

Revisions to Water Quality Impacts

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REVISION 5.37A

(Insert the following between first and second paragraphs under the heading 5.2 Water Quality Program)

Actions to curb contaminant emissions in mine drainage, urban and industrial storm water runoff and municipal and industrial wastewater treatment plant discharges are included for all regions except the SWP and CVP service areas outside the Central Valley. Actions to reduce contaminant emissions from agricultural surface runoff and/or subsurface drainage are included for the Sacramento and San Joaquin River basins and for the Delta. Actions to curb emissions of pathogenic microbes in wastes from boats are included for the Sacramento River and Delta regions, the regions where boat wastes have the greatest potential to affect drinking water quality. An action involving the relocation of water supply intakes is included in the Delta region because the direct effects of construction will be felt there, and in the San Joaquin River and San Francisco Bay regions and the SWP/CVP service area because this is where the benefits of better water quality will be achieved. An action involving improved treatment of municipal water supplies obtained from the Delta is included in the San Francisco Bay region and the SWP/CVP service areas because both the treatment plants and the ~~affected~~ municipal water supply consumers are located in those regions.

REVISION 5.37B

(Replace last sentence on Page 5.37 with the following sentence)

Reduction of cadmium, copper and zinc emissions from inactive mines would reduce basin wide loads by 15 to 25%.

REVISION 5.43

(Replace second and third sentences in last paragraph on page 5-43 with the following two sentences)

The proportion of the cadmium load attributable to urban and industrial runoff is about 9%. Corresponding proportions for copper and zinc are 11% and 18%, respectively.

REVISION 5.44

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(Add following sentence at end of second full paragraph on Page 5-44)

Similarly, small decreases in emissions of microbiological contaminants in urban runoff are unlikely to have much effect on regional water quality.

REVISION 5.50A

(Add following after Action 4 and immediately before heading "San Joaquin River Basin")

Action 5 Reduce discharge of pathogens from recreational pleasure craft by enforcement of existing regulations and provision of incentives

The discharge of vessel wastes is already regulated by federal and state governments but enforcement is problematic. Pleasure craft that carry passengers for a fee are subject to regulation by the U.S. Coast Guard and must be equipped with a marine sanitation device. Marine sanitation devices include flow-through treatment systems and holding tanks. Private pleasure craft must be equipped with a holding tank; flow through devices are not permitted.

Although these regulations have been in place for some time, sanitary surveys of rivers used as water supply sources continue to identify vessel wastes as a source of microbial pollution. This may be because even relatively small volumes of untreated human waste contain very high numbers of microbes. For example, one liter of untreated sewage from a boat might be expected to contain approximately one billion fecal coliform bacteria organisms. By comparison, one liter of treated effluent from a municipal wastewater treatment plant might be expected to contain 100 coliform organisms. Thus, one liter of untreated waste from a boat might have the same microbial pollution potential as 10 million liters (2.6 million gallons) of municipal effluent. By this measure, a single small pleasure boat discharging untreated waste could produce an adverse impact on microbial water quality equivalent to that of a city with a population of 25,000. If a person on board the vessel was ill and/or shedding pathogens, the equivalent adverse impact of discharge could be very much greater than the city of 25,000.

The microbial quality of surface waters used for drinking water supplies are important even though water is disinfected before being supplied to consumers. Conventional water treatment processes, including disinfection, remove most but not all microbes from water. Some microbes including the parasites *Giardia* and *Cryptosporidium* are resistant to disinfection and may pass through treatment systems and infect consumers. If a supplier draws from a relatively microbe-free water source then the chance of significant numbers of pathogenic organisms surviving the treatment process is very low. If the microbial quality of the source water is poor the risk is

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increased. In the Sacramento Valley, vessel waste discharges could adversely affect water quality at various water system intakes including those for the City of Sacramento and other communities on the Sacramento and American Rivers.

The microbial quality of waters used for recreation that involves body contact with the water is also important. Discharge of untreated wastes from boats that occur in the immediate vicinity of water-contact recreation activities are likely to cause violations of recreational water quality standards.

Existing regulations and legal authority to address the problem of boat wastes are adequate but enforcement is problematic. Small private pleasure craft are not usually inspected to determine if they are equipped with holding tanks. Even if they are properly equipped, some boat owners may choose to surreptitiously discharge them to surface waters rather than going to the trouble and expense of using a pump-out station. Compliance with regulations could be improved by more effective inspection of boats (perhaps linked to their licencing) and the provision of free pump-out services at conveniently located stations. The latter might be funded by boat registration fees. However, it is probably unrealistic to assume that full compliance with vessel waste regulations will ever be achieved.

Direct Short-Term Impacts The only short-term adverse impacts of this action would be those associated with the construction of new waste pump-out stations at waterfront locations. Minor and local increases in sediment discharge could occur at construction sites but would be lessened by the application of conventional construction impact mitigation measures.

Direct Long-Term Impacts Compared to the Existing Condition Increased compliance with vessel waste regulations could improve in-stream microbial water quality of receiving waters, particularly during the summer months when recreational use of some water bodies is heavy and other sources of microbes such as urban runoff are less of a factor. The risk to the health of recreational water users and consumers of drinking water obtained from surface waters could also be reduced, at least in theory. However, any health improvements are not likely to be noticeable because outbreaks of serious water-borne disease among recreationists and water consumers are very rare in California.

Direct Long-Term Impacts Compared to No Action Condition The direct long-term impacts of Action 5 would be similar to those compared to the existing condition.

Indirect Impacts Action 5 will have no indirect impacts.

Significant Impacts and Mitigation Measures Action 5 would have no long-term significant adverse impacts on water quality. Construction activities could have some short-term adverse effects on water quality but they would be reduced to insignificant levels by conventional construction mitigation measures.

REVISION 5.50B

(Replace first sentence under Action 1 with following sentence)

Drainage from inactive and abandoned mines has been identified as a source of heavy metals in the San Joaquin River basin.

REVISION 5.50C

(Remove last sentence of first paragraph under the heading "Direct Long-Term Impacts Compared to Existing Condition")

REVISION 5.52

(Replace third sentence under heading "Direct Long-Term Impacts Compared to Existing Condition" with the following two sentences)

If cadmium in urban runoff represents one-half of the basinwide total then the overall decrease would be 5%. Reductions in basinwide emissions of copper and mercury would also be reduced by less than 10%.

REVISION 5.60A

Action 6 Relocate diversions to improve water supply quality

(Add following after Action 5 and immediately before heading "Sacramento-San Joaquin Delta")

Diversions in the Delta could be relocated to improve water quality. Ways in which this could be accomplished are described under Action 5 for the Delta region in a subsequent section.

Relocation of diversions in the Delta would potentially benefit agriculture because a substantial proportion of the irrigation water supply in the San Joaquin Valley originates in the Delta.

However, Delta water is not a significant source of municipal water supply in the San Joaquin Valley.

Direct Short-Term Impacts There would be no short-term adverse impacts of this action. All construction activities would take place outside the San Joaquin River Region.

Direct Long-Term Impacts Compared to the Existing Condition This action would result in an improvement in the quality of water diverted for agricultural water supply at certain times. The benefits would be greatest during periods of low Delta outflow when brackish water from San Francisco Bay penetrates into the Delta and increases the salinity content of diverted water. The reduction in salinity would lower the risk of damage to salt-sensitive crops and reduce the overall mass of salt applied to the land in the San Joaquin Valley. This would reduce the rate at which saline agricultural wastewater build up in the valley. The long-standing drainage problem is described under Action 5 above.

Direct Long-Term Impacts Compared to No Action Condition The direct long-term impacts of this action compared to no action would be similar to those projected when compared to existing conditions.

Indirect Impacts This action will have no indirect impacts.

Significant Impacts and Mitigation Measures This action would have no long-term significant adverse impacts on water quality. It would produce moderate benefits for agriculture.

REVISION 5.60B

(Replace the second and third sentences under the heading "Direct Long-Term Impacts Compared to Existing Condition" with the following sentences)

A reduction of 25 to 30% in copper emissions from inactive and abandoned mines will reduce basin wide emissions by about 8%. Data is insufficient to make estimates of basin wide emission reductions of cadmium and zinc.

REVISION 5.68A

(Add the following sentence between the second and third sentences under the heading "Direct Long-term Impacts Compared to Existing Condition")

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The improvements would benefit municipal water consumers in the San Francisco Bay Region, the San Joaquin River and Tulare Lake Basin region, and the SWP/CVP service areas outside the Central Valley.

REVISION 5.68B

(Add following after Action 5 and immediately before heading "San Francisco Bay Region")

Action 6 Reduce discharge of pathogens from pleasure craft by enforcement of existing regulations and provision of incentives

As discussed under Action 5 for the Sacramento River Region, existing regulations and legal authority to address the problem of boat wastes are adequate but enforcement is problematic. Small private pleasure craft are not usually inspected to determine if they are equipped with holding tanks. Even if they are properly equipped, some boat owners may choose to surreptitiously discharge them to surface waters rather than going to the trouble and expense of using pump-out stations. Compliance with regulations could be improved by more effective inspection of boats, perhaps linked to their licencing, and the provision of free pump-out services at conveniently located stations. The latter might be funded by registration fees. However, it is probably unrealistic to assume that full compliance with vessel waste regulations will ever be achieved.

The Delta Region is heavily used by recreational craft and by water-contact recreationists. There is considerable potential for microbial water pollution from boats. Water quality standards for recreation are probably violated at times and the quality of water as a source of raw water supply is degraded. Millions of people are supplied with water withdrawn from the Delta at the intakes to the North Bay Aqueduct, the Contra Costa Canal, the South Bay Aqueduct, the California Aqueduct and the Delta-Mendota Canal.

Direct Short-Term Impacts The only short-term adverse impacts of this action would be those associated with the construction of new waste pump-out stations at waterfront locations. Minor and local increases in sediment discharge could occur at construction sites but would be lessened by the application of conventional construction impact mitigation measures.

Direct Long-Term Impacts Compared to the Existing Condition Increased compliance with vessel waste regulations could improve in-stream microbial water quality particularly during the summer months when recreational use of some water bodies is heavy and other sources of microbes such as urban runoff are less of a factor. The risk to the health of recreational water

users and consumers of drinking water obtained from surface waters could also be reduced, at least in theory. However, any health improvements are not likely to be noticeable because outbreaks of serious water-borne disease among recreationists and water consumers are very rare in California.

Direct Long-Term Impacts Compared to No Action Condition The direct long-term impacts of Action 6 would be similar to those compared to the existing condition.

Indirect Impacts Action 6 will have no indirect impacts.

Significant Impacts and Mitigation Measures Action 6 would have no long-term significant adverse impacts on water quality. Construction activities could have some short-term adverse effects on water quality but they would be reduced to insignificant levels by conventional construction mitigation measures.

REVISION 5.73

(Add following after Action 3 and immediately before heading "Delta Levee System Integrity Program")

Action 4 Relocate diversions to improve water supply quality

Action 5 for the Delta region described ways in which the water supply intakes in the Delta could be relocated to improve drinking water quality. Within the San Francisco Bay Region a number of communities receive water from the Delta and would potentially benefit from this action. They include communities in Solano, Sonoma and Marin counties that receive water from the North Bay Aqueduct, communities in Contra Costa County that receive water from the Contra Costa Canal, and communities in Alameda and Santa Clara County that receive water from the South Bay Aqueduct or the San Felipe Project.

Direct Short-Term Impacts There would be no short-term adverse impacts of this action. All construction activities would take place outside the San Francisco Bay Region.

Direct Long-Term Impacts Compared to the Existing Condition This action would result in an improvement in the quality of water diverted for municipal supply at certain times. The benefits would be greatest during periods of low Delta outflow when brackish water from San Francisco Bay penetrates into the Delta and increases the salinity and bromide content of diverted water. The reduction in salinity would not be expected to have much effect on the health of consumers

although it could benefit some individuals on low-salt diets. It might improve the palatability of water to some consumers but probably would not be noticeable to most. The reduction in bromide concentration would in turn reduce the concentration of trihalomethanes in finished water with possible health benefits to consumers.

Direct Long-Term Impacts Compared to No Action Condition The direct long-term impacts of Action 4 compared to no action would be similar to those projected when compared to existing conditions.

Indirect Impacts Action 4 will have no indirect impacts.

Significant Impacts and Mitigation Measures Action 4 would have no long-term significant adverse impacts on water quality. It would produce modest benefits for consumers. Construction activities could have some short-term adverse effects on water quality but they would be reduced to insignificance by conventional construction mitigation measures.

Action 5 Improve finished drinking water quality by treating raw water to reduce concentrations of total organic carbon, pathogenic organisms, turbidity and bromides.

Surface water is always treated before being served to customers. Conventional treatment for surface water from high quality sources is simple disinfection. Conventional treatment for surface water from less desirable sources consists of chemical coagulation, sedimentation, filtration and disinfection. However, since the passage of the initial Safe Drinking Water Act in 1974, drinking water standards have become increasingly stringent and in some cases conventional treatment is insufficient to meet the new standards.

The Delta has always been regarded by water purveyors as a less satisfactory source of drinking water supply than in the Sierra Nevada and foothill streams. Delta water contains more dissolved mineral salts, dissolved organics, turbidity and pathogenic organisms than water from Sierra streams. It is typically subject to conventional water treatment before being served to customers. Conventional treatment reduces turbidity and virtually eliminates microbial organisms from the source water. There is little reason to add treatment processes to further reduce turbidity and pathogenic organism concentrations.

The new standards that are most problematic for water purveyors that obtain water from the Delta are those for disinfection by-products. When water is chemically disinfected, the disinfection agents combine with dissolved organic matter to form various compounds including a group of substances referred to as trihalomethanes. Trihalomethanes have been shown to cause

cancer in animals. The U.S. Environmental Protection Agency has established standards for trihalomethanes in finished drinking water and is likely to make the standards more stringent in the future. Because Delta waters contain relatively high concentrations of dissolved organic matter, they have a high trihalomethane-formation potential. The bromides that are present in Delta waters at certain times as a result of intrusion of brackish water from San Francisco Bay also contribute to trihalomethane formation, especially the high risk bromoform compound.

The trihalomethane formation potential of Delta waters could be reduced by additional water treatment and pretreatment to remove some of the bromides and dissolved organic matter. Treatment processes that might be used for this purpose include carbon absorption, reverse osmosis and ion exchange.

Within the San Francisco Bay Region a number of communities receive water from the Delta. They include communities in Solano, Sonoma and Marin counties that receive water from the North Bay Aqueduct, communities in Contra Costa County that receive water from the Contra Costa Canal and communities in Alameda and Santa Clara County that receive water from the South Bay Aqueduct or the San Felipe Project.

Direct Short-Term Impacts The only short-term adverse impacts of this action would be those associated with the construction of new treatment units at existing water treatment plants. Minor and local increases in sediment discharge could occur at construction sites but would be lessened by the application of conventional construction impact mitigation measures.

Direct Long-Term Impacts Compared to the Existing Condition There would be no significant long term adverse impacts of this action on water quality compared to the existing condition.

Direct Long-Term Impacts Compared to No Action Condition There would be no significant long term adverse impacts of this action on water quality compared to the No Action Condition.

Indirect Impacts This action would increase the cost of water to consumers within municipalities served by the SWP and the CVP. It could alter patterns of water use which could have indirect impacts on a number of environmental elements. Effects would be small in most cases because water costs are low compared to other costs incurred by residents and owners of businesses.

Significant Impacts and Mitigation Measures This action would have no long-term significant adverse impacts on water quality. Construction activities could have some short-term adverse effects on water quality but they would be reduced to insignificance by conventional construction mitigation measures.

SWP AND CVP SERVICE AREAS OUTSIDE THE CENTRAL VALLEY DRAINAGE

Action 1 Relocate diversions to improve water supply quality

Action 5 for the Delta region described ways in which the water supply intakes in the Delta could be relocated to improve drinking water quality. Within the SWP and CVP service areas outside the Central Valley, a number of communities receive water from the Delta and would potentially benefit from this action. Users of Delta water outside the Central Valley drainage include communities in San Luis Obispo, Santa Barbara and San Diego counties and in the Los Angeles basin.

Direct Short-Term Impacts There would be no short-term adverse impacts of this action. All construction activities would take place outside the SWP and CVP service areas outside the Central Valley drainage.

Direct Long-Term Impacts Compared to the Existing Condition This action would result in an improvement in the quality of water diverted for municipal supply at certain times. The benefits would be greatest during periods of low Delta outflow when brackish water from San Francisco Bay penetrates into the Delta and increases the salinity and bromide content of diverted water. The reduction in salinity would not be expected to have much effect on the health of consumers although it could benefit some individuals on low-salt diets. It might improve the palatability of water to some consumers but probably would not be noticeable to most. The reduction in bromide concentration would in turn reduce the concentration of trihalomethanes in finished water with probable health benefits to consumers.

Direct Long-Term Impacts Compared to No Action Condition The direct long-term impacts of this action would be similar to those compared to the existing condition.

Indirect Impacts This action would have no indirect impacts.

Significant Impacts and Mitigation Measures This action would have no long-term significant adverse impacts on water quality. It would produce modest benefits for consumers.

Action 2 Improve finished drinking water quality by treating raw water to reduce concentrations of total organic carbon, pathogenic organisms, turbidity and bromides.

As discussed under Action 5 for the San Francisco Bay Region, Delta water has always been regarded by water purveyors as a less satisfactory source of drinking water supply than waters

obtained from streams in the Sierra Nevada and its foothills. The quality of Delta waters could be improved by additional treatment.

Users of Delta water outside the Central Valley include communities in the Los Angeles basin, and in San Luis Obispo, Santa Barbara and San Diego counties.

Direct Short-Term Impacts The only short-term adverse impacts of this action would be those associated with the construction of new treatment units at existing water treatment plants. Minor and local increases in sediment discharge could occur at construction sites but would be lessened by the application of conventional construction impact mitigation measures.

Direct Long-Term Impacts Compared to the Existing Condition There would be no long term adverse impacts of this action on water quality compared to the existing condition.

Direct Long-Term Impacts Compared to No Action Condition There would be no long term adverse impacts of this action on water quality compared to the No Action Condition.

Indirect Impacts This action would increase the cost of water to consumers within municipalities served by the SWP and the CVP. This could alter patterns of water use which could have indirect impacts on a number of environmental elements. Effects would be small in most cases because water costs are low compared to other costs incurred by residents and owners of businesses.

Significant Impacts and Mitigation Measures This action would have no long-term significant adverse impacts on water quality. Construction activities could have some short-term adverse effects on water quality but they would be reduced to insignificance by conventional construction mitigation measures.

REVISION 5.38

(Replace Table 5-6A with the following new table)

WATER QUALITY PROGRAM PLAN PROGRAMMATIC ACTIONS

ACTIONS	Sacramento River Basin	San Joaquin River Basin	Delta	San Francisco Bay	SWP & CVP Service Areas
<i>Reduce heavy metals emissions in mine drainage</i>	✓	✓	✓	✓	
<i>Reduce emissions of contaminants in urban and industrial runoff</i>	✓	✓	✓	✓	
<i>Reduce emissions of contaminants in wastewater treatment plant discharges</i>	✓	✓	✓	✓	
<i>Reduce emissions of contaminants in agricultural surface runoff</i>	✓	✓	✓		
<i>Reduce emissions of contaminants in agricultural subsurface drainage</i>		✓			
<i>Relocate diversions to improve wastewater supply</i>		✓	✓	✓	✓
<i>Reduce discharge of pathogens from vessels</i>	✓		✓		
<i>Improved drinking water quality by treating raw water</i>				✓	✓

REVISION 5.45

(Add following sentence to end of fourth paragraph under heading " Action 3: Reduce emission of contaminants ")

One possible approach would to provide incentives for wastewater reclamation and reuse which would reduce the discharge of pollutants to surface waters.

REVISION 5.46

(Replace second sentence under heading "Direct Long-term Impacts Compared to No Action Alternative")

Assuming that the per capita emission of pollutants in wastewater remains constant and wastewater treatment levels remain the same, the total emission of pollutants in wastewater will increase by 60%.

REVISION 5.59

(Insert following sentences at end of fifth paragraph under heading " Action 5 Reduce emissions of contaminants including selenium... ")

Another possibility would be to reduce the adverse impacts resulting from discharges of selenium and salts on water quality by timing the discharge of flows from holding ponds to coincide with high flow periods in the river. This would necessitate the construction of large holding basins which could retain agricultural subsurface drainage during the summer and fall and release it during the winter and spring. It would, of course, affect only the concentrations of selenium and salts in receiving waters over time; total basinwide loads would remain the same.

REVISION 5.65

(Insert the following sentence between the fifth and sixth sentences in the section entitled "Direct long-Term Impacts Compared to Existing Condition ")

Ammonia toxicity, which has been identified as a problem in some Delta waters, would also be somewhat reduced.