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Tam Doduc, Chair, and Members
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Via email to: Ms. Jeanine Townsend, Clerk to the Board
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SUBJECT: **CITY OF LODI COMMENTS TO A-1886—FEBRUARY 3, 2009 BOARD MEETING AS RELATED TO DRAFT STATE WATER BOARD ORDER**

The City of Lodi (City) appreciates the opportunity to provide a response to the Proposed Order of the State Water Resources Control Board (State Water Board) In the Matter of Own Motion Review of City of Lodi Waste Discharge Requirements and Master Reclamation Permit (Order No. R5-2007-0113 [NPDES CA0079243]) (Proposed Order) (SWRCB OCC File No. A-1886).

The City acknowledges the level of effort the State Water Board staff has undertaken to review the permit and administrative record, particularly given the great number of complicating factors that affect the City's White Slough Water Pollution Control Facility (WPCF). To the extent, however, that the Proposed Order finds that Order No. R5-2007-0113 (Permit) for the WPCF fails to comply with Title 27 or constitute a proper exercise of the Central Valley Regional Water Quality Control Board's (Regional Water Board's) discretion, the City respectfully disagrees.[1] We believe substantial evidence supports the Permit provisions under review. The City submitted data and information to the Regional Water Board, which exercised its professional judgment to reasonably address the complex issues involved. While the City does not agree with each and every provision, the Permit protects beneficial uses and otherwise complies with the Water Quality Control Plan for the Sacramento River and

[1] The City concurs with the Board's proposed dismissal of the remaining claims raised by the California Sportfishing Protection Alliance (CSPA).

San Joaquin River Basins (Basin Plan). As the State Water Board's own Proposed Order recognizes, the application of Title 27 exemptions in this case are far from clear-cut, and additional guidance on proper application of the regulations in complex cases may be helpful. Unfortunately, as drafted, the Proposed Order creates greater uncertainty about Title 27 interpretation and serves to undermine the Regional Water Board's determinations about application of its Basin Plan. For these reasons, the City urges the State Water Board to reject or substantially revise the Proposed Order.

Given the complexity of the issues involved and need for significant revisions to the Proposed Order, the City respectfully requests that the State Water Board defer the adoption hearing for the Proposed Order until at least March 3, 2009. This will allow the parties an adequate opportunity to review and comment on a revised Order.

This Response details the City's concerns with the State Water Board's discussion, findings and conclusions in the Proposed Order related to Title 27. The Proposed Order is inconsistent with the applicable regulations and does not fairly characterize the evidence in the record. If adopted, the Proposed Order could result in unnecessarily stringent permit requirements. Specifically, the City is concerned about the following aspects of the Proposed Order:

- The State Water Board concludes that the monitoring performed to date is inadequate to demonstrate compliance with the Basin Plan. Assuming for the sake of argument that this is true, then the corollary is also true: There is insufficient information to conclude that the City's activities exceeded the applicable water quality objectives and otherwise did not comply with the Basin Plan. Further, there is insufficient information to conclude that the City's activities degraded groundwater.

- It is inappropriate for the Proposed Order to specify any proposed capital improvements (such as constructing lined ponds) when there are inadequate data to demonstrate that such controls are necessary.

- The Proposed Order reflects inadequate consideration of the regional and site-specific factors that complicate the characterization of groundwater conditions and is dismissive of the extent of the City's efforts to date.

For these reasons, the City respectfully requests that the State Water Board either reject the sections of the Proposed Order pertaining to Title 27 or revise the order to find that the Permit is consistent with Title 27. Alternatively, the City requests a remand of the Permit to the Regional Water Board for appropriate findings based on the substantial evidence in the record in support of the exemption. Modifying the Proposed Order to incorporate any of these alternative approaches would require substantial revisions and given the number of other issues identified with the Proposed Order, it is premature to

provide suggested language. Therefore, if requested following further review by State Water Board staff, additional suggested language could be provided to allow implementation of a preferred approach.

Nevertheless, regardless of how the State Water Board rules regarding Title 27 compliance, the Proposed Order requires significant revision due to the number of factual and technical errors. Moreover, a number of these identified errors appear directly to affect some of the conclusions presented in the Proposed Order. Therefore, the City suggests that many of the conclusions presented also should be revisited. The attachment to this Response outlines these issues identified and proposes the substantive language changes to the Proposed Order in this regard.

I. Compliance with Title 27

The Permit establishes requirements for the City to land apply secondary and tertiary treated municipal wastewater, untreated industrial wastewater and a biosolids slurry to the agricultural fields adjacent to the WPCF. The Permit finds that Section 20090(a) of Title 27[2] exempts these activities (including the treatment and storage ponds) from its regulations as discharges of domestic sewage or treated effluent.[3] (Permit Fact Sheet at p. F-56.) The Response of the City of Lodi to California Sportfishing Protection Alliance's Petition for Review (City Response to Petition) explains how Section 20090(a) exempts the land application of the treated municipal effluent from Title 27. (City Response to Petition (Dec. 7, 2007) at p. 23.) The City Response to Petition also explains that the industrial wastewater and biosolids slurry discharges are exempt from Title 27 as wastewater discharges Section 20090(b)) and soil amendments (Section 20090(f)), respectively. (*Id.* at pp. 23-26.)

The Proposed Order concludes that the most appropriate exemption from Title 27 for the City's land application activities is the wastewater exemption of Section 20090(b). (Proposed Order at p. 8.) The Proposed Order also concludes that the wastewater exemption does not apply to the City's activities. (*Id.* at p. 1.) In the City's view, whether the sewage exemption of subsection (a) or wastewater exemption of

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[2] Any subsequent use of "Section" refers to Title 27 unless otherwise indicated.

[3] The sewage exemption applies to:

> Discharges of domestic sewage or treated effluent which are regulated by WDRs ... or for which WDRs have been waived, and which are consistent with applicable water quality objectives, and treatment or storage facilities associated with municipal wastewater treatment plants, provided that residual sludges or solid waste from wastewater treatment facilities shall be discharged only in accordance with [Title 27]. (Cal. Code Regs, tit. 27, § 20090(a).)

subsection (b) applies is not of great significance since their preconditions are similar. (*Id.* at p. 8.) However, the City maintains that the more appropriate exemption for the biosolids slurry is as a soil amendment under Section 20090(f). The City also maintains that its land application activities are exempt under Title 27. To the extent that the Permit findings do not sufficiently articulate the basis for this exemption, the State Water Board could remand the Permit to the Regional Water Board with direction to specify in the findings the evidence in the record supporting the exemption.

Further, the Proposed Order concludes that releases of wastewater from the City's unlined storage ponds have caused groundwater in the vicinity of the WPCF to exceed water quality objectives. (*Id.* at pp. 14, 17, 21.) As discussed in detail below, the City objects to this conclusion as legally flawed, unsupported by evidence in the record and procedurally inappropriate. (See Attachment A, "Comments on the Proposed Order of the State Water Resources Control Board in the Matter of Own Motion Review of City of Lodi Waste Discharge Requirements and Master Reclamation Permit Order No. R5-2007-0113 (NPDES CA0079243) SWRCB OCC File No. A-1886" (Comments, Attachment A).)

A. The Permit's Land Application Requirements Are Consistent with the Wastewater Exemption of Title 27

Section 20090(b) exempts from Title 27:

> Discharges of wastewater to land, including but not limited to evaporation ponds, percolation ponds, or subsurface leachfields if the following conditions are met:
>
> (1) the applicable RWQCB has issued WDRs, reclamation requirements, or waived such issuance;
>
> (2) the discharge is in compliance with the applicable water quality control plan; and
>
> (3) the wastewater does not need to be managed ... as a hazardous waste.

The Proposed Order concludes that the Permit requirements for the City's land application activities are not consistent with the wastewater exemption of Section 20090(b). (Proposed Order at p. 1.) The Proposed Order acknowledges that the Regional Water Board issued WDRs (i.e., the Permit) for the City's land application

activities and the discharges are not hazardous.[4] (*Id.* at p. 9.) Yet the Proposed Order finds that neither the Permit findings nor the evidence in the record demonstrate that the land application operations are consistent with the applicable water quality objectives in the Basin Plan. (*Id.* at p. 7.) As discussed below, the City respectfully disagrees with this conclusion.

Of even greater concern, however, is that rather than remanding the permit to the Regional Water Board for a careful review of the data and appropriate Permit revisions, the Proposed Order goes on to draw conclusions about whether the City's activities have caused exceedances of Basin Plan objectives. The Proposed Order does so despite numerous references to limited and inadequate data. (Proposed Order at pp. 7, 9-11, 13-17, 21.) If, as the State Water Board concludes, the monitoring performed to date is inadequate to demonstrate applicable criteria and therefore compliance with the Basin Plan, the corollary is also true: There is insufficient information to conclude that the City's activities have cause groundwater to exceed applicable objective and thus not complied with the Basin Plan. (*Id.* at p. 7.) At most, the Proposed Order should refer to uncertainties in the record regarding compliance. Moreover, the Proposed Order fails to recognize numerous data that are available in the record regarding the water quality of the irrigation water stored in the ponds and discharged to the land application area and presents a clear misunderstanding of the Regional conditions that affect groundwater quality. (Comments, Attachment A at pp. 11-13, 15-19.) Therefore, the conclusions regarding whether the City's activities have contributed to Basin Plan exceedances not only rely on an incorrect interpretation of the Basin Plan, they are also not supported by the data and should be removed from the Proposed Order.

As explained below, the Permit findings and record demonstrate that Section 20090(b) exempts the City's land application activities from Title 27 as discharges of wastewater to land. The City also explains that given the complicated factors involved, the City continues to take reasonable steps to characterize the groundwater.

1. The City's Land Application Activities Comply with the Basin Plan

The Basin Plan is a comprehensive document that not only establishes water quality objectives, but implements federal, state and regional policies related to water quality. Accordingly, the Regional or State Water Board must consider the *entire* Basin Plan to determine whether Section 20090(b) exempts the City's land application activities from Title 27. The City provided the Regional Water Board the data necessary to make

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[4] The Permit prohibits any "[d]ischarge or application of waste classified as 'hazardous', as defined in CCR, Title 23, Section 2521(a), or 'designated', as defined in CWC Section 3173." (Permit at p. 8.)

this determination. The Regional Water Board considered its Basin Plan and the complex nature of the issues involved and determined that the activities are not subject to Title 27.[5] Based on the Permit requirements and other evidence in the record, the State Water Board should uphold the Regional Water Board's determination even if additional Permit findings are necessary.

a. The Permit Requirements Are Consistent with the Basin Plan

The Proposed Order concludes that because the City has yet to characterize fully the groundwater below the WPCF, the Regional Water Board may not find that the City's wastewater discharges comply with the Basin Plan (Proposed Order at pp. 9-10.) The City respectfully disagrees. The Permit imposes discharge prohibitions, land discharge specifications, groundwater and receiving water limits, and special study requirements to ensure Basin Plan compliance.[6] For example, these requirements implement the State Water Board's antidegradation policy (Resolution No. 68-16) and reclamation policy (Resolution No. 77-1); federal policy for the regulation of biosolids (40 C.F.R. Part 503); and regional policies for wastewater reuse and monitoring as outlined in the Basin Plan. (Basin Plan at pp. IV-4.00, IV-8.00, IV-9.00, IV-14.00, IV-15.01, V-1.00-V-2.00.)

Moreover, the Permit requirements implement and ensure compliance with the applicable water quality objectives. For example, the Permit prohibits any land

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[5] The Proposed Order states: "The City bears the burden of proof on this issue [i.e., whether the discharge complies with the Basin Plan]. The City must demonstrate, with appropriate data, that its land application activities comply with the Basin Plan." (Proposed Order at p. 9.) This statement should be revised to make clear that, like any other discharger, the City must provide the Regional Water Board with data and information necessary for the Regional Water Board to determine that the proposed discharge complies with the Basin Plan. The City supplies the data, but the exercise of regulatory judgment is the province of the Regional Water Board.

[6] In addition to the studies identified below, the Permit requires the City to prepare a wintertime irrigation management plan, which the City submitted in December 2008. (Permit at p. 30; White Slough WPCF Wintertime Irrigation Management Plan (Dec. 19, 2008), attached hereto as Attachment B.) Under section 2050.6 of the California Code of Regulations, the City respectfully requests permission to submit the wintertime irrigation management plan as supplemental evidence. The purpose of the submittal is to establish the City's efforts to comply with the Permit's requirement to prepare such a plan. (See Cal. Code Regs, tit. 23, § 2050.6(a)(2).) The City did not submit the plan to the Regional Water Board prior to the Permit's adoption since the work plan did not exist then and is a product of the Permit's requirements. (See Cal. Code Regs, tit. 23, § 2050.6(a)(2).) Similarly, Attachment A includes a technical review of the Permit that was prepared on January 21, 2009, after the Permit issued. The purpose is to supplement the support in Attachment A. (See Cal. Code Regs, tit. 23, § 2050.6(a)(2).) The City also requests permission to submit the technical review as part of Attachment since it was not available at the time the Permit issued and was a result of the Permit's adoption. (See Cal. Code Regs, tit. 23, § 2050.6(a)(2).)

application or discharges from the agricultural area that would create a nuisance (Cal. Wat. Code, § 13050(m).) (Permit at p. 8.) The land discharge specifications require that hydraulic, total nitrogen, metals and biochemical oxygen demand (BOD) loadings occur at agronomic or specified rates. (*Id.* at p. 12.) Secondary effluent discharged to the onsite storage ponds must meet maximum daily and average monthly effluent limits for BOD and settleable solids. (*Id.* at pp. 12-13.) The Permit includes receiving water limits based on the water quality objectives in the Basin Plan. (*Id.* at p. 13-15.)

In addition, groundwater limits prohibit releases that would unreasonably affect beneficial uses or cause a condition of pollution or nuisance. (Permit at p. 15.) When the City completes tasks required by the Permit to characterize the groundwater fully, additional groundwater limits take effect to prohibit certain waste constituents in concentrations greater than the limits listed in the Permit or natural background quality, whichever is greater. (*Id.* at pp. 15-16.) The constituents for which the additional groundwater limits take effect include, but are not limited to, chloride, sodium, total nitrogen, nitrite (as N), nitrate (as N), and ammonia (as NH_4). (*Ibid.*)

The Permit requires the City to conduct specials studies, submit technical reports and conduct expanded monitoring to ensure compliance with the Basin Plan. For example, the City must submit a groundwater monitoring workplan and use the methods in Title 27 to characterize the natural background quality of monitored constituents in a technical report by August 1, 2010. (Permit at pp. 26-27.) If the results show that the City's discharge caused or threatens to cause groundwater to contain the constituents in concentrations greater than background, the City must submit a best practical treatment or control evaluation workplan by December 1, 2010. (*Id.* at p. 27.) The City must complete any necessary WPCF modifications within four years[7] after the Regional Water Board's Executive Officer determines that the technical evaluation required under the workplan is adequate. (*Ibid.*)

The City must also characterize the wastewater influent collected by the WPCF's industrial line. (Permit at p. 25.) The study's goal is to isolate and identify the primary, unique components of the industrial influent. (*Ibid.*) The City must monitor several constituents, which include BOD, Total Kjeldahl nitrogen, total nitrogen, sodium, chloride, and boron. The City already submitted the workplan and time schedule, which the Regional Water Board approved on June 26, 2008. In accordance with the workplan, the City initiated the study in August 2008 and will complete it by October 2010. (*Id.* pp. 25-26; City of Lodi White Slough Water Pollution Control Facility Industrial Influent

[7] If appropriate, the Executive Officer may approve a longer schedule. (Permit at p. 27.)

Characterization Study Work Plan (April 23, 2008), attached hereto as Attachment C (White Slough WPCF).)[8]

Further, the Permit requires the City to develop a salinity evaluation and minimization plan to address sources of salinity in the area.[9] (Permit at p. 29.) Consistent with the Regional Water Board's Management Guidance for Salinity in Waste Discharge Requirements (Salinity Guidance), the City must submit annual reports that demonstrate reasonable progress in the reduction of salinity in its discharges to Dredger Cut and the agricultural fields. (*Ibid*; see Salinity Guidance (April 26, 2007) at p. 6.) The City submitted the workplan to the Regional Water Board on October 30, 2008. (City of Lodi, White Slough WPCF Salinity Evaluation Minimization Plan (Oct. 31, 2008) attached hereto as Attachment D (White Slough WPCF Evaluation).)[10] This workplan outlines the City's proposed salinity management practices, and approval of the proposed approach is at the discretion of the Regional Water Board. Therefore, any discussion in the Proposed Order regarding management strategies is at best premature and should be removed.

Issues raised in the Proposed Order regarding the specific constituents the City must monitor and monitoring frequency are also of concern the City. First, the Proposed Order fails to recognize the significant body of data available that characterize the priority pollutant levels in both the treated municipal wastewater and combined irrigation water (Comments, Attachment A at pp. 11-13, 15-19.) Moreover, it is surely within the Regional Water Board's purview to specify the information reasonably required to assess discharge characteristics and groundwater impacts. Finally, priority pollutants are

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[8] In accordance with section 2050.6 of the California Code of Regulations, the City respectfully requests permission from the State Water Board to submit the industrial influent characterization study work plan as supplemental evidence. The purpose of the submittal is to establish the City's efforts to comply with the Permit's requirement to characterize the wastewater influent collected by the WPCF's industrial line. (See Cal. Code Regs, tit. 23, § 2050.6(a)(2).) The City did not submit the work plan to the Regional Water Board prior to the Permit's adoption since the work plan did not exist then and is a product of the Permit's requirements. (See Cal. Code Regs, tit. 23, § 2050.6(a)(2).)

[9] As explained in section C below, the Proposed Order contradicts the Basin Pan and a precedential order of the State Water Board to conclude that the City's land application activities degrade water quality and do not comply with the narrative water quality objective for chemical constituents with respect to EC.

[10] Pursuant to section 2050.6 of the California Code of Regulations, the City also respectfully requests the State Water Board's permission to submit the salinity work plan as supplemental evidence. The submittal's purpose is to demonstrate the City's efforts to comply with the Permit's requirement to develop a salinity evaluation and minimization plan. (See Cal. Code Regs, tit. 23, § 2050.6(a)(2).) The City did not submit the work plan to the Regional Water Board prior to the Permit's adoption since the work plan did not exist then and is a product of the Permit's requirements. (See Cal. Code Regs, tit. 23, § 2050.6(a)(2).)

specified for monitoring in surface water and are identified for monitoring because of impacts they may have on beneficial uses that do not apply to groundwater, such as aquatic habitat and recreation. (*Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (2005) at p. 4.) Therefore, any reference in the Proposed Order regarding the State Water Board's concern with the monitoring frequency for priority pollutants with respect to groundwater impacts is inappropriate. (Proposed order at pp. 10-11.)

b. <u>The City's Land Application Practices Are Consistent with the Basin Plan</u>

Additional evidence in the record establishes that the City's wastewater discharges comply with the water quality objectives in the Basin Plan. For example, the City's monitoring data show that the metals concentrations in the industrial influent are below the applicable drinking water standards (i.e., maximum contaminant levels (MCLs)), agricultural goals and California Toxics Rule criteria for human health and to protect the drinking water beneficial use. (City Response to Petition, Attachment A at p. 8.) As explained in section A.2 below and Attachment A to the City Response to Petition, the groundwater surrounding the WPCF has higher elevated levels of salinity than the City's irrigation water or water stored in the onsite ponds. (*Id.* at p. 11.) Generally, total nitrogen loading to each field area is less than crop uptake on a seasonal basis. (*Ibid.*) In addition, the Permit requirements for BOD are overprotective. (*Id.* at p. 12.)

The City and industrial sources employ best management practices (BMPs) to meet water quality objectives and protect beneficial uses. (See Permit at pp. 33-34; City Response to Petition, Attachment A at pp. 8, 10-12.) For example, the City blends the industrial flows with the municipal effluent prior to land application. (Permit at p. F-6; City Response to Petition, Attachment A at pp. 8, 11.) The City treats (and must treat) its sewage sludge to Class B standards pursuant to 40 C.F.R. 503 regulations. (Permit at p. 32; City Response to Petition, Attachment A at p. 13.) The City then land applies the biosolids as a soil amendment in accordance with BMPs. (Permit at pp. 12, 30, 32; City Response to Petition, Attachment A at p. 13.) The United States Environmental Protection Agency conducted extensive risk assessment analyses for biosolids to identify the appropriate requirements for the use of biosolids as soil amendments. (City Response to Petition, Attachment A at p. 13.) The federal regulations at 40 C.F.R. Part 503 establish requirements that apply to the land application of biosolids to protect public health and the environment. (See e.g., 40 C.F.R. § 503.13.) Data submitted to the Regional Water Board evinces that the City consistently meets these requirements. (*Id.* at pp. 13-15.)

Further, the City uses practices necessary to ensure that nitrogen loadings are less than the uptake rates of crops on a seasonal basis. (Memorandum to R.C. Prima Jr.,

State Water Board, from K. Gies et al., West Yost Associates and Somach Simmons & Dunn (Aug. 27, 2007) (2007 Memorandum) at p. 27[11]; City Response to Petition, Attachment A at p. 11.) The City relies on published agronomic loading rates to determine what the allowable loadings would be and continues to evaluate annual allowable loading rates. (2007 Memorandum at p. 27; see City Response to Petition, Attachment A at pp. 11-12.) The City compared this information to the anticipated worst-case nitrogen loadings from the applied irrigation water (including cannery water). (2007 Memorandum at p. 27.) Based on this analysis, the land application area is the appropriate size to allow for crop uptake of the anticipated applied nitrogen even under worst-case monthly conditions. (*Ibid.*) By considering both monthly and annual rates, the City is implementing a best practicable treatment or control measure that is beyond what is typical for these types of facilities." (*Ibid.*) Further, the City applies nitrogen discharges associated with the cannery to well-established crops with relatively high nitrogen uptake rates. (City Response to Petition, Attachment A p. 12.)

2. The City Continues to Make Reasonable Progress in Characterizing the Complex Nature of the Groundwater's Background

The Proposed Order describes the City's past monitoring activities as inadequate due to the lack of full groundwater characterization to date. (See Proposed Order at pp. 9-10, 17.) The City understands the State Water Board's concern about the lack of fully defined background. However, the Proposed Order reflects inadequate consideration of the regional and site-specific factors that complicate the characterization and is dismissive of the extent of the City's efforts to date.

The 2006 Groundwater Report and August 27, 2007 review of the WPCF's disposal practices and groundwater impacts report describe the complex nature of the subject groundwater. (See 2006 Groundwater Report;[12] 2007 Memorandum at pp. 4-5, 10-13.) Regional flow patterns and a variety of local recharge sources greatly influence groundwater flow near the WPCF. (2007 Memorandum at p. 4) The inaccurate statements presented in the Proposed Order regarding the groundwater conditions near the WPCF evince these complexities. The highest groundwater elevations observed year round are actually offset to the north and west of the WPCF treatment, storage and land application facilities. (*Id.* at p. 5.) The sources of recharge around the WPCF (which is referred to in the Proposed Order as mounding) include irrigated Delta lands and related

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[11] Administrative Record Index filed in this matter, Index Item No. 16, "Letter from: Richard Prima, City of Lodi, to: Pamela Creedon, VRWQCB, subject: City Response to State Board Report on City of Lodi Wastewater Disposal Practices and Groundwater Impacts," (Aug. 27, 2007). (2007 Memorandum.)

[12] Administrative Record Index filed in this matter, Index Item No. 54, "Report: Groundwater Investigation City of Lodi Water Pollution Control Facility Existing Conditions Report," (Sept. 2006). (2006 Groundwater Report.)

waterways located west of the WPCF. (*Id.* at pp. 4-5) The WPCF storage ponds and land application areas only have a minor influence on the mounding effect. (*Ibid.*) However, the Proposed Order concludes that the WPCF's storage ponds—not the Delta waterways—are the most likely cause of the groundwater mound. (See Proposed Order at p. 12.)

These regional trends also appear to affect observed EC levels in groundwater. (City Response to Petition, Attachment A at p. 2.) As the 2006 Groundwater Report and the United States Geological Survey (USGS) publication *Chemical Quality of Ground Water in San Joaquin and Parts of Contra Costa Counties, California* (Sorenson, 1981) explain, regional EC is high and exceeds 1,000 μmhos/cm primarily along the Delta's margin. (2007 Memorandum at p. 11; City Response to Petition, Attachment A at p. 2.) The likely cause is brackish to saline surface waters that intruded into the Delta and San Joaquin River (as far south as Stockton) before the advent of water projects (e.g., California State Water Project and federal Central Valley Project) and other development. (2007 Memorandum at p. 11; City Response to Petition, Attachment A at p. 2, 3.) USGS continues to evaluate groundwater in the eastern Delta region, which includes the vicinity of the WPCF. (2007 Memorandum at p. 11; City Response to Petition, Attachment A at p. 2.) The results of the evaluation should provide additional information on the origin and distribution of chloride[13] and EC in the area of the WPCF. (2007 Memorandum at p. 11; City Response to Petition, Attachment A at p. 2.)

The WPCF groundwater monitor has shown that wells on the western (upgradient) side of the City's property evince this phenomenon; EC, chloride and sodium appeared at concentrations significantly above the agricultural goals and the City's discharge levels. (City Response to Petition, Attachment A at p. 11.) Therefore, natural background levels of EC appear well above the average levels in the reclamation water applied. (*Id.*) To that end, the Petition specifically references the high salinity levels in WSM2 and suggests they are attributable to the storage ponds. However, not only is this well located upgradient of the ponds, this well also has had high levels of chloride – which is not found in high concentrations in the applied water.

Regional factors also make it difficult to site appropriate background wells related to nitrate. The farmlands located to the west of the WPCF's are within the Delta, where high quality irrigation water combined with hydric soils (which will denitrify applied

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[13] Chloride is not a major constituent in waste streams that enter the WPCF. (City Response to Petition, Attachment A at p. 4.) It appears unlikely that the chloride concentrations detected in the WPCF monitoring wells exceed the range of chloride concentrations observed regionally. (2007 Memorandum at p. 13; City Response to Petition, Attachment A at p. 4.) Therefore, the regional groundwater conditions are most likely affecting the WPCF monitoring wells more than impacts from the WPCF infrastructure or land application areas. (2007 Memorandum at p. 13; City Response to Petition, Attachment A at p. 4.)

nitrate) result in significantly better groundwater quality than would typical occur in a Central Valley agricultural area. However, on the eastern side of the WPCF property, lower quality groundwater that is more typical of Central Valley farming operations is the dominant irrigation supply and the soils are not hydric. (2007 Memorandum at p. 10; City Response to Petition, Attachment A at p. 1.) Further, there are large dairy operations north, northeast and adjacent to the WPCF. (2007 Memorandum at p. 11; City Response to Petition, Attachment A at pp. 1-2.) These facilities only recently obtained coverage under WDRs issued by the Regional Water Board. (2007 Memorandum at p. 11; City Response to Petition, Attachment A at pp. 1-2.) Consequently, the historic operations at the facilities probably did not involve BMPs and groundwater within the direct influence of any of these dairies would not be "natural background." (2007 Memorandum at p. 11; City Response to Petition, Attachment A at pp. 1-2.)

In sum, the land application of the municipal wastewater, industrial wastewater and biosolids is subject to WDRs (i.e., the Permit), complies with the Basin Plan and does not involve a hazardous waste. Thus, the City's land application activities are exempt from Title 27. If State Water Board determines that a remand is necessary, the Regional Water Board can rely upon the evidence in the record to bolster the Permit findings in support of the exemption. It is very important to clarify in the Proposed Order that the lack of complete and fully characterized groundwater background does not bar applicability of a Title 27 exemption.

B. The Biosolids Are Exempt from Title 27 as Land-Applied Soil Amendments

The Proposed Order concludes that the wastewater exemption of Section 20090(b) is more appropriate than the soil amendment exemption of Section 20090(f) for the land application of the biosolids slurry. (Proposed Order at p. 8.) The State Water Board reasons that the biosolids slurry and supernatant are part of the land-applied wastewater mixture. (*Ibid.*) However, the City has recently redirected the biosolids supernatant from the onsite ponds to the domestic treatment train. (Comments, Attachment A at p. 3.) The State Water Board also reasons that "the wastewater mixture applied to land includes waste components that are likely not decomposable, such as metal finishing wastes and a considerable amount of non-nutritive salts." (*Id.* at p. 9.)

The City submits that Section 20090(b) exempts application of the biosolids from Title 27 (see Section A.1 above). However, the City maintains that the soil amendment exemption of Section 20090(f) is more appropriate. Section 20090(f) exempts from regulation under Title 27 the "[u]se of nonhazardous decomposable waste as a soil amendment pursuant to applicable best management practices, provided that [Regional Water Boards] may issue waste discharge or reclamation requirements for such use."

As previously explained, the wastes at issue are not hazardous, the City employs BMPs as part of its land application operations and WDRs (i.e., the Permit) regulate the land application activities. Further, the State Water Board's concern that the wastewater mixture at issue may include components that are not decomposable represents an overly restrictive reading of the soil amendment exemption. Such a reading could render the use of soil amendments a nullity, as every soil amendment includes at least some amount of non-decomposable material.

In addition, the Proposed Order's preference for the wastewater exemption over the soil amendment exemption conflicts with the State Water Board's biosolids policy embodied in WQO No. 2004-0012-DWQ, *General Waste Discharge Requirements for the Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and land Reclamation Activities* (General Order). The General Order encourages the use of biosolids as a soil amendment in agricultural, silvicultural, horticultural, and land reclamation activities. (*Id.* at p. 1.) As a source of organic matter, nitrogen, phosphorus, and micronutrients, biosolids benefit these activities and improve agricultural productivity. (*Id.* at p. 6.) For example, nitrogen, phosphorus and micronutrients (e.g., salts and metals) are necessary for plant growth. (*Ibid.*) The addition of biosolids to soils enhances soil structure, promotes soil aggregation, reduces bulk density, and increases water retention. (*Ibid.*) Increased water retention reduces the need to apply water and facilitates water conservation in the soil column. (*Ibid.*) Organic matter helps maintain soil pores to allow water and air to pass through the soil medium. (*Ibid.*) Continuous cultivation destroys such pores and the critical aerobic environment they create within the plant root zone. (*Ibid.*)

The General Order establishes requirements for discharges of biosolids used as a soil amendment to protect public health and the environment. (*Id.* at pp. 1, 8.) The General Order uses the previously mentioned requirements of 40 C.F.R. Part 503 as the baseline requirements for compliance. (*Id.* at p. 8.) The City's biosolids application practices continue to conform to the requirements in the General Order and are consistent with EPA requirements for land application. (2007 Memorandum at p. 19; City Response to Petition, Attachment A at pp. 13-15.)

C. The Proposed Order Inappropriately Concludes that the City's Activities Adversely Affected Groundwater

The Proposed Order concludes that releases of wastewater from the City's unlined storage ponds caused the underlying groundwater to exceed water quality objectives for EC and nitrate. (Proposed Order at pp. 14, 17, 21.) This conclusion is of great concern to the City, as it relies on a misinterpretation of the Basin Plan and does not accurately reflect the extensive factual information in the record.

As an initial matter, the Proposed Order consistently states that the monitoring data are inadequate or insufficiently clear to demonstrate compliance. (*Id.* at pp. 7, 9-11, 13-17, 21.) However, the Proposed Order also fails to recognize some of the data available in the record. Moreover, even if this were the case, the data must also be inadequate to demonstrate non-compliance. Moreover, the Proposed Order relies on a reading of the Basin Plan contrary to the Regional Water Board's stated interpretation and practice and an inaccurate characterization of the subject data. Statements in the Proposed Order with regard to EC, the distance to groundwater beneath the WPCF site and suggested facility improvements evince this point.

Further, site factors complicate the City's ability to define background as explained in section A.2 above. Regional flow patterns and various local recharge sources influence the groundwater flow (and are suspected to also affect EC levels) near the WPCF. (2007 Memorandum at p. 4; City Response to Petition, Attachment A at p. 2.) The available data support that Delta waterways—not the WPCF's storage ponds—are the primary cause of the groundwater recharge. (See Proposed Order at p. 12; Comments, Attachment A.) The monitoring data also evinces that highest EC levels are observed upgradient of the WPCF and its storage ponds. (2007 Memorandum at p. 11; City Response to Petition, Attachment A at p. 11.) Along the Delta's margin, brackish to saline surface waters intruded into the Delta and San Joaquin River predevelopment and subsequent post development processes have been documented to cause elevated EC levels in this area. (2007 Memorandum at p. 11; City Response to Petition, Attachment A at p. 2, 3.) The errors outlined in the Proposed Order regarding these issues demonstrate that understanding and evaluating the data is a highly complex undertaking. Therefore, the City contends that the Regional Water Board's reasonable interpretation of the data is entitled to some deference. In any event, even if the State Water Board concludes that background data are inadequate to demonstrate Basin Plan compliance, the State Water Board must also conclude that the data do not support the conclusion that the WPCF has degraded groundwater, as background has not been adequately characterized.

1. The Proposed Order Relies Upon an Advisory Goal Rather than an Adopted Regulatory Standard to Evaluate EC Compliance

The Proposed Order represents an inaccurate interpretation of the Basin Plan's narrative water quality objective for chemical constituents. The Proposed Order relies upon a secondary MCL of 900 µmhos/cm and agricultural water quality goal of 700 µmhos/cm to conclude that the peak EC groundwater levels within the "mound" area exceed the water quality objective. (*Id.* at p. 13.) This is contrary to the Basin Plan, State Water Board precedent and Regional Water Board practice. The Basin Plan states: "Ground waters shall not contain chemical constituents in concentrations that adversely affect beneficial uses." (Basin Plan at p. III-10.00.) For domestic municipal supply uses (MUN), this means that groundwater must not contain concentrations of chemical constituents in concentrations that exceed the secondary MCL. (Basin Plan at p. III-10.00.) The secondary MCL for EC is a *range* of 900 µmhos/cm to 1600 µmhos/cm with a short-term range of 2,200 µmhos/cm. (Cal. Code Regs, tit. 22, § 64449(a), Table 64449-B.) With regard to MUN, the Proposed Order thus ignores the range provided by the secondary MCL and misstates the water quality objective at issue.

Moreover, the use of 700 µmhos/cm to determine Basin Plan compliance or degradation squarely conflicts with State Water Board Order WQO 2004-0010—*In the Matter of the Own Motion Review of City of Woodland* (Woodland Order). The Woodland Order explains that the value of 700 µmhos/cm arises from a United Nations Report that "makes it clear that site-specific considerations are important is assessing irrigation water suitability." (Woodland Order at p. 7.) The Woodland Order further explains:

> [T]he true suitability of a given water depends on the specific conditions of use and on the management capability of the user. The [United Nations] guidelines are intended to place in perspective water quality effects ... with the other factors affecting crop production, the ultimate goal being to obtain maximum production per unit of available water. (*Ibid.* internal footnotes and quotations omitted.)

In the Woodland Order, the State Water Board thus concluded that the Regional Water Board cannot interpret the 700 µmhos/cm value as an absolute value. (*Ibid.*) Rather, the Regional Water Board must determine whether site-specific conditions applicable to the discharge allow some relaxation in the value. (Woodland Order at p. 7.) Consistent with the Woodland Order, the Salinity Guidance emphasis the importance of considering site-specific factors in determining salinity-based compliance under the narrative water quality objective. (Salinity Guidance at p. 4.) While not a formal regulation, the Regional Water Board's Salinity Guidance represents a thoughtful and reasonable interpretation of the Basin Plan with regard to salinity.

2. The Depth to Groundwater Beneath the Irrigation Site Is Adequate

The Proposed Order evinces the State Water Board's concern about the distance to groundwater. (Proposed Order at pp. 15-16.) The depth to groundwater beneath the irrigation site is adequate. The depth to groundwater measured in the City's monitoring wells are almost always greater than two feet, with much greater soil depth observed on the eastern portion of the City's properties. (2007 Memorandum at p. 22.) The subsoils beneath the land application area have low hydraulic conductivity because of fine-grained texture or the presence of a duripan, which significantly impedes water's vertical flow. (2007 Memorandum at p. 22; City Response to Petition, Attachment A at p. 5.) Accordingly, flow velocities are low and allow for chemical transformations and plant uptake. (2007 Memorandum at p. 23; City Response to Petition, Attachment A at pp. 5-6) These processes can reduce contaminant concentrations in the soil column over time. (2007 Memorandum at p. 23; City Response to Petition, Attachment A at p. 6.) Fine-grained soils tend to strongly absorb metals and organic compounds, leading to decreased potential for groundwater impacts. (2007 Memorandum at p. 23; City Response to Petition, Attachment A at p. 6)

The State Water Board also expresses concern that salts from the industrial waste stream and non-nutritive TDS from the biosolids mixture move directly to groundwater. (Proposed Order at pp. 15-16.) As acknowledged in the Proposed Order, the industrial waste stream mixes with other liquid wastes prior to land application. (*Id.* at p. 16.) "Therefore, the focus must be on the wastewater mixture that is applied to the fields." (*Ibid.*) As explained in section A above, the wastewater mixture as applied and regulated by the Permit is consistent with the Basin Plan.

3. The Suggestions in the Proposed Order Related to Facility Improvements Are Premature

The Proposed Order suggests that the City undertake certain options to address discharges from the storage ponds. (See Proposed Order at p. 18.) For example, the Proposed Order states that the City could line the storage ponds, provide tertiary treatment for all applied flows, implement operational and design improvements to the storage ponds, and consider enhanced pretreatment requirements for industrial discharges. (*Ibid.*) These suggestions, many of which would involve significant expenditures of ratepayer monies, are at best premature.

The Permit was issued only recently, and the City continues its diligent efforts to characterize background and complete facility upgrades. Indeed, the Proposed Order fails to recognize that the City has recently added tertiary filtration, ultraviolet disinfection and improved the treatment process to provided enhanced nitrogen removal - and that most of the applied irrigation water is treated to this level. The Proposed Order

also fails to recognize that the City has already redirected the biosolids supernatant from the onsite ponds to the domestic treatment train and repaired the municipal influent line. (Comments, Attachment A at p. 17.) These improvements all improve water quality stored in the ponds and applied to the land application area. Moreover, the City cannot make responsible decisions about future capital improvements without reliable information regarding historic water quality impacts and how the recent improvements have helped to mitigate any potential concerns. The Proposed Order would set a troubling precedent requiring municipalities and other dischargers to expend significant scarce resources on major capital improvements such as constructing lined ponds simply because of incomplete or unclear groundwater data.

II. Conclusion

For the reasons set forth in this Response, the City respectfully requests that the State Water Board reject the Proposed Order or significantly revise the discussion, findings and conclusions as reflected in Comments, Attachment A and modify all language regarding Title 27 compliance to reflect that the City's land application activities are exempt from Title 27. As an alternative, the State Water Board could remand the Permit to the Regional Water Board for further investigation and revisions regarding Title 27 and the applicability of the wastewater exemption as appropriate based on evidence in the record. Nevertheless, regardless of the State Water Board's findings regarding Title 27, the Proposed Order requires significant revision and must, at a minimum, not include any conclusion or discussion that inappropriately conclude that the City's activities are adversely affecting groundwater or violate the Basin Plan.

Sincerely,

Cassie N. Aw-yang

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ATTACHMENT

A

COMMENTS ON THE PROPOSED ORDER OF THE STATE WATER RESOURCES CONTROL BOARD IN THE MATTER OF OWN MOTION REVIEW OF CITY OF LODI WASTE DISCHARGE REQUIREMENTS AND MASTER RECLAMATION PERMIT ORDER NO. R5-2007-0113 (NPDES CA0079243) SWRCB OCC FILE NO. A-1886

The City of Lodi (City) has reviewed the Proposed Order of the State Water Resources Control Board (State Water Board) In the Matter of Own Motion Review of City of Lodi Waste Discharge Requirements and Master Reclamation Permit (Order No. R5-2007-0113 [NPDES CA0079243]) (Proposed Order). This attachment provides a summary of the City's comments and associated recommended language changes to address major factual issues and conclusions in the Proposed Order.

This Attachment provides only those comments and associated recommended language changes that must be made to accurately reflect the record and applicable regulations - even if the State Water Board concludes following review of this additional information that Title 27 compliance has not been demonstrated. The organization of these requested language changes is as follows:

I. Substantive Comments and Factual Corrections Applicable to the Proposed Order

II. Factual Corrections

Attachment: Technical Review of Own Motion Review of Waste Discharge Requirements and Master Reclamation Permit (City of Lodi), San Joaquin Valley Regional: Board Meeting Notification, SWRCB/OCC File A-1886

In addition, the City continues to believe the State Water Board should reject the findings and conclusions in the Proposed Order related to Title 27 compliance. Nevertheless, the following two alternative courses of action would also be acceptable to the City:

- Revise the Proposed Order to find that the Permit is consistent with Title 27 of the California Code of Regulations (Title 27); or
- Remand the Permit to the Regional Water Board for appropriate findings based on the substantial evidence in the record in support of a Title 27 exemption.

Modifying the Proposed Order to incorporate either of these alternative approaches would require substantial revisions, given that the Proposed Order is replete with references to Title 27 noncompliance. If, as the City has requested, the State Water Board defers the hearing on the Proposed Order and would find additional, comprehensive language changes useful, the City would be happy to provide them.

I. SUBSTANTIVE COMMENTS AND FACTUAL CORRECTIONS APPLICABLE TO THE PROPOSED ORDER

This section presents a summary of the City's substantive comments and factual corrections regarding the Proposed Order and the suggested language changes needed to address the outlined concerns.

Comment I-1. Modify Findings Regarding Data Available for Characterization of the Secondary Municipal Wastewater

The Proposed Order concludes that the secondary waste stream has not been adequately characterized. However, the City has completed extensive analysis of the secondary waste steam prior to the completion of the tertiary project in January 2005. Specifically, the City completed quarterly priority pollutant monitoring of the secondary effluent between January 2000 and December 2004. Moreover, the City completed priority pollutant monitoring once or twice per year for the combined irrigation water that was applied to the land application area. Certain metals have been evaluated even more extensively. This information was available to the Central Valley Regional Board in developing the Permit. Based on the available data, it was determined that additional characterization of the secondary effluent would not be necessary and only limited priority pollutant monitoring of the irrigation water was needed.

It is recognized that there has been limited characterization of water stored in the onsite ponds. Because this water can include untreated industrial flows and captured runoff, additional monitoring, as required under the permit, is warranted. Nevertheless, the majority of water discharged to the ponds and the land application area is treated municipal effluent – which has been more than adequately characterized.

Given this misunderstanding regarding the availability of data, it is suggested that the discussion and conclusions drawn in the Proposed Order be revised as follows:

Item II.A.2 – Findings, Page 10, Paragraph 1

> Likewise, prior monitoring has been inadequate to characterize some of the minor sources of the ~~wastes~~ flows discharged to the unlined ponds and agricultural fields at the Facility and to assess potential groundwater impacts. These minor flows are comprised of runoff and untreated winter-month industrial influent, both of which are directed to the onsite storage ponds. The sampling program for the ponds has focused primarily on nitrogen compounds, EC, and TDS, which are the three constituents most difficult to distinguish from the historic legacy of other discharges in the area. ~~There may be many other wastewater constituents of concern that are percolating through the bottom of the ponds to groundwater, such as volatile organic compounds or certain metals, that have not been addressed. In this regard, the Board notes that the City's analytical monitoring results from June 2000 through August 2006 indicate that there are no data for the great majority of pollutants with maximum contaminant levels identified in the Title 22 regulations.~~
>
> The Central Valley Water Board has taken steps to address this lack of data by imposing expanded monitoring requirements in Order No. R5-2007-0113. For example, the Central Valley Water Board

required additional monitoring of wastewater in the storage ponds to assess degradation in the underlying groundwater and "to derive appropriate numerical groundwater quality objectives for the Facility that are consistent with the Basin Plan." Likewise, the Central Valley Water Board required the City to conduct an industrial influent characterization study to "determine the potential impacts of the untreated waste on the underlying groundwater quality." The Board notes~~, however,~~ that the City is required to monitor the pond wastewater, the wastewater mixture applied to the agricultural fields, and the groundwater itself for priority pollutants, other than certain metals, ~~only~~ once during the permit term. ~~One sampling event is unlikely to provide sufficient data to assess the potential impacts of discharging priority pollutants on groundwater. In any event, the lack of data in the current record leads to the conclusion that an exemption from Title 27 is not justified at the present time.~~

Item II.A.4.c - Secondary Wastewater, Page 17, Paragraph 2

~~CALPSA's concern has merit.~~ The secondary waste stream is stored in the onsite ponds and applied to the agricultural fields at the Facility. As explained previously, there is very little monitoring information on the wastewater in the ponds, other than for nitrogen and salts. However, the City completed quarterly priority pollutant monitoring of the secondary effluent between January 2000 and December 2004 under the previous Order No. R5-00-031. Based on the review of this available data, the Central Valley Water Board determined that Order No. R5-2007-0113 would contain only two effluent limitations, for BOD and suspended solids, that apply to the discharge of secondary effluent to the onsite ponds. Nevertheless, t~~T~~he Central Valley Water Board has recognized the need to better characterize wastewater in the ponds and has required additional pond monitoring. To the extent that secondary effluent is mixed with industrial wastewater and the biosolids slurry and applied to the agricultural fields, the conclusions on the wastewater mixture discussed above apply here as well.

Item II.A.5 - Action on Remand, Page 17, Paragraph 4

To demonstrate compliance with the exemptions from Title 27, the City must implement the ~~develop an~~ appropriate monitoring program that adequately characterizes groundwater quality and the wastewater applied to land and that is capable of demonstrating that the land application of wastewater complies with the Basin Plan, as outlined in . ~~The Board notes that~~ Order No. R5-2007-0113, ~~contains expanded monitoring requirements that may address this deficiency, although, as noted previously, the monitoring frequency for priority pollutants in the groundwater, pond wastewater, and wastewater used for agricultural~~

~~irrigation is probably inadequate to meaning fully assess groundwater impacts.~~

Item III.7. Page 21

~~7. The secondary waste stream has not been adequately characterized and there is insufficient evidence in the record to assess the water quality impacts of discharging this waste stream to the ponds or to the agricultural fields;~~

Comment I-2. Update Discussion Presented in Section II.A.3 Evidence in the Record on Basin Plan Compliance

The Proposed Order correctly acknowledges that additional information on groundwater quality is necessary to characterize the background groundwater quality. Additional details in support of this conclusion are presented in the attached memorandum from Ken Loy, Principal Groundwater Hydrogeologist with West Yost Associates, to Charles Swimley, Waste Services Manager for the City of Lodi. However, as also pointed out in the attached memorandum, the technical assumptions put forth in the Proposed Order section "Evidence in the Record on Basin Plan Compliance" are based on a flawed understanding of the available data in the record. The following specific issues have been identified:

1. Groundwater mounding associated with the effluent storage ponds and the influence of the mounding on groundwater flow and contaminant transport is overstated.
2. The relationship between the mounding beneath the effluent storage ponds and the observed historical maximum nitrate concentrations is overstated. The peak concentrations are more likely the result of other WPCF sources, which have been, or are being, addressed.
3. The high levels of EC detected in WSM2 are most likely associated with natural, regional trends in EC and chloride, which are documented to encompass the vicinity of the WPCF.

In addition, there are a number of minor factual errors that should be corrected and/or clarified. Consequently, it is suggested that the entire "Evidence in the Record on Basin Plan Compliance" section of the Proposed Order be revised as follows:

Item II.A.3 – Evidence in the Record on Basin Plan Compliance, Pages 11 through 14 (Note that some additional suggested modifications to these paragraphs are presented under Comment II-4 and Comment II-6.)

In the area near the White Slough Facility, the regional groundwater flow direction appears to be from the Delta waterways in the

west toward a large groundwater depression to the south and southeast. The current regional flow regime is profoundly influenced by intensive groundwater withdrawals in an area bounded by ~~Highway 99~~ Interstate 5 on the west and the foothills to the east and by Highway 12 to the north and the southern boundary of the city of Stockton (Highway 120) to the south. The deep groundwater depression caused by pumping draws groundwater toward it from all directions. At the center of this depression, the local water table elevation is as much as 70 feet below the nearly sea level elevation of the Delta's waterways. In the area just to the east of the White Slough Facility, the local expression of this regional groundwater flow regime results in eastward and southeastward flow. The groundwater level in the Delta area to the west is lowered in some areas by agricultural well pumping, but that effect tends to be localized due to the continual groundwater recharge by the Delta's surface water channels.

The land surface elevations on the City's property range from about 0 to 5 feet above mean sea level near the western edge of the property to about 10 feet above mean sea level near the eastern edge. Groundwater underlying the Facility is very shallow, ranging from the ground surface at the facilities discharge point in the Delta approximately 1000 feet beyond ~~near~~ the western edge of the property to more than 20 feet below level near the eastern edge of the property. Groundwater elevations in the immediate vicinity of the treatment plant change little throughout the year, ranging from 1 to 2 feet below mean sea level in the spring to about 2 to 4 feet below mean sea level in the fall.

Evidence in the record indicates that there is ~~a~~ persistent, ~~slight~~ groundwater recharge ~~mound~~ to the west of ~~underlying~~ the Facility, which influences the groundwater gradient and flow direction within the City's property. ~~While groundwater from the mound does flow to the east, in response to the regional gradient, the mound also appears to induce flow away from the facility to the south and west.~~ City property located immediately north of the Facility exhibits evidence of a northeasterly flow during the summer months when local groundwater pumping is significant; while property located immediately southeast exhibits a seasonal shift from southeasterly in the ~~winter~~ summer months to ~~north~~southeasterly/easterly in the ~~summer~~ winter months. Property located further to the east from the mound shows a dominant southeasterly/easterly flow throughout the year. At the southwest corner of the City's property, the ~~mound~~ recharge from the west of the Facility apparently, at times, induces flow away from the Facility to the south and west.

The most likely causes of the groundwater ~~mound~~ recharge are Delta waterways and wildlife areas to the west of the Facility. ~~is a continued discharge to groundwater in the area of the Facility. The Delta~~

~~waterways unlined storage ponds at the Facility are the most likely source for the flow causing the groundwater mound.~~ However, the unlined storage ponds also have a small contribution to the mounding effect. ~~The onsite storage ponds are extensive, and they appear to provide the only large quantity, constant source of water available fore creating and maintaining the mound.~~ The four storage ponds have depths ranging from 7 to 9 feet, and they hold approximately 97 million gallons when full.

Evidence in the record indicates that there is ~~significant~~ leakage from the ponds. The average annual percolation rate from the 549-acre pond area is estimated to be approximately 0.3 inches per day, totaling about 109 million gallons of wastewater per year lost to percolation. However, t~~T~~his equates to ~~nearly~~ only 10 percent of the average annual flow to the agricultural fields. In addition Central Valley Water Board staff observed rapid percolation of untreated industrial wastewater during an inspection in November 2005. At that time, the pond was relatively dry and the industrial flow "was observed to be percolating into the pond bottom within a short distance from the outfall."

An additional concern is that the thickness of the soil between the pond bottoms and groundwater may be inadequate to allow soil treatment of the percolating wastewater to occur. The bottom elevation of Pond 1 is 5.5 feet and of Pond 4 is 2.5 feet above mean sea level. The groundwater elevation recorded in a ~~nearby~~ monitoring well located between the ponds and a perennial waterway located to the south of the Facility has historically varied from a high of 3.2 feet above mean sea level to a low of 11 feet below mean sea level. The h~~H~~istorically-recorded high groundwater levels indicate that the separation between the bottom of ponds can be minimal and the water in the ponds may, at times, have been in direct contact with groundwater. ~~be in Pond 1 and groundwater has been as little as 2.3 feet, and Pond 4 has been inundated by nearly a foot.~~

The four closest groundwater monitoring wells to the storage ponds and the Facility are WSM2, WSM3, WSM4, WSM7 and WSM8. A review of quarterly nitrate concentration and groundwater table elevation maps~~, matched by date, in the City's 2003 Groundwater Monitoring Status Report~~ indicates that onsite nitrate concentrations remain highest in the area near the Facility and to the south of the pond area, and in the land application area east of the ponds. ~~an area near the center of the mound. The four closest groundwater monitoring wells to the storage ponds are WSM2, WSM3, WSM4, and WSM8.~~ Elevated concentrations in wells WSM2, WSM3 and WSM4 (located to the south of the ponds), are thought to be attributable to sources at the Facility other than the ponds, such as leakage from the recently repaired municipal influent sewer. Concentrations in WSM3 and WSM4 have declined

significantly since August 2006, and concentrations in WSM4 have been less than 5 mg/L in recent sampling events. Currently, peak concentrations for the Facility are observed in WSM2, which is located the furthest from the Facility. ~~Because of the persistent groundwater mound underlying the Facility in the storage pond area,~~ WSM7 and WSM 8 ~~these wells are assumed to be~~ are the closest wells on the ~~hydraulically~~ downgradient side of the ponds ~~for most, if not all, of the year~~. Between August 2001 and November 2005, ~~all four~~ these wells exhibited median nitrate concentrations ~~over~~ of 25 and 11 milligrams per liter (mg/L) as N, respectively. The applicable groundwater objective for nitrate is the maximum contaminant level of 10 mg/L as N. These~~Three of the~~ wells had peak concentrations, during this period, of ~~over 36~~ 41 and 17 mg/L, ~~more than three times~~ which exceed the maximum contaminant level for nitrate as N. Note that nitrate levels observed in WSM7 and WSM8 could also be influenced by sources other than the storage ponds. ~~This result would not be expected if the nitrate source were off site.~~ Groundwater in the area to the north of the Facility appears to generally flow in an easterly or northeasterly direction, making it unlikely that higher nitrate concentrations to the far north of the Facility are responsible for the high onsite nitrate concentrations in the pond and Facility area.

~~Peak EC concentrations area also present within the area of the mound.~~ The highest median value was found in WSM-2, located near but upgradient to the onsite ponds. The value was 1,750 micromohs per centimeter (µmhos/cm). In contrast, the secondary maximum contaminant level and the agricultural water quality goal are 900 and 700 µmhos/cm, respectively. On the other hand, the City contends that the elevated EC levels encountered to the west of the ponds are ~~may be~~ due to regional groundwater conditions, which have been influenced by the predevelopment intrusion of brackish to saline water in the Delta region and post-development processes. Moreover, other wells located on the eastern, and downgradient, portion of the City's properties (including WSM-8) exhibit EC levels significantly lower than this value.

There is little information in the record on concentrations of wastewater constituents in the storage ponds. Limited data indicates that TDS and EC values in the pond exceed water quality objectives ~~for groundwater~~ during ~~much~~ a portion of the year. However, levels in the ponds are lower than those observed to the west (and upgradient) of the ponds. Nitrate concentrations as N in the ponds, ~~on the other hand,~~ have been relatively low. From 2002 to 2004, average monthly nitrate concentrations in the storage ponds varied from roughly 1 to 7 mg/L as N. On the other hand, ammonia concentrations in the ponds are relatively high. The City has indicated that transformation of ammonia to nitrate in the storage ponds and subsurface ~~may be occurring~~ is not likely to occur due to saturated conditions. Nevertheless, Leakage of wastewater from

the ponds ~~along with~~ followed by subsequent nitrification could lead to nitrate concentrations in groundwater ~~well~~ above the maximum contaminant level.

Based on the available evidence in the record, the Board concludes that at least some of the Facility's activities may have had the potential to adversely affected groundwater underlying the site. ~~The groundwater mounding provides physical evidence of a release from the Facility.~~ Groundwater monitoring data from wells downgradient from the unlined ponds show nitrate and EC levels that exceed the applicable Basin Plan objectives. ~~Although~~ However, it is unclear whether the predischarge EC and nitrate values in the groundwater underlying the Facility were also elevated, ~~it is clear that the EC concentrations currently existing within the downward and outward flowing groundwater mound could only have been caused by the ongoing downward percolation to wastewater discharged within the Facility. The Board concludes that wastewater releases from the unlined storage ponds have resulted in nitrate and EC concentrations above the applicable Basin Plan objectives in the underlying groundwater.~~ Therefore, the City's discharge of wastewater to the unlined ponds does not qualify for an exemption from Title 27 at the present time.

As explained previously, there is insufficient evidence in the record to assess whether naturally occurring concentrations of some constituents, such as EC, in groundwater underlying the Facility exceed the applicable Basin Plan objectives. The Board notes that the ~~mound exerts such a strong influence on the underlying groundwater that it~~ complexity of the groundwater conditions in the area makes a determination of "naturally occurring" background concentrations extremely difficult. ~~The mound, which is composed of wastewater draining from the surface,~~ Regional recharge induces flow down and away from the Facility. Because of the complex hydrologic and land use conditions in the area ~~the mound interferes with groundwater flow across the site~~, it is difficult at this time to determine ~~what upgradient, or~~ background, conditions might be. In any event, the City bears the burden of ~~demonstrating~~providing information to allow the Regional Board to determine that its discharge complies with the Basin Plan, and, in particular, that the discharge meets Basin Plan objectives or naturally occurring concentrations, whichever values are higher.

Comment I-3. Remove Any Facility Improvement Recommendations from the Proposed Order

The Proposed Order correctly acknowledges that additional information on groundwater quality is necessary to characterize the background groundwater quality. In accordance with the Basin Plan and the City's Permit, an analysis of this condition is needed to determine if waste released to groundwater has caused or threaten to cause increases in background concentrations. Also in accordance with the Basin Plan and the City's Permit, to address any groundwater impacts, the City must submit a workplan to the Central Valley Regional Board for a technical evaluation of each Facility component to determine best practicable treatment or control for each waste constituent of concern. Finally, the permit requires that any necessary Facility modifications must be completed no later than four years after the Central Valley Water Board Executive Officer's determination that the technical evaluation is adequate.

The approach outlined above is the appropriate mechanism for identifying and implementing best practicable treatment or control practices for any facility. Therefore, it is premature for the Proposed Order to detail any proposed capital improvements (such as constructing lined ponds) when there is not adequate data to demonstrate that such controls are needed. It is suggested that the discussion and conclusions drawn in the Proposed Order be revised as follows:

Item II.A.5 Action on Remand. Page 18, Paragraph 2

If further investigation reveals that current operations of the onsite storage ponds are not in compliance with the Basin Plan, the~~The~~ City has several options to address the waste releases from the storage ponds to ensure consistency with Title 27. The City could~~can~~ line the ponds to prevent waste releases to groundwater. Alternatively, the City could~~can~~ improve the quality of wastewater discharged to the ponds in order to ensure that waste releases comply with Basin Plan groundwater objectives. As stated previously, the City is proposing repairs and operational improvements to the Facility that could significantly reduce nitrogen concentrations in the wastewater effluent. ~~These include redirection of the biosolids lagoon supernatant, repair of the leaking municipal influent pipe and improvements to enhance nitrification and denitrification. Done properly, the expanded monitoring program may be able to assess whether these changes are successful.~~ Operational and design improvements to the onsite ponds can also be evaluated to address water quality impacts. If these improvements, combined with the current strategies of blending of the stored industrial wastewaters are determined to not be adequate to protect groundwater, ~~T~~the City ~~sh~~could consider enhanced pretreatment requirements for its industrial discharges. ~~In addition the City can improve the treatment of the municipal effluent applied to land beyond secondary standards.~~ Done properly, the expanded

monitoring program should be able to assess whether such changes are necessary.

Item II.A.5 Action on Remand. Page 18, Paragraph 3

With respect to salt management, the Board notes that Order No. R5-2007-0113 requires that City to prepare a salinity evaluation and minimization plan to address salt sources and to provide annual progress reports on salinity reductions in its discharges to Dredger Cut and the agricultural fields. Experience shows that sources of salt in municipal wastewater can typically be managed and reduced. Likewise, if the current strategies of blending, selected chemical usage, and limited pretreatment of the food processing water are determined to not be adequate to protect groundwater, the City couldean consider controlling salinity in the untreated industrial wastewater line through the application of enhanced pretreatment requirements for this type of discharge. The Board recognizes that elevated salinity in surface water and groundwater throughout the Central Valley is an increasing problem. The State Water Board and the Central Valley Water Board have initiated a comprehensive effort to address salinity problems in the valley and to adopt long-term solutions that will lead to enhanced water quality and economic sustainability.

Comment I-4. Remove Conclusions Regarding Exceedances of Applicable Objectives from the Proposed Order

The Proposed Order correctly acknowledges that additional information on groundwater quality is necessary to characterize the background groundwater quality. The Proposed Order also acknowledges that both the Basin Plan and the City's permit designate that if "naturally occurring concentrations" exceed the objectives, then the background values serve as the objectives. Therefore, it is premature for the Proposed Order to identify and/or assert that the City's practices have caused the groundwater to exceed applicable objectives. It is suggested that the discussion and conclusions drawn in the Proposed Order be revised as follows:

Item II.A - Discussion, Page 7, Paragraph 4

Discussion: The Board agrees with this assertion. Order No. R5-2007-0113 does not contain the necessary findings that the City's land disposal activities meet all of the preconditions for an exemption under Title 27. In particular, the order does not contain findings, nor is there evidence in the record supporting the conclusion that, the City's land disposal operations are consistent with the applicable water quality objectives in the Basin Plan. The monitoring that has been performed to date is inadequate to demonstrate compliance. Further, the limited evidence that is in the record indicates that~~, at a minimum,~~ ~~discharges~~

~~from~~ water held in the unlined storage ponds at the Facility may have at times ~~released waste constituents to groundwater at concentrations that~~ exceeded ~~applicable~~ agricultural and municipal use water quality ~~objectives~~goals.

Item II.A.3 – Evidence in the Record on Basin Plan Compliance, Page 13, Paragraph 1 (Note that suggestions shown also reflect the recommended changes that were presented under Comment II-2. The additional changes associated with Comment II-4 are Italicized.)

The four closest groundwater monitoring wells to the storage ponds and the Facility are WSM2, WSM3, WSM4, WSM7 and WSM8. A review of quarterly nitrate concentration and groundwater table elevation maps~~, matched by date, in the City's 2003 Groundwater Monitoring Status Report~~ indicates that onsite nitrate concentrations remain highest in the area near the Facility and to the south of the pond area, and in the land application area east of the ponds. ~~an area near the center of the mound. The four closest groundwater monitoring wells to the storage ponds are WSM2, WSM3, WSM4, and WSM8.~~ Elevated concentrations in wells WSM2, WSM3 and WSM4 (located to the south of the ponds), are thought to be attributable to sources at the Facility other than the ponds, such as leakage from the recently repaired municipal influent sewer. Concentrations in WSM3 and WSM4 have declined significantly since August 2006, and concentrations in WSM4 have been less than 5 mg/L in recent sampling events. Currently, peak concentrations for the Facility are observed in WSM2, which is located the furthest from the Facility. ~~Because of the persistent groundwater mound underlying the Facility in the storage pond area,~~ WSM7 and WSM 8 ~~these wells are assumed to be~~ are the closest wells on the ~~hydraulically~~ downgradient side of the ponds ~~for most, if not all, of the year~~. Between August 2001 and November 2005, ~~all four~~ these wells exhibited median nitrate concentrations ~~over~~ of 25 and 11 milligrams per liter (mg/L) as N, respectively. *The applicable groundwater objective for nitrate is the maximum contaminant level of 10 mg/L as N, unless natural background concentrations are determined to be greater than this level.* These~~Three of the~~ wells had peak concentrations, during this period, of ~~over 36~~ 41 and 17 mg/L, ~~more than three times~~ which exceed the maximum contaminant level for nitrate as N. Note that nitrate levels observed in WSM7 and WSM8 could also be influenced by sources other than the storage ponds. ~~This result would not be expected if the nitrate source were off-site.~~ Groundwater in the area to the north of the Facility appears to generally flow in an easterly or northeasterly direction, making it unlikely that higher nitrate concentrations to the far north of the Facility are responsible for the high onsite nitrate concentrations in the pond and Facility area.

Item II.A.3 – Evidence in the Record on Basin Plan Compliance, Page 13, Paragraph 3, and Page 14, Paragraph 1 (Note that suggestions shown also reflect the recommended changes that were presented under Comment II-2. The additional changes associated with Comment II-4 are italicized.)

There is little information in the record on concentrations of wastewater constituents in the storage ponds. *Limited data indicates that ~~TDS and~~ EC values in the ponds may be greater than the agricultural water quality goal of 700 µmhos/cm ~~exceed water quality objectives for groundwater during much~~ a portion of the year.* However, levels in the ponds are lower than those observed to the west (and upgradient) of the ponds. Nitrate concentrations as N in the ponds~~, on the other hand,~~ have been relatively low. From 2002 to 2004, average monthly nitrate concentrations in the storage ponds varied from roughly 1 to 7 mg/L as N. On the other hand, ammonia concentrations in the ponds are relatively high. The City has indicated that transformation of ammonia to nitrate in the storage ponds and subsurface ~~may be occurring~~ is not likely to occur due to saturated conditions. Nevertheless, ~~I~~Leakage of wastewater from the ponds ~~along with~~ followed by subsequent nitrification could lead to nitrate concentrations in groundwater ~~well~~ above the maximum contaminant level.

Based on the available evidence in the record, the Board concludes that at least some of the Facility's activities may have had the potential to adversely affected groundwater underlying the site. ~~The groundwater mounding provides physical evidence of a release from the Facility.~~ *Groundwater monitoring data from wells downgradient from the unlined ponds show nitrate and EC levels that exceed the maximum contaminant level of 10 mg/L as N and the agricultural water quality goal of 700 µmhos/cm, respectively. ~~the applicable Basin Plan objectives.~~* ~~Although~~ However, it is unclear whether the predischarge EC and nitrate values in the groundwater underlying the Facility were also elevated. ~~, it is clear that the EC concentrations currently existing within the downward and outward flowing groundwater mound could only have been caused by the ongoing downward percolation to wastewater discharged within the Facility. The Board concludes that wastewater releases from the unlined storage ponds have resulted in nitrate and EC concentrations above the applicable Basin Plan objectives in the underlying groundwater.~~ Therefore, the City's discharge of wastewater to the unlined ponds does not qualify for an exemption from Title 27 at the present time.

Item II.A.5 - Action on Remand. Page 17, Paragraph 3

The Board has concluded that the monitoring performed to date at the White Slough Facility is inadequate to show that the City's land disposal activities comply with preconditions for an exemption from Title 27. In addition, evidence in the record indicates that the releases of wastewater from the onsite storage ponds may have ~~caused~~ contributed ~~the underlying groundwater to exceed the applicable Basin Plan~~ nitrate and EC to the underlying groundwater ~~objectives~~. Therefore, the findings in Order No. R5-2007-0113 must be revised, on remand, to reflect that the City's land disposal activities do not currently meet the criteria for an exemption. ~~Until the City's demonstrates compliance, the Central Valley Water Board can regulate the City's land disposal activities under an appropriate enforcement order, such as a time schedule order, or under an appropriate time schedule included in Order No. R5-2007-0113.~~

Item III.7. Page 21

~~4. Evidence in the record indicates that releases of wastewater from the City's unlined storage ponds have caused the underlying groundwater to contain nitrate and EC levels that exceed Basin Plan objectives;~~

Comment I-5. Remove Discussions That Suggest an Appropriate Timeline for Characterizing Groundwater and Demonstrating Compliance with Title 27

The Proposed Order correctly acknowledges that the Central Valley Regional Board has concluded that it is appropriate to provide the City with additional time to assess whether the City's practices comply with the Basin Plan. As detailed in length in the *City of Lodi White Slough Water Pollution Control Facility Groundwater Investigation - Existing Conditions Report*, there are both regional and site-specific conditions that are unique to the area surrounding the White Slough Water Pollution Control Facility that have caused difficulties in developing such an assessment in the past. Therefore, despite the extensive monitoring efforts employed by the City to date, additional time is needed. The City contends that Central Valley Regional Board, upon their review of the available information, correctly determined that additional time is warranted given these specific conditions.

The Proposed Order does not accurately characterize the extensive efforts made by the City to date. The Proposed Order also does not adequately characterize the site-specific factors that have resulted in a complex and lengthy evaluation process. For these reasons, it is suggested that the discussion and conclusions drawn in the Proposed Order be revised as follows:

Item II.A.2. Findings. Page 9, Paragraph 2

> The Central Valley Water Board concluded that the City's land disposal activities were exempt under the sewage exemption in Title 27, but did not explicitly find that the City's discharge currently complies with the Basin Plan. Instead, the record reflects that the Central Valley Water Board stated that additional information on groundwater quality and discharge characterization was necessary to assess whether the City's discharge complies with the Basin Plan. Without this information, however, the Central Valley Water Board could not legally make the necessary finding that the city's land disposal activities meet the precondition for an exemption. Both the sewage and wastewater exemptions presuppose a monitoring program that is adequate to demonstrate compliance with the precondition. ~~Both Title 27 and the Facility have been in place many years; it is reasonable to conclude that the City should, by now, be able to prove its compliance with the exemption criteria.~~

Item II.A.2. Findings. Page 9, Paragraph 3

> As discussed above, the Basin Plan contains narrative and numeric groundwater objectives for waste constituents that apply to the city's activities, unless "naturally occurring background concentrations" exceed the objectives. In the later case, the higher, naturally occurring background values serve as the objectives. At a minimum, therefore, natural background groundwater quality must first be established, through an appropriate monitoring program, for those constituents that can be expected to be present naturally in groundwater. These constituents include, for example, electrical conductivity (EC), sodium, and chloride. This information is essential in order to define the applicable water quality objectives for the city's discharge. To date, this has not occurred. Although the City has ~~apparently~~ expended significant efforts to characterize groundwater and has been conducting groundwater monitoring since 1989, the City and the Central Valley Water Board agree that due to a number of complicating regional and site-specific conditions, background groundwater quality has not yet been adequately characterized. Hence, the City's compliance with the Basin Plan cannot be determined.

Comment I-6. Remove Unsupported Factual Statements

There is a statement in the Proposed Order section "Evidence in the Record on Basin Plan Compliance" that references an observation made of the storage ponds by Central Valley Regional Board staff during a site visit. However, this statement does not address other factual information that is relevant to the discussion. Specifically, the Proposed Order states that Central Valley Regional Board "observed rapid

percolation of untreated industrial wastewater during an inspection in November 2005." However, the industrial flows during this period were so low that flows were only recorded for six (not continuous) days during this month and the average flow during these six days was less than 30,000 gallons per day. Therefore, the conditions observed by Central Valley Water Board staff are not indicative of "typical" operating conditions. Therefore, it is recommended that this information be removed from the Proposed Order, as follows:

Item II.A.3 – Evidence in the Record on Basin Plan Compliance, Page 12, Paragraph 2 (Note that suggestions shown also reflect the recommended changes that were presented under Comment II-2. The additional changes associated with Comment II-6 are italicized.)

Evidence in the record indicates that there is ~~significant~~ leakage from the ponds. The average annual percolation rate from the 549-acre pond area is estimated to be approximately 0.3 inches per day, totaling about 109 million gallons of wastewater per year lost to percolation. However, ~~T~~This equates to ~~nearly~~ only 10 percent of the average annual flow to the agricultural fields. ~~*In addition Central Valley Water Board staff observed rapid percolation of untreated industrial wastewater during an inspection in November 2005. At that time, the pond was relatively dry and the industrial flow "was observed to be percolating into the pond bottom within a short distance from the outfall."*~~

II. FACTUAL CORRECTIONS

This section presents a summary of the major factual corrections recommended for each of the section of the Proposed Order.

I. BACKGROUND

A. White Slough Facility

Comment II-1. Further Clarify the Quality of Municipal Wastewater Directed to Storage and Land Application Facilities

Page 2. Paragraph 2. Sentence 4

Municipal effluent that will be discharged to the agricultural fields ~~is~~ may be treated to either undisinfected secondary standards or disinfected tertiary standards and pumped into the equalization basins. The majority of this flow is disinfected tertiary effluent.

Page 2. Paragraph 3. Sentence 1

In addition to the ~~secondary~~ treated municipal wastewater, the City discharges untreated industrial wastewater through land application.

Page 2. Paragraph 3. Sentence 3

Rather, during the irrigation season, untreated industrial wastewater is blended with the ~~secondary treated~~ other irrigation water flows in the storage ponds and discharged to the agricultural fields.

Comment II-2. Inaccurate Description of the Location where Irrigation Water Blending Occurs

Page 2. Paragraph 3. Sentence 3.

Rather, during the irrigation season, untreated industrial wastewater is blended with the ~~secondary treated~~ other irrigation water flows ~~in the storage ponds~~ in a concrete irrigation box and is discharged to the agricultural fields.

Comment II-3. Further Characterize the Industrial Wastewater Flow

Page 2. Paragraph 4. Sentence 2.

During the summer months, about ~~90~~ 96 percent of the industrial flow consists of food processing wastewater, ~~seven~~ three percent from metal finishers and approximately one percent is winery waste, where the food processing wastewater is typically discharged over a 65-day period between July and September. During the winter months, approximately 70 percent of the industrial flows are non-process wastewaters from metals finishers, and the remaining flow is process wastewater from a metal finisher that has been tested for potentially hazardous waste prior to discharge. The total volume of industrial wastewater is approximately 10 percent of the total flow directed to the land application and storage facilities.

Comment II-4. Update Biosolids Supernatant Handling Practices

Page 2. Paragraph 5. Sentence 2.

Fluids decanted from the lagoon, the biosolids supernatant are ~~stored in the Facility's storage ponds~~ directed to the White Slough Facility for treatment with the exception of occasional, temporary diversions that would occur if the stabilization lagoons reach storage capacity.

Comment II-5. Clarify and Update the Biosolids Land Application Practices

Page 2. Paragraph 5. Sentence 3.

During the summer months, a biosolids slurry is created by blending sludge with wastewater in ~~the storage ponds~~ a concrete distribution box, and the slurry is applied by flood irrigation to up to 350 ~~225~~ acres of the agricultural fields.

Comment II-6. Further Clarify the Recently Completed Improvements

Page 3. Paragraph 1. Sentence 3.

They include modifications to the aeration process to improve nitrification and denitrification. The City also recently completed improvements that include redirecting the biosolids supernatant from the onsite pond to the domestic treatment train and repairing the ~~leaking~~ municipal influent line.

B. Order No. R5-2007-0013

No Minor Factual Corrections.

C. Basin Plan

No Minor Factual Corrections.

D. Title 27

No Minor Factual Corrections.

E. California Sportfishing Protection Alliance Petition

No Minor Factual Corrections.

II. ISSUES AND FINDINGS

A. Title 27

1. Applicable Exemption

Comment II-7. Provide a More Accurate Characterization of Applied and Stored Wastewater

Page 8. Paragraph 2. Sentences 4 and 5.

The sewage exemption is not applicable because the City discharges a wastewater mixture to the ponds and to the agricultural fields, which includes not only treated sewage but also (predominantly food processing) wastewaters that do not go through the municipal treatment plant. As stated previously, the wastewater mixture applied to the fields ~~and discharged to the ponds~~ includes, at various times, ~~secondary~~ treated municipal effluent, untreated industrial wastewater, a biosolids slurry, stormwater, and runoff ~~and biosolids supernatant~~. The wastewater mixture discharged to the ponds includes, at various times, treated municipal effluent, untreated (predominantly non-processing) industrial wastewater, stormwater, and runoff.

Comment II-8. Update Biosolids Supernatant Handling Practices

Page 8. Paragraph 3. Sentence 4

The biosolids slurry ~~and supernatant are~~ is applied to land as part of a wastewater mixture, as noted previously.

2. Findings

No Minor Factual Corrections.

3. Evidence in the Record on Basin Plan Compliance

No Minor Factual Corrections.

4. Additional Contentions

a. Disposal of Biosolids

No Minor Factual Corrections.

b. Industrial Wastewater

Comment II-9. Update Characterization of Canning Process Wastewater

Page 16. Paragraph 2. Sentence 4.

The cannery that discharges the majority of the industrial flow recently switched to the use of potassium hydroxide in lieu of sodium hydroxide for its operations. Nevertheless, t~~T~~he salts in this waste stream are of particular concern, as discussed above, because some ~~the majority of~~ the salts are expected to move directly to groundwater.

c. Secondary Wastewater

Comment II-10. Further Clarify the Quality of Municipal Wastewater Directed to Storage and Land Application Facilities

Page 17. Paragraph 2. Sentence 2.

Although the majority of water stored in the onsite ponds and applied to the agricultural fields is disinfected tertiary effluent, ~~The~~a secondary waste stream is permitted to be stored in the onsite ponds and applied to the agricultural fields at the facility.

Page 17. Paragraph 2. Sentence 4.

Order No. R5-2007-0113 contains only two effluent limitations, for BOD and suspended solids, that apply to the discharge of ~~secondary~~ treated municipal effluent to the onsite ponds.

5. Action on Remand

No Minor Factual Corrections.

B. Title 27

No Minor Factual Corrections.

C. Chronic Toxicity

No Minor Factual Corrections.

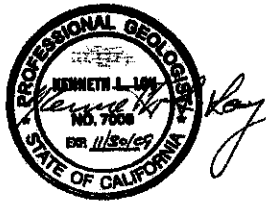
III. CONCLUSIONS

No Minor Factual Corrections.

ATTACHMENT

Technical Review of Own Motion Review of Waste Discharge Requirements and Master Reclamation Permit (City of Lodi), San Joaquin Valley Regional: Board Meeting Notification, SWRCB/OCC File A-1886

WEST YOST
ASSOCIATES
Consulting Engineers



MEMORANDUM

DATE: January 21, 2009 Project No.: 711-04-08-05

TO: Charles Swimley
City of Lodi

FROM: Kenneth Loy, P.G. 7008, California Certified Hydrogeologist 720

SUBJECT: Technical Review of Own Motion Review of Waste Discharge Requirements and Master Reclamation Permit (City of Lodi), San Joaquin Valley Regional: Board Meeting Notification, SWRCB/OCC File A-1886

This memorandum is intended to support the letter from the law firm of Somach, Simmons & Dunn to Tam Doduc, Chair, and Members State Water Resources Control Board (State Water Board) entitled City of Lodi Response to Draft State Water Board Order (SWRCB OCC File No. A-1886). This memorandum provides my opinions regarding hydrogeologic and water quality information contained in the section of the proposed State Water Board Order (Proposed Order) entitled "Evidence in the Record on Basin Plan Compliance". This memorandum provides a general discussion of the complexity and uncertainty that underlies characterization of groundwater quality in the vicinity of the City of Lodi's White Slough Water Pollution Control Facility (WPCF). The following topics are addressed in the general discussion:

- Predevelopment Considerations
- Post-Development Considerations
- Source Considerations
- Fate and Transport Considerations

This is followed by discussion of the following topics as they apply to the Proposed Order for the WPCF:

- Installation of Background Groundwater Monitoring Wells
- Groundwater Flow Conditions
- Distribution of Nitrate and Salinity

My analysis of these topics was based on the record for SWRCB/OCC File A-1886 supplemented by additional information available to the public. References are cited at the appropriate locations below.

Attached to this memorandum are suggested revisions to the section of the Proposed Order entitled "Evidence in the Record on Basin Plan Compliance" (Attachment A). These suggested revisions follow from the discussion presented in this memorandum.

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STATEMENT OF QUALIFICATIONS

I am a California-certified hydrogeologist with 19 years of experience in groundwater projects and water supply planning. I have expertise in hydrogeologic characterization, water quality analysis, and numerical modeling. I have a Bachelor of Science degree in Geophysics and a Master of Science degree in Geohydrology from the University of Arizona. My resume is attached (Attachment B).

CONCLUSIONS

Based on my analysis, I concluded that substantial uncertainty exists with respect to identification of appropriate background groundwater quality standards, and the characterization of the potential groundwater quality impacts in the vicinity of the WPCF. The City of Lodi is evaluating background groundwater quality conditions and has made substantial progress in characterizing potential impacts to groundwater resulting from facility operations. However, until appropriate background conditions are identified for all constituents of interest, the significance of even the potential impacts identified to date can not be fully assessed. This is because it is unclear whether and to what extent facility operations have caused groundwater quality to be degraded relative to background conditions.

Additional sampling and analysis is required to adequately define background conditions, assess potential groundwater impacts from the WPCF and differentiate the comingled contributions of multiple sources in the vicinity of the WPCF.

With respect to the contentions put forth in the section of the Proposed Order entitled "Evidence in the Record on Basin Plan Compliance", I concluded the following:

1. Groundwater mounding associated with the effluent storage ponds and the influence of the mound on groundwater flow and contaminant transport are overstated.
2. The relationship between the mounding beneath the effluent storage ponds and the observed historical maximum nitrate concentrations is overstated. The maximum peak concentrations are more likely the result of other WPCF sources, which have been, or are being, addressed.
3. The high levels of EC detected in WSM2 are most likely associated with natural, regional trends in EC and chloride, which are documented to encompass the vicinity of the WPCF.

GENERAL DISCUSSION

The complexity of the environmental setting of the WPCF and vicinity underlies the uncertainties in the characterization of groundwater flow conditions and contaminant fate and transport processes. The WPCF is located in a transitional area between fluvial/alluvial and deltaic environments. This area has significant variability in groundwater quality related to variations in soil properties, aquifer characteristics, and hydrology. At least three natural hydrologic processes are responsible for some of the variations in groundwater quality. This natural variability is overprinted and modified by man-induced changes in hydrology resulting from changes in land and water use dating back approximately one century (Bertoldi, et. al., 1991). Additional

uncertainties exist in the understanding of area-specific fate and transport processes affecting the constituents of interest. These uncertainties arise primarily from variable, but incompletely characterized, soil processes and limited understanding of three-dimensional flow conditions in the aquifer system. Additional data collection and analysis are needed before groundwater quality conditions in the vicinity of the WPCF can be adequately characterized.

Predevelopment Considerations

Prior to extensive water infrastructure development, the groundwater component of the hydrologic cycle in the San Joaquin Valley involved a circulation system in which precipitation was recharged along the mountain fronts of the Coast Ranges and Sierra Nevada, inducing groundwater flow towards discharge areas along the axis of the San Joaquin Valley and the Delta (Williamson, et. al. 1989; Bertoldi, et. al., 1991). Evidence for the upward flow necessary for this discharge is provided by the large number of flowing wells documented in the central area of the valley prior to 1900 (Hall, 1889; Mendenhall, et. al., 1916; Bertoldi, et. al., 1991).

Two aspects of this predevelopment pattern of groundwater circulation affect groundwater quality in areas along the axis of the San Joaquin Valley – including the WPCF and vicinity. First, deep groundwater circulation has induced the upward movement of high salinity groundwater (Mendenhall, 1908; Williamson, et. al. 1989; Bertoldi, et. al., 1991; Izbicki, 2006). High salinity groundwater underlies the fresh groundwater throughout the San Joaquin Valley (Page, 1973). Second, predevelopment groundwater discharge in areas along the axis of the San Joaquin Valley has been subjected to natural consumption through evaporation and transpiration (Izbicki, 2006). Evapotranspiration in areas of groundwater discharge tends to increase the salinity of shallow groundwater and soil because dissolved solids are concentrated as relatively pure water is lost to the atmosphere through evapotranspiration.

Also, under predevelopment conditions, changes in precipitation have driven variations in the degree to which has seawater displaced freshwater in the Delta environment (Piper et. al., 1939; Izbicki, 2006). The spatial distribution of groundwater quality in the vicinity of the WPCF has been affected by variation in the degree and extent to which seawater has percolated into the aquifer system.

Groundwater quality resulting from these three natural processes can be differentiated based on chemical characteristics (Izbicki, 2006). However, additional sampling and analysis will be required in the vicinity of the WPCF before this differentiation can take place.

Post-development Considerations

Development of surface water storage and distribution projects, including the Central Valley Project and the State Water Project, along with groundwater pumping, have had profound effects on groundwater flow and quality throughout the San Joaquin Valley, including the vicinity of the WPCF. Irrigation, using either groundwater or imported surface water, results in distributed groundwater recharge that is dissimilar to natural recharge in timing, magnitude, location and quality. Recharge from irrigation occurs between approximately April and October of each year, when recharge from precipitation is minimal. Recharge of irrigation water is estimated to be up to approximately six times the recharge from precipitation in the Central Valley (Williamson, et. al.

1989; Bertoldi, et. al., 1991). Recharge from irrigation occurs throughout the valley floor, including the vicinity of the WPCF, while, volumetrically, predevelopment recharge occurred predominantly along streams at the mountain fronts.

Groundwater pumping is the other dominant anthropogenic influence on natural patterns of groundwater circulation in the vicinity of the WPCF. Pumping creates zones of artificial groundwater discharge that lower the hydraulic heads in the vicinity of the pumping. This lowering of the groundwater levels results in capture, i.e., reduction, of the natural discharge. Under predevelopment conditions upward vertical gradients existed in the groundwater discharge areas along the axis of the valley, including the WPCF. In many areas, the vertical gradients have been reversed and are now downward. Although some groundwater discharge still occurs along the axis of the valley, groundwater discharge is now predominately in areas in which groundwater pumping for irrigation is most concentrated. Volumetrically, flows through the groundwater system have increased by a factor of approximately six relative to predevelopment conditions in response to substantially increased levels of recharge and pumping (Williamson, et. al. 1989; Bertoldi, et. al., 1991). One of the most significant effects on groundwater quality associated with groundwater pumping has been the movement of high salinity groundwater from the Delta to the east. This effect is manifested in the vicinity of the WPCF (DWR, 1967; USACE, 2001; Izbicki, 2006; DWR, 2006).

Development of surface water storage and distribution projects has brought relative stability to the distribution of seawater and freshwater in the Delta. This is because the projects have made freshwater available during the dry season when natural freshwater flows in the rivers entering the Delta would have otherwise been very low. The State Water Board regulates pumping from the Delta and releases of freshwater from storage when necessary to maintain Delta salinity standards (State Water Board, 1995 and 2000). Maintenance of these Delta salinity standards means that the salinity of groundwater is in a state of flux, because seawater intrusion into the Delta has been stabilized. Areas formerly affected by high salinity because of periodic seawater intrusion may now be undergoing flushing by lower-salinity waters.

The post-development hydrology in the vicinity of the WPCF has overprinted and modified the already complex predevelopment distribution of groundwater quality in the vicinity of the WPCF. These changes in water quality are time-dependant and many are ongoing. Pumping has induced the easterly flow of saline groundwater away from the Delta region in the vicinity of the WPCF. Variable groundwater quality has been made more complex and uncertain by the changes in the groundwater flow caused by pumping and by variations in the quality of applied irrigation water. The quality of the irrigation water resulting in recharge will influence the groundwater system by displacing preexisting groundwater. Some areas in the vicinity of the WPCF may have been underlain by shallow groundwater with relatively high salinity caused by one of or more of the natural processes identified above. Any of these areas that are irrigated with a surface water supply originating in the Sierra Nevada will tend to have reduced salinity in the shallow groundwater because of deep percolation of the low-salinity irrigation supply. Conversely, the use of groundwater for irrigation could lead to higher salinity than anticipated in the shallow groundwater. For these reasons, further efforts are needed to fully characterize the changes in groundwater quality changes associated with the use of variable sources of irrigation supply in the vicinity of the WPCF.

Source Considerations

Multiple anthropogenic sources also complicate the delineation of background groundwater quality conditions and characterization of potential impacts to groundwater quality in the vicinity of the WPCF. The vast majority of the area around the WPCF has been used for irrigated agriculture for many years. The effects of agricultural practices on the underlying groundwater have not been characterized in detail, but have lead to increases in the nitrate concentrations and salinity levels (Canter, 1997; DWR, 2006; SJCDEH, 2006). As documented in the record, 12 confined animal facilities and two wineries have been identified in the vicinity of the WPCF. At least five of the confined animal facilities practice storage and land application of animal wastes. The wineries also practice land application (West Yost Associates, 2006). Except in limited areas such as Flag City, residential wastewater is discharged to septic systems. All of these sources generate constituents of concern that are widespread and difficult to distinguish from WPCF constituents (DWR, 1967; Sorenson, 1981; USACE, 2001; Izbicki, 2006; DWR, 2006; SJCDEH, 2006). The presence of multiple sources has made the selection of background monitoring wells difficult and uncertain. Background wells have been constructed at locations with environmental setting, land use and water use similar to WPCF (West Yost Associates 2008). The well locations were selected to avoid areas that might be affected by anthropogenic sources. However, until additional monitoring is completed, whether or not these background wells are affected by anthropogenic sources cannot be determined conclusively.

Fate and Transport Considerations

Soils have varying capacity for denitrification and adsorption. Soil properties vary dramatically in the vicinity of the WPCF because of its location at the transition between fluvial/alluvial and deltaic environments (USDA-NRCS, 1992; West Yost Associates, 2006). Hydric soils are "formed under conditions of saturation, flooding or ponding long enough during the growing season to develop anaerobic conditions in the upper part" (USDA NRCS, 2006). Delta soils tend to be hydric and have a much higher propensity for denitrification than the drier fluvial/alluvial-derived soils to the east (Showers, et. al. 2006). The WPCF is located very near the boundary between hydric and non-hydric soils, which appears to approximately correspond with a land surface elevation of 0 feet mean sea level in the vicinity of the WPCF (USDA-NRCS, 1992; West Yost Associates, 2006). This boundary is located slightly west of the WPCF.

Available data for nitrate in groundwater indicate that nitrate concentrations drop sharply across the boundary between non-hydric and hydric soils (West Yost Associates, 2006). The presence of this very significant boundary is not reflected in readily available soil maps, because it transgresses soil class (USDA-NRCS, 1992; USDA NRCS, 2006). The uncertainty in the delineation of hydric verses non-hydric soils in the vicinity of the WPCF has made selection of background monitoring wells more difficult and uncertain, because background concentrations of nitrate in groundwater are affected by the presence or absence of hydric soils, even in areas where mapped soil class, land use and water use are similar. Additional evaluation of soil conditions and background groundwater monitoring is needed to adequately assess the impact of hydric soils on establishing background conditions for nitrate in groundwater in the vicinity of the WPCF.

A second key area of uncertainty in groundwater fate and transport processes in the vicinity of the WPCF lies in the incomplete characterization of soil and aquifer physical properties. Cemented and caliche zones documented in the unsaturated zone soils affect infiltration and percolation rates, but these effects have not been fully assessed to date (USDA-NRCS, 1992; West Yost Associates, 2006). Stratification and lateral facies changes within the aquifer exist through a range of spatial scales that influence the flow and transport of constituents of concern. Although groundwater contour maps can be used to establish the potential directions of the horizontal components of groundwater flow, actual flow velocities cannot be determined without knowledge of the hydraulic conductivity. Significant progress has been made to characterize these variations in physical properties. Available drilling data indicate localized variations in soil and aquifer properties exist and influence transport, but these localized variations have not been fully characterized (West Yost Associates, 2006). Additional characterization of the soil and aquifer properties is needed before potential impacts from the WPCF and other sources in the vicinity can be fully assessed.

Summary

Groundwater flow and quality conditions in the vicinity of the WPCF are unusually complex because of the transitional nature of the environmental setting between fluvial/alluvial and deltaic environments. The predevelopment hydrologic system had multiple influences on water quality, which led to significant lateral and vertical variation. The hydrologic system has undergone profound change over approximately the last 100 years leading to additional uncertainty in three-dimensional groundwater flow and transport. Further uncertainty is introduced because of the presence of multiple sources, which have potential to release constituents of concern to the groundwater system that are very similar to those identified at the WPCF. Because the WPCF and vicinity overlie a regional groundwater flow system that converges towards a pumping center located to the southeast, potential releases from the various sources have become commingled. Separating the potential impacts of the various sources is made more difficult by incompletely characterized aquifer physical properties. Variations in the ability of the soil and aquifer systems to adsorb or transform constituent of concern released from the various sources lead to additional uncertainty in establishing representative background conditions for groundwater and identification of potential sources of groundwater impacts.

GROUNDWATER CONDITIONS AT THE WPCF AND VICINITY

The following discussion provides additional site-specific information in response to the section of the Proposed Order entitled "Evidence in the Record on Basin Plan Compliance".

Installation of Background Groundwater Monitoring Wells

As discussed in the Proposed Order, identification of appropriate background standards has presented a challenge to the City of Lodi and the Regional Water Board. However, the City of Lodi has worked with Regional Water Board staff to develop a workplan for construction of three background monitoring wells, as required under their Waste Discharge Requirements (WDR) Order (West Yost Associates, 2008). The three monitoring wells were constructed and sampled in December 2008 and the City is still awaiting the results from this monitoring event. The background monitoring wells were constructed at locations in which the environmental setting, land use and water use are similar to the WPCF. A background study will be completed on the

time schedule required in the WDR Order. However, there is no guarantee that the wells constructed to date will prove to be appropriate for assessing background groundwater quality because of the complexity of the groundwater conditions in the vicinity of the WPCF. The City of Lodi will conduct additional sampling or install additional background wells, if required, based on review of the results from the three existing background wells.

Groundwater Flow Conditions

The available record indicates that regional groundwater flow in the vicinity of the WPCF is away from the Delta towards a regional groundwater depression located approximately five miles southeast of the WPCF and that this regional flow pattern has prevailed through a sequence of many wet, dry and normal years (San Joaquin County, 2004; West Yost Associates, 2006). This same groundwater depression causes groundwater flow from the vicinity of the WPCF to converge with groundwater flows from the northwest, north and northeast of the WPCF. These flows converge to the east of the WPCF as demonstrated by semiannual groundwater level monitoring conducted by San Joaquin County (San Joaquin County 2004; West Yost Associates, 2006). All of the areas from which the groundwater flows converge are overlain by potential sources that could cause groundwater quality degradation similar to the WPCF (West Yost Associates, 2006).

The section of the Proposed Order entitled "Evidence in the Record on Basin Plan Compliance" states that a groundwater mound underlying the WPCF controls groundwater flow directions in the vicinity, and the most likely cause of the mound is percolation from the effluent storage ponds. The Proposed Order cites anecdotal information as evidence of percolation beneath the ponds to support of the contention that the effluent storage ponds are the source of the groundwater mound. This contention is incorrect. While some percolation from the ponds does occur, this percolation is small in comparison to percolation from the area to the west of the WPCF.

Figure 1 is a map of groundwater elevation contours in the vicinity of the WPCF based on depth to groundwater measurements made in December 2008. The map is based on new data that has not been submitted to the State or Regional Water Board but is consistent with previous maps and interpretation of groundwater conditions in the area. Figure 1 clearly demonstrates that the WPCF is located above a groundwater surface that slopes to the east-southeast. The dominant influences on the groundwater surface are recharge immediately west of the WPCF and groundwater pumping to the east and southeast. The recharge is indicated by high, convexly curved groundwater elevation contours aligned along a northwest-southeast-trending axis. The recharge to the west of the WPCF, which has been documented in previous reports in the record, appears to be nearly constant because groundwater elevations along axis show only slight seasonal or multiyear variations (West Yost Associates, 2006).

Although the specific studies have not been conducted to verify the source of the recharge, it appears generally related to Delta water ways. More specifically, the axis of the recharge area coincides nearly exactly with the location of water-filled borrow pits dug during construction of Interstate 5 (I5). These borrow pits and the surrounding wetland areas are owned by the California Department of Water Resources and maintained as wildlife habitat by the California Department of Fish and Game (Figure 2). The area is known as the White Slough Wildlife Area and consists of 880 acres of man-made ditches, canals (former I5 borrow pits), freshwater

marshes, grassland/upland, and riparian habitat. The nine ponds are, for the most part, not contiguous to each other (DFG, 2008).

There is a slight convex deflection in the groundwater elevation contours beneath the effluent storage ponds (Figure 1). This indicates that percolation from the ponds causes limited groundwater recharge, which is superimposed on the much larger volume of recharge originating to the west. The presence of only a slight deflection in the groundwater elevation contours beneath the effluent storage ponds indicates that percolation from the ponds has only a slight and very localized effect on groundwater elevations and flow. There is no indication in the groundwater elevation contours that recharge in the land application areas of the WPCF exceeds recharge in the adjacent agricultural lands.

The Proposed Order states concern over the shallow depth to groundwater beneath the storage ponds. While this is a legitimate concern, it is overstated in the Proposed Order, because recharge from the ponds has less impact on groundwater flow than contended. Also, the stable recharge to the west maintains groundwater elevations beneath the ponds at a relatively stable level. Although this limits the opportunity for attenuation in the soil column beneath the ponds, it also acts to limit percolation from the ponds by keeping hydraulic gradients low between the ponds and the aquifer.

Distribution of Nitrate and Salinity

The Proposed Order states that the high nitrate concentrations measured in monitoring wells WSM2, WSM3, WSM4 and WSM8 result from percolation from the effluent storage ponds that is driven radially from the pond area by a groundwater mound. As discussed above, the effluent storage ponds do not create a significant groundwater mound. WSM2, WSM3 and WSM4 measure groundwater at about the same elevation as the groundwater beneath the ponds. As documented in the record, the high nitrate concentrations in these wells are probably attributable to WPCF sources other than the effluent storage ponds (West Yost Associates, 2006). The City of Lodi is undertaking facility and management improvements to mitigate these sources, including the following:

- A damaged section of influent sewer near the WPCF headworks was replaced in 2007.
- Nitrification-denitrification improvements to the WPCF are currently under construction and are scheduled to be fully operational in the next few months.
- Biosolids subnatant and supernatant have been redirected to the headworks as part of this upgrade project.
- A new biosolids storage facility (stabilization lagoon) has been constructed, additional improvement alternatives are currently being evaluated and recommendations will be implemented within the next few years.
- Improved land management practices are being pursued with the objective of maintaining a better balance between nutrient loadings and crop requirements. The City has retained the assistance of a soil scientist and a certified agronomist as part of this effort.

Nitrate concentrations in WSM3 and WSM4 have declined significantly in the last two years, and it is anticipated that nitrate concentrations in other wells will decrease as improvements in facilities and land management practices are implemented.

Contrary to the Proposed Order, the closest monitoring wells downgradient of the effluent storage ponds are WSM7 and WSM8. Although indicative of nitrate impacts from the ponds, the historical peak concentrations in these two wells are less than cited in the Proposed Order.

The Proposed Order also contends that the elevated electrical conductance (EC) detected in monitoring well WSM2 is attributable to the effluent storage ponds because the ponds have created a mound that induces groundwater flow from beneath the ponds towards WSM2. As discussed above, the influence of any groundwater mounding beneath the ponds is overstated in the Proposed Order. Also, the EC detected in WSM2 is associated with high chloride levels (West Yost Associates, 2006). In fact, WSM2 has the second highest historical chloride concentration of any monitoring well at the WPCF. The highest historical chloride concentration was detected in WSM15, which is clearly upgradient of the effluent storage ponds (Figure 1). Together, WSM2 and WSM15 have the highest maximum historical EC levels and chloride concentrations measured in the monitoring well network. Effluent from the WPCF is not characterized by high chloride concentrations (West Yost Associates, 2006).

The highest EC and chloride concentrations were detected upgradient of the effluent storage ponds in an area that is aligned with regional trends in high EC and chloride. Therefore, it appears unlikely that the ponds are the source of elevated EC detected in WSM2.

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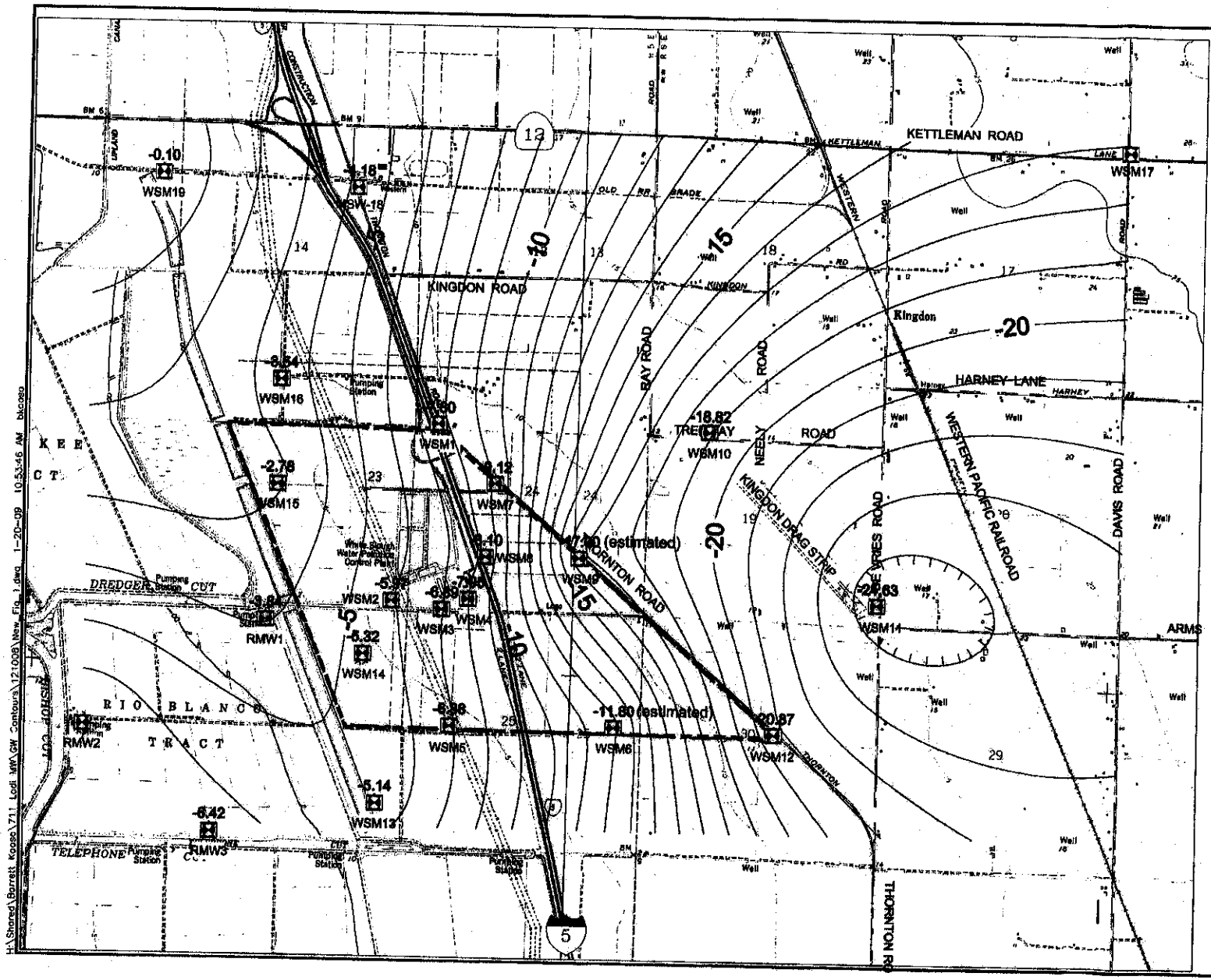

Figure 1
City of Lodi
White Slough WPCF
GROUNDWATER ELEVATION
CONTOUR MAP

LEGEND

- Boundary of City-Owned Land
- -3.99 WSM5 — WPCF Monitoring Well with Groundwater Elevation (Feet, MSL)
- -3.99 WSM5 — Background Monitoring Well with Groundwater Elevation (Feet, MSL)
- -5 — Groundwater Elevation Contour (feet, msl). Contour interval: 1 foot

Groundwater gradient from the White Slough Water Pollution Control Facility was easterly at approximately -0.002 feet/foot for the fourth quarter of 2008.

Note: WSM9 and WSM8 were dry on December 10, 2008. The groundwater elevation was estimated to be equal to or less than the well sump.

Note: Groundwater levels were measured in WPCF monitoring wells on December 10, 2008 and in the background monitoring wells on December 22, 2008

N

0 1000 2000
SCALE IN FEET

WEST YOST ASSOCIATES
Consulting Engineers

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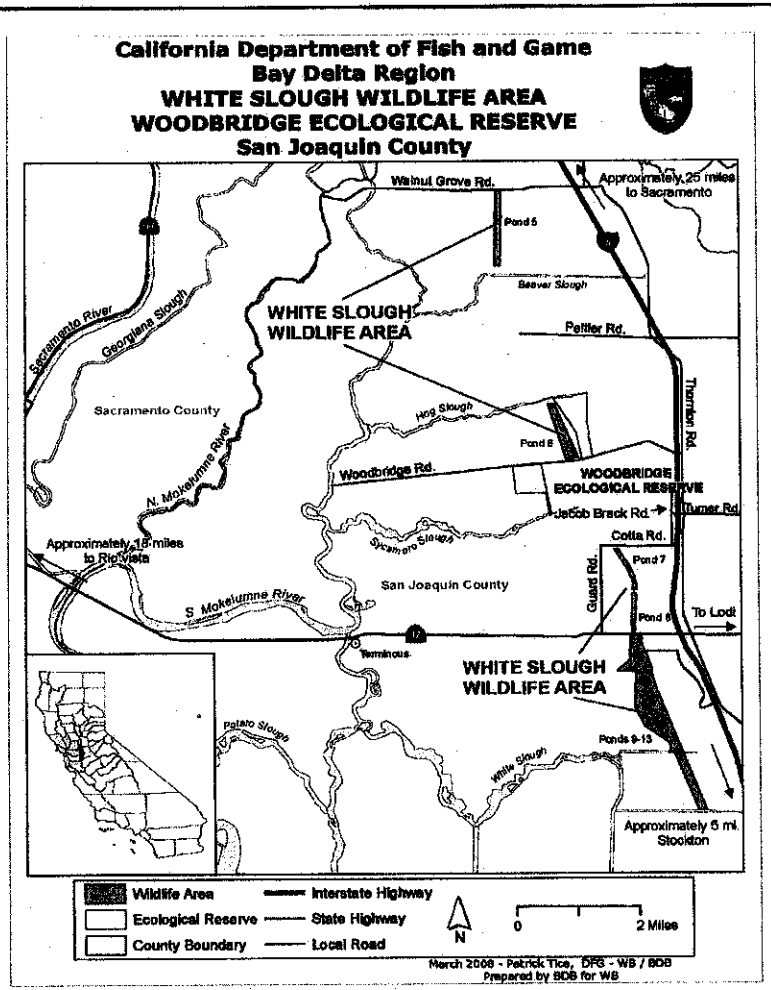

Reference: California Department of Fish and Game at:
http://www.dfg.ca.gov/lands/wa/region3/whiteslough.html

Figure 2

City of Lodi
White Slough WPCP

WHITE SLOUGH WILDLIFE AREA

WEST YOST ASSOCIATES
Consulting Engineers

ATTACHMENT A

Suggested Revisions: Evidence in the Record on Basin Plan Compliance

SUGGESTED REVISIONS:
EVIDENCE IN THE RECORD ON BASIN PLAN COMPLIANCE

PROPOSED ORDER OF THE
STATE WATER RESOURCES CONTROL BOARD
IN THE MATTER OF OWN MOTION REVIEW OF CITY OF LODI
WASTE DISCHARGE REQUIREMENTS AND MASTER RECLAMATION
PERMIT ORDER NO. R5-2007-0113 (NPDES CA0079243)
SWRCB OCC FILE NO. A-1886

In the area near the White Slough Facility, the regional groundwater flow direction appears to be from the Delta waterways in the west toward a large groundwater depression to the south and southeast. The current regional flow regime is profoundly influenced by intensive groundwater withdrawals in an area bounded by ~~Highway 99~~ Interstate 5 on the west and the foothills to the east and by Highway 12 to the north and the southern boundary of the city of Stockton (Highway 120) to the south. The deep groundwater depression caused by pumping draws groundwater toward it from all directions. At the center of this depression, the local water table elevation is as much as 70 feet below the nearly sea level elevation of the Delta's waterways. In the area just to the east of the White Slough Facility, the local expression of this regional groundwater flow regime results in eastward and southeastward flow. The groundwater level in the Delta area to the west is lowered in some areas by agricultural well pumping, but that effect tends to be localized due to the continual groundwater recharge by the Delta's surface water channels.

The land surface elevations on the City's property range from about 0 to 5 feet above mean sea level near the western edge of the property to about 10 feet above mean sea level near the eastern edge. Groundwater underlying the Facility is very shallow, ranging from the ground surface at the facilities discharge point in the Delta approximately 1000 feet beyond ~~near~~ the western edge of the property to more than 20 feet below level near the eastern edge of the property. Groundwater elevations in the immediate vicinity of the treatment plant change little throughout the year, ranging from 1 to 2 feet below mean sea level in the spring to about 2 to 4 feet below mean sea level in the fall.

Evidence in the record indicates that there is a persistent, ~~slight~~ groundwater recharge ~~mound~~ to the west of ~~underlying~~ the Facility, which influences the groundwater gradient and flow direction within the City's property. ~~While groundwater from the mound does flow to the east, in response to the regional gradient, the mound also appears to induce flow away from the facility to the south and west.~~ City property located immediately north of the Facility exhibits evidence of a northeasterly flow during the summer months when local groundwater pumping is significant; while property located immediately southeast exhibits a seasonal shift from southeasterly in the ~~winter~~ summer months to ~~north~~southeasterly/easterly in the ~~summer~~ winter months. Property located further to the east from the mound shows a dominant southeasterly/easterly flow throughout the year. At the southwest corner of the City's property, the ~~mound~~ recharge

from the west of the Facility apparently, at times, induces flow away from the Facility to the south and west.

The most likely causes of the groundwater ~~mound~~ recharge are Delta waterways and wildlife areas to the west of the Facility, ~~is a continued discharge to groundwater in the area of the Facility. The~~ Delta waterways ~~unlined storage ponds at the Facility are the most likely source for the flow causing the groundwater mound.~~ However, the unlined storage ponds also have a small contribution to the mounding effect. ~~The onsite storage ponds are extensive, and they appear to provide the only large quantity, constant source of water available fore creating and maintaining the mound.~~ The four storage ponds have depths ranging from 7 to 9 feet, and they hold approximately 97 million gallons when full.

Evidence in the record indicates that there is ~~significant~~ leakage from the ponds. The average annual percolation rate from the 549-acre pond area is estimated to be approximately 0.3 inches per day, totaling about 109 million gallons of wastewater per year lost to percolation. However, tThis equates to ~~nearly~~ only 10 percent of the average annual flow to the agricultural fields. In addition Central Valley Water Board staff observed rapid percolation of untreated industrial wastewater during an inspection in November 2005. At that time, the pond was relatively dry and the industrial flow "was observed to be percolating into the pond bottom within a short distance from the outfall."

An additional concern is that the thickness of the soil between the pond bottoms and groundwater may be inadequate to allow soil treatment of the percolating wastewater to occur. The bottom elevation of Pond 1 is 5.5 feet and of Pond 4 is 2.5 feet above mean sea level. The groundwater elevation recorded in a ~~nearby~~ monitoring well located between the ponds and a perennial waterway located to the south of the Facility has historically varied from a high of 3.2 feet above mean sea level to a low of 11 feet below mean sea level. The hHistorically recorded high groundwater levels indicate that the separation between the bottom of ponds can be minimal and the water in the ponds may, at times, have been in direct contact with groundwater. ~~be in Pond 1 and groundwater has been as little as 2.3 feet, and Pond 4 has been inundated by nearly a foot.~~

The four closest groundwater monitoring wells to the storage ponds and the Facility are WSM2, WSM3, WSM4, WSM7 and WSM8. A review of quarterly nitrate concentration and groundwater table elevation maps~~, matched by date, in the City's 2003 Groundwater Monitoring Status Report~~ indicates that onsite nitrate concentrations remain highest in the area near the Facility and to the south of the pond area, and in the land application area east of the ponds. ~~an area near the center of the mound. The four closest groundwater monitoring wells to the storage ponds are WSM2, WSM3, WSM4, and WSM8.~~ Elevated concentrations in wells WSM2, WSM3 and WSM4 (located to the south of the ponds), are thought to be attributable to sources at the Facility other than the ponds, such as leakage from the recently repaired municipal influent sewer. Concentrations in WSM3 and WSM4 have declined significantly since August 2006, and concentrations in WSM4 have been less than 5 mg/L in recent sampling events. Currently, peak concentrations for the Facility are observed in WSM2,

which is located the furthest from the Facility. ~~Because of the persistent groundwater mound underlying the Facility in the storage pond area,~~ WSM7 and WSM 8 ~~these wells are assumed to be~~ are the closest wells on the ~~hydraulically~~ downgradient side of the ponds ~~for most, if not all, of the year~~. Between August 2001 and November 2005, ~~all four~~ these wells exhibited median nitrate concentrations ~~over~~ of 25 and 11 milligrams per liter (mg/L) as N, respectively. The applicable groundwater objective for nitrate is the maximum contaminant level of 10 mg/L as N. These~~Three of the~~ wells had peak concentrations, during this period, of ~~over 36~~ 41 and 17 mg/L, ~~more than three times~~ which exceed the maximum contaminant level for nitrate as N. Note that nitrate levels observed in WSM7 and WSM8 could also be influenced by sources other than the storage ponds. ~~This result would not be expected if the nitrate source were off-site.~~ Groundwater in the area to the north of the Facility appears to generally flow in an easterly or northeasterly direction, making it unlikely that higher nitrate concentrations to the far north of the Facility are responsible for the high onsite nitrate concentrations in the pond and Facility area.

~~Peak EC concentrations area also present within the area of the mound.~~ The highest median value was found in WSM-2, located near but upgradient to the onsite ponds. The value was 1,750 micromohs per centimeter (µmhos/cm). In contrast, the secondary maximum contaminant level and the agricultural water quality goal are 900 and 700 µmhos/cm, respectively. On the other hand, the City contends that the elevated EC levels encountered to the west of the ponds are ~~may be~~ due to regional groundwater conditions, which have been influenced by the predevelopment intrusion of brackish to saline water in the Delta region and post-development processes. Moreover, other wells located on the eastern, and downgradient, portion of the City's properties (including WSM-8) exhibit EC levels significantly lower than this value.

There is little information in the record on concentrations of wastewater constituents in the storage ponds. Limited data indicates that TDS and EC values in the pond exceed water quality objectives ~~for groundwater~~ during ~~much~~ a portion of the year. However, levels in the ponds are lower than those observed to the west (and upgradient) of the ponds. Nitrate concentrations as N in the ponds~~, on the other hand,~~ have been relatively low. From 2002 to 2004, average monthly nitrate concentrations in the storage ponds varied from roughly 1 to 7 mg/L as N. On the other hand, ammonia concentrations in the ponds are relatively high. The City has indicated that transformation of ammonia to nitrate in the storage ponds and subsurface ~~may be occurring~~ is not likely to occur due to saturated conditions. Nevertheless, ~~I~~Leakage of wastewater from the ponds ~~along with~~ followed by subsequent nitrification could lead to nitrate concentrations in groundwater ~~well~~ above the maximum contaminant level.

Based on the available evidence in the record, the Board concludes that at least some of the Facility's activities may have had the potential to adversely affected groundwater underlying the site. ~~The groundwater mounding provides physical evidence of a release from the Facility.~~ Groundwater monitoring data from wells downgradient from the unlined ponds show nitrate and EC levels that exceed the applicable Basin Plan objectives. ~~Although~~ However, it is unclear whether the predischarge EC and nitrate

values in the groundwater underlying the Facility were also elevated, ~~it is clear that the EC concentrations currently existing within the downward and outward flowing groundwater mound could only have been caused by the ongoing downward percolation to wastewater discharged within the Facility. The Board concludes that wastewater releases from the unlined storage ponds have resulted in nitrate and EC concentrations above the applicable Basin Plan objectives in the underlying groundwater.~~ Therefore, the City's discharge of wastewater to the unlined ponds does not qualify for an exemption from Title 27 at the present time.

As explained previously, there is insufficient evidence in the record to assess whether naturally occurring concentrations of some constituents, such as EC, in groundwater underlying the Facility exceed the applicable Basin Plan objectives. The Board notes that the ~~mound exerts such a strong influence on the underlying groundwater that it~~ complexity of the groundwater conditions in the area makes a determination of "naturally occurring" background concentrations extremely difficult. ~~The mound, which is composed of wastewater draining from the surface,~~ Regional recharge induces flow down and away from the Facility. Because of the complex hydrologic and land use conditions in the area ~~the mound interferes with groundwater flow across the site~~, it is difficult at this time to determine ~~what upgradient, or~~ background, conditions might be. In any event, the City bears the burden of ~~demonstrating~~providing information to allow the Regional Board to determine that its discharge complies with the Basin Plan, and, in particular, that the discharge meets Basin Plan objectives or naturally occurring concentrations, whichever values are higher.

ATTACHMENT B

Resume

WEST YOST ASSOCIATES
Consulting Engineers

Kenneth L. Loy, P.G., C.E.G., C.H.G.

Professional Registrations

Professional Geologist:
California No. 7008

Certified Hydrogeologist
California No. 720

Certified Engineering Geologist
California No. 2214

Education

M.S., Geohydrology, University of Arizona, Tucson, Arizona; 1990

B.S., Geophysics, University of Arizona, Tucson, Arizona; 1986

Professional Affiliations

National Ground Water Association

Association of Engineering Geologists

Groundwater Resources Association

Association of California Water Agencies

Continuing Education

Master's Certificate in Project Management, The George Washington University, Washington, DC; 1994

Karst for Environmental and Engineering Applications, University of Tennessee, Knoxville, Tennessee

40-Hour Health and Safety Training: OSHA (29 CFR 1910.120)

Hazardous Waste Supervisor Training: OSHA (29 CFR 1910.120)

Presentations

Loy, K.L., 2007, "Construction of 32-inch Diameter Blind Shafts in Granodiorite," presented at the Association of Environmental and Engineering Geologists 50th Annual Meeting, Los Angeles, California, September 2007.

Loy, K.L., 2007, "Application of IWFM to the Evaluation of Conjunctive Use in

Ken Loy is a certified hydrogeologist and engineering geologist with 20 years of experience in engineering consulting with emphasis on hydrogeologic and water quality characterization, data analysis, and modeling. Ken has characterized hydrogeologic conditions, assessed land and water use practices and applied numerical groundwater flow models in conjunctive use evaluations, groundwater impacts analyses and water supply planning efforts. He has performed numerous water quality evaluations and has used numerical flow and transport models to evaluate the movement of groundwater contaminants. He has been involved in several land subsidence evaluations, designed wells, and provided design services during construction of wells.

PROJECT EXPERIENCE

Municipal Well Design and Construction, Sacramento County Water Agency, Sacramento County. Principal Hydrogeologist and Project Manager for the design and design services during construction of three 1,500-foot production wells and a 1,500-foot, stainless steel, dual completion monitoring well located in Elk Grove. The wells were constructed as part of a new development but are the property of Sacramento County Water Agency (SCWA). In addition to serving the needs of the new development, the wells will also replace SCWA supply lost as a result of the implementation of the 10-mg/l federal MCL for arsenic. The effort resulted in a new 6,000-gpm potable groundwater supply in a rapidly developing area of Sacramento County. Typical production depths in the region yield groundwater with arsenic concentrations that can approach the pending 10-µg/l federal MCL. Deeper zones can contain concentrations of manganese and iron that exceed secondary MCLs and require treatment. Increasing salinity with depth places an additional constraint on groundwater production. Hydrogeologic and geochemical evaluations were performed to identify groundwater production depths that optimized water quality, while achieving production requirements. The completed wells met drinking water standards without treatment. *Reynen & Bardis Communities, Sacramento, California.*

Municipal Well Design and Hydrogeologic Consulting Services. Principal hydrogeologist supporting the City of Woodland's (City) municipal well design efforts and efforts to expand and improve the quality of its groundwater supply. The City depends completely on groundwater, which is produced from an intermediate depth. The City sought to expand its groundwater production to meet projected water demands and improve water quality by constructing new wells in a deeper aquifer zone, which, locally, has superior water quality. Ken led the effort to evaluate hydrogeologic conditions and groundwater quality, design the wells, and provide hydrogeologic support during construction. Ken used aquifer zone sampling test resulted from multicompletion monitoring wells and other subsurface information to calculate blended water quality from multiple aquifer zones, which individually exceeded water quality standards for nitrate, arsenic and manganese. He developed a well design to draw water from selected zones predicted to result in blended water quality that would not require treatment. The constructed well does not require treatment for public, potable supply. Ken has assisted the City in well siting prepared Drinking Water Source Assessment Reports and is preparing a groundwater management plan for the City. Ken also used analytical element modeling to assess potential groundwater impacts caused by the City's new wells. Ken developed a

Solano and Yolo Counties," presented at the California Water and Environmental Modeling Forum Annual Meeting, February 2007.

Loy, K.L., 2005, "Hydrogeology of the Squaw Valley Groundwater Basin, California", presented at the Association of Engineering Geologists 48th Annual Meeting, Las Vegas, Nevada, September 2005.

Bogle, F.R., L. Haines, and K.L. Loy, 1999, "Hydrogeologic Investigation of a Fold and Fault Controlled Karst Groundwater Basin, Hamilton County, Tennessee," presented at the National Groundwater Association 51st National Convention, December 1999.

Loy, K.L., J.L. Lin, and J.A. Matos, 1998, "Analysis of Groundwater Remedial Options using Analytical and Numerical Modeling and Computer Visualization," presented at the National Groundwater Association 50th National Convention, December 1998.

Bogle, F.R. and K.L. Loy, 1995, "The Application of Thermal Infrared Thermography in the Identification of Submerged Springs in Chickamauga Reservoir, Hamilton County, Tennessee," The Fifth Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, Gatlinburg, Tennessee, April 1995.

Johnson, R.A. and K.L. Loy, 1992, "Seismic Reflection Evidence for Seismogenic Low-Angle Faulting in Southeastern Arizona," Geology 20, no. 7: 597–600.

working relationship with the California Department of Water Resources (DWR), Central District. DWR provides in-kind services, including geologic logging and chemical analysis at no cost to the City. *City of Woodland, California.*

City of Santa Rosa Municipal Well Design and Hydrogeologic Consulting Services. Principal hydrogeologist supporting the City of Santa Rosa's efforts to identify and evaluate potential municipal well sites and to design municipal production wells meeting the City's production and water quality requirements. Ken assisted the City in evaluating the hydrogeology of the groundwater basin, assessing municipal and private wells, selecting and evaluating potential municipal well sites, and developing a test drilling and well construction program for two of the sites, which were located in City parks. Test drilling and well construction were conducted with measures to mitigate sound and light pollution and to protect public safety. Geologic and geophysical logging was conducted in partnership with the United States Geological Survey at no additional cost to the client. Aquifer testing and chemical analysis were conducted in the test-production wells to assess yields, hydraulic parameters and groundwater quality, with respect to drinking water standards. Analytical element modeling was used to assess potential groundwater impacts to other wells in the vicinity. *City of Santa Rosa, California.*

Lower San Joaquin River Water Transfer Feasibility Study. Principal hydrogeologist and project manager for the analysis of water transfer alternatives for a 3,500-acre agricultural property located on the lower San Joaquin River. Efforts included evaluation of pre-1914 rights, appropriative licenses and riparian rights; evaluation of possible mechanisms by which water could be made available, including crop shifting, idling and groundwater substitution; and identification of potential buyers. Evaluated groundwater resources for the property and designed and implemented a test drilling, monitoring well construction and groundwater quality sampling program. The California Department of Water Resources, Central District provided geological and analytical services during the drilling program at no cost to the client. Recent activities include negotiations with a potential buyer and preparation of a Petition for Temporary Urgency Change, which will be submitted to the State Water Resources Control Board. *Confidential Client, California.*

Upper Sacramento Valley Well Construction and Aquifer Testing. Principal hydrogeologist and project manager for investigation and hydraulic testing of the Lower Tuscan Aquifer. Scope of services include providing technical support to legal challenges; developing a phased, multi-year aquifer test work plan; providing geologic expertise during drilling of three, 1500-foot test holes extending to the base of fresh water, designing five 1,500-foot production wells; overseeing construction of the production wells; and implementing the aquifer test work plan. The work is conducted in association with the California Department of Water Resources, Northern District. *Stony Creek Fan Partners, California.*

Hydrogeologic Consulting Services. Ken was the principal hydrogeologist and project manager on this effort to evaluate the feasibility of using groundwater as a supplement to Reclamation District 2068's existing Delta water supply. Ken led the effort to assess the availability and quality of groundwater, the potential for impacts to stakeholders and the environment, and the costs of developing a conjunctive use program. These efforts included obtaining and evaluating available hydrostratigraphic, geophysical and water level and quality data; drilling and logging test borings; constructing nested monitoring wells; conducting aquifer testing; performing quarterly water level monitoring and semiannual water quality sampling; establishing and

performing the initial survey of a land subsidence benchmark tied to the Yolo County Subsidence Monitoring Network; performing IWFM modeling to assess the effects of full-scale groundwater production on groundwater elevations; preparing a feasibility study report; preparing a groundwater management plan; and conducting community outreach. *Reclamation District 2068, Yolo and Solano Counties, California.*

Placer County Regional University Water Planning Studies and Modeling. Ken is the principal hydrogeologist and project manager for water, recycled water, and wastewater planning studies for the Regional University project in Placer County. The water supply strategy calls for initial reliance on groundwater with a gradual transition to an integrated supply of treated surface water, groundwater, and recycled water. Groundwater impacts were assessed using MODFLOW and IGSM. A MODFLOW model was developed using the conceptual model for the regional-scale IGSM. Drawdown for various scenarios was then modeled using MODFLOW application and superimposed on the IGSM results to assess project impacts. *KT Communities, Placer County, California.*

Hydrogeologic Characterization and Modeling. Ken was the principal hydrogeologist and project manager on a multi-year study of the Squaw Valley watershed. These efforts included analysis of annual snow pack, stream gauging, development of rating curves, groundwater level monitoring, water quality analysis and monitoring well installation using the resonant sonic method. A conceptual model of the groundwater basin was developed, and MODFLOW was used to estimate the yield of the aquifer under a range of hydrologic conditions and pumping scenarios. Tools were developed for estimating the available groundwater supply based on snowpack thickness and stream flow. *Squaw Valley Public Service District, California.*

Groundwater Impact Analysis and Modeling. Ken was the principal hydrogeologist and project manager during assessment of potential groundwater impacts due to a proposed gravel mine in Dry Creek, Sacramento County. Ken analyzed the geology, land use and water use of the area and developed a conceptual site model that was used to assess potential impacts to groundwater levels, groundwater quality and flow in Dry Creek. The assessment was performed using IGSM and a water balance approach. IGSM was used to assess potential impacts at a regional scale. The water balance was used to assess localized affects, including to a perched aquifer in Dry Creek stream channel deposits. *Sacramento County Department of Environmental Review and Assessment.*

Groundwater Modeling and Conceptual Design. Developed and implemented a program of numerical flow and transport groundwater modeling, conceptual engineering design and cost estimating to select a protective, minimum present-worth design from a range of possible groundwater treatment system configurations. The key component of the approach was evaluation of a range of extraction and injection scenarios using analytical and three-dimensional groundwater flow (MODFLOW) and transport (MT3D) modeling of a multiple aquifer system spanning the Laguna and Mehrten Formations. The models included an extensive public supply well field and predicted the effect of groundwater withdrawals on contaminant transport to the wells. *AFCEE, Sacramento, California.*

Hydrogeologic Consulting Services for the University of California and City of Davis. Ken was the principal hydrogeologist and project manager for aquifer testing of deep municipal wells operated by UC Davis and the City of Davis. The effort included design of the tests; procurement, installation and operation of data loggers; data collection; and aquifer test analysis. The largest test involved pumping at a rate

of approximately 2,500 gallons per minute for nearly two weeks. The aquifer test data were corrected for background water level trends, fluctuations in barometric pressure due to storm events, and earth tides prior to calculation of the hydraulic properties of the aquifer. Ken also participated in the evaluation of aquifer recharge characteristics using standard water quality analyses, stable isotopes, and carbon-14 dating. Ken worked with UC Davis/City operations staff to coordinate pumping tests with ongoing water system operations. *Cities of Davis and Woodland, California and University of California at Davis.*

Hydrogeologic Consulting Services. Ken was the principal hydrogeologist and project manager for the City of Petaluma's groundwater feasibility study. This work included providing hydrogeologic support during construction of new municipal production wells, evaluation of the condition and capacity of existing wells, assessment of the hydrogeology of the groundwater basin, and aquifer testing. The City currently relies on surface water supply from the Sonoma County Water Agency to meet water demands. The reliability of this supply is currently in question; particularly in regards to expansion of the supply to meet increasing needs as the City grows. Ken led the effort to evaluate integration of groundwater into the City's planning to meet increasing demands, either as a permanent supply or to meet peaking and/or emergency supply needs. Potential supply deficits that could be faced by the City in the future and the water quality issues associated with use of existing and proposed wells were considered in the development of alternatives for conjunctive use of surface and groundwater to meet future demands. The work also included the development of long-term objectives for the City for management of its underlying groundwater basin; development of long-term policies to protect the quality and production; and recommendations for groundwater monitoring. *City of Petaluma, California.*

Groundwater Management Planning. Ken was the principal hydrogeologist and project manager during evaluation of SB 1938 basin management objectives for the Solano Sub-basin. Some of the sub-basin stakeholders adopted groundwater management plans in the late 1990's. Ken supported Solano County Water Agency's efforts to evaluate the existing groundwater management plans and identify basin management objectives that the stakeholders held in common. The effort involved reviewing existing groundwater management plans, agreements and technical studies, and meeting with the stakeholders to develop consensus on basin management objectives. The outcome of the effort was a technical document that is available to guide preparation of individual SB 1938 groundwater management plans by sub-basin stakeholders. *Solano County Water Agency, California.*

Groundwater Management Planning. Ken was West Yost Associate's principal hydrogeologist and project manager during preparation of a SB 1938 groundwater management plan for UC Davis and the City of Davis. UC Davis and the City rely solely on groundwater for potable supply. The groundwater management plan was prepared and adopted jointly and has been implemented by the two agencies to help manage groundwater salinity, groundwater levels and land subsidence. *University of California, Davis, and City of Davis, California.*

Hydrogeologic Characterization/Groundwater Management Planning. Ken was the principal hydrogeologist during evaluation of groundwater resources in Dunnigan Water District. Ken evaluated and documented hydrogeologic conditions including aquifer hydraulic properties, recharge sources and potential, historical variations in storage with hydrologic conditions, water quality, typical well construction and typical well yield. Ken also provided recommendations supporting preparation of a SB 1938 groundwater management plan, including recommended

groundwater monitoring locations, stream gauging locations and recommendations for the content of the plan. *Davids Engineering, California.*

Groundwater Management Planning. Ken was the principal hydrogeologist and project manager during preparation of a SB 1938 groundwater management plan for Reclamation District 2068. The adopted plan includes DWR's required and recommended components for SB 1938 groundwater management plans. Currently, the District does not use groundwater, and the plan is used to guide baseline data collection, including groundwater levels, groundwater quality and land subsidence potential. The groundwater management plan can also be used in the future, if the District chooses to adopt a conjunctive use program. *Reclamation District 2068, California.*

ASR Well Evaluation. Evaluated the historical and projected supply and demand with and without the ASR project, developed a summary of the hydrostratigraphy, aquifer hydraulic parameters, and groundwater flow and quality characteristics obtained from published and unpublished reports and California Department of Water Resources (DWR) records. Developed a preliminary conceptual model of the groundwater basin, estimated the potential storage of the basin and evaluated the potential yield of an ASR well and its affect on storage in the groundwater aquifer near Yountville. Evaluated water quality information to assess the potential for adverse effects due to chemical reactions between recharged treated surface water, groundwater, and the aquifer. Selected possible ASR well sites, and developed a conceptual design, conceptual implementation plan and budgetary cost estimate for the ASR system. Identified potential sources of funding for construction of the ASR system and prepared a construction grant application for funding under the Groundwater Storage Program of the Safe Drinking Water, Clean Water, Watershed Protection, and Flood Protection Bond Act (Proposition 13). *Town of Yountville, California.*

Groundwater Resource Study. Evaluated potential for development of a new nonpotable groundwater supply beneath the San Mateo Plain, southwestern San Francisco Bay region. Interviewed staff at USGS, local universities and regulatory agencies to identify and obtain site-specific subsurface information for the project site. Evaluated the potential well yield and water quality and assessed the risk of saltwater intrusion and land subsidence should the resource be developed. *Confidential client, Redwood City, California.*

Land Subsidence Study. Evaluated land subsidence caused by groundwater withdrawal in the Chino Basin, southern California. Used well construction information, geophysical logs, groundwater production and elevation records, land survey information and interferometric synthetic aperture radar (InSAR) to assess the historical magnitudes and rates of land subsidence. Performed a qualitative evaluation of the risks of further subsidence over a range of hypothetical scenarios in which groundwater production and artificial recharge were increased through the year 2020. *Confidential client, Pasadena, California.*

Land Subsidence Studies. Research assistant participating in USGS land subsidence studies using wellhead and extensometer measurements, microgravity and GPS. Participated in establishing land subsidence monitoring networks in Avra Valley, the Tucson Basin and the Picacho Basin (upper and lower Santa Cruz River basins). Research assistant for projects involving collection, processing and interpretation of geophysical data used to characterize engineering properties at proposed Superconducting Supercollider sites in Arizona. Managed the University of Arizona's geophysical database. *University of Arizona, Tucson, Arizona.*

Groundwater Investigations. Conducted geologic, hydrogeologic and geophysical evaluations in the eastern United States and Virgin Islands. Responsibilities included development of project objectives, investigation design, data collection and interpretation, report preparation, and task management. Hydrogeologic activities included: geologic mapping and structural analysis of Valley and Ridge structures; design and implementation of bedrock drilling programs; dye trace testing in fractured bedrock and karst aquifers; groundwater flow and transport modeling; aquifer test analysis; and providing input to engineering design. Geophysical activities included location and delineation of buried structures using electromagnetic induction, magnetics and ground penetrating radar. *Various clients, Eastern United States.*

Hydrogeologic Investigations. Conducted environmental and hydrogeologic investigations on Terceira, Azores Archipelago, Portugal. Conceived and developed work plans for vanguard hydrogeological investigations at this remote volcanic island after performing extensive background research in Portuguese technical references and European Economic Community environmental regulations. *United States Air Force.*

Hydrogeologic Investigations. Conducted geologic, hydrogeologic and geophysical characterization projects in California. Responsibilities included survey design, data collection and interpretation, and report preparation. Hydrogeologic efforts included aquifer test analysis and drilling and stratigraphic logging. Geophysical activities included fault studies and assessment of engineering properties using seismic refraction (GRM), resistivity, and induced polarization. *Various clients, Southern California.*

Groundwater Flow and Transport Modeling. Project manager for the characterization and remediation of arsenic, copper, and hexavalent chromium at a former wood pressure treating facility. Evaluated the nature and extent of contamination in soil and groundwater, established background concentrations, developed remediation approaches, and managed design efforts. Conducted flow and transport modeling (MODFLOW and MT3D) to support evaluation and modification of the groundwater treatment plant. Evaluated a variety of scenarios to minimize the volume of treated water injected into the aquifer. Evaluation of the hypothetical modifications allowed the client and the Regional Board to make risk management decisions regarding the overall water balance of the site, plume capture, chemical processes applied at the treatment plant and discharge options for the treated effluent. *Confidential client, Merced, California.*

PCB Transport Modeling. Evaluated transport of PCBs in the vadose zone and groundwater. Performed vadose zone and groundwater flow and transport modeling to assess the potential for PCB transport from contaminated soil to groundwater production wells in the vicinity. Performed research on PCB transport properties for use in the modeling effort and presented the results to the California Department of Toxic Substances Control. *Confidential client, Pico Rivera, California.*

Benzene Transport Modeling. Evaluated benzene transport in the vadose zone. Developed a vadose zone model to simulate the effects of precipitation, surface runoff, evapotranspiration, infiltration to groundwater and gas phase diffusion on the transport of benzene to a deep aquifer used for water supply. Used time-dependant site-specific weather information and site- and chemical-specific transport parameters to develop the model. *Confidential client, Carson, California.*

Radiological Site Characterization. Designed and implemented a statistical sampling approach that was used to assess the degree and extent of reactor-generated radionuclides in the environment, including Humboldt Bay. The results of the characterization were used as part of the basis for estimating the cost of

decontamination and decommissioning of the nuclear power plant. At the conclusion of the study it was possible to distinguish between areas likely to require remediation, areas that were affected by plant operations but were unlikely to require remediation, and areas in which no effects were measurable. *PG&E, Eureka, California.*

Remedial Investigation/Feasibility Study. Hydrogeologist for Remedial Investigation/Feasibility Study (RI/FS) of the Laboratory for Energy Related Health Research (LEHR) Superfund Site, Davis, California. Evaluated the degree and extent of nitrate, TDS, hexavalent chromium, and chloroform in the unsaturated zone and groundwater. Evaluated records of historical operations and chemical analytical results for unsaturated zone soils to assess potential sources of contamination. Evaluated hydrogeologic information, chemical analytical results for groundwater, and fate and transport processes to delineate the degree and extent of groundwater contamination. Evaluated neighboring supply wells for potential impacts. The information developed was used to assess the effectiveness of remediation approaches, and to plan additional investigations and new groundwater remediation approaches that would be compliant with California Regional Water Quality Control Board, Central Valley Region Waste Discharge Requirements. *University of California, Davis, California.*

Unocal (Former PureGro) Fertilizer Facility. Project manager for the investigation and remediation of ammonia, nitrate, and organochlorine pesticides in soil and groundwater. Investigated the nature, degree, and extent of contamination and submitted compliance reports to the California Regional Water Quality Control Board, Central Valley Region. Established background concentrations in groundwater. Performed a survey of neighboring supply wells, assessed the potential for impacts, and sampled susceptible wells. Evaluated and estimated capital costs for corrective action. *Walnut Grove, California.*

Recycled Water Study. Evaluated the use of recycled water generated by the Sacramento Regional Wastewater Treatment Plant. Developed a projected water balance to the year 2030 for Sacramento County to assess potential changes in surface water and groundwater supply with and without the use of recycled water. Evaluated how the changes in supply might affect net surface water flows and groundwater elevations under climate conditions ranging from wet to critically dry. Evaluated the projected cost of recycled water relative to the cost of other water supplies, which included the projected costs of increasingly stringent treatment requirements. Identified and evaluated options for the best use of recycled water. Options included stabilization of groundwater elevations in high demand areas, areas critical for maintenance of instream flows, and areas in which groundwater quality could potentially be improved. *Sacramento Regional County Sanitation District, Sacramento, California.*

Wastewater Treatment Plant Groundwater Investigation. Principal hydrogeologist for evaluation of potential groundwater impacts at the City of Lodi's White Slough Pollution Control Facility. The primary goal of this ongoing effort is to determine whether facility operations and land application of treated effluent and biosolids have impacted groundwater relative to background conditions. A major challenge of the project was to establish these background conditions. Land use in the area includes intensive agricultural and dairy operations, which have affected water quality. Ken evaluated land and water use information and existing groundwater quality in the region to develop the basis for defining background conditions. He evaluated potential sources of contamination and waste streams at the facility, site-specific hydrogeologic conditions and groundwater quality to prioritize potential sources of

groundwater contamination and identified groundwater transport pathways and seepage rates. Results of the study will be used to determine whether improved treatment and control measures are needed. *City of Lodi, California.*

City of Galt Wastewater Treatment Plant Groundwater Investigation. Project manager for the City's Groundwater Monitoring and Reporting Program. The program addresses the wastewater treatment facilities and the surrounding lands, which are irrigated with plant effluent and used for biosolids disposal. Initiated the program by negotiating with the California Regional Water Quality Control Board, Central Valley Region, and developing the work plan defining well locations, analytical parameters, monitoring protocols, and schedule. No revisions to the work plan were required after the subsequent issuance of Waste Discharge Requirements. Analytical parameters include ammonia, nitrate, coliform, and metals. Established background monitoring locations that have been accepted by the Regional Board. Plant operations result in year-round mounding of groundwater, making placement of upgradient background wells impractical. Instead, background well locations were selected based on groundwater transport and land use considerations. Evaluated the potential for impacts to neighboring supply wells; used nonparametric statistical methods to evaluate whether the monitored constituents exceeded background concentrations. *City of Galt, California.*

Mountain House Wastewater Treatment Plant Pond Evaluation. Hydrogeologist for the evaluation of secondary treated effluent storage ponds. Leakage was observed shortly after the ponds were constructed. Ken evaluated as-built geotechnical data, groundwater quality data and groundwater modeling results to assess the potential future impacts of leakage; the likelihood that newly constructed ponds would meet California Regional Water Quality Control Board, Central Valley Region Waste Discharge Requirements; and potential remedial solutions. Results of the evaluation led to lining of the ponds. *San Joaquin County, California.*

ATTACHMENT

B

White Slough WPCF
Wintertime Irrigation Management Plan

Prepared for

City of Lodi

December 19, 2008

WEST YOST
ASSOCIATES
Consulting Engineers

711-04-08-05

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CITY OF LODI
WHITE SLOUGH WPCF
WINTERTIME IRRIGATION MANAGEMENT PLAN

1.0 INTRODUCTION

West Yost Associates (WYA) has prepared this *City of Lodi White Slough Water Pollution Control Facility Wintertime Irrigation Management Plan* (WIMP) on behalf of the City of Lodi (City) in response to Special Provisions, Section VI.C.3.c, of Waste Discharge Requirements and Master Reclamation Permit (WDRs) Order No. R5-2007-0113 (NPDES No. CA0079243).

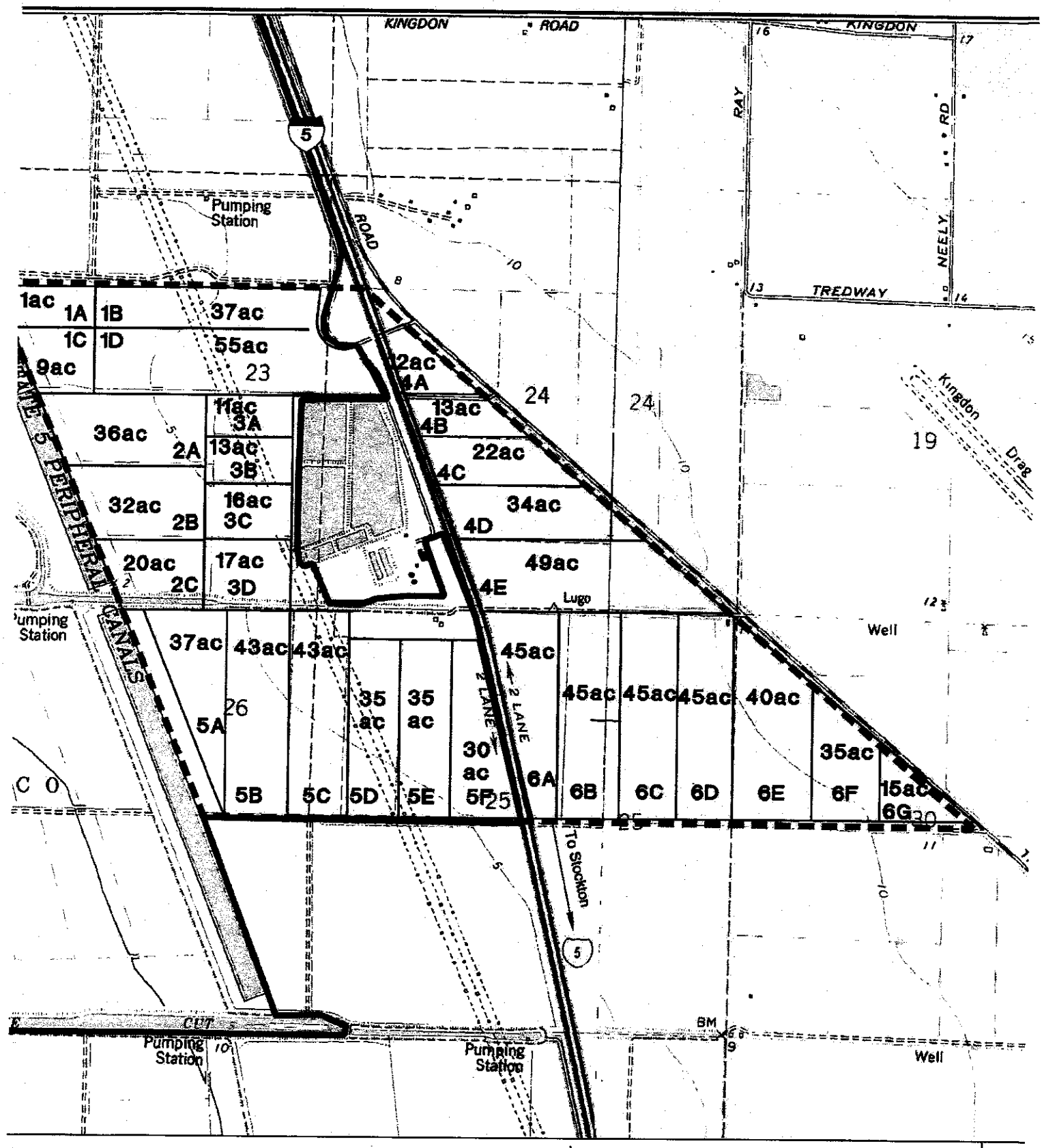
The WDRs address discharges to surface water and groundwater from the City's White Slough Water Pollution Control Facility (WPCF). They were adopted by the Central Valley Regional Water Quality Control Board (Regional Board) on September 14, 2007, and became effective on November 3, 2007. In accordance with Special Provisions, Section VI.C.3.c of the WDRs, the Work Plan for this effort was submitted on April 30, 2008. The Wintertime Irrigation Management Plan is to be submitted within 6 months of Work Plan approval. The Regional Board approved the Work Plan in a letter dated June 19, 2008, thus the WIMP is due by December 19, 2008.

1.1 Organization

Section 1.0 of the WIMP provides an introduction, with a statement of the purpose and scope of the effort. Section 2.0 provides a description of the physical setting of the White Slough WPCF, a description of the agricultural reuse areas, and the sources of irrigation water for these areas. Section 3.0 describes the seasonal operations of the agricultural reuse area. Section 4.0 provides a summary of the City's procedures to minimize water quality impacts during flood events.

1.2 Purpose

This WIMP documents the current land management procedures for the agricultural reuse areas at the WPCF and details the actions that would be implemented if flooding occurred within these areas as required by WDR Order No. R5-2007-0113. Approximately half of the City's agricultural fields (as shown in Figure 1) are located within the 100-year flood plain of the Sacramento-San Joaquin River Delta (Delta) and are not protected from inundation during a 100-year flood event. Winter crops are grown in these areas and may be irrigated with wastewater during the winter. The Regional Board is requiring the City prepare and implement a wintertime irrigation management plan that outlines the land application operations and management practices that will be employed to minimize the potential for water quality impacts to occur during flooding events.


KINGDON ROAD
KINGDON
RAY RD
NEELY
TREDWAY
Pumping Station
ROAD
1ac
1A
1B
37ac
1C
1D
55ac
9ac
23
2ac
4A
24
13ac
4B
22ac
4C
34ac
4D
49ac
4E
Lugo
Well
Kingdon Drag
19
11ac
3A
36ac
2A
13ac
3B
32ac
2B
16ac
3C
20ac
2C
17ac
3D
INTERSTATE 5 PERIPHERAL CANALS
37ac
43ac
43ac
45ac
35 ac
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40ac
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15ac
5A
5B
5C
5D
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5F
6A
6B
6C
6D
6E
6F
6G
26
25
30
2 LANE
2 LANE
To Stockton
5
CUT
Pumping Station
Pumping Station
BM
Well
1A FIELD DESIGNATION
37ac FIELD AREA, ACRES
N
0 800 1600
SCALE IN FEET

2.0 FACILITY DESCRIPTION

This section presents a description of the following aspects of the WPCF and associated land application areas:

- Location
- Treatment Facilities Overview
- Agricultural Use Area Overview
- Irrigation Facilities
- Sources of Irrigation Water
- Cropping
- Biosolids Treatment and Disposal Facilities

2.1 Location

The City of Lodi is located in San Joaquin County along the Interstate-5 (I-5)/Highway 99 corridor between Sacramento and Stockton. The WPCF is located on a 1,040-acre City-owned property located southwest of the City adjacent to I-5, about two miles south of the Highway 12 interchange. The location of the WPCF is depicted on Figure 1.

2.2 Treatment Facilities Overview

The City of Lodi WPCF provides secondary treatment, tertiary filtration and ultraviolet disinfection for approximately 6.4 millions gallon per day (mgd) (annual average) of municipal wastewater from the City. During the summer months the City supplies recycled water from the WPCF for a number of uses including irrigation of fodder crops grown on the City-owned agricultural reuse areas. Municipal effluent not needed to satisfy the reuse demands are discharged to Dredger Cut, a dead-end slough of the Delta. From approximately late September through early April, most of the WPCF effluent is typically discharged to Dredger Cut.

The City anticipates completion of the construction of several WPCF improvements in spring 2009. These improvements will increase the available treatment capacity and upgrade the City's municipal wastewater treatment facilities to achieve improved nitrogen reductions. This project will therefore result in reduced total nitrogen discharges from the municipal wastewater treatment system to the land application area.

2.3 Agricultural Reuse Area Overview

A total of 880 acres of the existing 1,040-acre City property is used for agricultural production. Approximately 90 acres of this agricultural property is currently irrigated solely with groundwater. Irrigation water used on the remaining 790 acres is supplied from a number of sources - predominantly tertiary-treated municipal effluent. In addition, the City land applies Class B biosolids on selected fields within the Reuse Area. Since the City's agricultural facilities are intended to provide for beneficial reuse of the applied recycled water flows and

biosolids, the WDRs require that irrigation water and biosolids be applied at or below agronomic application rates.

The City's irrigation area is leased to two local farmers that grow fodder crops. The City-owned agricultural fields and their associated field number and acreages are shown on Figure 1. As shown, the City's irrigation area consists of 29 separate fields ranging in size from 9 to 55 acres (average field size is 30 acres). The farmers that lease the City's agricultural properties are responsible for day-to-day management of the irrigation areas; however, the application practices are monitored by City staff and controlled on a seasonal basis such as to avoid over-irrigation and exceedances of the estimated nitrogen uptake rates.

2.4 Irrigation Facilities

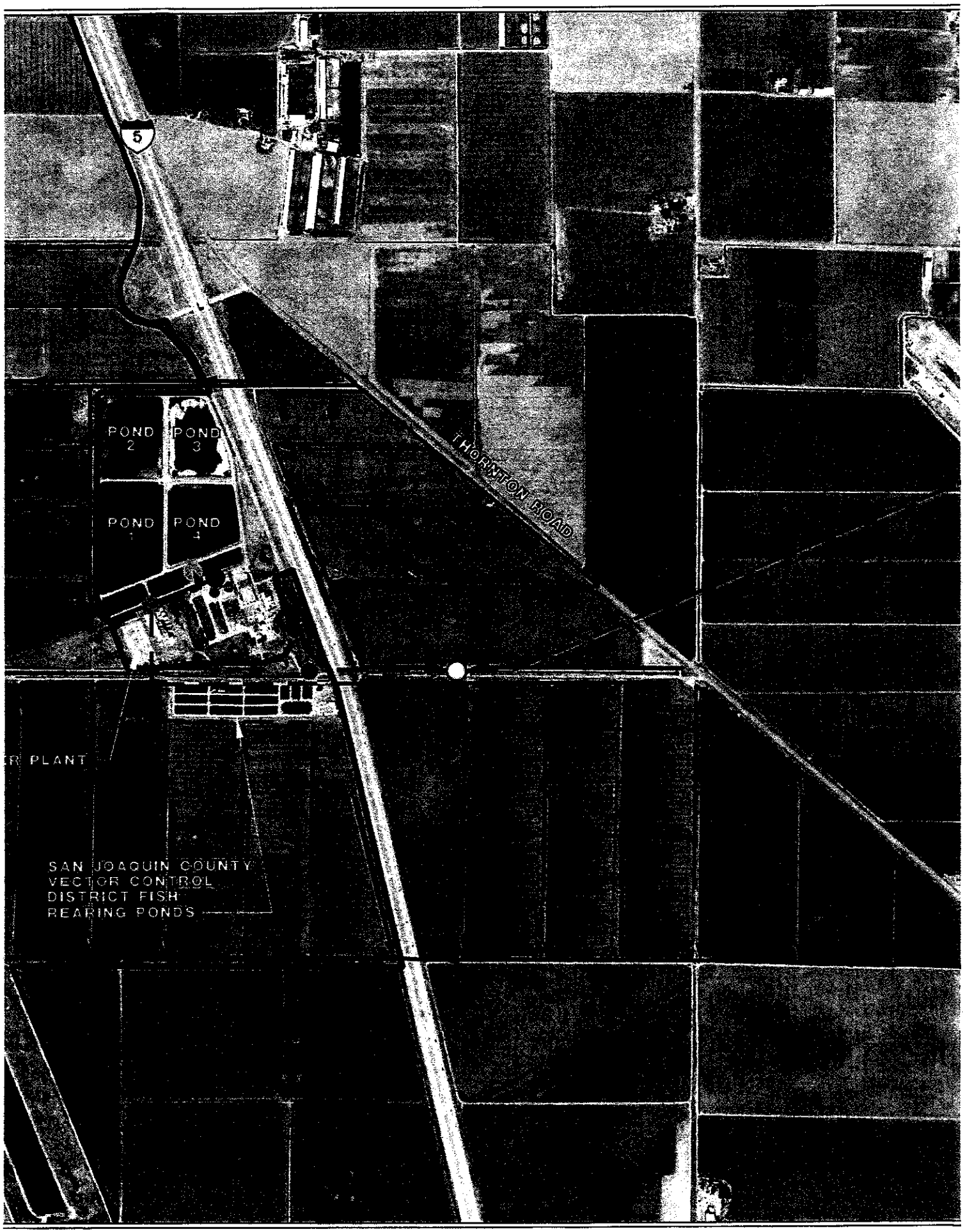
The layout of the City-owned irrigation facilities is shown on Figure 2. Irrigation flows are distributed to the irrigation area via a series of concrete-lined and earthen irrigation ditches and subsurface pipelines. The individual field areas are irrigated via furrow irrigation for row crops (such as corn and winter wheat) and border strip irrigation for field crops (such as alfalfa). The City also operates an extensive tailwater return and runoff control system for the properties surrounding the WPCF. These facilities are used year-round to manage irrigation tailwater and storm water runoff.

Runoff and tailwater flows are returned to the storage pond and/or irrigation system via two primary pathways. Flows originating on 762-acres of the City's property (primarily the western and southeastern portions) are directed to a collection point in the western portion of the City's property. From here, these flows are conveyed via a gravity flow pipeline to the tailwater pump station, where they are pumped into the storage ponds.

Flows that originate in 118 acres of the 130-acre northeastern portion of the City's property are directed into the industrial influent pipeline at a manhole located in the southern portion of Field 4E (note that flows from Field 4A are directed to the western collection point). These flows are then conveyed along with the other industrial line flows to either to the storage ponds (during the non-irrigation season) or to the City's agricultural reuse areas (during the irrigation season).

2.5 Sources of Irrigation Water

The water sources and associated quality of the irrigation water used on the 790-acre reuse area varies throughout the year. The major source of irrigation water is high quality municipal effluent. The City provides tertiary-treated effluent to the NCPA power plant for use as cooling water. Therefore, this level of treatment is provided for all wastewater flows when the power plant requires water (or when discharge to surface water is occurring). Other sources of irrigation water that can be significant are undisinfected secondary-treated effluent from the WPCF (the City has the option of using this quality of water on the agricultural fields when the power plant does not require water supply) and industrial flows that are discharged to the WPCF via a collection system dedicated to a number of industries located within the City.


5
POND 2
POND 3
POND 1
POND 4
THORNTON ROAD
R PLANT
SAN JOAQUIN COUNTY
VECTOR CONTROL
DISTRICT FISH
REARING PONDS

The agricultural reuse area also provides both beneficial reuse and additional treatment for the following minor flows and associated loads:

- Storm water runoff captured in the industrial collection system from some areas located within the City;
- Captured storm water runoff from the City-owned WPCF agricultural property; and
- Captured storm water runoff and agricultural storm water from the agricultural areas located east of the City's property (the City plans to bypass these flows in the future, such that they will not be collected within the City's irrigation system).

Note that stormwater runoff and industrial flows entering the WPCF industrial collection system during the non-irrigation season are directed to the onsite storage ponds where they are contained until they are used for irrigation during the summer months.

A summary of the annual wastewater flow to the industrial collection system is presented in Table 1. As shown, the majority of wastewater discharged to the WPCF via the industrial collection system is from the PCP cannery (about 95 percent of the total industrial flow). These industrial flows are screened prior to being directed to the City's agricultural lands for treatment and reuse. The annual discharges to the industrial line that have occurred in recent years are provided in Table 2. Industrial wastewater flows have declined significantly since 2004.

The estimated typical daily industrial line flows are presented in Table 3 (note the wineries were not included because they are typically batch discharges and are minor). All the industrial line flows are more or less continuous year-round except the PCP cannery and the three wineries (Van Ruiten, Michael David, and Jesse's Grove). PCP flows are generally distributed over the period between June and September. The winery flows are typically batch flows that can occur at any time, but discharges are most likely to occur in July/August and March.

The City is in the process of implementing a water quality characterization study for the industrial flows, the stormwater captured from some industrial areas located in the City, and the onsite agricultural stormwater to identify the potential for pollutant loadings associated with these sources of irrigation water. While it is not expected that significant sources of pollutants will be identified, the City may elect to modify the current reuse area practices if significant levels of pollutants are identified. Additional information regarding this effort is provided in the Industrial Influent Characterization Study Work Plan, which was provided to the Regional Board in April 2008.

Table 1. Industries Currently Contributing to the WPCF Industrial Wastewater Flow

Industry Name	Industry Type	Discharge, MGY[a]	Discharge Areas within the Facility
Pacific Coast Producers (PCP)	Cannery	50 – 130[b]	Fruit wash, boiler blow down, caustic peeling of fruit, factory washdown
Thule Towing Systems	Categorical metal finisher	5.4	Process wastewater stored in tanks[c]
Holz Rubber Company	Categorical metal finisher	2.7[d]	Compressor cooling water, autoclave blowdown
M & R Packing	Fruit packing	2.0	Cooling water, fruit wash
Lodi Iron Works	Iron casting plant	0.5	Compressor cooling water
Van Ruiten	Winery	1.2[e]	Process wastewater, fruit wash, equipment wash
Michael David	Winery	1.0[e]	Process wastewater, fruit wash, equipment wash
Jesse's Grove	Winery	0.3[e]	Process wastewater, fruit wash, equipment wash

[a] MGY = Million gallons per year.
[b] Maximum permitted discharge for PCP is 130 MGY.
[c] Process water sampled prior to discharge and non-compliant water is hauled to the Evergreen Oil Facility.
[d] 2006 flows, does not include process wastewater, which is no longer discharged to the WPCF.
[e] Discharge limit.

Table 2. Total Annual Industrial Line Flows, MG/Year

Discharger	2007	2006	2005	2004	2003
Pacific Coast Producers	89	53	83	126	128
Thule Towing Systems	4.0	4.7	6.1	5.5	5.5
Holz Rubber Company	2.0	2.7	4.6	5.4	3.3
M & R Packing	2.0	1.2	1.2	2.4	3.1
Chevron Remediation Project	—	—	1.1	3.1	3.3
Lodi Iron Works	0.5	0.4	0.5	0.8	0.4
Van Ruiten	1.0	0.9	0.1	—	—
Michael David	0.4	—	—	—	—
Jesse's Grove	0.1	—	—	—	—
Total	99	63	96	144	144

Table 3. Estimated Daily Industrial Line Flows, Gallons per Day[a]

Discharger	June – September		October – May	
	Flow	% of Total	Flow	% of Total
Pacific Coast Producers	785,000	95	—	0
Thule Towing Systems	14,200	1.7	14,200	38
Holz Rubber Company	10,000	1.2	10,000	26
M & R Packing	5,500	0.7	5,500	14
Chevron Remediation Project	6,900	0.8	6,900	18
Lodi Iron Works	1,400	0.2	1,400	4
Total	823,000	—	38,000	—

[a] Average of 2003 thru 2007 data.

2.6 Cropping

The majority of the agricultural area is planted with alfalfa or an alfalfa/ryegrass mixture, which are of high value to the farmers that lease the City's properties. These crops are perennial and are typically grown on a 5-year cycle. As such, they have water demands year-round. During the winter months, this irrigation demand is typically met by rainfall. Supplemental irrigation water is typically needed beginning early in the spring once the winter rains cease and into the late fall up until the onset of the winter rainfall season. A perennial crop is critical for the operations at the WPCF site because they can accommodate hydraulic and nitrogen loadings that occur late in the irrigation season associated with the PCP cannery wastewater.

Biosolids applications are limited to areas where alfalfa and perennial grasses are not grown due to the 30-day limitation of no harvesting after the biosolids have been applied and the fact that these crops must be harvested throughout the growing season. For this reason, the City requires that the farmers that lease the WPCF properties maintain a summer corn/winter wheat crop on at least 350 acres of the irrigation area to ensure sufficient nutrient demand is available for the biosolids generated at the WWTP. The required summer corn/winter wheat acreage may increase in the future as the volume of biosolids produced by the WWTP increases.

2.7 Biosolids Treatment and Disposal Facilities

The City's biosolids handling facilities consist of onsite anaerobic digesters that process solids from the primary settling basins and waste activated sludge (WAS) from the secondary treatment process. WAS from the activated sludge process is thickened in a dissolved air flotation thickener (DAFT) prior to digestion. The processed solids from the digesters are then stabilized in the onsite concrete lagoon before land application. The City is currently in the process of constructing a second biosolids stabilization lagoon.

Beginning in early 2008, the City modified the WPCF to allow the DAFT subnatant (the liquid remaining beneath the surface of the floating solids) to be directed to the headworks of the treatment facilities. The City also recently began operation of a new pumping station that directs all lagoon supernatant (the liquid remaining at the top surface of the stabilization lagoon after most of the solids have settled to the bottom) from the stabilization lagoon to the headworks of the treatment facilities. Prior to the completion of these improvements, both the DAFT subnatant and the lagoon supernatant were either directed to the irrigation water storage pond or blended with the irrigation water and land applied to the agricultural fields.

Biosolids that are land applied are mixed with irrigation water and applied to the summer corn/winter wheat cropping rotation using furrow irrigation. The furrow irrigation generally provides sufficient flow velocity to prevent biosolids from setting at the head of the furrow. (Note that border strip irrigation, which is used to irrigate alfalfa, would not provide sufficient flow velocity to prevent the biosolids from settling at the head of the field.) Additional discussion regarding the biosolids application practices is provided in the "Irrigation System Operations" section below.

The City is evaluating the feasibility of working with a private contractor to provide temporary onsite dewatering services for some of the WPCF biosolids during the winter of 2008. If the City elects to pursue this option, the dewatered solids will be hauled to an offsite location that is permitted through the private contractor for land application. This temporary onsite dewatering operation is expected to provide dewatering for the solids currently stored in the stabilization lagoon and the additional solids generated up until early March 2009. Solids that are generated after March 2009 will be stored in the two onsite stabilization lagoons and subsequently land applied via the existing irrigation system.

The City plans to construct new dewatering and solids storage facilities at the WPCF in the next one to two years. Once these facilities are constructed the City will have the ability to land apply biosolids in the liquid (dewatered solids combined with irrigation water) and solid (dewatered solids) form.

3.0 IRRIGATION SYSTEM OPERATIONS

This section presents an overview of the typical operational procedures for the following:

- Storage Ponds
- Irrigation Areas

3.1 Storage Ponds

Beginning typically in mid-April and extending through early September, the City relies on the storage ponds for operational storage of the flows that are used for irrigation. Note that although the irrigation season can extend through October (and sometimes into November during very dry years), the City typically begins discharge of treated effluent to Dredger Cut prior to this time to ensure the entire capacity of 97 million gallons within the four onsite storage ponds will be available by the end of the irrigation season. This practice provides for the maximum amount of storage capacity possible to hold winter-month industrial flows, municipal flows that are diverted if effluent limitations for surface water discharge cannot be met, and captured stormwater runoff. As a result of storing these flows through the winter months, the ponds are almost (if not completely) full at the beginning of the irrigation season in April.

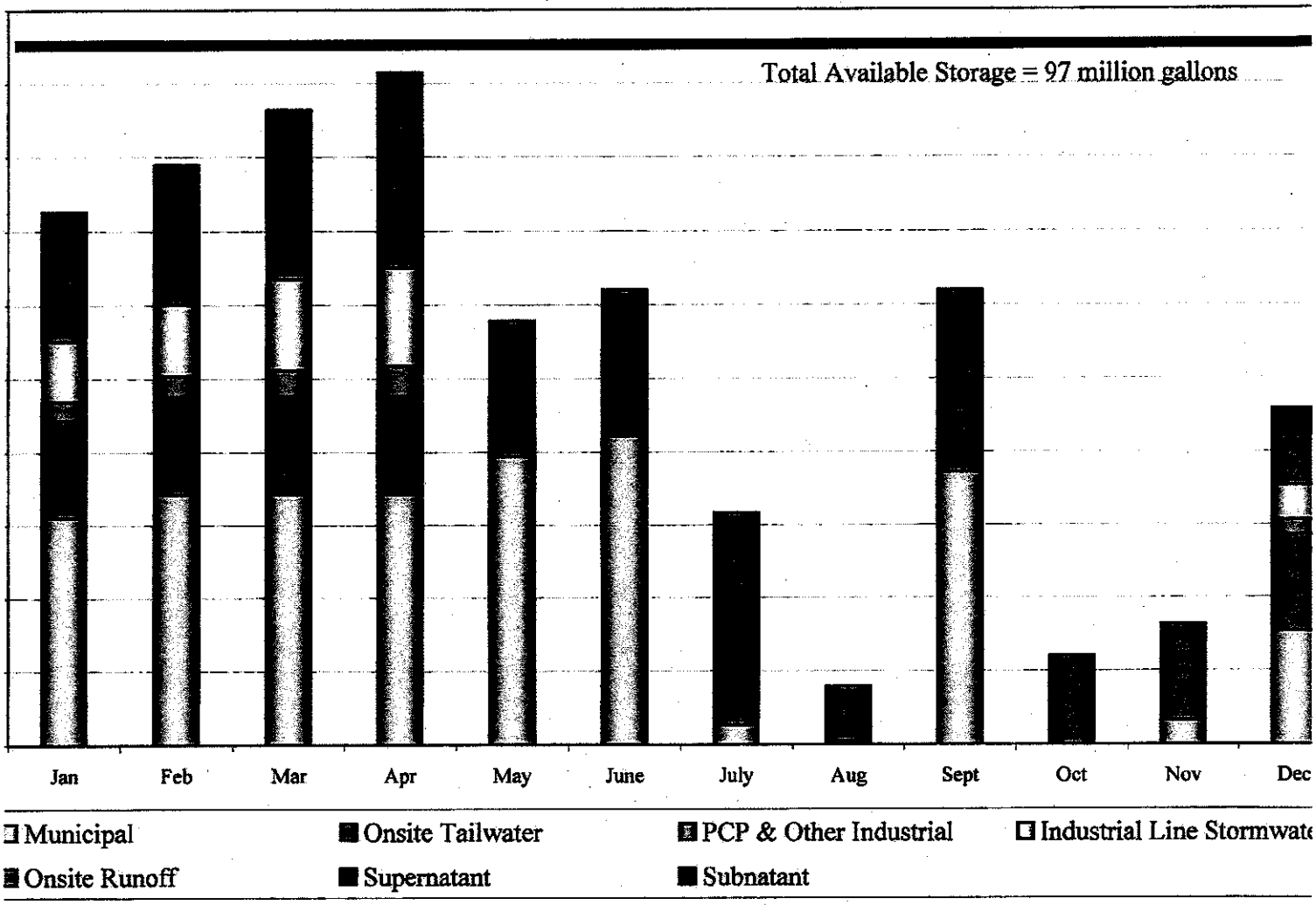
The City completed a detailed assessment of the sources and volumes of the water held in the four onsite storage ponds in the *Soil and Groundwater Investigation Existing Conditions Report* for the *White Slough Water Pollution Control Facility* (September 2006). The typical storage volume and estimated percentage of volume associated with each source of irrigation water at the beginning of each month determined through this evaluation (based on data reported by the City between 2002 and 2005) is shown graphically on Figure 3. As mentioned previously, the City recently installed the facilities needed to divert biosolids lagoon supernatant and DAFT subnatant flows to the WPCF treatment facilities. Therefore, beginning in the 2008/2009 winter season, these flows are no longer discharged to the storage ponds. Nevertheless, Figure 3 still provides an approximate representation of the volumes and sources of the stored flows.

3.2 Irrigation Facilities

Irrigation system operations and water sources are dependent on the time of year. The typical sources of irrigation water each month (also based on data reported in the *Soil and Groundwater Investigation Existing Conditions Report for the White Slough Water Pollution Control Facility*) is shown graphically on Figure 4. As mentioned previously, although the City no longer discharges biosolids lagoon supernatant and DAFT subnatant flows to the reuse facilities, the data shown in Figure 4 provides an approximate representation of the volumes and sources of the irrigation water each month.

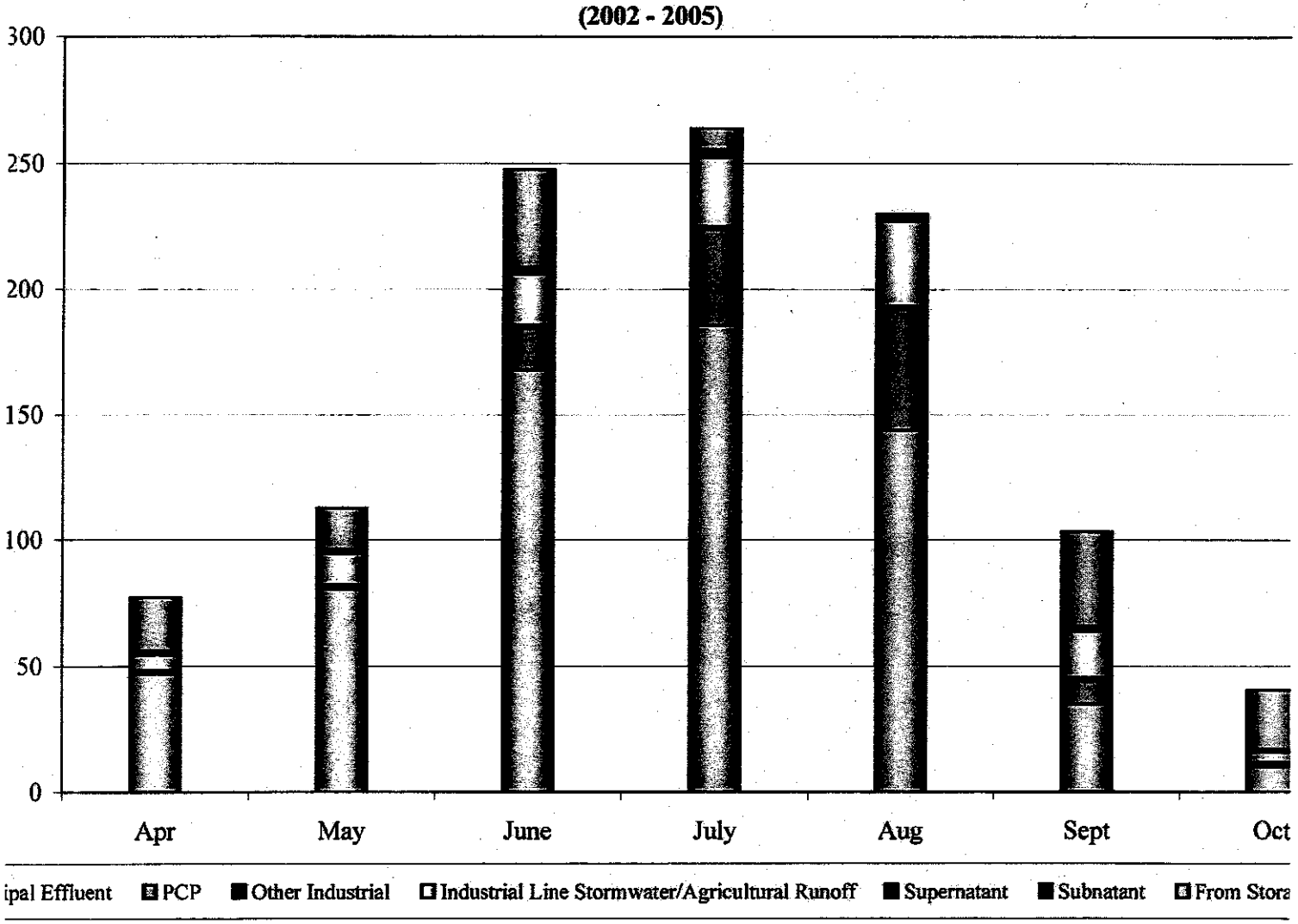
The City increased the frequency of irrigation water quality sampling in the 2008 irrigation season as a results of the adoption of the WDRs in September 2007. Therefore, water quality and associated field loading data collected since the beginning with the 2008 irrigation season provides the most accurate representation of the City's current practices. The average monthly biochemical oxygen demand (BOD), total dissolved solids (TDS) and total nitrogen loadings applied to the fields in 2008 are shown in Figure 5. Note that the relatively high nitrogen

Figure 3. Average Cumulative Volumes Stored in WPCF Ponds, Designated by Source (2002 - 2005)



ical storage are based on an assumed total available storage volume of 97 million gallons, as reported by the City.
olids supernatnat and subnatant are no longer discharged to the storage ponds.

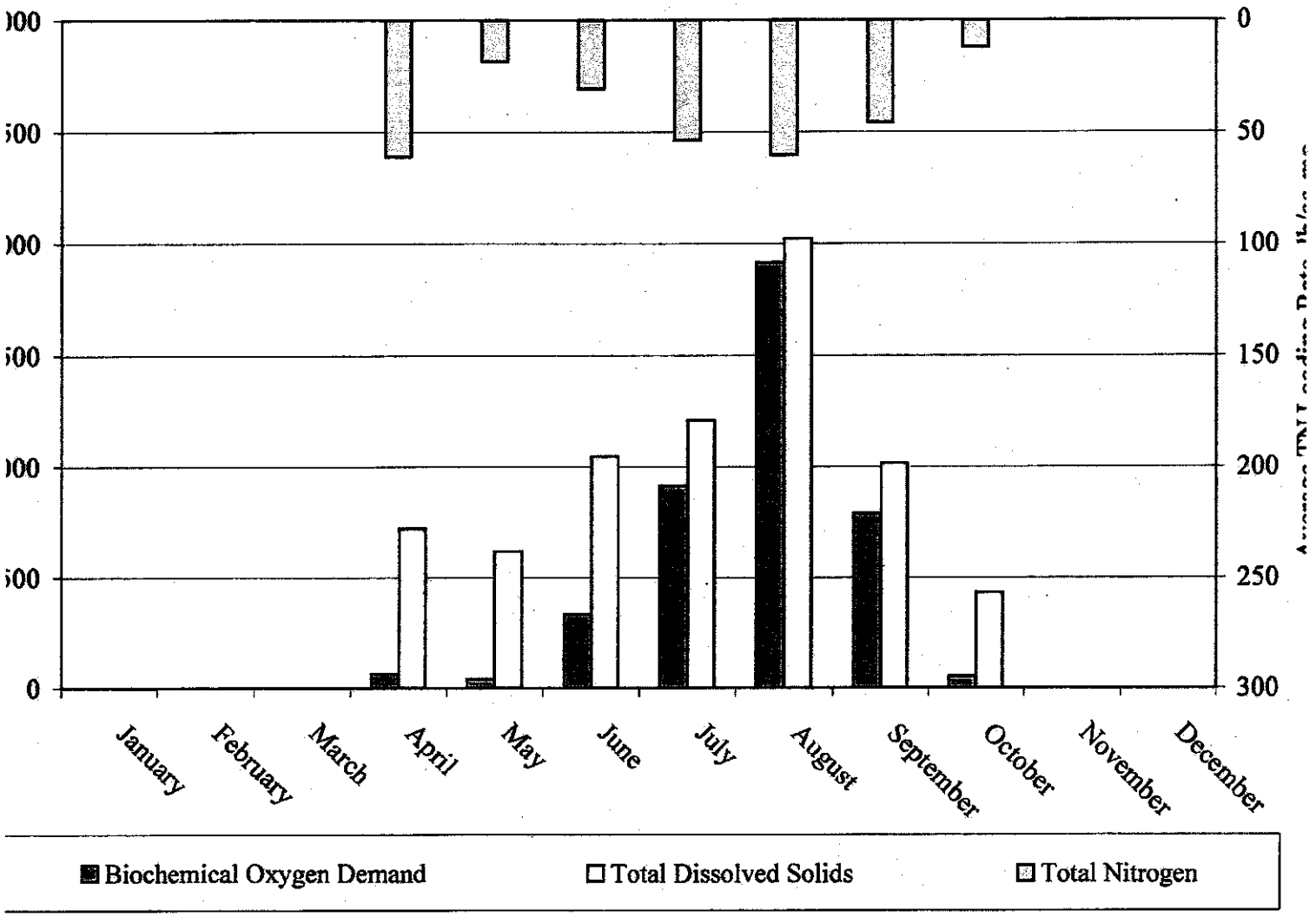
Figure 4. Irrigation Water Under Typical Operating Conditions (2002 - 2005)



ipal Effluent ■ PCP ■ Other Industrial ■ Industrial Line Stormwater/Agricultural Runoff ■ Supernatant ■ Subnatant ■ From Stora

w to Irrigation is based on 2002 - 2005 data
e biosolids subnatant and supernatant are no longer discharged to the storage ponds.

Figure 5. Average of Individual Field BOD, TDS, and Total Nitrogen Loadings (2008)



loadings shown on Figure 5 for April 2008 can likely be attributed to the fact that the City did allow supernatant to enter the irrigation ponds during the winter 2007/2008. Future nitrogen loadings in the early spring are therefore expected to be significantly lower.

Additional information regarding the typical sources and water quality of the irrigation water are discussed below for the following time periods:

- Spring
- Summer
- Fall
- Pre-irrigation
- Winter
- Flooding Events

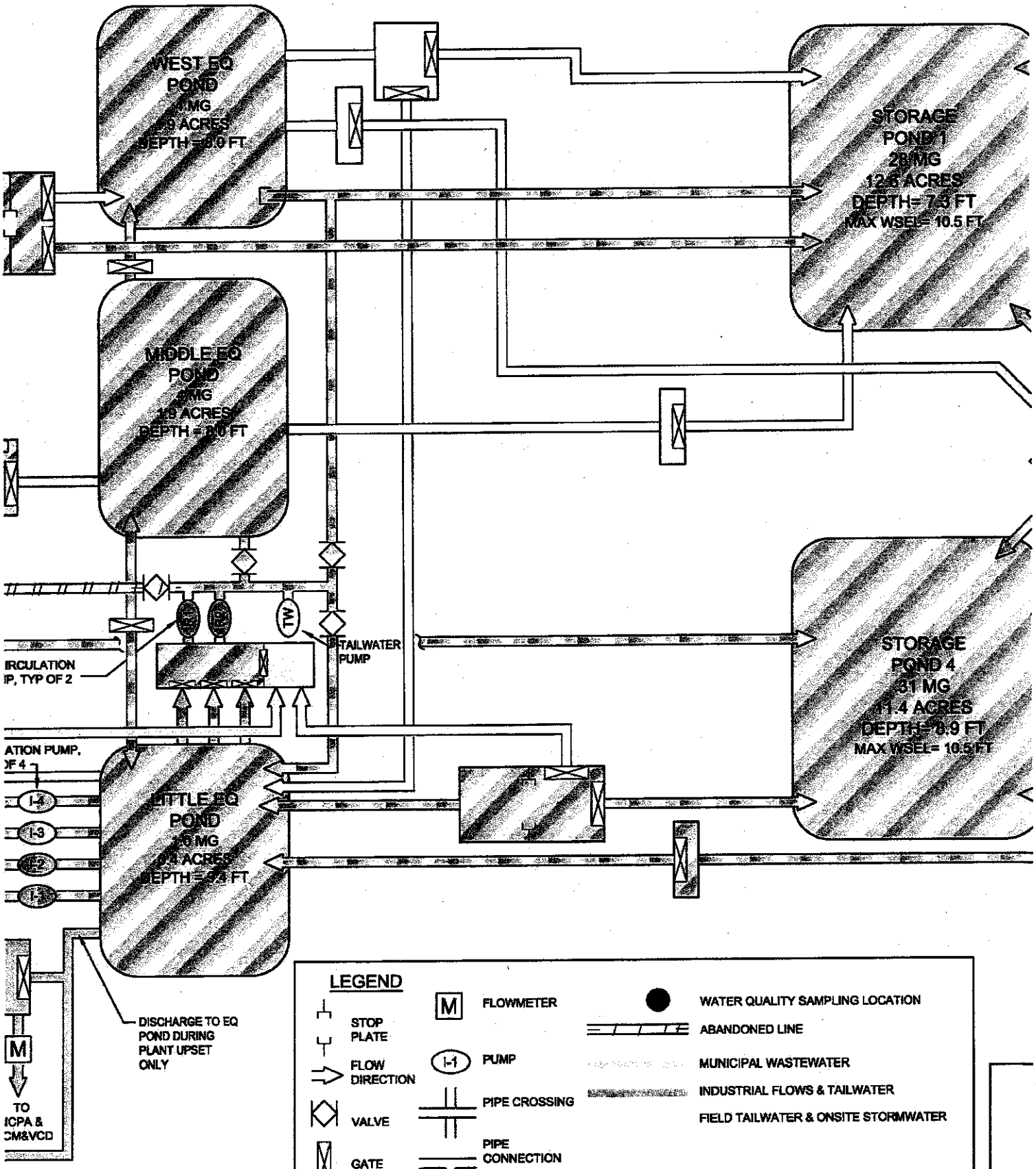
Note, however, that weather and associated cropping patterns can result in considerable variation in the operational procedures applied during a given irrigation season.

3.2.1 Spring

Early in the irrigation season, water stored in the onsite ponds during the winter months is the primary irrigation water supply. The predominant sources of this water are onsite and offsite storm water, non-canning industrial flows, and tertiary water not meeting standards for surface water discharge. The City typically begins diverting tertiary treated municipal effluent to the reuse area near the end of April once the stored volumes have been utilized. A schematic showing the typical spring operations and water sources is provided on Figure 6.

As shown in Figure 5, the BOD loadings in March and April are both relatively low, while TDS loadings increase through March and April. This is likely because there is less dilution of the treated municipal wastewater which is a predominant source of TDS early in the irrigation season. Figure 5 also shows relatively high the nitrogen loadings early in the spring months. These loadings were most likely due to the previous practice of discharging stabilization lagoon supernatant to the storage ponds during the winter months. Nitrogen loadings associated with the treated municipal wastewater are expected to decrease in 2009 as a result of the completion of the WPCF improvement project discussed previously. Therefore, beginning in 2009, the spring nitrogen loadings associated with irrigation water are expected to be significantly lower. Note, however, that early spring nitrogen fertilizer applications may need to increase in the future to ensure the plants' nutrient demands are met.

The first liquid biosolids application event occurs in the early spring (typically between late March and late April). This application event is scheduled in accordance with the cropping schedule and occurs just after the winter wheat crop has been harvested. After this application event, the biosolids are incorporated into the soil prior to the planting of a summer corn crop. Beginning in 2009, the City will also have the option of applying dewatered solids to the fields in the spring. These applications will occur at the same time as (or possibly in lieu of) the liquid application events. The dewatered solids would also be incorporated into the soil prior to planting the summer corn crop.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MUNICIPAL WASTEWATER
INDUSTRIAL FLOWS & TAILWATER
FIELD TAILWATER & ONSITE STORMWATER

3.2.2 Summer

During the summer months all of the treated municipal effluent is directed to either the storage ponds or to the agricultural reuse areas. The onsite tailwater is also directed to the storage ponds through the tailwater system and is eventually returned to the agricultural reuse area. In the early summer months (June and July) the primary source of irrigation water is the treated municipal effluent. Once the PCP canning season begins (typically in July or August), all of the industrial line flows are sent directly to the agricultural reuse area (thereby bypassing the pond facilities). A schematic showing the typical summer operations and water sources is provided on Figure 7.

As shown in Figure 5, BOD, TDS, and nitrogen loadings increase in July/August due to increased loadings associated with the cannery discharge.

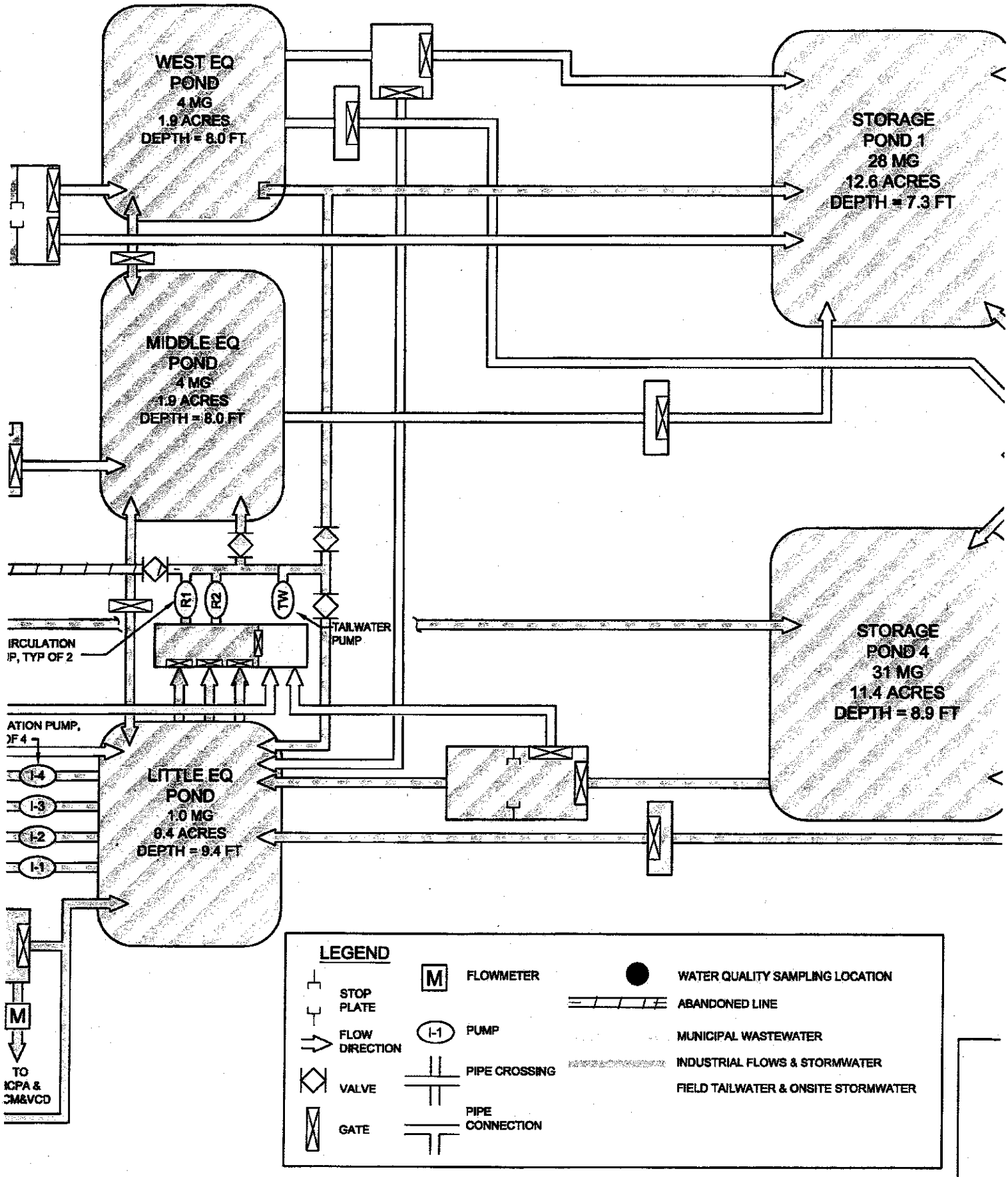
A second liquid biosolids application event also occurs during the peak of the summer irrigation season (typically in late June to early August). This application event is scheduled once the summer corn crop has grown to approximately 2 feet, and is in need of additional nutrients.

3.2.3 Fall

Once the PCP cannery discharge flows end in mid-September flows entering the WPCF from the industrial collection system are typically directed to the storage ponds. In addition, beginning typically in late-September almost all of the treated municipal effluent is directed to Dredger Cut. Any irrigation demands are met by the water stored in the onsite ponds. However, some tertiary treated water may be diverted to the reuse facilities as needed to supplement crop water demands. Tailwater is collected throughout this period and is returned to the storage ponds through the tailwater pump stations. Fall irrigation operations are very similar to spring operations, and a schematic showing these operations was provided on Figure 6.

A third liquid biosolids application event also typically occurs in the fall months (typically late September to early October). This application event is scheduled in accordance with the cropping schedule and occurs just after the summer corn crop has been harvested. After this application event, the biosolids are incorporated into the soil prior to the planting of a winter wheat crop. The City also may elect to not apply biosolids during this period to avoid excessive nitrogen applications to the fields. Once the permanent dewatering facilities have been constructed, the City will also have the option of applying dewatered solids to the fields in the fall. These fall applications would possibly occur in lieu of the liquid application events. The dewatered solids would be incorporated into the soil prior to planting the winter wheat crop.

As shown in Figures 5, BOD, TDS, and nitrogen loadings typically are very low in the fall once the canning season ends in September and municipal effluent once again becomes the predominant nitrogen load source.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ABANDONED LINE
MUNICIPAL WASTEWATER
INDUSTRIAL FLOWS & STORMWATER
FIELD TAILWATER & ONSITE STORMWATER

3.2.4 Pre-Irrigation

During late October or early November the City may also pre-irrigate the winter wheat crop or a newly established alfalfa crop to ensure a better establishment of crop growth and uniformity. From approximately October 1 through March 30 all municipal effluent discharged to the storage ponds would be treated through the WPCF filtration and UV disinfection facilities. Therefore, during the pre-irrigation period the predominant water source would typically be tertiary treated municipal effluent. However, flows could also include onsite tailwater, runoff, and industrial discharges. Note that the industrial discharge does not include PCP cannery water since the cannery typically stops discharging water in September. A schematic showing the typical pre-irrigation water sources and operations of the onsite storage facilities is provided on Figure 8.

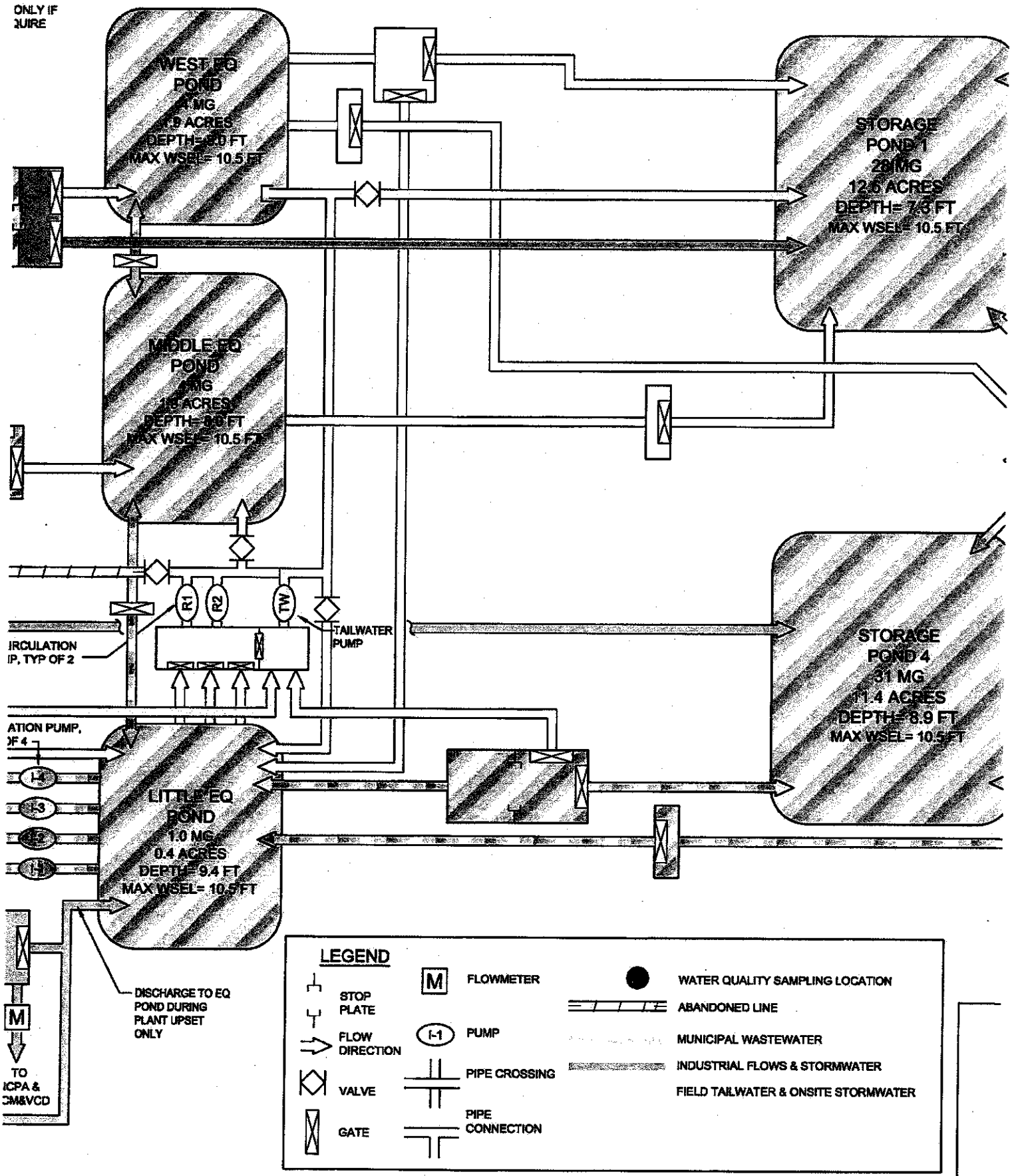
3.2.5 Winter

Beginning typically in late November and extending through early April, no onsite irrigation will likely need to occur. All collected offsite stormwater runoff, industrial flows, and tertiary water not meeting discharge standards are directed to the onsite storage ponds, where they are blended and stored until being land applied in the following irrigation season. However, irrigation may be required during this period if adequate rainfall does not occur to meet crop water demands. Irrigation water applied in such an event would be pumped from the onsite storage ponds and would primarily consist of tertiary treated municipal effluent and onsite tailwater.

3.2.6 Flooding Events

The boundary of the 100 year flood plain is Interstate 5; therefore, flooding would only be expected to occur on the western side of the WWTP property. There are berms surrounding the western agricultural reuse fields are several feet above existing grade to prevent the land application area from naturally draining to the Delta. However, these berms do not exceed the 100 year floodplain elevation of approximately eight feet above mean sea level. Therefore some infrequent flooding of the western fields does occur.

During lower-flow flooding events, floodwaters could empty from the Delta into the City's properties. During these events, the City will continue to maintain control of this floodwater to some extent by using the tailwater collection system to return as much water as possible to the storage ponds - provided sufficient storage is available. During higher-flow flooding events, the City would not be able to continue pumping water from the field areas to the storage ponds. However, once the floodwaters receded after such an event, the City would pump water remaining within the field areas to the storage ponds – again provided sufficient storage is available. Any water remaining on the fields that cannot be pumped to the storage ponds would be allowed to remain on the property until such a time that it either evaporates or percolates. Historically these practices have allowed the City to maintain control of the floodwater entering the reuse area. There is however, potential for excess flood waters to travel through the reuse area during the highest flow flooding events. The City will implement procedures to minimize the potential water quality impacts during such wintertime runoff events.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MUNICIPAL WASTEWATER
INDUSTRIAL FLOWS & STORMWATER
FIELD TAILWATER & ONSITE STORMWATER

4.0 CITY PROCEDURES TO MINIMIZE WINTERTIME RUNOFF

To minimize the risk of water quality impacts to the Delta in the event the City's fields are inundated during a 100-year flood, the City will implement the following action items:

- The City will not apply wastewater for irrigation purposes during periods of significant precipitation, and for at least 24 hours after cessation of signification precipitation, or when soils are saturated. Significant rainfall is defined as 0.25 inches in a 24-hour period.
- Between late November and early April, the City will only supply water to the fields if the crops require water. Winter wheat has not typically required irrigation during this period because the crop water demands are low and can almost always be satisfied by rainfall. However, alfalfa may need to be irrigated if it is a very dry winter (for example some fields planted in alfalfa required irrigation in January 2007 because less than 1 inch of rainfall occurring during this month). However, if rainfall is critically low, the risk of flooding and associated runoff is minimal.
- The City will continue to capture field runoff caused by a rainfall event and return it to the storage ponds when sufficient pond storage is available. During drier rainfall years (when winter season irrigation may be necessary), there should be adequate capacity to hold field runoff. During wetter rainfall years storage may be unavailable for runoff flows that occur late in the winter months. In these events, the City will maintain control by allowing the water to remain on-site until it either evaporates or percolates. Note that winter irrigation would not be necessary if sufficient rainfall occurs in the late winter/early spring.
- Biosolids will be applied only to fields planted with a summer corn/winter wheat crop. As previously discussed, applications of liquid biosolids will occur three times per year: early spring (after the fields have sufficiently dried and before the corn is planted), mid summer (during peak periods of corn nitrogen uptake) and early fall (after corn is harvested and before fields are tilled and wheat is planted). Following the implementation of the planned biosolids dewatering project, biosolids will only be applied in the early spring and early fall.
- Prior to the onset of the winter rainfall season, the fields that received biosolids will be tilled and a crop will be planted to ensure stabilization of the soils. This practice will help ensure that biosolids are incorporated into the soil and should minimize the potential for soil erosion during the winter months.
- If necessary to promote healthy plant growth, the City often pre-irrigates the winter wheat crop to ensure a better establishment of crop growth and uniformity. This minimizes soil erosion and promotes uniform nitrogen uptake.
- Biosolids applied to the fields during the spring application period have a minimal risk of impacting the Delta due to flooding. This is because the City waits until the fields have sufficiently dried so equipment can enter the field to harvest winter wheat and prepare the fields for the spring biosolid application. This drying period would generally push the biosolid application event past a period when flooding would likely occur. Biosolids

applied during the summer months have virtually no possibility of impacting Delta waters.

- The City will not apply biosolids 24 hours before forecasted precipitation, during periods of precipitation, and for at least 24 hours after cessation of precipitation, or when soils are saturated.
- The City has contracted with a certified agronomist to assist in management decisions of the WPCF fields. The agronomist, City staff and the farmers who lease the WPCF fields meet at the beginning, mid-point and at the end of the irrigation season to discuss the planned operations including: planting dates, crop rotations, irrigation scheduling, biosolids applications, and to coordinate the monitoring and reporting requirements included in the WDRs. Additional meetings are scheduled as new procedures are implemented to ensure the requirements are conveyed to employees and the WPCF remains in permit compliance.

REFERENCES

Central Valley Regional Water Quality Control Board (Regional Board), 2007, Waste Discharge Requirements Order No. R5-2007-0113 (NPDES No. CA0079243).

West Yost Associates, 2006, Soil and Groundwater Investigation Existing Conditions Report for the White Slough Water Pollution Control Facility, September.

ATTACHMENT

C

City of Lodi
White Slough Water Pollution Control Facility
Industrial Influent Characterization Study
Work Plan

Prepared for

City of Lodi

April 23, 2008

WEST YOST
ASSOCIATES
Consulting Engineers

711-04-08-04

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CITY OF LODI
WHITE SLOUGH WATER POLLUTION CONTROL FACILITY
INDUSTRIAL INFLUENT CHARACTERIZATION STUDY WORK PLAN

1.0 INTRODUCTION

West Yost Associates (WYA) has prepared this *City of Lodi White Slough Water Pollution Control Facility Industrial Influent Characterization Study Work Plan* (Work Plan) on behalf of the City of Lodi (City) in response to Special Provisions, Section VI.C.2.c, of Waste Discharge Requirements and Master Reclamation Permit (WDRs) Order No. R5-2007-0113 (NPDES No. CA0079243).

The WDRs address discharges to surface water and groundwater from the City's White Slough Water Pollution Control Facility (WPCF). They were adopted by the Central Valley Regional Water Quality Control Board (CVRWQCB) on September 14, 2007, and became effective on November 3, 2007. In accordance with Special Provisions, Section VI.C.2.c of the WDRs, this Work Plan is due six months following the effective date of the permit, and should be submitted by May 1, 2008.

1.1 Organization

Section 1.0 of this Work Plan provides an introduction and rationale for this Work Plan. Section 2.0 provides a description of the Lodi WPCF and the industries that discharge to the City's industrial collection system. Section 3.0 addresses the study objectives and approach.

Attachment A provides a table showing the constituents that will be evaluated during the first year of monitoring under this study.

1.2 Purpose of the Work Plan

This Work Plan describes the approach, methods, and timeline for conducting and investigating the chemical characteristics of the wastewater influent collected by the City's industrial sewer system as required under Special Provisions, Section VI.C.2.c of the WDRs, which states the following:

> *To identify potential groundwater quality issues, the Discharger shall submit a monitoring study that characterizes the wastewater influent collected by its industrial line. The goal of this study is to isolate and characterize the primary unique components of the industrial influent, including: 1) industrial influent that contains discharges from Pacific Coast Producers (PCP) (during the irrigation season June through September), 2) industrial influent that only contains discharges from the remaining industrial users (Non-irrigation season, which excludes PCP's wastewater), and 3) industrial influent that contains the first-flush*

of off-site and on-site stormwater runoff. The study shall include monitoring of biochemical oxygen demand (BOD), Total Kjeldahl nitrogen, total nitrogen, sodium, total suspended solids, fixed dissolved solids, chloride, Total Coliform Organisms, boron, magnesium, total petroleum hydrocarbons (TPH), five fuel oxygenates, lead scavengers, and all constituents listed in Attachment H of this Order. The monitoring study must be conducted at least quarterly for the duration of no less than two years. After the first year of study, if any constituent, classified in Attachment H as a Volatile Organic (p. H-1), Semi-volatile Organic (p. H-2), or Pesticide-PCBs (pp. H-3 and H-4), or any TPH, fuel oxygenate, or lead scavenger, was not detected in the industrial influent, then the Discharger may cease monitoring for that constituent(s) during the remainder of this study. Upon completion, the Discharger shall summarize the analytical results of the data collected and describe future monitoring to take place.

2.0 BACKGROUND

The City of Lodi WPCF is a state-of-the-art wastewater treatment plant that provides secondary treatment, tertiary filtration and ultraviolet disinfection for approximately 6.3 million gallons per day (mgd) (average dry weather flow, ADWF) of municipal wastewater from the City. This level of treatment is provided for all municipal flows discharged into surface waters during the winter months.

From approximately mid-April to mid-September, municipal wastewater is pumped to onsite storage ponds and used to irrigate 790 acres of agricultural fields. Typically, the municipal wastewater that is discharged on the onsite ponds is filtered and disinfected; however, the City is permitted to irrigate the fields with un-disinfected secondary flows. The municipal wastewater has been thoroughly characterized as part of the WDR renewal process, and additional characterization of these flows is not necessary for this study.

The City also land applies irrigation water from a number of sources to the agricultural fields, including wastewater and stormwater discharges from several industries located within the City that discharge to the City's industrial wastewater collection system. There have been some concerns raised regarding the potential impacts associated with these flows because (i) they have not been fully characterized and (ii) during the winter months, these flows are directed to the City's onsite, unlined storage ponds. Therefore, the purpose of this study is to provide a characterization of these flows to determine whether additional control strategies are needed to protect groundwater resources.

A summary of the wastewater flows discharged from the industrial facilities is presented in Table 1.

Table 1. Industries Currently Contributing to the WPCF Industrial Wastewater Flow

Industry Name	Industry Type	Discharge, MGY[a]	Discharge Areas within Plant	Possible Hazardous Waste Limitations
Pacific Coast Producers	Cannery	50 – 130[b]	Fruit wash, boiler blow down, caustic peeling of fruit, factory washdown	No
Thule Towing Systems (Formerly Valley Industries)	Categorical metal finisher	5.4	Process wastewater stored in tanks[c]	Yes
Holz Rubber Company	Categorical metal finisher	2.7[d]	Compressor cooling water, autoclave blowdown	No
M & R Packing	Fruit packing	2.0	Cooling water, fruit wash	No
Lodi Iron Works	Iron casting plant	0.5	Compressor cooling water	No
Van Ruiten	Winery	1.1[e]	Process wastewater, fruit wash, equipment wash	No
Michael David	Winery	0.7[e]	Process wastewater, fruit wash, equipment wash	No
Jesse's Grove	Winery	0.3[e]	Process wastewater, fruit wash, equipment wash	No

[a] Million gallons per year.
[b] Maximum permitted discharge for PCP is 130 MGY.
[c] Process water sampled prior to discharge and non-compliant water is hauled to the Evergreen Oil Facility.
[d] 2006 flows, does not include process wastewater, which is no longer discharged to the WPCF.
[e] Discharge limit.

The annual discharges to the industrial line that have occurred in recent years are provided in Table 2. As shown, the industrial wastewater flows have declined significantly since 2003.

Table 2. Total Annual Industrial Line Flows, MG/Year

Discharger	2007	2006	2005	2004	2003
Pacific Coast Producers	89	53	83	126	128
Thule Towing Systems (Formerly Valley Industries)	4.0	4.7	6.1	5.5	5.5
Holz Rubber Company	2.0	2.7	4.6	5.4	3.3
M & R Packing	2.0	1.2	1.2	2.4	3.1
Chevron Remediation Project	—	—	1.1	3.1	3.3
Lodi Iron Works	0.5	0.4	0.5	0.8	0.4
Van Ruiten	1.0	0.9	0.1	—	—
Michael David	0.4	—	—	—	—
Jesse's Grove	0.1	—	—	—	—
Total	99	63	96	144	144

All the industrial line flows are more or less continuous year-round except PCP and the three wineries. PCP flows are mostly spread out between June and September. The winery flows are typically batch flows that can occur at any time, but discharges are most likely to occur in July/August and March. The estimated typical daily industrial line flows are presented in Table 3 (note the wineries were not included because they are typically batch discharges and are minor).

Table 3. Estimated Daily Industrial Line Flows, Gallons per Day[a]

Discharger	June – September		October - May	
	Flow	% of Total	Flow	% of Total
Pacific Coast Producers	785,000	95%	—	0%
Thule Towing Systems (Formerly Valley Industries)	14,200	1.7%	14,200	38%
Holz Rubber Company	10,000	1.2%	10,000	26%
M & R Packing	5,500	0.7%	5,500	14%
Chevron Remediation Project	6,900	0.8%	6,900	18%
Lodi Iron Works	1,400	0.2%	1,400	4%
Total	823,000	—	38,000	—

[a] Average of 2003 thru 2007 data.

3.0 STUDY APPROACH

The following items related to the study approach are discussed below:

- Irrigation Source Water Monitoring Justification
- Monitoring Locations and Frequency
- Chemical Analyses
- Quality Control
- Reporting
- Proposed Schedule

3.1 Irrigation Source Water Monitoring Justification

This Work Plan presents the monitoring strategy for further characterizing the non-municipal flows used for irrigation of the City-owned properties. The sources of irrigation water include:

- Industrial Wastewater
- Captured Offsite Stormwater
- Offsite Agricultural Tailwater
- Onsite Agricultural Stormwater Runoff
- Onsite Agricultural Tailwater
- Biosolids Lagoon Supernatant

As discussed in the Purpose of the Work Plan, the WDRs prescribe this industrial influent study to identify potential groundwater quality issues. However, as listed above, the City has multiple sources of irrigation water which may need to be characterized to assess impacts to groundwater. The following presents the rationale discussion for determining which of these sources will be monitored under this Industrial Influent Characterization Study. As discussed below, most of the existing sources of irrigation water are currently characterized through other efforts.

3.1.1 Industrial Wastewater

These flows vary seasonally and have the potential to carry metals and organic compounds originating in the industrial facilities. This Work Plan provides the monitoring strategy for characterizing this industrial wastewater influent to the WPCF. Note that the City will also complete some additional characterization of the industrial discharge during the PCP canning season as part the BOD Organic Loading study. The additional data collected under this effort will be incorporated, as appropriate, into the Industrial Influent Characterization Summary Report. Furthermore, data collected during this study period as part of the WDR Monitoring and Reporting Program (MRP) will also be incorporated into the Industrial Influent Characterization Summary Report.

3.1.2 Captured Offsite Stormwater

Stormwater runoff from the industrial facilities discussed above and stormwater runoff from agricultural areas located east of the City's property are both discharged to the WPCF via the industrial sewer line. Note that the City plans to bypass these agricultural runoff flows in the future, such that they will be discharged directly to surface waters. Furthermore, the potential contaminants associated with industrial stormwater runoff flows include metals, total petroleum hydrocarbons, fuel oxygenates, and lead scavengers. Therefore, the industrial stormwater runoff is of more concern than the agricultural stormwater runoff.

The period of greatest concern for such contaminants to enter the industrial line is during first-flush rainfall events. This Work Plan provides the monitoring strategy for characterizing these stormwater runoff discharges to the WPCF industrial sewer system.

3.1.3 Offsite Agricultural Tailwater

Agricultural tailwater captured during the irrigation season from agricultural areas located east of the City's property also enter the WPCF through the industrial sewer line. Potential contaminants associated with the agricultural tailwater flows are pesticides and nutrients that were applied to these agricultural fields. During the majority of the irrigation season when such tailwater flows would be present, wastewater entering the WPCF from the industrial line is directed to the irrigation distribution facilities and are considered in the field loading calculations that are reported on a monthly basis. Therefore, a separate characterization of these agricultural tailwater flows is not necessary for identifying potential groundwater quality issues.

3.1.4 Onsite Agricultural Stormwater Runoff

Except during major flooding events, all stormwater runoff is captured during the non-irrigation season from the City-owned agricultural properties. Some of these flows enter the industrial line, however, a vast majority of the flows are directed to a return flow pump station located in the Western portion of the City's property, and conveyed from there to the City's onsite unlined storage ponds. Stormwater runoff from the City's properties may contain elevated levels of nutrients, dioxins and metals attributable to biosolids application. As such, there are some concerns with regard to the potential loadings from this source to enter the onsite storage ponds. Therefore, the City proposes to characterize the onsite stormwater flows directed to the ponds as part of this study. The sampling locations and monitoring frequency are discussed later in the Monitoring Locations and Frequency Section of this Work Plan.

3.1.5 Onsite Agricultural Tailwater

Tailwater flows from the City-owned agricultural properties, which are generated exclusively during the summer irrigation season, are collected in the same manner as the onsite stormwater runoff flows discussed above. As such, these flows are currently directed to the WPCF onsite unlined storage ponds. However, the City plans to modify the tailwater conveyance facilities such that the onsite agricultural runoff flows can be directed back the irrigation distribution system (and therefore not be discharged to the storage ponds).

These agricultural tailwater flows are expected to have similar characteristics to the water applied to the fields, the characteristics of which are regularly monitored and reported on a monthly basis. Moreover, once the modifications discussed above are complete, the loadings from this source will not affect water quality in the onsite storage ponds. Therefore, a separate characterization of the onsite agricultural tailwater under this Work Plan is not necessary for identifying potential groundwater quality impacts.

3.1.6 Biosolids Lagoon Supernatant

Supernatant flows from the onsite biosolids lagoon are currently directed to the onsite storage ponds. However, the City has plans to modify the solids handling facilities to eliminate the discharge to the storage ponds. Due to these planned changes, characterization of the biosolids lagoon supernatant is not proposed at this time.

Also note that the City historically discharged the subnatant from the waste activated sludge Dissolved Air Flotation Thickeners (DAFTs) to the storage ponds. However, the City has already made the modifications necessary to direct these flows back to the WPCF municipal treatment train.

3.2 Monitoring Locations and Schedule

The Special Provisions of the WDRs requires that the monitoring study be conducted at least quarterly for the duration of no less than two years. This Work Plan described in detail the first year of monitoring that will take place. The second year monitoring program will be determined based on a review of the monitoring data collected during the first year. The first year quarterly will occur in accordance with the following schedule:

1. During summer (irrigation season) when the Pacific Coast Producers' discharge occurs. The canning season begins in mid-June and is at its peak in July and August. Therefore, to capture the water quality associated with the Pacific Coast Producers' discharge, a sample will be collected during the first week of August. This will be the first monitoring event that occurs under this study and will serve as the third quarter of 2008 sample.
2. During one of the first rainfall events in the 2009 water year (October 1, 2008 through September 30, 2009) to capture the first-flush stormwater runoff. The rainfall event contributing to the first-flush is difficult to predict. However, based on a review of historic records, the depth of precipitation during the first rainfall event of a given water year is typically small and does not result in significant runoff, as most (if not all) of the precipitation will infiltrate into the soil. Therefore, it is not likely that the first rainfall event of the 2009 water year will be monitored. Instead the second rainfall event (assuming it occurs within a two week period of the first event), will likely be the trigger for first-flush sampling. (Note if the second rainfall event of the water year does not occur within two weeks for the first event, then this second rainfall event will be considered the trigger, and sampling will be conducted during the third rainfall event).

   The storm events to be sampled will be selected based on criteria stated in EPA's NPDES Storm Water Sampling Guidance Document. As such, the depth of rain of the event should not vary by more than 50 percent from the average depth. The average

depth of rain in the Lodi area is approximately 0.5 inches. Therefore, samples will be collected after at least 0.25 inch of rainfall has been measured by the City's onsite rain gauge during a given rainfall event (i.e. approximately 4 to 6 hours). To ensure that samples can be collected as prescribed, the City staff will need to be attentive to weather forecasts and the onsite rain gauge. In addition, sample collection bottles and field blank bottles will need to be available onsite prior to a potential occurrence of rainfall.

Note that sampling events to capture first-flush of off-site and on-site stormwater runoff are likely to occur during the same storm event. However, the on-site stormwater runoff sampling is likely to be before the off-site stormwater runoff sampling, due to the travel time required for the off-site runoff to reach the WPCF from the City in the industrial influent pipeline. Increased pumping at the tailwater pump station will provide an indication as to when the onsite runoff flows are significant. The City will want to collect a sample when these pumping rates first start to increase. It is expected that offsite runoff flows will reach the WPCF within a few hours of when the City collects samples from the tailwater pump station. Increased flows in the industrial influent pipeline will provide an indication as to when this sampling will need to occur.

This will be the second monitoring event that occurs under this study and will serve as the fourth quarter of 2008 sample.

3. During the first rainfall event that occurs in 2009, but only after a period of at least three weeks of no rain. This sampling event will also attempt to capture a first-flush of both off-site and on-site stormwater runoff. Two first-flush sampling events are recommended because of the difficulty in predicting which rainfall events contribute to runoff. As with the second sampling event, the City staff will need to be ready with sample collection and field blank bottles, and be informed about weather forecasts to ensure sampling the appropriate rainfall event will occur. As mentioned previously, the City staff should closely observe influent flows so that on-site and off-site stormwater runoff are monitored accurately.

   This will be the third monitoring event that occurs under this study and will serve as the first quarter of 2009 sample.

4. During the non-irrigation season when discharges are predominantly from the non-canning industrial users. The City will need to ensure that there is little to no runoff or tailwater entering the industrial line during this sampling event. Therefore, this sampling will need to occur at least three weeks after any major stormwater runoff events have occurred, such that groundwater levels are not at their peak. The sample must also be collected before irrigation begins on the City's properties, or during a period of no irrigation (and at least three days after the last irrigation event). These conditions are most likely to occur in the beginning of April.

   This will be the fourth monitoring event that occurs under this study and will serve as the second quarter of 2009 sample.

All of the samples will be grab samples.

The industrial wastewater influent flows will be monitored at the headworks of the WPCF, where industrial influent line enters the facility. This monitoring location is designated as INF-002 in the City's Monitoring and Reporting Program (MRP) (Order No. R5-2007-0113).

In addition, grab samples of the stormwater runoff from the City's field areas will be collected to characterize these flows and their potential for causing impacts to underlying groundwater. These samples will be collected concurrently with sampling events 2 and 3 discussed above. The City will collect samples of the runoff from the agricultural fields at the tailwater pump station.

3.3 Chemical Analyses

A table showing the constituents that will be evaluated during the first year of monitoring is provided in Attachment A. This table includes sampling details for each constituent such as the number of samples, sampling locations, analytical methods, reporting limits, sample containers, preservatives and holding times. These constituents that will be monitored can generally be classified as follows:

1. Conventional Parameters, such as biochemical oxygen demand (BOD), total Kjeldahl nitrogen, total nitrogen, total suspended solids, and total coliform organisms.
2. Constituents of particular concern for the industrial discharges to the WPCF. These include boron, magnesium, sodium, chloride, and fixed dissolved solids.
3. Total petroleum hydrocarbons (TPH)
4. Five fuel oxygenates
5. Lead scavengers
6. Volatile organic compounds that have been identified as "Priority Pollutants" by the CVRWQCB.
7. Semi-volatile organic compounds that have been identified as "Priority Pollutants" by the CVRWQCB.
8. Pesticides and PCBs that have been identified as "Priority Pollutants" by the CVRWQCB.
9. Inorganic compounds that have been identified as "Priority Pollutants" by the CVRWQCB.

The onsite stormwater runoff samples collected at the tailwater pump station will be analyzed items 1, 2, 6, 7, 8, and 9 above. However, the onsite stormwater samples will not be analyzed total petroleum hydrocarbons (3), fuel oxygenates (4), and lead scavengers (5) since these constituents are not likely to be encountered in runoff from agricultural fields.

The specific constituents that will be will be monitored during the second year of sample collected will be determined based on a review of the monitoring data collected during the first year. As provided in the Special Provisions of the WDRs, the second year monitoring will not need to include volatile organics, semi-volatile organics, pesticides-PCBs, TPHs, fuel oxygenates, or lead scavengers if they are not detected during the first year of sampling.

Finally, note that the following industrial influent monitoring data must be collected at the INF-002 monitoring location under the MRP:

- Flow (Continuous monitoring)
- Electrical Conductivity (Weekly)
- Total Dissolved Solids (Weekly)
- Heavy Metals (Annually).

Some of this data collection will be redundant with the monitoring proposed under either this Work Plan or the BOD Organic Loading Study Work Plan. Therefore, coordination between these efforts is recommended such that only one sample will be analyzed for these parameters.

3.4 Quality Control

The monitoring program proposed in this Work Plan will rely on clean sampling techniques and ultra-low reporting limits. Such rigorous sampling techniques require common sense as well as biogeochemical and analytical understanding by the practitioner. Therefore, sampling will be performed by a qualified laboratory staff member with an understanding of the ultra-clean sampling requirements. In order to ensure the application of these techniques, the following steps will be taken:

1. Rigorous pre-cleaning of sampling containers, field blank bottles, and all sample processing glassware will be performed by the analytical laboratory.
2. Use of powder-free disposable nitrile gloves when handling sample containers.
3. Application of the "Clean hands-Dirty hands" sampling team technique, and double bagging of sample bottles for trace metals samples.
4. Collecting samples while facing upstream, and immediately covering the bottles to minimize contamination. Minimizing the amount of time that a sample bottle is exposed to airborne particulate matter is especially critical when collecting samples at the City's WPCF because it is near agricultural fields which routinely spray pesticides, and small dust particles from neighboring fields could potentially contaminate the sample.
5. Precautions such as not smoking, not sampling near motor vehicles, not placing sample bottle lids down where they may accumulate contamination, not breathing, sneezing, or coughing in the direction of an open sample bottle, and not touching the inside surfaces of a sample bottle or sample bottle lid.

Historic reclamation water monitoring indicates detectible concentrations of the toluene, and bis(2-ethylhexyl)phthalate in the irrigation water. However, both of these compounds are not detected in the WPCF effluent monitoring and are not suspected to be present in significant concentrations in the industrial flows. Moreover, bis(2-ethylhexyl)phthalate is present in most plastic materials and often contaminates samples during either the collection or analytical process. Toluene is very abundant and can come from many sources, primarily gasoline fuel, but also found in products like kerosene, heating oil, paints and even automobile exhaust. Samples or sampling equipment exposed to these sources may become contaminated.

Therefore, field blank samples are recommended for these two compounds. Field blanks are defined as an aliquot of contaminant-free reagent water that is placed in a sample container, taken to the field and treated as a sample in all respects, including the following treatments:

- Contact with the sampling devices and exposure to sampling site conditions
- Filtration
- Storage
- Preservation
- Analytical procedures
- "Dirty-hands/clean-hands" technique.

These field blank samples should be taken at or near the most exposed sampling location, to expose both the field blanks and the samples to the same atmospheric conditions. In addition, all of the same sampling equipment (poles, buckets, tubing, etc.) that are used for sampling the actual site should be used for collection of the field blank sample.

Note that bis(2-ethylhexyl)phthalate and toluene are classified, respectively, as semi-volatile and volatile organic compound designated as "Priority Pollutants" by the CVRWQCB. Often analytical costs for these types of compounds are charged as one base rate. Therefore, it may be cost effective for field blank samples to include all semi-volatile and volatile organic compound designated as "Priority Pollutants" by the CVRWQCB.

3.5 Reporting

Following the completion of the first year of monitoring described in this Work Plan, the analytical results will be summarized in a technical report. This report will also include recommendations for and a description of the second year monitoring efforts.

Upon completion of two years of monitoring, a final report which summarizes results of data analysis will be submitted to the CVRWQCB for approval in accordance with the schedule provided below. This report will identify the constituents of concern and, if appropriate, recommend additional Best Practicable Treatment or Controls (BPTCs) to help reduce the potential for impacts associated with these constituents. This report will also account for data collected under the BOD Organic Loading Study; and the Land Discharge, Storage Ponds, and Groundwater monitoring conducted in accordance with the MRP prescribed in the WDRs (Tables E-6, E-7b and E-8b).

3.6 Proposed Schedule

In accordance with the Special Provisions of the WDRs, this Work Plan will be submitted no later than May 1, 2008. As described above, monitoring will begin in August 2008 and will be completed within 2 years of this date (July 2010). The first-year monitoring report will be provided within 60 days of the fourth monitoring event. The final Industrial Influent Characterization Study Report will be developed within 90 days after completion of the data analysis for the eight monitoring events completed under this study. Table 4 presents a summary of this proposed schedule.

Table 4. Industrial Influent Characterization Study Schedule

Item	Start Date	Estimated Completion Date
Submit Industrial Influent Characterization Study Work Plan	March 2008	May 1, 2008
First Year of Monitoring	August 2008	April 2009
Data Analysis	June 2009	
Technical Report and Year 2 Monitoring Plan	July 2009	
Second Year of Monitoring	August 2009	April 2010
Data Analysis	June 2010	July 2010
Submit Study Report	August 2010	October 2010

APPENDIX A

List of Constituents

City of Lodi Industrial Influent Characterization Study - Phase I
List of Constituents to be Monitored

Parameter	Number of Samples	Sampling Locations	EPA Analytical Method	Reporting Limit	Sample Container/Preservatives	Holding Times
Conventional & Inorganic						
Flow	Continuous	INF-002 & Tailwater Pump Station	Metered			
pH	6		Measured in Field During Each Sampling Event			
Temperature						
Specific Conductance (EC)			SM2510B	10 µmhos/cm	500 ml, polyethylene coo	28 days
Total Dissolved Solids (TDS)			EPA 160.2 / SM2540D	3 mg/L	Plastic Pint / No Pres.	7 days
Fixed Dissolved Solids (FDS)			EPA 160.1 / SM2540C	10 mg/L		
Total Suspended Solids (TSS)			EPA 160.2 / SM2540D	3 mg/L		
Biological Oxygen Demand (BOD)			EPA 405.1 / SM5210B	2 mg/L	Plastic Pint / No Pres.	48 hours
Total Coliform Organisms			SM20-9221 B	2 MPN/100mL	Plastic 100mL / Sterile	6 hours
Chloride			EPA 300.0	1 mg/L	Plastic Pint / No Pres.	28 days
Fluoride				0.1 mg/L		
Nitrate (as N)				0.2 mg/l		
Nitrite (as N)				0.2 mg/l		
Total Kjeldahl Nitrogen			EPA 351.3 / SM4500C	0.1 mg/L	Plastic Pint / H_2SO_4 Pres.	
Ammonia (as N)			EPA 350.1	0.5 mg/l		
Total Nitrogen			Calculation			
Phosphorus, Total (as P)			EPA 6010B	50 ug/l	500 mL polyethylene, HNO_3, pH < 2	6 months
Sulfate			EPA 300.0	1.0 mg/l	125 mL polyethylene	28 days
Sulfide (as S)			EPA 376.2	0.1 mg/L	Glass BOD Bottle, $AlCl_3$ + NaOH Pres.	7 days
Sulfite (as SO_3)			Subcontracted	1 mg/L	EDTA Pres.	24 hours (recommended)
Foaming Agents (as MBAS)			SM5540C	0.05 mg/L	Plastic Pint / No Pres.	48 hours
Boron	6	INF-002 & Tailwater Pump Station	EPA 200.7	1 mg/L	Plastic Pint / HNO_3 Pres.	180 days
Magnesium				0.5 mg/L		
Sodium				1 mg/L		
Hardness (as $CaCO_3$)				1 mg/L		
Iron				0.05 mg/L		
Aluminum			EPA 200.8	10 ug/L		
Antimony				0.5 ug/L		
Arsenic				0.5 ug/L		
Barium				0.1 ug/L		
Beryllium				0.1 ug/L		
Cadmium				0.1 ug/L		
Chromium (total)				0.5 ug/L		
Copper				0.5 ug/L		
Lead				0.25 ug/L		
Manganese				0.5 ug/L		
Nickel				0.5 ug/L		
Selenium				2 ug/L		
Silver				0.1 ug/L		
Thallium				0.1 ug/L		
Zinc				10 ug/L		
Mercury			EPA 245.1	0.05 ug/L		28 days
Cyanide			EPA 335.2 / SM4500E	0.003 mg/L	Amber Plastic Pint / NaOH Pres.	14 days
Asbestos			EPA 100.2	1 MFL	Plastic Quart / No Pres.	48 hours
Tributyltin			GC/MS (PSEP)	0.0024 ug/L	Glass Amber Liter / No Pres.	n/a
Chromium (VI)			SM3500	0.002 mg/L	Plastic Pint / No Pres.	24 hours

Parameter	Number of Samples	Sampling Locations	EPA Analytical Methoc	Reporting Limit	Sample Container/Preservatives	Holding Times
Volatile Organics						
1,2 Dibromoethane (EDB)(1)	4	INF-002	EPA 624	1 ug/L	6x 40mL VOA Vials/ 2x Pres. w/ HCl, 2x No Pres., 2x Pres. To pH 4-5.	14 days for preserved, 7 days for unpreserved, 3 day unpreserved for Acrolein
1,1 Dichloroethane				1 ug/L		
1,1 Dichloroethene				1 ug/L		
1,1,1 Trichloroethane				1 ug/L		
1,1,2 Trichloroethane				1 ug/L		
1,1,2,2 Tetrachloroethane				1 ug/L		
1,2 Dichlorobenzene				1 ug/L		
1,2 Dichloroethane (DCA/EDC) (1)				1 ug/L		
cis-1,2 Dichloroethene				1 ug/L		
1,2 Dichloropropane				1 ug/L		
1,2,4 Trichlorobenzene				1 ug/L		
1,3 Dichlorobenzene				1 ug/L		
1,3 Dichloropropene				1 ug/L		
1,4 Dichlorobenzene				1 ug/L		
Acrolein				10 ug/L		
Acrylonitrile				10 ug/L		
Benzene				1 ug/L		
Bromoform				1 ug/L		
Bromomethane				1 ug/L		
Carbon Tetrachloride				1 ug/L		
Chlorobenzene				1 ug/L		
Chloroethane				1 ug/L		
2-Chloroethyl vinyl ether				1 ug/L		
Chloroform				1 ug/L		
Chloromethane				1 ug/L		
Dibromochloromethane				1 ug/L		
Dichlorobromomethane				1 ug/L		
Dichloromethane				1 ug/L		
Ethylbenzene				1 ug/L		
Hexachlorobutadiene				1 ug/L		
Naphthalene				1 ug/L		
Tetrachloroethene				1 ug/L		
Toluene	8 (3)			1 ug/L		
trans-1,2 Dichloroethene	4			1 ug/L		
Trichloroethene				1 ug/L		
Vinyl Chloride				1 ug/L		
Methyl-tert-butyl ether (MTBE) (2)				1 ug/L		
Trichlorofluoromethane				1 ug/L		
1,1,2 Trichloro- 1,2,2 Iriffuoroethane				1 ug/L		
Styrene				1 ug/L		
Xylenes				1 ug/L		
Tertiary-amyl methyl ether (TAME) (2)				1 ug/L		
Ethyl tertiary-butyl ether (ETBE) (2)				1 ug/L		
Diisopropyl ether (DIPE) (2)				1 ug/L		
Tertiary-butyl alcohol (TBA) (2)				20 ug/L		
Total Petroleum Hydrocarbons Purgable						
- Gas	4	INF-002	SW846 8015(MOD)	50 ug/L	3 Glass 40mL VOA Vials / HCl Pres.	14 days

(1). Lead Scavengers
(2). Fuel oxygenates
(3). Field Blank samples recommended

Parameter	Number of Samples	Sampling Locations	EPA Analytical Method	Reporting Limit	Sample Container/Preservatives	Holding Times
Semivolatile Organics						
1,2 Benzanthracene	6	INF-002 & Tailwater Pump Station	EPA 625	5 ug/L	Glass Amber Liter / No Pres.	7 days
1,2 Diphenylhydrazine				5 ug/L		
2-Chlorophenol				5 ug/L		
2,4 Dichlorophenol				5 ug/L		
2,4-Dimethylphenol				5 ug/L		
2,4 Dinitrophenol				5 ug/L		
2,4 Dinitrotoluene				5 ug/L		
2,4,6 Trichlorophenol				5 ug/L		
2,6 Dinitrotoluene				5 ug/L		
2-Nitrophenol				5 ug/L		
2-Chloronaphthalene				5 ug/L		
3,3 Dichlorobenzidine				5 ug/L		
3,4 Benzofluoranthene				5 ug/L		
4-Chloro-3-methylphenol				5 ug/L		
4,6 Dinitro-2-methylphenol				5 ug/L		
4-Nitrophenol				5 ug/L		
4-Bromophenyl phenyl ether				5 ug/L		
4-Chlorophenyl phenyl ether				5 ug/L		
Acenaphthene				5 ug/L		
Acenaphthylene				5 ug/L		
Anthracene				5 ug/L		
Benzidene				10 ug/L		
Benzo(a)pyrene				5 ug/L		
Benzo(g,h,i)perylene				5 ug/L		
Benzo(k)fluoranthene				5 ug/L		
Bis(2-chloroethoxy) methane				5 ug/L		
Bis(2-chloroethyl) ether				5 ug/L		
Bis(2-chloroisopropyl) ether				5 ug/L		
Bis(2-ethylhexyl) phthalate	12 (3)			5 ug/L		
Butyl benzyl phthalate	6			5 ug/L		
Chrysene				5 ug/L		
Di-n-butylphthalate				5 ug/L		
Di-n-octylphthalate				5 ug/L		
Dibenz(a,h)anthracene				5 ug/L		
Diethyl phthalate				5 ug/L		
Dimethyl phthalate				5 ug/L		
Fluoranthene				5 ug/L		
Fluorene				5 ug/L		
Hexachlorobenzene				5 ug/L		
Hexachlorocyclopentadiene				5 ug/L		
Hexachloroethane				5 ug/L		
Indeno(1,2,3-c,d)pyrene				5 ug/L		
Isophorone				5 ug/L		
N-Nitrosodiphenylamine				5 ug/L		
N-Nitrosodimethylamine				5 ug/L		
N-Nitrosodi-n-propylamine				5 ug/L		
Nitrobenzene				5 ug/L		
Pentachlorophenol				5 ug/L		
Phenanthrene				5 ug/L		
Phenol				5 ug/L		
Pyrene				5 ug/L		
Total Petroleum Hydrocarbons Extractable				-		
- Diesel	4	INF-002	SW846 8015(MOD)	50 ug/L	Glass Amber Liter / No Pres.	14 days
- Motor Oil				200 ug/L		

(3). Field Blank samples recommended

Parameter	Number of Samples	Sampling Locations	EPA Analytical Method	Reporting Limit	Sample Container/Preservatives	Holding Times
Pesticides						
DBCP	6	INF-002 & Tailwater Pump Station	EPA 504.1	0.01 ug/L	3 Glass 40mL VOA Vial / $Na_2S_2O_3$ Pres. if chlorinated	28 days
Ethylene Dibromide				0.01 ug/L		
Alachlor			EPA 507	0.1 ug/L	Glass Amber Liter / $Na_2S_2O_3$ Pres. if chlorinated	14 days
Atrazine				0.1 ug/L		
Molinate				0.1 ug/L		
Simazine				0.1 ug/L		
Thiobencarb				0.1 ug/L		
2,4 D			EPA 515.4	0.1 ug/L	Glass Amber 125 mL / $Na_2S_2O_3$ Pres. if chlorinated	
2,4,5 TP (Silvex)				0.2 ug/L		
Bentazon				0.5 ug/L		
Dalapon				1 ug/L		
Dinoseb				0.2 ug/L		
Picloram				0.1 ug/L		
Di(2-ethylhexyl)adipate			EPA 525.2	0.6 ug/L	Glass Amber Liter / $NaSO_3$ + HCl Pres.	
Methoxychlor				0.1 ug/L		
Carbofuran			EPA 531.2	0.5 ug/L	2 Glass 40mL VOA Vials / KH2CIT + $Na_2S_2O_3$ Pres.	28 days
Oxamyl				0.5 ug/L		
Glyphosate			EPA 547	6 ug/L	Glass Amber 125 mL / $Na_2S_2O_3$ Pres. if chlorinated	14 days
Endothal			EPA 548.1	8 ug/L	Glass Amber 250 mL / $Na_2S_2O_3$ Pres. if chlorinated	7 days
Diquat			EPA 549.2	0.4 ug/L	Plastic Amber Liter / $Na_2S_2O_3$ Pres. if chlorinated	
4,4' DDE			EPA 608	0.1 ug/L	Glass Amber Liter / No Pres.	
4,4' DDT				0.1 ug/L		
4,4'-DDD				0.1 ug/L		
Aldrin				0.05 ug/L		
alpha-BHC				0.05 ug/L		
alpha-Endosulfan				0.05 ug/L		
beta-BHC				0.05 ug/L		
beta-Endosulfan				0.1 ug/L		
Chlordane				0.5 ug/L		
delta-BHC				0.05 ug/L		
Dieldrin				0.1 ug/L		
Endosulfan Sulfate				0.1 ug/L		
Endrin				0.1 ug/L		
Endrin Aldehyde				0.05 ug/L		
gamma-BHC (lindane)				0.05 ug/L		
Heptachlor				0.05 ug/L		
Heptachlor Epoxide				0.05 ug/L		
PCB 1016				0.1 ug/L		
PCB 1221				0.1 ug/L		
PCB 1232				0.1 ug/L		
PCB 1242				0.1 ug/L		
PCB 1248				0.1 ug/L		
PCB 1254				0.1 ug/L		
PCB 1260				0.1 ug/L		
Toxaphene				1 ug/L		
Chlorpyrifos			EPA 614	0.05 ug/L	Glass Amber Liter / No Pres.	
Diazinon				0.05 ug/L		
Dioxin and Furan Compounds						
2,3,7,8-TCDD	6	INF-002 & Tailwater Pump Station	EPA 1613	5 pg/L	Glass Amber Liter / No Pres.	1 Year
1,2,3,7,8-PeCDD				25 pg/L		
1,2,3,4,7,8-HxCDD				25 pg/L		
1,2,3,6,7,8-HxCDD				25 pg/L		
1,2,3,7,8,9-HxCDD				25 pg/L		
1,2,3,4,6,7,8-HpCDD				25 pg/L		
OCDD				50 pg/L		
2,3,7,8-TCDF				5 pg/L		
1,2,3,7,8-PeCDF				25 pg/L		
2,3,4,7,8-PeCDF				25 pg/L		
1,2,3,4,7,8-HxCDF				25 pg/L		
1,2,3,6,7,8-HxCDF				25 pg/L		
1,2,3,7,8,9-HxCDF				25 pg/L		
2,3,4,6,7,8-HxCDF				25 pg/L		
1,2,3,4,6,7,8-HpCDF				25 pg/L		
1,2,3,4,7,8,9-HpCDF				25 pg/L		
OCDF				50 pg/L		

ATTACHMENT

D

City of Lodi
White Slough WPCF
Salinity Evaluation and Minimization Plan

Prepared for

City of Lodi

October 31, 2008

WEST YOST
ASSOCIATES
Consulting Engineers

711-04-08-05

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CITY OF LODI
WHITE SLOUGH WPCF
SALINITY EVALUATION AND MINIMIZATION PLAN

1.0 INTRODUCTION

West Yost Associates (WYA) has prepared this *City of Lodi White Slough Water Pollution Control Facility Salinity Evaluation and Minimization Plan* (Salinity Plan) on behalf of the City of Lodi (City) in response to the requirements outlined in Special Provisions, Section VI.C.3.b of the Waste Discharge Requirements and Master Reclamation Permit (WDRs) Order No. R5-2007-0113 (NPDES No. CA0079243).

The WDRs address discharges to surface water and groundwater from the City's White Slough Water Pollution Control Facility (WPCF). The WDRs were adopted by the Central Valley Regional Water Quality Control Board (Regional Board) on September 14, 2007, and became effective on November 3, 2007.

1.1 Organization

Section 1.0 of this Salinity Plan provides an introduction and a description of the purpose of this effort. Section 2.0 provides facility background information, a discussion of the City's municipal water supply, and a discussion of available information regarding salinity discharges to the WPCF. Section 3.0 presents the Salinity Evaluation strategy and Section 4.0 presents a summary of the City's Salinity Minimization Plan.

1.2 Purpose of the Salinity Evaluation and Minimization Plan

The Salinity Plan describes the strategy and approach for an evaluation and minimization of salinity in the City's discharge as required under Special Provisions, Section VI.C.3.b of the WDRs, which states the following:

> *The Discharger shall prepare a salinity evaluation and minimization plan to address sources of salinity and shall provide annual reports demonstrating reasonable progress in the reduction of salinity in its discharge to Dredger Cut and The Agricultural Fields. The plan shall be completed and submitted to the Regional Water Board within (1) year of the effective date of this Order for approval by the Executive Officer.*

Salinity is a measure of the dissolved salts or ionic substances present in water. The water quality parameters that are indicative of salinity are total dissolved solids (TDS) and electrical conductivity (EC). Some of the salinity compounds, particularly chloride and sodium, have the potential to be growth limiting to certain agricultural crops and can affect the taste of water for human consumption. The salinity in the City's discharge is regulated to control salt contribution to the Sacramento-San Joaquin Delta and underlying groundwater to protect the use of these waters as a supply source for municipal drinking water systems and agricultural users.

2.0 FACILITY AND REGULATORY BACKGROUND

This section discusses the following items:

- WPCF Treatment Facilities
- Municipal Water Supply
- Industrial Discharges to the Municipal Collection System
- Industrial Wastewater Influent

2.1 WPCF Treatment Facilities

The City of Lodi WPCF is a state-of-the-art wastewater treatment plant that currently provides secondary treatment, tertiary filtration and ultraviolet disinfection for approximately 6.3 million gallons per day (mgd) average dry weather flow (ADWF) of municipal wastewater from the City. Dischargers to the City's municipal wastewater collection system include the following:

- Domestic effluent from the City's residential population of approximately 63,000 and associated its commercial activities;
- A small number industries that are further described below in the section "Industrial Discharges to the Municipal Collection System;" and
- Approximately 30,000 gallon per day of commercial discharge from the San Joaquin County (County) Service Area #31, also known as Flag City. (Note the County is permitted to discharge up to 0.19 million gallons per day to the WPCF.)

The City typically discharges all of the treated WPCF effluent to Dredger Cut from approximately mid-September through mid-April though flows may be directed to storage during minor upset events. From approximately mid-April to mid-September, the treated municipal wastewater is pumped to onsite storage ponds and is used to irrigate 790 acres of agricultural fields. Typically, the municipal wastewater that is used to irrigate this area is filtered and disinfected; however, the City is permitted to irrigate the fields with un-disinfected secondary flows.

The long-term average effluent EC level in the municipal effluent is 650 mhos/cm (based on data collected from January 2000 through December 2007). This is less than the agricultural water quality goal of 700 mhos/cm. Furthermore, the long-term average effluent TDS concentration of 423 mg/L is also below the recommended municipal drinking water secondary MCL of 500 mg/L.

The WDRs prescribe an average monthly effluent salinity limitation of 780 mhos/cm for EC, based on the municipal water supply EC plus an increment of 500 mhos/cm. The application of this EC limitation satisfies the Best Practical Treatment or Control (BPTC) requirements for the WPCF discharge. The City's discharge can reliably meet this standard.

The City also maintains a separate industrial treatment and disposal process for wastewater collected in the City's industrial collection system. This wastewater is screened before it is directed to the City's agricultural reuse facilities. During the summer months, the industrial flows are blended with flows stored in the City's onsite storage ponds (which primarily consist of

treated municipal effluent), and are sent directly to the City's fields for agricultural reuse. During the remainder of the year, industrial flows are directed to the onsite storage ponds, where they are blended with other flows and are stored until being land applied in the following year.

EC levels in the industrial influent can vary significantly throughout the year. Based on data collected between January 1, 2000 and September 30, 2008, the industrial influent EC levels range from 140 mhos/cm to 3,270 mhos/cm and the TDS concentrations range from 12 mg/L to 4,040 mg/L /L. As discussed further below, the elevated salinity loads in the industrial influent are almost entirely associated with discharges from the PCP cannery, and discharges from the PCP cannery comprise 95 percent of the total influent flow to the industrial collection system. The flow-weighted concentrations for EC and TDS in the industrial influent are 1,198 mhos/cm and 1,672 mg/L, respectively.

2.2 Municipal Water Supply

The municipal water supply for the City of Lodi is derived from 27 groundwater wells. Six (6) of the existing well pump stations include granular activated carbon (GAC) adsorption and all are ready to receive chlorination equipment. Lodi's groundwater is of satisfactory bacteriological quality and has received an exception from the need to disinfect by the California Department of Public Health. Therefore, the City currently does not regularly chlorinate its potable water supply.

The City is currently considering the introduction of treated surface water supply from the Mokelumne River into the existing distribution system upon startup of the proposed surface water treatment facility (SWTF). The recommended surface water treatment processes includes rapid mixing and flocculation followed by membrane filtration and chemical disinfection. Proposed chemical additions include the intermittent use of alum and powdered activated carbon (PAC) at the rapid mixers ahead of the membrane filters, the routine use of sodium carbonate (i.e. soda ash) and sodium hypochlorite (i.e. chlorine) downstream of the membrane filters, and the routine use of alum and polymer to clarify the backwash water.

The incorporation (i.e. blending) of a surface water supply into the City's water portfolio will result in a significant reduction to the salinity of the water entering the WPCF. The salinity of the Mokelumne River water is much lower (average EC levels ~40 mhos/cm) than the current groundwater supplies. Moreover, the hardness of the Mokelumne River water is also significantly lower than that of the existing groundwater supplies (average Mokelumne River concentrations are 14 mg/L compared to 138 mg/L in the existing water supply). Therefore, the use of water softening units is likely to decrease once the new Mokelumne supply is online, resulting in even further salinity reduction at the WPCF.

2.3 Industrial Discharges to the Municipal Collection System

The following six Significant Industrial User (SIUs) currently contribute to the municipal influent flow:

- General Mills
- Lodi Metal Tech
- Lustre Cal
- Cottage Bakery
- Miller Packing
- Northern California Power Agency (NCPA)

A summary of the products that are generated by these industries, their approximate discharge flows to the WPCF, and the discharge monitoring data routinely collected by each SIU and submitted to the City are shown in Table 1. As indicated in this table, the City has not collected adequate data from these industries to determine whether they may be a significant source of the constituents addressed under this Salinity Plan. Additional monitoring has been recommended for most of these facilities under the City's Pollution Prevention Plan Work Plan (PPP Work Plan), which was completed by WYA in April 2008 and approved by the Regional Board on September 9, 2008.

2.4 Industrial Wastewater Influent

A summary of the wastewater flows discharging to the City's industrial wastewater collection system is presented in Table 2. All the industrial line flows are more or less continuous year-round except Pacific Coast Producers (PCP) and the three wineries. The flows from PCP, a large fruit canning facility, are mostly spread out between June and September, and constitute over 90 percent of the industrial line flows during these months. The winery flows are typically batch flows that can occur at any time, but discharges are most likely to occur in July/August and March.

Table 1. City of Lodi WPCF Industrial Discharge Monitoring Summary

Discharger	Principal Products	Process wastewater flow rate, gallons per day	Non-process wastewater flow rate, gallons per day	Current Discharge Monitoring
General Mills	Cereals, cake mixes	87,000	10,000	BOD, COD, TSS - weekly TDS and EC - every third sample
Lustre Cal	Finished metal (aluminum)	7,200	1,200	Metals - seven times per year 624/625 organics - three times a year BOD, COD, TSS - nine times a year
Lodi Metal Tech	Metal racks	200	1,100	Metals and 624/625 organics - three times a year
Cottage Bakery	Wholesale bakery, bagels, breads, cakes	53,000	6,000	BOD, COD, TSS - fifteen to eighteen times per year (two locations)
Miller Packing	Hotdogs and sausages	23,000	900	BOD, COD, TSS - nine to twelve times per year
NCPA[1]	Power plant	—	25,500	pH, temp, conductivity - daily BOD, TSS, TDS - quarterly Metals and 624/625 organics - annually

[1] One monitoring event occurred in 2006.

Table 2. Industries Currently Contributing to the WPCF Industrial Wastewater Flow

Industry Name	Industry Type	Discharge, MGY[a]	Discharge Areas within Plant
Pacific Coast Producers	Cannery	50 – 130[b]	Fruit wash, boiler blow down, caustic peeling of fruit, factory washdown
Thule Towing Systems (Formerly Valley Industries)	Categorical metal finisher	5.4	Process wastewater stored in tanks[c]
Holz Rubber Company	Categorical metal finisher	2.7[d]	Compressor cooling water, autoclave blowdown
M & R Packing	Fruit packing	2.0	Cooling water, fruit wash
Lodi Iron Works	Iron casting plant	0.5	Compressor cooling water
Van Ruiten	Winery	1.2[e]	Process wastewater, fruit wash, equipment wash
Michael David	Winery	1.0[e]	Process wastewater, fruit wash, equipment wash
Jesse's Grove	Winery	0.3[e]	Process wastewater, fruit wash, equipment wash

[a] Million gallons per year.
[b] Maximum permitted discharge for PCP is 130 MGY.
[c] Process water sampled prior to discharge and non-compliant water is hauled to the Evergreen Oil Facility.
[d] 2006 flows, does not include process wastewater, which is no longer discharged to the WPCF.
[e] Discharge limit.

The annual discharges to the industrial line that have occurred in recent years are provided in Table 3. As shown, the industrial wastewater flows have declined significantly since 2003.

The discharge from the PCP cannery into the industrial wastewater collection system is high in TDS, which can be a cause for concern with respect to groundwater degradation. However, TDS consist of both volatile (organic) dissolved solids (VDS) and fixed (inorganic) dissolved solids (FDS) - and the PCP cannery wastewater is comprised of a significant amount of VDS (mostly fruit sugars). Because the VDS will readily breakdown following land application, they do not pose a significant threat to groundwater. Therefore, salinity control for the PCP cannery should be focused on FDS.

Table 3. Total Annual Industrial Line Flows, MG/Year

Discharger	2007	2006	2005	2004	2003
Pacific Coast Producers	89	53	83	126	128
Thule Towing Systems (Formerly Valley Industries)	4.0	4.7	6.1	5.5	5.5
Holz Rubber Company	2.0	2.7	4.6	5.4	3.3
M & R Packing	2.0	1.2	1.2	2.4	3.1
Chevron Remediation Project	—	—	1.1	3.1	3.3
Lodi Iron Works	0.5	0.4	0.5	0.8	0.4
Van Ruiten	1.0	0.9	0.1	—	—
Michael David	0.4	—	—	—	—
Jesse's Grove	0.1	—	—	—	—
Total	99	63	96	144	144

One control strategy that has recently been implemented by the PCP cannery is the use potassium hydroxide in lieu of sodium hydroxide in the canning process as a caustic material for peeling fruit. This is considered a significant improvement since high levels of sodium are undesirable in the land-applied wastewater and potassium is an essential plant nutrient. Note that although PCP is committed to using potassium hydroxide whenever possible, PCP experiences difficulties in obtaining potassium hydroxide at the end of the 2008 canning season and sodium hydroxide had to be substituted.

Additional source control efforts are not likely to be a practical or beneficial strategy for PCP. Therefore, the City has historically focused on onsite management practices to control the potential impacts associated with salinity from PCP cannery. Studies described in this Salinity Plan will be used to evaluate whether additional controls are necessary.

3.0 SALINITY EVALUATION

This section provides a discussion of the following activities that will be completed under this Salinity Plan:

- Influent Characterization
- Flag City Salinity Management Plan
- Groundwater Background Characterization
- Land Application Area Loading Study

3.1 Influent Characterization

Through the completion of the monitoring under the PPP Work Plan and the Monitoring and Reporting Program provided in the WDRs the City will be able to better characterize the sources

of salinity to the WPCF and identify the potential for additional salinity management strategies. This monitoring will include the following:

- Significant Industrial Users discharging to the municipal collection system will be monitored quarterly for a one-year period under the PPP Work Plan
- The municipal water supply will be monitored annually in accordance with the Monitoring and Reporting Program. Unlike the City's previous Monitoring and Reporting Program, these data must be provided as a flow-weighted average – thereby requiring the collection of EC data from each of the City's supply wells. This will allow the City to better evaluate the potential for impacts for any given supply well.
- Municipal collection system influent will be monitored weekly in accordance with the Monitoring and Reporting Program. This is an increase to the monthly monitoring requirement provided in the City's previous WDRs.
- Industrial collection system influent will be monitored weekly accordance with the Monitoring and Reporting Program. This is an increase to the monthly monitoring requirement provided in the City's previous WDRs.

3.2 Flag City Salinity Management Plan

The source water for the Flag City Service Area has significantly higher salinity levels than the City's source water. Moreover, the wastewater from the Flag City Service Area has EC levels that are greater than this water supply EC plus an increment of 500 mhos/cm – indicating significant increases within the Flag City system. Therefore, even though the Flag City Service Area wastewater discharge it is a small fraction of the overall WPCF flow, the City is concerned that this discharge will have the potential to impact the salinity levels in the WPCF effluent.

The City established in the County's Wastewater Discharge Permit (Lodi Discharge Permit No. 421) the following EC limitations for the Flag City Service Area discharge:

- Beginning immediately, the maximum effluent concentrations shall not exceed 2,100 mhos/cm, based on this historic maximum concentration
- Beginning June 1, 2010, the maximum effluent concentrations shall not exceed the Service Area's water supply EC plus an increment of 500 mhos/cm

In addition, the County's Wastewater Discharge Permit requires that by January 1, 2009 the County develop a Salinity Evaluation and Minimization Plan. This plan is required to address the sources of salinity within the Flag City Service Area and establish a timeline for reducing EC to meet limit of "water supply EC plus an increment of 500 mhos/cm" by the June 1, 2010 deadline.

3.3 Groundwater Background Characterization

In 2006, the City conducted an extensive investigation regarding the existing conditions of the soil and groundwater in the vicinity of the WPCF. The findings of this investigation were documented in the City of Lodi WPCF Soil and Groundwater Investigation Existing Conditions Report (WYA, September 2006) (Existing Conditions Report). Based on this investigation, it was found that the groundwater EC levels are elevated regionally, and the major constituents contributing to EC lead to the classification of the groundwater as a calcium-sodium-chloride type

water on the western portion of the City's properties and a calcium-sodium-bicarbonate type water on the eastern portion.

Relatively high concentrations of chloride and sodium in some WPCF monitoring wells located closest to the Delta suggest that the EC levels in these wells may be the result of processes controlling regional groundwater quality. Specifically, intrusion of brackish to saline water into the Delta prior to the advent of Delta water projects during the last century has led to elevated groundwater salinity in this region. However, characterization of this effect is complicated by the fact that salinity levels in shallow groundwater in areas west of the City's property are most similar to the surface water quality than the regional conditions, because they are irrigated with the surface waters from upstream reservoir districts brought through the Delta water projects. Nevertheless, the conclusion that these high levels of EC are a result of Delta influences is supported by the fact that the onsite salinity concentrations do not appear to have a seasonal variability, which could be expected if they were largely influenced by field loadings.

The Existing Conditions Report recommended the installation of an additional monitoring well outside of the influence of the WPCF but encompassed by the Delta water quality influence, to determine the background EC and general chemistry in groundwater. Comparison of EC and general chemistry data from this monitoring well will help determine whether the City's management practices have been adequate to control potential salinity impacts to underlying groundwater.

3.4 Land Application Area Loading Study

The City has recently begun significant monitoring efforts associated with the Land Discharge Organic Loading Study (Loading Study) as documented in the City of Lodi White Slough Pollution Control Facility Organic Loading Study Work Plan (WYA, April 2008). The purpose of the Organic Loading Study is to evaluate the BOD_5 loading rates to the City's land application areas that will be protective of groundwater – where the primary source of concern for BOD_5 is the PCP cannery discharge.

The study includes an evaluation of BOD_5 removals that occur in the City's agricultural fields and in bench test soil columns that were constructed for the purpose of the study. As part of this study, the City will also characterize removals of water quality parameters indicative of salinity, such as EC and TDS. Therefore, data collected during this study will help to characterize the potential groundwater salinity impacts associated with the City's current land management practices and help to ascertain whether additional control strategies are needed.

4.0 SALINITY MINIMIZATION

The municipal discharge already satisfies the BPTC requirements applicable to the WPCF. Moreover, the City's proposal to modify its water portfolio by including treated surface water will result in significant reductions in the overall salinity load of the WPCF's discharge. Nevertheless, through the monitoring strategy described above, the City will identify if additional source control efforts are reasonably viable. In addition, the efforts completed by the County in accordance with the forthcoming Flag City Service Area Salinity Evaluation and Minimization Plan will result in a decrease to the WPCF effluent salinity levels.

Salinity discharges to the land application area are predominantly influenced by discharges from the PCP cannery. However, there are limited source control options available for this discharge that has not already been explored. Therefore, continued onsite blending of the PCP cannery water with other, lower salinity, irrigation waters is the preferred approach for addressing salinity loads from this source. The ongoing groundwater and field loading studies will be helpful in determining whether the current practices for minimizing salinity are adequate or whether additional control strategies are necessary.

As required under the WDRs, the City will provide annual progress reports, beginning August 1, 2009 detailing the results of the efforts described in this Salinity Plan and identifying additional control strategies that could be evaluated further.