allow for significant leaching. Because acrolein dissipates rapidly from surface water, and water moves quickly down the canal during application, there is unlikely to be sufficient time for leaching to occur before removal of acrolein takes place.

10. "Cumulative impacts, historic, present and future, both within this Irrigation District, as well as to the larger system of waters of the United States and the State of California. Cumulative effects throughout the food chain and to the greater ecosystem are not addressed; when plants and insects are affected (i.e. glyphosate), there is an effect on wildlife that feeds on these organisms."

Response: The cumulative effects of the identified programs on San Joaquin Valley waterways are less-than-significant based on historical practices and observations of the districts. While the SWRCB has a list of agencies using aquatic pesticides, this list did not indicate the materials being used. Adequate information is not currently available to comprehensively address the potential cumulative effects of multiple agricultural sources and other sources that may affect water quality in the receiving waters. However, under the recently issued Central Valley Region Regional Water Quality Control Board's Resolution No. R5-2003-0105 Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Ag Waiver), additional water quality monitoring will be required. This monitoring will be focused on identification of sources and determination of loads of multiple agricultural pollutants from specific sources. Once this information is obtained, a rigorous cumulative analysis can be performed.

As indicated above, and described in the Initial Study, the District's facilities do not provide significant habitat. The majority of the canals are lined and maintained to ensure passage of stormwater and irrigation flows. As a result, the proposed program is not anticipated to have a significant impact on wildlife.

11. "Use of a time basis, rather than toxicity base, for release of treated water into the greater system is inadequate."

Response: The District does not rely solely on holding water for a specified period of time or using the field test kits to insure that treated water is not released to receiving waters. District personnel use a combination of holding times, field test kits and flow calculations to insure that the Magnacide has been irrigated from the system before gates are opened to receiving waters.

12. "Removal of cover from the canal banks which provide the protection to species when moving for reproductive purposes is not addressed."

Response: Removal of cover from canal banks was not addressed in the Initial Study as it was prepared solely for the application of aquatic herbicides. Removal of vegetative cover has occurred on a regular basis for decades; therefore ongoing removal of vegetation does not constitute a change to the habitat present.

13. "The Negative Declaration does not list total amounts of chemicals applied, neither annually, monthly or any other time frame. These figures must be provided."

Response: Specific amounts of Magnacide applied to TID canals vary for each application and for every year. Application amounts are determined by a number of variable conditions at the application site, as well as seasonal weather variations. (See response to Shute, Mihaly & Weinberger, LLP comments number II-A-2 and II-A-6)

14. "The use of sterilants is not discussed."

Response: The use of sterilants was not addressed in the Initial Study as it was prepared solely for the application of aquatic herbicides.

15. The commenter quotes the evaluation of biological impacts on page 35 of the Initial study which states: "Under the Proposed Project, pesticide application procedures in Turlock Irrigation District would be essentially equivalent to practices that have occurred for the past 2 years during which water quality monitoring has been conducted and BMPs implmemented as required by the existing General Permit (existing conditions). Turlock Irrigation District complies with label instructions and does not release treated water from irrigation facilities while the pesticide remains in the water. When applying herbicides directly to the water, Turlock Irrigation District uses the practice of closing all gates at potential release points during and after application to ensure that streams or wetlands are not affected."

The commenter goes on to state,
"…this fails to address the issue of impacts to species, including the nine special status species identified as being potentially impacted in the Initial Study. It attempts to skirt the issue entirely. To say there is not effect because what's proposed will be the same as what's been done in the past says nothing about the effects of the pesticides and herbicides on species. Where is the pertinent data? Where is the analysis? Compliance with the label instructions is not compliance with CEQA. There are impacts due to the pesticide being in the water, prior to release, and these are simply glossed over. Closing gates does not prevent seepage into surrounding streams and wetlands, which are thereby affected, and the resultant impacts are not addressed."

Response:
The reference listed is but a small portion of the discussion under 6.4a in the review of the potential of the project having a "substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species…" Included in the Initial Study (Section 3) is an analysis of the biological resources, including the candidate, sensitive or special species that might be in the vicinity of the proposed project. That analysis identified eight (the number nine was a typographical error in the Initial Study report) potential special status species, and describes the possibility that they may be found in the facilities proposed for treatment. The species of concern are not anticipated to be located within the canal system. Therefore the District's practice of controlling the water containing acrolein in the canal system would protect any potentially sensitive species downstream. (Which is the discussion that the commenter referenced.) The analysis goes on to evaluate the application of Rodeo/Aquamaster, containing glyphosate (which could be applied directly to plants located in the drains), to determine the potential for impacts due to this practice. The analysis concludes that the impact is "less-than significant". As indicated in the response to comment 5 above, seepage is not anticipated to have a significant impact.

16. "The above is but one example of unsupported conclusory statements, and lack of needed data and analysis, which are clear violations of CEQA. These must be corrected in an Environmental Impact Report."

Response: Please see the response to comment 15 and the general comment above.

17. "This is also but one of many internal inconsistencies found in the Negative Declaration, which must be corrected.

Response: Comment noted and considered.

18. "These canals run through many agricultural, habitat and refuge (both State and Federal) easement areas, including Williamson Act areas, both contract and preserve. There are effects, both direct and indirect, of the pesticide application program on the terms and conditions of the associated easements as well (sic) relevant statues. These effects are not adequately addressed."

Response: District facilities do run through agricultural, habitat and refuge easement areas and therefore, the proposed project would not have an affect on the terms and/or conditions of such easements. (See the response to comment 7 above.)

19. "Concentrations are given for monitoring points, which are distant from application points. Concentrations in between are therefore higher. This needs to be addressed in the CEQA review."

Response: The monitoring points were distant from application points as designed in the monitoring program to insure that Magnacide was not released to receiving waters with designated beneficial uses. Magnacide concentration at an indeterminate point downstream from the application point is inconsequential as the concern is that the concentration has dropped below toxic levels at the points of release. (See the response to DeltaKeeper comment 3d)

20. "Deferral of mitigation, BMPs and other considerations to the new General Permit, yet to be issued by the Regional Water Quality Control Board, is inappropriate."

Response: The new permit will have standards at least equal to the past permit and more than likely they will be more stringent. In any event, the aquatic herbicide treatment will not change from what has been done in the past (baseline) and therefore is not likely to cause a significant impact.

21. "The Negative Declaration attempts to narrow the focus of the use of the aquatic pesticides inappropriately, and not adequately consider the larger environmental impacts."

Response: The use of the specific aquatic pesticides identified and analyzed through this process is by design a narrow focused project. The District only uses pesticides to treat aquatic weeds within the specific facilities identified. The program is designed to minimize any potential "larger environmental impacts."

22. "The affected area is within the critical habitat area as designated by US Fish and Wildlife Service. Analysis of impacts to species and habitat are needed. The history of failure to adequately address endangered species issues cannot continue. The resource values in Eastern Stanislaus County, similar to Merced County are at risk from lack of understanding and data. As stated by John Vollmar, EMRCD Vernal Pool Program Director:

    'At the same time, we are becoming fully aware that nearly everyone involved in determining the future of Eastern Merced County including planners, supervisors, legislators, UC staff, landowner, and even agency staff have little or no knowledge of the actual resources present in the region. While the battle over UC Merced continues, the environmental focus is almost entirely on vernal pools and fairy shrimp. There is little or no acknowledgement of the numerous rare plant species present in the region.'"

    Response: The Initial Study provides an evaluation of the potential impacts to critical habitat resulting from the project. In the Initial Study (page 38) the District has commented to "implement awareness training for personnel that apply the pesticides to further reduce any less-than-significant potential impacts to special-status species."

23. "There are potential impacts to numerous ongoing projects and legal challenges involving the San Joaquin River which are not addressed."

    Response: As proposed and analyzed in the Initial Study, the project is not anticipated to have any impacts on the San Joaquin River. The Initial Study did not find any impacts that would affect other projects or legal challenges.

24. "The attached letter from the Central Valley Safe Environment Network, issued at the time of the proposed National Pollutant Discharge Elimination System (NPDES) Permit for Discharges of Aquatic Pesticides (Water Quality Order No. 2001-12-DWQ, General Permit No. CAG990003) serves to highlight and elaborate on issues germane to all pesticide application programs."

    Response: Turlock ID appreciates the concerns addressed in the numerous letters included by the Central Valley Safe Environmental Network, however the letters were not specific to the Initial Study prepared by the District.

25. "We disagree with the Initial Study, the Environmental Checklist, and the relate conclusions and findings. We reiterate: the "fair argument" standard cannot be met, under the CEQA statues. An EIR is required."

    Response: Comment noted and considered.

26. "Please provide us with written notice of all future actions regarding this project."

Response: Written notice of all future actions regarding this project will be provided to you per your request.

References:

International Programme on Chemical Safety (IPCS). 2004. Environmental Health Criteria 127: Acrolein. http://www.inchem.org/

Nordone, J.N. et al. 1998. Metabolism of acrolein (Magnacide H herbicide): nature and magnitude of residues in freshwater fish and shellfish. Environmental Toxicity and Chemistry. Vol. 17, No. 2, pp. 276-281

Response to Comments – DeltaKeeper

General Comments

1. Commenter believes that a Negative Declaration is clearly inadequate and that a full EIR is required.

   Response:
   At issue is whether the comment letter and attachments presented by DeltaKeeper, and by the other commenters (WaterKeepers and the Central Valley Safe Environmental Network), present substantial evidence in support of a fair argument that an EIR must be prepared. The CEQA Guidelines define the term "substantial evidence" as *enough relevant information and reasonable inferences from this information that a fair argument can be made to support a conclusion*, even though other conclusions might also be reached.... Substantial evidence shall include *facts, reasonable assumptions predicated upon facts, and expert opinion supported by facts.* (CEQA Guidelines, Sec. 15384, subds. (a), (b); Sec. 15064, subd. (f)(5).) Evidence that, if viewed in isolation, might seem to give rise to a fair argument may ultimately prove insubstantial after all if other information in the record shows that the evidence is *inaccurate or misleading*. *Fears and desires* of project opponents do not qualify as substantial evidence. *Unsubstantiated opinions, concerns, and suspicions* about a project do not rise to the level of substantial evidence supporting a fair argument of significant environmental effect; and *speculation and conjecture* regarding a project's potential impacts do not amount to substantial evidence. Furthermore, the *absence of evidence in the record* on a particular issue does not automatically give rise to a fair argument that a project may have a significant impact on the environment. (Remy et al, Guide to the California Environmental Quality Act, 1999). These criteria are applied to the specific comments and the results are included in the detailed responses.

   For example, comment 4 includes the following assertion: "Multiple applications of acrolein and other herbicides throughout a growing season, year after year, will assuredly and irreparably degrade the non-target aquatic communities and recreational values that comprise the beneficial uses of the subject waterways." This statement represents conjecture by the commenter and is also misleading. The conjecture that multiple applications year after year will degrade non-target areas is not supported by the fact that the District has applied herbicides over the past 25 years and has not observed evidence of harm to non-target communities within the District in the form of fish kills or complaints from farmers or recreationists. The comment is misleading because it implies that viable aquatic communities or intensive recreational use in other District facilities is being adversely affected. Turlock Lake is the only District facility with natural resource and recreational values. It has not been closed or otherwise adversely affected in the past 25 years of operation. Recent monitoring data indicates that the District has been successful in avoiding impacts to non-target facilities

In summary, several of the comments by Mr. Jennings fail to meet these criteria for substantial evidence that the specific aquatic pesticide program of the District poses significant adverse impacts on the environment. The District understands the fears and concerns of the public over the use of highly toxic materials to control undesirable vegetation in some of the District's irrigation canals, and has demonstrated responsible use of these materials consistent with current regulations and District policies to protect water resources within the District.

Specific Comments

1. Commenter states, "as waters of the State, irrigation canals have designated beneficial uses via the Tributary Rule, Porter-Cologne and the Federal Clean Water Act." "The designated beneficial uses of the laterals and canals within the project include, at a minimum, agriculture, municipal, and the fishable/swimmable uses."

Response:

The District has concluded that the tributary language in the Basin Plan does not apply to agricultural canals or drains. The Regional Board has previously interpreted the language to exclude constructed agricultural drains, based upon the provision's limited application to "tributary streams." See Memorandum from Elizabeth Miller Jennings to Dennis W. Westcot, March 3, 1994, re: Application of the Tributary Footnote in the Water Quality Control Plan for the RWQCB, Central Valley Region, Basins 5A, 5B, and 5C.

The Basin Plan directs that water bodies without designated beneficial uses are assigned the designation of Municipal (MUN) and Domestic Supply, in accordance with State Water Board Resolution No. 88-63, the State Board Sources of Drinking Water Policy. However, Resolution No. 88-63 contains an exception for waters "in systems designed or modified for the primary purpose of conveying or holding agricultural drainage waters, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards." State Board Resolution No. 88-63, 2.b.

Swimmable – Swimming is not an authorized use of TID canals. Canals typically have fast flowing water, making the siphons, trash grates and other facilities in the canal system extremely dangerous. TID has a long established program of posting canals and canal right-of-ways, prohibiting public traffic and warning of the dangers of swimming. Both District personnel and the county sheriff's department enforce these rules. During treatment periods, canals are closely monitored to ensure there is no public contact with the water. The District spends thousands of dollars each year on public education and school programs to discourage individuals from illegally trespassing near or swimming in the canals.

Municipal supply – The canals are not used for municipal supply purposes. With the control measures utilized by the District, treated water will not be allowed to leave the canal. In addition, glyphosate is unlikely to impact municipal water supplies located downstream in the San Joaquin River system because it is strongly adsorbed by organic matter and fine sediment, both of which are typically found in agricultural drains. Lastly, the copper compounds utilized in French Pit reservoir (a drinking water supply reservoir) are registered for use in municipal water supplies. Monitoring of water quality in the reservoir and of the treated water has shown no exceedances of copper objectives to date. The commenter has provided no evidence to establish an adverse environmental impact.

Agricultural Uses – The canal system does provide agricultural supply water. The District has been applying these chemicals since 1975, with no significant impacts to agricultural uses. Magnacide H is applied to reaches of canal. The treated water is then utilized further downstream to irrigate crops. Growers are informed, as necessary, about the presence of the pesticide in the water they are receiving. Irrigation customers are allowed to discontinue service during such treatments if there is any possibility that the applied material will harm the irrigated crops. In addition, the District's experience with the application of glyphosate and copper compounds has shown no impacts to downstream agricultural uses. The commenter has provided no evidence to establish an adverse environmental impact.

Fishable – Fishing is not a beneficial use of the TID canal system because normally there are no fish in the canals. Flows from Turlock Lake typically pass through the Turlock Lake power plant before discharging into the Main Canal. Thereby reducing the potential for fish from Turlock Lake finding their way into the canal system. In addition, the canal system is raised above, and separate from the rivers. As a result, fish do not typically enter the canals from upstream or downstream waters. In any event, the canals are drained each fall following the conclusion of the irrigation season. Therefore, the canals cannot provide continuous or suitable habitat for fish. The commenter has provided no evidence to establish an adverse environmental impact.

2. Commenter is concerned that the Neg. Dec. does not analyze the site-specific impacts of the project by relying upon EPA and FIFRA licensing evaluations of the herbicides. "An EIR must be prepared to evaluate and mitigate the site-specific impacts resulting from the application of herbicides to an already impaired and relatively stagnant waterway with little current or dilution."

Response:
There is no evidence that the canal waters are impaired, stagnant or have little current. Quite the opposite is true as water quality monitoring indicates very high quality water with generally swift flows. Dilution occurs as the pesticide plume flows down the canal system, and over drops, blending with downstream and upstream waters. In addition, acrolein degrades quickly and is not released to natural surface waters in concentrations exceeding the water quality objectives.

Copper compounds are applied in a small retention reservoir used for municipal supply. The reservoir is isolated, with the exception of a pump back system into the canal system, which is operated by the District. During pesticide applications, water is held in the reservoir for several days, based on label instructions. After which, water is pumped out of the reservoir, using a 250 gpm pump, into the Upper Main Canal when canal flows are at their highest (2000- 3000 cfs). At the concentrations copper compounds are applied, and given the canal flows at the time water is pumped from the reservoir, there are no detectable concentrations of copper found downstream of the discharge point. Sampling has been conducted over the past two years to verify this.

Pesticides containing glyphosate could be applied to aquatic weeds in the canals or drains. Local drains do typically have slower moving waters. It is applied to the plant directly, and not the general area. As indicated in the Initial Study, glyphosate is "not mobile or highly toxic and, therefore, unlikely to impact the environment" (page 35). Glyphosate is also strongly adsorbed by organic matter and fine sediment, both of which are typically found in agricultural drains. The application of Rodeo/Aquamaster to aquatic weeds (in the water) is uncommon, and has not occurred over the last 2 years.

As described in the Initial Study, waters containing levels of acrolein or copper compounds exceeding the water quality objectives are not allowed to discharge from the canal system. The canal system is not an impaired water body. Rodeo/Aquamaster, a pesticide containing glyphosate, is applied to aquatic weeds in the canal during the non-irrigation season or in the drains at any time of the year. The Harding Drain is the only water body considered "impaired". However, as indicated above, glyphosate is "not mobile or highly toxic and, therefore, unlikely to impact the environment."

Acrolein is acutely toxic to organisms such as mammals and fish at certain concentrations. Copper can be toxic to invertebrates and fish. (See Attachment 5 – Fate, Transport and Toxicity of Copper Herbicides). However, in order for significant adverse environmental effects to occur, receptors must be present and exposure pathways must be complete. Because no viable populations of sensitive species are known to exist within the treated facilities, no significant adverse effects are expected to occur.

In the Initial Study (page 38) the District has commented to "implement awareness training for personnel that apply the pesticides to further reduce any less-than-significant potential impacts to special-status species."

3. The commenter states that:
   a. The "EIR must analyze and discuss potential acute and sublethal effects that may result from the use of these herbicides in the site-specific setting.";

b. "The District seems to regard all of its 250 miles of laterals and canals as a single treatment vessel where what (sic) quality standards do not apply. This is highly inappropriate. Mixing zones must be discreet areas with definable boundaries that allow for fish passage. While the state can allow for exceedance of water quality criteria within a mixing zone, it cannot… allow lethality to aquatic life." "To the extent that the project is considered an "exception"… it must be consistent with federal requirements related to toxicity variances."

c. "…acute toxicity of toads, fish and zooplankton can occur significantly below the 78 μg/l acrolein concentration identified as historically present upstream of Highline Spill." "The EIR must discuss the… likely impacts to non-target species."

d. "With one exception, the Negative Declaration did not provide or discuss ambient concentrations of herbicides from previous sampling. Since previous sampling was apparently conducted miles from actual application points, it is likely that significantly higher concentrations of herbicides could be present closer to application areas. An EIR must discuss the "representativeness" of the sampling locations, results from previous sampling…"

Response:

a. Magnacide H concentrations are high enough to be lethal to aquatic life during treatment and are designed to be so. However, as noted above, fish are not likely to enter the canals from Turlock Lake or from the downstream outlets, and the majority of the affected canals are lined with concrete. The canals do not provide suitable habitat for fish and other aquatic life for the simple reason that the canals are drained every year in the fall. Copper concentrations are highly unlikely to be found in detectable concentrations downstream of the discharge into the canal and are therefore not considered significant. Lastly, as stated above, glyphosate is "not mobile or highly toxic and, therefore, unlikely to impact the environment."

b. Pesticides are applied throughout the canal system. As a result, the entire canal system is the potential treatment area. The canals are not considered significant habitat (for various reasons described above and in the Initial Study). The impacts of pesticide treatments are temporary, with water quality being restored relatively quickly as fresh water flows in from upstream of the treatment location. As a result, the critical sampling point is the location where the canal water could be discharged to a downstream waterway. Sampling sites are located at the last point of control along a particular reach of canal. Many times, due to the operational requirements of the canal and the pesticide program, the sampling location is upstream several "drops" from the ultimate discharge point.

c. Applying the pesticides according to the regulatory requirements ensures we know the concentration of pesticide at the point of application. As stated in the Initial Study (pg. 8), the actual application rate varies from application to application dependant upon the condition, temperature, flow and contact time. The resulting concentration is a function of the dosage and application time. As described in (b) above, the impacts of treatment are temporary, and the canal system is not considered significant habitat. The project is operated such that no water containing acrolein, exceeding the water quality objectives, is allowed to leave the canal system.

d. The results of the ongoing sampling program, being conducted as part of the current pesticide treatment program are representative. The monitoring locations were selected to be at potential release locations and chosen to be representative of various canal flow regimes, such as high flow and low flow conditions. These sampling schemes allowed for the determination that the standard best management practices (BMPs) employed by the District during all treatments of all canals are sufficient to prevent discharge of pesticides to receiving waters. This monitoring plan was reviewed and approved by the Central Valley RWQCB. The Initial Study (pgs 46-48) discusses the results of the water quality sampling in 2002-2003. Future sampling will comply with all of the requirements of the new NPDES permit once it has been adopted by the SWRCB.

4. Commenter states "Application of acrolein and other herbicides throughout a growing season, year after year, will assuredly and irreparably degrade the non-target aquatic communities and recreational values that comprise the beneficial uses of the subject waterways. An EIR must discuss the project's consistency with state and federal anti-degradation policies."

Response:
The District follows the requirements set forth by the regulatory agencies, including the SWRCB, RWQCB and DPR, with respect to the application of pesticides to local water bodies. The second paragraph represents conjecture by the commenter and is also misleading. The conjecture that multiple applications year after year will degrade non-target areas is not supported by the fact that the District has applied herbicides for over 25 years and has not observed evidence of harm to non-target communities. The comment is misleading because it implies that viable aquatic communities or intensive recreational use in other District facilities is being adversely affected. Turlock Lake is the only District facility with natural resource and recreational values. This facility has not been closed or otherwise adversely affected in the past 25 years of the District's aquatic herbicide program. Recent monitoring data indicates that the District has been successful in avoiding impacts to non-target facilities and waterways.

5. Commenter states, "The Negative Declaration fails to discuss toxicological interactions. An EIR must identify other constituents present in the waterbodies and discuss potential additive and synergistic effects resulting from the application of herbicides to waters already containing mixtures of pesticides and other chemicals."

Response:
Because aquatic herbicides applied by the District are not released at concentrations exceeding the water quality objectives into waters with designated beneficial uses, these herbicides are not expected to contribute to toxicity of these waters. Therefore, synergistic effects have not been evaluated.

6. Commenter states "Aquatic pesticide use frequently has unintended adverse effects on other water quality parameters such as dissolved oxygen, turbidity, pH, etc. The Negative Declaration ignores potential redirected impacts. An EIR must analyze the project's impacts on other water quality parameters."

Response:
The active ingredients of the pesticides applied were sampled and analyzed as required by the existing permit. The other water quality parameters referenced by the commenter were not a requirement of the temporary permit, and were therefore not sampled. The District will comply with any additional requirements of future NPDES permits, and provide additional analyses as necessary.

The use of Magnacide H in District canals does cause decreases in dissolved oxygen in the canal water where the material is applied. However, these changes are expected to be short in duration. Non-chemical, or physical cleaning methods, such as chaining, would be used in lieu of Magnacide H and may have a greater adverse impact on water quality.

Many factors contribute to low dissolved oxygen in parts of the San Joaquin River downstream of Turlock Irrigation District, and development of a Total Maximum Daily Load (TMDL) for dissolved oxygen in these segments is currently underway. Turlock Irrigation District is participating in separate efforts to monitor upstream sources of oxygen depleting materials and evaluate linkages to depletion of oxygen downstream. For more information, see the following website: www.sjrtmdl.org.

Turbidity will temporarily increase as plants decompose. However, while there is some increased turbidity due to pesticide applications, it is significantly less than alternative management measures, including mechanical removal.

The pH of the chemicals may be more basic or acidic than the surrounding waters, but are not anticipated to have a significant long-term impact to the water, as the pesticide is blended with a significant amount of water in the waterbody being treated.

7. Commenter states the analysis "fails to discuss the inert ingredients that make up the vast bulk of applied chemicals. Inert ingredients in a number of pesticides have been found to be highly persistent and toxic. An EIR must analyze project impacts caused by the full range of chemicals that will be discharged to ambient waters… The discharge of undisclosed and potentially toxic material into waterways poses an unreasonable risk."

Response:
During the pesticide registration process, registrants are required to test the toxicity of not only the active ingredients in pesticides, but also the formulated product which includes inert ingredients. Only inert ingredients approved by EPA are allowed to be used in pesticide products. In addition, EPA encourages pesticide registrants to use the least toxic inerts in their products. For each pesticide product, the recipe

developed by formulation chemists to meet all the requirements of storage, handling, application, effectiveness, and safety is considered a trade secret, and is protected by federal statute as "confidential business information". What is public knowledge is the list of EPA approved substances that can be used in pesticide products.

Acrolein composes 92 to 98% of Magnacide H with an additional 0.1 to 1% being Acetaldehyde. Inert ingredients, including water, make up a miniscule percentage of this product.

The District has been applying aquatic pesticides since 1975. No significant adverse impacts have been observed, either the District waterways or downstream, as a result of the application of these pesticides.

8. The commenter states that there has been "no evaluation… of breakdown products. Active and inert ingredients can be transformed in the environment into substances that are more persistent and toxic than the original constituents can. The fate and transformation of applied chemicals and their effects on the biotic communities of the District's waterways must be evaluated…"

Response:
The District uses the practice of closing all gates at potential release points during and after application to ensure that downstream waterways and wetlands are not affected by pesticide applications. As stated above, the District has been applying these pesticides since 1975. No significant adverse impacts have been observed, either the District waterways or downstream, as a result of the application of these pesticides.

The dissipation half-life of acrolein in canals is approximately 7 hours to one day (Nordone et al. 1998, Nordone et al. 1996, Smith et al. 1995), but the half-life is dependent on factors such as concentration and temperature (Nordone et al. 1998, Nordone et al. 1996). Dissipation is the result of numerous processes including degradation, volatilization, adsorption, and dilution. Degradation processes result in the formation of the primary hydrolytic degradation product, 3-hydroxypropanol, and several transient metabolic products, including acrylic acid, allyl alcohol, propionic acid, propanol, and 3-hydroxypropionic acid. Terminal metabolites are oxalic acid and carbon dioxide (Nordone et al. 1998, Smith et al. 1995). (See References section at the end of these comments).

Copper may exist in natural surface waters as free hydrated ions, complexed with inorganic and organic ligands, or sorbed onto surfaces of suspended particles. Copper toxicity to aquatic organisms is primarily due to soluble forms, such as the free ion Cu^{2+} (cupric ion) and some hydroxy and carbonate complexes (Mastin and Rodgers 2000). The cuprous ion (Cu^{+}) is another soluble form, but this species is unstable in aerated water over the pH range of most natural water (6 to 8) and will oxidize to the cupric state (USEPA 1980). Copper sulfate is highly soluble in water (USEPA 1980) and Cu^{2+} is rapidly formed when copper sulfate is applied to surface water. However, once copper ions are formed they tend to sorb strongly to particles, and may precipitate out of solution if conditions are appropriate (EXTOXNET 2003, USEPA 1980). Precipitated and organically bound forms of copper are generally less bioavailable to aquatic biota (Mastin and Rodgers 2000). Due to the complex interactions of copper with other chemical species found in natural waters, the proportions of the various copper compounds that actually exist in the water column depends on factors such as pH, temperature, alkalinity, hardness, and the concentrations of bicarbonate, sulfide, and organic ligands (USEPA 1980, Mastin and Rodgers 2000). Murray-Gulde et al (2002) determined half-lives of copper in water columns for copper sulfate, Cutrine-Plus and Clearigate, and found that half-lives ranged from 2.6 days to 5.7 days. (See References section at the end of these responses to comments).

The only pesticide applied in an area that could discharge to natural water bodies is Rodeo/Aquamaster (glyphosate is the active ingredient). As described in the Initial Study (pg. 37), the primary breakdown product of glyphosate is aminophosphoric acid, which is generally reported to be nontoxic to animals. Therefore, breakdown products are not anticipated to have a significant impact to the environment.

9. Commenter states the "Negative Declaration ignores potential impacts to groundwater. The document acknowledges that some unknown numbers of miles of canals are not lined. The PAN database identifies acrolein as a possible carcinogen and potential groundwater contaminant. The California DWR and USGS have identified significant percentages of Central Valley groundwater supplies as impaired because of pesticides and herbicides."

Response:
The majority of the District's canals are concrete lined. Although the Initial Study indicates that the District has 44 miles of unlined canals and 206 miles of lined canals (pg. 7). These were approximate numbers of miles. Further analysis indicates that 35 miles of unlined canals are located downstream of Turlock Lake, the facilities which would be potentially treated with Magnacide H. The unlined canals have impervious clay bottoms. Evaluations conducted for the Agricultural Water Management Plan and other purposes indicate that very little seepage occurs from our canal system.

Leakage from concrete lined sections is minimal. In light of the relatively short duration of Magnacide H in the canals, and the proportionately small amount of Magnacide H in the water at any given time, it is extremely unlikely that seepage of Magnacide H into the groundwater would ever rise to a level of significance. To the District's knowledge, Magnacide H has never been detected in the groundwater.

While little information is available on the potential for acrolein to leach to groundwater, the soil beneath irrigation canals is unlikely to be sufficiently permeable to allow for significant leaching. Because acrolein dissipates rapidly from surface water, and water moves quickly down the canal during application, there is unlikely to be sufficient time for leaching to occur before removal of acrolein takes place.

10. The commenter has a variety of concerns including:

a. finding "no discussion… regarding the composition and health of the aquatic communities in the sediment and water column of affected waterbodies. The SIP explicitly states that projects receiving an "exception" must, upon completion "provide certification by a qualified biologist that the receiving water beneficial uses have been restored." SIP at 33. The District failed to conduct required baseline studies, which are crucial to any certification establishing that beneficial uses have been "restored.""

b. "An EIR must identify and analyze potential impacts to aquatic and terrestrial species to provide the baseline for certifying, "receiving water beneficial uses have been restored" following treatment."

c. The Initial Study (pg. 22) states, "the two special-status plant species that could be present would be extremely vulnerable to the proposed applications, but these species have not been observed and are unlikely to occur in the water conveyance facilities proposed for treatment." "Since there was no baseline study conducted, any conclusion is meaningless. Further, water treated with herbicides could be diverted to areas where such species are potentially present."

Response:
As explained in responses 1, 2, and 4 above, the canal system (District canals) does not contain viable populations of aquatic organisms in either sediments (which are regularly removed) or the water column. A study is not necessary to determine that beneficial uses have been restored, as no beneficial uses were impaired. To reiterate, concrete lined canals do not provide suitable habitat for aquatic and terrestrial organisms, and receiving waters outside the District canals do not receive water containing Magnacide H.

The aquatic pesticide program has been on going since 1975. As a result, it is not likely that conditions have changed significantly under the emergency permit. Baseline conditions are the current conditions. The presence or absence of aquatic organisms in the facilities is not relevant since the proposed treatment program is not substantially different from the existing program – the baseline and post-project conditions will be similar. Based on our knowledge of the facilities and environment surrounding our facilities, the Initial Study evaluated the potential impacts to special-status species that could be in or around our facilities.

Because aquatic pesticide activities have not caused exceedances of water quality criteria in water bodies with designated beneficial uses, the project has not caused an impairment of beneficial uses and does not require an exception from the SIP. Therefore, there is no need to "provide certification by a qualified biologist that the receiving water beneficial uses have been restored."

As indicated in the Initial Study, the two special-status plant species that could be present have not been observed and are unlikely to occur in the water conveyance facilities proposed for treatment. These plants prefer shallow marsh or water zones with little movement. The District facilities are typically concrete lined and have much higher flows. In addition, water diverted from the canal is used to irrigate local crops. District water is not utilized for local refuges, or marshy areas. Cropping areas do not provide the shallow water conditions needed by these species of plants.

11. The commenter is concerned about impacts to riparian habitat along unlined segments of the canal system. "Apparently the District has concluded that riparian habitat is not present in along (sic) the unlined segments. We disagree and further suggest that, since concrete liners are not water tight, there are likely riparian values along concrete lined segments. An EIR must quantify the amount of riparian habitat within the District and evaluate potential impacts to that habitat."

Response:
There are approximately 35 miles of unlined canals. In the Initial Study, the District did an evaluation of special-status species to evaluation the potential for those species to be present in the proposed project area, including the unlined sections. It was determined that there was little likelihood that these species would be present, and therefore would not be impacted by the project. In addition, the District has committed to giving our employees training on identifying special-status species.

The lined canals are essentially devoid of riparian habitat. The District maintains canal banks/roadways on both sides of the canal, further minimizing any potential riparian habitat along those reaches.

As indicated in response to comment 9 above, leakage from the canals is minimal, and therefore unlikely to create habitat adjacent to the canals or contaminate groundwater supplies.

12. The commenter is concerned about:
   a. Potential leakage from gates located at the end of the canal system. "… [T]here is inadequate discussion of potential gate leakage, monitoring or procedures that will be undertaken if leakage is discovered."
   b. "…a six-day minimum holding period ignores the fact that acrolein's half-life is 20 days. … there is no information regarding the adequacy of the field test kits (i.e. detection limits, accuracy, QA/QC, etc.) or laboratory detection levels to enable a reviewer to determine if sampling will adequately protect downstream waters."

Response:
a. Release gates downstream of a Magnacide H application are closed prior to the start of the application. District personnel insure that the release gates stay closed throughout the Magnacide H application and degradation process. If a leak was to be discovered, upstream gates would be closed and the water level in the canal would be lowered to stop the leakage. The application of Magnacide H would stop until the situation could be resolved.

Water is typically not "held" at the last gate or spill point. Instead, the last drops are emptied, and water is held several drops upstream of the spill. This operational practice provides more control over the water within the canal system and further reduces any potential for "leaks" into downstream waterways.

During 25 years of use of Magnacide H in TID canals, there is not record of leaks during an application period.

b. The District does not rely solely on holding water for six-days or using the field-test kits to insure that treated water is not released to receiving waters. District personal use a combination of holding times, field test kits and flow calculations to ensure that the Magnacide H has degraded sufficiently and has been irrigated from the system before any of the treated water is released into the canal reach immediately upstream of the point of discharge into receiving waters. The half-life of 20 days referred to in the comment is specific to one form of removal: hydration to beta-hydroxypropionaldehyde. According to the Spectrum Chemical Fact Sheet, acrolein is removed from aqueous environments with half-lives usually on the order of less than a day. The primary loss process appears to be an initial hydration (and possibly some biotransformation) to beta-hydroxypropionaldehyde, which is then further biotransformed. If released to water, acrolein may biodegrade under aerobic conditions, volatilize (half-life = 7 hours from a model river), or undergo reversible hydration to beta-hydroxypropionaldehyde (half-life = 21 days). (See discussion on half-life in response to comment 8 above.)

The field test kits are used as an indicator of whether or not acrolein is present in the water. The manufacturer's instructions are followed. The test kit is but one indicator of whether or not acrolein may be present. The detection limits of the test kits are higher than those of the laboratory tests. However, as indicated above, they are an indicator of the presence of the pesticide. We also use observations, understanding of flows within the canal system and where the water has been irrigated out of the system, detection of odors created by the pesticide, representative sampling, etc.

As dictated by the monitoring plan, the laboratory detection limits for acrolein are 20 μg/l, less than the water quality objective. Samples were taken as specified in monitoring plan, approved by the Central Valley RWQCB.

13. The commenter is concerned the Negative Declaration "provides no information on the pre-treatment and post-treatment, water quality sampling that will be conducted. The few samples drawn… are clearly inadequate. There is no discussion of toxicity tests, bioassessments, life-cycle studies, etc. The SIP requires that "(a) discharge and receiving water quality monitoring plan (before project initiation, during the project, and after project completion, with the appropriate quality assurance and quality control procedures) be submitted to the Regional Board for approval of a project dependent upon an 'exception.' (SIP at 33.)" "An EIR must provide a detailed

description of previous sampling, the proposed monitoring plan, including QA/QC, and discuss its adequacy in protecting the environment."

Response:
TID believes that its application program and monitoring activities ensure no harm to the environment, to District customers and personnel, or to receiving water beneficial uses, will occur as the result of the pesticide program. TID will comply with all monitoring requirements of the NPDES permit, including any SIP requirements as necessary. However, future monitoring will be no less that the monitoring conducted under the existing permit.

14. The commenter indicates that the CEQA documents suggest, "non-chemical control is unreasonably expensive and will only be employed in rare situations. Yet there is no information provided to enable a reviewer to compare relative treatment costs. An EIR must discuss the effectiveness and costs of chemical and non-chemical control methods, including respective advantages and disadvantages."

Response:
CEQA does not require economic evaluation in an Initial Study, where the emphasis is on impacts to the physical environment and socioeconomic impacts resulting from any physical impacts. Mechanical methods are much less effective, much more expensive, and can be more environmentally damaging than aquatic herbicide treatments.

15. The commenter indicates that "the Negative Declaration claims that the Project and the Monitoring and Reporting Program will comply with the state's Aquatic Pesticide Permit. However, the interim Aquatic Pesticide General Permit sunsets on 30 January 2004. The requirements of the permanent permit are unknown. They will, however, likely be substantially different than those in the existing temporary permit. It is inappropriate to employ a Negative Declaration to justify a project that must comply with requirements of an Order that has yet to be publicly circulated. The inadequate monitoring requirements in the sunsetting permit are unacceptable to the environmental community and will almost certainly be strengthened."

Response:
The new permit will have standards at least equal to the past permit and more then likely they will be more stringent. In any event, the aquatic herbicide treatment will not change from what has been done over the past 25 years (baseline) and therefore is not likely to cause a significant impact. The SWRCB requires that CEQA documentation be completed by dischargers prior to the time the new draft permit is distributed for public review. Therefore, the District does not have the option to wait until the future permit requirements are circulated before preparing the environmental document.

16. The commenter is concerned that the BMPs identified in the Initial Study "are not included as part of a mitigated negative declaration and, consequently, are not

enforceable. Nor is there an identified monitoring program to identify whether the BMPs will be implemented during the Project's life. This violates CEQA mandates to prepare a mitigated negative declaration where BMPs are employed (to) mitigate a project's impacts."

Response:
The BMPs discussed in the project description in the Initial Study are part of District standard operating procedures. They are not mitigation measures. As a result, the use of BMPs does not automatically require the finding of a Mitigated Negative Declaration. The BMPs for the revised program will include awareness training for personnel on special status species.

17. The commenter states that:
   a. "There is no information provided to establish that future application rates will not increase."
   b. "Repeated pulses of toxicity clearly will degrade an ecosystem over time... Cumulatively, the projects will treat virtually all of the canals and laterals on the entire eastern side of the San Joaquin... This is clearly significant... The Negative Declaration states that 'although special status species or other native species may occupy some of the treated water conveyance facilities, the cumulative effect of aquatic pesticide applications within the five districts is not expected to degrade habitat or result in increased mortality of these species compared to existing conditions.' Initial Study at 50."
   c. "An adequate baseline study will provide the opportunity to quantify likely "take" of listed species and allow an EIR to discuss the need for consultation pursuant to state and federal endangered species acts."

   Response:
   a. As indicated in response to comment 3c above, the application rates are dependant on field conditions. As a result, the Initial Study is based on the existing practices. In the future, the District will comply with the new permit requirements. There are no anticipated changes in application practices.
   b. The cumulative effects of the identified programs on San Joaquin Valley waterways are less-than-significant based on historical practices and observations of the districts. While the SWRCB has a list of agencies using aquatic pesticides, this list did not indicate the materials being used. Adequate information is not currently available to comprehensively address the potential cumulative effects of multiple agricultural sources and other sources that may affect water quality in the receiving waters. However, under the recently issued Central Valley Region Regional Water Quality Control Board's Resolution No. R5-2003-0105 Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Lands (Ag Waiver), additional water quality monitoring will be required. This monitoring will be focused on identification of sources and determination of loads of multiple agricultural pollutants from specific sources. Once this information is obtained, a rigorous cumulative analysis can be performed.

c. As indicated in response to comment 10, the baseline conditions are equal to current conditions. There is no record of any "take" of special-status species due to the past applications, therefore no "take" of special-status species is anticipated in the future.

18. The commenter states that the "District's canals are used for fishing, swimming and other recreational uses, both in rural and urban portions. Some local residents also use them for bathing and for domestic water source. Both domestic animals and livestock use the canals as well. All these uses have taken place for many years. The public health and safety considerations, and impacts related to all of these uses, are not addressed."

Response:
As stated in #1 above, the canals do not have the beneficial uses indicated by the commenter. Bathing would be extremely hazardous in the canal system, for the same reasons identified for swimming (in #1 above). The District has not witnessed this activity in or along the canal. The canals and drains have fast moving water, and are shaped in such a way that domestic animals and livestock have a difficult time entering or exiting these facilities. Neither the canals nor drains are utilized for domestic supply. As a result, it is unlikely that they would utilize the facilities for any such purpose.

French Pit reservoir in La Grange is used for municipal supply. The copper compounds used in the reservoir are permitted for use in these types of facilities. No impacts have been identified as a result of the use of these chemicals. Water samples have shown no detectable traces of copper in the water downstream of the discharge point. French Pit is fenced to protect the water supply. Therefore no fishing, swimming, bathing or use by domestic animals or livestock is a concern.

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Appendix B

Trial Court Ruling on Submitted Matters

SUPERIOR COURT OF CALIFORNIA
COUNTY OF SACRAMENTO

DATE/TIME : NOVEMBER 24, 2004
JUDGE : GAIL D. OHANESIAN
REPORTER : NONE

DEPT. NO : 11
CLERK : C. LEWIS
BAILIFF : NONE

DELTAKEEPER, a Project of WaterKeepers, Northern California, et al,
Petitioners,

COUNSEL:
ELLISON FOLK
JENNY HARBINE
DONALD MOONEY

VS. Case No.: 04CS00188

OAKDALE IRRIGATION DIST; BD OF DIRECTORS OF OAKDALE IRRIGATION DIST.; GOV.'S OFFICE OF PLANNING AND RESEARCH; JAN BOEL, STATE CLEARINGHOUSE; TURLOCK IRRIGATION DIST.; MODESTO IRRIGATION DIST.; MERCED IRRIGATION DIST; SOUTH SAN JOAQUIN IRRIGATION DIST. ,
Respondents.

LISA TRANKLEY
GALILEO MORALES
WILLIAM GNASS
TIMOTHY O'LAUGHLIN
WILLIAM PARIS III
JOY A. WARREN

Nature of Proceedings: PETITION FOR WRIT OF MANDATE

Rulings on Submitted Matters

1. Governor's Office of Planning and Research and State Clearinghouse, et al. Respondents/Defendants have moved for Summary Judgment. Petitioner/Plaintiff has filed a counter-motion for Summary Adjudication regarding the same causes of action. Respondents'/Defendants' request for Judicial Notice is granted, there being no objection.

These motions concern the causes of action based on the alleged failure of the Governor's Office and State Clearinghouse to provide a sufficient period of time for State agencies to review the subject initial studies/proposed negative declarations. At issue is whether the time period prescribed in Public Resources Code section 21091 is computed pursuant to CCP section 12, excluding the first day and including the last day. Or, in the alternative, as in *E. M. Derby & Co. v. City of Modesto* (1894) 103 Cal. 515, whether both the first and the last day may be included in computing the 30 day time period. There are no facts in dispute as to the notice periods actually given. Thus, the matter is properly decided as a question of law on summary judgment or summary adjudication. The court finds that the *Derby* case is on point and is still good law. There is no triggering event in Public Resources Code section 21091(b). Thus CCP section 12 does not apply. Accordingly, in 4 of the

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CASE TITLE : DELTAKEEPER V OAKDALE IRRIG DIST ET AL

Superior Court of California,
County of Sacramento

BY: C. LEWIS,
Deputy Clerk

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cases, namely, Turlock Irrigation District, Modesto Irrigation District, Merced Irrigation District and South San Joaquin Irrigation District, the review period was adequate.

In the Oakdale Irrigation District case, it is conceded that under either method of calculating the review period, it was at least one day less than the required 30 days because the last day fell on a holiday. Public Resources Code section 21005(b) provides that there is no presumption that error in the information disclosure is prejudicial. Moreover, errors which are insubstantial or *de minimis* are not prejudicial. See *Environmental Protection Information Center, Inc. v. Johnson* (1985) 170 Cal.App.3d 604. *Fall River Wild Trout Foundation v. County of Shasta* (1999) 70 Cal.App.4th 482, relied upon by Petitioner/Plaintiff is distinguishable. In *Fall River*, the effect, if any, of the defect in notice was not known. As to each of the cases before this court, Respondents/Defendants have submitted declarations stating that the state agencies' decision on whether or not to submit comments was not based on the length of the comment period and that the agencies would not have acted differently had they had more time. The effect on members of the public, including Petitioner/Plaintiff and Mr. Burke, is not relevant to this inquiry. Whether or not Oakdale Irrigation District would have held its meeting to consider the proposed negative declaration on some day after January 20, 2004, had the notice period been one day longer is speculative. Moreover, there is still no showing of prejudice caused by OID's meeting having been held on January 20, 2004, as opposed to some later date. Accordingly, Respondents/Defendants motion for **Summary Judgment** is properly **Granted** in each of the cases. Judgment shall also be entered in favor of respondents/defendants on the causes of action for declaratory relief.

Objections to Folk Declaration filed August 16, 2004, paragraphs 2, 3 and 5 are sustained.

2. **Oakdale Irrigation District, et al.** Petitioner is not barred by the failure to exhaust administrative remedies. Petitioner did not submit any comments or otherwise participate in the administrative process leading up to the adoption of the resolution for a negative declaration. However, petitioner is excused from having to do so because OID failed to give adequate notice of the public comment period and failed to give adequate notice of the time of its meeting. Public Resources Code section 21177(e).

Petitioner contends that OID failed to provide an adequate description of the proposed project; and that the initial study/negative declaration itself acknowledges potential adverse impacts associated with the project. Petitioner further contends that the record supports a fair argument of potential adverse environmental impacts. Therefore, according to petitioner, an EIR is required.

Petitioner's August 16, 2004, Request for Judicial Notice is denied. This matter has already been ruled upon in the Motion to Augment. Respondent's objections to paragraphs 2, 3, 4 and 5 of the Declaration of Ellison Folk filed August 16, 2004, are sustained. These are improper attempts to augment the record. Objection to paragraph 5 of the Folk declaration is also sustained on the grounds of hearsay. There appears to be no objection to Petitioner's October 4, 2004, Supplemental Request for Judicial Notice. However, the information in this Request for Judicial Notice is not relied upon by petitioner in any of its arguments in this case. Moreover, it concerns matters that took place after the subject decision and, thus, are not properly part of the administrative record. Accordingly, this request is denied. No specific objection was made to the October 4, 2004, Supplemental Folk declaration. However, paragraphs 2 through 5 do not cure the bases for the objections previously ruled upon regarding the August 16, 2004, Folk declaration. The other paragraphs do not relate to this case.

The objection made orally at the hearing to the Burke declaration of October 15, 2004, which was filed in connection with the motions for summary judgment and summary adjudication referred to above, is overruled.

Respondent contends that, even if this court were to find that its negative declaration in this matter is invalid, it can still apply pesticides pursuant to a general permit which does not include the SIP Section 5.3 exception. Thus, according to Respondent, it is still not required to do an EIR. However, this position seems to be beyond the scope of the pleadings and not a matter for this court.

The court finds that the defects in the notice did not result in any prejudice and, thus, are not a sufficient basis for setting aside the decision to adopt a negative declaration. Petitioner's reliance on evidence in the records of the consolidated cases before this court is improper. These cases have been consolidated for hearing. But each case has its own separate record and the court's review is limited to the evidence in the record that was before the particular agency at the time it made its decision. The administrative record of the OID proceedings does not contain evidence sufficient to raise a fair argument that the project may result in significant environmental impacts. The court further finds that the description of this project is adequate.

Accordingly, petitioner has failed to show an abuse of discretion. This **Petition is Denied.**

3. **Turlock Irrigation District, et al.** Petitioners in this case, and in the next 3 cases, include Deltakeeper and San Joaquin Raptor Center, et al. It appears that petitioners are seeking to rely on the same RJN in this case as the one filed August 16, 2004, in connection with the Oakdale Irrigation District case. That RJN is again denied in that in concerns matters that were the subject of a motion to augment the record which has been denied. Notwithstanding Evidence Code Section 452(c), this is still evidence outside the record which is inadmissible pursuant to *Western States Petroleum Association v. Superior Court* (1995) 9 Cal.4th 559.

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DELTAKEEPERS V OAKDALE IRRIGATION DIST et al

Petitioners' objections to the declaration of Liebersbach filed September 13, 2004, are sustained. This declaration also is extra-record evidence which is not admissible. There is no objection to Exhibits 1 and 2 to the Liebersbach declaration. Thus, those matters are received.

The court again finds that the description of this project is adequate. However, in this case, the court finds that substantial evidence in the administrative record supports a fair argument that the project may have a significant environmental impact. Respondent's system includes the French Pit Reservoir where one consultant stated there are likely to be fish and invertebrates. Native fish species may occupy some of the water conveyance facilities. Respondent has also failed to analyze the degree to which copper laden sediment may be released from French Pit Reservoir into the Upper Main Canal and Turlock Lake. Substantial evidence also supports a fair argument that the project may have a significant impact on drinking water. Water from French Pit Reservoir is used for drinking water supplies. The project applies the application of copper in concentrations which exceed water quality standards. Respondent did not study or adequately discuss the effects of the application of copper-containing products to the Reservoir. Moreover, there is evidence that there is seepage from the respondent's unlined canals. Respondent did not adequately respond to evidence of the potential for acrolein to leach into ground water.

Accordingly, this **Petition** is **Granted.**

4. **Modesto Irrigation District, et al.** Petitioners' objection to the Coutrakis declaration filed September 13, 2004, is sustained. This is extra-record evidence which is not admissible.

The court finds that the project description is adequate.

MID's treated canals are all lined. The rest of the Respondent's treated system is pipeline. The administrative record does not contain substantial evidence that the project may result in a significant impact on the environment. The court finds that the initial study contained an accurate description of the project setting. The administrative record does not contain substantial evidence to support a fair argument that the project may have a significant impact on beneficial uses of the irrigation canals. The record shows that no domestic use is made of the canal water below the Modesto Reservoir, and MID enforces its policies preventing swimming and other recreational use of its canals.

The record does not contain substantial evidence to support a fair argument that acrolein from water in Respondent's lined canals and pipes will contaminate ground water.

The court also finds that the Best Management Practices are properly considered part of this project and do not need to be set out as mitigation measures in a mitigated negative declaration.

Petitioners have failed to show that MID failed to give adequate opportunity for public comment on the initial study/negative declaration. Petitioners have not shown that any errors in notice were prejudicial.

The Supplemental Declaration of Folk filed October 4, 2004, in the OID case also refers to the MID case. There was no objection to this declaration. Therefore, paragraph 8 of that declaration is received in this case.

For the reasons stated above, this **Petition** is **Denied.**

5. **Merced Irrigation District, et al.** The court finds that the initial study accurately describes the project setting. The court finds, in this case, that the record contains substantial evidence to support a fair argument that the project may have a significant impact on the environment. Evidence was submitted by Diane Renshaw, an ecologist, that the irrigation canals can and do provide natural habitat. Respondent's system includes canals, ditches, natural creeks and reservoirs. Substantial evidence supports a fair argument that the project may have an impact on ground water by the leaching of acrolein in unlined canals.

The court finds that the Best Management Practices are properly considered part of this project and do not need to be set out as mitigation measures in a mitigated negative declaration.

However, for the other reasons stated above, this **Petition** is **Granted.**

6. **South San Joaquin Irrigation District, et al.** The Supplemental Declaration of Folk filed October 4, 2004, in the OID case also refers to the South San Joaquin Irrigation District case. There was no objection to this declaration. Therefore, paragraph 7 of that declaration is received in this case.

The court finds that the initial study accurately describes the project setting. The court further finds, however, that, in this case, the record contains substantial evidence to support a fair argument that the project may have a significant impact on groundwater due to leaching of acrolein. The evidence of fish in canals and reservoirs concerns districts other than SSJID.

The court finds that the Best Management Practices are properly considered part of this project and do not need to be set out as mitigation measures in a mitigated negative declaration.

However, for the other reasons stated above, this **Petition** is **Granted.**

7. **Conclusion.** In the Turlock, Merced and South San Joaquin cases, petitioners shall prepare a judgment for the court's signature and a separate form of writ for issuance by the clerk as to each case. Respondents in each of these 3 cases shall file a return within 60 days of

issuance of the writ. Petitioners shall recover their costs, pursuant to a memo of costs, in these cases.

The Oakdale and Modesto respondents shall prepare a judgment for the court's signature in each case. These respondents shall also recover their costs, pursuant to a memo of costs, in these cases including any costs recoverable under Government Code section 6103.5.

Respondents/defendants Governor's Office and State Clearinghouse shall prepare an order and a separate form of judgment on its motion for summary judgment and the cross-motion for summary adjudication for the court's signature. These respondents/defendants shall also recover their costs, pursuant to a memo of costs, including any costs recoverable under Government Code section 6103.5.

All parties shall comply with California Rules of Court, Rule 391. Counsel are also admonished, for future reference, that any references to federal authority shall be accompanied by a copy of the case, statute or regulation cited. See Cal. Rules of Court, Rule 313(h)..

Dated: 11/24/04

GAIL D. OHANESIAN

Honorable GAIL D. OHANESIAN,
Judge of the Superior Court of California,
County of Sacramento

Appendix C
Biological Resources

URS

Memorandum

Date: August 9, 2005

To: File

From: Daniel Weinberg, Biologist

Subject: **Turlock Irrigation District Canal Reconnaissance Survey**

On the afternoon of July 20, 2005 I performed a reconnaissance survey and habitat assessment of the unlined and partially lined sections of the Main, Turlock Main, and Highline Canals as well as Cross Ditch #1 of the Turlock Irrigation District (TID) to identify habitats that are potentially utilized by special status plant or wildlife species. The special status species addressed by the survey were identified based on their potential to utilize the aquatic habitats associated with the TID water conveyance system for breeding, forage or movement. The following species were addressed during this reconnaissance survey: tricolored blackbird (*Agelaius tricolor*), Kern brook lamprey (*Lampetra hubbsi*), San Joaquin roach (*Lavina symmetricus*), hardhead minnow (*Mylophardon conocephalus*), western pond turtle (*Clemmys marmorata*), giant garter snake (*Thamnophis gigas*), Sanford's arrowhead (*Sagittaria sanfordii*) and slender-leaved pondweed (*Potamogeton filiformis*).

Reconnaissance Survey

The survey began at 1215 hours under a clear sky with an air temperature of approximately 95 degrees and winds from the northwest at 5-10 mph. The survey was initiated on the downstream (west) canal access right-of-way road along the Turlock Main Canal at the intersection with East Avenue, a few hundred feet east of Gratton Road. The survey proceeded north towards the Tuolumne River, and gradually worked east following the Main Canal to Turlock Lake. At the Lake Road bridge crossing I crossed over the canal and traveled west towards the Highline Canal. I then surveyed the Highline Canal south to Monte Vista Road and concluded the survey for the day at 1755 hours with an air temperature of approximately 100 degrees and northwest winds of 5-10 mph.

At 0700 hours on July 21, 2005 I resumed the Highline Canal survey towards the south along the downstream canal right-of-way access road beginning at Monte Vista Road under a partially cloudy sky with an air temperature of approximately 75 degrees and calm winds. At the canal intersection with East Avenue I turned right onto the road and drove west to inspect the unlined portion of Cross Ditch #1. At the intersection of this ditch and East Avenue, I collected a sample of emergent vegetation for further analysis. I then completed surveying the ditch back to the Highline Canal. I resumed following the Highline Canal as it meandered east and then south towards a partially lined section. I followed this section of the canal to its terminus adjacent to the Merced River between Griffith Road and Golf Road. I concluded the survey at 1145 hours under a sunny sky with an air temperature of approximately 88 degrees and northwest winds of 5-10 mph.

The TID unlined and partially lined canals contain common pondweed. It is possible that the TID canal system could support slender-leaved pondweed as well, but none was located during the survey. California arrowhead, observed during the reconnaissance survey visit, is located in a small section of unlined canal. Thus, it is possible that sections of TID unlined canal could also support Sanford's arrowhead but none was located during the survey.

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URS

Memorandum

Date: August 9, 2005

To: File

From: Daniel Weinberg, Biologist

Subject: **Turlock Irrigation District Canal Reconnaissance Survey**

On the afternoon of July 20, 2005 I performed a reconnaissance survey and habitat assessment of the unlined and partially lined sections of the Main, Turlock Main, and Highline Canals as well as Cross Ditch #1 of the Turlock Irrigation District (TID) to identify habitats that are potentially utilized by special status plant or wildlife species. The special status species addressed by the survey were identified based on their potential to utilize the aquatic habitats associated with the TID water conveyance system for breeding, forage or movement. The following species were addressed during this reconnaissance survey: tricolored blackbird (*Agelaius tricolor*), Kern brook lamprey (*Lampetra hubbsi*), San Joaquin roach (*Lavina symmetricus*), hardhead minnow (*Mylophardon conocephalus*), western pond turtle (*Clemmys marmorata*), giant garter snake (*Thamnophis gigas*), Sanford's arrowhead (*Sagittaria sanfordii*) and slender-leaved pondweed (*Potamogeton filiformis*).

Reconnaissance Survey

The survey began at 1215 hours under a clear sky with an air temperature of approximately 95 degrees and winds from the northwest at 5-10 mph. The survey was initiated on the downstream (west) canal access right-of-way road along the Turlock Main Canal at the intersection with East Avenue, a few hundred feet east of Gratton Road. The survey proceeded north towards the Tuolumne River, and gradually worked east following the Main Canal to Turlock Lake. At the Lake Road bridge crossing I crossed over the canal and traveled west towards the Highline Canal. I then surveyed the Highline Canal south to Monte Vista Road and concluded the survey for the day at 1755 hours with an air temperature of approximately 100 degrees and northwest winds of 5-10 mph.

At 0700 hours on July 21, 2005 I resumed the Highline Canal survey towards the south along the downstream canal right-of-way access road beginning at Monte Vista Road under a partially cloudy sky with an air temperature of approximately 75 degrees and calm winds. At the canal intersection with East Avenue I turned right onto the road and drove west to inspect the unlined portion of Cross Ditch #1. At the intersection of this ditch and East Avenue, I collected a sample of emergent vegetation for further analysis. I then completed surveying the ditch back to the Highline Canal. I resumed following the Highline Canal as it meandered east and then south towards a partially lined section. I followed this section of the canal to its terminus adjacent to the Merced River between Griffith Road and Golf Road. I concluded the survey at 1145 hours under a sunny sky with an air temperature of approximately 88 degrees and northwest winds of 5-10 mph.

URS

The TID unlined and partially lined canals contain common pondweed. It is possible that the TID canal system could support slender-leaved pondweed as well, but none was located during the survey. California arrowhead, observed during the reconnaissance survey visit, is located in a small section of unlined canal. Thus, it is possible that sections of TID unlined canal could also support Sanford's arrowhead but none was located during the survey.

References

California Department of Fish and Game. California Interagency Wildlife Task Group. 2002. **CWHR Version 8.0.** Sacramento, California.

Ford, Tim. Turlock Irrigation District. 2005. Personal Communication. Turlock, California

Turlock Mosquito Abatement District. 2005. Personal communication **http://www.mosquitoturlock.com/Index.htm**. Turlock, California.

Appendix D
Water Quality

Specimen MAGNACIDE H® Herbicide Label

RESTRICTED USE PESTICIDE
DUE TO A HIGH ACUTE TOXICITY
For retail sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification.

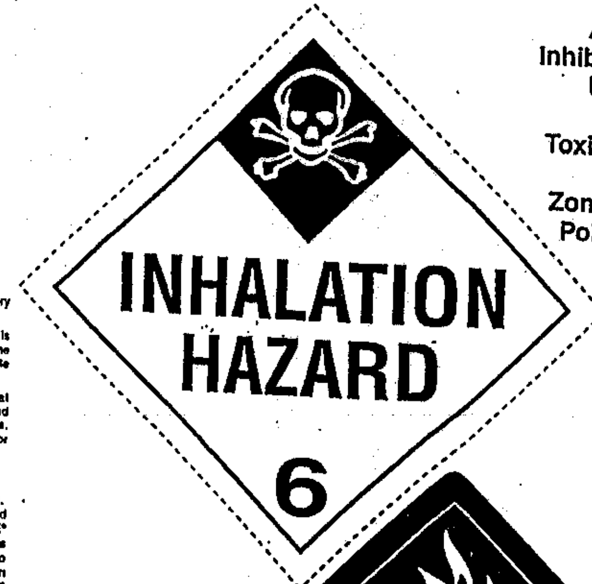
BAKER HUGHES
Baker Petrolite

MAGNACIDE® H HERBICIDE
(Acrolein, Inhibited)
CONTENTS UNDER PRESSURE

DANGER POISON POISON

KEEP OUT OF REACH OF CHILDREN

Acrolein, Inhibited, 6.1, (3), UN 1092, PG I, Toxic-Inhalation Hazard, Zone A, Marine Pollutant, RQ



EPA Reg. No. 10707-9   EPA Est. 10707-CA-005

ACTIVE INGREDIENT	BY WEIGHT
Acrolein	95%
INERT INGREDIENTS	5%
TOTAL	100%

This product contains the toxic inert ingredient hydroquinone.
(MAGNACIDE® H Herbicide contains 6.7 pounds of active ingredient per gallon.)

PRECAUTIONARY STATEMENTS
HAZARDS TO HUMANS AND DOMESTIC ANIMALS
DANGER

EXTREMELY FLAMMABLE AND IRRITATING VAPOR AND LIQUID. POISONOUS BY INHALATION, SKIN CONTACT OR SWALLOWING. DO NOT BREATHE VAPOR. CORROSIVE. CAUSES EYE AND SKIN DAMAGE. DO NOT GET IN EYES, ON SKIN OR ON CLOTHING. KEEP AWAY FROM FIRE, SPARKS AND HEATED SURFACES.

When setting up and breaking down application equipment, a full-face air purifying respirator with organic vapor (OV) cartridges jointly approved by the Mine Safety and Health Administration (MSHA) and the National Institute of Occupational Safety and Health (NIOSH) and butyl rubber gloves must be worn. For visual inspection during treatment, chemical splash goggles must be worn. If spilled on clothing, gloves, or shoes, remove them immediately and wash thoroughly with soap and water before reuse. Use with adequate ventilation.

ENVIRONMENTAL HAZARDS

This product is toxic to fish and wildlife. Keep out of lakes, streams or ponds. Fish, shrimp and crabs will be killed at application rates recommended. Do not apply where they are important resources. Do not apply to water drainage areas where runoff or flooding will contaminate ponds, lakes, streams, tidal marshes and estuaries. Do not contaminate water by cleaning of equipment or disposal of wastes. Notify your State Fish and Game Agency before applying this product. Use only as specified.

PHYSICAL AND CHEMICAL HAZARDS

DANGER: Extremely flammable. Contents under pressure. Keep away from fire, sparks and heated surfaces. Do not puncture or incinerate container. Acrolein, the active ingredient in MAGNACIDE® H Herbicide, is highly reactive chemically and readily forms polymers. If alkalies (such as ammonia and caustic) or strong acids are brought in contact with MAGNACIDE® H Herbicide in a closed system, the Herbicide can polymerize with sufficient violence to rupture the container. Do not apply with equipment used for acids and alkalies. Contamination of MAGNACIDE® H Herbicide with any foreign matter must be avoided.

A supply of sodium carbonate (soda ash) should be readily available for deactivating spilled MAGNACIDE® H Herbicide. All spills should be confined and deactivated before disposal. See the MAGNACIDE® H Herbicide Application and Safety Manual for additional information.

FIRST AID

If inhaled:
- Move person to fresh air.
- If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible.
- Call a poison control center or doctor for further treatment advice.

If on skin or clothing:
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

If in eyes:
- Hold eye open and rinse slowly and gently with water for 15-20 minutes.
- Remove contact lenses, if present, after 5 minutes, then continue rinsing eye.
- Call a poison control center or doctor for treatment advice.

If swallowed:
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by the poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

Have the product container, label or application manual with you when calling a poison control center or doctor, or going for treatment. CALL A PHYSICIAN IMMEDIATELY IN ALL CASES OF SUSPECTED POISONING.

NOTE TO PHYSICIAN

Probable mucosal damage may contraindicate the use of gastric lavage. Measures against circulatory shock, respiratory depression and convulsion may be needed.

WARNING SIGNS AND SYMPTOMS: Liquid MAGNACIDE® H Herbicide is absorbed by the skin and is particularly irritating to any lesion and to the eye. The vapors act principally on the mucous membrane of the eyes and respiratory tract. Because of the extreme lachrymatory warning effect, the concentration tolerable by man is far below the minimum lethal concentration.

TREATMENT: Treat exposed area as a chemical burn. Thoroughly flush eyes with water and treat symptomatically. Persons exposed to MAGNACIDE® H Herbicide vapors have a delayed reaction and experience irritation of the respiratory tract. In severe cases, this may progress to pulmonary edema. Therefore, it is advisable to keep persons exposed to MAGNACIDE® H Herbicide under observation for 24 hours following exposure.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
MAGNACIDE® H Herbicide is a water soluble material for the control of submersed and floating weeds and algae in irrigation canals. This material must be applied in accordance with directions in the MAGNACIDE® H Herbicide Application and Safety Manual by a certified applicator or under a certified applicator's supervision. Do not permit dairy animals to drink treated water. Do not use where waters will flow into potential sources of drinking water. Water treated with MAGNACIDE® H Herbicide must be used for irrigation of fields, either crop bearing, fallow or pasture, where the treated water remains on the field OR held for 6 days before being released into fish bearing waters or where it will drain into them.

STORAGE AND DISPOSAL
STORAGE OF MAGNACIDE® H HERBICIDE TANKS

All containers of MAGNACIDE® H Herbicide should be stored in a secured, well-ventilated area, away from all other chemicals. No alkalies or oxidizing materials should be near. Any electrical equipment should be Class 1 - Division 2 and properly grounded. Do not reuse empty container. Return empty containers to Baker Petrolite Corporation.

DISPOSAL

Pesticide wastes are acutely hazardous. Improper disposal of excess pesticide, spray mixture, or rinsate is a violation of Federal law. If these wastes cannot be disposed of by use according to label instructions, contact your State Pesticide or Environmental Control Agency, or the Hazardous Waste representative at the nearest EPA Regional Office for guidance.

NOTICE OF WARRANTY

BAKER PETROLITE CORPORATION MAKES NO WARRANTY OF MERCHANTABILITY FITNESS FOR ANY PURPOSE, OR OTHERWISE, EXPRESSED OR IMPLIED concerning this product or its uses which extend beyond the use of the product under normal conditions in accord with the statements made on this label.

NET WEIGHTS

Cylinder-370 lbs.   Skid Tank-2450 lbs.

MANUFACTURED BY: BAKER PETROLITE CORPORATION   12645 W. Airport Blvd., Sugar Land, TX 77478   Customer Care: 800-872-1916

RC 0801

TECHNICAL MEMORANDUM

POTENTIAL FOR ACROLEIN MIGRATION TO GROUNDWATER

Prepared for

Turlock Irrigation District
333 East Canal Drive
Turlock, CA 95381

September 2005

URS

URS Corporation
1333 Broadway, Suite 800
Oakland, CA 94612

26815137.00200

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Tables

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ppb	parts(s) per billion
ppm	parts(s) per million
L/kg	liter(s) per kilogram
TID	Turlock Irrigation District

SECTIONONE

A one-dimensional fate and transport model was used to model the potential for acrolein to leach to groundwater when it is applied to unlined canals at Turlock Irrigation District (TID). U.S. Geological Survey's finite-difference model, VS2DT program (Hsieh et al. 1999), was employed to simulate flow and contaminant transport in variably saturated porous media (from canal bottom to groundwater table), and to predict the contaminant concentrations immediately above the groundwater table. The contaminant simulated was acrolein, the active ingredient of Magnacide H (an aquatic pesticide applied to the canals). The objective of this study was to predict the maximum concentrations of acrolein likely to occur in water immediately above the water table under worst-case conditions of Magnacide H application, groundwater elevation, and soil type.

Four canals in TID's system of canals have unlined sections: Main Canal, Highline Canal, Turlock Main Canal, and Cross Ditch 1, as shown on Figure 1. These canals are especially prone to weed growth since they are not lined with concrete, as are other canals in the system. To combat this weed growth, the canals are treated with aquatic pesticides during the irrigation season.

2.1 MODEL SELECTION

U.S. Geological Survey's VS2DT program was employed to simulate water flow and predict acrolein migration through the variably saturated porous media from canal bottom to groundwater table. VS2DT uses a finite-difference approximation to the advection-dispersion equation as well as the nonlinear water-flow equation (based on total hydraulic head). It simulates processes of advection, dispersion, adsorption, and first-order decay. Relations among pressure head, moisture content, and unsaturated hydraulic conductivity may be represented by functions developed by van Genuchten (1980), Brooks and Corey (1964), Haverkamp et al. (1977), or interpolated from tabular data.

Boundary conditions for flow in VS2DT can take the form of fixed pressure heads, infiltration with ponding, evaporation from the soil surface, plant transpiration, or seepage faces. Boundary conditions for solute transport in VS2DT include fixed solute concentration and fixed mass flux. Solute source/sink terms include first-order decay, equilibrium partitioning to the solid phase (Langmuir or Freundlich isotherms), and ion exchange. VS2DT can simulate problems in one, two (vertical cross section), or three dimensions (axially symmetric). The porous media may be heterogeneous and anisotropic.

Other unsaturated flow and transport models (such as VLEACH, PESTAN, and SESOIL) were considered but not selected because they do not fit this situation well. For example, both VLEACH and PESTAN models are only suitable for a one-layer homogeneous soil profile. The SESOIL model canonly be used for up to four layers. Other models such as HYDRUS-2D and SUTRA can be used to solve the problem but are not as easy to use as VS2DT. More complicated 3-D models (such as 3DFEMFAT, MODFLOW-SURFACT) are not necessary for this project. VS2DT was selected for this study because it meets the modeling objectives, is well designed to simulate flow and transport in the vadose zone, can combine site-specific and model-default soil characteristic data, and is relatively simple to use.

In this study, VS2DT is applied to a one-dimensional vertical soil column representing the soil profile from canal bottom to the groundwater table. This one-dimensional vertical flow and transport model predicts faster vertical water flow and contaminant migration and, consequently, predicts higher contaminant concentrations near the groundwater table than are actually likely to occur because it does not take into consideration water flow and contaminant transport in the horizontal direction (which would reduce the amount of contaminant migrating vertically).

2.2 DATA COLLECTION

To collect site-specific information on groundwater elevations and soil characteristics, seven borings were drilled adjacent to the unlined canals, and groundwater monitoring wells were developed at locations shown on Figure 1. The boring locations were selected to collect data on soil profiles representative of each of the canal sections with unlined or clay-lined bottoms. Well construction details are shown in Table 1, and soil boring logs and soil test results are included as Attachment A. Clay liner samples were also collected from the bottom of the canal at locations on the Highline Canal where an artificial clay liner was present (Locations C1, C2, C3, and C4 shown on Figure 1). Clay liner test results are included as Attachment B. The shallowest groundwater elevations of the seven boring locations along the canals were measured at Locations 1, 2, and 4 (shown on Figure 1). In addition, the soils found at these locations are fairly representative of the other sites, and represent the worst-case scenarios in terms of potential for acrolein to leach from the canals to the underlying groundwater. Therefore, modeling scenarios were based on soil and groundwater profiles at these locations.

In addition to conducting modeling, groundwater collected from each well in July 2005 was sampled for acrolein. No acrolein was detected in groundwater (the reporting limit was 20 micrograms per liter). The laboratory report is presented in Attachment C. These results provide evidence that groundwater is not currently contaminated with Acrolein; however, as no Magnacide H has been applied to the unlined canal sections in 2005, these sampling results do not conclusively show that acrolein would not reach groundwater after application to canals.

2.3 ACROLEIN APPLICATION

To determine the most appropriate modeling assumptions for duration, frequency, and concentration of acrolein at points in the lower reach of the Highline Canal (where Locations 1 and 2 are located) and the Turlock Main Canal (where Location 4 is located), historical application data for 2001 to 2004 provided by TID were reviewed (see Tables 2, 4, and 6). In addition, TID provided information on estimated duration of acrolein contact time at a given point downstream of applications. A memorandum prepared by TID is included as Attachment D.

It should be noted that although degradation of acrolein has been shown to occur rapidly in canals, degradation in surface water is neglected here to evaluate a worst-case scenario.

2.3.1 Acrolein Applications to the Main Canal

Historical acrolein applications to the Main Canal are shown in Table 2. Most applications were made at Drop 1, and one application in 2003 was made at Drop 2. Both of these locations are well upstream of both the Highline Canal and the Turlock Main Canal. Acrolein applied at these locations will be transported through both the Highline Canal and the Turlock Main Canal. By the time the acrolein slug arrives at the lower reach of the Highline Canal, it is expected that the slug will be close to its maximum length (a 6-hour application duration would result in a maximum estimated 10-hour contact duration according to Attachment D). Location 4 in the Turlock Main Canal is closer to the application point; therefore, the expected contact duration would be somewhat less than the maximum estimated.

One application to the Main Canal occurred at Drop 8, which is downstream of the diversion to the Highline Canal but upstream of the Turlock Main Canal. Therefore, applications at this location would affect the Turlock Main Canal but not the Highline Canal, and are discussed below along with applications made directly to the Turlock Main Canal.

Based on historical records, a reasonable worst-case scenario in terms of maximum acrolein applications to the Main Canal is presented in Table 3. Although a maximum of 4 applications per year were made at Drops 1 and 2, it is conceivable that 5 applications could be made on a monthly basis during the summer months.

Based on the information discussed above provided in Attachment D, the estimated contact time at Locations 1 and 2 is calculated by multiplying the application duration by 10/6 (a 6-hour application would result in an estimated 10-hour contact time at the point of interest). Although concentration distribution over that contact time is expected to be bell-shaped rather than constant, it is assumed to be constant for modeling purposes. Therefore, the estimated average concentration of acrolein over the contact time is calculated by multiplying the application concentration by 6/10. This assumes that the total amount (mass) of acrolein present in the water at the point of application remains present at the downstream, but this total amount is spread out proportionally over the greater contact time.

To evaluate the sensitivity of the model results with regard to changes in contact time and concentration, two scenarios were evaluated for Location 4. Scenario 1 assumes the highest reasonable concentration and a shorter contact time for each application. Scenario 2 assumes the longest reasonable contact time and a lower concentration for each application. The sensitivity analysis (see results described in Section 3.5) indicated that worst-case conditions in terms of acrolein transport would occur under conditions of relatively high concentration, which corresponds with the shorter contact time.

2.3.2 Acrolein Applications to the Turlock Main Canal

Historical acrolein applications to the Turlock Main Canal are shown in Table 4. All application points (Drops 1, 3, and 5) are upstream of Location 4.

To evaluate the sensitivity of the model results with regard to changes in contact time and concentration, two scenarios were evaluated for applications to the Turlock Main Canal (see Table 5). Scenario 1 assumes the shortest reasonable contact time and the highest reasonable concentration for each application. Scenario 2 assumes the longest reasonable contact time and a lower concentration for each application.

Estimates made by TID (see Attachment D) indicate that for a 3 to 4 hour application on the Turlock Main Canal, the maximum contact time downstream on the unlined canal portion would be 4 to 8 hours. As most of the application points are well upstream of Location 4, it could be assumed that the contact time at Location 4 could be roughly twice the application duration. However, because the sensitivity analysis described above indicates that the worst-case condition occurs when acrolein concentrations are higher (see Section 3.5), it was assumed that the contact time would be approximately 3/2 the application duration (as this results in a higher acrolein concentrations than the alternative of assuming the contact time would be approximately twice the application duration). The estimated contact time at Location 4 is calculated by multiplying the application duration by 3/2.

2.3.3 Acrolein Applications to the Highline Canal

Historical acrolein applications to the Highline Canal are shown in Table 6. Most application points (Drops 1-12) are upstream of Location 1, and many are also upstream of Location 2 (Drops 1-7). Several applications were also made at Drop 14, which is downstream of both application points. However, because Drop 14 is within the unlined portion of the canal, Location 1 was treated as though it is just downstream of Drop 14, representing the worst-case condition with regard to acrolein exposure in the Highline Canal.

Based on estimates provided in Attachment D, it is assumed that applications made to Drops 1 and 2 (the upper reach) will result in contact time of twice the application duration and a concentration of half the application concentration at Locations 1 and 2. It is assumed that for applications made to lower reaches (Drops 4–14) the concentration at Location 1 will be equal to the application concentration, and that the estimated contact times will be the same as the application duration. Because Location 2 will not be affected by applications made to Drops 8-14, it will be assumed that for applications made to Drops 4–7 the concentration at Location 2 will be equal to the application concentration, and that the estimated contact times will be the same as the application duration.

Based on historical records, a reasonable worst-case scenario in terms of maximum acrolein applications to the Highline Canal is presented in Table 7.

2.4 ESTIMATED ACROLEIN CONCENTRATIONS AND CONTACT TIME IN CANALS

Based on the assumed reasonable worst-case scenario of maximum acrolein application to TID's system of canals described above, the acrolein exposure at Locations 1, 2, and 4 are estimated below.

Table 8 presents the modeling assumptions made for Location 1, taking into account acrolein applications made to the Main Canal, the upper reach of the Highline Canal, and the lower reach of the Highline Canal as described above. Note that in some cases multiple applications are made at different points on the same canal reach on the same day. In cases where the concentration is the same, these multiple applications are treated as one application by summing the application duration.

Table 9 presents the modeling assumptions made for Location 2, taking into account acrolein applications made to the Main Canal and the upper reach of the Highline Canal as described above. Note that in some cases multiple applications are made at different points on the same canal reach on the same day. In cases where the concentration is the same, these multiple applications are treated as one application by summing the application duration.

Table 10 presents the modeling assumptions made for Location 4, taking into account acrolein applications made to the Main Canal and the Turlock Main Canal as described above. Two scenarios were considered at Location 4: Scenario 1 represents short application durations with relatively high concentrations; and Scenario 2 represents longer application durations with lower concentrations.

2.5 NUMERICAL MODEL SETUP AT LOCATIONS 1, 2, AND 4

A VS2DT model was set up for each of the scenarios at Locations 1, 2, and 4, based on the soil profiles from the canal bottom to the groundwater table at each respective location. Each flow and transport model was run separately, based on specific flow and transport conditions at Locations 1, 2, and 4. The model setup and input parameters for each location are discussed below.

2.5.1 Soil Profiles, Model Domain

Based on the soil boring logs (Attachment A) and canal cross-section measurements, the modeled soil profiles from canal bottom to groundwater table at Locations 1, 2, and 4 are shown on Figures 2 through 4, respectively. The model domains at all three locations are from the canal bottom to the groundwater table. The model domain lengths are 20.2, 30.7, and 23.3 feet at Locations 1, 2, and 4, respectively.

2.5.2 Finite-Difference Grid

Non-uniform grid cells were used for each soil type and through the whole model domain. To achieve better numerical convergence and more accurate model results, smaller grid sizes were used at the interface of different soils. Specifically, the model domain in Location 1 has 55 grid cells and the cell size varies from 0.1–0.6 foot; the model domain in Location 2 has 97 grid cells and the cell size varies from 0.1–0.4 foot; the model domain in Location 3 has 61 grid cells and the cell size varies from 0.2–0.5 foot. The finite-difference grids in Locations 1, 2, and 4 are shown on Figures 5 through 7, respectively.

2.5.3 Hydraulic Parameters

The hydraulic parameters used in VS2DT include saturated hydraulic conductivity, unsaturated parameters of soils (here van Genuchten parameters), initial moisture content, specific storage coefficient, and porosity.

Values for saturated hydraulic conductivity, porosity, and moisture content were obtained from site-specific data as shown on Figures 2 through 4. In some cases (where noted on the figures), no laboratory test data were available for a specific soil type, and it was necessary to substitute data for a similar soil collected at a different boring location.

Hydraulic parameter values are determined as follows:

- **Hydraulic Conductivity:** Saturated hydraulic conductivity values for different soils are obtained from the lab test results, as shown on Figures 2 through 4. The unsaturated hydraulic conductivity of soils is determined based on the saturated hydraulic conductivity, moisture content (or water pressure), residual moisture content, and soil-water retention characteristics (here van Genuchten parameters).
- **Initial Moisture Content:** Initial moisture contents of different soils at Locations 1, 2, and 4 are also obtained from the lab test results, as shown on Figures 2 through 4.
- **van Genuchten Parameters:** The van Genuchten parameters that determine the hydraulic conductivity in unsaturated conditions are obtained from VS2DT's default values for different categories of soils, as shown in Table 11. The soil categories in VS2DT were matched to the soil descriptions recorded in the boring logs included in Attachment A. For soil types not listed in the VS2DT soil type listing, the values are obtained by considering the similar soils and by professional judgment (tending towards the worst-case scenario with regards to leaching potential).
- **Specific Storage:** Specific storage is the water released from storage due to water and soil compressibilities under saturated condition. It is specified as a typical literature value of 0.00003 (1/foot) for all soil (Freeze and Cherry 1979). Although it is possible to estimate the specific storage by conducting pumping test, the modeling results are not sensitive to this parameter and literature values of 0.0003–0.0000003 (1/foot) are often considered appropriate.
- **Soil Porosity:** Similar to saturated hydraulic conductivity and initial moisture content, the soil porosity for different soils is also obtained from the lab test results, as shown on Figures 2 through 4 for soil profiles at Locations 1, 2, and 4, respectively.

2.5.4 Chemical Parameters

The chemical parameters used in VS2DT include longitudinal dispersivity, molecular diffusion coefficient, organic carbon/water partition coefficient, fraction of organic carbon in uncontaminated soils, and chemical decay constant (here half-life). In some cases (where noted on the figures), no laboratory test data were available for a specific soil type, and it was necessary to substitute data for a similar soil collected at a different boring location.

Values for chemical parameters are determined as follows:

- **Longitudinal Dispersivity:** The longitudinal dispersivity is specified as 2.0 feet for all locations, approximately 7 to 10 percent of the travel distance (from canal bottom to groundwater table), which is considered conservative (Gelhar et al. 1992).
- **Molecular Diffusion Coefficient:** The molecular diffusion coefficient for acrolein is specified as its literature value of 0.001 ft^2/day (or 1.0 cm^2/day) (Groundwater Service, Inc, http://www.gsi-net.com/useful%20tools/ChemPropDatabaseHome.asp).
- **Organic Carbon/Water Partition Coefficient:** Acrolein is highly mobile in groundwater, with a very small organic carbon/water partition coefficient. Due to the relatively high total organic carbon in the uncontaminated soils, the retardation factor is also considered here. A value of 0.5 liter per kilogram (L/kg) is used for the organic carbon/water partition coefficient, based on the following references:
  - (Koc=0.76 L/kg, http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC35753)
  - (Koc=0.525 L/kg, http://www.gsinet.com/useful%20tools/ChemPropDatabaseHome.asp)
- **Fraction of Organic Carbon:** The values of the fraction of organic carbon (or total organic carbon) for all soils at Locations 1, 2, and 4 are obtained from the lab test results. The values are shown on the attached figures (Figures 2 through 4) for soil profiles at Locations 1, 2, and 4, respectively.
- **Bulk Density:** The bulk density can be estimated from the specific weight, porosity, and moisture content. However, since bulk density is not a sensitive parameter in this study (affecting the retardation factor only) and the organic carbon/water partition coefficient is small), the bulk density is specified as its typical value of 1.6 kg/L (Freeze and Cherry 1979) for all soils.
- **Half-Life of Decay:** No data are available on decay rates of acrolein in the vadose zone or in groundwater. The half-lives of acrolein in sterile soil-water mixtures ranged from 4.5 to 4.9 days, and half-lives in non-sterile soil-water mixtures ranged from 2.9 to 3.6 days (unpublished data provide by Baker Petrolite on March 3, 2005). In soil, the half-lives of 0.16 and 6.22 days are estimated based on aerobic and anaerobic degradation, respectively (http://www.pesticideinfo.org/Detail_Chemical.jsp?Rec_Id=PC35753). Half-lives for acrolein in canal water were reported as 9.5 hours (aerobic) and 10.3 hours (anaerobic), and half-lives for acrolein in sediment were reported as 7.6 hours (aerobic) and 20 days (anaerobic) (Smith et al. 1995). Based on these data, a conservative value of 20 days is assumed for the half-life of acrolein in vadose zone water.

2.5.5 Initial Conditions

The initial flow condition is specified in terms of initial moisture contents of all soils. The initial moisture contents were obtained from the lab results. It is assumed that the initial moisture content is uniformly distributed for each soil type. The soil is initially assumed to be relatively dry due to the period of little or no water in the canal during the non-irrigation season. For the initial concentration condition, it is assumed that initially the soil is clean (zero acrolein concentration).

2.5.6 Boundary Conditions

Values for boundary conditions are determined as follows:

- **Flow Boundary Condition:** Based on historical acrolein applications, it is assumed that during the irrigation season (from approximately mid-March through mid-October), constant water depths are present in the canals, while during non-irrigation season (from approximately mid-October through mid-March), there is generally no water present in the unlined and partially lined canals. To simplify modeling, the irrigation season was assumed to be April 1 through October 31, and similarly, the non-irrigation season was assumed to be November 1 through March 31. Consequently, at the model upper boundary (canal bottom), constant water pressure heads corresponding to the water depths are specified from April 1 through October 31, and in the non-irrigation season (from November 1 through March 31), no flux boundary condition is specified at the canal bottom. The water depths in the irrigation season are shown on Figures 2 through 4 at Locations 1, 2, and 4, respectively. At the lower boundary, the boundary condition is always set to be the groundwater table.
- **Transport Boundary Condition:** Based on estimated acrolein exposure at Locations 1, 2, and 4, a constant acrolein concentration is specified for the inflow at canal bottom during the exposure time, and zero acrolein concentration is specified for the inflow during the rest of the irrigation season. During the non-irrigation season, no solute flux is specified at the canal bottom. For the lower boundary, zero acrolein concentration is always specified at the water table.

2.5.7 Other Model Conditions

Other model conditions are determined as follows:

- **Simulation Time:** The simulation starts at the time when the irrigation season starts (assumed April 1). The total simulation time is 1 year (365 days), covering a full cycle of irrigation application.
- **Observation Point:** To predict acrolein concentrations immediately above the water table (before accounting for dilution by the groundwater), the observation point is located in the cell right above the bottom cell. In reality, the concentration in this cell is slightly higher (due to shorter travel distance, making this estimate conservative) than the cell right above the water table. However, this cell is used because it is less affected by the greater concentration gradient due to the specified zero concentration at the water table.
- **Time Steps:** A very small time step (as low as 0.0001 day) is specified at the beginning of simulation due to the sharp change of flow condition at the canal bottom at the start of the

irrigation season. A small time step is also used at the specified acrolein exposure time at those locations. The time step is increased to as large as 1.0 day during the rest of time, adjusted automatically based on the convergence condition.

- **Output:** To get the maximum predicted acrolein concentration near the water table, simulation results were saved and exported for each time step.

With the above model setup and input parameters, the VS2DT program was run for soil profiles at Locations 1, 2, and 4. The simulation time is 1 full year, covering the irrigation and non-irrigation periods. At Location 4, two scenarios were modeled to evaluate the sensitivity of the model to exposure duration versus concentration. Scenario 1 represents a short pesticide application duration (short acrolein contact time) with a relatively high acrolein concentration. Scenario 2 represents a longer pesticide application duration with a lower acrolein concentration. The results of this sensitivity analysis, as described in Section 3.5, indicate that worst-case conditions occur under the assumptions of relatively high concentration and shorter contact time.

3.1 LOCATION 1

The first acrolein application occurs on April 3, and the highest acrolein concentration in the canal water (or the inflow to the domain) is 10.99 parts per million (ppm), occurring on May 8 and lasting for 3 hours and occurring at June 28 and lasting for 1 hour. The last acrolein application is on September 23. The simulated acrolein concentration immediately above the water table is shown on Figure 8. The simulation results show that the acrolein starts to reach the water table on July 12, indicating a travel time of approximately 100 days from canal bottom to the water table. The highest simulated acrolein concentration is approximately 0.016 part per billion (ppb).

3.2 LOCATION 2

The first acrolein application occurs on May 1, and the highest acrolein concentration in the canal water (or the inflow to the domain) is 10.99 ppm, occurring on May 8 and lasting for 1 hour. The last acrolein application is on September 23. The simulated acrolein concentration immediately above the water table is shown on Figure 9. The simulation results show that the acrolein starts to reach the water table at the beginning of September, indicating a travel time of approximately 120 days from canal bottom to the water table. The highest simulated acrolein concentration is approximately 0.0006 ppb, which is far below that in Location 1, mainly because the water table is deeper in Location 2.

3.3 LOCATION 4 - SCENARIO 1

At Location 4, the first scenario represents higher acrolein concentration with shorter exposure time. The first acrolein application occurs on May 1, and the highest acrolein concentration in the canal water (or the inflow to the domain) is 3.49 ppm, occurring on June 24 and lasting for 4.5 hours. The last acrolein application is on September 1. The simulated acrolein concentration immediately above the water table is shown on Figure 10. The simulation results show that the acrolein starts to reach the water table on May 8, indicating a travel time of approximately 8 days from canal bottom to the water table. The highest simulated acrolein concentration is approximately 2.0 ppb.

3.4 LOCATION 4 - SCENARIO 2

The second scenario represents lower acrolein concentration with longer exposure time. The first acrolein application also occurs on May 1, and the highest acrolein concentration in the canal water is 1.67 ppm, occurring on June 24 and August 5 and both lasting for 4.5 hours. The last acrolein application is on September 1. The simulated acrolein concentration variation right above water table is shown on Figure 11. The simulation results show that the acrolein starts to reach the water table on May 8, indicating a travel time of approximately 8 days from canal bottom to the water table. The highest simulated acrolein concentration is approximately 1.8 ppb.

3.5 INTERPRETATION OF RESULTS

Upon review of the results for Scenario 1 and Scenario 2 for Location 4 described above in Sections 3.4 and 3.5, it can be seen that higher predictions of acrolein concentration near the groundwater table occur under conditions of relatively high acrolein concentration. These conditions would occur concurrently with shorter contact times.

To determine whether the predicted concentrations of acrolein are likely to affect groundwater quality, applicable water quality goals were reviewed. No state or federal drinking water standards (maximum contaminant levels) exist for acrolein. Central Valley Regional Water Quality Control Board (CVRWQB2003) identifies a literature-based taste and odor threshold of 110 ppb, and also cites a reference dose (as a drinking water level) of 3.5 ppb from the U.S. Environmental Protection Agency Integrated Risk Information System (IRIS). The U.S. Environmental Protection Agency National Recommended Ambient Water Quality Criteria for sources of drinking water is 290 ppb.

Simulation results show that the highest acrolein concentration predicted to occur immediately above water table (before accounting for dilution) is approximately 2.0 ppb, well below the lowest risk threshold of 3.5 ppb. It should be noted that once acrolein reaches the groundwater table, a substantial amount of dilution is likely to occur, further reducing the modeled value. Furthermore, as worst-case assumptions were made for modeling purposes, it is likely that actual concentrations would be lower than the predicted concentrations.

The flow and transport process model used here is one-dimensional in the vertical direction, which is different from the three-dimensional flow and transport process that would actually occur. Uncertainty also exists in the model input parameters. Most parameter values were selected conservatively to predict worst-case conditions. The modeling uncertainty in this study mainly includes:

- **van Genuchten Parameters:** The saturated hydraulic conductivity values were obtained from laboratory tests and are considered accurate in terms of modeling. The unsaturated hydraulic conductivity is calculated based on the water pressure head, depending on the soil-water moisture characteristics (here represented by van Genuchten parameters). The default values of van Genuchten parameters for different soils listed in the VS2DT program are the representative values (or averaged values), and these values vary considerably.
- **Half-Life of Decay:** No data are available on decay rates of acrolein in the vadose zone or in groundwater. The half-life of decay for acrolein is assumed to be 20 days, which is considered to be conservative (the high end of the range of values reviewed).
- **Substitute Soil Parameters:** In some cases (where noted on Figures 2 through 4), no laboratory test data were available for a specific soil type, and it was necessary to substitute data for a similar soil collected at a different boring location. The use of soil parameters from similar soil results contributes uncertainty to the flow and transport simulation.
- **Longitudinal Dispersivity:** The longitudinal dispersivity is assumed to be 7 to 10 percent of the travel distance, which is considered conservative. A change in the dispersivity value would alter the vertical migration of the contamination from the canal to the groundwater. A small dispersivity value would increase the concentration in the migration front, but also increase the travel time until it reached the groundwater, thereby allowing more degradation to occur.

Other input parameters are either considered relatively accurate (such as porosity, fraction of organic carbon, initial moisture content, etc) or not sensitive (such as soil bulk density, specific storage).

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Tables

Table 1
Well Construction Data

Sampling Location ID	Total Depth of Well (feet)	Well Casing Diameter (inches)	Well Screen Diameter (inches)	Screened Interval (feet)
MW1	36.0	2	2	26.0–36.0
MW2	46.0	2	2	36.0–46.0
MW3	91.5	2	2	81.5–91.5
MW4	41.5	2	2	31.5–41.5
MW5	91.5	2	2	81.5–91.5
MW6 (well may not be operational)	127.5	2	2	117.5–127.5
MW7	81.0	2	2	71.0–81.0

Table 2
MagH Applications and Concentrations – Main Canal

Date	Rate gal/cfs	App Time minutes	Flow cfs	Concentration ppm	Location	Upper Reach y/n
5/22/2001	0.20	180	1565	2.09	D 1	y
6/18/2001	0.20	330	1460	1.14	D 1	y
9/10/2001	0.17	120	500	2.60	D 1	y
4/22/2002	0.17	180	637	1.77	D 1	y
6/17/2002	0.17	270	1271	1.19	D 1	y
7/29/2002	0.17	300	1351	1.06	D 1	y
9/9/2002	0.20	120	446	3.14	D 1	y
5/13/2003	0.20	180	575	2.09	D 1	y
6/2/2003	0.17	240	825	1.33	D 1	y
7/14/2003	0.17	360	1560	0.89	D 1	y
7/22/2003	0.17	300	1305	1.06	D 8	y
9/2/2003	0.17	240	885	1.33	D 2	n
6/15/2004	0.17	300	1340	1.07	D 1	y

Table 3
Modeling Assumptions – Main Canal

Date	Application Duration (min)	Application Concentration (ppm)	Estimated Contact Time at Locations 1 and 2	Estimated Concentration at Locations 1 and 2	Estimated Contact Time at Location 4	Estimated Concentration at Location 4
1-May	180	2.1	300	1.26	270	1.40
1-Jun	240	1.33	400	0.80	360	0.89
1-Jul	330	1.14	550	0.68	495	0.76
1-Aug	300	1.06	500	0.64	450	0.71
1-Sep	120	3.14	200	1.88	180	2.09

Scenario 1 - Sensitivity Analysis				
Date	Application Duration (min)	Application Concentration (ppm)	Estimated Contact Time at Location 4	Estimated Concentration at Location 4
1-May	120	3.14	180	2.09
1-Jun	120	3.14	180	2.09
1-Jul	120	3.14	180	2.09
1-Aug	120	3.14	180	2.09
1-Sep	120	3.14	180	2.09
Scenario 2 - Sensitivity Analysis				
Date	Application Duration (min)	Application Concentration (ppm)	Estimated Contact Time at Location 4	Estimated Concentration at Location 4
1-May	360	1.33	540	0.89
1-Jun	360	1.33	540	0.89
1-Jul	360	1.33	540	0.89
1-Aug	360	1.33	540	0.89
1-Sep	360	1.33	540	0.89

Table 4
MagH Applications and Concentrations – Turlock Main Canal

Date	Rate gal/cfs	App Time minutes	Flow cfs	Concentration ppm	Location	Upper Reach y/n
5/23/2001	0.25	195	673	2.41	D 1	y
6/25/2001	0.20	180	610	2.09	D 1	y
8/6/2001	0.20	150	640	2.50	D 1	y
5/6/2002	0.25	120	380	3.93	D 1	y
6/24/2002	0.25	120	400	3.93	D 5	n
8/5/2002	0.25	120	370	3.93	D 1	y
5/19/2003	0.50	180	170	5.23	D 3	y
6/10/2003	0.25	120	395	3.93	D 1	y
6/2/2004	0.50	240	395	3.93	D 1	y
7/13/2004	0.40	300	640	2.51	D 1	y

Table 5
Modeling Assumptions – Turlock Main Canal

Date	Application Duration (min)	Application Concentration (ppm)	Estimated Contact Time at Location 4	Estimated Concentration at Location 4
Scenario 1				
May 23	180	5.23	270	3.49
June 24	240	3.93	360	2.62
Aug 5	240	3.93	360	2.62
Scenario 2				
May 23	300	2.51	450	1.67
June 24	300	2.51	450	1.67
Aug 5	300	2.51	450	1.67

Table 6
MagH Applications and Concentrations – Highline Canal

Date	Rate gal/cfs	App Time minutes	Flow cfs	Concentration ppm	Location	Upper Reach y/n
6/1/2001	0.20	60	45	6.28	D 14	n
6/1/2001	0.20	60	70	6.28	D 10	n
6/13/2001	0.20	60	40	6.28	D 14	n
6/13/2001	0.20	60	60	6.28	D 9	n
6/25/2001	0.20	60	195	6.28	D 2	y
4/3/2002	0.18	60	55	5.55	D 14	n
5/8/2002	0.35	60	25	10.99	D 12	n
5/8/2002	0.35	60	40	10.99	D 7	n
5/8/2002	0.35	60	65	10.99	D 4	n
5/13/2002	0.25	60	145	7.85	D 2	y
6/4/2002	0.30	120	30	4.71	D 14	n
6/4/2002	0.30	60	50	9.42	D 1	y
6/28/2002	0.35	60	50	10.99	D 14	n
6/28/2002	0.25	90	85	5.23	D 9	n
7/31/2002	0.30	60	65	9.42	D 14	n
7/31/2002	0.30	60	95	9.42	D 11	n
7/31/2002	0.30	60	95	9.42	D 7	n
7/31/2002	0.30	60	120	9.42	D 4	n
7/10/2002	0.25	60	60	7.85	D 14	n
9/23/2002	0.30	60	40	9.42	D 4	n
9/23/2002	0.30	60	20	9.42	D 10	n
9/23/2002	0.35	60	115	10.99	D 1	y
9/23/2002	0.30	60	115	9.42	D 2	y
8/12/2002	0.25	90	220	5.23	D 2	y
7/1/2002	0.30	60	65	9.42	D 7	n
7/1/2002	0.30	60	60	9.42	D 4	n
7/1/2002	0.30	120	220	4.71	D 2	y
5/20/2003	0.35	60	30	10.99	D 11	n
5/20/2003	0.35	60	60	10.99	D 7	n
5/20/2003	0.35	60	60	10.99	D 4	n
6/2/2003	0.30	60	70	9.42	D 4	n
6/2/2003	0.25	60	35	7.85	D 14	n
6/2/2003	0.25	60	150	7.85	D 2	y
6/17/2003	0.25	120	50	3.93	D 14	n
6/17/2003	0.25	120	70	3.93	D 11	n
7/14/2003	0.25	60	175	7.85	D 2	y
7/14/2003	0.25	60	112	7.85	D 4	n
7/14/2003	0.25	60	80	7.85	D 11	n
7/29/2003	0.25	60	50	7.85	D 14	n
8/11/2003	0.25	60	55	7.85	D 14	n
6/8/2004	0.50	180	200	5.23	D 1	y
6/8/2004	0.50	120	175	7.85	D 2	y
7/27/2004	0.40	120	205	6.28	D 1	y
7/27/2004	0.40	120	185	6.28	D 2	y

Table 7
Modeling Assumptions – Highline Canal

Date	Application Duration (min)	Application Concentration (ppm)	Application Location	Estimated Contact Time at Location 1	Estimated Concentration at Location 1	Estimated Contact Time at Location 2	Estimated Concentration at Location 2
3-Apr	60	5.55	D14	60	5.55	NA	NA
8-May	60	10.99	D12	60	10.99	NA	NA
8-May	60	10.99	D7	60	10.99	NA	NA
8-May	60	10.99	D14	60	10.99	60	10.99
13-May	60	7.85	D 2	120	3.93	NA	NA
4-Jun	120	4.71	D 14	120	4.71	120	3.93
4-Jun	60	9.42	D 1	120	4.71	NA	NA
10-Jul	60	7.85	D 14	60	7.85	120	4.71
28-Jun	60	10.99	D 14	60	10.99	NA	NA
28-Jun	90	5.23	D 9	90	5.23	NA	NA
1-Jul	60	9.42	D 7	60	9.42	NA	NA
1-Jul	60	9.42	D 4	60	9.42	60	9.42
1-Jul	120	4.71	D 2	240	2.36	60	9.42
31-Jul	60	9.42	D 14	60	9.42	240	2.36
31-Jul	60	9.42	D 11	60	9.42	NA	NA
31-Jul	60	9.42	D 7	60	9.42	NA	NA
31-Jul	60	9.42	D 4	60	9.42	60	9.42
12-Aug	90	5.23	D 2	180	2.62	60	9.42
23-Sep	60	9.42	D 4	60	9.42	180	2.62
23-Sep	60	9.42	D 10	60	9.42	60	9.42
23-Sep	60	10.99	D 1	120	5.50	NA	NA
23-Sep	60	9.42	D 2	120	4.71	120	5.50

Table 8
Modeling Assumptions – Location 1

Date	Application Location	Application Duration (min)	Application Concentration (ppm)	Estimated Contact Time at Location 1	Estimated Concentration at Location 1
3-Apr	Highline Lower Reach	60	5.55	60	5.55
1-May	Main Canal	180	2.1	300	1.26
8-May	Highline Lower Reach	180	10.99	180	10.99
13-May	Highline Upper Reach	60	7.85	120	3.93
1-Jun	Main Canal	240	1.33	400	0.80
4-Jun	Highline Lower Reach	120	4.71	120	4.71
4-Jun	Highline Upper Reach	60	9.42	120	4.71
28-Jun	Highline Lower Reach	60	10.99	60	10.99
28-Jun	Highline Lower Reach	90	5.23	90	5.23
1-Jul	Main Canal	330	1.14	550	0.68
1-Jul	Highline Lower Reach	120	9.42	120	9.42
1-Jul	Highline Upper Reach	120	4.71	240	2.36
10-Jul	Highline Lower Reach	60	7.85	60	7.85
31-Jul	Highline Lower Reach	240	9.42	240	9.42
1-Aug	Main Canal	300	1.06	500	0.64
12-Aug	Highline Upper Reach	90	5.23	180	2.62
1-Sep	Main Canal	120	3.14	200	1.88
23-Sep	Highline Lower Reach	120	9.42	120	9.42
23-Sep	Highline Upper Reach	60	10.99	120	5.50
23-Sep	Highline Upper Reach	60	9.42	120	4.71

Table 9
Modeling Assumptions – Location 2

Date	Application Location	Application Duration (min)	Application Concentration (ppm)	Estimated Contact Time at Location 2	Estimated Concentration at Location 2
1-May	Main Canal	180	2.1	300	1.26
8-May	Highline Lower Reach	120	10.99	120	10.99
13-May	Highline Upper Reach	60	7.85	120	3.93
1-Jun	Main Canal	240	1.33	400	0.80
4-Jun	Highline Upper Reach	60	9.42	120	4.71
1-Jul	Main Canal	330	1.14	550	0.68
1-Jul	Highline Lower Reach	120	9.42	120	9.42
1-Jul	Highline Upper Reach	120	4.71	240	2.36
31-Jul	Highline Lower Reach	120	9.42	120	9.42
1-Aug	Main Canal	300	1.06	500	0.64
12-Aug	Highline Upper Reach	90	5.23	180	2.62
1-Sep	Main Canal	120	3.14	200	1.88
23-Sep	Highline Lower Reach	60	9.42	60	9.42
23-Sep	Highline Upper Reach	60	10.99	120	5.50
23-Sep	Highline Upper Reach	60	9.42	120	4.71

Table 10
Modeling Assumptions – Location 4

Date	Application Location	Application Duration (min)	Application Concentration (ppm)	Estimated Contact Time at Location 4	Estimated Concentration at Location 4
Scenario 1					
1-May	Main Canal	120	3.14	180	2.09
23-May	Turlock Main Canal	180	5.23	270	3.49
1-Jun	Main Canal	120	3.14	180	2.09
24-Jun	Turlock Main Canal	180	5.23	270	3.49
1-Jul	Main Canal	120	3.14	180	2.09
1-Aug	Main Canal	120	3.14	180	2.09
5-Aug	Turlock Main Canal	240	3.93	360	2.62
1-Sep	Main Canal	120	3.14	180	2.09
Scenario 2					
1-May	Main Canal	360	1.33	540	0.89
23-May	Turlock Main Canal	300	2.51	450	1.67
1-Jun	Main Canal	360	1.33	540	0.89
24-Jun	Turlock Main Canal	300	2.51	450	1.67
1-Jul	Main Canal	360	1.33	540	0.89
1-Aug	Main Canal	360	1.33	540	0.89
5-Aug	Turlock Main Canal	300	2.51	450	1.67
1-Sep	Main Canal	360	1.33	540	0.89

Table 11
Van Genuchten Parameters Used in the Model

Soils	α (1/ft)	β
Clay	0.244	1.28
Fine Sand	0.317	6.9
Silty Sand	0.65	2.21
Sandy Silt	0.388	3.5
Fine Sandy Silt	0.488	1.57
Clayey Fine Sand	0.29	5.5

Figures

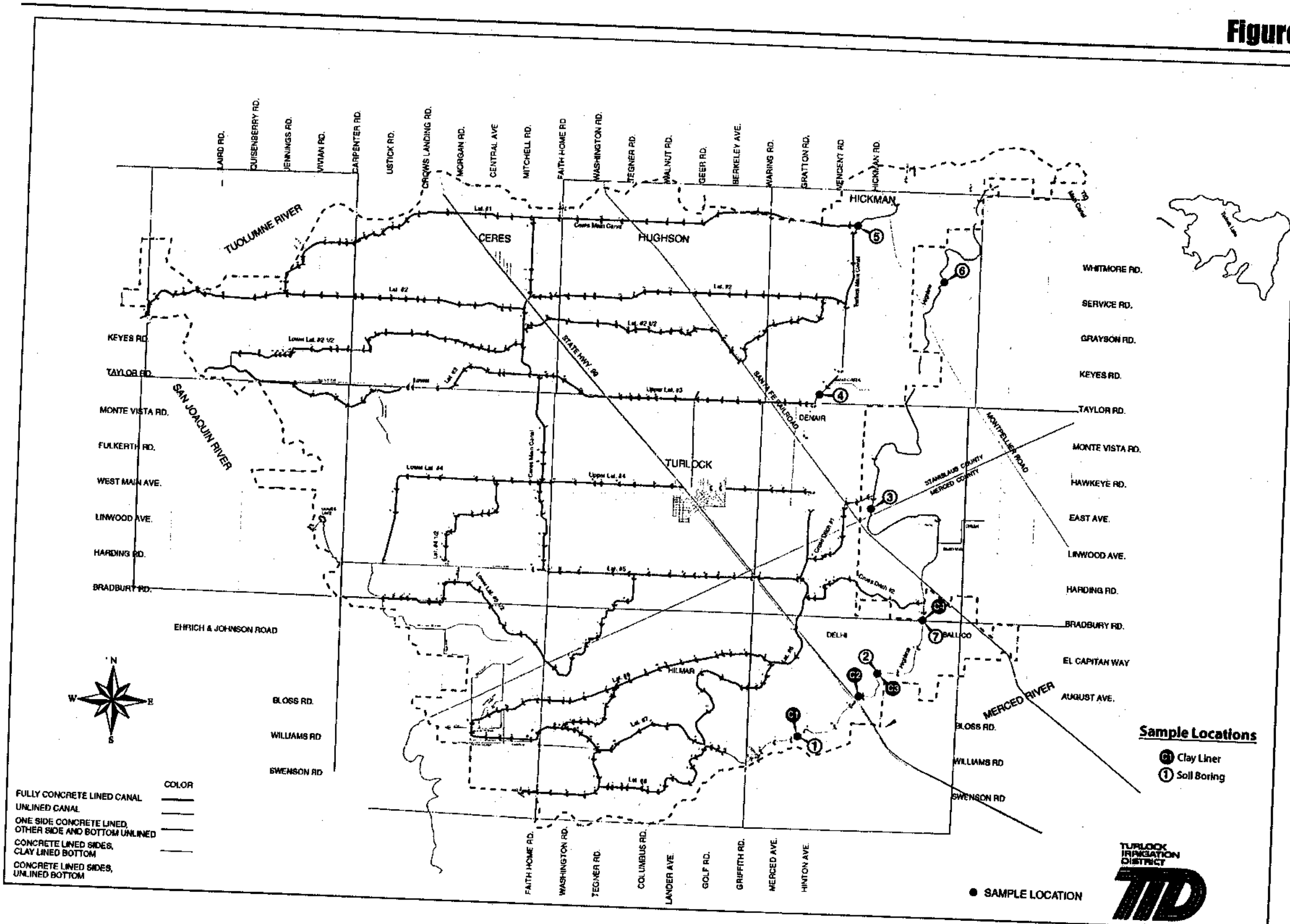

Figure 1 Sample Locations

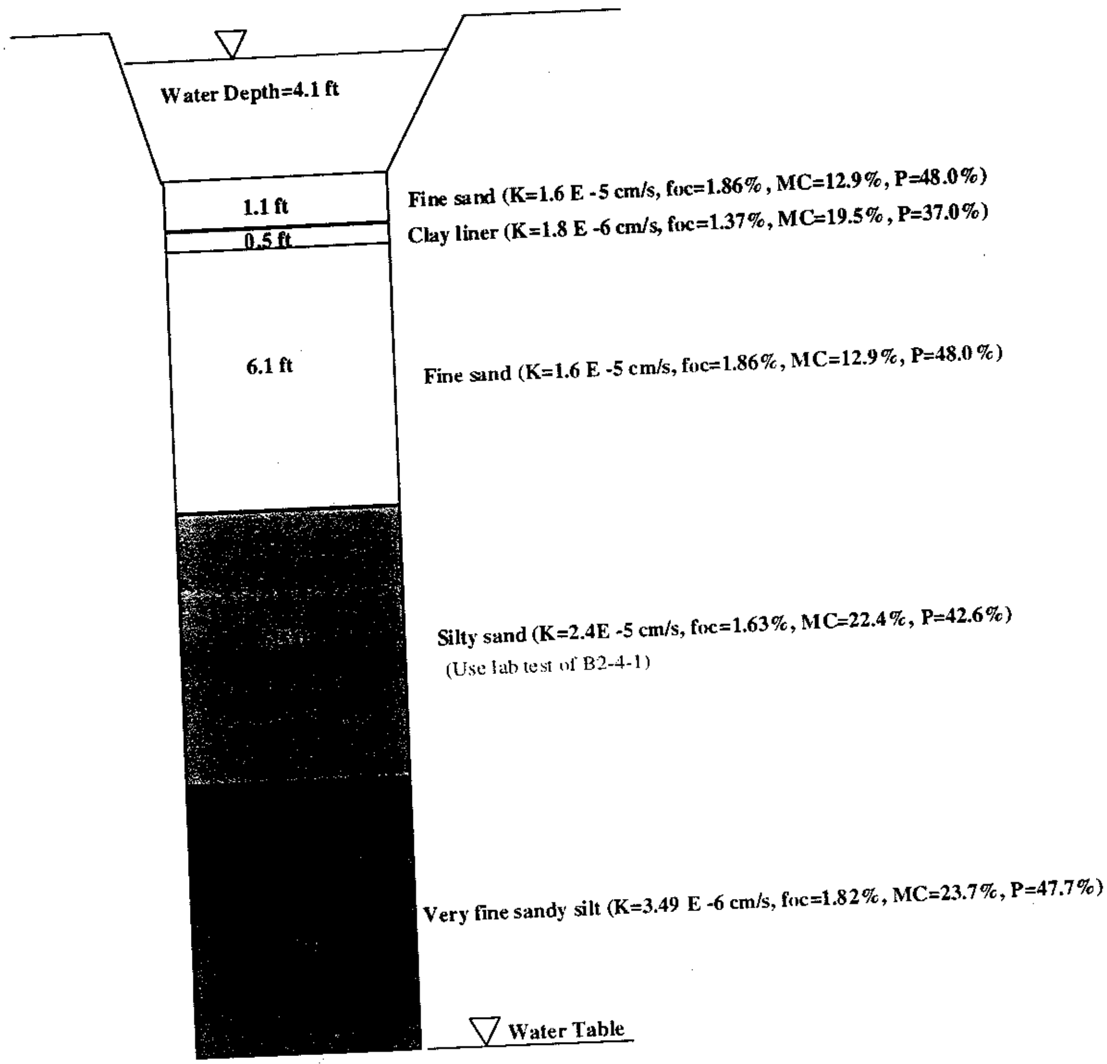

Figure 2 Representation of Soil Profile at Location 1 (not to scale)

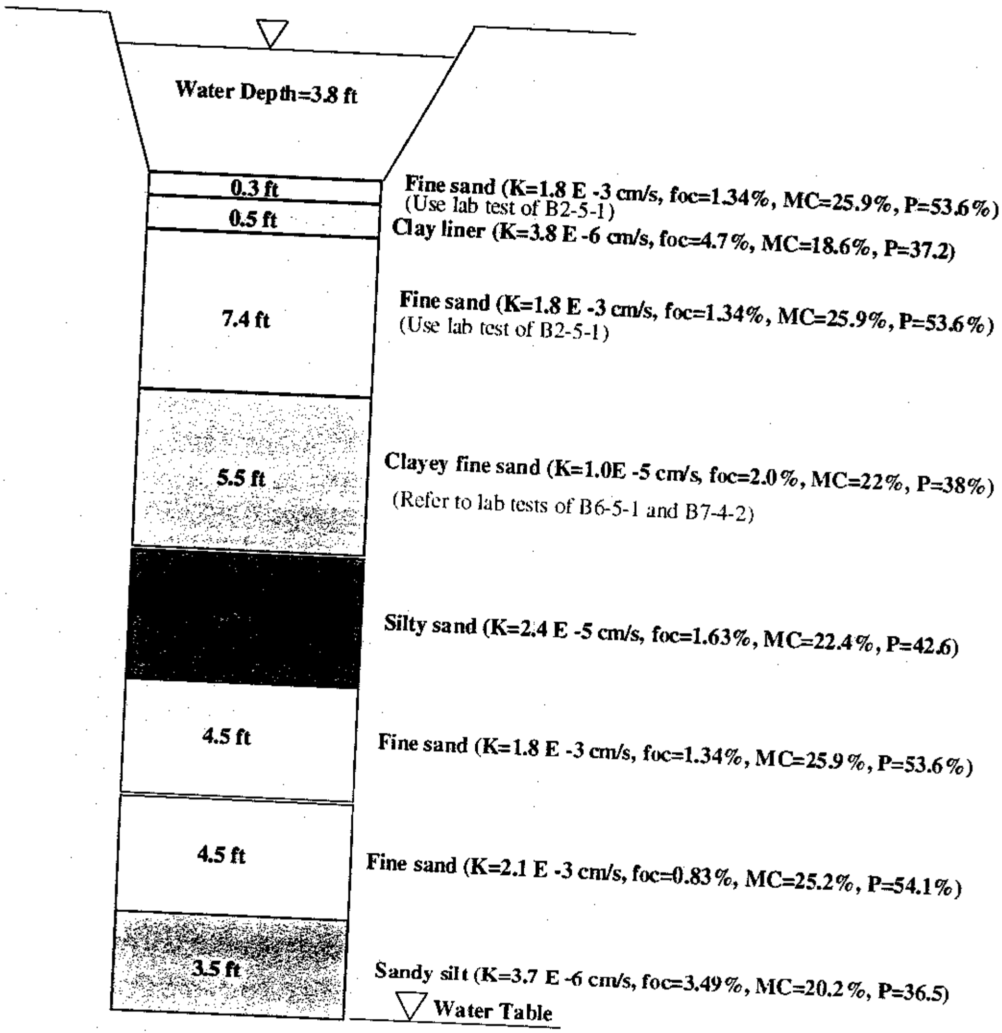

Figure 3 **Representation of Soil Profile at Location 2 (not to scale)**

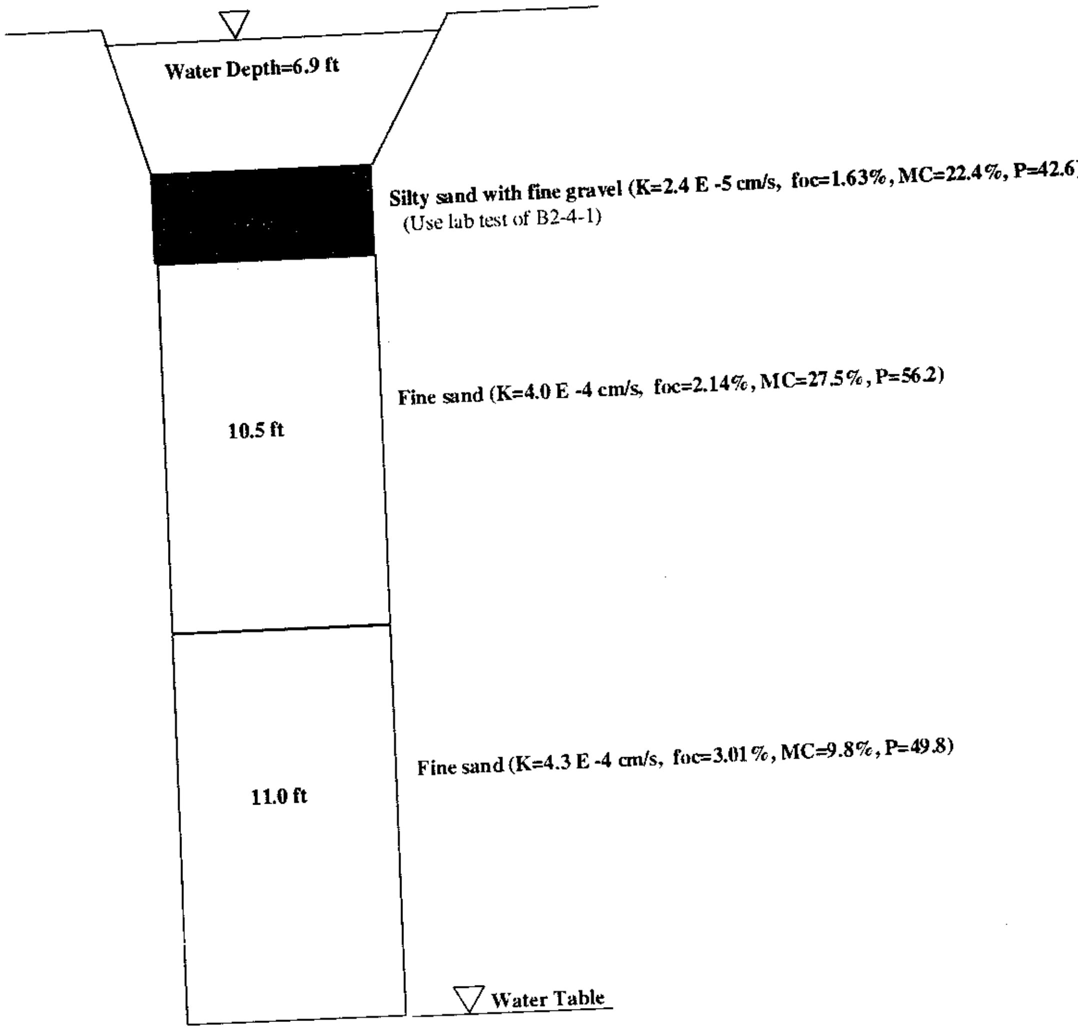

Figure 4 Representation of Soil Profile at Location 4 (not to scale)

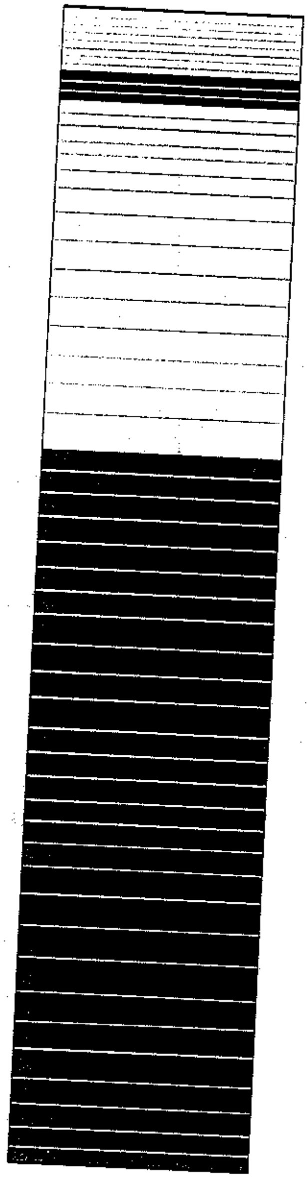

Figure 5 Representation of Finite-Difference Grid at Location 1

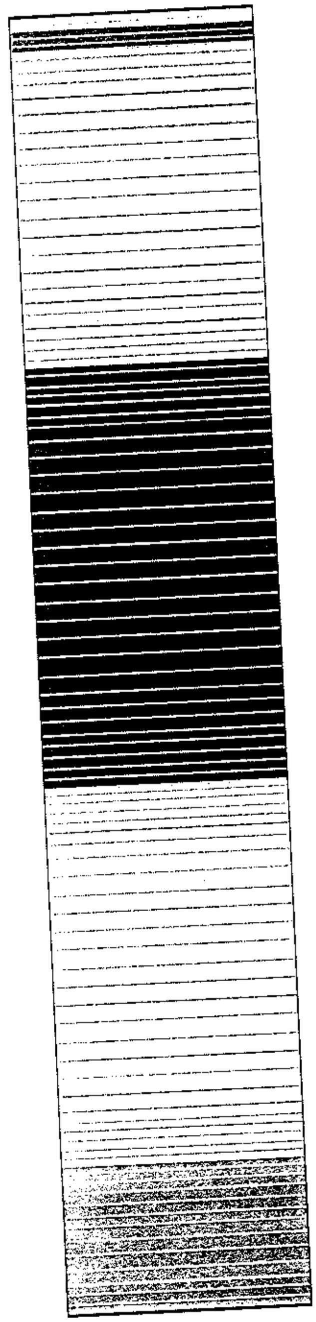

Figure 6 Representation of Finite-Difference Grid at Location 2

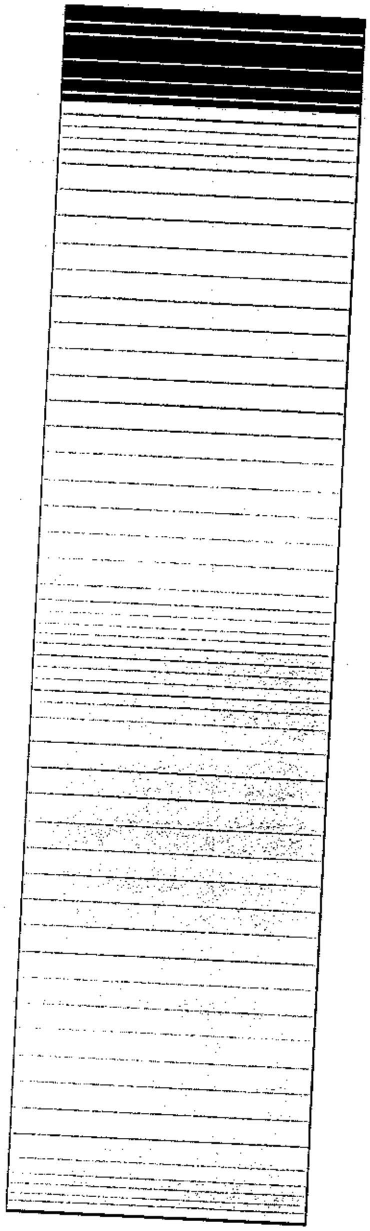

Figure 7 Representation of Finite-Difference Grid at Location 4

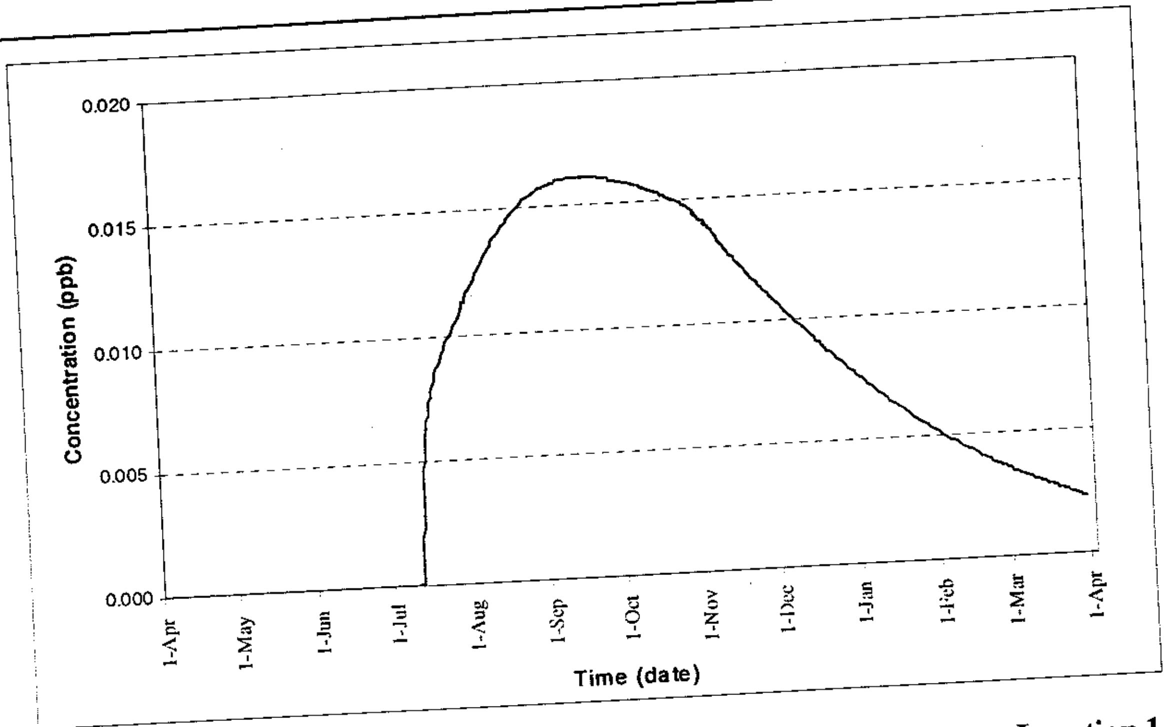

Figure 8 Simulated Acrolein Concentration Above Water Table at Location 1

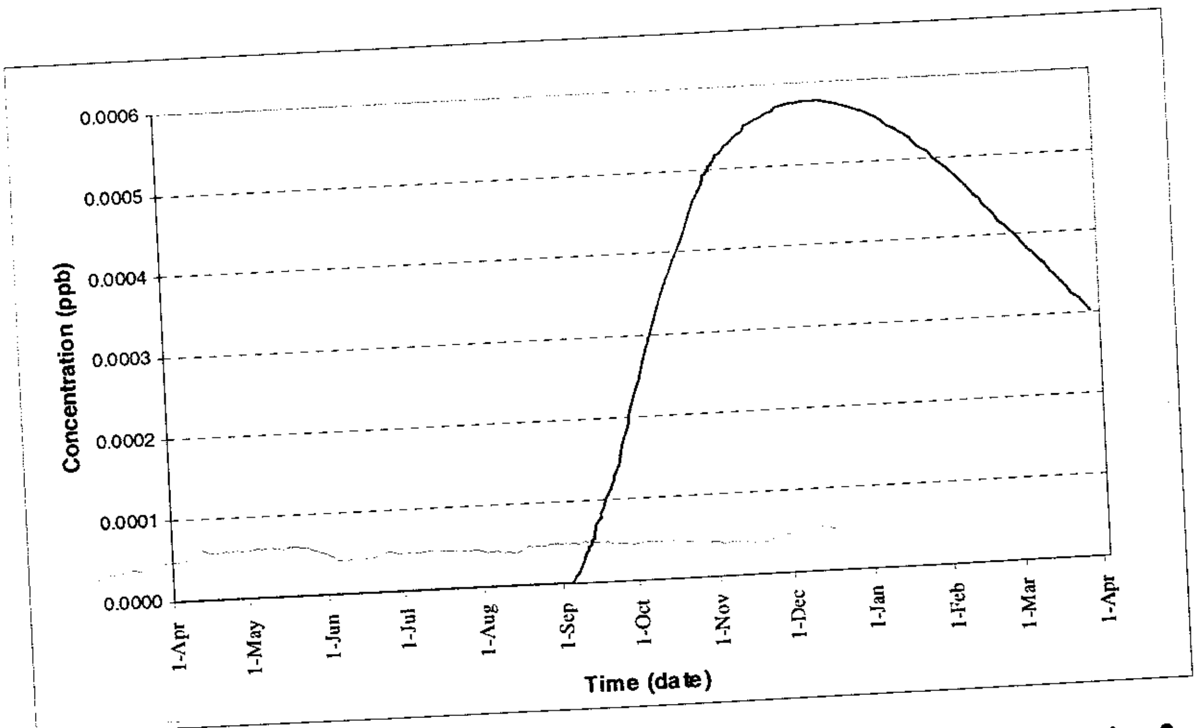

Figure 9 Simulated Acrolein Concentration Above Water Table at Location 2

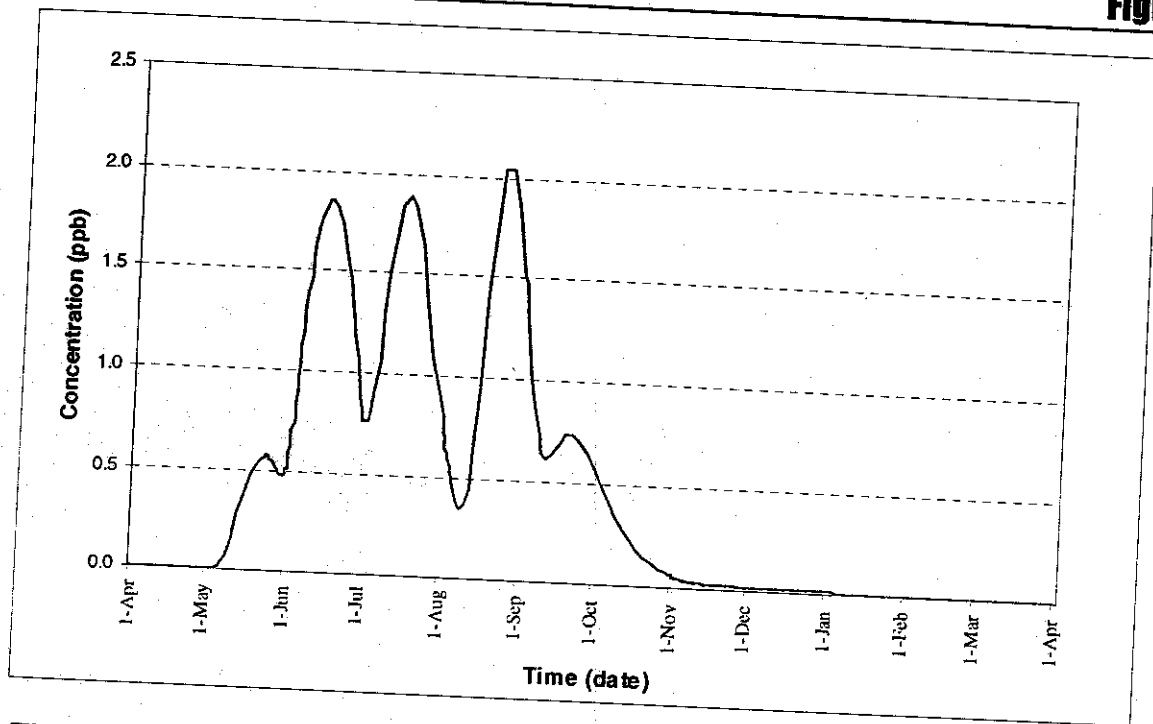

Figure 10 **Simulated Acrolein Concentration Above Water Table at Location 4 (Scenario 1)**

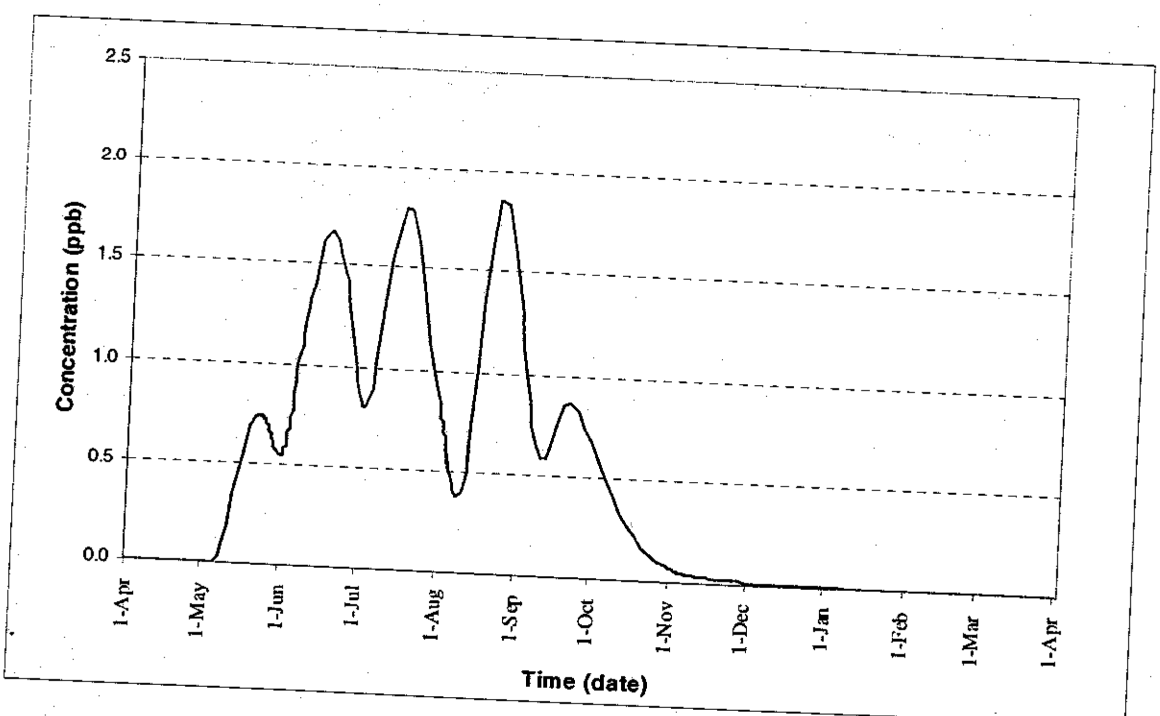

Figure 11 **Simulated Acrolein Concentration Above Water Table at Location 4 (Scenario 2)**

Attachment A

Summary of Well Installation and Development Activities and Soil Test Results

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

Project No. 20132A-01
June 30, 2005

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Reference: ***High Line Canal – Phase B***
Stanislaus and Merced Counties, California

Subject: ***Summary of Well Installation and Development Activities***

Dear Mr. Morales:

Holdrege & Kull (H&K) is pleased to submit this letter summarizing the well installation and development activities performed for Phase B of the High Line Canal Project located in Stanislaus and Merced Counties, California. Our services included installing and developing seven monitoring wells, laboratory testing of select soil samples, and preparing this letter. We performed our services in general accordance with the scope of services presented in our April 12 and May 18, 2005 proposals.

Drilling and Well Installation

Seven groundwater monitoring wells, B-1 through B-7, were installed along the High Line Canal and Turlock Main Canal. The locations of B-1 through B-7 are shown on Figure 1. Borehole drilling and well installation was performed between May 4 and 11, 2005 by Woodward Drilling Company, Inc. of Rio Vista, California under the supervision of an H&K geologist. Seven 8-inch diameter borings were drilled to depths between approximately 35 and 127 feet below existing ground surface (bgs) using hollow-stem auger drilling methods. During the drilling operation, penetration tests were performed at regular intervals to evaluate the soil consistency, obtain information regarding the engineering properties of the soil, and retain soil samples for laboratory testing. Samples were taken at 5-foot intervals to a depth of about 40 feet bgs and at 10-foot intervals thereafter to the maximum depth explored. The soil encountered was examined and visually classified in accordance with the Unified Soil Classification System by an H&K geologist. In accordance with our April 12, 2005 proposal, the soil cuttings from the boreholes were spread onsite and no decontamination of the drilling equipment was performed between borings. The boring logs are attached.

Upon completion of drilling operations, each boring was completed as a monitoring well. The monitoring well consisted of a 10-foot section of 2-inch diameter PVC well screen and PVC blank casing to the surface. The annulus between the borehole and PVC casing was filled with a sand filter pack to approximately 1 foot above the top of the screen, followed by a 3-foot thick bentonite seal. The remaining annulus was backfilled with neat cement slurry to within approximately 1 foot of the existing ground surface. The wellhead was completed with a locking, water tight cap within a traffic-rated well vault set in concrete. The monitoring well number was identified on each vault box with permanent markings. The well construction details for monitoring wells are shown on the attached boring logs.

Well Development

Between June 1 and 3, 2005, H&K developed monitoring wells B-1, B-2, B-3, B-4, B-5 and B-7 through continuous purging to sort the sand filter pack and remove fines from the well. Well development was performed by surging and pumping. During well development, the pH, temperature, conductivity, and turbidity were monitored and the data recorded. Purging continued until at least ten well volumes were removed and parameters stabilized. Surging was performed using a surge block or pump to facilitate removal of fines from the filter pack and well casing. Prior to development, the water levels in the wells were measured using an electronic water level sounder. The sounder was cleaned with a solution of non-phosphate detergent and distilled water and then rinsed with distilled water before use in each well. Development water was discharged directly to the ground surface next to each well. Following completion of well development activities, the cap on the PVC casing in each monitoring well was locked prior to closing the vault box. Copies of the well development field forms are attached.

Well B-6 was not developed. Because of the well depth (approximately 127 feet bgs) and because the water encountered in B-6 was very turbid (sandy, clayey, silty water), the groundwater pump used did not have the lifting capability to pump the water out of the well. A bailer was used and approximately six gallons (about three well volumes) of very turbid water were removed.

Discussion and Recommendations for Well B-6

We recommend that the groundwater pump used for the planned purging and sampling of well B-6 be equipped or sized to handle the very turbid water in terms of lift capability and potential pump damage.

Our opinion is that it is not necessary to create an additional purging event to develop B-6. Instead, the well can be developed/purged by pumping during the initial sampling event. Some groundwater systems in unconsolidated sediments are naturally turbid. Purging may reduce turbidity, or remove the majority of the fines in the well that may be the result of drilling, but will not eliminate turbidity from the surrounding formation water. If the formation water remains turbid, then turbidity may not be good indicator parameter for use as stabilization criteria during future purging events during monitoring. During future purging, you may consider experimenting with the pump rate to identify whether it influences mobilization of fines into the well. High volume, high rate purging can mobilize fines and increase turbidity in a well.

Depth to Groundwater

Depth to groundwater was measured during both the well installation and development activities for this project. The depth to groundwater during the well installation phase was measured below the existing ground surface at the well location, whereas the depth to groundwater during the well development was measured below the top of the PVC casing. The following table summarizes the depth to groundwater measured during each phase of work performed.

Monitoring Well Number	Depth to Groundwater Measured During Well Installation (feet)	Depth to Groundwater Measured During Well Development (feet)
B-1	27.0	26.6
B-2	37.0	36.3
B-3	78.0	47.7
B-4	31.0	28.2
B-5	77.4	73.0
B-6	114.6	114.0
B-7	69.0	65.3

Please note that groundwater elevations and soil moisture conditions within the project area will vary depending on seasonal rainfall, irrigation practices, land use, and/or runoff conditions not apparent at the time our work was performed.

Laboratory Testing

Laboratory tests were performed on selected soil samples in accordance with current ASTM standards to evaluate their physical characteristics and engineering properties. We performed the following laboratory tests:

- D422, Full Sieve Analysis with Hydrometer
- D854, Specific Gravity
- D2216, Moisture Content
- D2487, Unified Soil Classification System
- D2488, Soil Description Visual Manual Method
- D2937, Density
- D2974, Total Organic Carbon Content
- D5084, Falling Head Permeability

Moisture content, density, porosity, specific gravity, total organic carbon content, percent passing the No. 200 sieve, and falling head permeability test results are summarized in the table below. The laboratory data sheets are attached.

Boring Number	Sample Interval (feet)	Moisture Content (%)	Dry Density (pcf)	Porosity (%)	Specific Gravity	Total Organic Carbon Content (%)	Percent Passing No. 200 Sieve	Average Hydraulic Conductivity (cm/sec)
B-1	10.5-11.0	12.9	87.4	48.0	2.69	1.86	16.0	1.6×10^{-5}
B-1	20.5-21.0	23.7 21.2	87.2	47.7	2.67	1.82	58.5	3.5×10^{-6}
B-2	20.5-21.5[(a)]	22.4	94.5	42.6	2.64	1.63	38.6	2.4×10^{-5}
B-2	25.0-25.5	25.9	76.5	53.6	2.64	1.34	1.5	1.8×10^{-3}
B-2	30.0-30.5	25.2	79.4	54.1	2.77	0.83	2.7	2.1×10^{-3}
B-2	35.5-36.5[(a)]	20.2	107.0	36.5	2.70	3.49	80.6	3.7×10^{-6}
B-2	25.5-26.0	25.4	86.3	49.9	2.76	2.32	2.5	2.2×10^{-3}
B-3	61.0-62.0[(a)]	47.6	73.7	55.5	2.64	14.21	84.8	1.0×10^{-6}
B-4	16.0-16.5	27.5	74.1	56.2	2.71	2.14	9.4	4.0×10^{-4}
B-4	26.0-26.5	9.8	83.1	49.8	2.65	3.01	1.6	4.3×10^{-5}
B-5	45.5-46.5[(a)]	43.8	76.4	55.5	2.75	8.25	77.7	2.4×10^{-7}
B-6	26.0-27.0[(a)]	16.3	108.7	34.3	2.65	7.76	51.4	1.2×10^{-5}
B-6	61.0- 2.0[(a)]	33.8	76.6	55.5	2.76	8.88	80.1	8.0×10^{-5}
B-7	21.0-21.5	15.3	95.9	42.3	2.66	2.25	0.1	1.6×10^{-5}
B-7	51.0-51.5	22.1	102.5	38.5	2.67	4.50	38.2	5.7×10^{-6}

(a) - Due to the sample recovery, two sample tubes from the selected sampling interval were used to perform the required laboratory tests. The sample interval listed in the table above for these samples reflects the depth interval for both tubes collected.

Please call if you have any questions or need additional information. Thank you for selecting Holdrege & Kull to provide services for this important project.

Sincerely,

HOLDREGE & KULL

REGISTERED PROFESSIONAL ENGINEER
ANTHONY P. MAZZEI
No. 67802
Exp. 6/30/05
CIVIL
STATE OF CALIFORNIA

Anthony P. Mazzei, C.E. 67802
Senior Engineer

Attachments: Figure 1, Exploratory Boring Location Map
Boring Logs and Well Construction Details
Well Development Field Forms
Laboratory Data Sheets

Copies: 3 to Addressee
1 to Turlock Irrigation District, Mr. Brent Harrison

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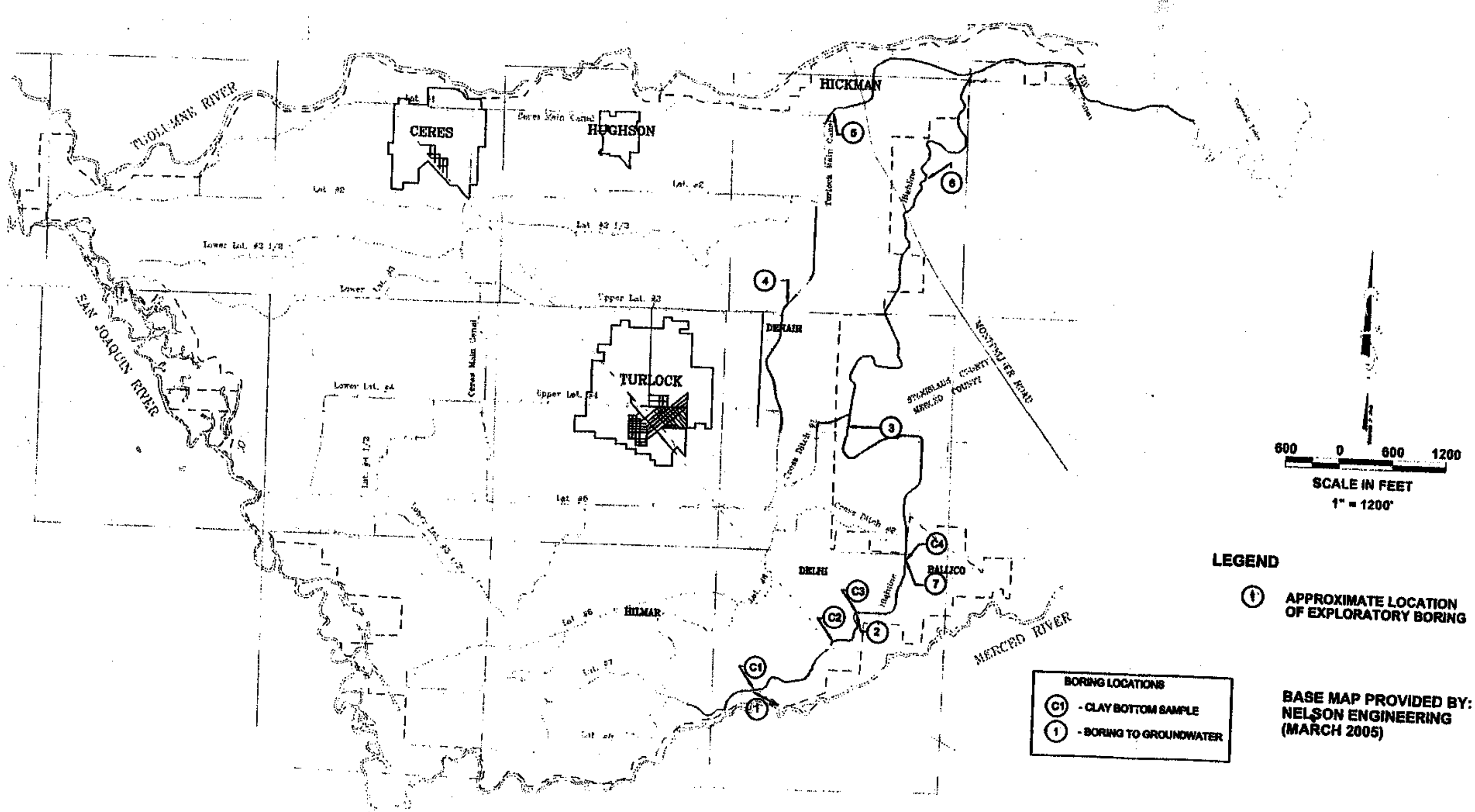

20132A-01-FIG1

HK HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS
792 SEARLS AVENUE
NEVADA CITY, CA 95959

EXPLORATORY BORING LOCATION MAP
TID – HIGH LINE CANAL
STANISLAUS AND MERCED COUNTIES, CALIFORNIA

DRAWN BY: DFD	CHECKED BY: AM
PROJECT NO.: 20132A-01	
DATE: JUNE 2005	
FIGURE NO.: 1	

EXPLORATORY BORING LOGS AND WELL CONSTRUCTION DETAILS

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EXPLORATORY BORING LOG

Boring No. **B-1**

Notes / Site Sketch:

Project Name: TID High Line Canal - Phase B
Project No.: 20132A-01 Task:
Location: High Line Canal~350 ft SE of Merced Av; 0.5 mi S of Bloss
Logged by: N. Langley Date: May 4 2005
Drilling Contr: Woodward Drilling Company
Driller: Van Helper(s): Jesse and Jeremy
Drill Rig Type: Mobile BK-81 - wire line Hammer Type: 140 lb
Method: 8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill: 2" Monitoring Well Boring Depth: 36 feet
Site Elevation: 115 feet MSL Datum: TID Boring Location Map

Ground Water Information

Date:	5/4/2005	5/4/2005			
Time:	10:35 AM	10:45 AM			
Depth:	30.5	27.0			

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions: USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
		HSA		PB 1-1	0–3	FILL (SP) Fine SAND; (Field Estimate: 20% medium sand, 50% fine sand, 20% very fine sand, 10% fines); damp; loose; non-plastic; olive brown (2.5YR,4/4)
					3–10	SP Fine SAND; (Field Estimate: 20% medium sand, 50% fine sand, olive brown (2.5YR,4/4); 20% very fine sand, 10% fines); damp; loose; non-plastic; Water @ 4.5' Moist
	8	2" SS / HSA	3 6 3	B1-1-1	5–6.5	
	13	2" SS / HSA	5 6 4	PB 2-2 *B1-2-1	10–11.5	SM Silty Fine SAND; (Field Estimate: 20% medium sand, 35% fine sand, 25% very fine sand, 20% fines); olive yellow (2.5Y 6/8); moist, medium dense; non-plastic
					13.5–20	SM Silty SAND (Field Estimate: 5% coarse sand, 45% medium sand, 25% fine sand, 10% very fine sand, 15% fines); mottled olive brown (2.5YR,4/4); saturated; medium dense; non-plastic;
	20	2" SS / HSA	3 5 5	B1-3-1 B1-3-2	15–16.5	

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Notes / Site Sketch:

EXPLORATORY BORING LOG

Boring No. **B-1**

Project Name:	TID High Line Canal - Phase B		
Project No.:	20132A-01	Task:	
Location:	High Line Canal~350 ft SE of Merced Av; 0.5 mi S of Bloss		
Logged by:	N. Langley	Date:	May 4 2005
Drilling Contr:	Woodward Drilling Company		
Driller:	Van	Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line	Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)		
Backfill:	2" Monitoring Well		
Site Elevation:	115 feet MSL	Boring Depth:	36 feet
		Datum:	TID Boring Location Map

Ground Water Information

Date:	5/4/2005	5/4/2005			
Time:	10:35 AM	10:45 AM			
Depth:	30.5	27.0			

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
	24	2" SS ↓ HSA	1 / 5.5 / 3	*B1-4-1	21	(ML) Sandy SILT, (Field Estimate: 5% fine sand, 15% very fine sand, 80% fines); yellowish brown (10YR 5/6); damp; medium dense; slightly plastic; micaceous;
					22	
					23	
					24	
	20	2" SS ↓ HSA	6 / 6 / 5	PB 1-6 / B1-5-2 / B1-5-1	25	
					26	
					27	@ 10:45 am
					28	
					29	
	24	2" SS ↓ HSA	4.5 / 5.5 / 5.5	PB 1-6 / B1-6-2 / B1-6-1	30	@ 10:35 am
					31	
					32	
					33	
					34	
50/6		2" SS	5.5 / 5	PB1-7	35	(SP) SAND (Field Estimate: 45% medium sand, 30% Fine, 15% very fine sand, 10% fines); mottled olive brown (2.5YR 4/4); saturated; very dense; non-plastic
					36	

Bottom of Hole at 36 feet.

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EXPLORA●RY BORING LOG

Boring No. **B-2**

Notes / Site Sketch:

Project Name: TID High Line Canal - Phase B
Project No.: 20132A-01 Task:
Location: High Line Canal: 65' N of South Ave and 95 feet E of Canal Dr.
Logged by: N. Langley Date: May 5, 2005
Drilling Company: Woodward Drilling Company
Driller: Van Helper(s): Jesse and Jeremy
Drill Rig Type: Mobile BK-81 - wire line Hammer Type: 140 lb
Method: 8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill: 2" Monitoring Well Boring Depth: 46 feet
Site Elevation: 125 feet MSL Datum: TID Boring Location Map

Ground Water Information

Date:	5/5/2002				
Time:	10:00 AM				
Depth:	37.0				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
		HSA			0–3	FILL (SP) Fine SAND (Field Estimate: 5% medium sand,60% fine sand, 25% very fine sand, 10% fines); dark yellowish brown (10YR,4/4); damp; loose; non-plastic
					4	SM Silty Fine SAND (Field Estimate: 5% medium sand, 60% fine sand, 25% very fine sand, 10% fines); olive yellow (2.5Y 6/8); damp; loose; non-plastic
	10	2" SS	0 3 3	PB 2-1	5–6.5	
		HSA			7	Color change: Light Olive Brown (2.5Y 5/3)
					9	SP Fine SAND (Field Estimate: 60% fine sand, 30% very fine sand, 10% fines); light olive brown (2.5Y 5/3); damp; medium dense; non-plastic
	25	2" SS	0 3 1	PB 2-2	10–11.5	
		HSA			12–14	
					15	SC Clayey Fine SAND (Field Estimate: 60% fine sand, 20% very fine sand, 20% fines); olive (5Y 4/4); wet; medium dense; medium plastic
	40	2" SS	0 1 3	PB 2-3	15–16.5	
		HSA			17–20	

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EXPLORATORY BORING LOG

Boring No. **B-2**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	High Line Canal: 65' N of South Ave and 95 feet E of Canal Dr.
Logged by:	N. Langley
Date:	May 5, 2005
Drilling Company:	Woodward Drilling Company
Driller:	Van
Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	46 feet
Site Elevation:	125 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/5/2002				
Time:	10:00 AM				
Depth:	37.0				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
	52	2" SS / HSA	0 / 5 / 5	*2-4-2 / *2-4-1	21	SM Poorly Graded Fine SAND with Silt (Field Estimate: 35% fine sand, 45% very fine sand, 20% fines); reddish yellow (7.5YR 6/8); damp, very dense; non-plastic
					22	
					23	Color change: light olive brown (2.5Y 5/4)
					24	
	50/5	2" SS / HSA	6 / 4	*2-5-1 / PB2-5	25–26	SP Poorly Graded Fine SAND (Field Estimate: 60% fine sand, 3 10% very fine sand, 10% fines); lt brownish grey (2.5Y 6/2); wet; very dense; non-plastic; with silt
					27	
					28	
					29	
	50/5	2" SS / HSA	5 / 5	*2-6-1 / PB2-6	30–31	SP Poorly Graded SAND, (Field Estimate: 40% medium sand,40% fine sand,10% very fine sand, 10% fines); light brownish grey (10YR 6/2) damp, very dense, non-plastic
					32	
					33	
					34	
	25	2" SS / HSA	5 / 5	*2-7-2 / *2-7-1	35–36	ML Clayey SILT with Sand; (Field Estimate: 15% fine sand, 10% very fine sand, 75% fines); wet; light brownish grey (10YR 6/2); medium dense; medium plastic
					37	Water at 37 feet
					38	SM Silty Fine SAND, (Field Estimate: 60% fine sand, 35% very fine sand, 15% fines), saturated, medium olive brown (2.5Y 4/4) dense, non-plastic
					39	
					40	

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EXPLORATORY BORING LOG

Boring No. **B-2**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B		
Project No.:	20132A-01	Task:	
Location:	High Line Canal: 65' N of South Ave and 95 feet E of Canal Dr.		
Logged by:	N. Langley	Date:	May 5, 2005
Drilling Company:	Woodward Drilling Company		
Driller:	Van	Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line	Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)		
Backfill:	2" Monitoring Well	Boring Depth:	46 feet
Site Elevation:	125 feet MSL	Datum:	TID Boring Location Map

Ground Water Information

Date:	5/5/2002				
Time:	10:00 AM				
Depth:	37.0				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (Inch-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Sample Interval	Well Construction	Graphic Log	Soil / Rock Descriptions USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
	40	2" SS ↓	1 5 2	2-8-2 PB 2-8	41				SM Silty Fine SAND, (Field Estimate: 60% fine sand, 35% very fine sand, 15% fines), olive brown (2.5Y 4/4) ; saturated, medium dense, non-plastic
		HSA ↓			42 43 44 45				
	50/5	2" SS ↓	0 4.5	PB 2-9 2-9-1	46				CH Silty CLAY, greenish grey (10BG 4/1); moist; hard; medium to highly plastic

Bottom of Hole at 46 feet.

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EXPLORATORY BORING LOG

Boring No. **B-3**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B		
Project No.:	20132A-01	Task:	
Location:	High Line Canal- ~75' S of East Ave, 0.2 mi E of Hickman		
Logged by:	N. Langley	Date:	May 6, 2005
Drilling Contr.:	Woodward Drilling Company		
Driller:	Van	Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line		
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)	Hammer Type:	140 lb
Backfill:	2" Monitoring Well	Boring Depth:	91.5 feet
Site Elevation:	165 feet MSL	Datum:	TID Boring Location Map

Ground Water Information

Date:	5/6/2005	5/6/2005			
Time:	1:20 PM	1:50 PM			
Depth:	81.0	78.0			

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Sample Interval	Well Construction	Graphic Log	Soil / Rock Descriptions USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
		HSA			0–1				FILL (SM) Silty SAND with Gravel, brown; damp, medium dense, non-plastic
					1–5				ML Sandy SILT; (Field Estimate: 10% fine gravel, 10% medium sand, 20 percent fine sand, 20% very fine sand, 40% fines); dark yellowish brown (10YR 4/4); damp, medium dense slightly plastic; partially cemented; trace fine gravel;
	13	2" SS / HSA	0 / 2	PB3-1	5–6	X			
	50	2" SS / HSA	0 / 3 / 5	PB3-2 3-2-1	10–11.5	X			SM Silty SAND, (Field Estimate, 15% medium sand, 30% fine sand, 20% very fine sand, 35% fines); dark yellowish brown (10YR 4/6); damp, very dense, slightly plastic; trace clay;
	35	2" SS / HSA	0 / 2 / 4	PB3-3	15–16.5	X			SM Silty Fine SAND; (Field Estimate: 30% fine sand, 40% very fine sand, 30% fines); dark yellowish brown (10YR 4/6); damp, dense, slightly plastic;
		HSA			17–20				

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EXPLORATORY BORING LOG

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	High Line Canal- ~75' S of East Ave, 0.2 mi E of Hickman
Logged by:	N. Langley
Date:	May 6, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Van
Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	91.5 feet
Site Elevation:	165 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/6/2005	5/6/2005			
Time:	1:20 PM	1:50 PM			
Depth:	81.0	78.0			

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. (* = Submitted for Laboratory Testing)	Depth	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
	44	2" SS ↓ HSA	0 / 3 / 4.5	PB3-4 3-4-1	21	SM Silty Fine SAND (Field Estimate: 50% fine sand, 35% very fine sand, 15% fines) dark yellowish brown (10YR 4/6); damp, dense; non-plastic
					22	
					23	
					24	
					25	
	50/5	2" SS ↓ HSA		PB 3-5 *3-5-1	26	SP Poorly Graded SAND; (Field Estimate: 25% medium sand 35% fine sand, 30% very fine sand, 10% fines); yellowish brown (10YR 5/6); damp, very dense, non-plastic
					27	
					28	
					29	
					30	Moist
	50/5	2" SS ↓ HSA	3 / 5	PB3-6 3-6-1	31	
					32	
					33	
					34	
					35	
	29	2" SS ↓ HSA	0 / 3 / 5	PB3-7 3-7-1	36	Medium dense
					37	
					38	Possible perched water
					39	
					40	

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EXPLORATORY BORING LOG

Boring No. **B-3**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	High Line Canal- ~75' S of East Ave, 0.2 mi E of Hickman
Logged by:	N. Langley
Date:	May 6, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Van
Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	91.5 feet
Site Elevation:	165 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/6/2005	5/6/2005			
Time:	1:20 PM	1:50 PM			
Depth:	81.0	78.0			

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
	50	2" SS ↓ HSA		PB 13-1 3-13-1	81	CL Silty CLAY; olive brown (2.5 y 5/4); moist, hard; medium plastic; trace very fine sand. Water @ 1:20
					82–89	SP Fine SAND; (Field Estimate: 5% medium sand, 50% fine sand, 35% very fine sand, 10% fines); olive brown (2.5Y 4/3); saturated; very dense; slightly to non-plastic;
	67	↓ 2" SS ↓	2 5.5 5	PB13-2 3-13-2 3-13-1	90–91	
					92–100	Bottom of Hole at 91.5 feet.

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EXPLORATORY BORING LOG

Boring No. **B-4**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B		
Project No.:	20132A-01	Task:	
Location:	Turlock Main Canal: West Bank - 1.25 mi SE of Keyes Road		
Logged by:	N. Langley	Date:	May 5, 2005
Drilling Contr.:	Woodward Drilling Company		
Driller:	Van	Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line	Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)		
Backfill:	2" Monitoring Well	Boring Depth:	41.5 feet
Site Elevation:	130 feet MSL	Datum:	TID Boring Location Map

Ground Water Information

Date:	5/5/2005				
Time:	12:48 PM				
Depth:	31.0				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
		HSA			0–4	FILL (GM) Sandy Gravel ~2" (SC) Clayey SAND; (Field Estimate: 25% medium sand, 30% fine sand, 20% very fine sand, 25% fines); brown (7.5 YR; 4/4); moist, loose; medium plastic
	50/3	2" SS HSA	3		4–10	SM Silty SAND with Fine Gravel; (Field Estimate: 20% fine gravel, 15% medium sand, 30% fine sand 15% very fine sand, 20% fines); brown (7.5 YR 4/4); damp,very dense, slightly plastic
	50	2" SS HSA	0 3 4.5	PB4-1 4-2-1	10–15	SP Poorly Graded Fine SAND: (Field Estimate: 45% fine sand, 45% very fine sand,10% fines), light olive brown (2.5 Y 5/4); damp, very dense; non-plastic
	40	2" SS HSA	0 4 4.5	PB4-3 *4-3-1	15–20	SP Poorly Graded Fine SAND (Field Estimate: 60% fine sand, 30% very fine sand, 10% fines); light brownish grey (2.5Y 6/2); damp, dense, non plastic; trace silt

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EXPLORATORY BORING LOG

Boring No. **B-4**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01 Task:
Location:	Turlock Main Canal: West Bank - 1.25 mi SE of Keyes Road
Logged by:	N. Langley Date: May 5, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Van Helper(s): Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line Hammer Type: 140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well Boring Depth: 41.5 feet
Site Elevation:	130 feet MSL Datum: TID Boring Location Map

Ground Water Information

Date:	5/5/2005				
Time:	12:48 PM				
Depth:	31.0				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
	38	2" SS ↓ HSA	0.5 4 4.5	PB4-4 4-4-1	21–22	SP Fine SAND (Field Estimate: 60% fine sand, 30% very fine sand, 10% fines); yellowish brown (10YR 4/6), with reddish brown damp; dense; non plastic
					23–24	
	50/5	2" SS ↓ HSA	3 5	PB4-5 *4-5-1	25–26	SP Poorly Graded Fine SAND (Field Estimate: 65% fine sand, 30% very fine sand, 5% fines); light olive brown (2.5YR 5/3); damp; very dense; non-plastic;
					27–29	
	66/11	2" SS ↓ HSA		PB4-6 4-6-2 4-6-1	30–31	Groundwater encountered
					32–34	
	50/4	2" SS HSA	4.5	4-7-4	35–36	
					37–40	

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EXPLORATORY BORING LOG

Boring No. **B-4**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	Turlock Main Canal: West Bank - 1.25 mi SE of Keyes Road
Logged by:	N. Langley
Date:	May 5, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Van
Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	41.5 feet
Site Elevation:	130 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/5/2005				
Time:	12:48 PM				
Depth:	31.0				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/ 12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Sample Interval	Well Construction	Graphic Log	Soil / Rock Descriptions USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
	50/5	2" SS	5 6	PB4-8	41				SP Fine SAND; (Field Estimate: 65% fine sand, 35% very fine sand, 10% fines); light olive brown (2.5YR 5/3); wet, very dense, non-plastic, micaceous;

Bottom of Hole at 41.5 feet.

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EXPLORATORY BORING LOG

Boring No.: **B-5**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	Turlock Main Canal: 161' W of Hickman Road, 0.5 mi S of 6th St
Logged by:	N. Langley
Date:	May 10, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador
Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	91.5 feet
Site Elevation:	160 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/10/2005				
Time:	12:54 PM				
Depth:	77.4'				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. (* = Submitted for Laboratory Testing)	Depth
		HSA			0–5
	16	2" SS	3 6 35	5-1-1 PB5-1	5.5–7
		HSA			7–10.5
	12	2" SS	3 4 6	PB5-2 5-2-1	10.5–12
		HSA			12–15.5
	20	2" SS	2 6 6	PB5-3 5-3-2 5-3-1	15.5–17
		HSA			17–20

Soil / Rock Descriptions

USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations

FILL (SM) Silty SAND with Gravel; (Field Estimate: 10% round gravel, 15% medium sand, 40% fine sand; 20% very fine sand; 15% fines); dark yellowish brown (10YR 4/4); damp; loose, non-plastic; trace fine sand

SM Silty SAND with Gravel; (Field Estimate: 10% fine to medium gravel, 20% medium sand, 40% fine sand; 20% very fine sand; 10% fines); dark yellowish brown (10YR 4/4) damp; loose, non-plastic;

ML Clayey SILT: (Field Estimate: 5% fine sand, 5% very fine sand, 90% fines); light brownish grey (2.5Y 6/2); moist; very stiff; non-plastic;

SP SAND; (Field Estimate: 35% medium sand, 30% fine sand, 25% very fine sand,10% fines); light brownish grey (2.5Y 6/2); moist; medium dense; non-plastic

SC Clayey SAND; (Field Estimate: 25% medium sand, 20% fine sand, 20% very fine sand, 35% fines); olive brown (2.5Y 4/4); moist; medium dense; slight to medium plastic;

SP Silty SAND; (Field Estimate: 50% medium sand, 25% fine sand, 20% very fine sand, 5% fines); yellowish brown (10YR 4/6); moist; medium dense; non-plastic; reddish brown streaks

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EXPLORA[illegible]RY BORING LOG

Boring No.: **B-5**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	Turlock Main Canal: 161' W of Hickman Road, 0.5 mi S of 6th St
Logged by:	N. Langley
Date:	May 10, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador
Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	91.5 feet
Site Elevation:	160 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/10/2005				
Time:	12:54 PM				
Depth:	77.4'				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Sample Interval	Well Construction	Graphic Log	Soil / Rock Descriptions — USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
	25	2" SS ↓ HSA	3 5 5	PB5-4 5-4-1	21	X			SP Silty SAND; (Field Estimate: 50% medium sand, 25% fine sand, 20% very fine sand, 5% fines); yellowish brown (10YR 4/6); moist; medium dense; non-plastic; reddish brown streaks
		↓			22				
					23				
					24				
					25				
	22	2" SS ↓ HSA	6 6 6	PB-5 5-5-2 5-5-1	26	X			
		↓			27				
					28				
					29				
					30				
	22	2" SS ↓ HSA	5 6 5.5	PB5-6 5-6-2 5-6-1	31	X			
		↓			32				
					33				
					34				
					35				Yellowish brown-grey, (10YR 6/2); (no staining). Dense
	38	2" SS ↓ HSA	4 5 5	PB5-7 5-7-2 5-7-1	36	X			
		↓			37				
					38				
					39				
		↓			40				

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EXPLORATORY BORING LOG

Boring No.: **B-5**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	Turlock Main Canal: 161' W of Hickman Road, 0.5 mi S of 6th St
Logged by:	N. Langley
Date:	May 10, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador
Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	91.5 feet
Site Elevation:	160 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/10/2005				
Time:	12:54 PM				
Depth:	77.4'				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
	100	2" SS → HSA	2 6 6	PB5-8 5-8-1	41–44	SW SAND; (Field Estimate: 5% coarse sand, 45% medium sand, 25% fine sand, 20% very fine sand, 5% fines);yellowish brown (10YR 5/4); moist; very dense; non-plastic;
	26	2" SS → HSA	3 6 6	PB5-9 *5-9-2 *5-9-1	45–49	CL Sandy CLAY; (Field Estimate: 10% very fine sand, 90% fines); light brownish grey (10YR 6/2); damp; soft to medium stiff; medium plastic; few layered organics; with silt
	63	2" SS → HSA	0 5 6	PB10-1 5-10-1	50–54	SM Silty Fine SAND; (Field Estimate: 40% fine sand, 45% very fine sand, 15% fines); pale yellow (5Y 7/3); damp; dense; non-plastic; seams of olive fine sandy clay
	31	2" SS → HSA	1 6 6	5-11-2 5-11-1	55–60	ML Fine Sandy SILT; (Field Estimate 15% fine sand, 20% very fine sand, 65% fines); olive (5Y 5/3); damp; medium dense; slight to medium plastic;

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EXPLORATORY BORING LOG

Boring No.: **B-5**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01 Task:
Location:	Turlock Main Canal: 161' W of Hickman Road, 0.5 mi S of 6th St
Logged by:	N. Langley Date: May 10, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador Helper(s): Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX Hammer Type: 140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well Boring Depth: 91.5 feet
Site Elevation:	160 feet MSL Datum: TID Boring Location Map

Ground Water Information

Date:	5/10/2005				
Time:	12:54 PM				
Depth:	77.4'				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions: USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
		2" SS	1	PB5-12		SP Fine SAND; (Field Estimate: 45% fine sand, 45% very fine sand, 10% low plastic fines); light grey (2.5Y 7/2); damp; medium dense; non-plastic;
	33	↓	6	5-12-2	61	
		HSA	6	5-12-1	62	
		↓			63–69	
					70	
		2" SS	2	PB5-13		SP SAND; (Field Estimate: 25% medium sand, 45% fine sand, 25% very fine sand, 5% fines); pale olive (5Y 6/3); damp; medium dense; non-plastic
	15	↓	4.5	5-13-2	71	
		HSA	5	5-13-1	72	
		↓			73–77	
					77.5	Water at 77.5'
		↓			78–80	

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EXPLORATORY BORING LOG

Boring No.: **B-5**

Page 5 of 5

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	Turlock Main Canal: 161' W of Hickman Road, 0.5 mi S of 6th St
Logged by:	N. Langley
Date:	May 10, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador
Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	91.5 feet
Site Elevation:	160 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/10/2005				
Time:	12:54 PM				
Depth:	77.4'				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. (* = Submitted for Laboratory Testing)	Depth	Sample Interval	Well Construction	Graphic Log	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
		2" SS							
	10		5	5-14-2	81				SW SAND; (Field Estimate: 10% coarse sand, 40% medium sand, 30% fine sand, 10% very fine sand, 10% fines); olive (5Y 5/3); saturated; loose; non-plastic;
			5	5-14-1					
		HSA			82				
					83				
					84				
					85				
					86				
					87				
					88				
					89				
					90				
		2" SS	3.5	PB5-15					
	15		5	PB5-15a	91				
			6	5-15-1					CL Silty CLAY; moist; medium stiff; medium plastic; layered decayed organics

Bottom of hole at 91.5 feet

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EXPLORATORY BORING LOG

Boring No. **B-6**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	South of Miekle Road terminus
Logged by:	N. Langley
Date:	May 11, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador
Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	127.5 feet
Site Elevation:	175 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/11/2005	5/11/2005	5/11/2005		
Time:	3:02 PM	3:12 PM	5:15 PM		
Depth:	118.0'	117.2'	114.6'		

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. (* = Submitted for Laboratory Testing)	Depth	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
		HSA			0–4	FILL (SM) Silty SAND (Field Estimate: 10% round gravel, 15% coarse sand, 35% medium sand, 30% fine sand, 10% fines); dark yellowish brown (10YR 4/4); damp; loose; non-plastic; gravel; shells and shell fragments
					4	SM Silty SAND, trace clay, (Field Estimate: 15% medium sand, 40% fine sand, 20% very fine sand, 25% fines); dark yellowish brown (10YR 4/4); damp to moist; loose; slightly plastic
	5	2" SS	1 / 2 / 5	PB6-1 6-1-1	5.5–7	
		HSA				
					9	SC Clayey Fine SAND, (Field Estimate: 35% fine sand, 30% very fine sand, 35% fines); dark yellowish brown (10YR 4/4); damp; loose; moist to wet; medium dense; medium plastic
	30	2" SS	1 / 4 / 5	PB6-2 6-2-1	10.5–12	
		HSA				
					14.5	SM Silty Fine SAND (Field Estimate: 10% medium sand, 35% fine sand, 20% very fine sand, 35% fines); damp; medium dense; slight to medium plastic; strong brown (7.5YR 4/6); (partially cemented)
	40	2" SS	1 / 6 / 6	PB6-3 6-3-2 6-3-1	15.5–17	
		HSA			17–20	

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EXPLORATORY BORING LOG

Boring No. **B-6**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	South of Miekle Road terminus
Logged by:	N. Langley
Date:	May 11, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador
Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	127.5 feet
Site Elevation:	175 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/11/2005	5/11/2005	5/11/2005		
Time:	3:02 PM	3:12 PM	5:15 PM		
Depth:	118.0'	117.2'	114.6'		

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Sample Interval	Well Construction	Graphic Log	Soil / Rock Descriptions USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
	40	2" SS → HSA	3 6 6	PB6-4 6-4-2 6-4-1	21–25				SC Clayey SAND (Field Estimate: 5% medium sand, 30% fine sand, 35% very fine sand, 30% fines) light brownish grey (10YR 6/2); moist; medium dense; medium plastic;
	29	2" SS → HSA	2 6 6	PB6-5 *6-5-2 *6-5-1	25–30				SM Silty SAND, (Field Estimate: 5% medium sand, 10% fine sand, 45% very fine sand, 40% fines); light yellowish brown (10YR 6/4); damp; medium dense; medium plastic; with clay
	27	2" SS → HSA	2 5.5 5.5	PB6-6 6-6-2 6-6-1	30–34				SM Silty Fine SAND, (Field Estimate: 10% medium sand, 35% fine sand, 30% very fine sand, 25% fines), dark yellow brown (10YR 4/6); damp; medium dense; non to slightly plastic;
	33	2" SS → HSA	3 6 6	PB6-7 6-7-2 6-7-1	35–40				SC Clayey SAND, (Field Estimate: 10% coarse sand, 35% medium sand, 15% fine sand, 10% very fine sand, 30% fines); dark yellow brown (10YR 4/6); moist; dense; medium plastic

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EXPLORATORY BORING LOG

Boring No. **B-6**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	South of Miekle Road terminus
Logged by:	N. Langley
Date:	May 11, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador
Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	127.5 feet
Site Elevation:	175 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/11/2005	5/11/2005	5/11/2005		
Time:	3:02 PM	3:12 PM	5:15 PM		
Depth:	118.0'	117.2'	114.6'		

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions: USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
		2" SS				SC Clayey SAND; dark yellowish brown (10YR 46); moist, dense, non-plastic;
	41	↓		6-8-2	41	
		↓		6-8-1		SC Sandy CLAY, (Field Estimate: 10% fine sand, 10% very fine sand, 80% fines); light olive brown (2.5Y 5/3); moist; dense, medium to highly plastic
		HSA			42	
		↓			43	
		↓			44	
		↓			45	
		2" SS				
		↓			46	
		HSA			47	
		↓		PB6-8b	48	
		↓			49	
		↓			50	
		2" SS	2	PB6-9		SP Fine SAND, (Field Estimate: 20% medium sand, 50% fine sand, 25% very fine sand, 5% fines), olive brown (2.5Y 4/4); damp; medium dense; non-plastic
	15	↓	5	6-9-2	51	
		↓	6	6-9-1		
		HSA			52	
		↓			53	
		↓			54	
		↓			55	ML Clayey SILT, (Field Estimate: 10% very fine sand, 90% fines); light olive brown (2.5Y 5/3); damp, medium stiff, medium plastic;
		↓			56	
		↓			57	
		↓			58	
		↓			59	
		↓			60	

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EXPLORATORY BORING LOG

Boring No. **B-6**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	South of Miekle Road terminus
Logged by:	N. Langley
Date:	May 11, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador
Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	127.5 feet
Site Elevation:	175 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/11/2005	5/11/2005	5/11/2005		
Time:	3:02 PM	3:12 PM	5:15 PM		
Depth:	118.0'	117.2'	114.6'		

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions — USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
	19	2" SS ↓ HSA		PB6-10 *6-10-2 *6-10-1	61	ML Fine Sandy CLAY, (Field Estimate: 10% very fine sand, 90% fines); dark yellowish brown (10YR 4/4); damp, medium stiff, medium plastic;
		↓			62–65	
					66	Very stiff, slow drilling, repeatedly backed out and re-drilled
		↓			67–69	
	50/3	2" SS ↓ HSA	2.5 5	PB6-11 6-11-1	70–71	SP SAND, (Field Estimate: 20% medium sand, 40% fine sand, 30% very fine sand, 10% fines); light olive brown (2.5Y 5/4); damp; very dense; non-plastic; micaceous
					73	ML Very Fine Sandy SILT; light olive brown (2.5Y 5/3) damp; hard; slight to medium plastic; with trace clay
		↓			74–80	

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EXPLORAT[illegible]RY BORING LOG

Boring No. **B-6**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01 Task:
Location:	South of Miekle Road terminus
Logged by:	N. Langley Date: May 11, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador Helper(s): Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX Hammer Type: 140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well Boring Depth: 127.5 feet
Site Elevation:	175 feet MSL Datum: TID Boring Location Map

Ground Water Information

Date:	5/11/2005	5/11/2005	5/11/2005		
Time:	3:02 PM	3:12 PM	5:15 PM		
Depth:	118.0'	117.2'	114.6'		

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions: USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
	32	2" SS	2	PB6-12		
			5.5	6-12-2	81	ML Very Fine Sandy SILT with trace clay; (Field Estimate 5% fine sand, 25% very fine sand, 70% fines); light olive brown (2.5Y 5/3); damp; hard; slight to medium plastic; trace clay
		↓	5	6-12-1		
		HSA			82	
		↓			83	(Note: Very slow drilling - repeatedly backed out to re-drill - clayey cuttings)
					84	
					85	
		2" SS			86	
		HSA			87	
		↓			88	
					89	ML Very fine sandy SILT with trace clay; (Field Estimate: 5% fine sand, 30% very fine sand, 30% very fine sand, 65% fines); dark reddish brown (5YR 4/2); damp; hard; slight to medium plastic;trace clay
					90	
	50/6	2" SS	1.5	PB6-13		
		↓	3.5		91	
		HSA			92	Easier drilling - moist clay-sand cuttings
		↓			93	
					94	
					95	Hard drilling again - shaft vibration but no chatter
		2" SS			96	
		HSA			97	
		↓			98	
					99	
		↓			100	

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EXPLORATORY BORING LOG

Boring No. **B-6**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B		
Project No.:	20132A-01	Task:	
Location:	South of Miekle Road terminus		
Logged by:	N. Langley	Date:	May 11, 2005
Drilling Contr.:	Woodward Drilling Company		
Driller:	Amador	Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX	Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)		
Backfill:	2" Monitoring Well	Boring Depth:	127.5 feet
Site Elevation:	175 feet MSL	Datum:	TID Boring Location Map

Ground Water Information

Date:	5/11/2005	5/11/2005	5/11/2005		
Time:	3:02 PM	3:12 PM	5:15 PM		
Depth:	118.0'	117.2'	114.6'		

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (ft/6-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%); Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
	50/2	2" SS → HSA	2 / 4.5	PB6-14 / 6-14-1	101–105	ML Very Fine Sandy SILT; (Field Estimate 10% fine sand, 20% very fine sand, 70% fines); dark yellowish brown (10YR 4/4); damp; hard; slightly to non-plastic; Very slow drilling - shaft still vibrating
		2" SS → HSA			105–110	
	52/2	2" SS → HSA	2.5 / 5	PB6-15 / 6-15-1	110–115	ML Clayey SILT; (Field Estimate 10% fine sand, 10% very fine sand, 80% low plastic fines); brown (10YR 4/3); damp; very dense; slightly plastic; cemented fragments
					115	Ground water measured at 5:15 p.m.
		2" SS → HSA			117	Ground water measured at 3:15 p.m.
					118–120	Ground water measured at 3:02 p.m.

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EXPLORAT[illegible]RY BORING LOG

Boring No. **B-6**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	South of Miekle Road terminus
Logged by:	N. Langley
Date:	May 11, 2005
Drilling Contr.:	Woodward Drilling Company
Driller:	Amador
Helper(s):	Frank and Jeff
Drill Rig Type:	Mobile B-61 HGX
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	127.5 feet
Site Elevation:	175 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/11/2005	5/11/2005	5/11/2005		
Time:	3:02 PM	3:12 PM	5:15 PM		
Depth:	118.0'	117.2'	114.6'		

Pocket Penetrometer (tsf)	Hammer Blow Count (N/6")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions — USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
	50/4	2" SS	3 5	PB6-16 6-16-1	121	SM Silty SAND with clay; (Field Estimate: 5% coarse sand, 20% medium sand, 25% fine sand, 15% very fine sand, 35% fines); saturated with dark greyish brown (10YR 4/2) wet-soft, dry-hard; medium plastic; seams of damp clean sand
		HSA			122 123 124	
	50/5	2"SS HSA	3.5	PB6-17	125 126	SM Silty SAND with clay and gravel; (Field Estimate: 10% gravel, 10% coarse sand, 20% medium sand, 10% fine sand, 10% very fine sand, 40% fines); greyish brown (10YR 4/2); saturated; very dense; slightly to medium plastic
	50/4	2" SS	3.5	PB6-18	127	SM Silty SAND; (Field Estimate 5% coarse sand, 15% medium sand, 30% fine sand, 20% very fine sand, 25% fines); saturated; very dense; slightly plastic; very dark greyish brown (10YR 4/2)

Bottom of hole at 127.5

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EXPLORATORY BORING LOG

Boring No. **B-7**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	High Line Canal- 97' W of Pepper St.; 70' N of Bradbury Rd.
Logged by:	N. Langley
Date:	May 4, 2005
Drilling Company:	Woodward Drilling Company
Driller:	Van
Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	81 feet
Site Elevation:	145 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/4/2005				
Time:	3:00 PM				
Depth:	69.0				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. * = Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
		HSA			0–3	FILL (SP) Fine SAND with trace silt, (Field Estimate: 15% medium sand, 50% fine sand, 25% very fine sand, 10% fines); dark yellowish brown (10YR 4/6); moist; medium dense; non-plastic;
	27	2" SS / HSA	3 5.5 5	7-1-2 7-1-1	3–9.5	SP Fine Sand, trace silt; (Field Estimate: 15% medium sand, 55% fine sand, 25% very fine sand, 5% fines); dark yellowish brown (10YR 4/6); moist, medium dense; non-plastic;
	24	2" SS / HSA	2 5 5	PB7-2 7-2-2 7-2-1	9.5–15	SC Clayey SAND, (Field Estimate: 5% coarse sand, 25% medium sand, 25% fine sand 20% very fine sand, 25% fines); dark yellowish brown (10YR 4/4); wet, medium dense, medium plastic
	33	2" SS / HSA	1 5.5 5	7-3-2 7-3-1	15–20	SM Silty SAND (Field Estimate: 5% coarse sand, 30% medium sand, 25% fine sand, 25% very fine sand, 15% fines), dark yellowish brown (10YR 4/4); moist, medium dense, slightly to non-plastic

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EXPLORATORY BORING LOG

Boring No. **B-7**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	High Line Canal- 97' W of Pepper St.; 70' N of Bradbury Rd.
Logged by:	N. Langley
Date:	May 4, 2005
Drilling Company:	Woodward Drilling Company
Driller:	Van
Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	81 feet
Site Elevation:	145 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/4/2005				
Time:	3:00 PM				
Depth:	69.0				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (inch-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Sample Interval	Well Construction	Graphic Log	Soil / Rock Descriptions: USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations
	30	2" SS ↓ HSA	2 5.5 5	PB7-4 *7-4-2 7-4-1	21				SP Poorly Graded SAND; (Field Estimate: 35% medium sand, 20% fine sand, 20% very fine sand, 25% fines); yellowish brown (10YR 5/4); moist, medium dense, slight to medium plastic
					22				
					23				
					24				
					25				
	31	2" SS ↓ HSA	0 2 5	PB7-5 7-5-1	26	X			
					27				
					28				
					29				
					30				SP Fine SAND; (Field Estimate 10% medium sand, 40% fine sand, 30% very fine sand, 20% fines); olive (5Y 5/6); moist; dense, non-plastic
	37	2" SS ↓ HSA	2 5 5	PB7-6 7-6-2 7-6-1	31	X			
					32				
					33				
					34				
					35				SC Clayey Fine SAND: (Field Estimate: 15% medium dense, 30% fine sand, 20% very fine sand, 30% fines); olive (5Y 5/4); moist, medium dense; mediuim plastic
	30	2" SS ↓ HSA	1 5 5	PB7-7 7-7-2 7-7-1	36	X			
					37				
					38				
					39				
					40				

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EXPLORATORY BORING LOG

Boring No. **B-7**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	High Line Canal- 97' W of Pepper St.; 70' N of Bradbury Rd.
Logged by:	N. Langley
Date:	May 4, 2005
Drilling Company:	Woodward Drilling Company
Driller:	Van
Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	81 feet
Site Elevation:	145 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/4/2005				
Time:	3:00 PM				
Depth:	69.0				

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. (* = Submitted for Laboratory Testing)	Depth	Soil / Rock Descriptions (USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations)
	51	2" SS ↓ HSA ↓	1 5 5	PB7-8 7-8-2 7-8-1	41	SC Clayey Fine SAND: (Field Estimate: 15% medium dense, 30% fine sand, 20% very fine sand, 30% fines); olive (5Y 5/4); moist, very dense; medium plastic
					42–47	
	50/5	2" SS HSA ↓	5	7-9-1	48–49	ML Fine Sandy SILT; (Field Estimate: 10% fine sand, 20% very fine sand, 70% fines); olive brown (2.5Y 4/3) damp; hard; slightly plastic
	50/5	2" SS ↓ HSA ↓	2 5	PB7-1 *7-10-1	50–51	ML Clayey SAND; (Field Estimate 10% very fine sand, 20% very fine sand, 70% fines); dark yellowish brown (10YR 4/6); wet, hard; medium plastic;
					52–60	

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EXPLORATORY BORING LOG

Boring No. **B-7**

Notes / Site Sketch:

Project Name:	TID High Line Canal - Phase B
Project No.:	20132A-01
Task:	
Location:	High Line Canal- 97' W of Pepper St.; 70' N of Bradbury Rd.
Logged by:	N. Langley
Date:	May 4, 2005
Drilling Company:	Woodward Drilling Company
Driller:	Van
Helper(s):	Jesse and Jeremy
Drill Rig Type:	Mobile BK-81 - wire line
Hammer Type:	140 lb
Method:	8-inch Hollow Stem Auger (HSA); 2-inch Split Spoon (2" SS)
Backfill:	2" Monitoring Well
Boring Depth:	81 feet
Site Elevation:	145 feet MSL
Datum:	TID Boring Location Map

Ground Water Information

Date:	5/4/2005				
Time:	3:00 PM				
Depth:	69.0				

Soil / Rock Descriptions

USCS Symbol; Soil Name; Particle Sizes (%), Munsel Color; Moisture; Density or Consistency; Plasticity; Other Observations

Pocket Penetrometer (tsf)	Hammer Blow Count (N/12")	Sampler Type or Drilling Method	Sample Recovery (in/6-in)	Sample No. *= Submitted for Laboratory Testing	Depth	Soil / Rock Descriptions
		2" SS	3	PB 7-11		ML Very Fine Sandy SILT; (Field Estimate 10% very fine sand, 20% very fine sand, 70% fines); Light olive brown (2.5Y 5/6); wet, stiff; medium plastic; with clay
	28		5	7-11-12	61	
		HSA	5	7-11-1	62	
					63	
					64	
					65	
					66	
					67	
					68	
					69	Groundwater encountered at 69 feet
					70	ML Clayey SILT; light olive brown (2.5Y 5/4); damp; hard; medium plastic
	50/5.5	2" SS HSA	5	7-12-1	71	
					72	
					73	
					74	
					75	
					76	
					77	
					78	
					79	SP SAND; (Field Estimate: 5% coarse sand, 40% medium sand, 30% fine sand, 15% very fine sand, 10% fines); dark olive brown (2.5YR 3/3); saturated; very dense; non-plastic
		2" SS	1		80	
	50/5		5.5	B1-4-1	81	**Bottom of Hole at 81 feet.**

WELL DEVELOPMENT FIELD FORMS

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WELL DEVELOPMENT FORM

Page:	1 of 1
Date/Time:	June 2, 2005
Project Name:	TID
Job No.:	20132A-02
Recorded By:	John R. [illegible]
Sampled By:	None

Well No.: B-1	Well Type:	☒ Monitoring	☐ Extraction	☐ Other
	Well Material:	☒ PVC	☐ Stainless Steel	☐ Other

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches)

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other ____

Total Depth of Casing (TD in feet below top of casing): 36.0

Water-Level Depth (WL in feet below top of casing): 26.63

PURGING METHOD

☐ Bailer - Type: ____

☒ Submersible ☒ Centrifugal ☐ Bladder

☐ Other - Type: ____

PUMP INTAKE SETTING

☒ ~~Near~~ on Bottom ☐ Near Top ☐ Other ____

Depth in feet (BTOC): 35

Screen interval in feet (BTOC) from 27 to 36

PURGE VOLUME CALCULATIONS:

Doc 36
meas 36

(36 (Well Depth) - 26.63 (Depth to Water)) x 2 (Well Diameter) ^{2} x 10 casing volumes x 0.0408 = 15.2 gallons (Calculated Purge Volume)

FIELD PARAMETER MEASUREMENT

→ START TIME ~~750~~ 820

Minutes Since Pumping	Gallons Removed	pH	Conductivity	Temperature	Turbidity	Observations (color, well condition, odor, cloudiness, etc.)
—						Stopped because water level dropped
—						too fast with Grundfos pump-
—						Switch to Proactive pump ie. two pumps
10	4	6.80	233 us	19.7	cloudy	[illegible]/gal ~ .3 gpm H_2O ltgt 29.2
20	8	6.84	174.6	19.8	s. cloudy	-surge after reading 29.1
40	12	6.80	143.8	19.8	s. cloudy	still .3 gpm 170 ntu after surge 29.7
60	16	6.85	130.8	19.6	220 ntu	flow ~ .25 gpm 30.4
80	20	6.76	124.5	19.7	110	Same flow 30.45
100	26	6.77	120.2	19.8	160	Same 30.5-
120	30	6.77	117.3	19.8	150	Same 30.26
140	34	6.72	111.8	19.9	130	30.25
160	38	6.74	110.6	20.0	75	330 sec/gal 30.3
180	42	6.74	109.8	20.0	~~130~~	Second sample 85 ntu 30.3

→ DEVELOPMENT COMPLETION TIME 1115

TOTAL GALLONS REMOVED 44

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WELL DEVELOPMENT FORM

Page: 1 of 1
Date/Time: June 2, 2005
Project Name: TID
Job No.: 20132A-07
Recorded By: [signature]
Sampled By: None

Well No.: B-2
Well Type: ☒ Monitoring ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ Stainless Steel ☐ Other

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches)

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other ____

Total Depth of Casing (TD in feet below top of casing): assumed 45'

Water-Level Depth (WL in feet below top of casing): 36.30

PURGING METHOD

☐ Bailer - Type: ____

☒ Submersible ☒ Centrifugal ☐ Bladder

☐ Other - Type: ____

PUMP INTAKE SETTING

☒ Near Bottom ☐ Near Top ☐ Other ____

Depth in feet (BTOC): 44'

Screen interval in feet (BTOC) from 36 to 46

PURGE VOLUME CALCULATIONS:

(DOC 46 ~~meas~~ 45 [Well Depth] - 36.30 [Depth to Water]) x 2 [Well Diameter] ² x 10 casing volumes x 0.0408 = 14.2 [Calculated Purge Volume] gallons

FIELD PARAMETER MEASUREMENT

→ START TIME 1240

Minutes Since Pumping	Gallons Removed	pH	Conductivity	Temperature	Turbidity	Observations (color, well condition, odor, cloudiness, etc.)
0	1	–	–	–	–	2gpm H2O lvl 38.35
10	20	7.01	110 us	21.5	muddy cloudy	2gpm Surged 38.1
20	40	7.43	126.7 us	21.4	turbidity	Same Surged H2O lvl ⇒ 38.2
30	60	7.11	113.0	21.3	clearing	Same Surged (at bottom) 38.3
40	80	7.08	112.9	21.9	clearing	Same 38.2
50	–	–	–	–	–	Stopped to surge with surge block
60	–	–	–	–	–	Start again 2gpm
70	100	7.12	116.7	21.2	50	2gpm 38.2
80	120	7.02	116.4	21.3	6.7	Same 38.3
90	140	~~6.99~~	~~109.3~~	21.3	3.2	
–	–	7.01	111.5	–	–	Dumped sand out of container
100	160	7.00	111.0	21.3	2.7	Bottom @ 44.2

→ DEVELOPMENT COMPLETION TIME 1430

TOTAL GALLONS REMOVED 160+

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WELL DEVELOPMENT FORM

Page:	1 of 1
Date/Time:	June 2, 2005
Project Name:	TID
Job No.:	20132A-02
Recorded By:	John ? Hanson
Sampled By:	None

Well No.: B-3

Well Type: ☒ Monitoring ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ Stainless Steel ☐ Other

WELL PURGING

PURGE VOLUME Cement/Grout seal has sunk 6'

Casing Diameter (D in inches)

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other____

Total Depth of Casing (TD in feet below top of casing): Measured 79.5 Now 6-3-05 90.5

Water-Level Depth (WL in feet below top of casing): 47.66 next day 6-3-05 48.56

PURGING METHOD

☐ Bailer - Type:____

☒ Submersible ☐ Centrifugal ☐ Bladder

☐ Other - Type:____

PUMP INTAKE SETTING

☒ Near Bottom ☐ Near Top ☐ Other____

Depth in feet (BTOC): 78'

Screen interval in feet (BTOC) from 82 to 91

PURGE VOLUME CALCULATIONS:

(TOC 91.5 / meas. 79.5 - 47.66) x 2 ²x 10 casing volumes x 0.4008 = 51.9 gallons

Well Depth, Depth to Water, Well Diameter, Calculated Purge Volume

FIELD PARAMETER MEASUREMENT

——> START TIME 1830

Minutes Since Pumping	Gallons Removed	pH	Conductivity	Temperature	Turbidity	Observations (color, well condition, odor, cloudiness, etc.)
1	1	–	–	–	–	.75 gpm H_2O Hgt 55'
15	10	6.61	1330us	19.4	Muddy	Now 2gpm - surging 55.6
30	40	6.64	1343us	19.2	cloudy	Same surged + lowered 54.2
45	70	6.65	1347us	19.1	cloudy	Same surged + pump lowered 54.2
60	100	6.63	1321us	19.1	cloudy	lowered pump 53.05
75	130	6.63	1313us	19.1	cloudy	Same lowered again 53.9
–	–	–	–	–	–	Bottom reached. surged again
90	160	6.65	1360	19.1	50	54.6
105	190	6.63	1335	19.4	36	Shut down for nite - generator gas
						Next day - very silty water being pumped
–	–	–	–	–	–	pump triggering overload protection
10	20	6.48	1292us	19.8	Cloudy	2gpm water height 50.3
20	40	6.50	1292us	19.5	50	Same 50.4
30	60	6.48	1296us	19.5	35	2gpm height 50.4
40	80	6.48	1297us	19.5	19	2gpm 50.5

——> DEVELOPMENT COMPLETION TIME 1211 TOTAL GALLONS REMOVED 82+190

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WELL DEVELOPMENT FORM

Page:	1 of 1
Date/Time:	June 1, 2005 1630
Project Name:	TID
Job No.:	20132[illegible]-02
Recorded By:	[illegible]
Sampled By:	None

Well No.: B-4	Well Type:	☒ Monitoring	☐ Extraction	☐ Other
	Well Material:	☒ PVC	☐ Stainless Steel	☐ Other

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches)

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other ________

Total Depth of Casing (TD in feet below top of casing): 38.6 measured

Water-Level Depth (WL in feet below top of casing): 28.24

PURGING METHOD

☐ Bailer - Type: ________

☒ Submersible ☒ Centrifugal ☐ Bladder

☐ Other - Type: ________

PUMP INTAKE SETTING

☒ Near Bottom ☐ Near Top ☐ Other ________

Depth in feet (BTOC): 40

Screen interval in feet (BTOC) from 32 to 41

PURGE VOLUME CALCULATIONS:

(Doc 41.5 / meas 38.6 - 28.24) x 2 ² x 10 casing volumes x 0.0408 = 16.9 gallons

Well Depth — Depth to Water — Well Diameter — Calculated Purge Volume

FIELD PARAMETER MEASUREMENT

→ START TIME 1700

Minutes Since Pumping	Gallons Removed	pH	Conductivity	Temperature	Turbidity	Observations (color, well condition, odor, cloudiness, etc.)
1	1	–	–	–	cloudy	2gpm
5	10	6.73	294 us	18.5	almost clear	Surge H₂O Hgt 29.95
10	20	6.82	297 us	18.4	Muddy from surging	
15	30	6.87	297 us	18.2	Slightly cloudy	H₂O H 29.60
1730 Restart						Stop for mechanical surge 2gpm
1735	40	6.90	292 us	18.2	almost clear	
1740	50	6.90	295 us	18.2	5.2 ntu	
1745	60	6.88	293 us	18.1	75	increased pump rate. H₂O Hgt 30.88
1750	70	6.89	291 us	18.0	7.2 ntu	
1800	90	6.89	289 us	18.0	2.2	
1810	110	6.90	285 us	18.0	1.1	TD 38'

→ DEVELOPMENT COMPLETION TIME 1810

TOTAL GALLONS REMOVED 110

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WELL DEVELOPMENT FORM

Page: 1 of 1
Date/Time: 6-1-05
Project Name: TID
Job No.: 20132A-02
Recorded By: John Atkinson (Atkinson)
Sampled By: Non

Well No.: B-5
Well Type: ☒ Monitoring ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ Stainless Steel ☐ Other

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches)

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other_____

Total Depth of Casing (TD in feet below top of casing): 90

Water-Level Depth (WL in feet below top of casing): 72.97

PURGING METHOD

☐ Bailer - Type:_____

☒ Submersible ☒ Centrifugal ☐ Bladder

☐ Other - Type:_____

PUMP INTAKE SETTING

☒ Near Bottom ☐ Near Top ☐ Other_____

Depth in feet (BTOC): ~~89' After purge~~

Screen interval in feet (BTOC) from ~~82~~ to 91

PURGE VOLUME CALCULATIONS:

(DOC 91 / Meas 90 [Well Depth] - 72.97 [Depth to Water]) x 2 [Well Diameter]^2 x 10 casing volumes x 0.0408 = 27.8 gallons [Calculated Purge Volume]

FIELD PARAMETER MEASUREMENT

——> START TIME 9AM

2gpm

Minutes Since Pumping	Gallons Removed	pH	Conductivity	Temperature	Turbidity	Observations (color, well condition, odor, cloudiness, etc.)
7	7	6.64	91.	20.0	cloudy	Change to 1gpm
11	11	7.32	84.8	19.8	less Cloudy	
15	15	8.66	118.4	20.0	Cloudy (muddy)	Surged & H_2O lvl 72.05 H_2O Height; cloudy again after surge
20	20	7.95	84.6	20.	s. cloudy	cleared up after 5 minutes 73.03
25	25	8.08	88.9	20.	muddy	After Surging 73.03
30	30	~~8~~7.73	81.7	20	cloudy	No surge 73.03
35	—	—	—	—	s. cloudy	Increased rate to 1.5gpm & Surge again
40	37.5	7.78	82.0	19.6	cloudy	Increase again 2gpm 73.05
50	57		~~0.38us~~	~~22.5~~		Surge once more 73.08
50	57	7.52	76.9	19.3	S-cloudy	
60	77	7.68	81.2	19.0	cloudy	after surge
65	87	-	—	-	310ntu	
70	97	7.34	76.5	19.3	slightly cloudy	230 ntu
90	117	7.27	74.3	19.3	almost clear	ntu 55 water height 73.1
100	137	7.29	74.2	19.3	clearing up	ntu
110	157	7.20	73.3	19.3	slightly cloudy	ntu => 70
120	177	7.16	72.0	19.4	almost clear	ntu => 9.1
140	197	7.15	71.6	19.4	clear	ntu => 6.6 H_2O hgt. 73.1
150	217	7.15	71.3	19.4	clear	ntu => 5.1

——> DEVELOPMENT COMPLETION TIME 1130

TOTAL GALLONS REMOVED 220

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Page:	1 of 1
Date/Time:	June 1 - 2005
Project Name:	TID
Job No.:	20132A-0A
Recorded By:	[illegible signature]
Sampled By:	None

WELL DEVELOPMENT FORM

Well No.: B-6	Well Type:	☒ Monitoring	☐ Extraction	☐ Other
	Well Material:	☒ PVC	☐ Stainless Steel	☐ Other

WELL PURGING

PURGE VOLUME

Casing Diameter (D in inches)

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other ____________

Total Depth of Casing (TD in feet below top of casing): meas 120'

Water-Level Depth (WL in feet below top of casing): 114.01
6-3-2005 115.69

PURGING METHOD

☐ Bailer - Type: ____________

☒ Submersible ☒ Centrifugal ☐ Bladder

☐ Other - Type: ____________

PUMP INTAKE SETTING

☐ Near Bottom ☐ Near Top ☐ Other ____________

Depth in feet (BTOC): ____________

Screen interval in feet (BTOC) from 118 to 127

PURGE VOLUME CALCULATIONS:

(Doc 127 / meas 120 [Well Depth] - 114.01 [Depth to Water]) x 2 [Well Diameter] ^{2} x 10 casing volumes x 0.0408 = 21.2 [Calculated Purge Volume] gallons

FIELD PARAMETER MEASUREMENT

————> START TIME 1300

Minutes Since Pumping	Gallons Removed	pH	Conductivity	Temperature	Turbidity	Observations (color, well condition, odor, cloudiness, etc.)
	2				Muddy	using hand bailer. H_2O Hgt => 117.25
	4				Muddy	TD 123'; 1 gal every 4 minutes with hand bailer
	6					H_2O Hgt 117.03 after 4 gal, H_2O Hgt 11[illegible]

————> DEVELOPMENT COMPLETION TIME ____________ TOTAL GALLONS REMOVED ____________

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WELL DEVELOPMENT FORM

Page: 1 of 1
Date/Time: June 2, 2005
Project Name: TID
Job No.: 20132A-02
Recorded By: [signature]
Sampled By: None

Well No.: B-7
Well Type: ☒ Monitoring ☐ Extraction ☐ Other
Well Material: ☒ PVC ☐ Stainless Steel ☐ Other

WELL PURGING

PURGE VOLUME Cement/Grout Seal has stuck 7' feet

Casing Diameter (D in inches)

☒ 2-inch ☐ 4-inch ☐ 6-inch ☐ Other ______

Total Depth of Casing (TD in feet below top of casing): 75.5' measured

Water-Level Depth (WL in feet below top of casing): 65.30'
6-3-05 730A 63.85 TD 76.

PURGING METHOD

☐ Bailer - Type: ______
☒ Submersible ☒ Centrifugal ☐ Bladder
☐ Other - Type: ______

PUMP INTAKE SETTING

☒ Near Bottom ☐ Near Top ☐ Other ______
Depth in feet (BTOC): ______
Screen Interval in feet (BTOC) from 71 to 87

PURGE VOLUME CALCULATIONS:

DOC 81'
(meas. 75.5 - 65.30) x 2 ^{2} x 10 casing volumes x 0.0408 = 16.6 gallons
Well Depth, Depth to Water, Well Diameter, Calculated Purge Volume

FIELD PARAMETER MEASUREMENT

→ START TIME ~~1555~~ 815

Minutes Since Pumping	Gallons Removed	pH	Conductivity	Temperature	Turbidity	Observations (color, well condition, odor, cloudiness, etc.)
1	2	—	—	—	—	Pumped stopped - H_2O Hgt now 73'
N/A	~~+3=5~~					Water level @ 70.1 after 10 minutes
N/A	+3 =2 5					Next day hand bailing Hgt ≈ 69
						Proactive pump 8803/60sec ⇒ ~ .7g/m
15	5	6.81	124.8us	20.4	cloudy	rate .87 (1123/60sec) water Hgt 66'
30	10	6.90	123.7us	20.5	cloudy	.75 gpm H_2O Hgt 68.6
40	15	7.00	124.3us	20.5	cloudy	.67 gpm 69.7
50	20	6.86	119.0us	20.6	cloudy	71.3
60	24	9.57	191.2	21.0	400ntu	Dripo Stopped now going Can not get water out of pump
	29	6.80	114.7us	20.7	140	.51 gpm
	35	6.87	115.6	21.1	95	.43 gpm
	40	6.81	114.0	21.1	100	.43 gpm
	45	6.78	114.2	21.1	33	.40 gpm
	50	6.80	114.2	21.5	65	after pumpout TD 76 63.87

→ DEVELOPMENT COMPLETION TIME 10 AM

TOTAL GALLONS REMOVED 57

LABORATORY DATA SHEETS

BORING B-1

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.: 20132A-01 Project Name: TID High Line Canal- Phase B Date: 6/14/2005
Sample No.: 1-2-1 Boring/Trench: B1 Depth, (ft.): 10.5 - 11.0 Tested By: BLP
Description: Olive Yellow (2.5Y 6/8) Silty Sand Checked By: JHA
Sample Location: Lab. No.: 5-244

Moisture Content Data:

Pan ID	40	
Pan Weight	21.65	(gm)
Wet Soil + Pan	110.14	(gm)
Dry Soil + Pan	95.65	(gm)
Water Weight	14.49	(gm)
Dry Soil Weight	74.00	(gm)
Moisture Conter	19.6	(%)

Total Material Sample Data:

Pan ID	M2	
Pan Weight	169.45	(gm)
Wet Soil + Pan Wt.	384.94	(gm)
Total Wet Weight	215.49	(gm)
Total Dry Weight	180.20	(gm)
Total Dry Wt. >#4 Sieve	0.00	(gm)
Total Dry Wt.<#4 Sieve	180.20	(gm)
Total Dry Wt. <#200 Sieve	28.90	(gm)
Total Percent <#200 Sieve	16.04	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Wet Weight Retained On Sieve (gm)	Dry Weight Retained On Sieve (gm)	Dry Weight Accum. On Sieve (gm)	Dry Weight Passing Sieve (gm)	Dry Weight Percent Passing (%)
6 Inch	6.0000	152.40			0.00	180.20	100.0
3 Inch	3.0000	76.20			0.00	180.20	100.0
2 Inch	2.0000	50.80			0.00	180.20	100.0
1.5 Inch	1.5000	38.10			0.00	180.20	100.0
1.0 Inch	1.0000	25.40			0.00	180.20	100.0
3/4 Inch	0.7500	19.05			0.00	180.20	100.0
1/2 Inch	0.5000	12.70			0.00	180.20	100.0
3/8 Inch	0.3750	9.53			0.00	180.20	100.0
#4	0.1870	4.75			0.00	180.20	100.0
PAN			215.49	180.20	180.20	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

Pan ID	M2	
Pan Weight	169.45	(gm)
Wet Soil + Pan	384.94	(gm)
Wet Soil	215.49	(gm)
Dry Soil	180.20	(gm)

#200 Wash Data:

Portion >#200 Sieve:	151.30	(gm)
Portion <#200 Sieve:	28.90	(gm)
Percent <#200 Sieve	16.04	(%)
Total Wt. <#200 Sieve	28.90	(gm)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight Rep. Sample Retained On Sieve (gm)	Dry Weight Rep. Sample Percent Retained (%)	Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
#10	0.079	2.000	0.20	0.11	0.20	0.20	99.9
#20	0.033	0.850	6.50	3.61	6.50	6.70	96.3
#40	0.017	0.425	43.10	23.92	43.10	49.80	72.4
#60	0.010	0.250	31.10	17.26	31.10	80.90	55.1
#100	0.006	0.150	34.00	18.87	34.00	114.90	36.2
#200	0.003	0.075	36.40	20.20	36.40	151.30	16.0
PAN			Discard				

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Particle Size Distribution

ASTM D422

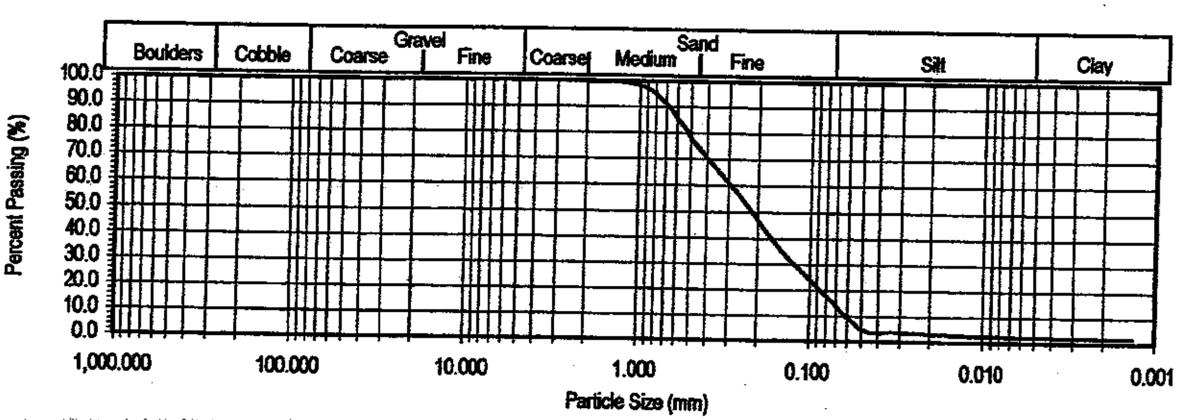
Project No.: **20132A-01** Project Name: **TID High Line Canal- Phase B** Date: **6/14/2005**
Sample No.: **B1-2-1** Boring/Trench: **B1** Depth, (ft.): **10.5 - 11.0** Tested By: **BLP**
Description: **Olive Yellow (2.5Y 6/8) Silty Sand** Checked By: **JHA**
Sample Location: Lab. No.: **5-244**

Sieve Size (U.S. Standard)	Particle Diameter: Inches (in.)	Particle Diameter: Millimeter (mm)	Dry Weight on Sieve: Retained On Sieve (gm)	Dry Weight on Sieve: Accumulated On Sieve (gm)	Dry Weight on Sieve: Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4		0.0	180.2	**100.0**
3 Inch	3.0000	76.2		0.0	180.2	**100.0**
2 Inch	2.0000	50.8		0.0	180.2	**100.0**
1.5 Inch	1.5000	38.1		0.0	180.2	**100.0**
1.0 Inch	1.0000	25.4		0.0	180.2	**100.0**
3/4 Inch	0.7500	19.1		0.0	180.2	**100.0**
1/2 Inch	0.5000	12.7		0.0	180.2	**100.0**
3/8 Inch	0.3750	9.5		0.0	180.2	**100.0**
#4	0.1870	4.7500		0.0	180.2	**100.0**
#10	0.0787	2.0000	0.20	0.2	180.0	**99.9**
#20	0.0335	0.8500	6.50	6.7	173.5	**96.3**
#40	0.0167	0.4250	43.10	49.8	130.4	**72.4**
#60	0.0098	0.2500	31.10	80.9	99.3	**55.1**
#100	0.0059	0.1500	34.00	114.9	65.3	**36.2**
#200	0.0030	0.0750	36.40	151.3	28.9	**16.0**
Hydrometer		0.0486				**4.6**
Hydrometer		0.0347				**4.0**
Hydrometer		0.0248				**3.5**
Hydrometer		0.0177				**3.0**
Hydrometer		0.0094				**2.5**
Hydrometer		0.0024				**2.0**
Hydrometer		0.0013				**2.0**

Cc = 0.39

Cu = 0.59

Particle Size Gradation



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Specific Gravity

ASTM D854

Project No.: 20132A-01 **Project Name:** TID High Line Canal- Phase B **Date:** 8/14/2005
Sample No.: 1-2-1 **Boring/Trench** B1 **Depth, ft.:** 10.5 - 11.0 **Tested By:** MLH
Description: Olive Yellow (2.5Y 6/8) Silty Sand **Checked By:** JHA
Sample Location: **Lab No.** 5-244

Test material screened on number 4 sieve Other
Sample Air or Oven Dried: oven
Type of fluid used in test: distilled

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	89.36	92.73	94.61	
Temperature in Celsius	25	25	25	
Weight of Bottle + Fluid	82.16	82.16	82.16	
Evaporating Dish Number	5T	AB	20	
Weight of Dish + Soil	33.37	39.41	42.16	
Weight of Dish	21.9	22.67	22.31	
Weight of Soil	11.47	16.74	19.85	
Specific Gravity of Fluid at Temp	0.99707	0.99707	0.99707	
Specific Gravity	2.68	2.71	2.67	0.00

Average Specific Gravity = 2.69

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PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132A-01 Project Name: TID High Line Canal- Phase B
Sample No. 1-2-1 Boring/Trench No.: B-1 Sample Depth (ft): 10.5 - 11.0
Sample Description Olive Yellow (2.5Y 6/8) Silty Sand
Date Tested: 6/9/2005 Tested By: MLH/BLP Checked By: JHA Lab No. 5-244
Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.90	5.45
Area	(cm^2)	18.86	23.33
Height	(cm)	9.64	6.67
Volume	(cm^3)	181.79	155.60
Wet Soil Weight	(gr)	287.34	304.30
Dry Soil Weight	(gr)	254.50	254.50
Water Weight	(gr)	32.84	49.80
Moisture Content	(%)	12.9	19.6
Dry Density	(pcf)	87.4	102.1
Void Ratio	(dim)	0.921	0.645
Saturation	(%)	37.7	81.7
Porosity	(%)	48.0	39.2
Relative Compactio	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	M2
Tare Weight	(gr)	169.45
Wet Soil + Tare Weight	(gr)	473.75
Dry Soil + Tare Weight	(gr)	423.95
Water Weight	(gr)	49.80
Dry Soil Weight	(gr)	254.50
Moisture Content	(%)	19.6
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.69

Avg. Permeability(Last Four Readings), K= 1.61E-05 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Skempton "B" Parameter = 95.00
Chamber (psi) = Sample Top and Bottom (psi) = Skempton "B" Parameter =

Consolidation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Average Consol. Pressure (psi) = 5.0

Permeation Test Phase:

Permeant = water Initial Hydraulic Gradient (cm/cm) = 13.34
Chamber (psi) = 65.0 Sample Top (psi) = 59.0 Sample Bottom (psi) = 61.0

PERMEATION TEST DATA

Time Data			Burrett Readings			Temp.	Permeability	Restart	Comments
Date	Clock Time	Elapsed Time	Bottom (Inflow)	Top (Outflow)	Chamber	Degree Celcius		Test	
(m/d/y h:m am/pm)	(h:m)	(sec)	(cm)	(cm)	(cm)	(C)	(cm/s)	(Yes or No)	
15:16	3:16 PM	0	26.00	25.10	27.00	20.50		Yes	
15:31	3:31 PM	900	13.20	38.20	26.80	20.50	5.7E-05		
15:32	3:32 PM	0	49.40	2.00	26.60	20.50		Yes	Test Restart
15:47	3:47 PM	900	39.90	11.70	26.60	20.50	3.0E-05		
16:03	4:03 PM	960	32.80	18.90	26.50	20.50	2.3E-05		
16:19	4:19 PM	960	25.70	26.00	26.50	20.50	2.5E-05		
16:44	4:44 PM	1,500	18.80	33.10	26.40	20.50	1.8E-05		
16:59	4:59 PM	900	15.20	36.70	26.30	20.50	1.7E-05		
17:14	5:14 PM	900	12.00	40.00	26.30	20.50	1.6E-05		
17:29	5:29 PM	900	9.20	42.80	26.30	20.50	1.4E-05		
		0							
		0							
		0							
		0							
		0							
		0							
		0							
		0							

Organic Content

ASTM D2974

Project No.:	20132A-01 Project Nan TID High Line Canal- Phase B		Date: 6/15/2005
Sample No.:	1-2-1 Boring/Tren B1	Depth, (ft.): 10.5 - 11.0	Tested By: BLP
Description:	Olive Yellow (2.5Y 6/8) Silty Sand		Checked By: JHA
Sample Location:			Lab. No.: 5-244

Organic Content/ASTM D2974

Pan ID	Q				
Pan Weight	151.37				
Pan Weight + Oven Dried Soil	224.65				
Soil Weight	73.28				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Mass	224	223.89	223.47	223.29	223.29
Ash	0.65	0.76	1.18	1.36	1.36
Best Mass of Ash	1.36				
Ash Content	1.855895				
Organic Matter	1.86%				

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.:	20132A-01	Project Name:	TID High Line Canal - Phase B	Date:	6/14/2005
Sample No.:	1-4-1	Boring/Trench: B1	Depth, (ft.): 20.5 - 21.0	Tested By:	MLH/BLP
Description:	Yellowish Brown (10YR 5/6) Sandy Silt			Checked By:	JHA
Sample Location:				Lab. No.:	5-244

Moisture Content Data:

Pan ID	19	
Pan Weight	100.09	(gm)
Wet Soil + Pan	164.09	(gm)
Dry Soil + Pan	149.62	(gm)
Water Weight	14.47	(gm)
Dry Soil Weight	49.53	(gm)
Moisture Conter	29.2	(%)

Total Material Sample Data:

Pan ID	K	
Pan Weight	160.60	(gm)
Wet Soil + Pan Wt.	351.05	(gm)
Total Wet Weight	190.45	(gm)
Total Dry Weight	147.39	(gm)
Total Dry Wt. >#4 Sieve	0.00	(gm)
Total Dry Wt.<#4 Sieve	147.39	(gm)
Total Dry Wt. <#200 Sieve	86.19	(gm)
Total Percent <#200 Sieve	58.48	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter		Wet Weight	Dry Weight			
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Retained On Sieve (gm)	Accum. On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.40			0.00	147.39	100.0
3 Inch	3.0000	76.20			0.00	147.39	100.0
2 Inch	2.0000	50.80			0.00	147.39	100.0
1.5 Inch	1.5000	38.10			0.00	147.39	100.0
1.0 Inch	1.0000	25.40			0.00	147.39	100.0
3/4 Inch	0.7500	19.05			0.00	147.39	100.0
1/2 Inch	0.5000	12.70			0.00	147.39	100.0
3/8 Inch	0.3750	9.53			0.00	147.39	100.0
#4	0.1870	4.75			0.00	147.39	100.0
PAN			190.45	147.39	147.39	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

Pan ID	K	
Pan Weight	160.60	(gm)
Wet Soil + Pan	351.05	(gm)
Wet Soil	190.45	(gm)
Dry Soil	147.39	(gm)

#200 Wash Data:

Portion >#200 Sieve:	61.20	(gm)
Portion <#200 Sieve:	86.19	(gm)
Percent <#200 Sieve	58.48	(%)
Total Wt. <#200 Sieve	86.19	(gm)

Sieve Size	Particle Diameter		Dry Weight Rep. Sample		Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Percent Retained (%)			
#10	0.079	2.000	0.60	0.41	0.60	0.60	99.6
#20	0.033	0.850	1.70	1.15	1.70	2.30	98.4
#40	0.017	0.425	15.80	10.72	15.80	18.10	87.7
#60	0.010	0.250	24.30	16.49	24.30	42.40	71.2
#100	0.006	0.150	9.40	6.38	9.40	51.80	64.9
#200	0.003	0.075	9.40	6.38	9.40	61.20	58.5
PAN			Discard				

HOLDREGE & KULL

Particle Size Distribution

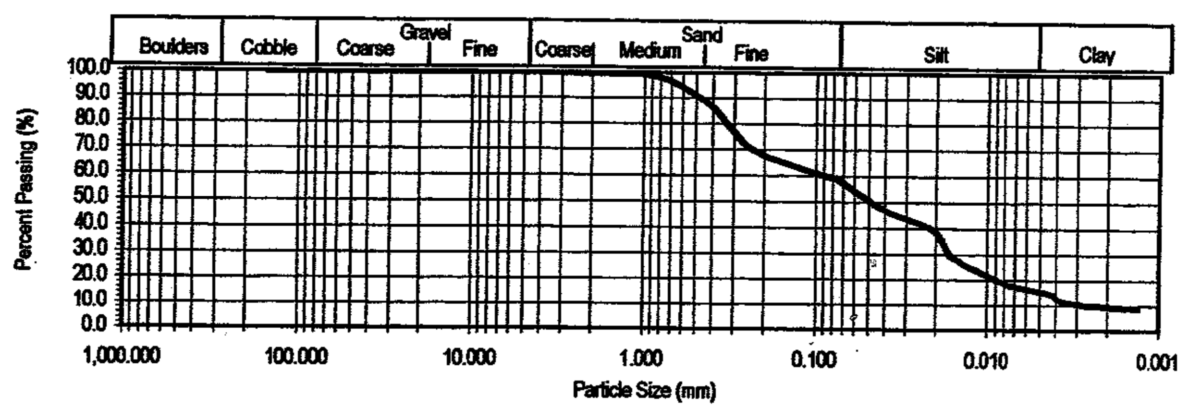
ASTM D422

Project No.: **20132A-01** Project Name: **TID High Line Canal - Phase B** Date: **6/14/2005**
Sample No.: **1-4-1** Boring/Trench: **B1** Depth, (ft.): **20.5 - 21.0** Tested By: **MLH/BLP**
Description: **Yellowish Brown (10YR 5/6) Sandy Silt** Checked By: **JHA**
Sample Location: Lab. No.: **5-244**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Millimeter (mm)	Dry Weight on Sieve: Retained On Sieve (gm)	Accumulated On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4		0.0	147.4	100.0
3 Inch	3.0000	76.2		0.0	147.4	100.0
2 Inch	2.0000	50.8		0.0	147.4	100.0
1.5 Inch	1.5000	38.1		0.0	147.4	100.0
1.0 Inch	1.0000	25.4		0.0	147.4	100.0
3/4 Inch	0.7500	19.1		0.0	147.4	100.0
1/2 Inch	0.5000	12.7		0.0	147.4	100.0
3/8 Inch	0.3750	9.5		0.0	147.4	100.0
#4	0.1870	4.7500		0.0	147.4	100.0
#10	0.0787	2.0000	0.60	0.6	146.8	99.6
#20	0.0335	0.8500	1.70	2.3	145.1	98.4
#40	0.0167	0.4250	15.80	18.1	129.3	87.7
#60	0.0098	0.2500	24.30	42.4	105.0	71.2
#100	0.0059	0.1500	9.40	51.8	95.6	64.9
#200	0.0030	0.0750	9.40	61.2	86.2	58.5
Hydrometer		0.0403				47.1
		0.0212				39.8
		0.0170				30.7
		0.0161				28.8
		0.0088				19.7
		0.0072				17.8
		0.0055				16.0
		0.0042				14.2
		0.0039				12.4
		0.0030				10.5
		0.0013				8.7

Cc = 34.95

Cu = 3.06



HOLDREGE & KULL

Specific Gravity

ASTM D854

Project No.: 20132A-01 **Project Name:** TID High Line Canal - Phase B **Date:** 6/14/2005
Sample No.: 1-4-1 **Boring/Trench** B1 **Depth, ft.:** 20.5 - 21.0 **Tested By:** MLH
Description: Yellowish Brown (10YR 5/6) Sandy Silt **Checked By:** JHA
Sample Location: **Lab No.** 5-244

Test material screened on number 4 sieve Other
Sample Air or Oven Dried: oven
Type of fluid used in test: distilled

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	92.17	94.46	90.17	
Temperature in Celsius	25	25	25	
Weight of Bottle + Fluid	82.16	82.16	82.16	
Evaporating Dish Number	OM	26	12	
Weight of Dish + Soil	38.28	41.91	34.85	
Weight of Dish	22.29	22.31	22.08	
Weight of Soil	15.99	19.60	12.77	
Specific Gravity of Fluid at Temp	0.99707	0.99707	0.99707	
Specific Gravity	2.67	2.68	2.67	0.00

Average Specific Gravity = 2.67

PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132A-01 Project Name: TID High Line Canal- Phase B

Sample No.: 1-4-1 Boring/Trench No.: B1 Sample Depth (ft): 20.5 - 21.0

Sample Description: Yellowish Brown (10YR 5/6) Sandy Silt

Date Tested: 6/9/2005 Tested By: MLH Checked By: JHA Lab No. 5-244

Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.90	5.15
Area	(cm^2)	18.86	20.83
Height	(cm)	7.54	6.80
Volume	(cm^3)	142.18	141.65
Wet Soil Weight	(gr)	245.79	256.57
Dry Soil Weight	(gr)	198.65	198.65
Water Weight	(gr)	47.14	57.92
Moisture Content	(%)	23.7	29.2
Dry Density	(pcf)	87.2	87.6
Void Ratio	(dim)	0.911	0.904
Saturation	(%)	69.5	86.1
Porosity	(%)	47.7	47.5
Relative Compactio	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	K
Tare Weight	(gr)	160.60
Wet Soil + Tare Weight	(gr)	417.17
Dry Soil + Tare Weight	(gr)	359.25
Water Weight	(gr)	57.92
Dry Soil Weight	(gr)	198.65
Moisture Content	(%)	29.2
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.67

Avg. Permeability(Last Four Readings), K= 3.49E-06 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Skempton "B" Parameter = 95.00

Chamber (psi) = Sample Top and Bottom (psi) = Skempton "B" Parameter =

Consolidation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Average Consol. Pressure (psi) = 5.0

Permeation Test Phase:

Permeant =

Initial Hydraulic Gradient (cm/cm) = 18.52

Chamber (psi) = 65.0 Sample Top (psi) = 59.0 Sample Bottom (psi) = 61.0

PERMEATION TEST DATA

Time Data			Burrett Readings			Temp.	Permeability	Restart	Comments
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Degree Celcius (C)	(cm/s)	Test (Yes or No)	
6:50	6:50 AM	0	30.50	29.80	31.90	20.50		Yes	
7:12	7:12 AM	1,320	28.80	31.50	31.40	20.50	3.7E-06		
7:27	7:27 AM	900	27.70	32.50	31.40	20.50	3.4E-06		
7:42	7:42 AM	900	26.60	33.60	31.40	20.50	3.6E-06		
7:57	7:57 AM	900	25.50	34.70	31.40	20.50	3.7E-06		
8:14	8:14 AM	1,020	24.50	35.80	31.40	20.50	3.1E-06		
8:29	8:29 AM	900	23.50	36.90	31.40	20.50	3.6E-06		
8:44	8:44 AM	900	22.50	37.80	31.30	20.50	3.3E-06		
8:59	8:59 AM	900	21.50	38.90	31.30	20.50	3.7E-06		
9:14	9:14 AM	900	20.50	39.90	31.30	20.50	3.6E-06		
9:29	9:29 AM	900	19.50	40.70	31.20	20.50	3.3E-06		
		0							
		0							
		0							
		0							
		0							
		0							
		0							
		0							

Organic Content

ASTM D2974

Project No.:	20132A-01	Project Nan	TID High Line Canal - Phase B	Date:	8/14/2005
Sample No.:	1-4-1	Boring/Tren B1	Depth, (ft.): 20.5 - 21.0	Tested By:	BLP
Description:	Yellowish Brown (10YR 5/6) Sandy Silt			Checked By:	JHA
Sample Location:				Lab. No.:	5-244

Organic Content/ASTM D2974

Pan ID	A8				
Pan Weight	163.32				
Pan Weight + Oven Dried Soil	211.58				
Soil Weight	48.26				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Mass	210.7	210.7			
Ash	0.88	0.88	211.58	211.58	211.58
Best Mass of Ash	0.88				
Ash Content	1.823456				
Organic Matter	1.82%				

BORING B-2

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.:	20132A-01	Project Name:	TID High Line Canal- Phase B	Date:	5/19/2005
Sample No.:	2-4-2	Boring/Trench: B-2	Depth, (ft.): 20.5-21.0	Tested By:	MLH/BLP
Description:	Reddish Yellow (7.5YR 6/8) Poorly Graded Sand with Silt			Checked By:	JHA
Sample Location:				Lab. No.:	5-186

Moisture Content Data:

Pan ID	31	
Pan Weight	33.10	(gm)
Wet Soil + Pan	92.10	(gm)
Dry Soil + Pan	91.70	(gm)
Water Weight	0.40	(gm)
Dry Soil Weight	58.60	(gm)
Moisture Conter	0.7	(%)

Total Material Sample Data:

Pan ID	0	
Pan Weight	0.00	(gm)
Wet Soil + Pan Wt.	390.20	(gm)
Total Wet Weight	390.20	(gm)
Total Dry Weight	387.55	(gm)
Total Dry Wt. >#4 Sieve	0.00	(gm)
Total Dry Wt.<#4 Sieve	387.55	(gm)
Total Dry Wt. <#200 Sieve	149.67	(gm)
Total Percent <#200 Sieve	38.62	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter		Wet Weight	Dry Weight			
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Retained On Sieve (gm)	Accum. On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.40			0.00	387.55	100.0
3 Inch	3.0000	76.20			0.00	387.55	100.0
2 Inch	2.0000	50.80			0.00	387.55	100.0
1.5 Inch	1.5000	38.10			0.00	387.55	100.0
1.0 Inch	1.0000	25.40			0.00	387.55	100.0
3/4 Inch	0.7500	19.05			0.00	387.55	100.0
1/2 Inch	0.5000	12.70			0.00	387.55	100.0
3/8 Inch	0.3750	9.53			0.00	387.55	100.0
#4	0.1870	4.75			0.00	387.55	100.0
PAN			390.20	387.55	387.55	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

Pan ID	2	
Pan Weight	150.80	(gm)
Wet Soil + Pan	492.20	(gm)
Wet Soil	341.40	(gm)
Dry Soil	339.09	(gm)

#200 Wash Data:

Portion >#200 Sieve:	208.13	(gm)
Portion <#200 Sieve:	130.96	(gm)
Percent <#200 Sieve	38.62	(%)
Total Wt. <#200 Sieve	149.67	(gm)

Sieve Size	Particle Diameter		Dry Weight Rep. Sample		Total Sample	Accum.	Total
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Percent Retained (%)	Weight Retained (gm)	Grand Total On Sieve (gm)	Percent Passing (%)
#10	0.079	2.000	0.00	0.00	0.00	0.00	100.0
#20	0.033	0.850	0.67	0.20	0.77	0.77	99.8
#40	0.017	0.425	10.67	3.15	12.20	12.96	96.7
#60	0.010	0.250	37.94	11.19	43.36	56.32	85.5
#100	0.006	0.150	86.24	25.43	98.57	154.89	60.0
#200	0.003	0.075	72.61	21.41	82.99	237.88	38.6
PAN			Discard				

HOLDREGE & KULL

Particle Size Distribution

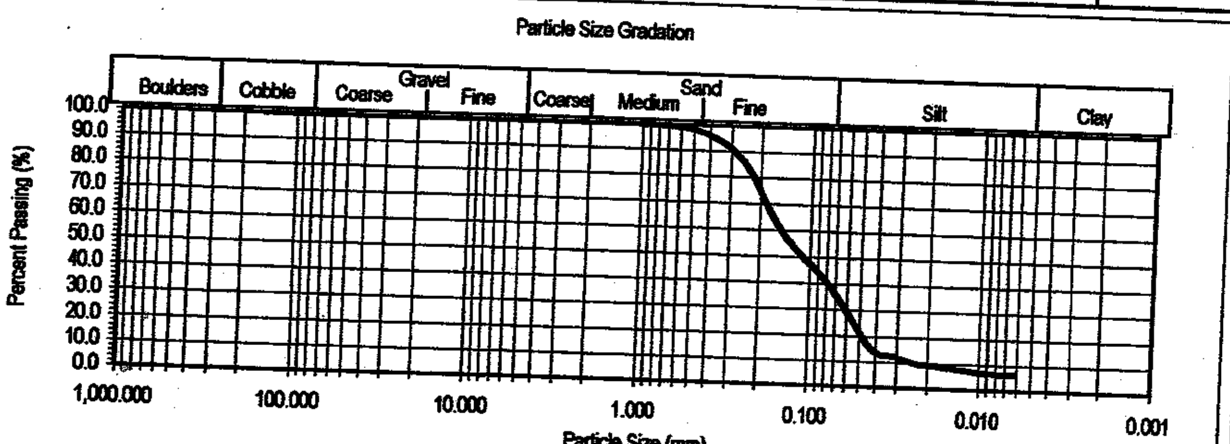
ASTM D422

Project No.: **20132A-01** Project Name: **TID High Line Canal- Phase B**
Sample No.: **2-4-2** Boring/Trench: **B-2** Depth, (ft.): **20.5-21.0** Date: **5/19/2005**
Description: **Reddish Yellow (7.5YR 6/8) Poorly Graded Sand with Silt** Tested By: **MLH/BLP**
Sample Location: Checked By: **JHA**
Lab. No.: **5-186**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4		0.0	387.6	**100.0**
3 Inch	3.0000	76.2		0.0	387.6	**100.0**
2 Inch	2.0000	50.8		0.0	387.6	**100.0**
1.5 Inch	1.5000	38.1		0.0	387.6	**100.0**
1.0 Inch	1.0000	25.4		0.0	387.6	**100.0**
3/4 Inch	0.7500	19.1		0.0	387.6	**100.0**
1/2 Inch	0.5000	12.7		0.0	387.6	**100.0**
3/8 Inch	0.3750	9.5		0.0	387.6	**100.0**
#4	0.1870	4.7500		0.0	387.6	**100.0**
#10	0.0787	2.0000	0.00	0.0	387.6	**100.0**
#20	0.0335	0.8500	0.77	0.0	387.6	**100.0**
#40	0.0167	0.4250	12.20	0.8	386.8	**99.8**
#60	0.0098	0.2500	43.36	13.0	374.6	**96.7**
#100	0.0059	0.1500	98.57	56.3	331.2	**85.5**
#200	0.0030	0.0750	82.99	154.9	232.7	**60.0**
				237.9	149.7	**38.6**
Hydrometer		0.0430				**15.3**
		0.0314				**12.6**
		0.0229				**9.8**
		0.0175				**8.9**
		0.0103				**7.1**
		0.0061				**6.2**

Cc = 111.91

Cu = 6.55



HOLDREGE & KULL

Specific Gravity

ASTM D854

Project No.: 20132A-01 **Project Name:** TID High Line Canal - Phase B **Date:** 5/24/2005
Sample No.: 2-4-2 **Boring/Trench** B-2 **Depth, ft.:** 20.5-21.0 **Tested By:** BLP
Description: Reddish Yellow (7.5YR 6/8) Poorly Graded Sand with Silt **Checked By:** JHA
Sample Location: **Lab No.** 5-186

Test material screened on number 4 sieve Other
Sample Air or Oven Dried: air
Type of fluid used in test distilled

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	152.33	150.8	153.6	
Temperature in Celsius	20.5	22	22	
Weight of Bottle + Fluid	144.21	144.21	144.21	
Evaporating Dish Number	A6	32	Q	
Weight of Dish + Soil	169.63	44.96	166.48	
Weight of Dish	156.63	34.25	151.5	
Weight of Soil	13.00	10.71	14.98	
Specific Gravity of Fluid at Temp	0.99812	0.9978	0.9978	
Specific Gravity	2.66	2.59	2.67	0.00

Average Specific Gravity = 2.64

Holdrege & Kull

20132A-01 5-186 2-4-1.xlsspecific gravity (2-4-2a)

PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132A-01
Project Name: TID High Line Canal- Phase B
Sample No. 2-4-1
Boring/Trench No.: B-2
Sample Depth (ft): 21.0-21.5
Sample Description Reddish Yellow (7.5YR 6/8) Poorly Graded Sand with Silt
Date Tested: 5/23/2005
Tested By: MLH
Checked By: JHA
Lab No. 5-186
Special Notes: Very Disturbed (loose sample)

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.90	5.20
Area	(cm^2)	18.86	20.34
Height	(cm)	5.00	4.60
Volume	(cm^3)	94.29	93.56
Wet Soil Weight	(gr)	174.80	177.03
Dry Soil Weight	(gr)	142.79	142.79
Water Weight	(gr)	32.01	34.24
Moisture Content	(%)	22.4	24.0
Dry Density	(pcf)	94.5	95.3
Void Ratio	(dim)	0.743	0.730
Saturation	(%)	79.6	86.7
Porosity	(%)	42.6	42.2
Relative Compactio	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	EZ1
Tare Weight	(gr)	156.67
Wet Soil + Tare Weight	(gr)	333.70
Dry Soil + Tare Weight	(gr)	299.46
Water Weight	(gr)	34.24
Dry Soil Weight	(gr)	142.79
Moisture Content	(%)	24.0
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.64

Avg. Permeability(Last Four Readings), K= 2.4E-05 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:
Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Skempton "B" Parameter = 95.00
Chamber (psi) = Sample Top and Bottom (psi) = Skempton "B" Parameter =

Consolidation Test Phase:
Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Average Consol. Pressure (psi) = 5.0

Permeation Test Phase:
Permeant = water
Initial Hydraulic Gradient (cm/cm) = 13.88
Chamber (psi) = 65.0 Sample Top (psi) = 59.0 Sample Bottom (psi) = 60.0

PERMEATION TEST DATA

Time Data			Burrett Readings						
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Temp. Degree Celcius (C)	Permeability (cm/s)	Restart Test (Yes or No)	Comments
5/23/2005	12:55 PM	0	15.10	10.10	27.10	23.50			
5/23/2005	1:17 PM	1,320	9.30	16.10	27.10	23.50		Yes	
5/23/2005	1:21 PM	240	3.80	21.50	27.10	23.50	1.6E-05		
5/23/2005	1:24 PM	0	47.70	4.70	27.10	23.50	9.5E-05		
5/23/2005	1:38 PM	840	39.00	13.30	27.10	23.50		yes	Test Restart
5/23/2005	1:50 PM	720	32.70	19.10	27.10	23.50	2.4E-05		
5/23/2005	2:01 PM	660	27.70	24.60	27.20	24.00	2.3E-05		
5/23/2005	2:12 PM	660	22.90	29.30	27.20	24.00	2.4E-05		
5/23/2005	2:24 PM	720	19.20	33.00	27.20	24.00	2.5E-05		
5/23/2005	2:35 PM	660	14.90	36.70	27.20	24.00	2.1E-05		
5/23/2005	2:47 PM	720	12.30	39.80	27.20	24.00	2.8E-05		
		0					2.1E-05		
		0							
		0							
		0							
		0							
		0							
		0							
		0							

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.:	20132A-01	Project Name:	TID Highline Canal- Phase B	Date:	6/15/2005
Sample No.:	2-5-1	Boring/Trench: B2	Depth, (ft.): 25.0 - 25.5	Tested By:	BLP/MLH
Description:	Light Brownish Gray (2.5Y 6/2) Poorly Graded Fine Sand			Checked By:	JHA
Sample Location:				Lab. No.:	5-244

Moisture Content Data:			Total Material Sample Data:		
			Pan ID	AS	
			Pan Weight	166.94	(gm)
Pan ID	33T		Wet Soil + Pan Wt.	336.78	(gm)
Pan Weight	21.99	(gm)	Total Wet Weight	169.84	(gm)
Wet Soil + Pan	109.98	(gm)	Total Dry Weight	130.14	(gm)
Dry Soil + Pan	89.41	(gm)	Total Dry Wt. >#4 Sieve	0.00	(gm)
Water Weight	20.57	(gm)	Total Dry Wt.<#4 Sieve	130.14	(gm)
Dry Soil Weight	67.42	(gm)	Total Dry Wt. <#200 Sieve	1.94	(gm)
Moisture Conter	30.5	(%)	Total Percent <#200 Sieve	1.49	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Wet Weight Retained On Sieve (gm)	Dry Weight Retained On Sieve (gm)	Dry Weight Accum. On Sieve (gm)	Dry Weight Passing Sieve (gm)	Dry Weight Percent Passing (%)
6 Inch	6.0000	152.40			0.00	130.14	100.0
3 Inch	3.0000	76.20			0.00	130.14	100.0
2 Inch	2.0000	50.80			0.00	130.14	100.0
1.5 Inch	1.5000	38.10			0.00	130.14	100.0
1.0 Inch	1.0000	25.40			0.00	130.14	100.0
3/4 Inch	0.7500	19.05			0.00	130.14	100.0
1/2 Inch	0.5000	12.70			0.00	130.14	100.0
3/8 Inch	0.3750	9.53			0.00	130.14	100.0
#4	0.1870	4.75			0.00	130.14	100.0
PAN			169.84	130.14	130.14	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

			#200 Wash Data:		
Pan ID	AS				
Pan Weight	166.94	(gm)	Portion >#200 Sieve:	128.20	(gm)
Wet Soil + Pan	336.78	(gm)	Portion <#200 Sieve:	1.94	(gm)
Wet Soil	169.84	(gm)	Percent <#200 Sieve	1.49	(%)
Dry Soil	130.14	(gm)	Total Wt. <#200 Sieve	1.94	(gm)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight Rep. Sample Retained On Sieve (gm)	Dry Weight Rep. Sample Percent Retained (%)	Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
#10	0.079	2.000	0.00	0.00	0.00	0.00	100.0
#20	0.033	0.850	1.10	0.85	1.10	1.10	99.2
#40	0.017	0.425	18.80	14.45	18.80	19.90	84.7
#60	0.010	0.250	52.80	40.57	52.80	72.70	44.1
#100	0.006	0.150	46.80	35.96	46.80	119.50	8.2
#200	0.003	0.075	8.70	6.69	8.70	128.20	1.5
PAN			Discard				

HOLDREGE & KULL

Specific Gravity

ASTM D854

Project No.: 20132A-01 **Project Name:** TID Highline Canal- Phase B **Date:** 6/15/2005
Sample No.: 2-5-1 **Boring/Trench** B2 **Depth, ft.:** 25.0 - 25.5 **Tested By:** MLH
Description: Light Brownish Gray (2.5Y 6/2) Poorly Graded Fine Sand **Checked By:** JHA
Sample Location: **Lab No.** 5-244

Test material screened on number 4 sieve Other
Sample Air or Oven Dried: oven
Type of fluid used in test: distilled

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	97.63	98.84	91.72	
Temperature in Celsius	24	24	24	
Weight of Bottle + Fluid	82.21	82.21	82.21	
Evaporating Dish Number	33	34	31	
Weight of Dish + Soil	57.68	59.34	48.48	
Weight of Dish	32.91	32.66	33.16	
Weight of Soil	24.77	26.68	15.32	
Specific Gravity of Fluid at Temp	0.99732	0.99732	0.99732	
Specific Gravity	2.64	2.65	2.63	0.00

Average Specific Gravity = 2.64

Holdrege & Kull

Organic Content

ASTM D2974

Project No.:	20132A-01	Project Nan	TID Highline Canal- Phase B	Date:	6/15/2005
Sample No.:	2-5-1	Boring/Tren	B2 Depth, (ft.): 25.0 - 25.5	Tested By:	MLH
Description:	Light Brownish Gray (2.5Y 6/2) Poorly Graded Fine Sand			Checked By:	JHA
Sample Location:				Lab. No.:	5-244

Organic Content/ASTM D2974

Pan ID	AO				
Pan Weight	97.23				
Pan Weight + Oven Dried Soil	137.51				
Soil Weight	40.28				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Mass	136.98	136.97			
Ash	0.53	0.54	137.51	137.51	137.51
Best Mass of Ash	0.54				
Ash Content	1.340616				
Organic Matter	1.34%				

Particle Size Distribution

ASTM D422

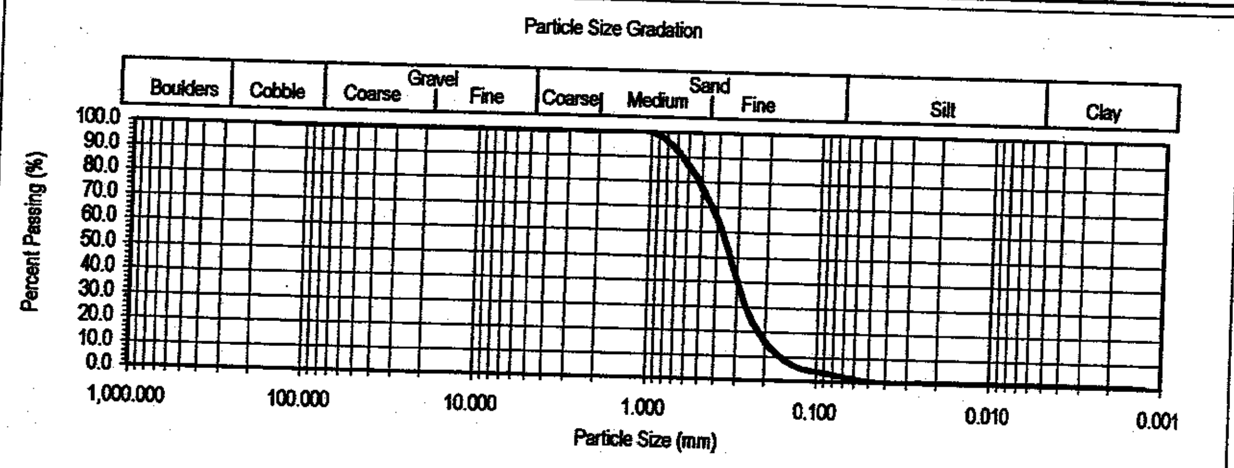
Project No.: **20132A-01** Project Name: **TID High Line Canal - Phase B**
Sample No.: **2-6-1** Boring/Trench: **B2** Depth, (ft.): **30.0 - 30.5**
Description: **Light Brownish Gray (2.5Y 6/2) Poorly Graded Sand**
Sample Location:

Date: **6/14/2005**
Tested By: **BLP/MLH**
Checked By: **JHA**
Lab. No.: **5-244**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4		0.0	154.2	**100.0**
3 Inch	3.0000	76.2		0.0	154.2	**100.0**
2 Inch	2.0000	50.8		0.0	154.2	**100.0**
1.5 Inch	1.5000	38.1		0.0	154.2	**100.0**
1.0 Inch	1.0000	25.4		0.0	154.2	**100.0**
3/4 Inch	0.7500	19.1		0.0	154.2	**100.0**
1/2 Inch	0.5000	12.7		0.0	154.2	**100.0**
3/8 Inch	0.3750	9.5		0.0	154.2	**100.0**
#4	0.1870	4.7500		0.0	154.2	**100.0**
#10	0.0787	2.0000	0.10	0.1	154.2	**100.0**
#20	0.0335	0.8500	3.50	3.6	154.1	**99.9**
#40	0.0167	0.4250	43.90	47.5	150.6	**97.7**
#60	0.0098	0.2500	65.60	113.1	106.7	**69.2**
#100	0.0059	0.1500	28.70	141.8	41.1	**26.7**
#200	0.0030	0.0750	8.20	150.0	12.4	**8.0**
Hydrometer		0.0459			4.2	**2.7**
		0.0268				**0.4**
		0.0156				**0.3**
		0.0060				**0.3**
		0.0015				**0.2**
		0.0012				**0.2**
						0.2

Cc = 1.14

Cu = 2.17



HOLDREGE & KULL

PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132A-01 Project Name: TID High Line Canal- Phase B
Sample No. 2-6-1 Boring/Trench No.: B2 Sample Depth (ft): 30.0 - 30.5
Sample Description Light Brownish Gray (2.5Y 6/2) Poorly Graded Sand
Date Tested: 6/13/2005 Tested By: MLH Checked By: JHA Lab No. 5-244
Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.90	5.58
Area	(cm^2)	18.86	24.45
Height	(cm)	7.00	5.32
Volume	(cm^3)	132.00	130.10
Wet Soil Weight	(gr)	210.34	213.15
Dry Soil Weight	(gr)	167.94	167.94
Water Weight	(gr)	42.40	45.21
Moisture Content	(%)	25.2	26.9
Dry Density	(pcf)	79.4	80.6
Void Ratio	(dim)	1.177	1.146
Saturation	(%)	59.4	65.1
Porosity	(%)	54.1	53.4
Relative Compactio	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	J
Tare Weight	(gr)	156.62
Wet Soil + Tare Weight	(gr)	369.77
Dry Soil + Tare Weight	(gr)	324.56
Water Weight	(gr)	45.21
Dry Soil Weight	(gr)	167.94
Moisture Content	(%)	26.9
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.77

Avg. Permeability(Last Four Readings), K= 2.1E-03 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:
Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Skempton "B" Parameter = 95.00
Chamber (psi) = Sample Top and Bottom (psi) = Skempton "B" Parameter =

Consolidation Test Phase:
Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Average Consol. Pressure (psi) = 5.0

Permeation Test Phase:
Permeant = water Initial Hydraulic Gradient (cm/cm) = 15.34
Chamber (psi) = 65.0 Sample Top (psi) = 60.0 Sample Bottom (psi) = 61.0

PERMEATION TEST DATA

Time Data			Burrett Readings			Temp.	Permeability	Restart	Comments
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Degree Celcius (C)	(cm/s)	Test (Yes or No)	
9:20:00	9:20 AM	0	50.00	0.30	24.40	25.50		Yes	Test Restart
9:20	9:20 AM	15	37.40	13.00	24.50	25.50	2.5E-03		
9:22	9:22 AM	0	50.00	0.20	24.50	27.00		Yes	Test Restart
9:22:15	9:22 AM	15	39.40	10.80	24.40	27.00	2.0E-03		
9:24:00	9:24 AM	0	50.00	0.10	24.40	27.00		Yes	Test Restart
9:24	9:24 AM	15	39.90	10.70	24.50	27.00	1.9E-03		
9:26	9:26 AM	0	50.00	0.20	24.50	27.00		Yes	Test Restart
9:26:15	9:26 AM	15	39.40	10.80	24.40	27.00	2.0E-03		
		0							
		0							
		0							
		0							
		0							
		0							
		0							
		0							
		0							
		0							

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.: **20132A-01** Project Name: **TID High Line Canal- Phase B** Date: **5/19/2005**
Sample No.: **2-7-2** Boring/Trench: **B-2** Depth, (ft.): **35.5-36.0** Tested By: **MLH/BLP**
Description: **Light Brownish Gray (10YR 6/2) Clayey Silt with Sand** Checked By: **JHA**
Sample Location: Lab. No.: **5-186**

Moisture Content Data:

Pan ID	11	
Pan Weight	92.80	(gm)
Wet Soil + Pan	133.70	(gm)
Dry Soil + Pan	133.20	(gm)
Water Weight	0.50	(gm)
Dry Soil Weight	40.40	(gm)
Moisture Conter	1.2	(%)

Total Material Sample Data:

Pan ID	0	
Pan Weight	0.00	(gm)
Wet Soil + Pan Wt.	426.30	(gm)
Total Wet Weight	426.30	(gm)
Total Dry Weight	421.09	(gm)
Total Dry Wt. >#4 Sieve	0.00	(gm)
Total Dry Wt.<#4 Sieve	421.09	(gm)
Total Dry Wt. <#200 Sieve	339.51	(gm)
Total Percent <#200 Sieve	80.63	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Wet Weight Retained On Sieve (gm)	Dry Weight Retained On Sieve (gm)	Dry Weight Accum. On Sieve (gm)	Dry Weight Passing Sieve (gm)	Dry Weight Percent Passing (%)
6 Inch	6.0000	152.40			0.00	421.09	100.0
3 Inch	3.0000	76.20			0.00	421.09	100.0
2 Inch	2.0000	50.80			0.00	421.09	100.0
1.5 Inch	1.5000	38.10			0.00	421.09	100.0
1.0 Inch	1.0000	25.40			0.00	421.09	100.0
3/4 Inch	0.7500	19.05			0.00	421.09	100.0
1/2 Inch	0.5000	12.70			0.00	421.09	100.0
3/8 Inch	0.3750	9.53			0.00	421.09	100.0
#4	0.1870	4.75			0.00	421.09	100.0
PAN					0.00	421.09	100.0
			426.30	421.09	421.09	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

Pan ID	A	
Pan Weight	158.80	(gm)
Wet Soil + Pan	400.90	(gm)
Wet Soil	242.10	(gm)
Dry Soil	239.14	(gm)

#200 Wash Data:

Portion >#200 Sieve:	46.33	(gm)
Portion <#200 Sieve:	192.81	(gm)
Percent <#200 Sieve	80.63	(%)
Total Wt. <#200 Sieve	339.51	(gm)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight Rep. Sample Retained On Sieve (gm)	Dry Weight Rep. Sample Percent Retained (%)	Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
#10	0.079	2.000	0.01	0.00	0.02	0.02	100.0
#20	0.033	0.850	0.07	0.03	0.12	0.14	100.0
#40	0.017	0.425	2.80	1.17	4.93	5.07	98.8
#60	0.010	0.250	3.73	1.56	6.57	11.64	97.2
#100	0.006	0.150	9.19	3.84	16.18	27.82	93.4
#200	0.003	0.075	30.53	12.77	53.76	81.58	80.6
PAN			Discard				

HOLDREGE & KULL

Specific Gravity

ASTM D854

Project No.: 20132A-01 **Project Name:** TID High Line Canal Phase B **Date:** 5/24/2005
Sample No.: 2-7-2 **Boring/Trench** B-2 **Depth, ft.:** 35.5-36.0 **Tested By:** BLP
Description: Light Brownish Gray (10YR 6/2) Clayey Silt with Sand **Checked By:** JHA
Sample Location: **Lab No.** 5-186

Test material screened on number 4 sieve Other
Sample Air or Oven Dried: air
Type of fluid used in test: distilled

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	146.72	149.09	665.36	
Temperature in Celsius	22	22	18.5	
Weight of Bottle + Fluid	143.9	143.9	664.21	
Evaporating Dish Number	33	34	C3	
Weight of Dish + Soil	37.81	41.25	287.69	
Weight of Dish	33.31	32.95	285.89	
Weight of Soil	4.50	8.30	1.80	
Specific Gravity of Fluid at Temp	0.9978	0.9978	0.99853	
Specific Gravity	2.67	2.66	2.77	0.00

Average Specific Gravity = 2.70

Holdrege & Kull

20132A-01 5-186 2-7-2a.xlsspecific gravity

Organic Content

ASTM D2974

Project No.:	20132A-01	Project Nan	TID High Line Canal- Phase B			Date:	5/25/2005
Sample No.:	2-7-2	Boring/Tren	B-2	Depth, (ft.):	35.5-36.0	Tested By:	LJC
Description:	Light Brownish Gray (10YR 6/2) Clayey Silt with Sand					Checked By:	JHA
Sample Location:						Lab. No.:	5-186

Pan ID	A4				
Pan Weight	152.76				
Pan Weight + Oven Dried Soi	162.5				
Soil Weight	9.74				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Mass	162.17	162.16	162.16		
Ash	0.33	0.34	0.34	162.5	162.5
(highest) Mass of Ash	0.34				
Ash Content	3.49076				
Organic Matter	3.49%				

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.: **20132A-01** Project Name: **TID Highline Canal- Phase B** Date: **6/15/2005**

Sample No.: **3-5-1** Boring/Trench: **B3** Depth, (ft.): **25.5 - 26.0** Tested By: **MLH/BLP**

Description: **Yellowish Brown (10YR 5/6) Poorly Graded Sand** Checked By: **JHA**

Sample Location: Lab. No.: **5-244**

Moisture Content Data:

Pan ID	AD	
Pan Weight	21.41	(gm)
Wet Soil + Pan	118.58	(gm)
Dry Soil + Pan	98.03	(gm)
Water Weight	20.55	(gm)
Dry Soil Weight	76.62	(gm)
Moisture Conter	26.8	(%)

Total Material Sample Data:

Pan ID	Y	
Pan Weight	152.52	(gm)
Wet Soil + Pan Wt.	386.25	(gm)
Total Wet Weight	233.73	(gm)
Total Dry Weight	184.30	(gm)
Total Dry Wt. >#4 Sieve	0.00	(gm)
Total Dry Wt.<#4 Sieve	184.30	(gm)
Total Dry Wt. <#200 Sieve	4.52	(gm)
Total Percent <#200 Sieve	2.45	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Wet Weight Retained On Sieve (gm)	Dry Weight Retained On Sieve (gm)	Dry Weight Accum. On Sieve (gm)	Dry Weight Passing Sieve (gm)	Dry Weight Percent Passing (%)
6 Inch	6.0000	152.40			0.00	184.30	100.0
3 Inch	3.0000	76.20			0.00	184.30	100.0
2 Inch	2.0000	50.80			0.00	184.30	100.0
1.5 Inch	1.5000	38.10			0.00	184.30	100.0
1.0 Inch	1.0000	25.40			0.00	184.30	100.0
3/4 Inch	0.7500	19.05			0.00	184.30	100.0
1/2 Inch	0.5000	12.70			0.00	184.30	100.0
3/8 Inch	0.3750	9.53			0.00	184.30	100.0
#4	0.1870	4.75			0.00	184.30	100.0
PAN			233.73	184.30	184.30	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

Pan ID	Y	
Pan Weight	152.52	(gm)
Wet Soil + Pan	386.25	(gm)
Wet Soil	233.73	(gm)
Dry Soil	184.30	(gm)

#200 Wash Data:

Portion >#200 Sieve:	179.78	(gm)
Portion <#200 Sieve:	4.52	(gm)
Percent <#200 Sieve	2.45	(%)
Total Wt. <#200 Sieve	4.52	(gm)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight Rep. Sample Retained On Sieve (gm)	Dry Weight Rep. Sample Percent Retained (%)	Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
#10	0.079	2.000	0.98	0.53	0.98	0.98	99.5
#20	0.033	0.850	47.00	25.50	47.00	47.98	74.0
#40	0.017	0.425	87.90	47.69	87.90	135.88	26.3
#60	0.010	0.250	28.00	15.19	28.00	163.88	11.1
#100	0.006	0.150	11.70	6.35	11.70	175.58	4.7
#200	0.003	0.075	4.20	2.28	4.20	179.78	2.5
PAN			Discard				

HOLDREGE & KULL

Specific Gravity

ASTM D854

Project No.: 20132A-01 **Project Name:** TID Highline Canal- Phase B **Date:** 6/15/2005
Sample No.: 3-5-1 **Boring/Trench** B3 **Depth, ft.:** 25.5 - 26.0 **Tested By:** BLP/EP
Description: Yellowish Brown (10YR 5/6) Poorly Graded Sand **Checked By:** JHA
Sample Location: **Lab No.** 5-244

Test material screened on number 4 sieve Other
Sample Air or Oven Dried: oven
Type of fluid used in test: distilled

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	88.82	87.93	87.73	
Temperature in Celsius	21	21	21	
Weight of Bottle + Fluid	82.22	82.22	82.22	
Evaporating Dish Number	32	5T	3PPO	
Weight of Dish + Soil	44.64	30.99	30.32	
Weight of Dish	34.38	22.05	21.62	
Weight of Soil	10.26	8.94	8.70	
Specific Gravity of Fluid at Temp	0.99802	0.99802	0.99802	
Specific Gravity	2.80	2.76	2.72	0.00

Average Specific Gravity = 2.76

Holdrege & Kull

Organic Content

ASTM D2974

Project No.:	20132A-01	Project Nan	TID Highline Canal- Phase B	Date:	6/15/2005
Sample No.:	3-5-1	Boring/Tren	B3	Depth, (ft.): 25.5 - 26.0	Tested By: MLH
Description:	Yellowish Brown (10YR 5/6) Poorly Graded Sand				Checked By: JHA
Sample Location:					Lab. No.: 5-244

Organic Content/ASTM D2974

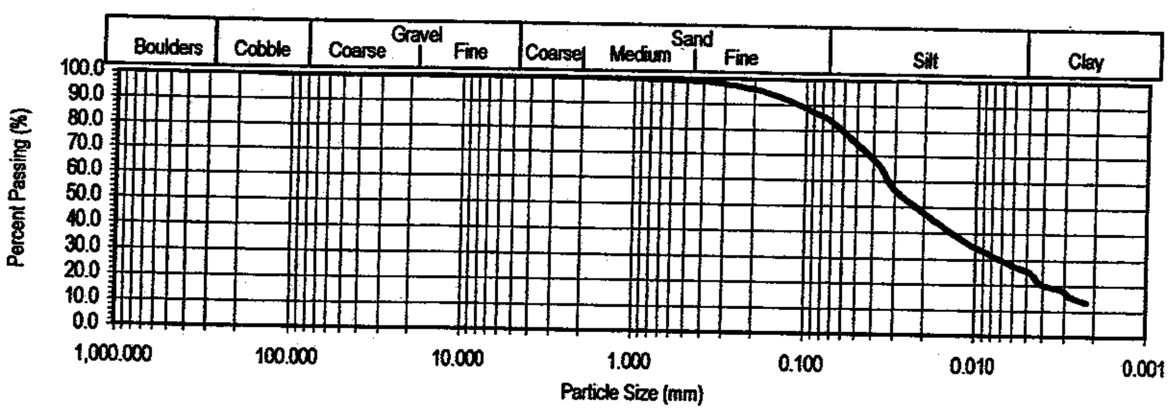
Pan ID	AO				
Pan Weight	97.35				
Pan Weight + Oven Dried Soil	116.74				
Soil Weight	19.39				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Mass	116.35	116.29	116.29		
Ash	0.39	0.45	0.45	116.74	116.74
Best Mass of Ash	0.45				
Ash Content	2.320784				
Organic Matter	2.32%				

Particle Size Distribution

ASTM D422

Project No.:	**20132A-01**	Project Name:	**TID High Line Canal- Phase B**	Date:	**5/19/2005**
Sample No.:	**3-11-1**	Boring/Trench: **B-3**	Depth, (ft.): **61.5-62.0**	Tested By:	**MLH/BLP**
Description:	**Light Brownish Gray (10YR 6/2) Clayey Silt with Sand**			Checked By:	**JHA**
Sample Location:				Lab. No.:	**5-186**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4		0.0	314.1	**100.0**
3 Inch	3.0000	76.2		0.0	314.1	**100.0**
2 Inch	2.0000	50.8		0.0	314.1	**100.0**
1.5 Inch	1.5000	38.1		0.0	314.1	**100.0**
1.0 Inch	1.0000	25.4		0.0	314.1	**100.0**
3/4 Inch	0.7500	19.1		0.0	314.1	**100.0**
1/2 Inch	0.5000	12.7		0.0	314.1	**100.0**
3/8 Inch	0.3750	9.5		0.0	314.1	**100.0**
#4	0.1870	4.7500		0.0	314.1	**100.0**
#10	0.0787	2.0000	0.12	0.1	314.0	**100.0**
#20	0.0335	0.8500	0.75	0.9	313.2	**99.7**
#40	0.0167	0.4250	2.68	3.5	310.5	**98.9**
#60	0.0098	0.2500	5.37	8.9	305.2	**97.2**
#100	0.0059	0.1500	11.11	20.0	294.1	**93.6**
#200	0.0030	0.0750	27.66	47.7	266.4	**84.8**
Hydrometer		0.0386				**67.7**
		0.0293				**55.9**
		0.0149				**41.8**
		0.0101				**34.7**
		0.0060				**27.7**
		0.0048				**25.3**
		0.0041				**20.6**
		0.0031				**18.3**
		0.0028				**15.9**
		0.0022				**13.5**



HOLDREGE & KULL

Specific Gravity

ASTM D854

Project No.: 20132A-01 **Project Name:** TID High Line Canal Phase B **Date:** 5/24/2005
Sample No.: 3-11-1 **Boring/Trench** B-3 **Depth, ft.:** 61.5-62.0 **Tested By:** BLP
Description: Light Brownish Gray (10YR 6/2) Clayey Silt with Sand **Checked By:** JHA
Sample Location: **Lab No.** 5-186

Test material screened on number 4 sieve Other
Sample Air or Oven Dried: air
Type of fluid used in test: distilled

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	148.12	148.06	664.98	
Temperature in Celsius	22	22	18.5	
Weight of Bottle + Fluid	143.9	143.9	664.21	
Evaporating Dish Number	BB	4	C7	
Weight of Dish + Soil	162.56	162.5	280.42	
Weight of Dish	156.23	155.73	279.08	
Weight of Soil	6.33	6.77	1.34	
Specific Gravity of Fluid at Temp	0.9978	0.9978	0.99853	
Specific Gravity	2.99	2.59	2.35	0.00

Average Specific Gravity = 2.64

Holdrege & Kull

Organic Content

ASTM D2974

Project No.:	20132A-01 Project Nan TID High Line Canal- Phase B	Date:	5/25/2005
Sample No.:	3-11-1 Boring/Tren B-3 Depth, (ft.): 61.1-62.0	Tested By:	LJC
Description:	Light Brownish Gray (10YR 6/2) Clayey Silt with Sand	Checked By:	JHA
Sample Location:		Lab. No.:	5-186

Organic Content/ASTM D2974

Pan ID	a-4				
Pan Weight	152.95				
Pan Weight + Oven Dried Soi	169.84				
Soil Weight	16.89				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Mass	167.48	167.44	167.44		
Ash	2.36	2.4	2.4	169.84	169.84
Max Mass of Ash	2.4				
Ash Content	14.20959				
Organic Matter	14.21%				

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.: **20132A-01** Project Name: **TID High Line Canal - Phase B** Date: **6/15/2005**
Sample No.: **4-3-1** Boring/Trench: **B4** Depth, (ft.): **16.0 - 16.5** Tested By: **LJC**
Description: **Light Brownish Gray (2.5Y 6/2) Poorly Graded Fine Sand with Silt** Checked By: **JHA**
Sample Location: Lab. No.: **5-244**

Moisture Content Data:

Pan ID	35	
Pan Weight	21.48	(gm)
Wet Soil + Pan	141.42	(gm)
Dry Soil + Pan	114.49	(gm)
Water Weight	26.93	(gm)
Dry Soil Weight	93.01	(gm)
Moisture Conter	29.0	(%)

Total Material Sample Data:

Pan ID	D	
Pan Weight	159.70	(gm)
Wet Soil + Pan Wt.	347.99	(gm)
Total Wet Weight	188.29	(gm)
Total Dry Weight	146.01	(gm)
Total Dry Wt. >#4 Sieve	0.00	(gm)
Total Dry Wt.<#4 Sieve	146.01	(gm)
Total Dry Wt. <#200 Sieve	13.70	(gm)
Total Percent <#200 Sieve	9.39	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Wet Weight Retained On Sieve (gm)	Dry Weight Retained On Sieve (gm)	Dry Weight Accum. On Sieve (gm)	Dry Weight Passing Sieve (gm)	Dry Weight Percent Passing (%)
6 Inch	6.0000	152.40	0.00	0.00	0.00	146.01	100.0
3 Inch	3.0000	76.20	0.00	0.00	0.00	146.01	100.0
2 Inch	2.0000	50.80	0.00	0.00	0.00	146.01	100.0
1.5 Inch	1.5000	38.10	0.00	0.00	0.00	146.01	100.0
1.0 Inch	1.0000	25.40	0.00	0.00	0.00	146.01	100.0
3/4 Inch	0.7500	19.05	0.00	0.00	0.00	146.01	100.0
1/2 Inch	0.5000	12.70	0.00	0.00	0.00	146.01	100.0
3/8 Inch	0.3750	9.53	0.00	0.00	0.00	146.01	100.0
#4	0.1870	4.75	0.00	0.00	0.00	146.01	100.0
PAN			188.29	146.01	146.01	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

Pan ID	D	
Pan Weight	159.70	(gm)
Wet Soil + Pan	347.99	(gm)
Wet Soil	188.29	(gm)
Dry Soil	146.01	(gm)

#200 Wash Data:

Portion >#200 Sieve:	132.31	(gm)
Portion <#200 Sieve:	13.70	(gm)
Percent <#200 Sieve	9.39	(%)
Total Wt. <#200 Sieve	13.70	(gm)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight Rep. Sample Retained On Sieve (gm)	Dry Weight Rep. Sample Percent Retained (%)	Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
#10	0.079	2.000	0.00	0.00	0.00	0.00	100.0
#20	0.033	0.850	0.06	0.04	0.06	0.06	100.0
#40	0.017	0.425	0.94	0.64	0.94	1.00	99.3
#60	0.010	0.250	30.27	20.73	30.27	31.27	78.6
#100	0.006	0.150	80.27	54.97	80.27	111.54	23.6
#200	0.003	0.075	20.77	14.22	20.77	132.31	9.4
PAN			Discard				

HOLDREGE & KULL

Specific Gravity

ASTM D854

Project No.: 20132A-01 **Project Name:** TID High Line Canal - Phase B **Date:** 6/15/2005
Sample No.: 4-3-1 **Boring/Trench** B4 **Depth, ft.:** 16.0 - 16.5 **Tested By:** LJC
Description: Light Brownish Gray (2.5Y 6/2) Poorly Graded Fine Sand with Silt **Checked By:** JHA
Sample Location: **Lab No.** 5-244

Test material screened on number 4 sieve Other
Sample Air or Oven Dried: oven
Type of fluid used in test: distilled

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	89.65	88.76	87.5	
Temperature in Celsius	23	23	23	
Weight of Bottle + Fluid	82.22	82.22	82.22	
Evaporating Dish Number	5	23	56	
Weight of Dish + Soil	45.32	46.1	39.87	
Weight of Dish	33.65	35.55	31.62	
Weight of Soil	11.67	10.55	8.25	
Specific Gravity of Fluid at Temp	0.99757	0.99757	0.99757	
Specific Gravity	2.75	2.62	2.77	0.00

Average Specific Gravity = 2.71

Holdrege & Kull

Organic Content

ASTM D2974

Project No.:	20132A-01 Project Nam TID High Line Canal - Phase B	Date:	6/15/2005
Sample No.:	4-3-1 Boring/Tren B4 Depth, (ft.): 16.0 - 16.5	Tested By:	MLH
Description:	Light Brownish Gray (2.5Y 6/2) Poorly Graded Fine Sand with Silt	Checked By:	JHA
Sample Location:		Lab. No.:	5-244

Organic Content/ASTM D2974

Pan ID	B60				
Pan Weight	239.27				
Pan Weight + Oven Dried Soi	332.53				
Soil Weight	93.26				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Mass	331.36	331.04	330.53	330.54	
Ash	1.17	1.49	2	1.99	332.53
Best Mass of Ash	2				
Ash Content	2.144542				
Organic Matter	2.14%				

Particle Size Distribution

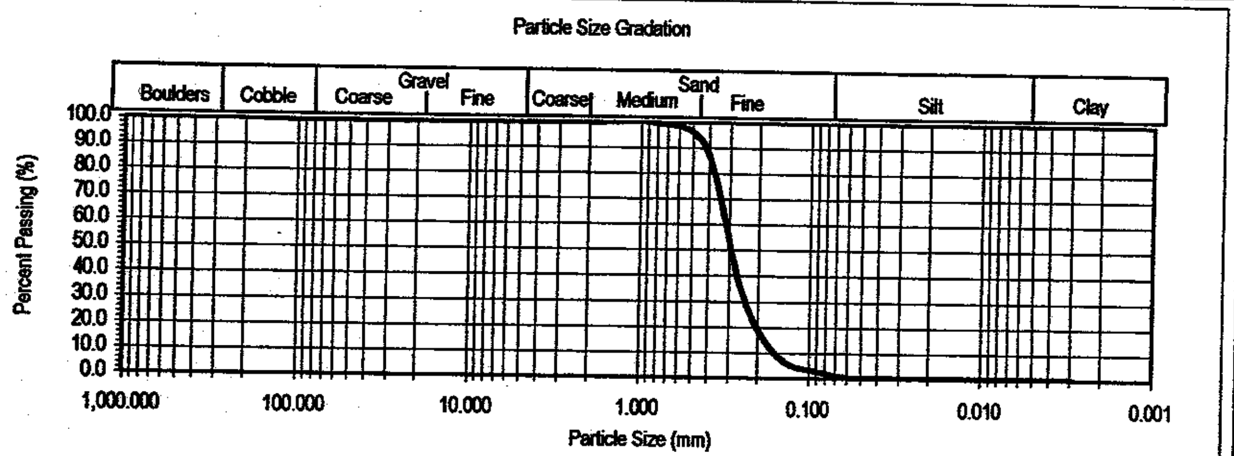
ASTM D422

Project No.: **20132A-01**	Project Name: **TID- High Line Canal Phase B**		Date: **6/1/2005**
Sample No.: **4-5-1**	Boring/Trench: **B-4**	Depth, (ft.): **26.0-26.5**	Tested By: **LJC**
Description: **Light Olive Brown (2.5Y 5/3) Poorly Graded Sand**			Checked By: **JHA**
Sample Location:			Lab. No.: **5-186**

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent Passing
(U.S. Standard)	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Accumulated On Sieve (gm)	Passing Sieve (gm)	(%)
6 Inch	6.0000	152.4		0.0	211.3	**100.0**
3 Inch	3.0000	76.2		0.0	211.3	**100.0**
2 Inch	2.0000	50.8		0.0	211.3	**100.0**
1.5 Inch	1.5000	38.1		0.0	211.3	**100.0**
1.0 Inch	1.0000	25.4		0.0	211.3	**100.0**
3/4 Inch	0.7500	19.1		0.0	211.3	**100.0**
1/2 Inch	0.5000	12.7		0.0	211.3	**100.0**
3/8 Inch	0.3750	9.5		0.0	211.3	**100.0**
#4	0.1870	4.7500		0.0	211.3	**100.0**
#10	0.0787	2.0000	0.00	0.0	211.3	**100.0**
#20	0.0335	0.8500	0.25	0.3	211.1	**100.0**
#40	0.0167	0.4250	18.97	19.2	192.1	**99.9**
#60	0.0098	0.2500	121.52	140.7	70.6	**90.9**
#100	0.0059	0.1500	53.13	193.9	17.5	**33.4**
#200	0.0030	0.0750	14.04	207.9	3.4	**8.3**
Hydrometer		0.0522				**1.6**
		0.0029				**0.2**
						0.2

Cc = 1.22

Cu = 2.00



HOLDREGE & KULL

PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132A-01 Project Name: TID- High Line Canal Phase B
Sample No. 4-5-1 Boring/Trench No.: B-4 Sample Depth (ft): 26.0-26.5
Sample Description Light Olive Brown (2.5Y 5/3) Poorly Graded Sand
Date Tested: 5/25/2005 Tested By: MLH Checked By: JHA Lab No. 5-186
Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.90	4.90
Area	(cm^2)	18.86	18.86
Height	(cm)	8.80	7.80
Volume	(cm^3)	165.95	147.09
Wet Soil Weight	(gr)	242.70	248.79
Dry Soil Weight	(gr)	220.97	220.97
Water Weight	(gr)	21.73	27.82
Moisture Content	(%)	9.8	12.6
Dry Density	(pcf)	83.1	93.8
Void Ratio	(dim)	0.990	0.764
Saturation	(%)	26.3	43.7
Porosity	(%)	49.8	43.3
Relative Compactio	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	JA3
Tare Weight	(gr)	156.02
Wet Soil + Tare Weight	(gr)	450.69
Dry Soil + Tare Weight	(gr)	376.99
Water Weight	(gr)	73.70
Dry Soil Weight	(gr)	220.97
Moisture Content	(%)	33.4
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.65

Avg. Permeability(Last Four Readings), K= 4.3E-04 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Skempton "B" Parameter = 95.00
Chamber (psi) = Sample Top and Bottom (psi) = Skempton "B" Parameter =

Consolidation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Average Consol. Pressure (psi) = 5.0

Permeation Test Phase:

Permeant = water Initial Hydraulic Gradient (cm/cm) = 10.43
Chamber (psi) = 65.0 Sample Top (psi) = 60.0 Sample Bottom (psi) = 61.0

PERMEATION TEST DATA

Time Data			Burrett Readings			Temp.	Permeability	Restart Test	Comments
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Degree Celcius (C)	(cm/s)	(Yes or No)	
5/23/2005	2:12 PM	0	47.00	1.10	10.60	24.00		Yes	
5/23/2005	2:17 PM	300	22.90	25.90	10.60	23.00	3.8E-04		
5/23/2005	2:18 PM	0	49.50	0.50	10.60	23.00		yes	Test Restart
5/23/2005	2:23 PM	300	23.00	26.50	10.50	23.00	4.1E-04		
5/23/2005	2:24 PM	0	49.30	0.60	10.60	23.00		yes	Test Restart
5/23/2005	2:32 PM	480	17.90	32.10	10.10	23.00	3.3E-04		
5/23/2005	2:33 PM	0	49.50	0.60	26.90	23.00		Yes	Test Restart
5/23/2005	2:41 PM	510	19.00	31.10	26.80	23.00	2.9E-04		
5/23/2005	2:42 PM	0	47.20	1.00	26.80	23.00		yes	Test Restart
5/23/2005	2:50 PM	480	13.10	35.20	26.80	23.00	3.8E-04		
5/23/2005	2:51 PM	0	48.00	1.50	26.80	23.00		yes	Test Restart
5/23/2005	2:59 PM	480	14.70	34.90	26.70	23.00	3.6E-04		
5/23/2005	3:00 PM	0	47.80	0.50	26.70	23.00		yes	Test Restart
5/23/2005	3:08 PM	480	9.60	39.00	26.70	23.00	4.4E-04		
5/23/2005	3:09 PM	0	49.20	2.30	26.70	23.00		yes	Test Restart
5/23/2005	3:18 PM	540	9.40	42.10	26.70	23.00	4.1E-04		
5/23/2005	3:19 PM	0	43.70	1.00	26.70	23.00		yes	Test Restart
5/23/2005	3:27 PM	480	4.00	40.90	26.70	23.00	4.9E-04		
		0							

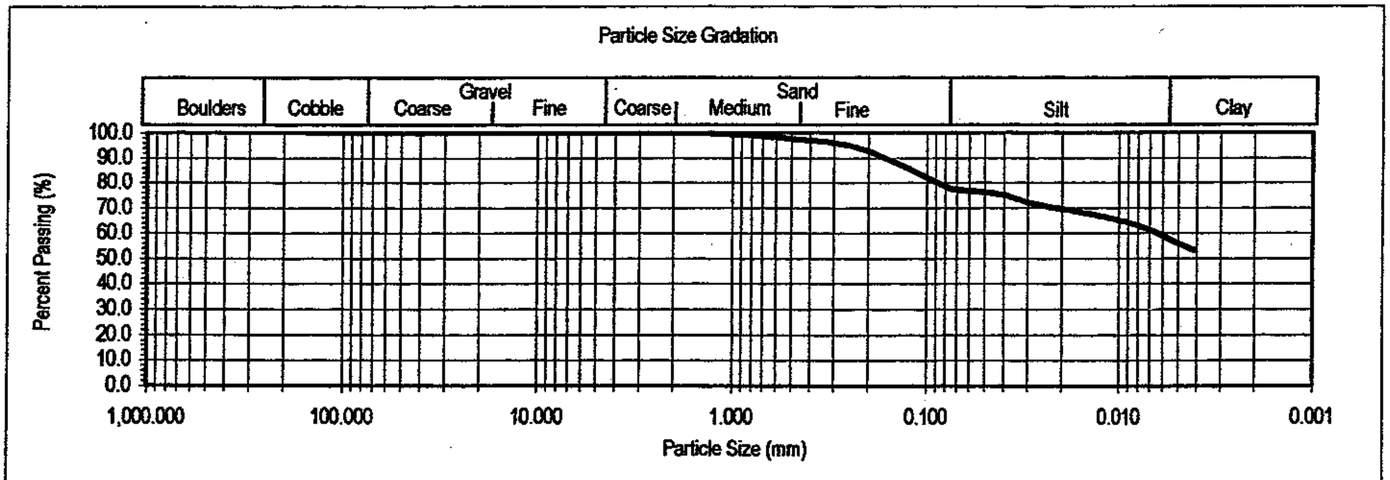
BORING B-5

Particle Size Distribution

ASTM D422

Project No.: **20132A-01** Project Name: **TID High Line Canal- Phase B** Date: **5/19/2005**
Sample No.: **5-9-2** Boring/Trench: **B-5** Depth, (ft.): **45.5 - 46.0** Tested By: **MLH/BLP**
Description: **Light Brownish Gray (10YR 6/2) Sandy Clay with Silt** Checked By: **JHA**
Sample Location: Lab. No.: **5-186**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4		0.0	385.5	**100.0**
3 Inch	3.0000	76.2		0.0	385.5	**100.0**
2 Inch	2.0000	50.8		0.0	385.5	**100.0**
1.5 Inch	1.5000	38.1		0.0	385.5	**100.0**
1.0 Inch	1.0000	25.4		0.0	385.5	**100.0**
3/4 Inch	0.7500	19.1		0.0	385.5	**100.0**
1/2 Inch	0.5000	12.7		0.0	385.5	**100.0**
3/8 Inch	0.3750	9.5		0.0	385.5	**100.0**
#4	0.1870	4.7500		0.0	385.5	**100.0**
#10	0.0787	2.0000	0.13	0.1	385.4	**100.0**
#20	0.0335	0.8500	2.60	2.7	382.8	**99.3**
#40	0.0167	0.4250	7.75	10.5	375.1	**97.3**
#60	0.0098	0.2500	9.43	19.9	365.6	**94.8**
#100	0.0059	0.1500	23.63	43.5	342.0	**88.7**
#200	0.0030	0.0750	42.61	86.1	299.4	**77.7**
Hydrometer		0.0402				**75.2**
		0.0288				**72.0**
		0.0108				**65.7**
		0.0077				**62.5**
		0.0062				**59.4**
		0.0051				**56.2**
		0.0041				**53.0**



HOLDREGE & KULL

PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132A-01
Project Name: TID High Line Canal- Phase B
Sample No. 5-9-1
Boring/Trench No.: B-5
Sample Depth (ft): 46.0 -46.5
Sample Description: Light Brownish Gray (10YR 6/2) Sandy Clay with Silt
Date Tested: 5/26/2005
Tested By: MLH
Checked By: JHA
Lab No. 5-186
Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.90	4.90
Area	(cm^2)	18.86	18.86
Height	(cm)	9.40	9.40
Volume	(cm^3)	177.26	177.26
Wet Soil Weight	(gr)	311.81	317.69
Dry Soil Weight	(gr)	216.87	216.87
Water Weight	(gr)	94.94	100.82
Moisture Content	(%)	43.8	46.5
Dry Density	(pcf)	76.4	76.4
Void Ratio	(dim)	1.248	1.248
Saturation	(%)	96.5	102.5
Porosity	(%)	55.5	55.5
Relative Compaction	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	FJ
Tare Weight	(gr)	156.94
Wet Soil + Tare Weight	(gr)	474.63
Dry Soil + Tare Weight	(gr)	373.81
Water Weight	(gr)	100.82
Dry Soil Weight	(gr)	216.87
Moisture Content	(%)	46.5
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.75

Avg. Permeability(Last Four Readings), K= 2.4E-07 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Skempton "B" Parameter = 95.00
Chamber (psi) = Sample Top and Bottom (psi) = Skempton "B" Parameter =

Consolidation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Average Consol. Pressure (psi) = 5.0

Permeation Test Phase:

Permeant =
Initial Hydraulic Gradient (cm/cm) = 12.08
Chamber (psi) = 65.0 Sample Top (psi) = 60.0 Sample Bottom (psi) = 61.0

PERMEATION TEST DATA

Time Data			Burrett Readings			Temp.	Permeability	Restart	Comments
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Degree Celcius (C)	(cm/s)	Test (Yes or No)	
5/26/2005	7:10 AM	0	47.90	4.20	14.00	22.00		Yes	
5/26/2005	8:10 AM	3,600	47.10	4.30	14.10	23.50	5.1E-07		
5/26/2005 9:10	9:10 AM	3,600	46.80	4.60	13.70	24.00	3.4E-07		
5/26/2005	10:11 AM	3,660	46.60	4.80	13.30	24.50	2.2E-07		
5/26/2005	11:10 AM	3,540	46.40	5.00	13.00	24.50	2.3E-07		
5/26/2005	12:10 PM	3,600	46.10	5.20	12.80	24.50	2.8E-07		
5/26/2005	1:10 PM	3,600	45.90	5.40	13.00	24.00	2.2E-07		
		0							
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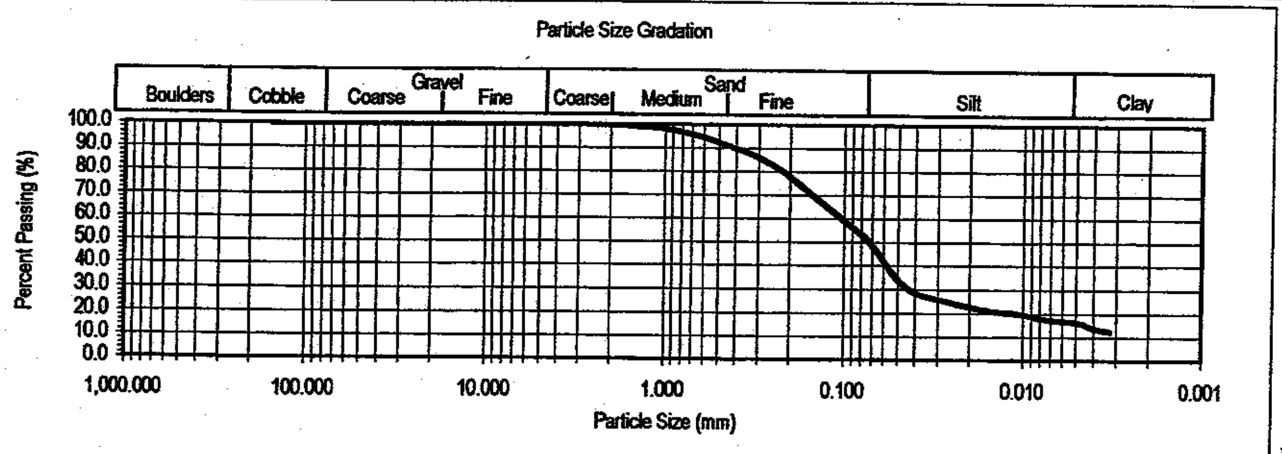
BORING B-6

Particle Size Distribution

ASTM D422

Project No.: **20132A-01** Project Name: **TID High Line Canal- Phase B** Date: **5/19/2005**
Sample No.: **6-5-2** Boring/Trench: **B-6** Depth, (ft.): **26.0-26.5** Tested By: **MLH/BLP**
Description: **Light Yellowish Brown (10YR 6/4) Sandy Silt** Checked By: **JHA**
Sample Location: Lab. No.: **5-186**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4		0.0	485.9	**100.0**
3 Inch	3.0000	76.2		0.0	485.9	**100.0**
2 Inch	2.0000	50.8		0.0	485.9	**100.0**
1.5 Inch	1.5000	38.1		0.0	485.9	**100.0**
1.0 Inch	1.0000	25.4		0.0	485.9	**100.0**
3/4 Inch	0.7500	19.1		0.0	485.9	**100.0**
1/2 Inch	0.5000	12.7		0.0	485.9	**100.0**
3/8 Inch	0.3750	9.5		0.0	485.9	**100.0**
#4	0.1870	4.7500		0.0	485.9	**100.0**
#10	0.0787	2.0000	0.98	1.0	484.9	**99.8**
#20	0.0335	0.8500	12.42	13.4	472.5	**97.2**
#40	0.0167	0.4250	32.22	45.6	440.3	**90.6**
#60	0.0098	0.2500	36.83	82.4	403.4	**83.0**
#100	0.0059	0.1500	63.31	145.8	340.1	**70.0**
#200	0.0030	0.0750	90.47	236.2	249.7	**51.4**
Hydrometer		0.0451				**30.8**
		0.0269				**25.3**
		0.0168				**21.6**
		0.0102				**19.8**
		0.0079				**17.9**
		0.0047				**16.1**
		0.0042				**14.3**
		0.0033				**12.4**



HOLDREGE & KULL

20132A-01 5-186 6-5-2.xls, Sieve (6-5-2a)

PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132A-01 Project Name: TID High Line Canal- Phase B
Sample No. 6-5-1 Boring/Trench No.: B-6 Sample Depth (ft): 26.5-27.0
Sample Description: Light Yellowish Brown (10YR 6/4) Sandy Silt
Date Tested: 5/26/2005 Tested By: MLH Checked By: JHA Lab No. 5-186
Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.90	5.20
Area	(cm^2)	18.86	21.24
Height	(cm)	10.00	8.79
Volume	(cm^3)	188.57	186.67
Wet Soil Weight	(gr)	381.95	391.78
Dry Soil Weight	(gr)	328.48	328.48
Water Weight	(gr)	53.47	63.30
Moisture Content	(%)	16.3	19.3
Dry Density	(pcf)	108.7	109.9
Void Ratio	(dim)	0.521	0.506
Saturation	(%)	82.7	100.9
Porosity	(%)	34.3	33.6
Relative Compaction	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	K
Tare Weight	(gr)	160.52
Wet Soil + Tare Weight	(gr)	552.30
Dry Soil + Tare Weight	(gr)	489.00
Water Weight	(gr)	63.30
Dry Soil Weight	(gr)	328.48
Moisture Content	(%)	19.3
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.65

Avg. Permeability(Last Four Readings), K= 1.2E-05 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Skempton "B" Parameter = 95.00
Chamber (psi) = Sample Top and Bottom (psi) = Skempton "B" Parameter =

Consolidation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Average Consol. Pressure (psi) = 5.0

Permeation Test Phase:

Permeant = water Initial Hydraulic Gradient (cm/cm) = 9.20
Chamber (psi) = 65.0 Sample Top (psi) = 60.0 Sample Bottom (psi) = 61.0

PERMEATION TEST DATA

Time Data			Burrett Readings			Temp.	Permeability	Restart	Comments
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Degree Celcius (C)	(cm/s)	Test (Yes or No)	
5/26/2005	7:10 AM	0	47.60	18.30	22.10	22.00		Yes	
5/26/2005	8:10 AM	3,600	39.90	25.90	22.00	22.50	1.2E-05		
5/26/2005	9:10 AM	3,600	33.60	32.20	21.80	23.00	1.1E-05		
5/26/2005	10:11 AM	3,660	28.30	37.50	21.80	23.50	1.1E-05		
5/26/2005	11:11 AM	3,600	23.70	42.20	21.80	24.00	1.1E-05		
5/26/2005	12:10 PM	3,540	19.00	46.80	21.90	24.50	1.3E-05		
5/26/2005	1:10 PM	3,600	15.00	51.00	21.90	24.00	1.4E-05		
5/26/2005	1:12 PM	0	14.90	6.90	21.80	24.00		yes	Test Restart
5/26/2005	2:12 PM	3,600	9.30	12.20	21.80	24.00	1.0E-05		
		0							
		0							
		0							
		0							
		0							
		0							
		0							
		0							
		0							
		0							

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.: **20132A-01** Project Name: **TID High Line Canal- Phase B** Date: **5/19/2005**
Sample No.: **6-10-2** Boring/Trench: **B-6** Depth, (ft.): **61.0-61.5** Tested By: **MLH/BLP**
Description: **Dark Yellowish Brown (10YR 4/4) Sandy Clay** Checked By: **JHA**
Sample Location: Lab. No.: **5-186**

Moisture Content Data:			Total Material Sample Data:		
			Pan ID	0	
			Pan Weight	0.00	(gm)
Pan ID	19		Wet Soil + Pan Wt.	280.90	(gm)
Pan Weight	100.10	(gm)	Total Wet Weight	280.90	(gm)
Wet Soil + Pan	127.90	(gm)	Total Dry Weight	261.70	(gm)
Dry Soil + Pan	126.00	(gm)	Total Dry Wt. >#4 Sieve	0.00	(gm)
Water Weight	1.90	(gm)	Total Dry Wt.<#4 Sieve	261.70	(gm)
Dry Soil Weight	25.90	(gm)	Total Dry Wt. <#200 Sieve	209.75	(gm)
Moisture Content	7.3	(%)	Total Percent <#200 Sieve	80.15	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter		Wet Weight	Dry Weight			
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Retained On Sieve (gm)	Accum. On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.40			0.00	261.70	100.0
3 Inch	3.0000	76.20			0.00	261.70	100.0
2 Inch	2.0000	50.80			0.00	261.70	100.0
1.5 Inch	1.5000	38.10			0.00	261.70	100.0
1.0 Inch	1.0000	25.40			0.00	261.70	100.0
3/4 Inch	0.7500	19.05			0.00	261.70	100.0
1/2 Inch	0.5000	12.70			0.00	261.70	100.0
3/8 Inch	0.3750	9.53			0.00	261.70	100.0
#4	0.1870	4.75			0.00	261.70	100.0
PAN			280.90	261.70	261.70	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

			#200 Wash Data:		
Pan ID	K				
Pan Weight	161.00	(gm)	Portion >#200 Sieve:	26.32	(gm)
Wet Soil + Pan	303.30	(gm)	Portion <#200 Sieve:	106.25	(gm)
Wet Soil	142.30	(gm)	Percent <#200 Sieve	80.15	(%)
Dry Soil	132.57	(gm)	Total Wt. <#200 Sieve	209.75	(gm)

Sieve Size	Particle Diameter		Dry Weight Rep. Sample		Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Percent Retained (%)			
#10	0.079	2.000	0.03	0.02	0.06	0.06	100.0
#20	0.033	0.850	1.46	1.10	2.88	2.94	98.9
#40	0.017	0.425	3.09	2.33	6.10	9.04	96.5
#60	0.010	0.250	2.87	2.16	5.67	14.71	94.4
#100	0.006	0.150	6.25	4.71	12.34	27.04	89.7
#200	0.003	0.075	12.62	9.52	24.91	51.96	80.1
PAN			Discard				

HOLDREGE & KULL

Specific Gravity

ASTM D854

Project No.:	20132A-01	**Project Name:**	TID High Line Canal Phase B	**Date:**	6/9/2005
Sample No.:	6-10-2	**Boring/Trench**	B-6 **Depth, ft.:** 61.0-61.5	**Tested By:**	BLP
Description:	Dark Yellowish Brown (10YR 4/4) Sandy Clay			**Checked By:**	JHA
Sample Location:				**Lab No.**	5-186

Test material screened on number 4 sieve Other

Sample Air or Oven Dried: oven

Type of fluid used in test: tap

Determination Number	1	2	2	
Weight of Bottle + Fluid + Soil	679.53	676.18	676.18	
Temperature in Celsius	18	18	18	
Weight of Bottle + Fluid	664.21	664.21	664.21	
Evaporating Dish Number	B	A6	A6	
Weight of Dish + Soil	184.45	174.98	174.98	
Weight of Dish	160.23	156.3	156.3	
Weight of Soil	24.22	18.68	18.68	
Specific Gravity of Fluid at Temp.	0.99862	0.99862	0.99862	
Specific Gravity	2.72	2.78	2.78	0.00

Average Specific Gravity = 2.76

Holdrege & Kull

Organic Content

ASTM D2974

Project No.:	20132A-01	Project Name: TID- High Line Canal Phase B	Date: 6/1/2005
Sample No.:	6-10-1	Boring/Trench: B-6 Depth, (ft.): 61.5-62.0	Tested By: LJC
Description:	Dark Yellowish Brown (10YR 4/4) Sandy Clay		Checked By: JHA
Sample Location:			Lab No.: 5-186

Organic Content/ASTM D2974

Pan ID	a-4				
Pan Weight	152.73				
Pan Weight + Oven Dried Soil	164.22				
Soil Weight	11.49				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Mass	163.37	163.3	163.21	163.2	
Ash	0.85	0.92	1.01	1.02	164.22
Max Mass of Ash	1.02				
Ash Content	8.8772846				
Organic Matter	8.88%				

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.: **20132A-01** Project Name: **TID- High Line Canal Phase B** Date: **5/26/2005**
Sample No.: **7-4-2** Boring/Trench: **B-7** Depth, (ft.): **21.0-21.5** Tested By: **LJC**
Description: **Yellowish Brown (10YR 5/4) Poorly Graded Sand** Checked By: **JHA**
Sample Location: Lab. No.: **5-186**

Moisture Content Data:

Pan ID	35	
Pan Weight	21.52	(gm)
Wet Soil + Pan	52.68	(gm)
Dry Soil + Pan	50.07	(gm)
Water Weight	2.61	(gm)
Dry Soil Weight	28.55	(gm)
Moisture Conter	9.1	(%)

Total Material Sample Data:

Pan ID	B4	
Pan Weight	151.14	(gm)
Wet Soil + Pan Wt.	344.55	(gm)
Total Wet Weight	193.41	(gm)
Total Dry Weight	177.21	(gm)
Total Dry Wt. >#4 Sieve	0.00	(gm)
Total Dry Wt.<#4 Sieve	177.21	(gm)
Total Dry Wt. <#200 Sieve	0.15	(gm)
Total Percent <#200 Sieve	0.08	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter		Wet Weight Retained On Sieve (gm)	Dry Weight			
	Inches (in.)	Millimeter (mm)		Retained On Sieve (gm)	Accum. On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.40			0.00	177.21	100.0
3 Inch	3.0000	76.20			0.00	177.21	100.0
2 Inch	2.0000	50.80			0.00	177.21	100.0
1.5 Inch	1.5000	38.10			0.00	177.21	100.0
1.0 Inch	1.0000	25.40			0.00	177.21	100.0
3/4 Inch	0.7500	19.05			0.00	177.21	100.0
1/2 Inch	0.5000	12.70			0.00	177.21	100.0
3/8 Inch	0.3750	9.53			0.00	177.21	100.0
#4	0.1870	4.75			0.00	177.21	100.0
PAN			193.41	177.21	177.21	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

Pan ID	B4	
Pan Weight	151.14	(gm)
Wet Soil + Pan	344.55	(gm)
Wet Soil	193.41	(gm)
Dry Soil	177.21	(gm)

#200 Wash Data:

Portion >#200 Sieve:	177.06	(gm)
Portion <#200 Sieve:	0.15	(gm)
Percent <#200 Sieve	0.08	(%)
Total Wt. <#200 Sieve	0.15	(gm)

Sieve Size	Particle Diameter		Dry Weight Rep. Sample		Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Percent Retained (%)			
#10	0.079	2.000	0.17	0.10	0.17	0.17	99.9
#20	0.033	0.850	8.74	4.93	8.74	8.91	95.0
#40	0.017	0.425	104.28	58.85	104.28	113.19	36.1
#60	0.010	0.250	41.66	23.51	41.66	154.85	12.6
#100	0.006	0.150	14.75	8.32	14.75	169.60	4.3
#200	0.003	0.075	7.46	4.21	7.46	177.06	0.1
PAN			Discard				

HOLDREGE & KULL

Specific Gravity

ASTM D854

Project No.: 20132A-01 **Project Name:** TID High Line Canal- Phase B **Date:** 5/27/2005
Sample No.: 7-4-2 **Boring/Trench** B-7 **Depth, ft.:** 21.0-21.5 **Tested By:** LJC
Description: Yellowish Brown (10YR 5/4) Poorly Graded Sand **Checked By:** JHA
Sample Location: **Lab No.** 5-186

Test material screened on number 4 sieve Other
Sample Air or Oven Dried: air
Type of fluid used in test tap water

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	150.76	154.93	151.59	
Temperature in Celsius	24	24	24	
Weight of Bottle + Fluid	144.15	144.13	144.12	
Evaporating Dish Number	AC	AA	46	
Weight of Dish + Soil	32.09	38.64	33.36	
Weight of Dish	21.49	21.4	21.43	
Weight of Soil	10.60	17.24	11.93	
Specific Gravity of Fluid at Temp.	0.99732	0.99732	0.99732	
Specific Gravity	2.65	2.67	2.67	0.00

Average Specific Gravity = 2.66

Organic Content

ASTM D2974

Project No.:	20132A-01	Project Name:	TID- High Line Canal Phase B	Date:	6/1/2005
Sample No.:	7-4-2	Boring/Trench:	B-7	Depth, (ft.):	21.0-21.5
Description:	Yellowish Brown (10YR 5/4) Poorly Graded Sand			Tested By:	LJC
Sample Location:				Checked By:	JHA
				Lab. No.:	5-186

Organic Content/ASTM D2974

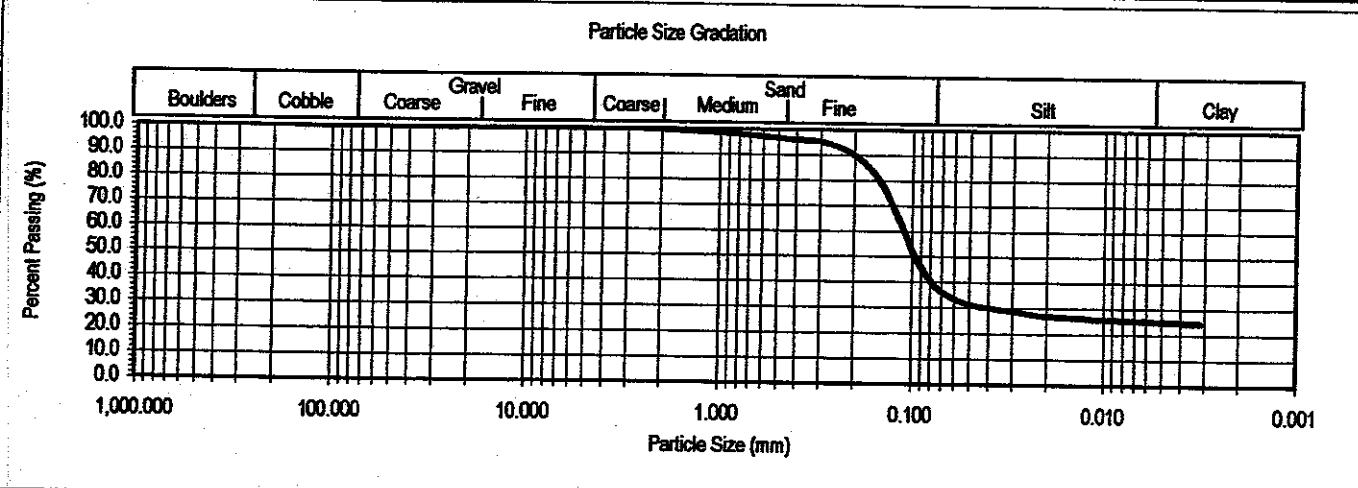
Pan ID	FU2				
Pan Weight	157.32				
Pan Weight + Oven Dried Soil	168.43				
Soil Weight	11.11				
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Mass	168.29	168.19	168.18	168.18	
Ash	0.14	0.24	0.25	0.25	168.43
Max Mass of Ash	0.25				
Ash Content	2.250225				
Organic Matter	2.25%				

Particle Size Distribution

ASTM D422

Project No.: **20132A-01** Project Name: **TID- High Line Canal Phase B** Date: **6/1/2005**
Sample No.: **7-10-1** Boring/Trench: **B-7** Depth, (ft.): **51.0 - 51.5** Tested By: **LJC/MLH**
Description: **Dark Yellowish Brown (10YR 4/6) Clayey Sand** Checked By: **JHA**
Sample Location: Lab. No.: **5-186**

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent Passing
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4		0.0	87.1	**100.0**
3 Inch	3.0000	76.2		0.0	87.1	**100.0**
2 Inch	2.0000	50.8		0.0	87.1	**100.0**
1.5 Inch	1.5000	38.1		0.0	87.1	**100.0**
1.0 Inch	1.0000	25.4		0.0	87.1	**100.0**
3/4 Inch	0.7500	19.1		0.0	87.1	**100.0**
1/2 Inch	0.5000	12.7		0.0	87.1	**100.0**
3/8 Inch	0.3750	9.5		0.0	87.1	**100.0**
#4	0.1870	4.7500		0.0	87.1	**100.0**
#10	0.0787	2.0000	0.24	0.2	86.8	**99.7**
#20	0.0335	0.8500	1.18	1.4	85.7	**98.4**
#40	0.0167	0.4250	1.89	3.3	83.8	**96.2**
#60	0.0098	0.2500	2.22	5.5	81.5	**93.6**
#100	0.0059	0.1500	11.35	16.9	70.2	**80.6**
#200	0.0030	0.0750	36.93	53.8	33.3	**38.2**
Hydrometer		0.0268				**28.2**
		0.0135				**26.4**
		0.0032				**24.6**



HOLDREGE & KULL

PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132A-01 Project Name: TID- High Line Canal Phase B

Sample No. 7-10-1 Boring/Trench No.: B-7 Sample Depth (ft): 51.0-51.5

Sample Description: Dark Yellowish Brown (10YR 4/6) Clayey Sand

Date Tested: 6/2/2005 Tested By: MLH Checked By: JHA Lab No. 5-186

Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.90	5.30
Area	(cm^2)	18.86	22.06
Height	(cm)	10.10	8.54
Volume	(cm^3)	190.46	188.41
Wet Soil Weight	(gr)	381.83	387.00
Dry Soil Weight	(gr)	312.63	312.63
Water Weight	(gr)	69.20	74.37
Moisture Content	(%)	22.1	23.8
Dry Density	(pcf)	102.5	103.6
Void Ratio	(dim)	0.627	0.609
Saturation	(%)	94.3	104.3
Porosity	(%)	38.5	37.9
Relative Compaction	(%)		

End of Test Oven Dried Sample Information

Item		Unit	Final
Tare Number		na	RU
Tare Weight		(gr)	156.44
Wet Soil + Tare Weight		(gr)	543.44
Dry Soil + Tare Weight		(gr)	469.07
Water Weight		(gr)	74.37
Dry Soil Weight		(gr)	312.63
Moisture Content		(%)	23.8
Lab Maximum Dry Density		(pcf)	
Optimum Moisture Content		(%)	
Specific Gravity		(dim)	2.67

Avg. Permeability(Last Four Readings), K= 5.7E-06 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Skempton "B" Parameter = 95.00

Chamber (psi) = Sample Top and Bottom (psi) = Skempton "B" Parameter =

Consolidation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Average Consol. Pressure (psi) = 5.0

Permeation Test Phase:

Permeant = water Initial Hydraulic Gradient (cm/cm) = 13.63

Chamber (psi) = 65.0 Sample Top (psi) = 59.0 Sample Bottom (psi) = 61.0

PERMEATION TEST DATA

Time Data			Burrett Readings			Temp.	Permeability	Restart	Comments
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Degree Celcius (C)	(cm/s)	Test (Yes or No)	
8:39	8:39 AM	0	19.20	19.20	17.50	21.00		Yes	
9:09	9:09 AM	1,800	16.20	22.10	17.40	21.00	6.2E-06		
9:39	9:39 AM	1,800	13.10	24.30	17.40	21.00	5.9E-06		
10:09	10:09 AM	1,800	10.90	27.40	17.30	21.00	6.1E-06		
10:39	10:39 AM	1,800	8.40	29.80	17.30	21.00	5.9E-06		
11:09	11:09 AM	1,800	6.00	32.30	17.30	21.00	6.1E-06		
11:11	11:11 AM	0	40.10	5.80	17.30	21.00		yes	Test Restart
11:41	11:41 AM	1,800	40.20	9.30	17.30	21.00	2.9E-06		
12:11	12:11 PM	1,800	40.30	12.80	17.30	21.00	2.9E-06		
12:41	12:41 PM	1,800	38.10	16.10	17.30	21.00	4.8E-06		
13:11	1:11 PM	1,800	34.90	19.20	17.30	22.50	5.7E-06		
13:41	1:41 PM	1,800	31.70	22.50	17.30	22.50	6.0E-06		
14:11	2:11 PM	1,800	28.90	25.30	17.30	22.50	5.3E-06		
14:41	2:41 PM	1,800	26.00	28.10	17.30	22.50	5.7E-06		
		0							
		0							
		0							
		0							
		0							

Attachment B

Summary of Laboratory Test Results for Clay Liners

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

Project No. 20132-01
April 20, 2005

Mr. Brent Harrison, Senior Civil Engineer
Civil Engineering Department
Turlock Irrigation District
P.O. Box 949
Turlock, California 95380

Reference: ***TID – High Line Canal***
Stanislaus and Merced Counties, California

Subject: ***Summary of Laboratory Test Results***

Dear Mr. Harrison:

Holdrege & Kull (H&K) is pleased to present this letter which summarizes the results of laboratory testing performed on the samples collected from the High Line Canal located in Stanislaus and Merced Counties, California. The purpose of our services was to characterize and determine the thickness of the existing clay liner in the canal. The following sections describe our limited field investigation, the site conditions encountered, and the results of the laboratory testing. The work was performed in general accordance with the scope of services presented in our proposal dated March 4, 2005.

Field Investigation

On March 10, 2005, an engineer with our firm performed a limited field investigation that consisted of drilling four exploratory borings in the High Line Canal. The locations of the exploratory borings were determined by Mr. Brent Harrison with the Turlock Irrigation District (TID). The borings were drilled using a hand auger to depths ranging from about 1.2 to 2.3 feet below the canal bottom. Relatively undisturbed samples of the liner material present in the bottom of the canal were collected using a slide hammer equipped with 2-inch diameter sampler lined with a brass liner. Our engineer maintained a log of the borings and visually classified the soil exposed according to the Unified Soil Classification System. Samples obtained from the exploratory borings were packaged and sealed in the field to reduce moisture loss and disturbance, and brought to our laboratory for further testing.

Detailed descriptions of the subsurface conditions encountered during our field investigation are presented on the attached exploratory boring logs. The approximate exploratory boring locations shown on Figure 1 are designated as C1 through C4.

Laboratory Testing

Laboratory tests were performed in accordance with current ASTM standards on selected soil samples of the liner material to evaluate their physical characteristics and engineering properties. The laboratory testing program was formulated with emphasis on the hydraulic conductivity of the existing liner material present in the bottom of the canal. We performed the following laboratory tests:

- D422, Full Sieve Analysis with Hydrometer
- D854, Specific Gravity
- D2216, Moisture Content
- D2487, Unified Soil Classification System
- D2488, Soil Description Visual Manual Method
- D2937, Density
- D2974, Total Organic Carbon Content
- D5084, Falling Head Permeability

Moisture content, density, porosity, specific gravity, total organic carbon content, percent passing the No. 200 sieve, and falling head permeability test results are summarized in the table below. The laboratory data sheets are attached.

Boring Number	Sample Interval (feet)	Moisture Content (%)	Dry Density (pcf)	Porosity (%)	Specific Gravity	Total Organic Carbon Content (%)	Percent Passing No. 200 Sieve	Average Hydraulic Conductivity (cm/sec)
C1	1.1–1.6	19.5	104.7	37.0	2.66	1.37	18.3	1.8E-06
C3	0.3-0.8	18.6	104.3	37.2	2.67	4.69	32.5	3.8E-06
C4	1.2-1.7	12.0	118.3	28.5	2.66	1.20	35.8	1.8E-06

Conclusions

Based on our exploratory borings, the liner material present at the locations drilled varied in thickness from about 5 to 7 inches. The liner material sampled consisted of clayey sand and silty sand with trace to some clay. The hydraulic conductivity of the liner material measured in the laboratory varied from 1.8E-06 to 3.8E-06 cm/sec.

We appreciate the opportunity of providing our services for this project. Please feel free to contact our office if you have any questions regarding this letter or if we may be of further assistance of this project.

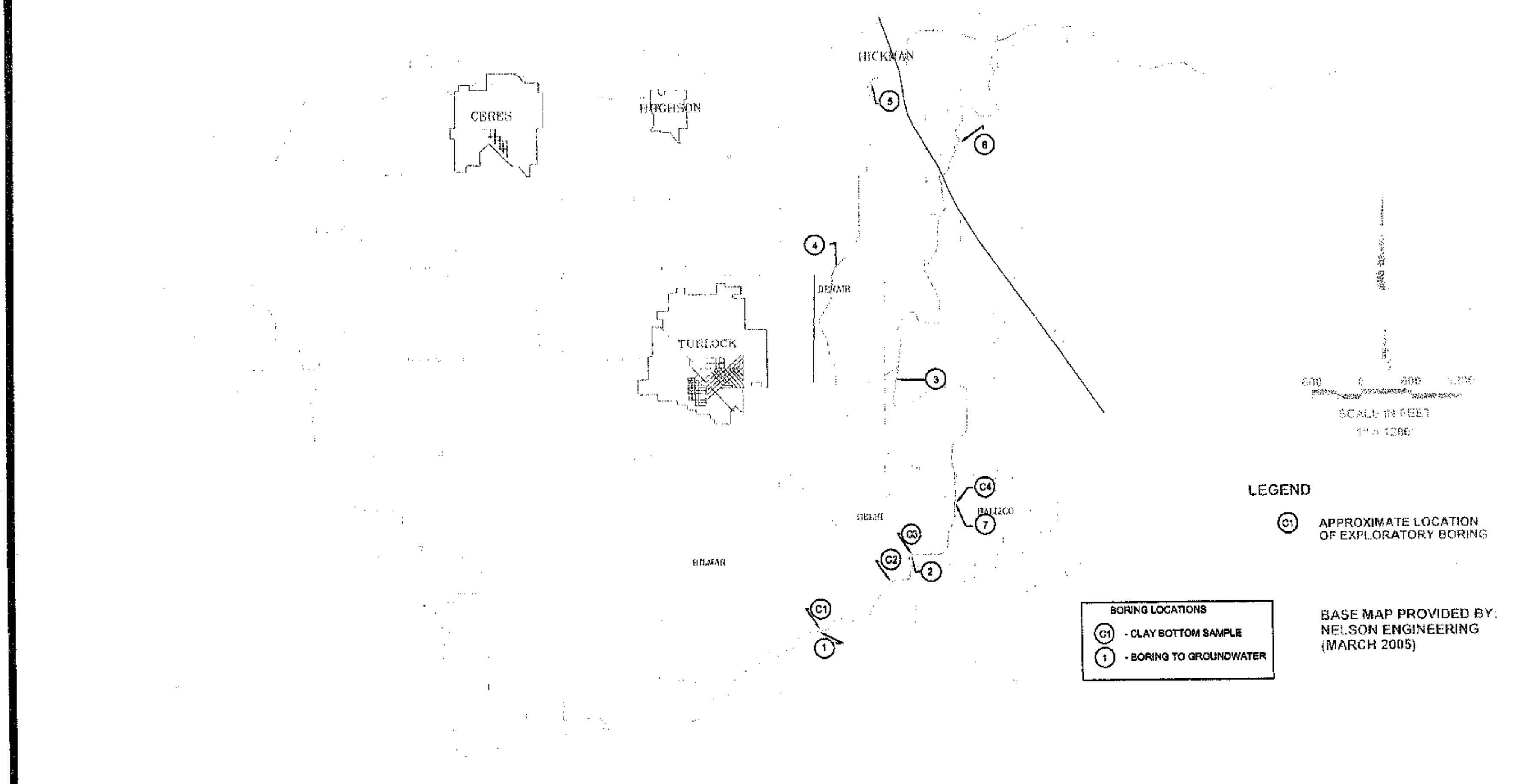
Sincerely,

HOLDREGE & KULL

REGISTERED PROFESSIONAL ENGINEER
ANTHONY P. MAZZEI
No. 67802
Exp. 6/05
CIVIL
STATE OF CALIFORNIA

Anthony P. Mazzei
C.E. 67802

Attachments: Figure 1 – Exploratory Boring Location Map
Exploratory Boring Logs
Laboratory Data Sheets



20132-01-FIG1

HK

EXPLORATORY BORING LOCATION MAP

TID – HIGHLINE CANAL

STANISLAUS AND MERCED COUNTIES, CALIFORNIA

DRAWN BY: DFD	*CHECKED BY:* AM
PROJECT NO.: 20132-01	
DATE: APRIL 2005	
FIGURE NO.: 1	

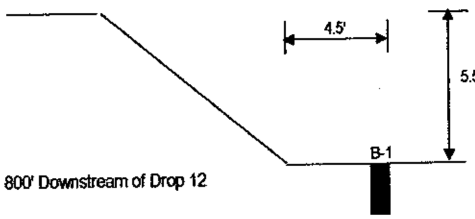
EXPLORATORY BORING LOGS

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

EXPLORATORY BORING LOG

Boring No. C1

Sheet 1 **Of** 1



800' Downstream of Drop 12

Project Name:	TID - High Line Canal
Project No.:	20132-01
Task:	
Location:	Stanislaus and Merced Counties, CA
Logged By:	A. Mazzei
Date Started:	3/10/2005
Date Completed:	3/10/2005
Drilling Cmpny:	
Driller:	
Helper:	
Drill Rig Type:	
Hammer Type:	
Drilling Method:	Hand auger and 2.0-inch diamter slide hammer
Boring Diameter (In.):	4
Total Depth (Ft.):	1.6
Ground Surface Elev. (Ft. MSL):	
Datum:	
Backfill or Well Casing:	

Ground Water Information

Date				
Time				
Depth (ft)				

Presentation Order for Soil and/or Rock Descriptions

(USCS Symbol; Partical Sizes (%), Munsel Color; Density or Consistency, Moisture; Other)

Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows/6 inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Description
								(CL) Silty CLAY; Dark Gray (10YR,4/1); Wet; Some Fine to Medium Sand [SEDIMENT]
					0.5			
								(SM) Silty SAND; Very Dark Grayish Brown (10YR,3/2); Wet [SEDIMENT]
					1.0			
								(SC) Clayey SAND; Reddish Brown (5YR,4/4); Moist [LINER MATERIAL]
				S-1				
								(SC) Clayey SAND; Gray (10YR,5/1); Moist [LINER MATERIAL]
					1.5			
								Boring terminated at a depth of 1.6 feet below existing canal grade.
					2.0			
					2.5			
					3.0			
					3.5			
					4.0			
					4.5			
					5.0			

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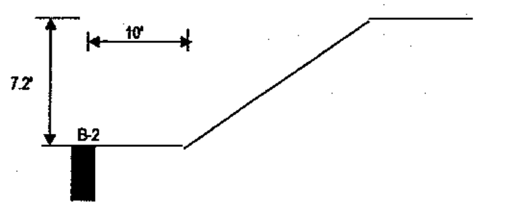
EXPLORATORY BORING LOG

Boring No. C2

Sheet 1 **Of** 1

500' Upstream of Union Pacific Railroad



Project Name:	TID - High Line Canal
Project No.:	20132-01
Task:	
Location:	Stanislaus and Merced Counties, CA
Logged By:	A. Mazzei
Date Started:	3/10/2005
Date Completed:	3/10/2005
Drilling Cmpny:	
Driller:	
Helper:	
Drill Rig Type:	
Hammer Type:	
Drilling Method:	Hand auger and 2.0-inch diamter slide hammer
Boring Diameter (in.):	4
Total Depth (Ft.):	1.2
Ground Surface Elev. (Ft. MSL):	
Datum:	
Backfill or Well Casing:	

Ground Water Information

Date				
Time				
Depth (ft)				

Presentation Order for Soil and/or Rock Descriptions
(USCS Symbol; Partical Sizes (%), Munsel Color; Density or Consistency; Moisture; Other)

Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows/6 Inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Description
								(SM) Silty SAND; Very Dark Grayish Brown (10YR,3/2); Wet; Some Coarse Gravels and Cobbles [SEDIMENT]
					0.5			
								(SM) Silty SAND; Reddish Brown (5YR,4/4); Moist [LINER MATERIAL]
				S-1				
					1.0			
								Boring terminated at 1.2 feet below existing canal grade.
					1.5			
					2.0			
					2.5			
					3.0			
					3.5			
					4.0			
					4.5			
					5.0			

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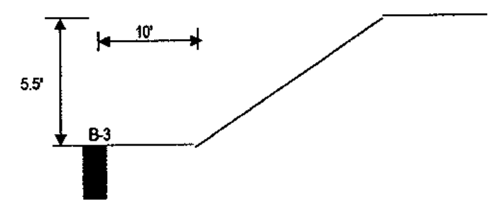
EXPLORATORY BORING LOG

Boring No. C3

Sheet 1 **Of** 1

650' Downstream of Drop 7, 100' Upstream of South Ave.



Project Name: TID - High Line Canal
Project No.: 20132-01 **Task:**
Location: Stanislaus and Merced Counties, CA
Logged By: A. Mazzei
Date Started: 3/10/2005 **Date Completed:** 3/10/2005
Drilling Cmpny:
Driller: **Helper:**
Drill Rig Type: **Hammer Type:**
Drilling Method: Hand auger and 2.0-inch diamter slide hammer
Boring Diameter (In.): 4 **Total Depth (Ft.):** 1.4
Ground Surface Elev. (Ft. MSL): **Datum:**
Backfill or Well Casing:

Ground Water Information

Date				
Time				
Depth (ft)				

Presentation Order for Soil and/or Rock Descriptions
(USCS Symbol; Partical Sizes (%), Munsel Color; Density or Consistency; Moisture; Other)

Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows/6 inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Description
								(SM) Silty SAND; Dark Gray (10YR,4/1); Wet [SEDIMENT]
					0.5			(SM) Silty SAND; Very Dark Grayish Brown (10YR,3/2); Moist [LINER MATERIAL]
				S-1				
					1.0			(SM) Silty SAND; Brown (10YR,4/3); Moist [NATIVE]
					1.5			Boring terminated at a depth of 1.4 feet below existing canal grade.
					2.0			
					2.5			
					3.0			
					3.5			
					4.0			
					4.5			
					5.0			

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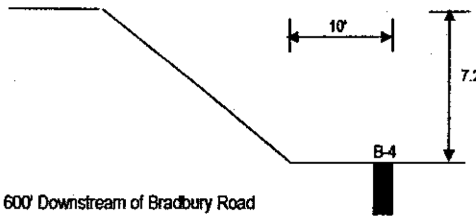
EXPLORATORY BORING LOG

Boring No.	C4	Sheet 1	Of 1
Project Name:	TID - High Line Canal		
Project No.:	20132-01	Task:	
Location:	Stanislaus and Merced Counties, CA		
Logged By:	A. Mazzei		
Date Started:	3/10/2005	Date Completed:	3/10/2005
Drilling Cmpny:			
Driller:		Helper:	
Drill Rig Type:		Hammer Type:	
Drilling Method:	Hand auger and 2.0-inch diamter slide hammer		
Boring Diameter (In.):	4	Total Depth (Ft.):	2.3
Ground Surface Elev. (Ft. MSL):		Datum:	
Backfill or Well Casing:			



600' Downstream of Bradbury Road

Ground Water Information

Date				
Time				
Depth (ft)				

Presentation Order for Soil and/or Rock Descriptions
(USCS Symbol; Partical Sizes (%), Munsel Color; Density or Consistency; Moisture; Other)

Pocket Penetrometer (TSF)	Uncorrected Blow Counts (Blows/6 Inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Graphic Log	Description
								(CL) Silty CLAY; Very Dark Grayish Brown (10YR,3/2); Wet [SEDIMENT]
					0.5			
					1.0			(SM) Silty SAND; Grayish Brown (10YR,5/2); Very Moist; Some Clay [SEDIMENT]
								(SM) Silty SAND; Very Dark Grayish Brown (10YR,3/2); Moist [LINER MATERIAL]
				S-1	1.5			
								(SM) Silty SAND; Brown (10YR,4/3); Moist [NATIVE]
					2.0			
					2.5			Boring terminated at a depth of 2.3 feet below existing canal grade.
					3.0			
					3.5			
					4.0			
					4.5			
					5.0			

LABORATORY DATA SHEETS

BORING C1

LABORATORY DATA SHEETS

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.: **20132-01** Project Name: **TID – High Line Canal** Date: **3/31/2005**
Sample No.: **S-1** Boring/Trench: **C1** Depth, (ft.): **1.1-1.6** Tested By: **MLH**
Description: **Reddish Brown (5YR 4/4) Clayey Sand (organic content 1.37%)** Checked By: **JHA**
Lab. No.: **5-056**
Sample Location:

Moisture Content Data:			Total Material Sample Data:		
			Pan ID	21	
			Pan Weight	153.55	(gm)
Pan ID	LF		Wet Soil + Pan Wt.	316.25	(gm)
Pan Weight	10.82	(gm)	Total Wet Weight	162.70	(gm)
Wet Soil + Pan	35.36	(gm)	Total Dry Weight	162.17	(gm)
Dry Soil + Pan	35.28	(gm)	Total Dry Wt. >#4 Sieve	0.00	(gm)
Water Weight	0.08	(gm)	Total Dry Wt.<#4 Sieve	162.17	(gm)
Dry Soil Weight	24.46	(gm)	Total Dry Wt. <#200 Sieve	29.63	(gm)
Moisture Content	0.3	(%)	Total Percent <#200 Sieve	18.27	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter		Wet Weight	Dry Weight			
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Retained On Sieve (gm)	Accum. On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.40	0.00	0.00	0.00	162.17	100.0
3 Inch	3.0000	76.20	0.00	0.00	0.00	162.17	100.0
2 Inch	2.0000	50.80	0.00	0.00	0.00	162.17	100.0
1.5 Inch	1.5000	38.10	0.00	0.00	0.00	162.17	100.0
1.0 Inch	1.0000	25.40	0.00	0.00	0.00	162.17	100.0
3/4 Inch	0.7500	19.05	0.00	0.00	0.00	162.17	100.0
1/2 Inch	0.5000	12.70	0.00	0.00	0.00	162.17	100.0
3/8 Inch	0.3750	9.53	0.00	0.00	0.00	162.17	100.0
#4	0.1870	4.75	0.00	0.00	0.00	162.17	100.0
PAN			162.70	162.17	162.17	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

			#200 Wash Data:		
Pan ID	21				
Pan Weight	153.55	(gm)	Portion >#200 Sieve:	132.54	(gm)
Wet Soil + Pan	316.25	(gm)	Portion <#200 Sieve:	29.63	(gm)
Wet Soil	162.70	(gm)	Percent <#200 Sieve	18.27	(%)
Dry Soil	162.17	(gm)	Total Wt. <#200 Sieve	29.63	(gm)

Sieve Size	Particle Diameter		Dry Weight Rep. Sample		Total Sample	Accum.	Total
	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Percent Retained (%)	Weight Retained (gm)	Grand Total On Sieve (gm)	Percent Passing (%)
#10	0.079	2.000	0.43	0.27	0.43	0.43	99.7
#20	0.033	0.850	8.59	5.30	8.59	9.02	94.4
#40	0.017	0.425	38.27	23.60	38.27	47.29	70.8
#60	0.010	0.250	31.76	19.58	31.76	79.05	51.3
#100	0.006	0.150	30.67	18.91	30.67	109.72	32.3
#200	0.003	0.075	22.82	14.07	22.82	132.54	18.3
PAN			Discard				

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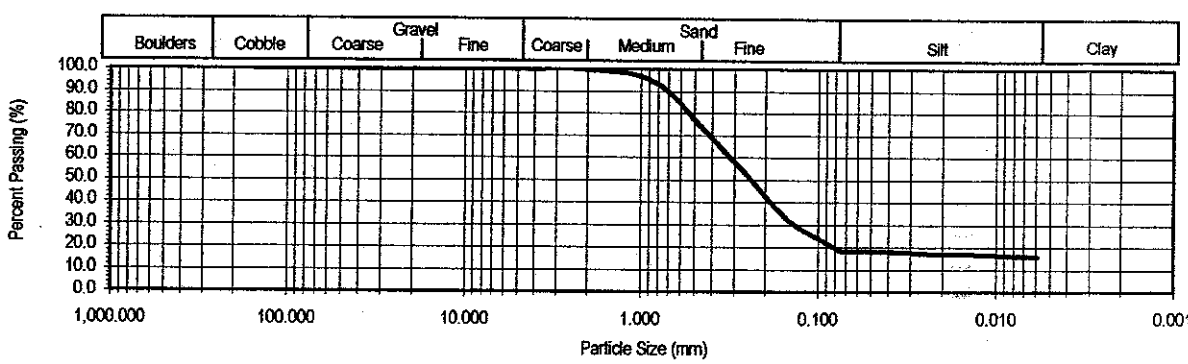
Particle Size Distribution

ASTM D422

Project No.: **20132-01**	Project Name: **TID – High Line Canal**		Date: **3/31/2005**
Sample No.: **S-1**	Boring/Trench: **C1**	Depth, (ft.): **1.1-1.6**	Tested By: **MLH**
Description: **Reddish Brown (5YR 4/4) Clayey Sand (organic content 1.37%)**			Checked By: **JHA**
Sample Location:			Lab. No.: **5-056**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	162.2	**100.0**
3 Inch	3.0000	76.2	0.00	0.0	162.2	**100.0**
2 Inch	2.0000	50.8	0.00	0.0	162.2	**100.0**
1.5 Inch	1.5000	38.1	0.00	0.0	162.2	**100.0**
1.0 Inch	1.0000	25.4	0.00	0.0	162.2	**100.0**
3/4 Inch	0.7500	19.1	0.00	0.0	162.2	**100.0**
1/2 Inch	0.5000	12.7	0.00	0.0	162.2	**100.0**
3/8 Inch	0.3750	9.5	0.00	0.0	162.2	**100.0**
#4	0.1870	4.7500	0.00	0.0	162.2	**100.0**
#10	0.0787	2.0000	0.43	0.4	161.7	**99.7**
#20	0.0335	0.8500	8.59	9.0	153.1	**94.4**
#40	0.0167	0.4250	38.27	47.3	114.9	**70.8**
#60	0.0098	0.2500	31.76	79.1	83.1	**51.3**
#100	0.0059	0.1500	30.67	109.7	52.4	**32.3**
#200	0.0030	0.0750	22.82	132.5	29.6	**18.3**
Hydrometer		0.0327				**17.8**
		0.0234				**16.8**
		0.0156				**16.8**
		0.0059				**15.8**

Particle Size Gradation



HOLDREGE & KULL

LONG HYDROMETER TEST WORK SHEET

ASTM D422

Boring/Trench No.: **C1** Sample No. **S-1** Depth (ft) **1.1-1.6**

Soil Description: **Reddish Brown (5YR 4/4) Clayey Sand (organic content 1.37%)**

Date Tested:	3/31/2005	Pan ID	0.00	
Tested By:	MLH	Dry Soil + Pan Weight	29.1	(gm)
Checked By:	JHA	Pan Weight	0.0	(gm)
Hydrometer Type:	151H	Dry Soil Weight	29.1	(gm)
Hydrometer No.:	3			

Percent of Total Gross Sample < No. 200 Sieve (%) 18.27

Soil Specific Gravity, Gs 2.65

Water Specific Gravity, 1.00

Reading Period			Hydrometer Sample Portion Data							Total Sample	
Date (m/d/y)	Time (h:m)	Total Elapsed Time T (minutes)	Actual Reading Ra (dim.)	Composite Hydrometer Correction C (dim.)	Corrected Reading Rc=Ra-C (dim.)	Water Temp. Tw (C)	K= f(Tw,Gs) Table 3 (dim)	Effective Depth L Table 2 (cm)	Particle Diameter D= K(L/T)^0.5 (mm)	Percent Passing Ph= (%)	Percent Passing Pt= Ps(Ph/100) (%)
3/29/2005	9:14	0.0									
3/29/2005	9:16	2	1.0180	0.00030	1.0177	20.0	0.01361	11.5	0.0327	97.69	17.85
3/29/2005	9:18	4	1.0170	0.00030	1.0167	20.0	0.01361	11.8	0.0234	92.17	16.84
3/29/2005	9:23	9	1.0170	0.00030	1.0167	20.0	0.01361	11.8	0.0156	92.17	16.84
3/29/2005	10:19	65	1.0160	0.00030	1.0157	20.0	0.01361	12.1	0.0059	86.65	15.83
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		

Specific Gravity

ASTM D854

Project No.: 20132-01 **Project Name:** TID – High Line Canal **Date:** 3/31/2005
Sample No.: S-1 **Boring/Trench** C1 **Depth, ft.:** 1.1-1.6 **Tested By:** MLH
Description: Reddish Brown (5YR 4/4) Clayey Sand **Checked By:** JHA
Sample Location: **Lab No.** 5-056

Test material screened on number 10 sieve Other
Sample Air or Oven Dried: Air
Type of fluid used in test: Distilled Water

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	147.36	151.27	149.27	
Temperature in Celsius	20	20	20	
Weight of Bottle + Fluid	144.22	144.22	144.22	
Evaporating Dish Number	19	37	32	
Weight of Dish + Soil	105.11	44.47	42.4	
Weight of Dish	100.08	33.16	34.36	
Weight of Soil	5.03	11.31	8.04	
Specific Gravity of Fluid at Temp.	0.99823	0.99823	0.99823	
Specific Gravity	2.66	2.65	2.68	0.00

Average Specific Gravity = 2.66

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PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132-01 Project Name: TID – High Line Canal
Sample No. S-1 Boring/Trench No.: C1 Sample Depth (ft): 1.1-1.6
Sample Description Reddish Brown (5YR 4/4) Clayey Sand
Date Tested: 3/22/2005 Tested By: MLH Checked By: JHA Lab No. 5-056

Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.86	5.08
Area	(cm^2)	18.55	20.27
Height	(cm)	7.53	6.85
Volume	(cm^3)	139.69	138.84
Wet Soil Weight	(gr)	279.82	278.54
Dry Soil Weight	(gr)	234.20	234.20
Water Weight	(gr)	45.62	44.34
Moisture Content	(%)	19.5	18.9
Dry Density	(pcf)	104.7	105.3
Void Ratio	(dim)	0.587	0.577
Saturation	(%)	88.3	87.3
Porosity	(%)	37.0	36.6
Relative Compactio	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	B
Tare Weight	(gr)	160.35
Wet Soil + Tare Weight	(gr)	438.89
Dry Soil + Tare Weight	(gr)	394.55
Water Weight	(gr)	44.34
Dry Soil Weight	(gr)	234.20
Moisture Content	(%)	18.9
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.66

Avg. Permeability(Last Four Readings), K= 1.8E-06 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:

Chamber (psi) = 60.0 Sample Top and Bottom (psi) = 55.0 Skempton "B" Parameter = 90.00
Chamber (psi) = 60.0 Sample Top and Bottom (psi) = 55.0 Skempton "B" Parameter = 90.00

Consolidation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 60.0 Average Consol. Pressure (psi) = 5.0

Permeation Test Phase:

Permeant = Water Initial Hydraulic Gradient (cm/cm) = 22.25
Chamber (psi) = 65.0 Sample Top (psi) = 59.0 Sample Bottom (psi) = 61.0

PERMEATION TEST DATA

Time Data			Burrett Readdings			Temp.	Permeability	Restart	Comments
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Degree Celcius (C)	(cm/s)	Test (Yes or No)	
3/22/2005	9:37 AM	0	39.60	7.90	44.20	20.50		Yes	
3/22/2005	10:37 AM	3,600	34.80	12.60	44.00	20.50	3.2E-06		
3/22/2005	12:48 PM	7,860	25.80	21.70	43.90	20.50	3.0E-06		
3/22/2005	4:20 PM	12,720	13.90	33.60	43.80	20.50	2.8E-06		
3/23/2005	7:17 AM	0	47.00	2.00	43.30	20.00		yes	Test Restart
3/23/2005	8:25 AM	4,080	43.20	6.50	43.20	20.00	2.3E-06		
3/23/2005	9:26 AM	3,660	39.30	10.30	43.20	20.50	2.5E-06		
3/23/2005	10:29 AM	3,780	37.00	12.40	43.10	21.00	1.4E-06		
3/23/2005	11:29 AM	3,600	34.80	14.10	43.10	21.00	1.3E-06		
3/23/2005	12:30 PM	3,660	32.50	16.80	43.10	21.00	1.7E-06		
3/23/2005	1:35 PM	3,900	29.70	19.00	43.10	21.00	1.7E-06		
3/23/2005	3:27 PM	6,720	25.30	23.90	43.00	21.00	1.9E-06		
3/23/2005	3:28 PM	0	49.40	0.20	43.00	21.00		yes	Test Restart
3/24/2005	6:44 AM	54,960	11.80	36.80	42.00	19.50	1.8E-06		
		0							
		0							
		0							
		0							
		0							

BORING C3

LABORATORY DATA SHEETS

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.:	**20132-01**	Project Name:	**TID-High Line Canal**	Date:	**3/31/2005**
Sample No.:	**S-1**	Boring/Trench:	**C3** Depth, (ft.): **0.3 - 0.8**	Tested By:	**BLP**
Description:	**Very Dark Grayish Brown (10YR 3/2) Silty Sand (organic content 4.69%)**			Checked By:	**JHA**
Sample Location:				Lab. No.:	**5-056**

Moisture Content Data:

Pan ID	33T	
Pan Weight	22.00	(gm)
Wet Soil + Pan	64.10	(gm)
Dry Soil + Pan	63.50	(gm)
Water Weight	0.60	(gm)
Dry Soil Weight	41.50	(gm)
Moisture Content	1.4	(%)

Total Material Sample Data:

Pan ID	B	
Pan Weight	156.60	(gm)
Wet Soil + Pan Wt.	356.60	(gm)
Total Wet Weight	200.00	(gm)
Total Dry Weight	197.15	(gm)
Total Dry Wt. >#4 Sieve	0.00	(gm)
Total Dry Wt.<#4 Sieve	197.15	(gm)
Total Dry Wt. <#200 Sieve	64.16	(gm)
Total Percent <#200 Sieve	32.54	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Wet Weight Retained On Sieve (gm)	Dry Weight Retained On Sieve (gm)	Dry Weight Accum. On Sieve (gm)	Dry Weight Passing Sieve (gm)	Dry Weight Percent Passing (%)
6 Inch	6.0000	152.40	0.00	0.00	0.00	197.15	100.0
3 Inch	3.0000	76.20	0.00	0.00	0.00	197.15	100.0
2 Inch	2.0000	50.80	0.00	0.00	0.00	197.15	100.0
1.5 Inch	1.5000	38.10	0.00	0.00	0.00	197.15	100.0
1.0 Inch	1.0000	25.40	0.00	0.00	0.00	197.15	100.0
3/4 Inch	0.7500	19.05	0.00	0.00	0.00	197.15	100.0
1/2 Inch	0.5000	12.70	0.00	0.00	0.00	197.15	100.0
3/8 Inch	0.3750	9.53	0.00	0.00	0.00	197.15	100.0
#4	0.1870	4.75	0.00	0.00	0.00	197.15	100.0
PAN			200.00	197.15	197.15	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

Pan ID	Bob	
Pan Weight	156.60	(gm)
Wet Soil + Pan	356.60	(gm)
Wet Soil	200.00	(gm)
Dry Soil	197.15	(gm)

#200 Wash Data:

Portion >#200 Sieve:	132.99	(gm)
Portion <#200 Sieve:	64.16	(gm)
Percent <#200 Sieve	32.54	(%)
Total Wt. <#200 Sieve	64.16	(gm)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight Rep. Sample Retained On Sieve (gm)	Dry Weight Rep. Sample Percent Retained (%)	Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
#10	0.079	2.000	1.69	0.86	1.69	1.69	99.1
#20	0.033	0.850	6.00	3.04	6.00	7.69	96.1
#40	0.017	0.425	49.50	25.11	49.50	57.19	71.0
#60	0.010	0.250	40.70	20.64	40.70	97.89	50.3
#100	0.006	0.150	26.10	13.24	26.10	123.99	37.1
#200	0.003	0.075	9.00	4.57	9.00	132.99	32.5
PAN			Discard				

HOLDREGE & KULL

Particle Size Distribution

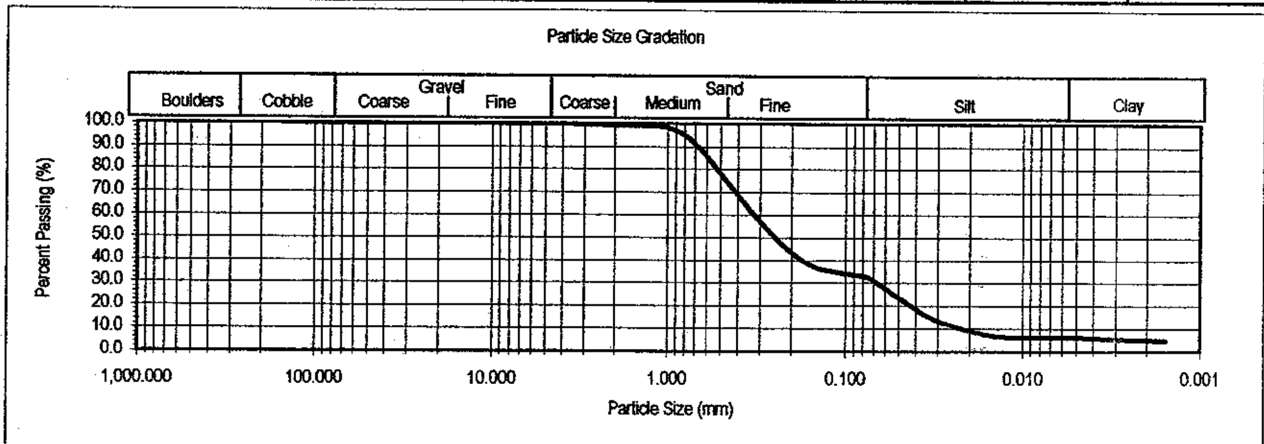
ASTM D422

Project No.: **20132-01** Project Name: **TID-High Line Canal** Date: **3/31/2005**
Sample No.: **S-1** Boring/Trench: **C3** Depth, (ft.): **0.3 - 0.8** Tested By: **BLP**
Description: **Very Dark Grayish Brown (10YR 3/2) Silty Sand (organic content 4.69%)** Checked By: **JHA**
Sample Location: Lab. No.: **5-056**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	197.1	100.0
3 Inch	3.0000	76.2	0.00	0.0	197.1	100.0
2 Inch	2.0000	50.8	0.00	0.0	197.1	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	197.1	100.0
1.0 Inch	1.0000	25.4	0.00	0.0	197.1	100.0
3/4 Inch	0.7500	19.1	0.00	0.0	197.1	100.0
1/2 Inch	0.5000	12.7	0.00	0.0	197.1	100.0
3/8 Inch	0.3750	9.5	0.00	0.0	197.1	100.0
#4	0.1870	4.7500	0.00	0.0	197.1	100.0
#10	0.0787	2.0000	1.69	1.7	195.5	99.1
#20	0.0335	0.8500	6.00	7.7	189.5	96.1
#40	0.0167	0.4250	49.50	57.2	140.0	71.0
#60	0.0098	0.2500	40.70	97.9	99.3	50.3
#100	0.0059	0.1500	26.10	124.0	73.2	37.1
#200	0.0030	0.0750	9.00	133.0	64.2	32.5
Hydrometer		0.0349				15.5
		0.0254				11.5
		0.0165				7.5
		0.0118				6.2
		0.0068				6.2
		0.0048				6.2
		0.0030				5.6
		0.0016				4.9

Cc = 0.68

Cu = 14.09



HOLDREGE & KULL

LONG HYDROMETER TEST WORK SHEET
ASTM D422

Boring/Trench No.: C3 Sample No. S-1 Depth (ft) 0.3 - 0.8
Soil Description: Very Dark Grayish Brown (10YR 3/2) Silty Sand (organic content 4.69%)
Date Tested: 3/31/2005
Tested By: BLP
Checked By: JHA
Hydrometer Type: 151H
Hydrometer No.: 2

Pan ID: A
Dry Soil + Pan Weight: 139.5 (gm)
Pan Weight: 100.0 (gm)
Dry Soil Weight: 39.5 (gm)

Percent of Total Gross Sample < No. 200 Sieve (%) 32.54

Soil Specific Gravity, Gs 2.65
Water Specific Gravity, 1.00

Reading Period			Hydrometer Sample Portion Data								Total Sample
Date (m/d/y)	Time (h:m)	Total Elapsed Time T (minutes)	Actual Reading Ra (dim.)	Composite Hydrometer Correction C (dim.)	Corrected Reading Rc=Ra-C (dim.)	Water Temp. Tw (C)	K= f(Tw,Gs) Table 3 (dim)	Effective Depth L Table 2 (cm)	Particle Diameter D= K(L/T)^0.5 (mm)	Percent Passing Ph= (%)	Percent Passing Pt= Ps(Ph/100) (%)
3/31/2005	11:20	0.0									
3/31/2005	11:22	2	1.0120	0.00030	1.0117	20.0	0.01361	13.1	0.0349	47.57	15.48
3/31/2005	11:24	4	1.0090	0.00030	1.0087	20.0	0.01361	13.9	0.0254	35.37	11.51
3/31/2005	11:30	10	1.0060	0.00030	1.0057	20.0	0.01361	14.7	0.0165	23.18	7.54
3/31/2005	11:40	20	1.0050	0.00030	1.0047	20.0	0.01361	15.0	0.0118	19.11	6.22
3/31/2005	12:20	60	1.0050	0.00030	1.0047	20.0	0.01361	15.0	0.0068	19.11	6.22
3/31/2005	13:20	120	1.0050	0.00030	1.0047	20.0	0.01361	15.0	0.0048	19.11	6.22
3/31/2005	16:30	310	1.0045	0.00030	1.0042	20.0	0.01361	15.1	0.0030	17.08	5.56
4/1/2005	6:15	1,135	1.0040	0.00030	1.0037	20.0	0.01361	15.2	0.0016	15.04	4.90
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		

Specific Gravity

ASTM D854

Project No.: 20132-01 **Project Name:** TID-High Line Canal **Date:** 3/31/2005
Sample No.: S-1 **Boring/Trench** C3 **Depth, ft.:** 0.3-0.8 **Tested By:** MLH
Description: Very Dark Grayish Brown (10YR 3/2) Silty Sand **Checked By:** JHA
Sample Location: **Lab No.** 5-056

Test material screened on number 10 sieve Other
Sample Air or Oven Dried: Air
Type of fluid used in test Distilled Water

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	151.1	154.58	155.21	
Temperature in Celsius	20	20	20	
Weight of Bottle + Fluid	147.65	147.65	147.65	
Evaporating Dish Number	F	Q	HP	
Weight of Dish + Soil	163.02	162.59	168.92	
Weight of Dish	157.54	151.43	156.87	
Weight of Soil	5.48	11.16	12.05	
Specific Gravity of Fluid at Temp.	0.99823	0.99823	0.99823	
Specific Gravity	2.69	2.63	2.68	0.00

Average Specific Gravity = 2.67

Holdrege & Kull

PERMEABILITY TEST

ASTM D5084 (Method C)

Project No.: 20132-01 Project Name: TID High Line Canal

Sample No.: S-1 Boring/Trench No.: C3 Sample Depth (ft): 0.3-0.8

Sample Description Very Dark Grayish Brown (10YR 3/2) Silty Sand

Date Tested: 3/28/2005 Tested By: MLH/JHA Checked By: JHA Lab No. 5-056

Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.90	4.88
Area	(cm^2)	18.86	18.70
Height	(cm)	7.38	7.38
Volume	(cm^3)	139.17	138.03
Wet Soil Weight	(gr)	275.82	283.17
Dry Soil Weight	(gr)	232.60	232.60
Water Weight	(gr)	43.22	50.57
Moisture Content	(%)	18.6	21.7
Dry Density	(pcf)	104.3	105.2
Void Ratio	(dim)	0.592	0.579
Saturation	(%)	83.6	100.0
Porosity	(%)	37.2	36.7
Relative Compactio	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	34
Tare Weight	(gr)	35.40
Wet Soil + Tare Weight	(gr)	318.57
Dry Soil + Tare Weight	(gr)	268.00
Water Weight	(gr)	50.57
Dry Soil Weight	(gr)	232.60
Moisture Content	(%)	21.7
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.66

Avg. Permeability(Last Four Readings), K= 3.8E-06 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 62.0 Skempton "B" Parameter = 95.00

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 62.0 Skempton "B" Parameter = 95.00

Consolidation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 62.0 Average Consol. Pressure (psi) = 3.0

Permeation Test Phase:

Permeant = Water Initial Hydraulic Gradient (cm/cm) = 31.58

Chamber (psi) = 65.0 Sample Top (psi) = 59.0 Sample Bottom (psi) = 62.0

PERMEATION TEST DATA

Time Data			Burrett Readdings			Temp.	Permeability	Restart	Comments
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Degree Celcius (C)	(cm/s)	Test (Yes or No)	
3/28/2005	7:00 AM	0	21.30	22.20	12.20	20.00		Yes	
3/29/2005	6:30 AM	0	45.70	0.50	10.00	20.00		Yes	Test Restart
3/29/2005	10:22 AM	13,920	19.50	27.00	10.00	20.00	3.2E-06		
3/29/2005	12:01 PM	5,940	12.00	34.40	10.00	20.00	2.5E-06		
3/29/2005	12:05 PM	0	48.00	3.80	10.00	20.00		Yes	Test Restart
3/29/2005	4:12 PM	14,820	21.30	30.30	9.90	20.00	3.1E-06		
3/30/2005	6:30 AM	0	49.90	1.30	9.90	20.00		Yes	Test Restart
3/30/2005	10:30 AM	14,400	15.80	35.50	9.90	20.00	4.1E-06		
3/30/2005	10:30 AM	0	49.80	2.00	9.90	20.00		Yes	Test Restart
3/30/2005	4:05 PM	20,100	8.50	43.70	9.90	20.00	3.7E-06		
3/31/2005	7:00 AM	0	46.50	1.30	9.90	20.00		Yes	Test Restart
3/31/2005	9:54 AM	10,440	19.80	27.80	9.80	20.00	4.4E-06		
		0							
		0							
		0							
		0							
		0							
		0							
20132-01 lab #5-056.xls, Perm B-3		0							

BORING C4

LABORATORY DATA SHEETS

PARTICLE SIZE DISTRIBUTION TEST WORK SHEET

ASTM D422

Sieve Only Analysis Worksheet

Project No.: 20132-01 Project Name: TID-High Line Canal Date: 3/31/2005

Sample No.: S-1 Boring/Trench: C4 Depth, (ft.): 1.2-1.7 Tested By: BLP

Description: Very Dark Grayish Brown (10YR 3/2) Silty Sand (organic content 1.2%) Checked By: JHA

Sample Location: Lab. No.: 5-056

Moisture Content Data:

Pan ID	30	
Pan Weight	35.33	(gm)
Wet Soil + Pan	77.77	(gm)
Dry Soil + Pan	73.44	(gm)
Water Weight	4.33	(gm)
Dry Soil Weight	38.11	(gm)
Moisture Content	11.4	(%)

Total Material Sample Data:

Pan ID	B2	
Pan Weight	152.45	(gm)
Wet Soil + Pan Wt.	323.20	(gm)
Total Wet Weight	170.75	(gm)
Total Dry Weight	153.33	(gm)
Total Dry Wt. >#4 Sieve	0.00	(gm)
Total Dry Wt.<#4 Sieve	153.33	(gm)
Total Dry Wt. <#200 Sieve	54.83	(gm)
Total Percent <#200 Sieve	35.76	(%)

GRAVEL PORTION SIEVE ANALYSIS

(Portion Retained On > #4 Sieve)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Wet Weight Retained On Sieve (gm)	Dry Weight Retained On Sieve (gm)	Dry Weight Accum. On Sieve (gm)	Dry Weight Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.40			0.00	153.33	100.0
3 Inch	3.0000	76.20			0.00	153.33	100.0
2 Inch	2.0000	50.80			0.00	153.33	100.0
1.5 Inch	1.5000	38.10			0.00	153.33	100.0
1.0 Inch	1.0000	25.40			0.00	153.33	100.0
3/4 Inch	0.7500	19.05			0.00	153.33	100.0
1/2 Inch	0.5000	12.70			0.00	153.33	100.0
3/8 Inch	0.3750	9.53			0.00	153.33	100.0
#4	0.1870	4.75			0.00	153.33	100.0
PAN			170.75	153.33	153.33	0.00	

SAND PORTION SIEVE ANALYSIS

(Portion Retained On < #4 Sieves)

Representative Sample Data:

Pan ID	B2	
Pan Weight	152.45	(gm)
Wet Soil + Pan	323.20	(gm)
Wet Soil	170.75	(gm)
Dry Soil	153.33	(gm)

#200 Wash Data:

Portion >#200 Sieve:	98.50	(gm)
Portion <#200 Sieve:	54.83	(gm)
Percent <#200 Sieve	35.76	(%)
Total Wt. <#200 Sieve	54.83	(gm)

Sieve Size	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight Rep. Sample Retained On Sieve (gm)	Dry Weight Rep. Sample Percent Retained (%)	Total Sample Weight Retained (gm)	Accum. Grand Total On Sieve (gm)	Total Percent Passing (%)
#10	0.079	2.000	1.90	1.24	1.90	1.90	98.8
#20	0.033	0.850	4.40	2.87	4.40	6.30	95.9
#40	0.017	0.425	29.20	19.04	29.20	35.50	76.8
#60	0.010	0.250	27.60	18.00	27.60	63.10	58.8
#100	0.006	0.150	23.50	15.33	23.50	86.60	43.5
#200	0.003	0.075	11.90	7.76	11.90	98.50	35.8
PAN			Discard				

HOLDREGE & KULL

Particle Size Distribution

ASTM D422

Project No.: 20132-01 Project Name: TID-High Line Canal

Sample No.: S-1 Boring/Trench: C4 Depth, (ft.): 1.2-1.7

Description: Very Dark Grayish Brown (10YR 3/2) Silty Sand (organic content 1.2%)

Sample Location:

Date: 3/31/2005

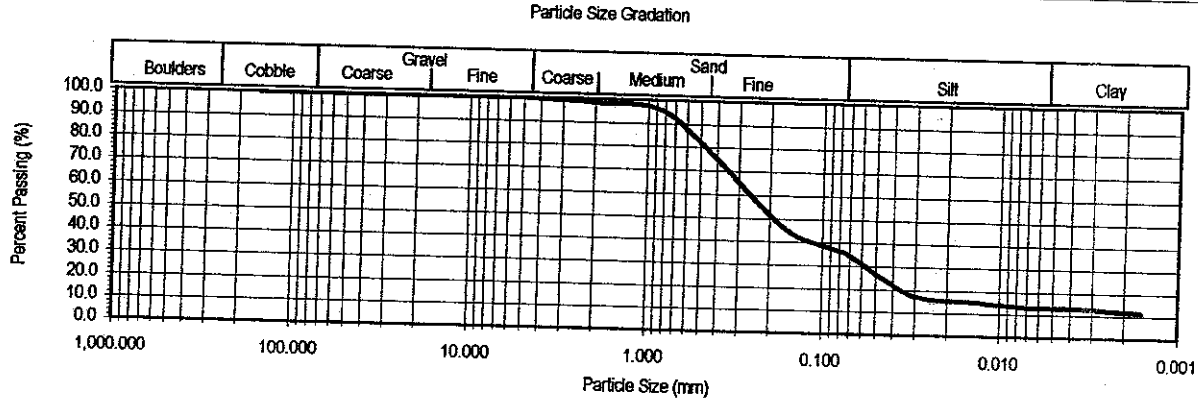
Tested By: BLP

Checked By: JHA

Lab. No.: 5-056

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve: Retained On Sieve (gm)	Dry Weight on Sieve: Accumulated On Sieve (gm)	Dry Weight on Sieve: Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4				
3 Inch	3.0000	76.2		0.0	153.3	100.0
2 Inch	2.0000	50.8		0.0	153.3	100.0
1.5 Inch	1.5000	38.1		0.0	153.3	100.0
1.0 Inch	1.0000	25.4		0.0	153.3	100.0
3/4 Inch	0.7500	19.1		0.0	153.3	100.0
1/2 Inch	0.5000	12.7		0.0	153.3	100.0
3/8 Inch	0.3750	9.5		0.0	153.3	100.0
#4	0.1870	4.7500		0.0	153.3	100.0
#10	0.0787	2.0000		0.0	153.3	100.0
#20	0.0335	0.8500	1.90	1.9	151.4	98.8
#40	0.0167	0.4250	4.40	6.3	147.0	95.9
#60	0.0098	0.2500	29.20	35.5	117.8	76.8
#100	0.0059	0.1500	27.60	63.1	90.2	58.8
#200	0.0030	0.0750	23.50	86.6	66.7	43.5
		0.0345	11.90	98.5	54.8	35.8
Hydrometer		0.0249				19.0
		0.0158				16.0
		0.0112				15.3
		0.0066				14.5
		0.0046				13.0
		0.0036				13.0
		0.0016				13.0
						11.5

Particle Size Gradation



HOLDREGE & KULL

20132-01 lab #5-056.xls, Sieve B-4

LONG HYDROMETER TEST WORK SHEET
ASTM D422

Boring/Trench No.: C4 Sample No. S-1 Depth (ft) 1.2-1.7
Soil Description: Very Dark Grayish Brown (10YR 3/2) Silty Sand (organic content 1.2%)
Date Tested: 3/31/2005
Tested By: BLP
Checked By: JHA
Hydrometer Type: 151H
Hydrometer No.: 1

Pan ID
Dry Soil + Pan Weight 138.4 (gm)
Pan Weight 100.0 (gm)
Dry Soil Weight 38.4 (gm)

Percent of Total Gross Sample
< No. 200 Sieve (%) 35.76

Soil Specific Gravity, Gs 2.65
Water Specific Gravity, 1.00

Reading Period			Hydrometer Sample Portion Data								Total Sample
Date (m/d/y)	Time (h:m)	Total Elapsed Time T (minutes)	Actual Reading Ra (dim.)	Composite Hydrometer Correction C (dim.)	Corrected Reading Rc=Ra-C (dim.)	Water Temp. Tw (C)	K= f(Tw,Gs) Table 3 (dim)	Effective Depth L Table 2 (cm)	Particle Diameter D= K(L/T)^0.5 (mm)	Percent Passing Ph= (%)	Percent Passing Pt= Ps(Ph/100) (%)
3/31/2005	13:16	0.0					0.01361	12.9	0.0345	53.12	18.99
3/31/2005	13:18	2	1.0130	0.00030	1.0127	20.0	0.01361	13.4	0.0249	44.75	16.00
3/31/2005	13:20	4	1.0110	0.00030	1.0107	20.0	0.01361	13.5	0.0158	42.66	15.26
3/31/2005	13:26	10	1.0105	0.00030	1.0102	20.0	0.01361	13.7	0.0112	40.57	14.51
3/31/2005	13:36	20	1.0100	0.00030	1.0097	20.0	0.01361	13.9	0.0066	36.39	13.01
3/31/2005	14:16	60	1.0090	0.00030	1.0087	20.0	0.01361	13.9	0.0046	36.39	13.01
3/31/2005	15:16	120	1.0090	0.00030	1.0087	20.0	0.01361	13.9	0.0036	36.39	13.01
3/31/2005	16:30	194	1.0090	0.00030	1.0087	20.0	0.01361	14.2	0.0016	32.21	11.52
4/1/2005	6:15	1,019	1.0080	0.00030	1.0077	20.0			0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		
									0.0001		

Specific Gravity

ASTM D854

Project No.: 20132-01 **Project Name:** TID-High Line Canal **Date:** 3/31/2005
Sample No.: S-1 **Boring/Trench** C4 **Depth, ft.:** 1.2-1.7 **Tested By:** MLH
Description: Very Dark Grayish Brown (10YR 3/2) Silty Sand **Checked By:** JHA
Sample Location: **Lab No.** 5-056

Test material screened on number 10 sieve Other
Sample Air or Oven Dried: Air
Type of fluid used in test: Distilled Water

Determination Number	1	2	3	
Weight of Bottle + Fluid + Soil	135.96	136.97	136.91	
Temperature in Celsius	20	20	20	
Weight of Bottle + Fluid	129.9	129.9	129.9	
Evaporating Dish Number	19	31	32	
Weight of Dish + Soil	109.74	44.98	46.25	
Weight of Dish	100.09	33.66	34.95	
Weight of Soil	9.65	11.32	11.30	
Specific Gravity of Fluid at Temp.	0.99823	0.99823	0.99823	
Specific Gravity	2.68	2.66	2.63	0.00

Average Specific Gravity = 2.66

Holdrege & Kull

PERMEABILITY TEST
ASTM D5084 (Method C)

Project No.: 20132-01 Project Name: TID High Line Canal
Sample No. S-1 Boring/Trench No.: C4 Sample Depth (ft): 1.2 - 1.7
Sample Descriptior Very Dark Grayish Brown (10YR 3/2) Silty Sand
Date Tested: 3/31/2005 Tested By: JHA Checked By: JHA Lab No. 5-056
Special Notes:

TEST SPECIMEN INFORMATION

Initial and Final Specimen Test Conditions

Property	Units	Initial	final
Diameter	(cm)	4.91	4.89
Area	(cm^2)	18.93	18.78
Height	(cm)	5.20	5.20
Volume	(cm^3)	98.46	97.66
Wet Soil Weight	(gr)	208.92	210.66
Dry Soil Weight	(gr)	186.57	186.57
Water Weight	(gr)	22.35	24.09
Moisture Content	(%)	12.0	12.9
Dry Density	(pcf)	118.3	119.3
Void Ratio	(dim)	0.398	0.387
Saturation	(%)	79.7	88.4
Porosity	(%)	28.5	27.9
Relative Compactic	(%)		

End of Test Oven Dried Sample Information

Item	Unit	Final
Tare Number	na	21
Tare Weight	(gr)	153.53
Wet Soil + Tare Weight	(gr)	364.19
Dry Soil + Tare Weight	(gr)	340.10
Water Weight	(gr)	24.09
Dry Soil Weight	(gr)	186.57
Moisture Content	(%)	12.9
Lab Maximum Dry Density	(pcf)	
Optimum Moisture Content	(%)	
Specific Gravity	(dim)	2.65

Avg. Permeability(Last Four Readings), K= 1.8E-06 cm/s

SAMPLE PREPARATION AND TEST CONDITIONS:

Back Pressure Saturation Test Phase:

Chamber (psi) = 75.0 Sample Top and Bottom (psi) = 65.0 Skempton "B" Parameter = 96.00
Chamber (psi) = Sample Top and Bottom (psi) = Skempton "B" Parameter =

Consolidation Test Phase:

Chamber (psi) = 65.0 Sample Top and Bottom (psi) = 59.0 Average Consol. Pressure (psi) = 6.0

Permeation Test Phase:

Permeant = Tap Water Initial Hydraulic Gradient (cm/cm) = 36.77
Chamber (psi) = 65.0 Sample Top (psi) = 59.0 Sample Bottom (psi) = 62.0

PERMEATION TEST DATA

Time Data			Burrett Readdings			Temp.	Permeability	Restart	Comments
Date (m/d/y h:m am/pm)	Clock Time (h:m)	Elapsed Time (sec)	Bottom (Inflow) (cm)	Top (Outflow) (cm)	Chamber (cm)	Degree Celcius (C)	(cm/s)	Test (Yes or No)	
4/1/2005	6:15 AM	0	26.60	35.70	21.50	20.00		Yes	
4/1/2005	7:45 AM	5,400	15.90	46.30	21.40	20.00	2.8E-06		
4/1/2005	7:45 AM	0	48.80	14.80	21.40	20.00		yes	Test Restart
4/1/2005	8:45 AM	3,600	42.00	21.50	21.40	20.00	2.2E-06		
4/1/2005	10:00 AM	4,500	35.00	28.40	21.30	20.00	1.9E-06		
4/1/2005	12:00 PM	7,200	30.60	32.90	21.20	20.00	8.0E-07		
4/1/2005	1:00 PM	3,600	24.30	39.10	21.20	20.00	2.4E-06		
		0							
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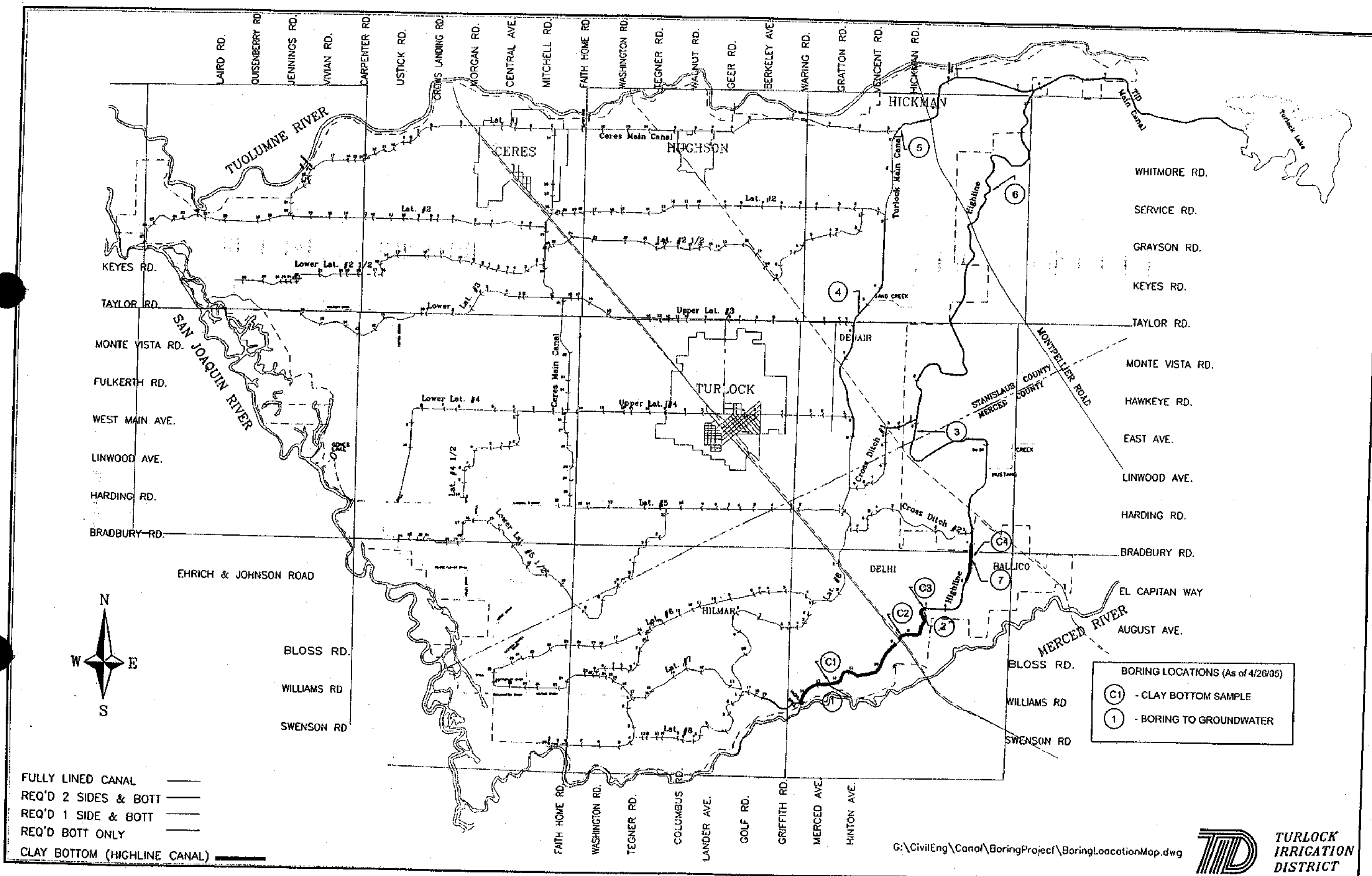

TUOLUMNE RIVER
SAN JOAQUIN RIVER
MERCED RIVER
CERES
HUGHSON
TURLOCK
HICKMAN
DENAIR
DELHI
HILMAR
BALLICO
LAIRD RD.
QUISENBERRY RD.
JENNINGS RD.
VIVIAN RD.
CARPENTER RD.
USTICK RD.
CROWS LANDING RD.
MORGAN RD.
CENTRAL AVE.
MITCHELL RD.
FAITH HOME RD.
WASHINGTON RD.
TEGNER RD.
WALNUT RD.
GEER RD.
BERKELEY AVE.
WARING RD.
GRATTON RD.
VENCENT RD.
HICKMAN RD.
KEYES RD.
TAYLOR RD.
MONTE VISTA RD.
FULKERTH RD.
WEST MAIN AVE.
LINWOOD AVE.
HARDING RD.
BRADBURY RD.
EHRICH & JOHNSON ROAD
BLOSS RD.
WILLIAMS RD
SWENSON RD
WHITMORE RD.
SERVICE RD.
GRAYSON RD.
HAWKEYE RD.
EAST AVE.
EL CAPITAN WAY
AUGUST AVE.
COLUMBUS RD.
LANDER AVE.
GOLF RD.
GRIFFITH RD.
MERCED AVE.
HINTON AVE.
MONTPELLIER ROAD
STANISLAUS COUNTY
MERCED COUNTY
Ceres Main Canal
Turlock Main Canal
TID Main Canal
Turlock Lake
Highline
Lat. #1
Lat. #2
Lat. #2 1/2
Lower Lat. #2 1/2
Lower Lat. #3
Upper Lat. #3
Lower Lat. #4
Upper Lat. #4
Lat. #4 1/2
Lat. #5
Lower Lat. #5 1/2
Lat. #6
Lat. #7
Lat. #8
Cross Ditch #1
Cross Ditch #2
N
S
W
E
FULLY LINED CANAL
REQ'D 2 SIDES & BOTT
REQ'D 1 SIDE & BOTT
REQ'D BOTT ONLY
CLAY BOTTOM (HIGHLINE CANAL)
BORING LOCATIONS (As of 4/26/05)
C1 - CLAY BOTTOM SAMPLE
1 - BORING TO GROUNDWATER
C1
C2
C3
C4
1
2
3
4
5
6
7
G:\CivilEng\Canal\BoringProject\BoringLoacationMap.dwg
TURLOCK IRRIGATION DISTRICT

Attachment C
Summary of Water Samples

argon laboratories

INV F0705-1419

TURLOCK IRRIGATION DISTRICT
P.O. BOX 949
TURLOCK, CA 95318-0949

REPORT DATE: 07/12/05
SAMPLE DATE(S): 07/07/05
07/08/05

ATTN: DEBRA LIEBERSBACH
CLIENT PROJ. ID: TURLOCK IRRIGATION DISTRICT

AL JOB #: F07141

Project Summary:

On July 8, 2005, this laboratory received 8 water samples.

Samples were analyzed according to instructions in accompanying chain-of-custody. Results of analysis are summarized on the following pages. Please see quality control report for a summary of QC data pertaining to this project.

Samples will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Samples may be archived by prior arrangement.

If you have any questions, please contact Sample Control at (209) 581-9280.

for
Hiram Cueto
Lab Director

Whitmore ext
West [illegible] bolton Rd
[illegible] 2905

ARGON ANALYTICAL SERVICES, INC.
CHAIN OF CUSTODY

Project Information:
Project No:
Project Title: Turlock Irrigation District
Location:
Sampler's Name (print): Steven Plunkett
Sampler's Signature: [signature]

Report To:
Debra Liebersbach
Turlock Irrigation District
PO Box 949
Turlock, CA 95381-0949
Phone: (209) 883-8428
Fax: (209) 656-2180

Bill To:
Debra Liebersbach
Client: Turlock Irrigation District
Address: PO Box 949
Turlock, CA 95381-0949

Samples Submitted To:
Laboratory: Argon Analytical Services, Inc.
Address: 3037 Fifth Street
Ceres, CA 95307
Contact: Paul Huckaba
Phone: (209) 581-9280
Fax:
Date Results Required:
Date Report Required:

TURN AROUND TIME
RUSH ☐ 24 Hour ☐ 48 Hour ☐ Standard (5 Day) ☒ ☐

Sample ID.	Date	Time	# Containers	Matrix	Acrolein	VOC's (8260B)	IC (300.0)	TDS / TSS	Oxygenates	Ca Mg Na K							COMMENTS / Preservative
MW-1	7/8/05	9:05	3	H2O	✓												
MW-2	7/8/05	10:15	3	H2O	✓												
MW-3	7/7/05	15:50	3	H2O	✓												
MW-4	7/7/05	11:40	3	H2O	✓												
MW-5	7/6/05	13:25	3	H2O	✓												
MW-7	7/7/05	17:40	3	H2O	✓												
MW-X	7/7/05	13:30	3	H2O	✓												
EQ 070705	7/7/05	16:00	3	H2O	✓												

Relinquished By:	Date:	Time:	Received By:	Date:	Time:
[signature]	7/8/05	12:00	[signature]	7/8/05	12:00

SPECIAL INSTRUCTIONS:
Please include the following information on the report:
- Method blanks, laboratory control spike and laboratory control spike duplicates and matrix spike and matrix spike duplicates must be reported at a minimum frequency of 5%.
- Please use one of our samples for the matrix spike analysis.
- Please include quality control limit data for all quality control tests.

Argon Laboratories Sample Receipt Checklist

Client Name: T. I. D. Date & Time Received: 7-8-05 / 12:00

Project Name: Client Project Number:

Received By: Emma Matrix: Water ☑ Soil ☐ Other

Sample Carrier: Client ☑ Laboratory ☐ Fed Ex ☐ UPS ☐ Other ☐

Argon Labs Project Number: F07141

Shipper Container in good condition? N/A ☐ Yes ☑ No ☐

Samples received under refrigeration? Yes ☑ No ☐

Chain of custody present? Yes ☑ No ☐

Chain of Custody signed by all parties? Yes ☑ No ☐

Chain of Custody matches all sample labels? Yes ☑ No ☐

Samples received in proper containers? Yes ☑ No ☐

Sufficient sample volume for requested tests? Yes ☑ No ☐

Samples received within holding time? Yes ☑ No ☐

Do samples contain proper preservative? N/A ☑ Yes ☐ No ☐

VOA vials with preservative? N/A ☑ Yes ☐ No ☐

VOA vials preservative type: HCL ☐ $Na_2S_2O_3$ ☐ Other

Do VOA vials contain zero headspace? N/A ☐ Yes ☑ No ☐

Samples received intact? Yes ☑ No ☐

ANY "No" RESPONSE MUST BE DETAILED IN THE COMMENTS SECTION BELOW

Date Client Contacted: Person Contacted:

Contacted By: Subject:

Comments:

Action Taken:

argon laboratories

Turlock Irrigation District
P.O. Box 949
Turlock, CA 95381-0949

Proj. ID: Turlock Irrigation District

Acrolein

EPA Method: 8260B

Date(s) Sampled: 07/07/05
07/08/05
Date Received: 07/08/05
Date Analyzed: 07/11/05

Matrix: Water

Lab ID	Sample ID	Result ug/L	Notes	Reporting Limit (ug/L)	Surrogate % Recovery
F07141	MW-1	ND		20	101
F07142	MW-2	ND		20	102
F07143	MW-3	ND		20	99
F07144	MW-4	ND		20	99
F07145	MW-5	ND		20	97
F07146	MW-7	ND		20	99
F07147	MW-X	ND		20	98
F07148	EQ 070705	ND		20	100

Note(s):
Water samples are reported in ug/L; soil/sludge samples in mg/Kg; product/oil/non-aqueous liquid samples in mg/L.
ND means not detected at or above the stated reporting limit; N/A means analyte not applicable to this analysis.

for
Hiram Cueto
Lab Director
DHS Certification No. 2359

2905 Railroad Avenue, Ceres, CA 95307 • Phone (209) 581-9280 • Fax (209) 581-9282
email: info@argonlabs.com

argon laboratories

Turlock Irrigation District
P.O. Box 949
Turlock, CA 95381-0949

Blank / QC Data

Date Analyzed: 07/11/05

EPA Method: 8260B

Proj. ID: Turlock Irrigation District

Matrix: Water

Lab ID	Sample ID	Result ug/L	Reporting Limit (ug/L)	Surrogate % Recovery	QC Limits
BLKF0711	Blank	ND	20	100	80 - 120

MS / MSD Recovery Summary

Analyte	Lab ID	Sample ID	Percent Recovery MS / MSD	%RPD
Acrolein	F07141	MW-1	91 / 85	7
QC Limits:			70 - 130	0-20

LCS / LCSD Recovery Summary

LCS / LSCD ID	Analyte	Percent Recovery LCS / LCSD	%RPD
LCS0711F / LCSD0711F	Acrolein	80 / 82	2
QC Limits:		70 - 130	0-20

Note(s):
Water samples are reported in ug/L; soil/sludge samples in mg/Kg; product/oil/non-aqueous liquid samples in mg/L.
ND means not detected at or above the stated reporting limit; N/A means analyte not applicable to this analysis.

2905 Railroad Avenue, Ceres, CA 95307 • Phone (209) 581-9280 • Fax (209) 581-9282
email: info@argonlabs.com

Appendix E

Public Involvement

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT

Project Name:	Aquatic Pesticides Application Program for the Turlock Irrigation District's Unlined and Partially Lined Canals
Project Location:	Merced and Stanislaus Counties
Name and Address of Project Proponent:	Turlock Irrigation District, P.O. Box 949 Turlock, CA 95381

INTRODUCTION

To satisfy California Environmental Quality Act (CEQA) requirements, the Turlock Irrigation District ("Turlock") will be the Lead Agency for a focused Environmental Impact Report (EIR) for the continuation of its Aquatic Pesticide Application Program for its 39.22 miles, more or less, of unlined and partially concrete lined canal sections. The EIR will analyze the potential for aquatic pesticides to seep from unlined and partially concrete lined portions of the District's canals into the groundwater. As required by CEQA Guidelines, Turlock is providing this Notice of Preparation (NOP) to responsible agencies and trustee agencies. Turlock would like your views regarding the scope and content of the environmental information to be addressed in the focused EIR.

PROJECT INFORMATION

The Turlock and Modesto irrigation districts (MID) own Don Pedro Reservoir and La Grange Reservoir. Water in Turlock's system flows in Turlock's Upper Main Canal down to Turlock Lake. Downstream from Turlock Lake, Turlock owns and operates approximately 39.22 miles of unlined and partially lined canals and approximately 164 miles of fully concrete lined canals. The unlined or partially lined canals are in the upper and eastern sections of Turlock's canal system and the fully lined canal sections are in the lower sections of the canal system. These facilities are used to supply irrigation water from Don Pedro Reservoir on the Tuolumne River to approximately 150,000 acres of agricultural land in Stanislaus and Merced counties (Figures 1 and 2). Water that is not used for irrigation is released from the canals into the Tuolumne, Merced, or San Joaquin rivers. Releases are either discharged directly to the rivers or into drains that flow to the rivers.

Turlock has safely applied aquatic pesticides to its irrigation conveyance system since 1975 to control weeds and algae. During the irrigation season, generally March 15 to October 15, Turlock applies Magnacide H (acrolein) to various sections of its canal system to control weeds and algae that would otherwise interfere with and slow the delivery of irrigation water, cause canal overtoppings, and clog waterways and pumps. The treated water is irrigated out to various agricultural lands in Stanislaus and Merced counties. The application of acrolein results in the conservation of water and maximizes the efficiency of the irrigation system. Aquatic weeds are targeted at early stages of growth so that low dosages of the pesticide can achieve the desired result, thereby reducing the pesticide concentrations in the water. Turlock has adopted and implemented Best Management Practices to insure that no treated water is released to the rivers or drains that flow to the rivers.

PROPOSED ACTION

The District proposes to continue its Aquatic Pesticide Application Program for its approximately 39.22 miles of unlined and partially concrete lined sections of its canal system under the State Water Resources Control Board's current General National Pollution Discharge Elimination System Permit and seeks to apply for a priority pollutant standard exception. Turlock will now prepare an EIR that focuses on the potential for groundwater quality impacts from seepage of acrolein from unlined and partially lined canals and such other significant impacts that are identified.

Due to the time limits mandated by State law, **your response must be sent at the earliest possible date but not later than 30 days after receipt of this notice.** Please identify a contact person, and send your response by mail or e-mail to:

Ms. Debra C. Liebersbach
Water Planning Department Manager
Turlock Irrigation District
P.O. Box 949
Turlock, CA 95381-0949
dcliebersbach@tid.org

PUBLIC MEETING AND WRITTEN COMMENTS

The District will hold a public meeting for members of the public and interested individuals to provide their input on issues to be addressed by the EIR. That meeting will be held at:

333 E. Canal Drive
Turlock, CA 95381
Thursday, July 28 at 9 a.m.

Members of the public are also invited to provide written comments on the content of the EIR via mail or e-mail to Ms. Liebersbach by **July 29, 2005** to the following address:

Water Planning Department Manager
Turlock Irrigation District
P.O. Box 949
Turlock, CA 95381-0949

Received Aug. 8, 2005 Dee

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southwest Region
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802-4213

August 4, 2005 In response reply to:
151422SWR2004SA9065:JSS

Debra C. Liebersbach
Water Planning Department Manager
Turlock Irrigation District
P.O. Box 949
Turlock, California 95381

Dear Ms. Liebersbach:

Thank you for the opportunity to comment on the Notice of Preparation (NOP) of the focused Environmental Impact Report (EIR) for the continuation the Aquatic Pesticide Application Program (Pesticide Program). The Turlock Irrigation District (TID) will be the Lead Agency under the California Environmental Quality Act for developing the EIR for its Pesticide Program. The focused EIR will evaluate the potential of herbicides applied under the Pesticide Program entering the groundwater from water seepage originating from these unlined and partially lined canals.

TID proposes to continue the Pesticide Program within the approximately 39.22 miles of partially lined and unlined sections of its canal system under the State Water Resources Control Board's current General National Pollution Discharge Elimination System (NPDES) permit. In addition, TID seeks to apply for a priority pollutant exception for its program. The herbicide listed in the NOP for evaluation is acrolein, the active ingredient of the herbicide Magnacide® H. This herbicide is applied during the irrigation season (generally March 15 to October 15) to control rooted aquatic weeds that restrict flow in the irrigation canals supplying water to TID customers.

NOAA's National Marine Fisheries Service (NMFS) has previously commented on the Pesticide Program (January 29, 2004) as presented in TID's Negative Declaration for the program. In brief, the compound acrolein is a water soluble aldehyde that is considered highly toxic to aquatic organisms. Data presented in the form of LC_{50}s (concentration at which 50 percent of the population is killed following exposure to the chemical of interest) indicate that salmonids will die at concentrations between 16 and 80 µg/L acrolein in water. The labeling directions for Magnacide H indicate that the effective application concentration for this herbicide is between 1 and 15 mg/L. The U.S Environmental Protection Agency has proposed acute criteria for acrolein of 5.7 µg/L (1–hour average exceeded no more than once in a 3-year period) and a chronic criteria of 2.9 µg/L (4-day average not exceeded more than once every 3 years) in order to protect freshwater organisms. The half-life ($T_{1/2}$) of acrolein in water may range from less than 1 day to approximately 4 days. In order for acrolein applied at 1 mg/L to decay to the lower end of the LC_{50} range for salmonds (assume 30 µg/L for the mid-range LC_{50} values) it will take approximately five half-lives ($2^5 = 32$) to decrease to the mid-range (1,000 µg/L ÷ 32 = 31.3 µg/l). In order to meet the proposed acute or chronic acrolein concentrations, it will take seven to eight half-lives (initial application rate of 1 mg/L). TID has previously indicated that they held acrolein treated water in their irrigation canals for 6 days before letting it out of the system. Based on the previous half-life estimates, this would be a minimum period of time with no margin for safety ($T_{1/2}$ equal to 1 day). A holding time of 10 days would be more protective of freshwater organisms (5 half lives * 2 days/half-life = 10 days). This time period would obviously increase as the application concentration increase above 1 mg/L. The field testing protocols for determining acrolein concentrations in treated water, as indicated in TID's negative declaration, have a lower detection limit of 100 µg/L. Therefore the test by itself can not conclusively determine whether the acrolein has decayed to safe levels for salmonids. Either safety margins must be confirmed by more sensitive analytical procedures (at higher costs) or adequate retention times utilized to allow for the degradation of the compound must be implemented.

Acrolein treated water that seeps through the unlined portions of the irrigation canal system may pose a threat to salmonid bearing surface waters if there is hydrological connectivity between these irrigation canals and surface waters. The EIR should examine the rate of degradation for acrolein in these underground waters and whether the degradation rates are equivalent to surface waters or are different. Underground water flow patterns should be determined within the vicinity of the treated irrigation canals and models of the potential plume developed. Irrigation patterns along the treated canals should be evaluated and treatments made during periods when the irrigated fields are dry and have no hydrologic connectivity to adjacent water courses, particularly when listed salmonids are present.

The EIR should also clearly specify:

- the monitoring that will be employed to track subsurface flows and acrolein levels during herbicide treatments;
- the management practices that will be employed to minimize or avoid acrolein contamination of the surrounding environment;
- the inspection and record keeping policies and protocols for the Pesticide Program;
- public and government agency notification of treatments prior to application of the herbicide;
- the reporting requirements to state and federal agencies with jurisdiction over the project and the environments it affects; and,
- all safety and emergency protocols to handle accidental discharges or spills by the application program.

Please contact Mr. Jeffrey Stuart at 916-930-3607, or via e-mail at J.Stuart@noaa.gov if you have any questions concerning this response or require any additional information.

Sincerely,

fv Rodney R. McInnis
Regional Administrator

cc: NMFS-PRD, Long Beach, CA