

STATE OF CALIFORNIA  
STATE WATER RESOURCES CONTROL BOARD

In the Matter of the Petition of )  
CITIZENS FOR A BETTER ENVIRONMENT )  
For Review of Order No. 85-26 of the )  
California Regional Water Quality )  
Control Board, San Francisco Bay )  
Region. Our File No. A-383. )  
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ORDER NO. WQ 86-4

BY THE BOARD:

On February 20, 1985, the California Regional Water Quality Control Board, San Francisco Bay Region (Regional Board) reissued waste discharge requirements (requirements) which served as a national pollutant discharge elimination system (NPDES) permit in Order No. 85-26 for Chevron U.S.A., Inc., Richmond Refinery (Chevron or discharger) and Allied Chemical Corporation, Richmond Works, Industrial Chemicals Division (Allied Chemical). The requirements regulate discharges from Chevron's petroleum refinery located in Contra Costa County. The discharge includes process and cooling wastewater from Chevron's refinery and wastewater from the manufacture of sulfuric acid and oleum by Allied Chemical. The discharge is to Castro Creek, 500 yards from its confluence with Castro Cove, an embayment of San Pablo Bay.

On March 22, 1985, the State Water Resources Control Board (State Board) received a petition from Citizens for a Better Environment (petitioner) seeking review of the requirements. The petition seeks more stringent interim limits for the discharge pending either the Regional Board's enforcement of a prohibition against discharge to Castro Creek or granting of an exception to the prohibition.

## I. BACKGROUND

The issues raised in this petition concern the appropriate standards to be applied to the discharge. The standards in the discharge permit are intended to implement the Regional Board's Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan), the State Board's Water Quality Control Policy for the Enclosed Bays and Estuaries of California (Bays and Estuaries Policy), and the Environmental Protection Agency's (EPA) regulation which limits effluent discharges from facilities engaged in the refining and processing of petroleum (EPA petroleum guidelines).

The petitioner has requested a hearing in this matter, pursuant to Title 23, California Administrative Code, Section 2050(b). Section 2050(b) requires that a petitioner requesting a hearing include a detailed statement of the evidence to be proved and an explanation of why it was not presented to the Regional Board. The petitioner did not comply with these requirements, stating only generally that it would provide technical data in support of its requested effluent limitations and that it had not presented evidence to the Regional Board because the Board's initial staff proposal was consistent with the petitioner's suggested limits. In any event, in this Board's review of the above-mentioned documents and the record as a whole, we have found there already is sufficient evidence to fully consider the petitioner's requests. This Board has therefore determined not to hold a hearing in this matter.

The discharger has also raised questions regarding the record before us. As was stated above, the State Board received the petition in this matter on March 22, 1985. This submittal was in compliance with Water Code Section 13320, which requires filing of petitions within 30 days of the

Regional Board action. On April 30, this Board notified the petitioner that the petition was complete and requested responses to the petition from the "Regional Board, the dischargers and other interested persons" by May 20. (Title 23, California Administrative Code, Section 2050.5.) The discharger, along with many other interested persons, filed a timely response. On May 20, the petitioner also filed "Supplemental Comments" to its petition, along with 19 attached exhibits. The discharger objects to acceptance of the Supplemental Comments and six of the exhibits (2A, 2C, 2D, 2E, 2R and 2S) into the record. The discharger contends that these late submissions violate the State Board's procedure, while the petitioner argues that the submissions comply with our regulations. The regulation provides that upon receipt of a complete petition, the State Board "shall give written notification to the petitioner, the discharger, if not the petitioner, the regional board, and other interested persons that they shall have 20 days from the date of mailing such notification to file a response to the petition with the state board." (Title 23, California Administrative Code, Section 2050.5.) While a literal reading of the section would allow the petitioner to file a response, it does not make sense that a petitioner should file a response to its own petition. We find, however, that the discharger has suffered no prejudice by the admission of these comments since the discharger was given full opportunity to respond, and did respond, to the Supplemental Comments. As to the attached exhibits, Water Code Section 13320(b) provides that "[t]he evidence before the state board shall consist of the record before the regional board, and any other relevant evidence which, in the judgment of the state board, should be considered to effectuate and implement the policies of this division." The exhibits to which the discharger objects are all studies relating either specifically to the

Chevron discharge and the surrounding environment or to the regulation of discharges from refineries in general. They include studies prepared by the discharger, as well as documents prepared for the State Board and EPA. This evidence is hereby made a part of this record.<sup>1</sup>

## II. CONTENTION

The requirements at issue refer to prohibitions in the Basin Plan against discharging wastewater which has "particular characteristics of concern to beneficial uses" if the wastewater does not receive a minimum, initial dilution of 10:1 or if the discharge is into a dead-end slough or similar confined water. The requirements provide that the discharger must comply with these prohibitions by July 1, 1987 unless the Regional Board has granted an exception. The petitioner does not argue with this date for compliance, but contends that in the interim, the Regional Board should have established more stringent water-quality based standards than the EPA petroleum guidelines which are contained in the requirements.

## III. DISCUSSION

### A. Operations of the Discharger

The Chevron refinery operates with a crude-run throughput of 215,000 barrels per day and a crude-run capacity of 365,000 barrels per day. The facility manufactures fuels, lubricants, asphalt and petrochemicals, and is classified as an integrated refinery pursuant to EPA regulations. (40 CFR §419.50.) The refinery discharges refinery process wastewater, once-through

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<sup>1</sup> This Order does not reflect any conclusions regarding issues raised in the record before us, or in other comments received, other than those addressed herein.

cooling waters and storm water runoff. It creates the largest direct industrial discharge to the San Francisco Bay.

The average process wastewater flow is estimated to be 18.5 million gallons per day (mgd), and the actual average discharge in the first four months of 1985 was approximately 12 mgd. This effluent is treated in aerated lagoons and oxidation ponds. The once-through cooling water discharge generally ranges from 28 to 59 mgd. Allied Chemical discharges 0.072 mgd of process wastewater to the Chevron wastewater system for treatment and disposal. The wastewater results from the manufacture of sulfuric acid and oleum, using alkylation acid and spent sulfuric acid from the refinery as raw materials. Chevron Chemical Company also discharges 0.26 mgd of treated incinerator blowdown through the Chevron outfall, but this discharge is regulated under a separate NPDES permit. (Order No. 85-27.)

The waste streams described above are discharged through a single outfall to Castro Creek, 500 yards from its confluence with Castro Cove, an embayment of San Pablo Bay. Castro Cove and Castro Creek constitute a confined water area similar to a dead-end slough. (Regional Board Order No. 80-1, Finding 13.) The initial dilution achieved, by mixing the process wastewater and the cooling wastewater, is less than 10:1. (Regional Board Order No. 78-18, Finding 5.)

## B. Regulatory History

### 1. Basin Plan Prohibitions

Since 1975, the Regional Board's Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) has included discharge prohibitions relevant to Chevron's discharge. In 1982, the Basin Plan was amended, but both

the prohibition language and the listing of grounds for exceptions are quite similar to the earlier version. The current Basin Plan provides:

"It shall be prohibited to discharge:

1. Any wastewater which has particular characteristics of concern to beneficial uses at any point at which the wastewater does not receive a minimum initial dilution of at least 10:1 or into any nontidal water, dead-end slough, similar confined waters, or any immediate tributaries thereof.

Waste discharges will contain some levels of pollutants regardless of treatment. This prohibition will require that these pollutants, when of concern to beneficial uses, be discharged away from areas of minimal assimilative capacity such as nontidal waters and dead-end sloughs. This prohibition will accomplish the following:

- a. Provide an added degree of protection from the continuous effects of waste discharge.
- b. Provide a buffer against the effects of abnormal discharges caused by temporary plant upsets or malfunctions.
- c. Minimize public contact with undiluted wastes.
- d. Reduce the visual (aesthetic) impact of waste discharges." (Water Quality Control Plan, San Francisco Bay Basin (2), July 21, 1982, p. 4-4.)

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"Exceptions to Prohibition 1, 2, and 3 above will be considered for discharges where:

- a) an inordinate burden would be placed on the discharger relative to beneficial uses protected and an equivalent level of environmental protection can be achieved by alternate means, such as an alternative discharge site, a higher level of treatment, and/or improved treatment reliability; or
- b) a discharge is approved as part of a reclamation project; or
- c) it can be demonstrated that net environmental benefits will be derived as a result of the discharge.

Significant factors to be considered by the Regional Board in reviewing requests for exceptions will be the reliability of the discharger's system in preventing inadequately treated wastewater from being discharged to the receiving water and the environmental consequences of such discharges." (Id, p. 4- 5.)

There is no question that Chevron's discharge is covered by the prohibitions against discharge to a dead-end slough<sup>2</sup> and discharge with a minimum initial dilution of less than 10:1,<sup>3</sup> and has been for a number of years. (The discharge has occurred for more than 70 years.) As is discussed below, Chevron has made efforts to obtain an exception to these prohibitions, but none has been granted. Major refinery dischargers to San Francisco Bay, other than Chevron, have complied with the prohibitions by building deepwater diffusers. Recently, Chevron has notified the Regional Board that it plans to comply with the prohibition by building a deepwater diffuser within the time allowed by the Regional Board, namely July 1, 1987. Chevron has also filed an application for an exception to the prohibitions.<sup>4</sup>

## 2. NPDES Permits

The Regional Board has adopted a number of NPDES permits for the discharger's refinery since the Basin Plan prohibitions were adopted in 1975. In 1978, the Regional Board adopted Order No. 78-18. The Regional Board found then that Chevron was in violation of the dilution prohibition and that Chevron had submitted a report which showed improved treatment but which was not sufficient to qualify for an exception based on equivalent level of protection

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<sup>2</sup> Regional Board Order No. 80-1, Finding 13.

<sup>3</sup> Regional Board Order No. 78-18, Finding 5.

<sup>4</sup> Letters from Chevron U.S.A. to Roger James, dated September 18, 1985 and December 18, 1985.

achieved by alternate means.<sup>5</sup> In Order No. 78-18, the Regional Board ordered Chevron to comply with the prohibition against discharging to a confined water body, or else justify an exception, by December 1983. In Order No. 78-18, Chevron was also ordered to comply with the minimum dilution discharge by March 1979. In October 1979, the Regional Board adopted Order No. 79-125, which extended the date for compliance with the minimum dilution prohibition to December 1983. In January 1980, the Regional Board adopted Order No. 80-1, in which it reviewed a study submitted by Chevron in July 1979, wherein Chevron argued that the compliance with requirements should be measured 3,000 feet downstream of the discharge point, in Castro Cove. The Regional Board, expressing concern with measuring compliance that far from the point of discharge, called for further study.

In February 1985, the requirements being reviewed in this Order were adopted. The Regional Board found that the "Equivalent Protection Study", submitted by Chevron, and which was intended to provide the basis for granting an exception to the prohibitions by exception (a) (described above), had provided "inconclusive results".<sup>6</sup> The Regional Board ordered Chevron to submit a report detailing its plans for compliance with the prohibition or a new proposal for an exception on October 1, 1985.<sup>7</sup> The Regional Board gave Chevron until July 1, 1987 to comply with the prohibition or to receive an exception.

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<sup>5</sup> Order No. 78-18, Findings 5 and 7.

<sup>6</sup> This was the same exception Chevron had applied for and was not granted in Order No. 78-18.

<sup>7</sup> As discussed above, Chevron has submitted plans to build a deepwater outfall to comply with the prohibitions and has also submitted a new application for an exception.



authorized by the Federal Water Pollution Control Act, as amended, issue waste discharge requirements and dredge or fill material permits which apply and ensure compliance with all applicable provisions of the act and acts amendatory thereof or supplementary, thereto, together with any more stringent effluent standards or limitations necessary to implement water quality control plans, or for the protection of beneficial uses, or to prevent nuisance." (Water Code Section 13377.)

The issue as to whether the Regional Board should have adopted more stringent state standards, depends first, therefore, on a finding that such standards are necessary to implement any water quality control plans, to protect beneficial uses, or to prevent nuisance. If the question is answered in the affirmative, it necessarily follows that the Regional Board should have adopted more stringent state standards in its requirements, since requirements "shall implement relevant water quality control plans...and shall take into consideration the beneficial uses to be protected . . . [and] the need to prevent nuisance . . . ." (Water Code Section 13263(a).)<sup>17</sup>

1. Beneficial Uses

The beneficial uses of Castro Creek, Castro Cove and San Pablo Bay are identified in the Regional Board's Basin Plan. They are water contact recreation, non-contact water recreation, navigation, commercial and sport fishing, wildlife habitat, estuarine habitat, fish spawning and migration,

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<sup>17</sup> "The regional board, after any necessary hearing, shall prescribe requirements as to the nature of any proposed discharge, existing discharge, or material change therein, except discharges into a community sewer system, with relation to the conditions existing from time to time in the disposal area or receiving waters upon or into which the discharge is made or proposed. The requirements shall implement relevant water quality control plans, if any have been adopted, and shall take into consideration the beneficial uses to be protected, the water quality objectives reasonably required for that purpose, other waste discharges, the need to prevent nuisance, and the provisions of Section 13241." (Water Code §13263(a).)

industrial uses, preservation of rare and endangered species, and shellfishing. (Basin Plan, 1982, at Table 2-1.)

Adverse impacts on beneficial uses can be established either by direct observation of fish kills, lack of species diversity or other obvious impacts, or by the indirect method of comparing concentrations of compounds in the receiving water with criteria which have been set for acute and chronic toxicity. Under either method, the evidence before us establishes that beneficial uses in the receiving water are being adversely affected by the Chevron discharge.

The requirements contain the following finding, which has not been challenged by the discharger: "Chevron, U.S.A. self-monitoring reports and other studies indicate process wastewater...and cooling water...have recurrently and independently exhibited acute toxicity. The combined effluent...may therefore contain conservative toxicants which are being discharged to Castro Creek."<sup>18</sup> Of special concern to us is that the cooling wastewater, which is purported to serve a dilution purpose, has exhibited toxic properties.

The discharger argues that there is no adverse impact on beneficial uses in Castro Cove, since Castro Cove has high plant productivity and that impacts caused by polluted sediments in Castro Cove are responsible for any harm to beneficial uses, rather than the present discharge.<sup>19</sup> Our review of the record reveals that while plant productivity is high, a lack of species

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<sup>18</sup> Order No. 85-26, Finding 9.

<sup>19</sup> Pollutants in the sediments are the result of years of discharge from the discharger's refinery, along with prior discharges to the Cove, including a major discharge from a sewage treatment plant.

adequately protect water quality. First, many toxic pollutants are not regulated. While toxic pollutants may be controlled to some extent by the control technologies required for other compounds, there is no assurance that discharges of toxic pollutants will be low enough to protect water quality. This is of special concern in the regulation of California refineries which process crude oil with great variability in concentration of metals and potential pollutants.

Another concern we have regarding the effectiveness of the EPA petroleum guidelines to protect water quality is the method used for calculating mass emission limits. The limits were arrived at by multiplying a predicted wastewater flow per unit of production by an actual, achievable effluent concentration. The model predicted greater wastewater flows than many refineries achieve, since they often reuse and recycle water. This applies to Chevron, which discharged an average of 12 mgd in early 1985, whereas the EPA model predicted a discharge of 16 mgd. At other refineries, actual discharges have been as low as one-third of the wastewater anticipated by the model.<sup>15</sup> The result is that pollutants are discharged at higher concentrations than was anticipated by EPA and is known to be achievable. While water savings may be an admirable goal, if this is not accompanied by a decrease in the mass of pollutants discharged, the result is a more highly concentrated effluent, which is more toxic to aquatic organisms.

Our concerns regarding the adopted guidelines pertain to the effluent limitations themselves and not to EPA's assumptions regarding control

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<sup>15</sup> Regional Board Memorandum from T. E. Mumley, M. D. Drennan and L. P. Koeb to Roger James, dated December 18, 1984.

technology. In other words, because the EPA petroleum guidelines do not contain concentration limitations for regulated pollutants, and contain no restrictions on many pollutants, they do not in fact fully reflect BAT technology. To correct this situation, the Regional Board would merely have to calculate the concentration limits which are achievable by employing the control technology found by EPA to constitute BAT.

In Order No. 85-26, the Regional Board has applied EPA's mass-based limitations and has added a concentration-based limitation for oil and grease, as required by the Basin Plan. In an earlier draft permit, the Regional Board staff had proposed concentration limits for most of the regulated pollutants and for several trace elements. The adopted permit did not include these limitations, and the petitioner seeks to have these or more stringent concentration-based limitations included in the requirements.

C. The Need for More Stringent State Standards

As described above, the Regional Board is compelled to adopt requirements at least as stringent as the EPA petroleum guidelines. These mass-based effluent limitations constitute the minimum restrictions required under federal law. In addition, federal law permits the enforcement of more stringent state standards.<sup>16</sup> In fact, California law requires such standards where necessary to protect beneficial uses, to implement water quality control plans, or to prevent nuisance:

"Notwithstanding any other provision of this division, the state board or the regional boards shall, as required or

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<sup>16</sup> Clean Water Act, §510.

Order No. 85-26 contains effluent limitations and toxic effluent standards established by EPA for petroleum refineries. As will be discussed more fully in the next section, these EPA petroleum guidelines are mass-based and exclude many toxic compounds. The petitioner argues that the Regional Board should have set more stringent water-quality based limitations in the interim period until July 1987, in order to protect the beneficial uses in Castro Creek and Castro Cove.

### 3. EPA Petroleum Guidelines

The NPDES permit system is a federal regulatory program to regulate discharges from point sources to waters of the United States, and is intended to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters."<sup>8</sup> The State has obtained authority to regulate point sources within this State, through issuance and enforcement of waste discharge requirements. Both the Clean Water Act<sup>9</sup> and the California Water Code<sup>10</sup> allow for more stringent state standards to be included in waste discharge requirements where necessary to protect beneficial uses, implement basin plans, or prevent nuisance.

To implement the Clean Water Act, EPA has developed effluent limitations guidelines and standards for major industries, including petroleum refining. In May 1974, EPA promulgated effluent limitations guidelines reflecting "best practicable control technology currently available" (BPT) for

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<sup>8</sup> Clean Water Act, §101(a).

<sup>9</sup> Clean Water Act, §510.

<sup>10</sup> Water Code §13377.

the petroleum refining point source category.<sup>11</sup> BPT is meant to represent the average of the best existing performances of well-known technologies for control of traditional pollutants. The BPT regulations set limitations for biochemical oxygen demand (BOD), total suspended solids (TSS), chemical oxygen demand (COD), oil and grease, phenolic compounds, ammonia, total chromium, hexavalent chromium, and pH. All limitations except pH were based on mass emissions rather than concentrations.

On October 18, 1982, EPA published effluent limitations guidelines for best available technology economically achievable (BAT) for the petroleum refining industry.<sup>12</sup> BAT limitations generally represent the best existing performance of control technology in the industrial category. Implementation of BAT limitations should result in less emissions than BPT limitations, thus complying with the intent expressed in the Clean Water Act to "result in reasonable, further progress toward the national goal of eliminating the discharge of all pollutants."<sup>13</sup> The regulations adopted using BAT, however, contained identical limitations to those used in BPT. Following a legal challenge to the regulations, and a subsequent settlement agreement, EPA revised its effluent limitations guidelines.<sup>14</sup> The guidelines reflected reductions in limitations for total chromium, hexavalent chromium and phenolic compounds.

There are two aspects of the federal petroleum guidelines which raise doubts as to whether use of these limitations at the discharger's refinery will

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<sup>11</sup> 39 Fed. Reg. p. 16560; amended on May 20, 1975 (40 Fed. Reg. p. 21939).

<sup>12</sup> 47 Fed. Reg. p. 46434.

<sup>13</sup> Clean Water Act, §301(b)(2)(A).

<sup>14</sup> 50 Fed. Reg. p. 28516.

diversity indicates harmful effects from pollutants and that the properties of the discharge, in addition to the polluted sediments, are causing harm to aquatic life.

The most extensive study of the discharge performed to date is the "Equivalent Protection Study" submitted to the Regional Board by the discharger.<sup>20</sup> The study involved a comparison of invertebrates, fish and marsh ecology, and water and sediment quality within Castro Cove and two similar habitats--Corte Madera and Gallinas Creek marshes.<sup>21</sup> The study found a 40 percent higher plant productivity rate at Castro Cove than at the control marshes. The higher plant productivity rate may be explained by the presence of nutrients, including nitrogen and phosphorous in the discharge. In addition, Chlorophyll a concentrations are elevated, which would indicate the presence of algae blooms--a food source for aquatic life.

While plant productivity levels were higher at Castro Cove than at the control sites, there was a reduction, and in some cases an absence, of certain species at Castro Cove. This appears to be the result of the toxic pollutants in Chevron's discharge and polluted sediments in the Cove.

One bird species which is present at the control marshes and significantly less abundant at Castro Creek is the California clapper rail, an endangered species. This may be explained by the lack of bivalves, the clapper rail's preferred food, in the marsh. The study showed that while horse mussels and Baltic macoma were present at the control sites, they were not generally found at the Castro Creek Marsh.

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<sup>20</sup> CH<sub>2</sub>M Hill, "Equivalent Protection Study Intensive Investigation," Final Report to Chevron, U.S.A., April 1982.

<sup>21</sup> While the two other habitats do not receive refinery wastes, they may also be impacted by the discharge of pollutants.

The Castro Creek marsh displayed fewer benthic species and less species diversity. Mollusc biomass was less than 20 percent that found in the control sites. Benthic invertebrates, including horse mussels and *Heteromasters filiformis*, are rare or absent from Castro Creek. On the other hand, the biomass of other benthic invertebrates, including some polychaetes, is 5 to 10 times greater in Castro Creek than the control sites. It appears that benthic species which are resistant to pollutants and can make use of algae and bacteria as food sources are thriving, while less hardy species have declined.

The study demonstrated that Dungeness crab and bay shrimp--aquatic life that are harvested commercially--were almost completely absent from Castro Creek, while the control site had significant populations. Fish catches in Castro Cove displayed few species and low numbers in the spring and almost no benthic flatfishes throughout the year.

The Chevron report also performed bioassay studies to measure directly the effects of the discharge on aquatic organisms. The importance of these studies is the ability to separate impacts from the discharge from those caused by the polluted sediments in Castro Cove. An in situ bioassay involved the placement of cages containing horse mussels at various sites in Castro Cove and the control sites. Significantly more horse mussels died at the station within 10 meters of the discharge than at any other station. The horse mussels in Castro Cove generally grew faster in length but gained less weight or lost weight, compared to the control sites. The mussels near the discharge accumulated hydrocarbons, chromium and two pesticides. The mortality rate and growth anomalies may explain the absence of horse mussels in Castro Creek. Results of tank bioassays using horse mussels yielded similar results.



The studies on aquatic organisms in Castro Creek lead us to conclude that the discharge is having a significant adverse impact on the following beneficial uses in Castro Creek and Cove: commercial and sport fishing, wildlife habitat, estuarine habitat, fish spawning and migration, preservation of rare and endangered species and shellfishing. In addition to the direct evidence provided by the study of aquatic organisms, the levels of chemical constituents in the receiving water and sediment of Castro Cove and Creek demonstrate the presence of toxic substances which are expected to impact beneficial uses.<sup>22</sup>

The following constituents have been found in the treated process wastewater over the past four years: cadmium, chromium, copper, cyanide, lead, mercury, nickel, selenium and zinc. The levels are shown in Attachment 1. From 1982 to 1984, however, cadmium, copper, cyanide, lead and zinc were monitored only once a year, and concentrations may at times have been higher.

We have analyzed the discharge to determine whether there is compliance with the receiving water criteria suggested by EPA for the protection of saltwater aquatic life.<sup>23</sup> The diluted concentrations of

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<sup>22</sup> The discharger concedes the presence of pollutants in the sediment near the discharge point, but argues that it is the result of former practices by itself and other dischargers, and not a result of current discharge activities. While water quality has improved in recent years, due to the removal of a municipal discharge and improvements in Chevron's discharge, Chevron's discharge continues to have an adverse impact on aquatic life. In addition, it appears from the presence of oil and grease in the sediment that the sediment quality is largely the result of discharges from the refinery.

<sup>23</sup> EPA Water Quality Criteria for Protection of Saltwater Aquatic Life. 50 Fed. Reg., p. 30784, July 29, 1985; 45 Fed. Reg., p. 79318, November 28, 1980. See Attachment 2.

copper, cyanide, lead, mercury, nickel and zinc were found to exceed the EPA water quality criteria. While the water quality criteria for selenium were not exceeded by the discharge of 0.036 ppm, we are concerned whether the criteria for the constituent are adequate, since the EPA criteria for selenium in freshwater were recently found to be inadequate.<sup>24</sup>

The discharger's study showed other pollutants of concern, including ammonia, nitrite, orthophosphate, chlorophyll and alkalinity were found in higher concentrations in Castro Cove than in the control areas. These levels are caused by the discharge from the Chevron refinery. The adopted requirements contain concentration limitations for oil and grease, which have not been exceeded. We are concerned, however, that the levels of oil and grease in the discharge may in fact be adversely affecting beneficial uses. In the in situ bioassay tests discussed above, horse mussels exposed to refinery effluent accumulated hydrocarbon fractions, which may have been the cause of the mortality and abnormalities detected. We are also concerned that not enough attention has been paid to the cooling water discharge, which the discharger's study found contained high levels of ammonia and oil.

The limitations for oil and grease in the requirements are based on provisions in the Basin Plan, which set levels for all treatment facilities discharging to inland surface water. We are concerned whether these levels may be too high where the discharger is a petroleum refinery, where the oil and grease may contain a collection of aliphatic and aromatic hydrocarbons which

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<sup>24</sup> A. Dennis Lemly, "Selenium in a Power Plant Cooling Reservoir: A Long Term Study of Accumulation from Waterborne concentrations in the Low Microgram Per Liter Range."

would be more toxic than oil and grease discharged from other industries.<sup>25</sup> The Regional Board should reevaluate the oil and grease limitations contained in the Basin Plan, to determine the feasibility of establishing different limitations for categories of industries.

The effect of the present discharge on Castro Creek and Cove is localized, making it easier to identify impacts on beneficial uses. Should the discharger construct a deepwater diffuser, it would be more difficult to ascertain and isolate an impact on beneficial uses caused by the discharge. As discussed below, however, the Bay is a stressed environment and the discharge of the same amount of pollutants through a deepwater diffuser can be expected to contribute to impacts on beneficial uses.

## 2. Basin Plan Provisions

In addition to the need to protect beneficial uses, there are Basin Plan provisions which require imposition of more stringent state standards. As discussed above, there has been a prohibition in the Basin Plan since 1974 against discharges of pollutants to dead-end sloughs and against discharges without a minimum initial dilution of 10:1. The discharger has been in violation of this prohibition for over 10 years.

The discharge is through an underflow weir into Castro Creek, which flows through intertidal mudflats in Castro Cove. The Basin Plan requires protection and preservation of the remaining marsh communities in the San Francisco Bay area, and acknowledges the importance of the mud flats to the

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<sup>25</sup> See, e.g., Striped Bass Study, n. 26, infra.

area.<sup>26</sup> The Basin Plan thus requires special protection of the area of the discharge.

The Basin Plan also prohibits the discharge of all toxic substances in toxic amounts:

"All water shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, species abundance, reproductive success, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board . . . . [T]he survival of aquatic life in surface waters subjected to a waste discharge or other water quality factors, shall not be less than that for the same water body in areas unaffected by the waste discharge." (Basin Plan, p. 3-5, 1982.)

From the foregoing discussion of beneficial uses, it is clear that the discharge contains toxic substances in violation of this prohibition.

### 3. Bays and Estuaries Policy

In 1974, the State Board adopted the Water Quality Control Policy for the Enclosed Bays and Estuaries of California (Bays and Estuaries Policy). In that policy, the Board stated:

"Persistent or cumulative toxic substances shall be removed from the waste to the maximum extent practicable through source control or adequate treatment prior to discharge."

Thus, the State Board policy for all bays and estuaries is removal of toxic substances prior to discharge, to the greatest extent practicable.

The San Francisco Bay was singled out as a body of water in particular need of protection:

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<sup>26</sup> Basin Plan, p. 2-8, 1982.

"There is a considerable body of scientific evidence and opinion which suggests the existence of biological degradation due to long-term exposure to toxicants which have been discharged to the San Francisco Bay-Delta system. Therefore, implementation of a program which controls toxic effects through a combination of source control for toxic materials, upgraded wastewater treatment, and improved dilution of wastewaters, shall proceed as rapidly as is practicable with the objective of providing full protection to the biota and the beneficial uses of Bay-Delta waters in a cost-effective manner."

#### 4. Impacts of Discharges to San Francisco Bay

As discussed above, the State Board has already found, in its Bays and Estuaries Policy, that "[t]here is a considerable body of scientific evidence and opinion which suggests the existence of biological degradation due to long-term exposure to toxicants which have been discharged to the San Francisco Bay-Delta System." This finding is supported by two recent studies of the area.

The Striped Bass Study,<sup>27</sup> recently conducted for the State Board, documents the presence of a broad variety of pollutants in striped bass which inhabit the San Francisco Bay and the Delta. The pollutants include hydrocarbons, PCBs, heavy metals and chlorinated hydrocarbons. In some cases, the levels found exceeded guidelines established by the National Academy of Sciences and EPA for the protection of aquatic life and predators. The researchers found the following potential effects on the population from chronic exposure to these pollutants: decreased growth, lack of reproduction, and lack of survival.

A recent study on cumulative impacts of discharges to San Francisco Bay confirmed the detrimental impact on aquatic life:

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<sup>27</sup> M. Jung, J. Whipple, M. Moser, "Summary Report of the Cooperative Striped Bass Study", 1984.

"Localized instances of biological contamination with toxic metals and trace organics equal those anywhere in the world. Indications of physiological stress in animals contaminated with trace toxicants have also been observed; and the toxicant tolerance in one species of bivalve suggests that adaptability to toxicant stress may be important for survival, at least in some parts of the Bay. Although most contaminant impacts are localized, the number of impacts may be large because of the number of point-source dischargers and accidental spills. The result is an environment of unpredictable and variable suitability for the development of a complete ecosystem. Such environments tend to select against the larger, longer-lived species most valuable to man. The history of fisheries in the Bay reflects such a trend-away from larger, more valuable species and toward smaller species with greater adaptive flexibility."<sup>28</sup>

##### 5. Water Quality Monitoring

A review of the discharger's water quality monitoring since January 1984 reveals that, if the concentration limits initially proposed by the Regional Board staff had been in effect since that date, there would have been no violations of the following toxic parameters: phenolic compounds, sulfide, total chromium and hexavalent chromium. The proposed limit for ammonia would have been exceeded twice, but as discussed above, high chlorophyll a concentrations in Castro Cove have demonstrated the presence of excessive nutrients. The ammonia limit should be reduced to protect beneficial uses. Finally, the proposed oil and grease limitation was exceeded several times in the first three months of 1984, but the adopted requirements would also have been violated. No further violations have occurred, making it unlikely that the treatment system is unable to control this constituent sufficiently.

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<sup>28</sup> S. Luoma, J. Cloern, "The Impact of Wastewater Discharge on Biological Communities in San Francisco Bay," U. S. Geological Survey, 1982.

As was discussed above, the adopted permit contains no limitations for trace elements. The Regional Board staff's draft permit did contain concentration limitations for cyanide, copper, lead, nickel and zinc. But there is not sufficient data in the record for us to determine whether these proposed limitations are presently achievable by the discharger. Specifically, there is no data on the concentration of these elements or of selenium in the cooling water, and it is therefore not possible for us to quantify a mass balance in order to determine the concentrations in the discharger's combined wastewater effluent.

#### IV. CONCLUSION

In conclusion, the implementation of more stringent state standards than the EPA petroleum guidelines is necessary to implement the Basin Plan and to protect beneficial uses. While the discharger argues that the observed beneficial use impacts are largely due to sediment quality from past discharges, we believe that the present water quality is also adversely affecting beneficial uses. While poor sediment quality would explain the greater impact on benthic organisms, we have noted impacts on a variety of wildlife. In addition, the bioassay tests indicate the presence of harmful pollutants in the discharge. Because we have detected the presence of pollutants in the discharge, we cannot assume all adverse impacts are caused by the sediments.

We realize that the Regional Board will enforce the prohibitions contained in the Basin Plan on July 1, 1987. However, until the July 1, 1987 deadline is met, discharges to Castro Creek will continue to have an adverse impact on beneficial uses. It is therefore necessary that the Regional Board

impose more stringent limitations on the discharger during this interim period in order to protect the water quality in Castro Cove and Creek. From our review of policies and studies concerning San Francisco Bay, we further conclude that more stringent limitations will be required should the discharger operate a deep-water diffuser.<sup>29</sup> We therefore agree with the petitioner that the Regional Board should have included more stringent, concentration-based limitations in its requirements. The technical feasibility of such requirements is documented in the EPA regulations establishing effluent limitations and by the discharger's own monitoring records. We also conclude that such more stringent limitations should be applied regardless of whether the discharge point is to Castro Cove or to the Bay. These conclusions relate to the petitions before us and are based on the site specific factors of this case.

We have analyzed the concentration-based limitations proposed by the Regional Board staff in their draft permit and have determined that those limitations on the toxic constituents already regulated in the adopted permit (i.e., oil and grease, phenolic compounds, ammonia, sulfides, total chromium and hexavalent chromium) would be appropriate, could be met, and should therefore be applied. The Regional Board should also determine appropriate concentration limitations for the trace elements not currently regulated. We cannot make a determination at this point as to whether the concentration limitations contained in the draft permit for these constituents (i.e., cadmium, chromium,

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<sup>29</sup> We note that the Regional Board may amend its Basin Plan to include water quality-based standards to regulate discharges to San Francisco Bay. Should the Basin Plan be amended in this manner, it would be appropriate for the Regional Board to revise any permit regulating discharge from a diffuser to the Bay to include such numerical standards.



copper, cyanide, lead, nickel, zinc and selenium) are appropriate or could be met, because the record does not contain data regarding the concentration of these constituents in the cooling water.

From our review of the impacts on beneficial uses in Castro Cove and Creek, it appears that even implementation of limitations based on complete application of BAT may not fully protect water quality in this area should the discharger fail to move its discharge to a deepwater outfall in July 1987. (As is noted above, Chevron is pursuing an application for an exception to the prohibitions against discharging to Castro Creek.) Therefore, if the discharge remains in Castro Creek past this date, the Regional Board should adopt limitations which will protect water quality, recognizing that such limitations may be more stringent than those based on BAT.

#### IV. ORDER

1. The Regional Board shall amend the requirements to include concentration limits based on BAT for the process wastewater discharge for oil and grease, phenolic compounds, ammonia, sulfides, total chromium and hexavalent chromium.

2. The Regional Board shall amend the requirements to include concentration limitations based on BAT for the process wastewater discharge for the following pollutants: cadmium, chromium, copper, cyanide, lead, nickel, zinc and selenium.

3. If the discharger does not move its discharge from Castro Creek and Cove by July 1, 1987, the Regional Board shall amend the requirements to include water quality-based concentration limitations for all pollutants described in 1 and 2 of this Order.

4. Pursuant to Water Code Section 13267, the Regional Board should require Chevron to submit a technical report regarding the presence of oil and grease in the sediments in the Castro Creek area. The study should examine the concentration of pollutants in the sediments, the areal extent of pollution and the economic feasibility of removing the polluted sediments.

CERTIFICATION

The undersigned, Executive Director of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of an order duly and regularly adopted at a meeting of the State Water Resources Control Board held on February 20, 1986.

Aye: Raymond V. Stone  
Darlene E. Ruiz  
E. H. Finster  
Eliseo M. Samaniego  
Danny Walsh

No: None

Absent: None

Abstain: None

*Raymond Walsh*

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Raymond Walsh  
Interim Executive Director

Maximum Reported Concentration [1] from Chevron USA's Richmond Refinery,  
Process Wastewater Discharge

	1982	1983	1984	1985
Cadmium	10	10	2	<10
Chromium	118	88	48	90
Copper	<10	10	32	113
Cyanide	<20	1000	100	<50
Lead	160	1	12	251
Mercury	<2	<2	<2	5
Nickel	1000	260	1070	158
Selenium	-	-	-	180
Zinc	100	20	30	880

[1] All concentrations have units of ug/l.

## USEPA Water Quality Criteria for Protection of Saltwater Aquatic Life [1]

	<u>96 Hour Average (ug/l)</u>	<u>1 hour average (ug/l)</u>
Cadmium	9.3	43
Copper	-	2.9
Cyanide	-	1.0
Lead	5.6	140
Mercury	0.025	2.1

## USEPA Water Quality Criteria for Protection of Saltwater Aquatic Life [2]

	<u>24 Hour Average (ug/l)</u>	<u>Maximum (ug/l)</u>
Nickel	7.1	140
Selenium	54	410
Zinc	58	170

## USEPA Saltwater Aquatic Life Toxicity Information [1,3]

	<u>Acute (ug/l)</u>
Chromium (III)	10,300

[1] Federal Register, Volume 50, No. 145, July 29, 1985.

[2] Federal Register, Volume 45, No. 231, November 28, 1980.

[3] The available data indicate that acute toxicity occurs at this concentration, and would occur at a lower concentration among species more sensitive than those tested.