

**STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION**

STAFF REPORT FOR REGIONAL BOARD MEETING OF September 10, 2004

Prepared on August 19, 2004

ITEM NUMBER: 12

SUBJECT: Status Report on Avila Pier Petroleum Contamination, Avila Beach, San Luis Obispo County

KEY INFORMATION

Location: Avila Beach, San Luis Obispo County
Discharge Type: Crude Oil and Petroleum Products
Existing Orders: None

SUMMARY

Between September 2000 and November 2001, Unocal, the Regional Board, and a number of federal, state, and local agencies participated in an effort to assess the buried hydrocarbon-contaminated sediment beneath and near Avila Pier, San Luis Obispo County, California. The results of human health and ecological risk assessments, predictive sand transport models, as well as a complete evaluation of pertinent environmental data indicate that this petroleum-contaminated sediment does not adversely impact humans, various ecological receptors, or water quality. This issue has not been discussed at a Board meeting until now so as to incorporate results from a recently completed study administered by the Central Coast Ambient Monitoring Program (CCAMP). Based on review of this study's results, as well as the evaluation of information noted above, staff has concluded that results from the CCAMP study do not conflict with results of the original assessments and models. Staff therefore requests the Regional Board concur with a staff conclusion (based on a multi-agency recommendation) that active remediation of the sediment is not needed and that the petroleum contamination may remain in its current location.

DISCUSSION

Avila Beach, San Luis Obispo County, California, has received almost as much attention for contaminated soil and groundwater as it has for its popularity as a tourist destination (see Figure 1). From as early as 1989, when hydrocarbon-contaminated soil was detected in Avila Beach, and extending to November 2000, when a large-scale remediation effort along Front Street was designated "closed" by the Regional Board, this town has been host to several environmental investigations. In fact, although petroleum contamination along Front Street was remediated to the Regional Board's satisfaction, the following additional areas of contamination remain in the Avila Beach community:

- Intersection of San Miguel Street and Avila Bay Drive,
- East of San Luis Creek/Estuary, in the vicinity of the Avila Beach Golf Resort property, Avila Beach Drive and First Street,
- West of San Luis Creek, at the landward end of the Cal Poly Pier (formerly the Unocal Pier),
- Unocal's Avila Beach tank farm, and
- Avila Pier Intertidal/Subtidal Outlier plume.

At the direction of the Regional Board, Unocal is in the process of addressing each of these areas. The remainder of this staff report, however, deals solely with the last area noted above (specifically, buried hydrocarbon-contaminated sediment beneath and near Avila Pier).

Avila Pier Outlier Plume and Investigation History

Due to contamination caused by leaks from Unocal pipelines located beneath Front Street in Avila Beach, the Regional Board issued its first of five cleanup or abatement orders (CAOs)¹ to Unocal in 1994. During investigations conducted in 1996 and 1997 to assess the extent of contamination along Front Street (Fluor-Daniel GTI 1996, 1997a, and 1997b), seemingly separate hydrocarbon-contaminated sediment in the vicinity of the Avila Pier was detected and designated as the "Outlier Plume." (Because of its occurrence in the intertidal and subtidal zones, Regional Board staff began to refer to this contamination --separate from the Front Street "Main Plume"-- as the Intertidal-Subtidal Plume. For the purposes of this Staff Report, however, all subsequent references will be made to the "Avila Pier Outlier Plume", or "Pier Plume", for short.) At the time the *Unocal Avila Beach Cleanup Project Environmental Impact Report/Statement, Final Report* (Final EIR/EIS) was completed in 1998 (Arthur D. Little, 1998), regulators and many Avila residents concurred with a conclusion contained in the Final EIR/EIS that a more thorough understanding of the type and extent of hydrocarbons was needed to better define the Pier Plume. Accordingly, further characterization of that plume was planned after the main Front Street contamination was cleaned up.

Consequently, Unocal performed an additional investigation in 2000 (CH2M Hill, 2000) to

¹ The Regional Board issued CAO 94-85, 95-89, 96-42, and 96-56 to Unocal to address groundwater monitoring, preliminary cleanup standards, and contamination delineation. Additionally, the Regional Board issued CAO 98-37, which required Unocal to excavate what had become known as the "Main Plume" of contamination at Avila Beach. All CAOs were rescinded on November 29, 2000.

further characterize the Pier Plume. This effort was separate from remaining Front Street activities and was not required by a Regional Board order. However, staff from the Regional Board, the Department of Fish and Game, and the Port San Luis Harbor District approved the additional characterization.

Results of all the investigations indicate the following:

- The Pier Plume is buried under two to eight feet of sand (depending on the season and position).
- It occurs onshore, extends approximately 400 feet seaward beneath the Avila Pier (see Figure 2), and covers approximately two acres.
- Plume thickness ranges from two to four feet.
- It is a weathered asphalt-like material that is stuck to and between sand grains.
- There is no free product associated with the plume, and it is not mobile.
- The Pier Plume is dominated by diesel- and crude oil-range hydrocarbons (typical of a weathered crude).

In addition to these geologic/sediment-based characterization efforts, biological studies were also conducted jointly by the California Department of Fish and Game and Unocal (California Department of Fish and Game, 2000a and 2000b, and Entrix, 1997a, 1997b, and 1997c respectively) to assess any apparent aquatic impacts associated with the Pier Plume. The results of these studies were incorporated into the ecological risk assessment, which is described below.

Responsibility for the Pier Plume

As already noted, Unocal conducted the final phase of Pier Plume characterization without a Regional Board order to do so. Although Unocal willingly participated in this and subsequent work, Unocal has neither claimed nor accepted responsibility for the Pier Plume. That being said, Regional Board staff has not issued requirements to Unocal for work associated with the Pier Plume for the following reasons:

- Staff has been satisfied with Unocal's approach to dealing with the Pier Plume, including cooperation with a number of state, federal, and local agencies, and a willingness to fund studies.
- Staff felt that Unocal's efforts devoted to the plume's characterization and impacts assessment were more environmentally beneficial than assigning - and likely disputing² - responsibility.

Throughout the Regional Board's involvement with the Pier Plume, however, Board staff has periodically reminded Unocal that regardless of past cooperation, the Regional Board reserves the right to issue requirements if the situation warrants such regulatory activity.

Formation of Avila Pier Intertidal Plume Team

In September 2000, the Regional Board along with the California Department of Fish and Game, the San Luis Obispo County Department of Health Services, and Unocal began a cooperative effort to assess the potential impacts to human health and the environment associated with the Pier Plume. Other agencies involved included the California Coastal Commission, California State Lands Commission, California Office of Environmental Health Hazard Assessment, Port San Luis Harbor District, San Luis Obispo County Air Pollution Control District, San Luis Obispo County Planning and Building Department, U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service. The goal of the effort was *"to evaluate the potential impacts to human health, the environment, and water quality from sediment-associated petroleum contaminants near the*

² It is noted in the Final EIR/EIS (Arthur D. Little, 1998) that although the Pier Plume's origin was considered speculative at the document's 1998 completion date, ". . . it is possible that [the Pier Plume's] sources could include contamination previously eroded from the main Avila plume (Beach Plume Areas 1-6) and deposited in the intertidal and subtidal regions, the Unocal Wharf, marine tankers visiting Avila, the 1926 Tank Farm Road spill, the 1992 Pirates Cove spill, passing vessels, day-to-day harbor operations, Avila pier construction and piling treatment, as well as natural seeps located far offshore."

Avila Pier, and to evaluate potential remediation strategies if impacts were determined to be unacceptable" (Avila Pier Outlier Plume Team, Nov. 2001). The Avila Pier Technical and Coordinating committees were formed from the various parties noted above; the former focused on technical aspects of the overall goal and the latter addressed policy issues.

Jointly, the Technical and Coordinating committees agreed that the following questions needed to be answered to meet the Team's goal:

- Are there current human or ecological impacts due to any of the buried hydrocarbon-associated compounds detected in the Pier Plume?
- What storm characteristics would expose the buried hydrocarbons?
- Would there be a human health or ecological threat if the buried hydrocarbons become exposed?

After reviewing the totality of environmental information, the Technical Committee agreed that three different scenarios would best serve to answer the questions, and would best assist the agencies in determining appropriate management of the Pier Plume. Specifically, these three scenarios were:

- Current Conditions Scenario: This scenario assumed conditions at Avila Beach remain as they are today.
- Future Conditions – Complete Mobilization Scenario: This scenario assumed that all of the Pier Plume hydrocarbons are eroded and mobilized by a severe storm event. The intensity of the storm required to completely erode and mobilize the plume, and the fate and transport of the mobilized hydrocarbons were assessed.
- Future Conditions – Partial Mobilization Scenario: This scenario was intermediate to the current conditions and complete mobilization scenarios and evaluated more realistic storm conditions. The potential for a storm to remove enough sand from Avila Beach to expose the hydrocarbons in the Pier Plume was estimated.

Impacts to water quality were evaluated by the Technical Committee on a variety of levels as the studies were conducted to examine the above-noted scenarios. These evaluations included examining hydrocarbon concentrations (if any) in sediment, groundwater, pore water, surface water, and biological receptors. In addition, the Technical Committee assessed potential water quality impacts due to any free product that would likely result from severe storm action.

Avila Pier Outlier Plume Risk-Based Studies

The Technical and Coordinating Committees agreed on the types of studies that were needed to address the scenarios, as well as the consultants needed to conduct the studies. Each of these studies is summarized below, and reports associated with this work are contained in the compendium *Evaluation of Potential Human, Ecological, and Water Quality Impacts Associated with the Avila Pier Outlier Plume*, November 2001.

1. **Agitation Experiment** – The hypothetical scenario of the Pier Plume hydrocarbons being completely eroded and dispersed by storm activity was simulated by a laboratory experiment using Pier Plume-derived contaminated sediment (Arcadis-JSA, 2001 and England Geosystem, 2001). Petroleum hydrocarbon concentrations were assessed for (a) soluble constituents of hydrocarbons that may dissolve into seawater, (b) non-aqueous phase liquid (i.e., free product) that may be released, and (c) oily sand (sediment) and/or oil and sand agglomerates (i.e., tar balls) that may form and be dispersed. **Result:** A storm vigorous enough to completely erode the Pier Plume would result in approximately one-third of the hydrocarbon-associated compounds³ adhering to and/or intermixing with

³ Specifically, total petroleum hydrocarbons and polycyclic aromatic hydrocarbons. Of the benzene, toluene, ethylbenzene, xylene components, only ethylbenzene and xylenes were detected in any of the six agitation experiments (two samples per core for three cores). These components were detected in two sediment samples from the same core in one post-agitation phase.

sediment, and the remaining two-thirds would be released as free product. Actual concentrations derived from this experiment were used in the subsequent studies.

2. **Coastal Processes Study** – The study included the following: (a) a probability analysis to estimate the storm recurrence interval that would likely mobilize the entire Pier Plume, (b) an evaluation of six lesser, more likely, storm return periods, (c) a forecast of the fate and concentrations of the displaced hydrocarbons in scenarios (a) and (b), and (d) a determination of the time needed to re-establish a specific depth of sand cover over the portion of the plume that is not mobilized. **Result:** A 500-year return period storm (recurrence interval of 1:500) would fully mobilize the Pier Plume. This would be a catastrophic storm that would likely result in destruction of ecological habitat, the Avila Pier, seawall, and a significant amount of Front Street. In this scenario, hydrocarbons would be released as hydrocarbon-coated sand grains and would wash up on Avila Beach over one to one-and-a-half years following the mobilizing event. In addition, hydrocarbons would be released as free product. Due to the energies associated with the storm, the released free product would become dispersed as small droplets within the water and be transported away from Avila (Everts Coastal, et al, 2001).

With respect to partial mobilization, evaluations of more likely storms included return periods of 10, 20, 30, 50, 100, and 200 years. Of these, only storms with a 200-year return period (1:200) are likely to approach within one foot (i.e., the biologically active zone) of the plume's upper surface at some locations. For all six of these "lesser storm" scenarios, sand coverage above the plume is expected to be at least one-foot thick within 1.5 months following the associated storm (Everts Coastal, et al, 2001).

3. **Human Health Risk Assessment** – Cancer and non-cancer human health risks were

evaluated for the current scenario (i.e., buried Pier Plume hydrocarbons). In addition, conservative (i.e., "worst-case") conditions were evaluated to determine health risks for the future complete and partial mobilization scenarios (SOMA, 2001). **Result:** As with the human health risk assessment conducted for Avila's Front Street contamination (Risk Science Associates, 1998), this study determined that there is no unacceptable human health risk given the current condition of the buried hydrocarbons. Therefore, Avila Beach in the vicinity of Avila Pier is safe for all beach users. In addition, the study indicated that hydrocarbons released either during full or partial mobilization scenarios pose no unacceptable human health risk.

4. **Ecological Risk Assessment** – Various receptors were assessed for the potential for unacceptable risk from exposure to contaminants within the top one-foot of sediment (the biologically active zone) (Windward Environmental LLC, 2001). Specifically, risk was calculated for aquatic organisms and wildlife that feed on these organisms. **Result:** No unacceptable risk was detected for fish or other aquatic organisms, birds, or mammals under current conditions. The following conclusions also resulted from the ecological risk assessment: There is limited risk to benthic organisms under current conditions, but the potential for adverse effects appear to be localized and are not expected to adversely impact the organisms at a community level. There would be limited risk to benthic invertebrates if the Pier Plume is partially mobilized, but the risk would be localized, short-lived, and the beach would rapidly recover. There would be no risk to fish, other aquatic organisms, benthic organisms, birds, and mammals if the Pier Plume were fully mobilized and re-deposited. This is because the habitat itself would be destroyed and, due to the intense mixing, the sediment concentrations would not be at levels to cause adverse impacts. Oiling of birds and mammals is unlikely due to both the predicted nature of the free product (small

disperse droplets) and the extreme storm conditions.

Regional Board's Central Coast Ambient Monitoring Program's Sand Crab Study

During approximately the same time that Unocal's 2000 investigation was underway, a Regional Board-administered contract was initiated to investigate the potential for using sand crabs as biological indicators of contaminants along sandy beaches within the Central Coast Region. This study continues to be administered by the Regional Board's Central Coast Ambient Monitoring Program (CCAMP), and is being conducted by staff from the California Department of Fish and Game and the University of California, Santa Barbara. Specifically, the study looks at the applicability of using sand crabs to monitor concentrations of polycyclic aromatic hydrocarbons (PAHs), pesticides, polychlorinated biphenyls (PCBs), and trace metals in sand crab tissue. Although the final report (entitled *Monitoring of Coastal Contaminants Using Sand Crabs*) is not yet completed, preliminary results from the evaluation of sand crab data collected in 2000 and 2001 that are pertinent to Avila Beach indicate the following:

- a. PAH concentrations⁴ detected in sand crabs collected from the following beaches were greater than PAHs detected in tissue samples collected from other Central Coast beaches: Port San Luis Harbor Beach, Avila Beach, Shell Beach, and Pismo Beach.
- b. There is significant variation in the magnitude of PAH concentrations over time; the reasons for this are not clear.
- c. There are large standard deviations in the Avila Beach data; the reasons for this are not clear.

It should be noted that this study was intended to be a screening level investigation to evaluate the potential for a biological monitoring tool; it was not intended to definitively link sand crab tissue data with contaminant sources. With respect to

⁴ PAHs are ubiquitous chemical compounds in the environment. PAHs are present in crude oils, in more refined petroleum hydrocarbon mixtures (e.g., gasoline and diesel), and are commonly associated with fuel combustion and deposition of atmospheric particulates.

Avila and nearby beaches, for instance, possible sources of PAHs could be due to one or more of the following: land-based or marine petroleum spills and leaks, urban runoff from roadways, natural hydrocarbon seeps, and atmospheric deposition of particulate-associated PAHs from automobile and truck fuel combustion. With all these uncertainties in mind, as well as the scientific community's lack of understanding of how PAHs are metabolized by sand crabs, the overall conclusions of the sand crab study are that more focused sand crab sampling and PAH analysis are needed to more clearly determine the significance of PAH concentrations in Avila Beach sand crabs. In addition, more needs to be learned about the metabolism of PAHs in sand crabs.

When data from this study became available to the Pier Plume Technical Committee, a subset of ecological risk assessors evaluated the sand crab PAH concentrations in the same way that benthic invertebrate tissue data collected in 1995, 1997, and 1998 were evaluated for risk in the Pier Plume ecological risk assessment. Based on this evaluation and the preliminary results and conclusions noted above, the Pier Plume ecological risk assessors agree that the 2000 and 2001 sand crab data do not conflict with the results of the Pier Plume ecological risk assessment.

Avila Pier Outlier Plume Technical and Coordinating Committee Recommendation

Based on the results of all the studies noted above, as well as the thorough analysis of pertinent environmental data, both the Technical and Coordinating Committees are satisfied that neither water quality, other environmental factors, nor human health is, or will be, adversely impacted by the presence of the Pier Plume. It is therefore the consensus of both committees that the Pier Plume be allowed to remain in place. Staff believes the following two lines of evidence support this recommendation.

1. **1998 Unocal Avila Beach Cleanup Project Final EIR/EIS** – At the time the Final EIR/EIS was completed, the Pier Plume had not been fully characterized. It is therefore

stated in the document that no recommendations for the California Environmental Quality Act (CEQA)- or National Environmental Policy Act (NEPA)-preferred alternatives were noted for the Pier Plume⁵. In fact, the following is stated on page 7-7 of the document: “. . . *Unocal has recently discovered significantly more contamination in the intertidal and subtidal zones at Avila Beach which leads to a considerable amount of uncertainty associated with the extent of intertidal and subtidal contamination, and the potential effects on marine biological resources. As a result, it would be premature to identify a preferred alternative for the intertidal zone. More assessment clearly needs to be completed and evaluated before an informed decision [about a preferred remediation alternative] can be reached.*”

To deal with the uncertainty, several data gaps were noted and recommendations made on page 7-2 of the Final EIR/EIS to more fully characterize the Pier Plume (Arthur D. Little, 1998). Recommendations included plume boundary delineation, contaminant and sediment characterization, as well as marine biological species identification and contaminant response evaluations. All these recommendations were carried out (California Department of Fish and Game, 2000a and 2000b, and Entrix, 1997a, 1997b, and 1997c) and are documented in the Ecological Risk Assessment (Winward, 2001). Furthermore, these investigations' results are integral components to the Pier Plume Technical and Coordinating Committees' recommendation to allow the Pier Plume to remain in place.

It is also noted on page 7-4 in the Final EIR/EIS that after information from the above-noted data gaps has been gathered and assessed, “. . . *a range of remedial alternatives can be evaluated for the intertidal and subtidal zones. If the marine biological studies summarized above show*

⁵ The Pier Plume is referred to as the “Intertidal Zone Plume (Area 7) in the Final EIR/EIS (Arthur D. Little, 1998).

that the contamination is not impacting the marine environment, then a No Action Alternative may be appropriate.” The Technical and Coordinating Committees’ recommendation to allow the Pier Plume to remain in place coincidentally echoes this 1998 recommendation for consideration of essentially a No Action Alternative.

2. **Leave In Place versus Active Remediation**

Although the risk assessments’ results and the water quality impacts assessment indicated that the presence of the Pier Plume poses no imminent or substantial threat, Regional Board staff encouraged Unocal to investigate and evaluate a remediation scenario. Based on discussions with the Regional Board, experience gained from the Front Street clean up, as well as the CEQA- and NEPA-preferred cleanup alternative for the Avila Beach Front Street contamination (i.e., excavation), Unocal evaluated dredging the Pier Plume and the associated impacts that could result from dredging (Richardson, 2002 and Haddad and Lambert, 2002, respectively)⁶.

Salient points from the *Feasibility Study of Dredging the Avila Outlier Plume, Avila Beach, San Luis Obispo, California* (Richardson, 2002) are as follows:

- Contaminants would be dredged somewhere within the late spring-to-fall period and last approximately two months.
- The operation would involve approximately 50 people and the following equipment: a Crane Barge dredge with clamshell bucket(s), a Walking-Spud barge with backhoe, a Cutter or Hopper Suction dredge with a floating and/or submerged pipeline to the beach, two or more dump barges, at

least one tug boat, a bulldozer, an anchor barge, and floating oil booms.

- Due to the irregular shape of the Pier Plume, over-excavation would be necessary; thus, the total volume of dredged material is estimated to be 59,000 cubic yards (78,000 tons).
- The backhoe noted above would dredge beneath the Pier.
- Dredged sand would be replaced with sand piped in to the beach from an offshore source (that has not yet been identified). A source that could provide approximately 100,000 cubic yards of appropriately sized and colored sand is desirable.
- Replenishment sand dredging would be accomplished with the suction dredge, and could be completed within one-to-two weeks while other dredging work continued.
- Dump barges would be off-loaded at an appropriate site within San Luis Bay. A three-to-four-acre on-land temporary stockpiling area would be needed for the off-loaded material.
- Trucking the dredged material to an appropriate on-land disposal site would require approximately 7,800 truckloads, carrying 10 tons each.
- Isolation of the entire plume area with sheet piling is not recommended because it would add considerable time to the project, and still would not guarantee isolation of all sections of the Pier Plume.
- The estimated total cost for dredging, sand replenishment, and disposal is \$4.9 million.

Conclusions contained in the *Potential Impacts of Outlier Plume Dredging Plan* (Haddad and Lambert, 2002) are as follows:

1. **Air Quality Impacts** – Due to approximately 7,800 truckloads being necessary to transport dredged material, the amount of oxides of nitrogen (NO_x) generated by the truck trips, as well as diesel particulate matter emissions, would significantly exceed San Luis Obispo County Air Pollution Control

⁶ Steam stripping and nutrient-enhanced biodegradation were discussed as potential cleanup alternatives for the Front Street Plume in the 1998 Final EIR/EIS. However, neither of these alternatives was considered practicable for the Pier Plume for reasons noted throughout the Final EIR/EIS.

District limits, and would likely represent a major source of air pollution for the Avila community. The same is true for emissions from the diesel-powered dredges. Therefore, the estimated human health risk from the proposed dredging is likely to be significant (10 excess cancers in one million or greater versus one excess cancer in 10 million for leaving the Pier Plume in place [SOMA, 2001]).

2. Occupational Health Risk – Physical risk would likely occur to workers involved in the dredging operation due to significantly increased truck traffic and the use of barges and tug boats in shallow water subjected to dynamic marine conditions.
3. Ecological Impacts – Environmental impacts are assumed to be similar to what would be expected from an oil spill occurring in the Avila Beach surf zone. Habitat above the high tide line will be subjected to significant impacts due to both excavation and vehicle traffic. In addition, approximately 1.8 million square feet of intertidal and subtidal benthic habitat would be removed as clean overburden. Following removal of the overburden, but prior to the complete removal of contaminated sand, there will be a short-term direct exposure pathway between the contaminated sediment and the overlying seawater, thereby facilitating contact between contamination and aquatic organisms, as well as the larger species that feed on them. Dredging will also likely result in an oil slick on the water surface in the dredged area. This separate oil phase of contamination would likely adversely impact marine birds and mammals. In the unlikely event that oil containment activities (e.g., use of booms) during dredging in the wave zone are 99 percent effective, approximately 400 gallons of oil will be released into the nearshore marine environment. If the containment activity is only 50 percent effective, a release of approximately 20,000 gallons

is expected. In either case, birds and mammals in the immediate area and the rocky habitat east and west of the dredged area would likely be adversely affected. The San Luis Creek estuary west of the dredged area might also be adversely affected.

4. Issues of Potential Public Concern – Avila Beach residents, merchants, and visitors would likely be subjected to the following impacts resulting from the dredging operation: (a) closure of Avila Beach in the event that hydrocarbons are released into the marine environment, and (b) approximately two months of increased truck traffic on the two-lane road leading into and out of the community. These impacts may not be well received by a community that has recently begun to rebound from the highly disruptive cleanup activities associated with the Front Street plume. Stigmatization - or re-stigmatization - of the town of Avila Beach being a “poisoned” town may result in considerable economic and emotional impacts.

In order to further illustrate the impacts of dredging, the following comparison is useful: the 500-year and 200-year storm events *as well as* dredging will likely result in the release of free product and at least some amount of contaminated sediment. However, if dredging is selected to remove the Pier Plume, associated adverse impacts will *very likely occur* (see above). On the other hand, if the Pier Plume remains in place, although exposure of the plume could occur, Everts Coastal, et al results indicate that exposure, and therefore the associated adverse impacts, are *highly unlikely to occur*⁷ (Flick, et al, 2002). In addition, dredging would occur during the most favorable weather and calmest seas. Irrespective of a free product release, the mere presence of the dredging

⁷ The Everts Coastal, et al (2001) study indicated that there is less than a 0.5 percent probability that the plume would become exposed, and a less than 0.2 percent probability that the plume would be fully mobilized in a given year.

operation during such conditions would disrupt tourism as well as animals and their habitat. In the likely event that oil is released, wave zone activity – even during favorable weather – will make the oil difficult to contain. In contrast, during the worst-case 500-year storm, free product would be rapidly dispersed offshore, southward out of San Luis Bay, by currents and wave-induced turbulence. Contaminated sand would initially be deposited offshore, and would be re-deposited at relatively low concentrations over a narrow section of the intertidal beach over a one-year period (Everts Coastal, et al, 2001). For less-than-full-mobilization of the plume, the Everts Coastal, et al study indicated that storms with return periods of 10, 20, 30, 50, 100, and 200 years would result in at least one foot of sand coverage above the Pier Plume within approximately six weeks following the storms.

Five-Year Monitoring and Contingency Plans

Although the Technical and Coordinating Committees agreed with the studies and risk assessments generated to address the Pier Plume, a subset of the Technical Committee⁸ developed a five-year monitoring plan to (a) track the minimum sand cover over the Pier Plume⁹, and (b) increase the confidence in the analysis and assumptions underlying sediment movement predictions presented in the report by Everts Coastal, et al (2001). Participants in the monitoring plan development agreed that in the worst-case scenario, monitoring results would enable consultants to revise and recalibrate the predictive model used to estimate Pier Plume full and partial mobilization. A five-year effort, starting in February 2002, was considered necessary to have a reasonable probability of encountering at least one winter with substantial storm activity, and to encompass a complete El

Niño climate cycle. A draft of the monitoring plan was implemented in February 2002 and the plan was finalized in March 2002.

A contingency plan has also been developed by the subset of agencies from the Technical Committee to implement response activities if the Pier Plume gets within one foot of being exposed (i.e., the biologically active zone), or becomes exposed. This plan explains what information from the monitoring plan would trigger contingency plan implementation, and describes response procedures and response strategy options. This contingency plan was also finalized in May 2002.

The same subset of agencies responsible for the contingency plan development reviews both plans annually. Updates to the monitoring and contingency plans are made as necessary. At the culmination of the five-year monitoring effort, the plans will be evaluated to determine if their implementation needs to be updated and continued, or terminated.

As further assurance that the Pier Plume's existence will not be forgotten by the appropriate regulatory agencies after the five-year effort, Unocal and the agencies responsible for the monitoring and contingency plans are in the process of establishing future (i.e., post-2007) monitoring protocols of the Pier Plume. Although in the preliminary stages, this monitoring may include expanding oceanographic monitoring that is currently being conducted by Cal Poly, photodocumentation of beach conditions, and establishing sand cover measuring points along Avila Pier pilings.

CONCLUSION

Based on the results of human health and ecological risk assessments, as well as review of all pertinent environmental data, allowing the Pier Plume to remain in place will result in less risk than active remediation via dredging. As additional assurance that the Pier Plume does not pose a current or likely future risk to humans or the environment, a five-year monitoring effort has begun, and a modified monitoring effort beyond 2007 is being developed.

⁸ Staff from the California Department of Fish and Game, the Regional Board, San Luis Obispo County Department of Health Services, and the Port San Luis Harbor District.

⁹ Monitoring of sand thickness on Avila Beach is not unique to activities associated with the Pier Plume; Unocal has been conducting beach profiling since 1996. This ongoing effort was initiated in response to agency requirements, and is designed to assess sand cover over a segment of the Front Street Plume that was "capped" by imported sand.

Concomitantly, the Regional Board and other appropriate agencies have developed a process for managing the Pier Plume in the event that it gets within the biologically active zone, or actually becomes exposed. Both the monitoring and contingency plans will be evaluated and updated as necessary.

RECOMMENDATION

Staff recommends the Regional Board concur with a staff conclusion to allow the Avila Pier Outlier Plume to remain in place with no active remediation.

ATTACHMENTS

1. Figure 1 – Vicinity Map
2. Figure 2 – Local Site Location Map
3. References

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Plume\Board Item\Staff report 0904 - NFA