

JOHN SPELTMAN
Governor



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

7272 Cleanwater Lane, LU-11 • Olympia, Washington 98504 • (206) 753-2353

M E M O R A N D U M
August 13, 1984

To: Ed O'Brien, Municipal Facilities Section
Through: Dick Cunningham *ie*
From: Tim Determan, Water Quality Investigations Section *TD*
Subject: Review of Proposal - Renton Sewage Treatment Plant Project:
Duwamish Head Baseline Study

You requested a review of the Proposed and Detailed Workplan for Renton Sewage Treatment Plant Project: Duwamish Head Baseline Study. The proposal defined five broad objectives for the project are as follows:

1. To collect, analyze, and interpret the significance of physical, chemical, biological, and geological data around the proposed very deep Duwamish Head outfall site to determine the properties and characteristics of the receiving environment (baseline goal).
2. To utilize the information obtained to aid in the final siting and design of the outfall pipe and diffuser (design goal).
3. To monitor selected physical, chemical, and biological parameters in inner Elliott Bay necessary to demonstrate the recovery following effluent diversion from the Duwamish River (recovery goal).
4. To recommend a post-construction and effluent discharge monitoring plan that would effectively and efficiently evaluate the success of the outfall siting and design criteria by assessing the nearfield receiving water environment (monitoring goal).
5. To provide missing data noted by Stober and Pierson (1984) in the biological and oceanographic data describing Elliott Bay (data base goal).

You requested that my review reflect the premise that the Department of Ecology (WDOE) would fund those objectives in the proposal that address changes induced by the very deep discharge. These are goals 1, 2, and 4 in the proposal. In the view of WDOE, efforts directed toward measuring recovery in the Duwamish estuary and inner Elliott Bay following diversion (goal 3) and developing the existing data base (goal 5) are of secondary interest and thus unlikely to be funded.

I also reviewed the data base (Stober and Pierson, 1984) in order to gauge the degree of variation to be expected in the parameters chosen for the study. In the following discussion I have identified elements of the proposal that respond to WDOE's major objectives and those that do not. I have also commented on the proposed methods and procedures insofar as I am able.

A general comment is in order. I do not imply that I am in a position to critique a proposal that has been developed by a number of qualified persons with extensive field knowledge in the project area. My comments are general in scope and brief since I understand that parts of the study are currently underway. Any issues that I raise should not be viewed as conclusive, but should lead to further interaction with the proposal's authors to clarify the points raised.

Task 1. Management

I have no comments.

Task 2. Water Column Studies

The water column studies serve several purposes, including precise outfall siting and establishing a baseline for identifying future effects. However, those aspects related to Duwamish River and Inner Elliott Bay are not targeted to the minimum WDOE goals. Thus specific objectives 2, 3, 4, and 5 (page 22) could be excluded. Routine stations 21, 22, and 24 would be retained, but station 23 might be eliminated (Figure 3.2). The surface mapping feature may also be eliminated since its main purpose seems to be tracking the Duwamish River through Elliott Bay. However, it can be argued that the savings from eliminating these programs would be a false economy since the research ship would be underway and in the area anyway. The Seahurst reference station should be retained.

The proposal calls for the determination of several variables associated with zooplankton and phytoplankton (Sections 3.7.6 - 3.7.9). Given the degree of field and seasonal variation to be expected and the relatively short time frame of the study, it may prove to be nearly impossible to detect changes due to relocation of the outfall with these methods.

The growth inhibition/recovery (Sections 3.9.3.1) and growth stimulation/recovery (Sections 3.9.3.2) experiments in the Duwamish River and Elliott Bay are not relevant to the effects of the very deep water discharge.

Task 3. Physical and Chemical Oceanography

This task uses the same sites as Task 2 (Figure 4.1). Comments made in the previous section regarding Station 23 are true here. Since the data for this task will be collected concurrently with the water column data, there is no real savings by eliminating other aspects of this program.

Tasks 4 and 5. Intertidal/Shallow Subtidal Benthic Ecology

This task serves to document the present conditions of selected important nearshore habitats potentially exposed to the very deep discharge. In addition, this task will establish a program to monitor the recovery of the inner Elliott Bay nearshore region. The latter purpose addresses the effects of the Duwamish River and is thus secondary in importance. The former is related to the very deep discharge proposal. Four objectives are identified (page 54). They are: (1) determine within-site/season variations, (2) determine among-seasons variation, (3) monitor sediment quality and oil and grease, and (4) develop a monitoring plan. Objectives 1 through 3 may prove to be difficult. Dexter, et al., 1981 (in Stober and Pierson, 1984; Figure 4.16) shows a nearly 30 percent difference between minimum and maximum abundance of benthic invertebrates over four seasons in Elliott Bay. Given the high degree of natural background variation, it may be difficult to use community structure statistics to detect changes attributable to the very deep discharge. Several authors have questioned this approach (Spight, 1976; Green, 1979). The other work (mussel growth) and periphyton productivity studies appear to be cost-effective and useful.

Another objective of this set of tasks is to examine the extent of sediment changes resulting from the relocation of the Renton discharge (page 64). The sampling plan calls for sediment samples to be taken at 70 stations in Elliott Bay including 20 in inner Elliott Bay targeted toward measuring recovery in the Duwamish River. A 30 percent savings could be accrued by not sampling the inner Elliott Bay sites.

It is estimated that approximately 10 percent of discharged total solids will rise to the surface and another 10 percent will sink (page 71). Sediment studies will be appropriate at the sites shown in Figure 6.2. The parameters to be studied include organic materials content, grain size, anaerobic conditions, and indicator organisms. My comments made earlier regarding using community structure as an index of human effects may be applicable here.

Task 6. Fishery Studies

The objectives of this task are to: (1) document the extent of recreational fisheries in the area, (2) document community statistics and ecology of fishes at two sites potentially affected by the very deep discharge and one in inner Elliott Bay, and (3) gather data on fish disease.

The first objective is not strictly related to the deepwater discharge. However, the information will be obtained relatively inexpensively. Little will be gained by its exclusion.

The other objectives are appropriate. However, Figure 7.1 shows an inner Elliott Bay site that could be eliminated.

Task 7. Fish Health

The proposal calls for avoiding areas previously studied in Malins, et al. (1980) and focusing on only two areas likely to receive effluent from the deepwater discharge. Thus, the effort fits the three objectives of interest to WDOE.

Task 8. Microbiological Studies

The specific objectives for this task include: (1) bacteria sampling in the surface film and underlying water, (2) study the effects of ultraviolet light on indicator bacteria at the surface, (3) determine survival of pathogens in the water column, (4) detect pathogens in sediments, fish, and (6) monitor shellfish for Salmonella.

The authors cited a cooperative study (citation not included) that 20 percent of the bacteria would reach the surface by adhering to suspended particles. Ten percent of this could reach nearshore areas as surface drift. In view of this possibility, the research outlined in this section is appropriate. The proposal calls for using five water column stations (Figure 9.1). Station 23 (near Duwamish River mouth) is recovery-directed. All other stations and intertidal and basin sediment and otter-trawl sites are deep discharge-directed.

Parametric coverage is appropriate. However, the authors propose to analyze shellfish for Salmonella, although they believe that the results could be ambiguous. Shellfish should instead be assessed for fecal coliform and E. coli., perhaps in conjunction with virology studies.

The bacteriological survival studies (section 9.6) are important. However, review of recent literature indicates that absence of light (typical of nighttime, cloudy conditions) may increase the likelihood of fecal coliform and pathogen survival. It is appropriate that the studies be done in the field.

Task 9. Virology

Two objectives are defined (page 115). The first is directed toward measuring recovery of inner Elliott Bay. The other objective relates to the very deep discharge and is appropriate. Inner Elliott Bay stations shown in Figure 10.1 (approximately five) may be eliminated.

Task 10. Toxicological Studies

This task involves conducting sediment and water bioassays materials from locations in outer Elliott Bay. The effort is very deep discharge-oriented. Thus, the program appears relevant to the three broad objectives identified by WDOE.

Task 11. Chemical Studies

This task defines three objectives (page 136) dealing with determining existing levels of priority pollutants. Only the first is directed toward effects produced by the very deep discharge. The others are much broader in scope. Because of this, the sampling sites in inner Elliott Bay (Figure 12.1) are not appropriate to the broad objectives of interest to WDOE.

Task 12. Floatable Particulate Studies

This task is worthwhile. However, like the other tasks, there are aspects dealing with the inner Elliott Bay that are not relevant to the three broad objectives of interest to WDOE.

In summary, there are a number of aspects of the proposal that are not directed toward the three broad goals specifically of interest to this agency. An undetermined amount of funds could be saved by eliminating specific sampling sites and studies from further consideration. However, I have made no estimates of the savings. From a holistic view, the study components that do not

Memo to Ed O'Brien
Review of Proposal - Renton Sewage Treatment Plant Project: Duwamish Head
Baseline Study
Page Six

address the three "approved" broad goals may shed light on other issues in the Duwamish River and inner Elliott Bay. This interacting system carries loads from storm drains, CSOs, industrial and agricultural sources, and septic tanks. Several important hypotheses have been proposed for the outcome of relocation of the Renton STP discharge. Additionally, the pathways of priority pollutants from a number of probable sources through the estuarine system is not understood. The elements of this proposal that do not address the direct effects caused by the new discharge could be included with the joint METRO/EPA study proposed for Elliott Bay. In addition, some savings may be realized if tasks within this proposal that include the very deep discharge are also considered in the joint research effort.

TAD:cp