SANITATION DISTRICTS OF LOS ANGELES COUNTY

INDUSTRIAL WASTE SECTION
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Industrial Chloride Reduction Guidance Document

1.0 Purpose

The purpose of this guidance document is to help your facility develop a Chloride Reduction Workplan for submittal to the County Sanitation Districts of Los Angeles County (Districts). These plans are due March 31, 2003.

A form to assist you in preparing the Chloride Reduction Workplan is attached. Note that use of this form is not required, as long as the Workplan contains all the necessary elements, including quantification of chloride sources, identification of potential chloride reduction measures, assessment of these practices for economic and technological feasibility, and commitment to accept the feasible practices as enforceable Industrial Wastewater Discharge Permit conditions.

For your convenience, electronic copies of this form are available on-line at www.lacsd.org/iw/forms/chlorideworkplan.doc and www.lacsd.org/iw/forms/chlorideworkplan.pdf. You are welcome to edit the electronic forms directly, or to add additional pages to the hard copy forms as needed.

2.0 Background

2.1 Santa Clarita Valley Joint Sewerage System

The two wastewater treatment plants in the Santa Clarita Valley are the Saugus and Valencia Water Reclamation Plants (WRPs). The two plants, along with trunk sewers in the area operated by the County Sanitation Districts of Los Angeles County (Districts), are collectively known as the Santa Clarita Valley Joint Sewerage System (SCVJSS). The Saugus WRP has a design flow of 6.5 million gallons per day (MGD) and treated 5.7 MGD of wastewater in 2001. The Valencia WRP has a design flow of 12.6 MGD and treated 11.2 MGD of wastewater in 2001. The two plants are interconnected, with solids sent from Saugus WRP to Valencia WRP for treatment. Additionally, excess flow arriving at the Saugus WRP is sent to Valencia WRP for treatment; currently about 1.2 MGD is diverted in this manner. Treated wastewater from both of the plants is discharged to the Santa Clara River.

2.2 Chloride Regulation in the Santa Clarita Valley

The State of California is responsible for determining the amount of chloride that can safely be present in the Santa Clara River. The state's Regional Water Quality Control Board, Los Angeles Region, has made this determination in the form of a chloride Total Maximum Daily Load (TMDL) for the river. The TMDL set a chloride waste load allocation (WLA) for discharges to the Santa Clara River from the Saugus and Valencia WRPs. The WRPs are facing chloride discharge limits of 100 mg/L, the current chloride water quality objective for the Santa Clara River. The WLA is based upon protecting the most sensitive beneficial use of the surface water, which is irrigation for agriculture.

The current discharge concentration of chloride from the facilities is approximately 180 to 200 mg/L. As chloride is not removed in the treatment plants, influent chloride must be reduced to meet the expected limitations. Treatment to reduce chloride at the plants would require installation of microfiltration/reverse osmosis at the plants as well as installation of a brine line and ocean outfall to convey waste materials from the process to the ocean. This treatment alternative would be very costly, and a proportionate share of the costs would be passed on to industrial users.

2.3 Chloride Sources

Chloride is best known as one of the main parts of table salt (sodium chloride). Any process which adds salt to wastewater in the SCVJSS will increase chloride loading at the Saugus and Valencia WRPs. The Districts have recently completed an extensive study of chloride sources in the SCVJSS and determined that industry adds approximately 700 pounds per day of chloride to wastewater above that present in the water supply, or about 5% of the added chloride loading. The Districts are currently working to ensure that all sources of chloride to the sewer, including industrial, commercial, and residential sources, are reduced to the extent feasible.

3.0 Source Characterization

The first step in developing the Chloride Reduction Workplan is to determine where chloride is added to wastewater, or concentrated in wastewater at your facility. Chloride can be added to wastewater from cleaning products, swimming pool chemicals, photographic and x-ray processing solutions, sanitizing agents, metal finishing chemicals, and various other products. Chloride can be concentrated in cooling towers, boilers, reverse osmosis units, and other processes.

3.1 Identification of Wastestreams

Start by making a comprehensive list of all sources of wastewater in your facility, as specified in Section III of the Chloride Reduction Workplan. If sanitary wastewater (i.e. from toilets and hand washing) is not sent through your industrial wastewater connection, sanitary wastewater need not be listed. Some examples of sources of wastewater that may be listed are cooling tower blowdown, boiler blowdown, swimming pool filter backwash, laboratory glassware washing, vehicle wash water, laundry wastewater, chiller condensate, plating rinses, scrubber blowdown, etc.

Besides listing each source of wastewater, the approximate volume of the flow needs to be listed. Some waste streams will flow continuously over the course of a day, such as cooling tower blowdown. Continuously flowing wastestreams should be listed in the first table in Section III. Other wastewaters may only be discharged once per day or once per week, such as backwash from a pool filter. These wastestreams should be listed in the second table in Section III. Flow volumes can be calculated, visually estimated, measured using flow monitoring equipment, or measured using less sophisticated equipment such as a stopwatch and a volume measuring device (bucket). Although flow measurements are generally not needed to determine chloride reduction measures, they will be used by the Districts to determine a site-specific chloride limit for your industrial wastewater discharge connection.

3.2 Chloride Concentrations

The next step is to determine the concentration of chloride in each wastestream. This may be done by hiring a laboratory or consultant to do the sampling and analysis. A list of certified wastewater laboratories can be found at www.lacsd.org/iw/lablist.pdf. Alternatively, your facility may choose to purchase a field testing kit for chloride and do the sampling and analysis at your facility. In either case, records of the test results need to be maintained and submitted with the Chloride Reduction Work Plan. Chloride concentrations in some wastewaters may vary considerably over the course of a day or week. Therefore, it is recommended that multiple samples be taken of each wastestream to allow for full characterization.

4.0 Potential Chloride Reduction Measures

The next step is to brainstorm potential chloride reduction measures for each chloride-containing wastestream at your facility. Potential reduction measures **must** be considered for wastestreams containing greater than 100 mg/L chloride, except for cooling tower blowdown/bleed and boiler blowdown/bleed. (The Districts have determined that no technologically and economically feasible chloride reduction measures exist for these two types of wastestreams.) Chloride reduction measures may also be considered for wastestreams with lower chloride contents. Some potential chloride reduction measures for various types of wastestreams are listed in Section V of the Chloride Reduction Workplan. You are encouraged to consider other types of chloride reduction measures for the various wastestreams at your facility. Measures that should be considered include, recycling, hauling, and product substitution.

5.0 Evaluation of Potential Chloride Reduction Measures

Potential chloride reduction measures that have been identified should now be assessed as to their technological and economic feasibility. It is not necessary to do this assessment for all chloride reduction measures, only those that you believe may be too expensive for your facility or not practical to implement. This step simply serves as a means to eliminate potential chloride reduction measures.

A full copy of the Districts' policy on technological and economic feasibility is included at the end of this guidance document. Technological feasibility simply means that the measure would work to reduce chlorides at your facility. Generally a reduction measure should be considered technologically feasible if it has worked for the same or a similar application at another facility. In considering technological feasibility, consider whether your facility has enough room to install any necessary equipment and whether any regulations exist that would prevent you from applying the technology. In addition, consideration should be made of the impact of the reduction measure on worker health and safety and the integrity of any equipment used at the facility. The Districts are not responsible for any adverse impacts resulting from implementation of chloride reduction measures.

Economic feasibility is more complex to determine. A measure is economically feasible to implement if the cost to implement the measure is less than $5.20 per pound of chloride removed. This is the projected cost for the Districts to remove chloride at the Saugus and Valencia WRPs. To perform the cost per pound calculations, first get an estimate for the cost of applying the reduction measure. You may need to contact various equipment, chemical, and waste service providers to obtain cost data. The cost should be broken down into capital costs (for purchase and installation of any equipment) and operations and maintenance (O&M) costs, which are ongoing costs to use the chloride reduction measure. To determine the annual cost of applying the technology, you can simply divide the capital costs by the expected lifetime of the equipment, and add the O & M costs.

Annual cost, $ = (Capital cost, $)/(Expected lifetime, in years) + (Annual O&M costs, $)

Alternatively, you are welcome to use perform more sophisticated annual cost calculations that take into account the time value of money.

Second, calculate the amount of chloride that will be removed when the technology is applied. The following equations can be used to convert from gallons of wastewater and mg/L of chloride to pounds of chloride:

$$V \times C \times D = M$$

where,

V = volume of wastewater, in gallons
C = concentration of chloride, in mg/L (parts per million)
D = conversion factor, 8.43×10^{-6} lb-gal/mg/L
M = mass of chloride, in pounds

OR

F x C x D = MF

where,
F = flowrate of wastewater, in gallons per day
C = concentration of chloride, in mg/L (parts per million)
D = conversion factor, 8.43×10^{-6} lb-gal/mg/L
MF = mass flowrate of chloride, in pounds per day

The third step in determining economic feasibility is to determine the cost per pound for chloride removal. This is done by simply dividing the annual cost of the reduction measure by the pounds of chloride removed per year. (To get pounds of chloride removed per year you can simply multiply pounds per day removed times the number of working days at your facility.)

Cost per pound chloride removed, $ = (Annual Cost, $)/(Pounds of chloride removed per year)

If the cost of a reduction measure is more than $5.20 per pound of chloride removed, your facility is not required to implement the measure. If the cost of a reduction measure is less than $5.20 per pound of chloride removed, your facility is required to implement the measure, unless evidence is submitted that implementation of the measure will cause financial hardship to your company. To claim financial hardship, detailed information must be submitted to the Districts regarding the financial status of your company and the specific impact of additional costs.

Example: One operation at your facility is to wash buses, and this is done 5 days per week (260 days per year). You have measured that bus washing generates 60 gallons per day of wastewater containing 400 mg/L chloride. You are evaluating the possibility of simply having this waste hauled away. You have called several commercial haulers and the best price you can get for the hauling is $100 per 55-gallons drum. Additionally, you would have to construct a storage area for the drums at a cost of $5000. Is it economically feasible to have the wastewater hauled? Assume a lifetime for the storage area of 20 years.

Use the equation:
V x C x D = M

V = 55 gallons of wastewater
C = 400 mg/L chloride
D = conversion factor, 8.43×10^{-6} lb-gal/mg/L

M = 55 gallons x 400 mg/L x 8.43×10^{-6} lb-gal/mg/L = 0.18 pounds of chloride in each drum

Drums per year: (60 gallons/day)x(260 days/year)/(55 gallons per drum) = 284 drums/year

Annual chloride removal: (284 drums/year)(0.18 pounds chloride/drum) = 51 pounds/year

Annual cost: (284 drums/year)x($100/drum) + ($5000)/(20 years) = $28,650 per year

Cost per pound: ($28,650/year)/(51 pounds/year chloride removed) = $562 per pound chloride

As $562 per pound chloride removed is greater than $5.20 per pound, it is not necessary to implement this chloride reduction measure.

6.0 Implementation and Certification Requirements

All technologically and economically feasible chloride reduction measures must be implemented at your facility. All measures must be implemented by June 30, 2003, unless specific authorization is obtained from the Districts. In general, extensions beyond the June 30, 2003 date will be given for measures which require installation of equipment, rather than a change in operating practices.

The Chloride Reduction Workplan must be certified by a registered professional engineer, to ensure accuracy and completeness. A list of consulting firms that may employ registered professional engineers may be found at www.lacsd.org/iw/consulteng.pdf. Additionally, the Chloride Reduction Workplan must be signed by an authorized company representative. This a generally the owner, a partner, a corporate officer, or a duly authorized representative of one of these.

7.0 Submission

Mail the completed Chloride Reduction Workplan, by March 31, 2002, to:

Industrial Waste Section
Sanitation Districts of Los Angeles County
1955 Workman Mill Road
Whittier, CA 90601

If you have any questions while completing the plan, please contact Dave Whipple of the Districts' Industrial Waste Section at 562/699-7411, x2909.

County Sanitation Districts of Los Angeles County

Policy on Determination of Technological and Economic Feasibility

The Districts have developed a policy that defines the criteria for determining “technological and economic feasibility.” The criteria in the policy were chosen such that they are reasonable, are well defined, and can be implemented. In developing the policy, the Districts relied on policies utilized by the U.S. EPA in promulgating Federal effluent guidelines (also known as categorical pretreatment standards pursuant to 40 CFR Parts 404 to 471). Under the federal categorical program, discharge standards or effluent guidelines are developed for types or categories of industry, then applied uniformly on a national basis to all industries in a particular category. The standards are technology-based (i.e., they are based on the performance of treatment and control technologies). The Districts’ policy also allows for determinations of economic feasibility by individual businesses. If an individual business can substantiate that implementation of a chloride reduction measure would cause financial hardship, the Districts may make the determination that implementation of that reduction measure is not economically feasible for the business. Both types of criteria for determining technological and economic feasibility are discussed in this section.

The types of discharge standards developed under the federal categorical program for indirect dischargers (those discharging to a POTW as opposed to discharging directly to a surface water body) are known as Pretreatment Standards for Existing Sources (PSES) and Pretreatment Standards for New Sources (PSNS). PSES are technology-based limits for toxic or non-conventional pollutants that are based on U.S. EPA standards for direct dischargers known as Best Available Technology Economically Achievable[1]. Generally, PSES are the same as Best Available Technology Economically Feasible for pollutants that pass through POTWs. Other types of effluent standards developed by U.S. EPA are based upon Best Practicable Control Technology Currently Available and Best Conventional Pollutant Control Technology.

The U.S. EPA uses different approaches to consider economic and technological feasibility under each of the various types of effluent guidelines that it develops. The Districts examined economic and technological feasibility criteria for the three major types of effluent limitations (Best Available Technology Economically Achievable, Best Practicable Control Technology Currently Available and Best Conventional Pollutant Control Technology) to see if any are appropriate in determining economical and technological feasibility of chloride reduction measures in the Santa Clarita Valley Joint Sewerage System (SCVJSS).

<u>Best Available Technology Economically Feasible (BAT)</u>

BAT effluent limitations guidelines represent the best existing economically achievable performance of plants in an industrial subcategory or category.[2] BAT effluent limitations for each industry type are developed by considering the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impacts (including energy requirements), and such other factors as the U.S. EPA deems appropriate.[3] Generally, the U.S. EPA determines the economic achievability of BAT effluent limitations on the basis of the total cost to the industrial subcategory and the overall effect of the rule on the industry’s financial health.[4] To develop BAT for an industry category, the U.S. EPA undergoes an extensive rule-making process under which numerous facilities in an industry category are surveyed and sampled, and an extensive economic analysis of the impact of the proposed limitations is conducted. The economic analysis considers detailed financial information for the industry and determines the number of facility closures that are to be expected when the rule is implemented. The U.S. EPA then exercises its judgement as to the percent of facility closures that is acceptable.

Because an analysis of each industry sector and the expected closure impact of limitations on each is beyond the scope of anything but a national rule-making effort, the method used by the U.S. EPA to determine economic feasibility for BAT is not acceptable for the Districts in determining the technological and economic feasibility of chloride reduction technology for each industry sector in the SCVJSS. Additionally, the U.S. EPA has not set a fixed level of acceptability for facility closures, so even if the number of facility closures could be predicted it would be difficult to determine whether the number of facility closures expected would be acceptable.

<u>Best Practicable Control Technology Currently Available (BPT)</u>

Closely related to BAT effluent guidelines are another type of effluent guidelines applied to direct dischargers known as BPT. In reality BPT is very similar to BAT, but it can also consider process changes in

[1] Federal Register, Vol. 66, No. 2, p. 427 (January 3, 2001).
[2] Ibid.
[3] Clean Water Act, Section 304(b)(2).
[4] Federal Register, Vol. 66, No. 2, p. 427 (January 3, 2001).

addition to other factors considered for BAT. However, economic feasibility is defined differently for each. In the case of BPT, the economic criterion is "the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application;" while for BAT, it is defined as "the cost of achieving such effluent reduction."[5] Whereas the BAT criterion looks at the total cost of a technology and its impact on industry, BPT looks at a cost effectiveness criterion that is the cost of reduction technology in relation to effluent reductions generally expressed on a dollar-per-pound-of-pollutant-reduction basis. In developing categorical effluent guidelines and standards through 2000, the BPT cost-reasonableness factor has ranged from $0.94 per pound removed to $34.34 per pound removed, in 1996 dollars[6]. Consequently, for a specific industry category, any reduction measure that can be achieved for less than $0.94 per pound removed should be applied, while at the other end of the scale, for another industry category anything greater than $34.34 per pound is not economically feasible. Because these costs are industry specific, and because of the wide range of feasible costs permitted under BPT, the BPT model alone is not acceptable for determining economic feasibility of chloride reduction.

Best Conventional Pollutant Control Technology (BCT)

A third type of effluent guideline developed by the U.S. EPA for industry categories BCT. This type of guideline is applicable to conventional pollutants such as biological oxygen demand, suspended solids, pH, and fecal coliform. BCT is applicable only to direct dischargers, as conventional pollutants are removed in POTWs so standards for conventional pollutants are not appropriate for indirect dischargers. BCT is not an additional limitation but rather replaces BAT for conventional pollutants. Although chloride is not a conventional pollutant, it is useful to examine the criteria developed by the U.S. EPA in determining whether a BCT technology should be used as the basis for a regulation. The U.S. EPA evaluates the reasonableness of BCT candidate technologies (those that are technically feasible) by applying a two-part cost test[7]:

1) The POTW test; and
2) The industry cost-effectiveness test.

In the POTW test, the U.S. EPA calculates the cost per pound of conventional pollutant removed by an industrial discharger in upgrading from a BPT to a BCT candidate technology, and then compares this cost to the cost per pound of conventional pollutant removed in upgrading POTWs from secondary treatment. The idea is to compare the cost of industry installing advanced treatment to the cost of a POTW installing the advanced treatment. If it is less expensive for industry to install the treatment, then the POTW test is satisfied. Applying the rationale behind the POTW test to chloride, the cost per pound for industry to remove chloride would be compared to the cost per pound for the Districts to remove chloride of $5.20[8]. This determination of economic feasibility could be applied to chloride reduction measures, as it establishes a specific number for comparison. In addition, it forms a logical basis for the determination of economic feasibility, as non-residential dischargers should be expected to reduce chloride on-site if it can be done more economically than at the receiving WRP.

The second part of the BCT economic feasibility determination is the industry cost-effectiveness test. Under this test, the U.S. EPA determines the ratio of the incremental BPT to BCT cost divided by the BPT cost.

[5] Clean Water Act, Sections 304(b)(1) and 304(b)(2).
[6] United States Environmental Protection Agency, Office of Water, *Development Document for the Proposed Effluent Limitations Guidelines and Standards for the Metal Products & Machinery Point Source Category*, EPA-821-B-00-005, December 2000.
[7] Ibid.
[8] See Montgomery Watson Harza (MWH), Cost Impacts for Compliance with a 100 mg/L Instantaneous Chloride Discharge Limit at the Santa Clarita Valley Water Reclamation Plants, dated October 2002. Per MWH's cost estimate, the total capital cost of microfiltration/reverse osmosis, brine line, and ocean outfall for 2015 flows (34.1 MGD) is estimated to be $422 million, with an operation and maintenance (O & M) cost of $9.7 million per year. The existing service base would be responsible for a total capital cost of $236.3 million and an O & M cost of $5.4 million per year, which are the proportional costs associated with the current design capacity of 19.1 MGD. Essentially, the existing service based would be responsible for 56% (19.1/34.1) of the total capital cost and O & M costs for 2015 projected flows (34.1 MGD). The total annualized cost to the existing service base, assuming an interest rate of 7% over a 20-year financing period, would be $27.7 million. Assuming a chloride concentration of 192 mg/L (95th percentile SCVJSS chloride concentration during 2001), 92 mg/l of chloride need to be removed to meet the 100 mg/L objective, which is equivalent to 5,330,000 pounds of chloride removed annually, based on current design flow of 19.1 MGD. The cost per pound for chloride removal is then $5.20 ($27.7 million per year divided by 5,330,000 pounds per year). This cost will be higher if it becomes necessary to treat the brine waste in lieu of constructing a brine line and outfall for ocean disposal.

This ratio must be less than 1.29, meaning that the cost increase in going from BPT to BCT is less than 29%[9]. The idea is to compare the cost of upgrading to a higher level of technology. If the higher level technology does not cost greater than 29% over the baseline technology (and the POTW test is satisfied), then the treatment is deemed economically acceptable. It is difficult to determine how this industry cost-effectiveness test could apply to determine the cost-effectiveness of industry removing chlorides, as there is no baseline technology to set as a basis of comparison.

In summary, the U.S. EPA applies three different standards of economic feasibility in determining effluent limitation guidelines for industry. The standard used for BAT, to look at the overall economic impact on an industry of a particular limitation, is too complex to apply on a local service area basis and is thus not acceptable for use in determining economic feasibility of non-residential chloride reduction. The standard used under BPT is to determine the cost per pound of pollutant removed and determine if the cost is reasonable. In the past, the U.S. EPA has deemed costs between $0.94 per pound and $34.34 per pound to be acceptable. This means of determining economic feasibility alone is not acceptable for application to chloride reduction measures because the range of costs involved is too broad and industry-specific. The standard used for BCT is to compare industry removal cost with the cost for treatment at a POTW. Applying this to chloride would mean that chloride reduction measures costing less than $5.20 per pound chloride removed are acceptable. As this cost falls within the BPT range set by the U.S. EPA, it appears to be reasonable. Additionally, it sets a logical basis for the economic feasibility measure, because businesses that can reduce chlorides more economically than the Districts should be expected to do so.

The Districts will apply the $5.20 cost factor to determine the economic feasibility of chloride reduction measures at businesses in the SCVJSS. If the reduction measures cost less than $5.20 per pound, they would be nominally considered to be economically feasible. In order to ensure, however, that the standard of “economic feasibility” is met at every business that has to implement chloride reduction measures, the Districts are adding a second component to the economic feasibility determination. Due to differences in financial health, profit margins, and volume of wastewater discharged, some businesses may be in a better position to absorb the cost of chloride reduction measures than others. Therefore, the Districts will allow individual businesses to demonstrate that certain chloride reduction measures, even those costing less than $5.20 per pound chloride removed, would cause financial hardship[10]. At minimum, the determination of financial hardship will involve the company submitting detailed information about its financial status and the impact of the additional costs.

In terms of technological feasibility, in general BAT effluent limitations guidelines represent the best existing economically achievable performance of direct discharging plants in an industrial subcategory or category.[11] This means that the U.S. EPA looks at existing facilities with reduction measures in place to determine the best performing ones, then determines whether the reduction measures in place can be applied to other facilities in the industry in an economically achievable manner. If no facilities have acceptable performance, then the EPA may base BAT upon technology transferred from a different subcategory within an industry category or from another industry category[12]. Technological feasibility for BPT and BCT are determined by similar processes.

For chloride reduction measures, the Districts will mimic this process by examining the reduction measures used at the best performing facilities of a particular business type. These measures will then be required at other facilities of the same business type if they meet the economically feasible criteria. However, if no facilities are performing acceptably, then established technology from another business type may be applied. For example, some hotels may use chlorine bleach on white laundry while some may use non-chlorine bleach. The technology of using non-chlorine bleach will then be transferred to other hotels (assuming that the cost differential between the two technologies is not greater than $5.20 per pound chloride). Even if no hotels in the SCVJSS were currently using non-chlorine bleach to whiten their clothes, the technology of using non-chlorine bleach could be transferred from other businesses such as laundries.

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[9] United States Environmental Protection Agency, Office of Water, *Development Document for the Proposed Effluent Limitations Guidelines and Standards for the Metal Products & Machinery Point Source Category*, EPA-821-B-00-005, December 2000.

[10] The Districts evaluation of financial hardship will comply with the principles discussed by the State Water Resources Control Board in Order No. WQO. 2002-0002 (In the Matter of the Petition of Chevron Pipe Line Company). Specifically, the State Board stated that "economic feasibility is an objective balancing of the incremental benefit of attaining further reductions in the concentrations of constituents of concern as compared with the incremental cost of achieving those reductions." Order No. WQO. 2002-0002 at n.13. The State Board further confirmed that economic feasibility does not simply refer to the ability to finance the reduction.

[11] Federal Register, Vol. 66, No. 2, p. 427 (January 3, 2001).

[12] Ibid.