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PHASE 2 FACILITIES PLAN

VOLUME VIII

Supplemental Environmental Impact Report: Effluent Outfall

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Camp Dresser & McKee Inc.

TABLE OF CONTENTS

SECTION		PAGE
1.0	INTRODUCTION	1-1
1.1	Overview	1-1
1.2	Update of Outfall	1-1
1.2.1	Dissolved Oxygen Issues	1-2
1.2.2	Toxicity Issues	1-2
1.2.3	Transport-Travel Time Issue	1-2
1.3	Regulatory Options	1-3
1.3.1	Dissolved Oxygen Criteria	1-4
1.3.2	Toxicity Pollutant Criteria	1-5
1.4	Report Organization	1-5
2.0	1990 DISSOLVED OXYGEN MONITORING PROGRAM	2-1
2.1	Background	2-1
2.1.1	Previous Field Studies in New Bedford Harbor	2-1
2.1.2	New Bedford Harbor Dissolved Oxygen	2-1
2.1.3	Data Needs	2-2
2.1.4	Collection Schedule	2-3
2.1.5	Supplemental Data	2-4
2.2	DO Data Summary	2-4
2.2.1	Individual Profile Data	2-4
2.2.2	Continuous Record Data	2-7
2.3	Other Data	2-10
2.3.1	Meteorology	2-10
2.3.2	Hydrographic Measurements of Temperature and Salinity	2-15
2.3.3	Mooring Temperature and Salinity	2-17
2.3.4	Current Meter Deployment	2-17
2.3.5	Wave Monitoring	2-23
2.3.6	Hydrographic Measurements of Chlorophyll	2-23
2.3.7	Nutrients	2-23
2.3.8	Streamflow	2-26
2.4	Summary of Data Observations	2-26

Section 1

Section 2

2.5 Data Interpretation..... 2-28

2.5.1 DO at the Moorings..... 2-28
2.5.2 Continuous Record at Mooring 3..... 2-28
2.5.3 Driving Forces..... 2-32
2.5.4 Advection and Gravity Currents..... 2-32
2.5.5 Air Temperature..... 2-33
2.5.6 Precipitation..... 2-36
2.5.7 Wind..... 2-40
2.5.8 Spatial Variability of Chlorophyll in Harbor..... 2-40
2.5.9 Cloud Cover..... 2-43

2.6 Summary..... 2-43

3.0 ASSESSMENT OF DISSOLVED OXYGEN IN THE RECEIVING WATERS..... 3-1

3.1 Introduction..... 3-1

3.2 Nitrogen Inputs..... 3-1

3.2.1 Existing Conditions..... 3-1
3.2.2 Nitrogen Inputs with Secondary Treatment..... 3-3
3.2.3 Conclusions Regarding Nitrogen Inputs..... 3-3

3.3 Dissolved Oxygen Dynamics..... 3-5

3.3.1 Primary Productivity..... 3-7
3.3.2 Sediment Oxygen Demand..... 3-8

3.4 Effects of Going to AWT on Dissolved Oxygen..... 3-11

3.4.1 Nitrogen Inputs..... 3-11
3.4.2 Sediment Oxygen Demand..... 3-14
3.4.3 Estimating Oxygen Depression with AWT..... 3-17

3.5 Summary of Findings..... 3-21

4.0 ASSESSMENT OF EFFLUENT DISCHARGE ON MARINE LIFE AND HARBOR USES..... 4-1

4.1 Introduction..... 4-1

4.2 Effects on Marine Life..... 4-1

4.2.1 Existing Site..... 4-1
4.2.2 The 301(h) Site..... 4-5

4.3 Evaluation of Regulatory Options for Water Body Classification..... 4-6

4.3.1 Existing Uses..... 4-7
4.3.2 Existing Water Quality Conditions Related to Designated Uses..... 4-7
4.3.3 Effects of a Secondary Effluent Discharge on Uses. 4-8

Section 1

Section 2

4.3.4 Conclusions..... 4-11

4.4 Findings..... 4-12

5.0 TOXICITY CONSIDERATIONS..... 5-1

5.1 Introduction..... 5-1

5.2 Assessing Compliance with State Toxic Pollutant Standards. 5-2

5.2.1 Individual Chemicals..... 5-2
5.2.2 Whole Effluent Toxicity..... 5-3

5.3 Subsequent Dilution for the Effluent Plumes..... 5-7

5.4 TREs and TIEs..... 5-8

6.0 SUMMARY..... 6-1

6.1 Overview..... 6-1

6.2 Findings of the 1990 DO Monitoring Program..... 6-2

6.2.1 DO Depletions..... 6-2
6.2.2 Benthic Populations..... 6-4

6.3 Changes in Outfall Evaluation Criteria..... 6-5

6.4 The Next Step..... 6-6

6.4.1 Dissolved Oxygen..... 6-6
6.4.2 Toxic Pollutant Criteria..... 6-9

Section 1

Section 2

Section 3

4.0 ASSESSMENT OF EFFLUENT DISCHARGE ON MARINE LIFE AND HARBOR USES

4.1 INTRODUCTION

Ultimately the issues about acceptable DO levels for New Bedford Outer Harbor focus on the effect of existing and predicted levels on the fauna of the harbor and the attainment of uses for the receiving waters. This section re-examines the findings of the final FP/EIR in light of the 1990 field program and analyses conducted in Sections 2.0 and 3.0, and considers the issue of whether predicted levels of DO in the bottom stratified layer will affect marine life or impair designated uses of the study area.

4.2 EFFECTS ON MARINE LIFE

4.2.1 EXISTING SITE

In the final FP/EIR, it was concluded that a secondary discharge at the existing Site would result in a slight increase in total harbor-wide primary productivity in the Outer Harbor (but not an increase in areal primary productivity); have no impact on fish, lobster, or clams; and increase the diversity of benthic species in the immediate vicinity of the outfall. The results obtained during the summer of 1990, and additional analyses of existing information, have all supported these conclusions.

The major issue addressed by the 1990 field program that has a direct bearing on marine life is the measurement of dissolved oxygen. The data collected confirmed the original contention that waters in the Outer Harbor do not become hypoxic (< 3 mg/l), even with the presence of a primary discharge. Although the DO levels fell below 5 mg/l occasionally, they never fell below 45% of saturation.

Recent data from the North Sea (Sweden) indicate that the DO levels need to fall below 40% of saturation before the marine life is affected to the extent that populations normally found in coastal embayments are impacted or changed (Baden et al., 1990; Rosenberg et al., 1990). Laholm Bay in

has been subjected to extensive studies during the last 10 years as lt of the recent occurrences of hypoxia caused by excess primary tivity. Field and laboratory studies were combined to determine the of low oxygen conditions on a number of different organisms, and these it was concluded that oxygen related-impacts in a coastal ent become evident only when the oxygen saturation fell below 40% et al., 1990). The Norway Lobster (Nephrops norvegicus) was one of st sensitive species. When oxygen saturation fell below 40%, it ed from its burrows. Death in the lobster, however, occurred only saturation fell below 15% to 10%. Other organisms began dying when ation levels fell between 5 to 10%. Most or all the macrofauna died when oxygen levels were at or below 5% for several weeks (Baden et 1990).

continuous DO data collected in the Outer Harbor show that DO ssions below 5 mg/l are usually of short duration and are mediated by or day/night cycles. As discussed in Section 2.0 and Appendix B, the oral distribution of oxygen in the nearshore bottom waters has a large of high frequency fluctuations. Hence benthic fauna are not subject continuous exposure of lower DO values (below 5 mg/l) for several but rather to brief periods ranging from 9 to 20 hours. Only once the summer did the DO saturation fall to between 50 and 75 percent more than 20 hours. Even then the DO depression lasted for less than days (Table 4-1).

dent fauna that may be affected by longer periods of low DO saturation will not be affected as much if the exposure is brief and tributed over the summer. The recent evidence also indicates that tal marine fauna living in shallow bays has evolved adaptive strategies rvive such short periods of reduced oxygen. For example, the Norway ers were observed to stretch their legs to reach higher oxygen waters the bottom when saturation fell to 20%. In addition, analyses of the of these species indicate it has the capability of metabolizing its lood protein for energy at times of low oxygen when it cannot feed.

TABLE 4-1
FREQUENCY AND DURATION OF DO DEPRESSIONS BELOW 60% SATURATION AT STAION 3L

	Duration (hrs)	Minimum % Sat	Mean % Sat
[illegible]/90	10	0.56	0.59
[illegible]/90	14	0.53	0.56
[illegible]/90	5	0.54	0.57
[illegible]/90	4	0.52	0.56
[illegible]/90	4	0.56	0.57
[illegible]/90	9	0.47	0.51
[illegible]/90	7	0.56	0.57
[illegible]/90	7	0.55	0.58
[illegible]/90	19	0.47	0.52
[illegible]/90	14	0.45	0.53
[illegible]/90	4	0.58	0.59
[illegible]/90	13	0.54	0.57
[illegible]/90	7	0.57	0.58
[illegible]/90	20	0.49	0.54
[illegible]/90	5	0.58	0.59
[illegible]/90	60	0.52	0.57
[illegible]/90	16	0.55	0.56

fish swim out of oxygen depleted bottom waters, while shellfish down their metabolism and even switch to anaerobic metabolism for riods (Baden et al., 1990).

cent results regarding the Norway Lobster would suggest that the y results regarding the American Lobster that were reported in the P/EIR may not reflect how the American Lobster might actually in its natural habitat to decreased DO level. In the laboratory, rican Lobster was observed to show signs of stress when saturation fell below 70%. The oxygen depressions in the experiments were rm and no surface to top gradients were established. Thus, the tory conditions did not adequately model actual field conditions, and re recent data should be used to assess potential impacts.

der analysis of existing benthic data suggests that the existing ic species and their abundances near the outfall are indicative of mental stress, but only moderate levels of stress. The original ent in the final FP/EIR that the benthic community at the Existing shows signs of being severely stressed was misleading. The population Existing Site may be considered highly stressed relative to other dens in Buzzards Bay, but only moderately stressed when considered ive to locations worldwide.

opportunistic species most common in the Outer Harbor is Mediomastus ineta. This species is common to coastal areas that are subject to rate levels of stress, but it is not found in severely stressed itats. For example, in Narragansett Bay Mediomastus is very abundant in middle of the bay, but not found in the Providence River, which is a ly stressed environment (Oviatt et al., 1986; Oviatt et al., 1987; et al., 1986). Mediomastus is also found as a significant component benthic population (10 to 50% of the numbers) in the middle of rds Bay (see Appendix B), which is also not considered to be severely ed. Species that dominate in areas of severe stress such as the tellids and Mulinia sp. were found in both the Outer Harbor and rds Bay but never as the dominant fauna.

ata collected in 1990 and re-analysis of existing data indicate coastal marine habitat in the Outer Harbor shows signs of some t the species living there are adapted to this stress. Important l and recreational species such as lobster, clams and fish are as described in Section 4.0 volume IV of the final FP/EIR) and lations seem to be stable. The species present are the same as nd in other less anthropogenically disturbed parts of Buzzards habitat in the Outer Harbor, therefore, is adequate for ing the structure and functioning of its indigenous community.

301(h) SITE

inal FP/EIR, it was concluded that no changes are expected in the community at the 301(h) Site if a secondary treated effluent is d there. This conclusion also needs further clarification in the more extensive analyses that have been done since the on of the report.

lusion made addresses only the benthic species that may be found at of a secondary effluent discharge in Buzzards bay, but not their abundances. Since the benthic species present in the Outer Harbor here is an existing discharge) are the same as those currently Buzzards Bay, no changes are expected in the composition of the present if the outfall were moved to the Bay. The increase in productivity reaching the bottom and the concomitant increase in lowering of DO levels, however, may result in a change in the abundance of Mediomastus. The map of Mediomastus distribution from recent benthic data collected during a number of different (see Appendix B) indicates that the 301(h) Site is in an area where tus densities are low, surrounded by areas to the north and east of diomastus densities. The benthic population at the 301(h) Site mark the edge of a less stressed area found southwest of New t the mouth of Buzzards Bay. Any increase in stress in the form sed organic deposition and SOD may change the relative abundance 01(h) Site to levels that are found toward the middle of Buzzards

astal embayments. Unfortunately, given the current lack of is not possible to predict the impact of such a change in bundance of dominant species on ecosystem functions.

TION OF REGULATORY OPTIONS FOR WATER BODY CLASSIFICATION

identified four regulatory mechanisms that could be used to esignation/classification of New Bedford Outer Harbor to allow scharge of treated wastewater effluent to meet water quality Discussions with the regulatory agencies have indicated that se options are the ones most reasonably pursued by the City of d. These options and our current understanding of the criteria valuate them are listed below:

- classification of the Outer Harbor (or some portion thereof) from lass SA to SB requires that the applicant show that "existing uses" ould not be impacted by the lower classification.
- stablishment of a site-specific criteria for bottom water dissolved xygen requires that the Director of DWPC determine that designated ses are not impaired.

mine the feasibility of these options, it is necessary to examine uses of the receiving waters, and how a discharge either in the arbor. The Massachusetts water quality standards define three types es: designated uses, existing uses, and national goal uses.

4.05 defines designated uses for receiving water based on the class ater body. Designated uses for Class SA receiving waters are: (1) an llent habitat for fish, other aquatic life and wildlife, (2) primary econdary contact recreation, and (3) suitable for shellfish harvesting t depuration in approved areas. Designated uses for Class SB ving waters are (1) a habitat for fish, other aquatic life and ife, (2) primary and secondary contact recreation, and (3) suitable ellfish harvesting with depuration in approved areas.

isting uses of a receiving water are "those designated uses and any uses that do not impair the designated uses that are actually d in the waterbody on or after November 28, 1975...." The national es (propagation of fish, shellfish, other aquatic life and wildlife; creation in and on the water in accordance with the Federal Water on Control Act) are incorporated directly into the definition of ted uses listed above.

EXISTING USES

ng uses of the Outer Harbor as of November 28, 1975 included tional water contact activities, recreational fishing, shellfishing, bstering. Fishing and lobstering were not prohibited in the Outer before the 1979 closure (a result of PCB contamination), and ore, need to be considered as an existing use. Although the ting of certain bivalve shellfish (clams and mussels) has been ed since before 1975 (a result of high coliform bacteria), there are trictions on other shellfish species such as scallops or whelks as ed in the final FP/EIR (Vol. IV, Section 4). Commercial fishing has nned for over 50 years, and therefore, cannot be considered an g use.

EXISTING WATER QUALITY CONDITIONS RELATED TO DESIGNATED USES

ent both the Outer Harbor and Buzzards Bay are designated Class SA . Current conditions in the Outer Harbor, however, do not support signated uses, as described below.

he shellfish beds are closed throughout the harbor as a result of igh levels of coliform bacteria, which are attributed to discharges om combined sewers and storm drains. The Division of Marine heries, however, is considering giving a conditional open status to shellfish resource in Clarks Cove. The expected procedure would o close the beds for five days following 0.2 inches of rain, and t the water after that time to see if they can be reopened.

of the beaches along the harbor are subject to occasional res because of high coliform counts predominately due to combined r overflows.

tering and the catching of certain fish is prohibited within the Harbor because of PCB contamination, and high levels of this ound in fish and lobster tissues. This closure is a result of discharges of PCBs that have contaminated the sediments. As ribed in Volume IV of the final FP/EIR, PCBs in the existing WWTP arge range from very low to not detectable.

aters do not provide an "excellent habitat for fish and other tic life." Although previous studies of fish populations did not any differences between the Outer Harbor and the rest of Buzzards (described in Section 4.0 of Volume IV of the final FP/EIR), the ysis of the benthic community in the vicinity of the existing arge indicates a certain level on stress exists (see Section 4.2) would preclude its being categorized as "excellent." The lysis of the benthic community, however, indicates that the amount tress present is moderate, and the dominant species present are ame as found throughout the rest of Buzzards Bay. Thus, the r Harbor would support an SB classification on this criterion e it does provide a "habitat for fish, other aquatic life and life."

ECTS OF A SECONDARY EFFLUENT DISCHARGE ON USES

ion discusses the effects of a secondary effluent discharge on the waters at the Existing Site relative to the "designated" and uses as defined in regulations. The discussion is focused on at the existing uses would not be impacted by a change in tion of the Outer Harbor from SA to SB, and that designated uses be impaired if a site-specific DO criterion were established. ed above, these issues exist because the recommended alternative fluent outfall system will not meet the DO criterion for Class SA

the analyses presented below and in Sections 3.0 and 4.0 it is d that the Harbor be re-classified to SB. The area that should ified include all waters in the Outer Harbor north of the harbor line extending approximately between Wilbur Point and Nonquitt).

ted and existing uses of the Outer Harbor would not be tly improved or impaired in the near future with a secondary t the Existing Site. This, however, is not result of the ischarge, but rather of other conditions in the harbor.

esent inability to achieve the designated use of shellfishing results he closure of the hard-shell clam beds in Clarks Cove and most of the rn part of the Outer Harbor. The closures result from CSO overflows orm drain discharges. As described in the final FP/EIR, the zone in shellfish could not be harvested as a result of the WWTP effluent arge can only be determined after the treatment plant is constructed. otential size of the exclusion zone, however, is small and has been ed to be approximately 400m x 250m. In the absence of other arges, the designated use of shellfish (hard-shell clam) harvesting be re-established throughout most of the Outer Harbor.

resent inability of the harbor waters to meet the designated use of ct recreation is also caused by high fecal coliform levels. Again, contamination is a result of shore discharges during storms (CDM,). The modeling of coliform bacteria coming out of a secondary arge done for the final FP/EIR indicate that beaches will not be cted by the effluent, and thus the designated use of contact ational activities will not be impaired.

econdary treatment effluent discharge at the Existing Site is not cted to cause significant changes in the existing moderately stressed hic community that is sufficient to meet the designated use criterion "excellent habitat" for aquatic life. The available data, however, also cate that the goal of "excellent habitat" cannot be met even in the al absence of any discharge. Nearshore habitats, such as those found in tal bays, are subject to environmental stresses that are natural as ll as anthropogenic. Storms, freshwater runoff, large temperature ctuations are all environmental stresses to marine organisms that are strongly felt in the nearshore habitats. As a result these habitats dominated by the more opportunistic, stress tolerant species, even when anthropogenic stresses are absent (Desprez et al., 1986). The vation that the benthic population in the northern part of Buzzards 30% to 40% Mediomastus (by abundance) would suggest that the numbers is species, which indicate moderate levels of environmental stress, never fall below this value in the Outer Harbor.

deling of DO with an AWT discharge in the Outer Harbor (see Section also suggest that much of the short-term DO stresses will still be t under "background" SOD conditions. The presence of such low level es would preclude the classification of the Outer Harbor as lent" habitat. As described in the previous section, however, the moderate levels of stress caused by occasional, short-term, DO its do not seem to be significant in the overall survival of the al nearshore benthic community in the Outer Harbor.

ould be also noted that the analyses of DO dynamics in the absence of ischarge indicate that the Outer Harbor would not meet the Class SA lved oxygen standard (75% saturation). This further supports the ision that the Outer Harbor should be reclassified to an SB water.

re-establishment of "existing uses" of fishing and lobstering will not d on improvements in the wastewater discharge, but rather in the -term burial of the existing PCB contamination in the sediments. The f PCBs has been stopped and their major continuing source to marine is through contact with the existing marine sediments. The levels in existing wastewater discharge are quite low. The addition of secondary tment and the removal of grit from the interceptor system will further ce PCB levels in the effluent.

the PCBs currently found in the New Bedford sewer system are removed, possible discharges will be eliminated. Thus, the existing uses of hing and lobstering could be re-established in the Outer Harbor with

CONCLUSIONS

basis of the predicted impacts of a secondary discharge in the Outer it is concluded that designated and existing uses of the receiving would not be impaired as they relate to Class SB waters. The data ow that the designated uses of Class SA waters are not achievable the absence of any wastewater discharge. The existing ification of the Outer Harbor is SA. Based on the analysis described

ions 3.0 and 4.0 above it is recommended that the harbor be sified to SB. The area sediments and bottom waters inside of harbor (a line extending approximately between Wilbur Point and Nonquitt) rally stressed because of the proximity to shore, and they cannot dered "excellent" habitat. The analysis of DO at Mooring 3 ts that Class SA oxygen standards would not be met even if the SOD to levels now found in the middle of Buzzards Bay. Even the Class dard of 60% saturation would be exceeded on occasion (see Table

more, establishing site-specific criteria for bottom water dissolved that allow excursions from the SB dissolved oxygen criterion of 60% tion would not impair the designated uses. The only designated use ight be impaired is "habitat for aquatic life." The analyses of the e community, the recent literature, and the existing distribution of d shellfish all show that the existing short-term DO depressions do pair the waters of the Outer Harbor as a habitat for aquatic life. the DO levels with a secondary treated effluent discharge into the arbor are not predicted to change from the existing levels, the d discharge will also not impair the habitat.

FINDINGS

final FP/EIR it was concluded that a secondary discharge at the g Site would result in a slight increase total primary productivity Outer Harbor; have no impact on fish, lobster, or clams; and e the diversity of benthic species in the immediate vicinity of the t. The results obtained during the summer of 1990, and additional of existing information, all support these findings.

s in the Outer Harbor with a secondary discharge are not expected from existing levels. The continuous record obtained during the 1990 indicate only short-term oxygen depressions that are below ration. No DO levels were measured at or below the 40% saturation produce stress in the one coastal benthic community where nsive field and laboratory experiments were done.

ore detailed analysis of the distribution of the opportunistic benthic ies, Mediomastus ambiseta, indicate that a secondary discharge at the (A) Site might result in a significant increase in the relative dance of this species.

Outer Harbor does not currently meet Class SA designated uses, and bly never will in the future because of natural background conditions. lassification of the Outer Harbor to Class SB waters is, therefore, ended. A discharge at the Existing Site would not impact Class SB gnated or existing uses; nor would a site-specific DO criterion for the ion waters.

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