

CITY OF COOS BAY CITY COUNCIL
Agenda Staff Report

MEETING DATE July 7, 2015	AGENDA ITEM NUMBER
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TO: Mayor Shoji and City Councilors

FROM: Jim Hossley, Public Works Director 

THROUGH: Rodger Craddock, City Manager

ISSUE: Continuation of Consideration of Approval for the Wastewater Treatment Plant No. 2 Outfall Repair

BACKGROUND:

The City Council considered this item at the June 30, 2016 Council meeting. Council members requested some additional information regarding the outfall prior to making a decision on this matter.

I believe it would be helpful to understand a few terms used by regulators regarding wastewater discharge outfalls. A **mixing zone** is the region in which the initial dilution of a discharge occurs. The **regulatory mixing zone** is a definition which allows for the initial dilution of a discharge rather than imposing strict end-of-pipe concentration requirements for National Pollution Discharge and Elimination System (NPDES) water quality permits for conventional and toxic discharges. In theory, the **regulatory mixing zone** may therefore allow for efficient natural pollutant assimilation.

From the 1984 USEPA "Water Quality Handbook", the **(regulatory) mixing zone** is defined as an "**allocated impact zone**" where numeric water quality criteria may be exceeded as long as acutely toxic conditions are prevented. A **(regulatory) mixing zone** can be thought of as a limited area or volume where the initial dilution of a discharge occurs. Water quality criteria apply at the boundary of the **(regulatory) mixing zone**, not within the mixing zone itself. Furthermore, "the **area or volume** of an individual **(regulatory) mixing zone** or group of **(regulatory) mixing zones** be limited to an **area or volume** as small as practicable that will not interfere with the designated uses or the established community of aquatic life in the segment for which the uses are designated," and the **shape** be "a simple configuration that is easy to locate in the body of water and **avoids impingement on biologically important areas**", and the "**shore hugging plumes** should be avoided."

Within the **(regulatory) mixing zone**, USEPA requires "any **(regulatory) mixing zone** should be free from point or nonpoint source related to:

1. Material in concentrations that will cause acute toxicity to aquatic life;
2. Materials in concentrations that settle to form objectionable deposits;
3. Floating debris, oil scum and other matter in concentrations that form nuisances;
4. Substances in concentrations that produce objectionable color, odor, taste or turbidity;
5. Substances in concentrations which produce undesirable aquatic life or result in a dominance of nuisance species.

The City is planning to replace WWTP #2 with a new treatment plant and to continue to use the existing outfall and diffuser. The Coos Bay WWTP #2 discharges through an outfall located approximately 1,800 feet due west of the plant, near River Mile 3.8. Based on 1975 drawings and the November 2009 diver inspection of the outfall and diffuser, the outfall consists of a 27-inch lined and coated concrete pipe approximately 1,826 feet long and the diffuser section is a 20-foot corrugated steel pipe (24-inch) with five 5-foot-long horizontal 10-inch diameter pipes with 10-inch ports and spaced ~10 feet apart. This diffuser length has ports located 5 feet south, west, and north of the 20-foot diffuser pipe alignment – so the diffuser has ports located along an east-west axis of 25 feet length, and 10 feet north and south of the pipe axis. (Note: this is important for correctly defining the existing mixing zone dimensions and size.) The 2009 dive inspection located 3 of 5 ports. The two ports on the south of the diffuser were not located or were buried under sand.

In 2014, City Staff, as a part of City's NPDES permit renewal process, agreed with DEQ to have a mixing zone analysis performed for the outfall that serves Wastewater Treatment Plant No. 2. The City contracted with CH2M HILL to perform the analysis under the miscellaneous engineering services contract. Originally, it was assumed that the analysis would be based on the outfall diffuser configuration as observed in a dive report performed in 2009 and the 1975 Record Drawings (It is believed that construction commenced in 1973). However, further analysis of the as-built information and the 2009 dive report yielded inconsistencies between the two. It was concluded that for the purposes of modeling an accurate mixing zone that a new dive inspection should be performed. The new 2015 dive report identified significant deterioration of the outfall since the 2009 investigation. The outfall was constructed with five diffusers at the end of the pipe that introduce the treated effluent into the bay and establish the dilution rates. The dive investigation determined that two of these ports are silted up, two are damaged, and one has broken off. In addition, there is a 3-4 inch gap in the top of the pipe near the end of the outfall.

Staff immediately contacted DEQ to inform them of the deteriorated outfall and to work with them on a solution. Staff also coordinated with CH2M HILL on the results of the dive investigation. After two conference calls with City staff, DEQ, and CH2M HILL it was recommended that an interim fix be performed on the diffuser until and ultimate fix can be designed, permitted, funded, and constructed.

The City's existing NPDES Permit defines the ZID (zone of immediate dilution, or acute criteria boundary) as a distance of 5 feet from the diffuser ports and the RMZ (regulatory mixing zone, or chronic criteria boundary) as a radius of 50 feet from the ports. The existing NPDES Permit applies dilution factors of 4 at the ZID and 41 at the RMZ (based on a study in the 1990s) to determine if effluent discharges require limitations. In June 2014, a Mixing Zone Modeling Study of Coos Bay WWTP #2 Outfall was completed by MixZon Inc. This mixing zone study used the CORMIX2 model to predict dilution factors at the ZID (5 feet) and the RMZ (radius of 50 feet from ports). The mixing zone study followed the DEQ's Regulatory Mixing Zone Internal Management Directive (RMZ-IMD) and produced a wide range of dilution predictions for the range of tidal and current conditions. The minimum predicted dilutions at the ZID and RMZ from the 2014 MixZon study are 1.3 and 7 (winter), respectively; and 7 and 35 (summer), respectively. These very low predicted dilutions are due to the ambient current speeds modeled and the short distances to the mixing zone boundaries. If these dilution factors are applied in the permit renewal, the plant could face effluent limits that are unnecessary.

CH2M HILL proposes to perform an engineering evaluation to assist the City of Coos Bay with developing revised mixing zone boundary dimensions that better represent the ambient currents and discharge plume behavior at the outfall site. If revisions of the mixing zone boundaries are too limited by DEQ such that adequate dilution factors are not allowed, CH2M Hill also included a task to design simple diffuser port modifications to increase dilution factors.

ADVANTAGES:

An interim fix will ensure that the City can submit a mixing zone study that will have high dilution rates for the pending NPDES permit renewal. Additionally, this interim fix will prevent the City from not spending a significant amount of money to meet unnecessary effluent limits associated with the pending NPDES permit.

There is a potential that the National Marines Fisheries Service (NMFS) will hold the permit approvals for the proposed WWTP #2 until the repair is made. This delay will increase construction costs due to escalation.

An interim fix (which is anticipated to last 5-10 years at a minimum), will allow the City to design an ultimate solution. It will also allow for the time necessary to process and receive approvals for the required environmental approvals.

DISADVANTAGES:

The ultimate goal is to be able to use the interim repair as part of the ultimate solution. At this time it is unknown if this will be the case.

BUDGET IMPLICATIONS:

Staff has requested a scope of work from CH2M for the preparation and permitting of an interim fix for the outfall along with performing a revised mixing zone analysis based on the repairs. It is estimated that design costs will be approximately \$30,000 and the construction costs for the interim repair should not exceed \$70,000. If the City Council decides to proceed forward with this repair, the funds will be obtained from the Wastewater Improvement Fund (29-810-530-3010).

ACTION REQUESTED:

If it pleases the Council, approve \$100,000 for design and construction (bidding process to be performed upon completion of design and permitting) for the repair for the outfall that serves Wastewater Treatment Plant No. 2.

ATTACHMENTS:

- Location Map
- Schematic of Outfall Diffuser
- Mix Zone Diagram

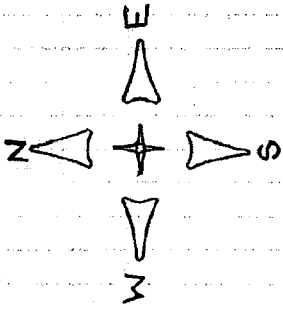
Coos Bay

Existing Wastewater Treatment Plant 2

Approx. Location of End of Outfall for Plant 2



Existing WWTP2 Outfall Diffuser Condition (2015)



DIFFUSER

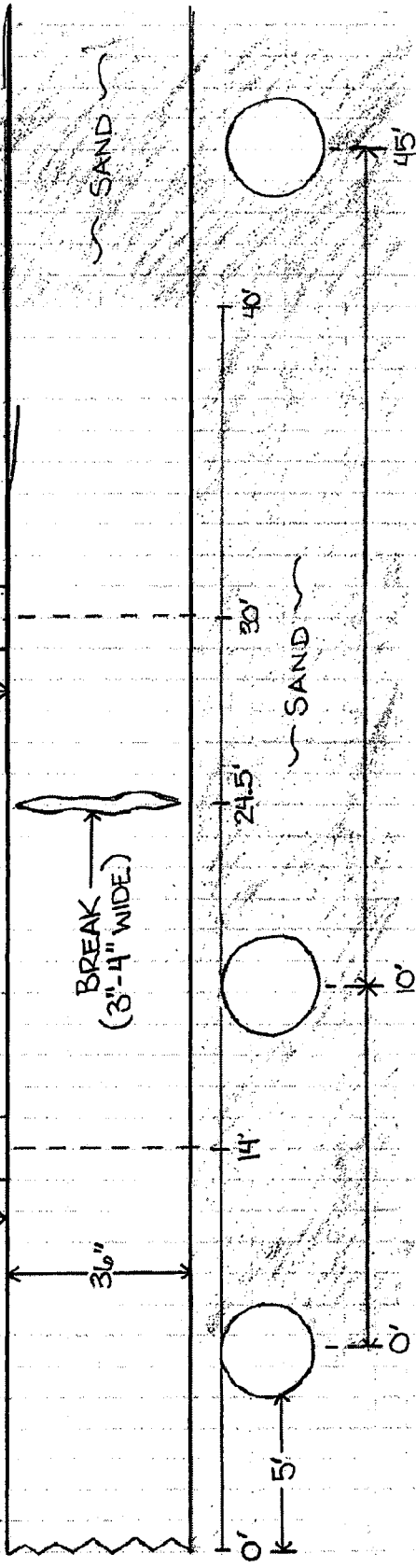
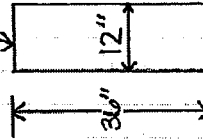
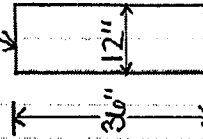
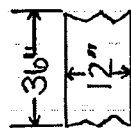
EXISTING
PILES

DIFFUSER

BREAK
(3'-4" WIDE)

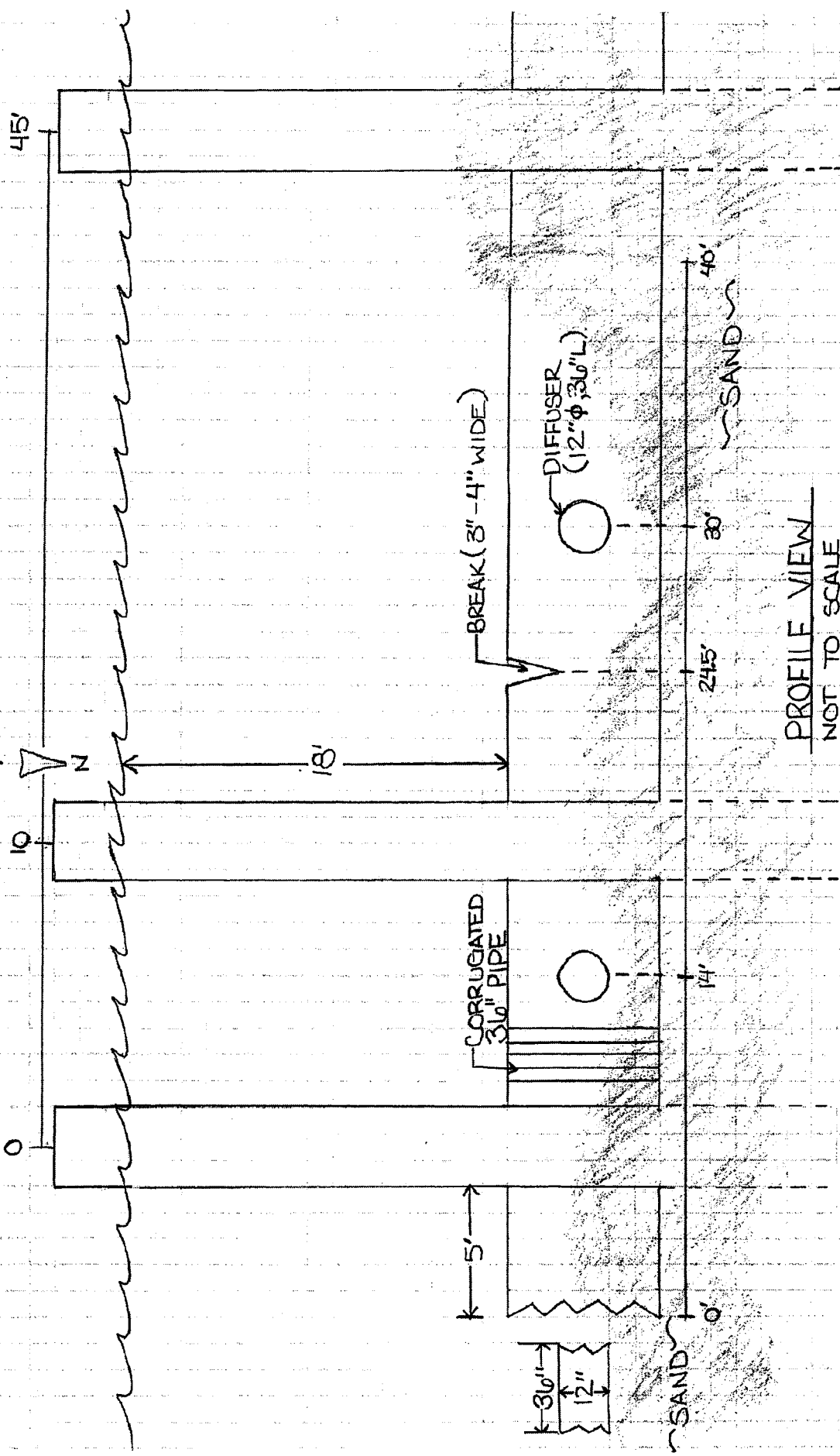
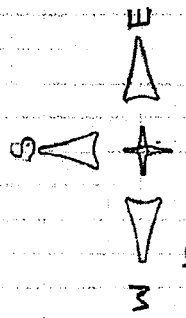
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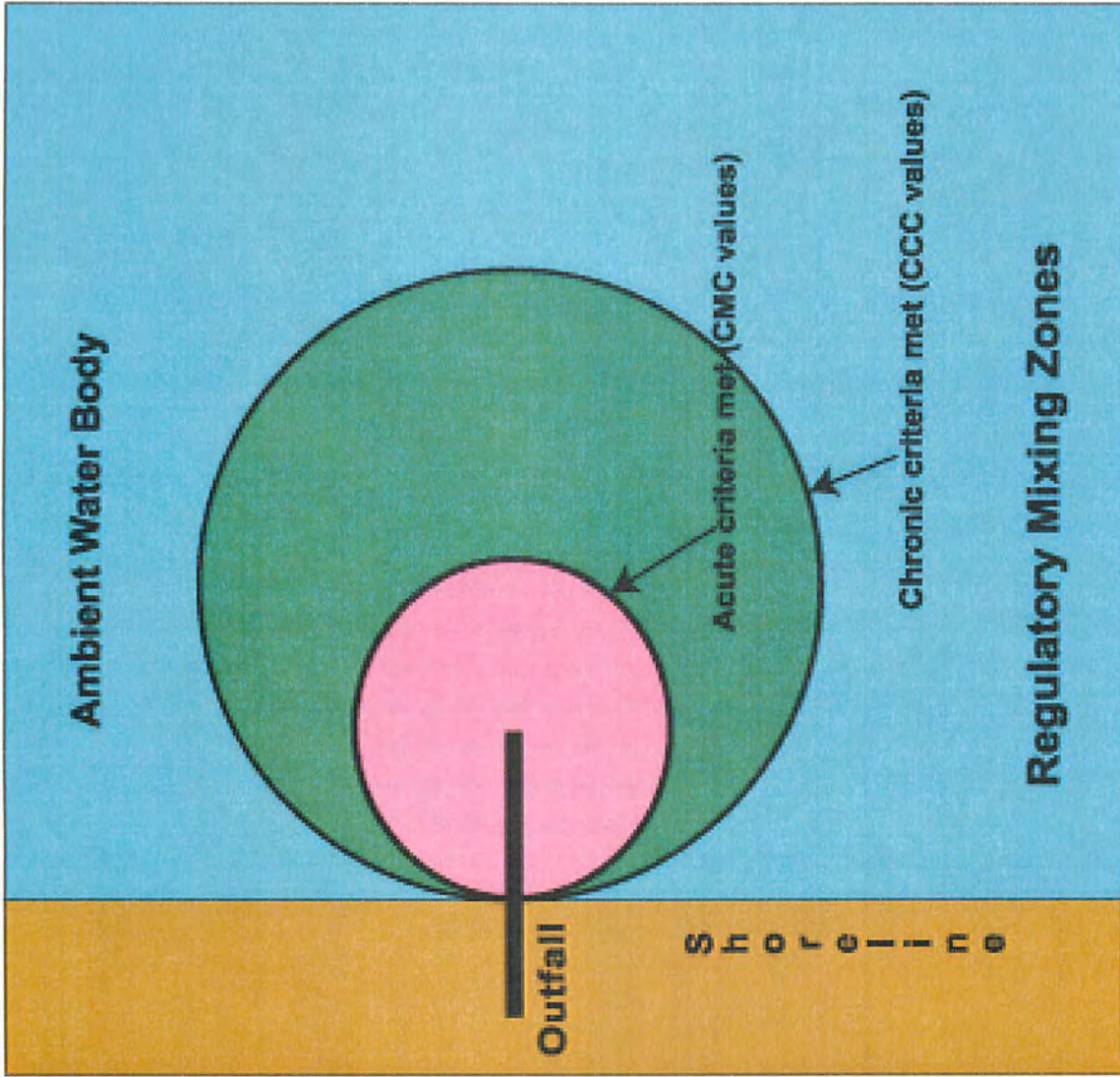


PLAN VIEW
NOT TO SCALE

Existing WWTP2 Outfall Diffuser
Condition (2015)



PROFILE VIEW
NOT TO SCALE

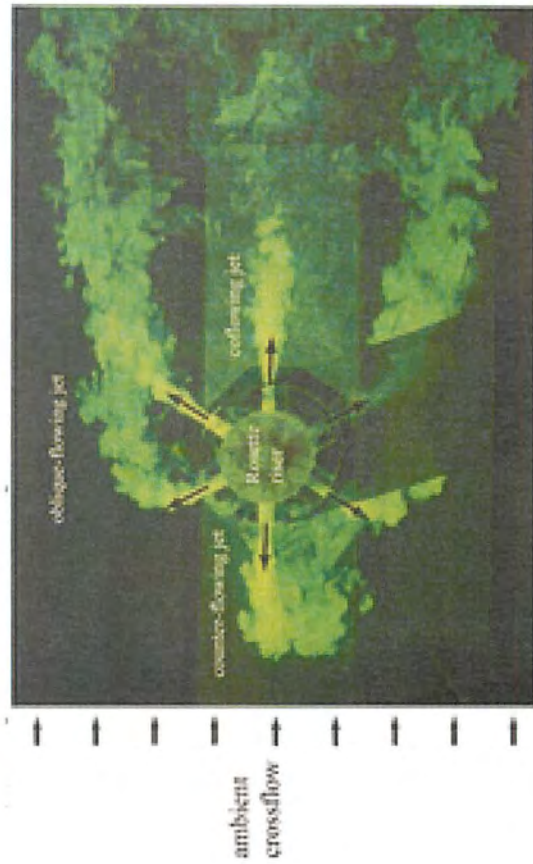
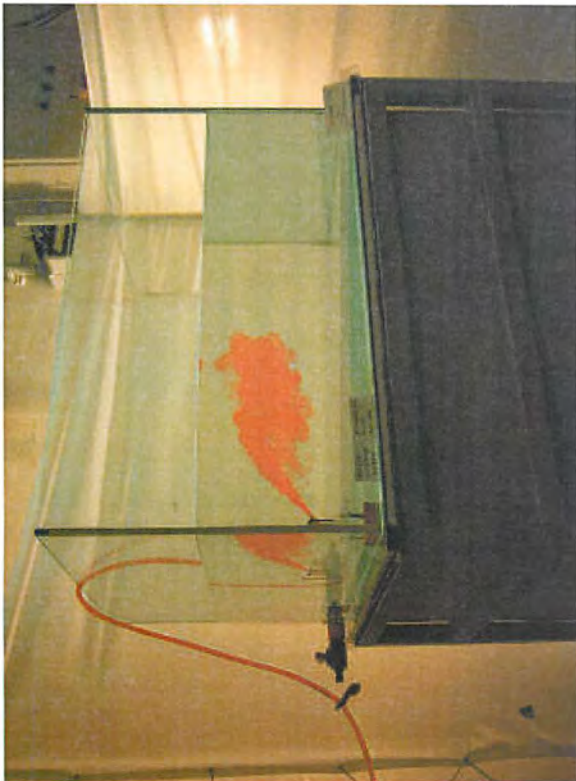


Simple rendering of a Regulatory Mixing Zone

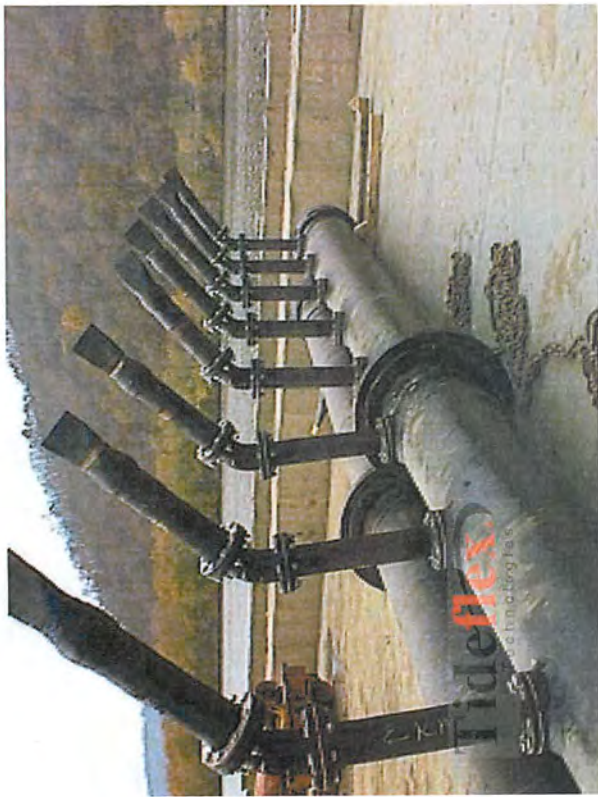


Example of what west end of the diffuser looks like.

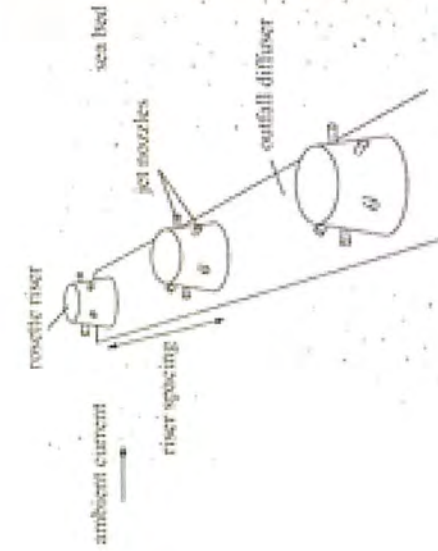
Examples of plumes in laboratory setting



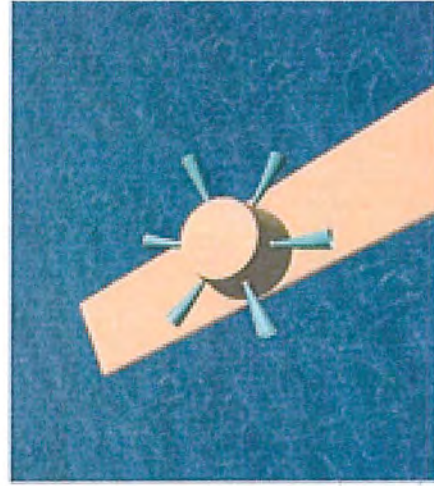
Top view of a rosette jet group
(Laboratory observation)



Examples of modern diffusers



Perspective view of multiple rosette risers on a submarine outfall



Discharge from a rosette riser (VISJET simulation)