

TO: James L. App, City Manager
FROM: Joseph M. Deakin, Public Works Director
SUBJECT: Water & Wastewater Quality
DATE: April 15, 2003

NEEDS: For the City Council to review the Water & Wastewater Quality Concerns – Water Quality Strategy report and provide direction to staff for implementation.

- FACTS:**
1. The City is actively developing a water quality strategy to address several interdependent issues concerning wastewater effluent and potable water.
 2. October 15, 2002, the City hired Malcolm Pirnie, Inc. to analyze water quality and water uses in the City, link that to wastewater effluent quality, and prioritize feasible alternatives for addressing wastewater effluent discharge compliance and source water quality needs.
 3. The City was notified in February that the NPDES (National Pollution Discharge Elimination System) permit issued to the wastewater treatment facility was expiring in September 2003, not 2005 as indicated on the permit.
 4. Malcolm Pirnie developed an administrative draft Water & Wastewater Quality Concerns – Water Quality Strategy report for City Council consideration.

**ANALYSIS
AND
CONCLUSION:**

Background

In October 2002, the City hired Malcolm Pirnie to investigate and study the relationship between wastewater discharge and source water quality. The study focused on meeting wastewater discharge limitations for total dissolved solids (TDS or “salts”), as well as individual salt ions such as sulfate, chloride, and sodium.

High TDS or salt concentration in wastewater is not unique to Paso Robles, and it can be resolved by treatment. Treatment to remove salts from water of any type (wastewater, seawater, groundwater, etc.) is expensive- the technology is energy consumptive and produces a concentrate (or brine) that must be disposed (disposal can be difficult).

The Water and Wastewater Quality Concerns Study identifies alternatives for resolving the wastewater salt concentration by:

- examining salt removal alternatives,
- finding a better (lower TDS or less salty) source

Summary Results

The study measures each alternative’s effectiveness at meeting community needs. The primary requirements - to reduce wastewater effluent salinity and river discharge – were evaluated on a pass/fail basis. If the alternative could reduce effluent salinity, it was considered further; additional consideration was based upon benefits to the community’s water supply, cost, time and other impacts.

The main alternatives explored and recommended by the study (see discussion, following) are:

- **Control Industrial and Commercial Discharge Quality**
- **Partially Desalinate Effluent**
- **Import Lake Nacimiento Water**

Control Industrial and Commercial Discharge Quality

The City's water supply typically averages 510 mg/L TDS. Raw wastewater at the treatment plant averages near the current Municipal Code sewer discharge limit for TDS (limit is 1000 mg/L, current average is 992 mg/L). It is possible that industrial and/or commercial discharges may be contributing to the increase in TDS during water usage.

The report recommends comprehensive sampling and monitoring to determine the extent of industrial and/or commercial discharge TDS contribution. The initial sampling and monitoring effort will cost approximately \$75,000 to \$100,000 and could be accomplished over the next 4 to 6 months. Implementation of the findings, with ongoing monitoring, analysis and enforcement, would cost approximately \$100,000 or more annually. The Council is provided the option to initiate industrial and commercial discharge monitoring by appropriating funds to hire analytical expertise and rent/buy monitoring equipment to conduct the first sampling phase (field labor will be provided by on-board staff).

Desalinate Effluent

The City anticipates significant challenges in reliably and consistently meeting the NPDES effluent TDS limit of 1100 mg/L. The fine for violating the limit is at least \$3000 per day for each day the NPDES limit is exceeded. While desalinating wastewater is expensive, it is a viable alternative, provides more certainty, and greater potential benefits than industrial controls. The most tangible community benefit from desalinating wastewater is to meet NPDES TDS limits, thus avoiding fines (or other more onerous requirements).

Import Lake Nacimiento Water

Participating in the Nacimiento Water Project provides the most viable alternative for resolving wastewater salinity (TDS). The study clearly indicates that importing Lake Nacimiento water, which contains much lower TDS concentrations than the City's current water resources, is the most prudent course to resolve community water quality issues (including wastewater discharge compliance) over the next twenty years.

Conclusion

The need to improve wastewater discharge quality is known and will be more clearly defined in the pending Regional Water Quality Control Board NPDES discharge permit revision. The current discharge parameter for TDS (salinity) will not be reduced, and likely will be further restricted. This will become the City's key discharge parameter. To address it, the City needs to:

- Reduce salinity additions during water use
- Reduce salinity in treated wastewater
- Reduce source water salinity (TDS)

POLICY

REFERENCE: 2003 City Council Goals; Municipal Code Section 14; NPDES Discharge Permit

FISCAL

IMPACT: To be determined.

- OPTIONS:**
- a.** Receive and comment on the Water and Wastewater Quality Concerns – Water Quality Strategy Administrative Draft and:
 - 1. Accept as a Final Report after incorporating given comments.
 - 2. Affirm staff's plan to: (a.) investigate an industrial and commercial wastewater discharge program to evaluate and more clearly enforce City wastewater discharge limits, adopting Resolution 03-xx appropriating \$100,000 for the initial project (engineering expertise and equipment costs), and providing the City Manager authority to hire engineering expertise up to \$50,000 towards this end, and (b.) further evaluate and define wastewater desalination alternatives, and (c.) continue active and serious consideration of the Nacimiento Water Project.
 - b.** Amend, modify or reject the above options.

Attachments (4):

- 1) Executive Summary (Malcolm Pirnie Report)
- 2) Table 3-11
- 3) Alternatives Comparison Matrix
- 4) Resolution

RESOLUTION NO. 03-

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF PASO ROBLES
TO APPROPRIATE FUNDS TO INVESTIGATE AN INDUSTRIAL AND
COMMERCIAL WASTEWATER DISCHARGE PROGRAM

WHEREAS, the City is actively developing a water quality strategy to address several interdependent issues concerning potable water as well as wastewater effluent quality; which is nearing certain discharge limits (for inorganics); and

WHEREAS, the City Council, on October 15, 2002, hired Malcolm Pirnie, Inc. to assist staff to develop a water/wastewater overview; and

WHEREAS, Malcolm Pirnie developed a Water & Wastewater Quality Concerns – Water Quality Strategy report in which the main alternatives explored and recommended by the study are: (1) Control Industrial and Commercial Discharge Quality, (2) Desalinate Effluent, and (3) Import Lake Nacimiento Water; and

WHEREAS, a study of an industrial and commercial wastewater discharge program to investigate, evaluate, and more clearly enforce City wastewater discharge limits, combining City resources (staff, rented equipment, contracted laboratory work) coupled with external analytical expertise (an engineering firm experienced in source sampling programs) will cost up to \$100,000.

NOW, THEREFORE, BE IT RESOLVED, AS FOLLOWS:

SECTION 1. That the City Council of the City of Paso Robles does hereby appropriate \$100,000 to Budget Account No. 600-310-5224-350 from the Sewer Enterprise Fund, and authorize the City Manager to hire Engineering expertise up to \$50,000 from the appropriated budget.

PASSED AND ADOPTED by the City Council of the City of Paso Robles this 15th day of April 2003 by the following vote:

AYES:
NOES:
ABSTAIN:
ABSENT:

Frank R. Mecham, Mayor

ATTEST:

Sharilyn M. Ryan, Deputy City Clerk

EXECUTIVE SUMMARY

The City of El Paso de Robles faces two important wastewater discharge challenges. Specifically, the City's wastewater effluent to the Salinas River does not consistently comply with numerical permit limits for Total Dissolved Solids (TDS) and the individual constituents chloride, sodium, and sulfate. The Regional Water Quality Control Board (RWQCB) has also indicated that ceasing discharge to the river altogether will likely become a future permit requirement. In addition, the City faces a long-term water supply problem. It currently relies completely on local groundwater for its water supply, but localized overdrafting of the groundwater basin has been documented. The City's population and water demand are expected to grow by roughly 80% over the next twenty years. These factors indicate that the City would be prudent to secure a new source of water to preserve the local groundwater basin and increase long-term water supply reliability. The City realized that these wastewater quality/discharge and water supply issues were interrelated, but had only been partially studied, individually in response to particular regulatory requirements. The City commissioned Malcolm Pirnie to develop a water/wastewater strategy to provide the City with direction to address its multiple, interrelated issues related to wastewater quality and discharge compliance, water supply, and drinking water quality.

We first reviewed individual reports and documents pertinent to the City's wastewater discharge and water supply issues. These included regular City water and wastewater quantity and quality reports, and reports prepared by others addressing previous individual regulatory requirements (e.g., recycled water, urban water management). We prepared a summary of this available information for the City's use and to provide a foundation for the subsequent phases of this project. We next considered the potential benefits and impacts of importing surface water, both in terms of City drinking water and wastewater effluent quality. The final and key task of this project was the development and relative ranking of over a dozen alternatives the City could implement to address its interrelated water and wastewater issues. For comparative purposes, well and wastewater desalination alternatives were evaluated on an equal TDS basis; that is, target TDS values in the City's water and wastewater system were set equivalent to the levels that would result from importing surface water.

Our evaluation indicated that importing surface water would provide drinking water quality benefits with respect to hardness and salinity, as well as not pose any water quality problems related to blending, as long as the new water is introduced to the City's system gradually and common treatment steps such as pH adjustment and disinfectant matching are taken. The City has a wide variety of potential alternatives to consider to address its wastewater compliance and related water supply issues. These include reducing salt load from industrial/commercial facilities, importing surface water, desalinating City wells, and desalinating wastewater effluent to either meet immediate river discharge standards or future recharge/reuse applications. Capital costs for the alternatives requiring new facilities range from under \$10 million to over \$50 million, and each alternative has its pros and cons related to other important considerations for the City (e.g., water supply reliability, customer/stakeholder acceptance). We provided a comparison matrix that allowed ranking of all the alternatives under consideration. Each was first considered against the two primary project criteria, namely, whether it would (1) solve the City's immediate TDS problem and (2) allow the City to cease discharge to the Salinas River. Alternatives were further ranked against the ten other criteria of importance to the City. Those alternatives involving importing surface water earned the highest

overall scores, despite their relatively high costs, for providing a unique combination of benefits, including increased water supply reliability, improved drinking water quality, relief from local groundwater overdraft, and salt reduction across all TDS sources to the City's wastewater treatment plant.

The City must take action to address its immediate wastewater discharge concern – its current inability to regularly meet its numerical NPDES permit effluent limits for TDS and related constituents (chloride, sodium, and sulfate). Currently the City is at high risk for continuing to exceed its permit limits, which is not an acceptable situation. Malcolm Pirnie provided the City with recommendations to implement to address this high priority concern, as well as realize benefits relative to longer-term National Pollutant Discharge Elimination System (NPDES)/wastewater concerns and the City's long-range plans. These three specific recommendations were based on the comparative evaluation of alternatives discussed above, and were designed to be considered as a group of three complementary alternatives to most efficiently address the City's immediate TDS compliance need, as well as provide the foundation for future ceasing of discharge to the Salinas River and for ensuring adequate water supply for future growth. These recommendations are briefly summarized here.

1. ***Desalinate WWTP Effluent.*** This alternative is the most cost-efficient way for the City to meet its current numerical TDS and related constituent effluent limits, and is also a necessary step for the City to take to prepare for ceasing discharge to the Salinas River. Leasing desalination equipment may be desirable if the City's current TDS limit (1,100 milligrams per liter [mg/L]) remains in effect with its upcoming NPDES permit renewal, because either wastewater desalination or surface water imports alone (discussed below) would bring the TDS of the City's effluent comfortably below that level. If the RWQCB reduces the City's effluent limit to 900 mg/L or lower, it is recommended that the City purchase permanent desalination capability.
2. ***Import Lake Nacimiento Water.*** Whether the City accomplishes this via the raw or treated water options of the Nacimiento Project (or on its own), this alternative offers a unique set of benefits among the alternatives considered in this report. In addition to bringing the City's effluent into compliance with its current TDS limit, it would provide increased water supply reliability, improved drinking water quality, relief from local groundwater overdraft, and salt reduction across all TDS sources to the City's wastewater treatment plant. The benefits of the regional treated water option are that the City could rely on the regional system for its treated water and it would require the least degree of variation from current City operations. However, significant cost savings are possible if the City participates in the raw water option of the Nacimiento Project and treats its own water with a package plant. With its own plant, the City also gains control over staffing and operation of the plant, and may have the opportunity to sell water to other agencies during periods of low demand. This alternative can be implemented in conjunction with wastewater desalination if necessary to meet a more stringent TDS effluent limit if put into place by the RWQCB. Various treatment options are available for either a regional or City-dedicated treatment plant to produce high-quality water, and phasing in the new water source gradually in conjunction

with taking common treatment steps such as pH and disinfectant matching are recommended.

3. ***Achieve Greater Industrial and Commercial Discharge Quality Control.*** Although the mass salt loading from industrial/commercial facilities (and thus the potential benefit of this alternative) cannot yet be quantified based on available data, this alternative represents a relatively low-cost measure that the City can take in addition to others to further reduce the TDS loading to its wastewater treatment plant. This alternative may well provide a worthwhile incremental TDS reduction, and therefore (1) a greater margin of safety against future TDS violations, as well as (2) decreased operating costs and brine disposal for a future City wastewater desalination system. We recommend that the City perform an industrial/commercial wastewater flow monitoring program and collect flow-weighted composite wastewater quality samples to complement the City's existing salt monitoring data. Following these steps, mass loading of salt from these facilities in the City's wastewater service area can be quantified, and the City can begin more active cooperation and/or Sewer Code enforcement for those facilities responsible for the most significant salt loadings to the City system.

Table 3-11. Cost Summary for Alternatives That Address Primary Project Criteria

Alternative^a	Total Capital Cost	Total Annual Capital Debt Service^b	Total Annual O&M for Year 1^c	Total Annual Costs (Debt Service + O&M)^c
3. Participate in Nacimiento Project (Treated Water Option) ^d	\$59.6	\$5.63	\$1.41	\$7.04
4. Participate in Nacimiento Project (Raw Water Option) and Treat Water With City-Owned Plant	\$53.2	\$5.02	\$0.88	\$5.90
5. Import Lake Nacimiento Raw Water (Independent of Nacimiento Project) and Treat Water With City-Owned Plant	\$26.9	\$2.54	\$0.86	\$3.40
7. Desalinate Well Water Supply	\$20.0	\$1.93	\$0.61	\$2.54
9. Desalinate WWTP Effluent to Meet NPDES Discharge Limits	\$8.73	\$0.83	\$0.21	\$1.04
10. Desalinate WWTP Effluent for Irrigation Reuse with Storage ^e	\$54.6	\$5.15	\$3.10	\$8.25
11. Desalinate WWTP Effluent for Irrigation Reuse with River Discharge ^e	\$12.5	\$1.18	\$1.30	\$2.48
12. Desalinate WWTP Effluent for Community-Based Reuse with River Discharge ^e	\$54.6	\$5.15	\$1.40	\$6.55
13. Desalinate WWTP Effluent for Recharge	\$21.7	\$2.05	\$0.53	\$2.58
14. Add East Side WWTP (Upstream Reclamation Plant)	\$34.5	\$3.26	\$0.56	\$3.82

CITY OF EL PASO DE NORLES
Water and Wastewater Quality Concerns - Water Quality Strategy
ALTERNATIVES COMPARISON MATRIX

Primary Criteria - Wastewater Regulatory Drivers		Relative Ranking Criteria								Common Criteria		Overall Ranking	Comments
Does Alternative Achieve Effluent TDS Compliance?	Does Alternative Cause Discharge to Salinas River?	Water Supply Magnitude/Reliability	Groundwater Basin Levels	Water Rights	Drinking Water Quality	Security/Vulnerability Position (U.S. EPA Vulnerability Assessment Requirement)	Capital Cost Competitiveness	Operating Cost Competitiveness	Regulatory Issues (Other than Water and Wastewater Quality)	Time to Implement	Customer/Stakeholder Acceptance	Overall Ranking	Comments
No	No	X	X	X	X	X	X	X	X	X	X	X	Does not address either primary criteria - alternative not considered further.
TBD	No	3	3	3	3	3	5	5	4	4	2	3.5	Insufficient information to quantify TDS benefit at this time - can only be considered as a supplement to other alternatives.
Yes	No	5	5	5	4	5	1	3	4	3	4	3.9	Would provide the City with a base flow of 4,000 AF/yr of treated surface water via regional transmission line and treatment plant.
Yes	No	5	5	5	4	5	1	4	4	3	4	4.0	Would provide the City with a base flow of 4,000 AF/yr of raw surface water via regional transmission pipe - City would own and operate its own treatment plant.
Yes	No	4	4	4	4	5	3	4	3	2	3	3.6	Would likely only be implemented if regional project does not materialize and City can obtain Lake Nacimiento water alone - requires City-owned reservoir inlet and all transmission/treatment infrastructure.
No	No	X	X	X	X	X	X	X	X	X	X	X	Does not address either primary criteria - alternative not considered further.
Yes	No	3	3	3	4	3	3	4	2	3	3	3.1	Level of well water desalination to achieve TDS benefit equivalent with surface water imports considered for comparative purposes.
Yes	Yes	2	4	4	2	3	4	5	X	2	2	X	Would theoretically address two primary project criteria but was considered infeasible due to difficulty demonstrating benefit to groundwater basin by recharging high-TDS water.
Yes	No	3	3	3	3	3	4	5	2	4	3	3.3	Level of WWTP effluent desalination to achieve TDS benefit equivalent with surface water imports considered for comparative purposes.
Yes	Yes	4	4	2	3	4	1	1	1	1	2	2.3	Based on Scenario #1 of Comprehensive Recycled Water Study (Carollo, 2001a).
Yes	No	4	4	3	3	4	4	3	1	1	3	3.0	Based on Scenario #2 of Comprehensive Recycled Water Study (Carollo, 2001a).
Yes	No	4	4	3	3	4	1	3	1	1	3	2.7	Based on Scenario #3 of Comprehensive Recycled Water Study (Carollo, 2001a).
Yes	Yes	4	5	4	3	3	3	4	2	2	3	3.3	Based on Scenario #5 of Comprehensive Recycled Water Study (Capello, 2001a) and Malcolm Pirnie desalination analysis to achieve TDS reduction sufficient to demonstrate benefit to groundwater basin.
No	No	X	X	X	X	X	X	X	X	X	X	X	Does not directly address either primary criteria. However, alternative would add City wastewater treatment capacity and was considered in this report for cost comparison reasons.

Relative Ranking Key for Each Alternative/Criterion

- 1 = unfavorable
- 2 = somewhat unfavorable
- 3 = neutral
- 4 = somewhat favorable
- 5 = significantly favorable
- TBD = to be determined

Water/Wastewater Strategy Alternatives