Site Specific Geographic Response Plan:
Cabrillo National Monument
Point Loma, California

December 2009

Dr. Benjamin Pister
Marine Ecologist
Cabrillo National Monument

Mr. Robin D. Lewis
Senior Environmental Scientist
California Department of Fish and Game
Office of Spill Prevention and Response

Mr. Kris Wiese
Environmental Scientist
California Department of Fish and Game
Office of Spill Prevention and Response

Cabrillo National Monument Site Specific Geographic Response Plan

Table of Contents

Figures and Tables

Introduction

During a significant oil spill event in proximity to the Cabrillo National Monument (CNM) intertidal shoreline may become contaminated by petroleum product. The purpose of this document is to provide shoreline clean-up guidelines in a Geographic Response Plan (GRP) format that also addresses the need to protect and maintain the natural beauty of the Park grounds both during and after any clean-up efforts.

These guidelines have been written to inform future spill response planners as they develop Incident Action Plans (IAP) that will direct the subsequent operations of shoreline cleanup response crews. This plan has consciously borrowed heavily from the existing San Diego Area Contingency Plan (ACP) intending that these two documents will be used together during future spill response actions at the CNM. Tables from the ACP that address oil spill clean-up methods that can be used at various shoreline habitat types have been modified and expanded in this plan to specifically address the unique environment contained within the National Park's boundaries. General descriptions of clean-up techniques to be used within the park have been included in this document to help inform any future CNM manager who may not be familiar with spill clean-up operations but who may by chance find themselves called out to respond to an oil spill emergency.

This document address concerns related to large spill events that may impact a significant area of park shoreline. Lesser events that may evoke a response should also take these guidelines into consideration.

This document has been reviewed and approved by the San Diego Area Committee and is incorporated into the local Area Plan by reference at Planning Section 4640, and as an inclusion of the 9800 section (9810.6).

Environmental Sensitivity Index

The standard shoreline habitat mapping protocol used for spill response in the United States is the Environmental Sensitivity Index or "ESI." The ESI assigns ranks to ten representative shoreline types using site exposure to potential wave energy combined with ecological sensitivity to injury from oiling of the predominant shoreline substrate. The ESI assigns these shoreline types with a sensitivity score from 1 to10, with 10 being the most susceptible and 1 being the least susceptible to injury from oiling. The 10 sensitivity ranks are further subdivided using letter designations to capture additional differences found in the environment. The National Park's shoreline is comprised of several Environmental Sensitivity Index (ESI) shoreline types including 1(a), 2(a), 3, 4, 5, and 6 (a and b) (ACP Sec 3000, pp 3-10 and 3-11). The CNM is located within the ACP Operational Division F (Figure 1).

Oil Threats & Spill Response Recommendations

Considering the existing military, commercial, and recreational uses of petroleum in both San Diego bay and along the California coastline, there are many significant sources of oil that threaten this shoreline. A quick list of these threats includes:

1) Crude oil from offshore lightering operations;

2) Bunker fuel (IFO 160, or 380) from local coastal transport by barge and some commercial vessel traffic;

3) Diesel fuel from Naval supply shipping and active duty vessels, local coastal barge, or private and commercial vessel traffic;

4) Jet fuel from Naval supply or activate duty vessel traffic, Naval or commercial air traffic;

5) Gasoline from private vessels.

All of these potential sources of spill products have been generally addressed in the Response Method Tables 44 through 47 inside of the existing ACP. We have adapted and modified those tables to address the specific ESI shoreline types that are present at CNM, and added a list of prioritized clean-up methods that can be used during responses on this shoreline.

The underlying goal that is addressed within these guidelines is a review the Cabrillo National Monument shoreline types and pre-identification of shoreline specific cleanup methods considered suitable and acceptable to the National Park Service in the interest of providing National Park Service input to any future emergency spill response planning effort.

Basic Park Information

Cabrillo National Monument (CNM) is a unit of the National Park Service (NPS) at the southern end of the Point Loma peninsula in San Diego, CA. It consists of approximately 160 acres of land, and approximately 130 acres of intertidal shoreline. The intertidal area of CNM is some of the healthiest natural shoreline in southern California. The coastal vegetation in the park represents the last remaining 1% of its type in California. Both are managed strictly by the NPS and the intertidal area includes a human exclusion zone. CNM is visited by close to one million visitors a year, about a tenth of which visit the intertidal area, making it one of the most visited National Monuments in the United States. Given the high quality of this environment, and its status as a National Monument, any operations in this area must balance the damage of clean-up operations with the damage of the spill to the natural resources on its own.

Park Entry and Contact Points

CNM is open daily from 9 AM – 5 PM including all holidays and weekends. During these hours, particularly on weekends, holidays, and days with nice weather, attendance at the park can be in the thousands of visitors. Access to the peninsula is controlled by Navy Base Point Loma. The Navy guards the entrance to the entire peninsula at the intersection of Catalina Blvd. and Electron Dr. From 5 PM to 5 AM on weekdays and 5 PM to 9 AM on weekends, this gate is manned and access is restricted without permission from the Navy.

To gain after hours access to the peninsula contact the Chief Warrant Officer at Navy Base Point Loma Security (ph: 619-553-7069, fax: 619-553-0456, alfonza.walton@navy.mil). To coordinate after hours access to Cabrillo call the Chief of Resource and Visitor Protection (Law Enforcement) (619-523-4563**, ralph_jones@nps.gov).**

Habitat Description and Spill Management Goals

The rocky intertidal shoreline consists of flat sandstone benches bordered on the shoreward side by steep sandstone cliffs. Both the benches and the cliffs are very soft and are actively eroding.

There are patches of boulders distributed along these benches that consist of much harder metamorphosed volcanic rock. These boulders range in size from a basketball to the size of a small bus. There are occasional pools of ankle to knee deep water. Surf grass, kelp, turf algae and rock weed dominate the intertidal. This shoreline topography extends the length of the peninsula from Sunset Cliffs on the western side, around the southern tip, to Ballast Point on the eastern side.

Shallow rocky benches extend sub-tidally seaward and make approach of the shoreline by boat difficult and hazardous.

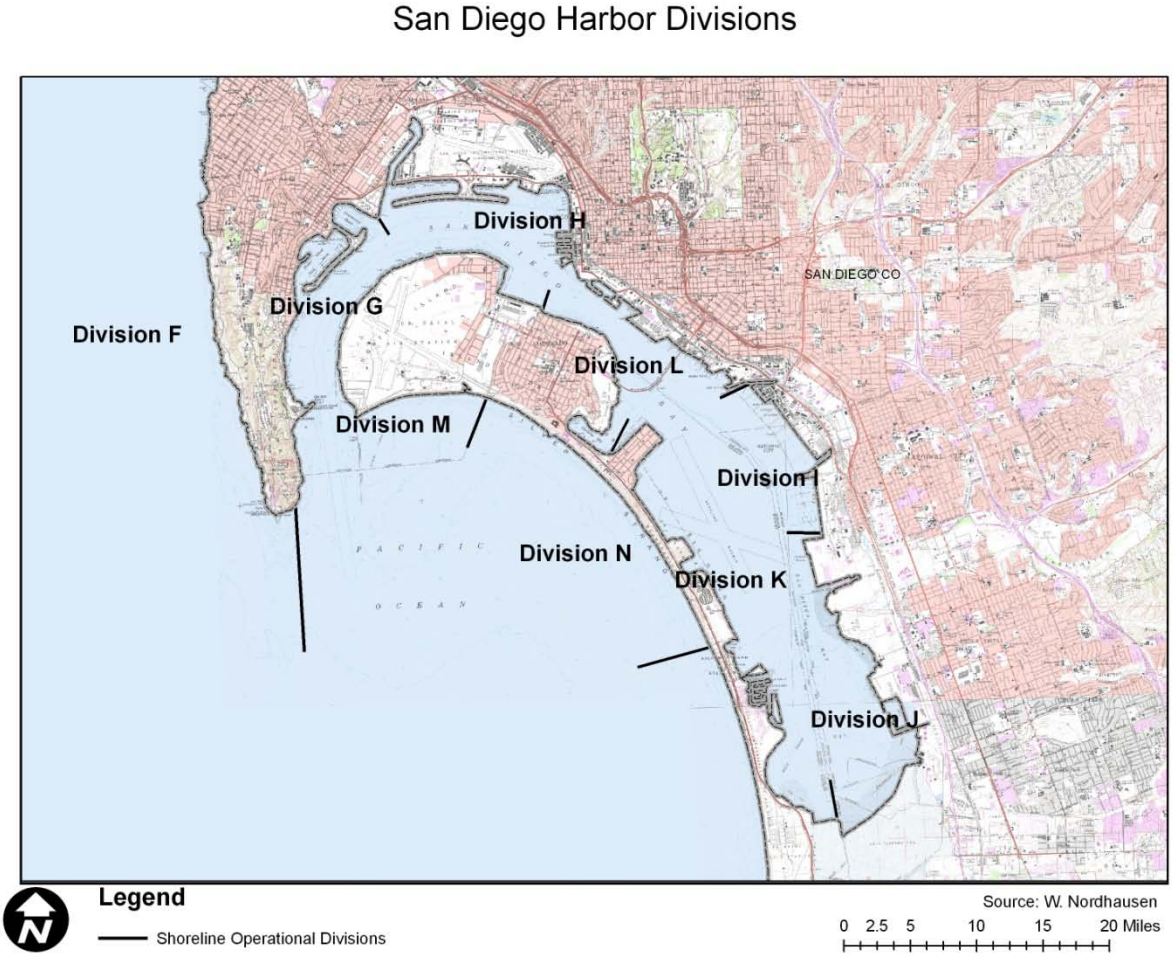

Figure 1. Spill Response Operational Divisions in the area of Cabrillo National Monument.

The shoreline within the boundaries of CNM has been divided into three different visitor management "Zones" (Figure 2). Zones 1 and 2 (the two northern most) are open to park visitors. Zone 3 is closed to human visitation for recovery and scientific research. Zone 3 must receive the lowest visitation possible for any recovery operations. Any planned response that intends to enter zone 3 will require pre-approval by the NPS biologist before work begins there. Coordinate access and clean-up options of the intertidal area with the CNM marine biologist (619) 523-4582.

Tides, Weather, and Climate

In addition to waves, the tides will have the biggest impact on shoreline conditions. Tides in the Point Loma area range from -2.0 ft. to +8.0 ft. At high tide water will reach the sea cliffs.

Current tide predictions for Point Loma can be found here:
http://tidesandcurrents.noaa.gov/tides11/tab2wc1a.html#122
Current and near future water levels including waves and tides can be found here:
http://www.cdip.ucsd.edu/
Near future predicted swell height for southern California, including Point Loma, can be found here:
http://www.cdip.ucsd.edu/?nav=recent&sub=forecast&units=metric&tz=UTC&pub=public&map_stati=1,2,3
Weather on Point Loma is generally mild with temperatures in the 50's to 70's. Unless a storm is present, wind is usually less than 15 knots. During Santa Ana conditions the weather approaches from the east and is quite warm and very calm on the coast.

Coastal currents are subject to several local physical influences, but wind is a major contributing factor. The coast is now monitored by Southern California Coastal Ocean Observation System (SNCOOS) radar network administered by Scripps Institute of Oceanography. Rapid updates in surface current information is readily available online at:
http://www.sccoos.org/data/hfrnet/.

An illustration of the generalized near shore current regime of Point Loma is presented in figure 2. The illustration presents Schematic Surface Current patterns within the San Diego region. The flow strength is represented by the thickness. Some flows have the consistent direction (black), and the other can have reverse direction (gray). b is southeastward flow, and b', g and h are the clockwise flows.

Other Agencies

There are four government agencies with waterfront property on the peninsula. In addition to the National Park Service, the area immediately to the north of CNM is leased by the City of San Diego from the Bureau or Land Management and supports the Point Loma Waste Water Treatment Plant. The U.S. Coast Guard owns a small piece of land at the southwestern corner of the peninsula, but has no property below Mean High Water. The rest of the coastline is owned by the U.S. Navy. Federal jurisdiction extends 300 yards offshore. Any medium to large spill is likely to affect all of these agencies.

Shoreline Access & Response Equipment Staging

Access to the shoreline is available on foot only. The access point is on the west side of the peninsula at the end of an approximately 100 yard trail from Lot 1 on Gatchell Rd. (Figure 2 and Table 1). An additional trail approximately ¼ mile from Lot 2 on Gatchell Rd.leads to the same access point. This access point leads directly to Zone 1.

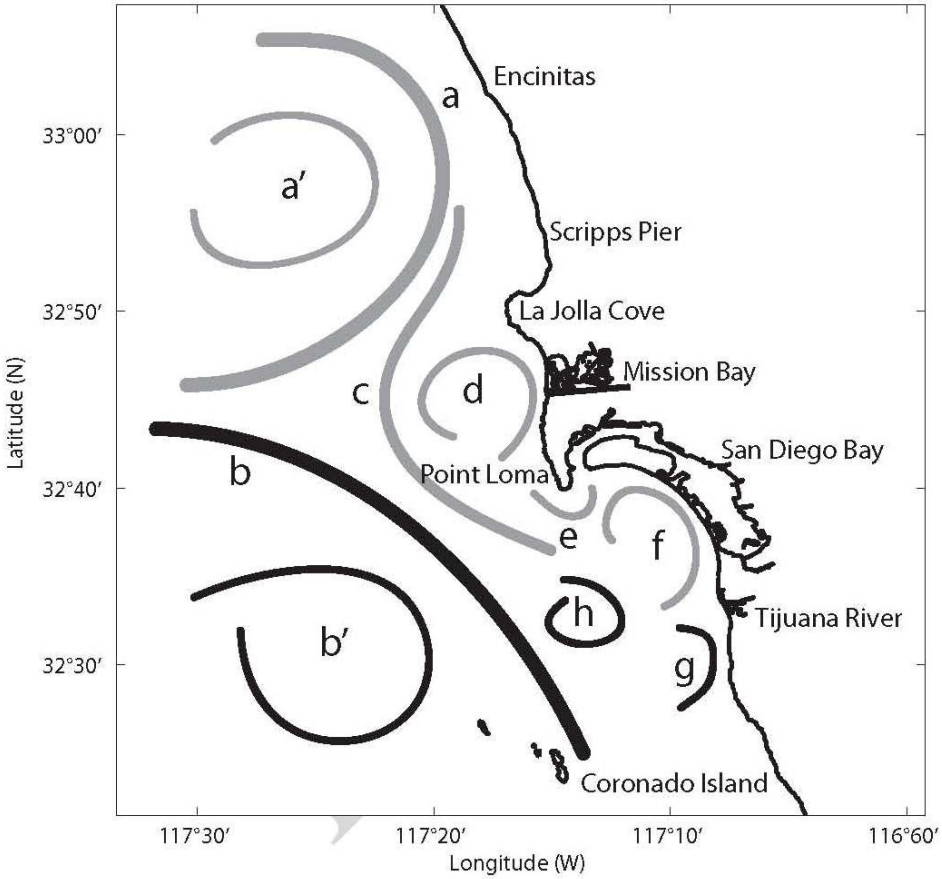

Figure 2. Generalized coastal surface currents off shore Point Loma and surrounding areas. From Kim, S. Y., 2009: Coastal ocean studies in southern San Diego using high-frequency radar derived surface currents, Ph.D Dissertation, Scripps Institution of Oceanography Technical Report. Available online at http://repositories.cdlib.org/sio/techreport/95.

There is an old boat ramp on the Coast guard property further south on the peninsula. This ramp has long fallen into disrepair and can no longer be used. It leads directly into Zone 3 (Figure 2 and Table 1).

There is one additional access point just to the north of the Point Loma waste Water Treatment Plant, on Navy property. This point can be accessed by Woodward Rd. It requires scrambling down a steep and eroding cliff. It is the least convenient of the three access points and is useable on foot only (see map and table).

Roads and Staging Areas

Staging of equipment and personnel should be coordinated with the Chief of Law Enforcement at CNM (619) 523-4563, and the Park Superintendent (619-523-4560).

As one enters the park, the main road stays on top of the peninsula and curves to the east. It leads to three large main parking lots near the Administration building (Table 1). These are the largest paved areas in the monument and a good place to stage vehicles and equipment. After the entrance station, Cabrillo Rd. goes down the hill on the right, towards the western side of the peninsula. After a 180º turn it becomes Gatchell Rd. Lot 1 is the first parking lot on the left, and the largest paved area near the shoreline (Figures 2 and 3, and Table 1). It is also the closest to the main access point to Zone 1. Lot 2 and Lot 3 are further north along Gatchell Rd., and are considerably smaller. After Lot 3, Gatchell Rd. enters the Point Loma Waste Water Treatment Plant (PLWWTP). The road is gated on the northern end of the PLWWTP, but does continue onto U.S. Navy property connecting to Woodward Rd at its northern end. Access through this gate must be coordinated with PLWWTP and the Navy. **Central Control at the Point Loma Wastewater Treatment Plant (619-221-8770)** can be contacted on a 24 hour basis. Woodward Rd. connects to Cabrillo Memorial Dr. which runs along the top of the peninsula (Table 1).

The Ocean View Parking Lot is small, but provides an excellent vantage point for the western side of the peninsula. The Cabrillo Statue or Visitor Center can provide similar views of the eastern side of the peninsula (Figure 3 and Table 1).

Main Parking Area: 210,046 sq. feet. This area should be used as the main staging area for all equipment.
Lot 1: 22,150 sq. feet. This area should be used as an advanced staging area for equipment and supplies for immediate use. There may also be room here for temporary storage of recovered oil, and a HAZWOPER decontamination area.

Lot 2: 7,448 sq. feet.

Lot 3: 13,950 sq. feet. Lots 2 and 3 may be used for temporary storage of equipment or recovered oil.

General Safety and Intertidal Safety

This plan does not deal with the most immediate concerns of human health and safety, stopping the spill at its source and contamination at the source, or protection from petroleum exposure. These issues are addressed by the Incident Action Plan. This plan defers the safety and medical plans to the IAP.

However, there are some safety concerns for which every person entering the intertidal area on Point Loma should be aware of which should be referenced in the Site Safety Plan during a response effort. They should also be addressed during any tailgate safety briefing. Those issues are as follows:

A) The tide can rise behind work crews cutting off access to exits. Response planning should schedule activities with the tides in mind.

B) Large waves can surprise people, even on calm days. They can easily knock a person down and potentially sweep them off the shore.

C) The rocks are often slippery due to water and the variety of algae that covers the rock

surfaces. Care in placing feet between rocks while walking minimizes falls. Use hands or long handled tools to assist balance while moving over rocks. Expect all surfaces to be slippery.

D) The sandstone cliffs are continually eroding. They may not support the weight of a person, or they may produce falling rocks and dirt from overhead bluffs.

Crowd Control and Security

Because CNM is a unit of the National Park System the public's access to the park must be maintained to the extent practical. However, public safety is a high priority for the National Park Service, and if warranted they would close areas of CNM. In addition, there are private residences on the Coast Guard property and in Rosecrans National Cemetery. Buildings adjacent to the shoreline and at the southern tip of the peninsula are manned and used daily by the Navy. All of these issues must be addressed to maintain an efficient flow of traffic throughout any response at CNM.

Limiting public access to the area due to safety or recovery operations must be coordinated with the Chief of Resource and Visitor Protection (Ralph Jones, Ralph_jones@nps.gov, 619-523-4563) and the Superintendent (Tom Workman, tom_workman@nps.gov, 619-523-4560**)** at CNM.

Communications

One of the most important issues for every response is the immediate need to establish a robust and functional communications network among the responders. Cell phone reception at CNM is generally not very good. Responder's will typically find that no reception is available on the shoreline, and usually spotty at the upper parking lot. On larger events the need to establish a better communications network should be handled through the Incident Command's designated Communication Leader assigned to the Logistic Section.

Spill Response Information

Response vs. Assessment: About NRDA

The response guidelines identified in this plan are tailored to assist shoreline cleanup efforts on the CNM coastal property. While this document will not specifically address the need or the method to be used in conducting a Natural Resource Damage Assessment (NRDA), it did seem worthwhile to include some potentially helpful information to guide future spill response managers that maybe asked to plan or conduct a spill related NRDA.

In general, NRDA should include representatives of the state and federal agencies responsible for developing NRDA plans subsequent to an oil spill requiring any measure of response clean-up effort. Conducting a joint NRDA can greatly reduce the duplication of effort and also assist in the development of the important professional working relationships that will be needed as the assessment process moves forward.

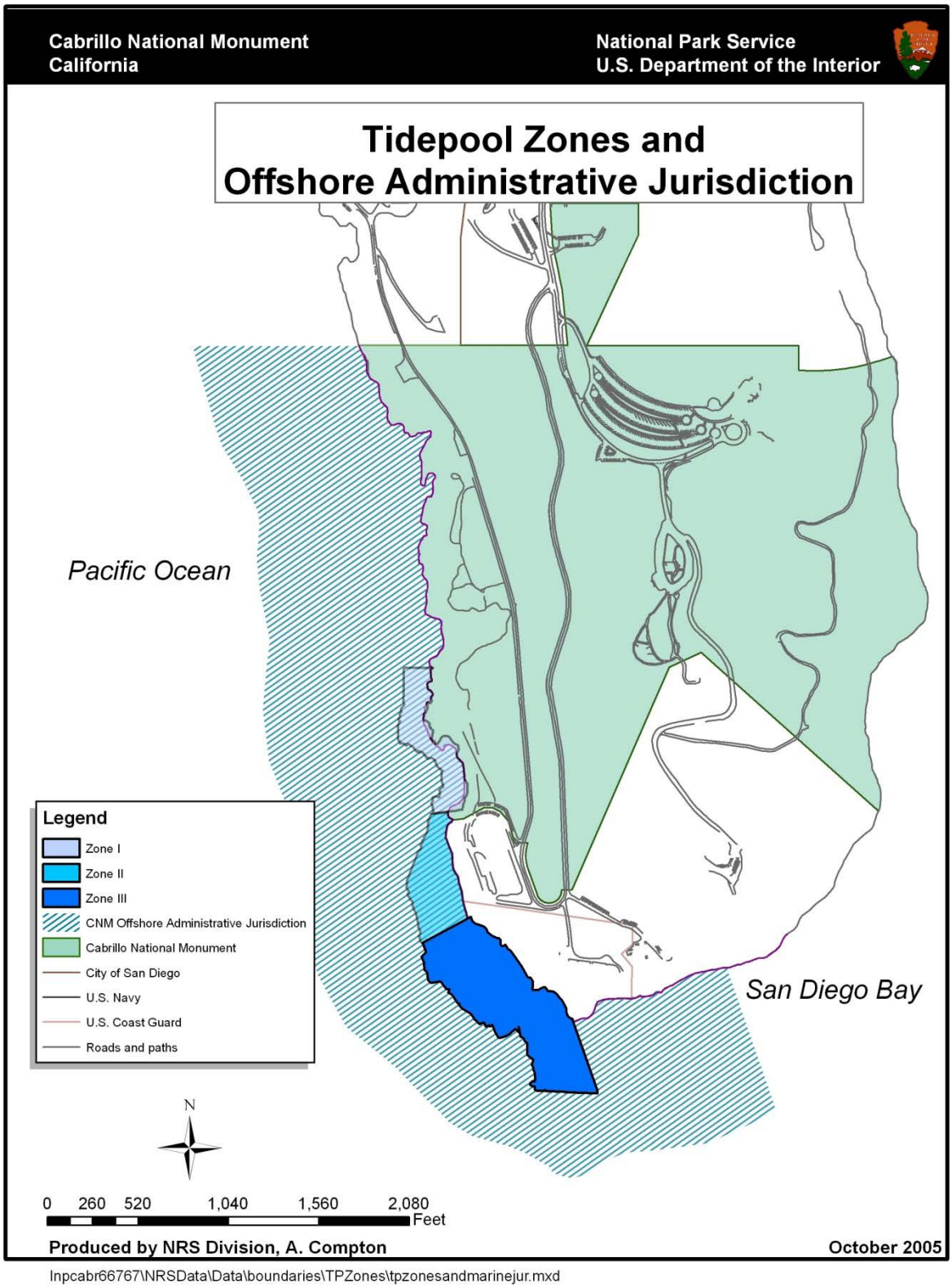

Figure 3. Diagram of Cabrillo National Monument tide pool access zones.

Finally, when it is possible, it is desirable to begin data collection before impacts to the beach occur. If time allows, a shoreline pre-assessment should be attempted when and if sufficient time exists so that such an assessment can be completed before the oil hits the beach. To this end, the Minerals Management Service (MMS) and California Department of Fish and Game's Office of Spill Prevention and Response (OSPR) have commissioned the development of a Pre-Spill Assessment of Coastal Habitat Resources manual that describes methods and protocols to use during the pre-oiling assessment. The manual might also be employed to conduct post-assessment impacts even if the pre-oiling assessment is not an option. This manual can be found on line at:
http://www.marine.gov/Findings/Reports/Ambrose%20and%20Diaz2008Pre-spill%20Assessment%20Final%20Report%20Volume%202.pdf

Options Related to Spill Location

Offshore Point Loma

Depending on the specific type, volume and location of spilled oil, several response options may be considered for (off site), offshore response effort. Generally, the greatest number of options is

Table 1. Locations of important spill response site features at Cabrillo National Monument. Also see Figures 3 and 4 to correlate locations.

Important Latitudes and Longitudes	Latitude	Longitude
1. Entrance Station	32º 40' 37.42"	117º 14' 35.84"
2. Ocean View Parking Lot (west side of peninsula)	32º 40' 25.32"	117º 14' 32.22"
3. Main Parking Lots	32º 40' 26.97"	117º 14' 23.88"
4. Cabrillo Admin Building	32º 40' 28.22"	117º 14' 22.16"
5. Cabrillo Statue Viewing Area (east side of peninsula)	32º 40' 26.30"	117º 14' 20.34"
6. Access to Intertidal at Cabrillo Zone 1	32º 40' 09.35"	117º 14' 42.97"
7. Lot 1	32º 40' 05.60"	117º 14' 39.14"
8. Lot 2	32º 40' 25.63"	117º 14' 41.51"
9. Lot 3	32º 40' 30.18"	117º 14' 45.56"
10. Zone 1/Zone 2 Boundary	32º 40' 05.35"	117º 14' 41.91"
11. Zone 2/Zone 3 Boundary	32º 39' 59.09"	117º 14' 41.10"
12. Old Boat Launch on Coast Guard Property	32º 39' 58.06"	117º 14' 38.30"
13. Coast Guard Gate	32º 39' 59.36"	117º 14' 34.13"
14. Point Loma Waste Water Treatment Plant Entrance	32º 41' 00.33"	117º 14' 58.17"

Figure 4. Aerial Image of Point Loma and Important Points from Table 1.

available with persistent oils such as crude and bunkers. These oil types may be evaluated for in situ burn, dispersant application, or mechanical recovery. The non-persistent oils (gasoline, jet fuel and diesel) are not candidates for dispersant use but may be evaluated for in situ burn or mechanical recovery depending on the volume and the spill location. Additionally, oceanic, climatologic and applicable regulatory variables will influence the decision making process

Ultimately, a substantial petroleum product release off the coast of Point Loma could result in an environmental impact to the intertidal zone of the National Park. Spill Responders could be expected to employ any combination of effective shoreline cleanup methods to mitigate the effects of oiling.

Inside San Diego Bay

Oil spills inside San Diego Bay are far more restrictive in the available response considerations. These spills are essentially limited to mechanical recovery methods on the water, and a variety of shoreline cleanup options, which are addressed in this guideline.

Options Before and After Oil Contacts the Shoreline

Pre-cleaning of the intertidal zone might be accomplished by hand crews that remove the kelp wrack and other debris from the active intertidal zone during low tide. Pre-cleaning can reduce the amount of oil contaminated material that must eventually be picked up during the cleanup phase, which can speed up the clean-up phase of a spill response. By accelerating the clean-up phase, the time oil is present in the environment can be reduced which generally reduces the collateral damages to the environment. Additionally, the clean wrack is sometimes returned to the beach after the oil has been removed, thereby restoring some of the lost habitat structure to the intertidal zone. Even if the material is sent to a land fill the cost of disposal is reduced since the un-oiled wrack it is not categorized as a hazardous waste.

Clean-up Options for Diesel and Gasoline

Gasoline and diesel spills will tend to evaporate within hours to days. They generally do not leave the residual stains that are associated with black oils. Response efforts can be hampered when these refined petroleum products volatilize and create unhealthy atmospheric working conditions. The risk from fire is high whenever large amounts of gasoline are spilled into the environment. Additionally, gasoline and (often) diesel contain high concentrations of aromatic hydrocarbons including benzene which produce its own particular health hazards. For these reasons, air monitoring is critical and should be done by properly trained and qualified personnel to determine that the response area is safe.

Clean-up of spilled diesel is usually limited to collection of the spilled material using sorbents which are then gathered up for disposal. Natural tidal washing or low pressure flooding to speed up the movement of oil into sorbents are typically the only tools for addressing this material when booming, excavation, or the use of skimming equipment is not practical.

Oil Collection Stations

If a clean-up effort occurs on the CNM shoreline, then a place to safely collect and store waste

will need to be identified. The response contractors will normally do this work, but they will want to know where they can place appropriate bins for collecting these wastes. On large spills, wastes are collected in roll-off bins, while in smaller spills storage drums can be used for waste collection. These collection stations ideally will be located near the shoreline and on a flat landing surface, preferably in a location where trucks can operate. Additionally, it is preferable that public access to these collection areas be precluded for the duration of the response. Should these collection sites be used as temporary storage facilities (i.e. left in place for several weeks) they will need to be approved by the Federal On Scene Coordinator (FOSC), Department of Toxic Substances Control (DTSC) in Long Beach (310-590-4968), California Coastal Commission (CCC) (415-557-3683), Regional Water Quality Control Board (RWQCB) (858-467-2987), the City of San Diego (858-492-5051), and the S.D. Fire Department (619- 533-4400). These sites are exempt from any hazardous waste generator and facility permit requirements for a period of 30 days, per the draft MOU between OSPR and DTSC. Additional 30-day extensions may be granted by DTSC, under appropriate circumstances.

Sources of Response Equipment

The San Diego Area Contingency Plan (ACP) provides extensive lists of spill related response resources accessible from local Oil Spill Response Organizations (OSRO's). Similarly, OSRO's can provide current listings of their available equipment and personnel which will most likely include resources available both locally and from more distant facilities. Collectively, a substantial response capability is available within a relatively short response request time-frame. However, the nature of shoreline cleanup effort at a rugged, limited access, open coastal setting such as CNM will undoubtedly rely heavily on manpower resources with only limited mechanical assistance.

Spill Response Options

Once oil has spilled into the environment, the clean-up option(s) that will be used must be carefully chosen to ensure that the best achievable clean-up can occur while minimizing both additional environmental injury and monetary cost of the clean-up operations. The following sections will identify and discuss the acceptable methods of clean-up that may be used during a response at the CNM. The discussion of methods deemed "Generally Disapproved" follows the discussion of "Pre-approved" methods. All of this information is summarized at the end of this document in Tables 2 through 5 (pages 28 to 31).

These guidelines attempt to apply a standard of best achievable protection in combination with the ideals of caution and prudence in evaluating the utility and applicability of each of these clean-up methods as it might come to be used in a hypothetical spill event. The text discussion and accompanying summary tables take into consideration how each of these methods might be expected to perform under some hypothetical standard condition.

Even though a clean-up method is identified in the pages of this document as "Approved" or "Disapproved," unforeseen considerations at a future spill response may justify the use of one or more of the "generally unacceptable" methods. Similarly, incident specific variables could render some of the pre-identified acceptable methods inappropriate response options.

Pre-Approved Spill Response Options

Natural Recovery

Natural recovery is simply the decision to allow for the natural degradation of the oil to proceed without any additional clean-up efforts. Occasionally this is the first and only cleanup option when the amount or type of product does not warrant any addition to environmental damage that is associated with staging a more labor intensive cleanup effort. This is also the default last option after all other clean-up methods have been either tried or ruled out, or when the amount of remaining oil no longer justifies the continuation of remedial work efforts.

Manual Oil Removal / Cleaning

Manual removal of oil is accomplished by hand crews that collect oil from the sand and rocky shoreline substrates. The oil is put into acceptable waste containers and disposed of properly after this waste stream is categorized. Generally, the method is most suitable in areas of limited accessibility, and high sensitivity. However, it may result in a relatively high degree of residual contamination.

Manual removal can include the wiping of rocks using rags or sorbent pads to lift the oil from the hard surfaces that it has adhered to. Additionally, manual removal sometimes includes the use of hand tools such as scrapers, rakes and shovels to remove the oil from the substrate. In spills of black oil the use of hand scrapers (putty knives) to remove heavy deposits of oil from the rock surfaces is a slow and tedious process. In the case of light oils sorbents and rags may remove all but a film from substrate surfaces, while sediment penetration may be greater than heavy oils. Carrying or dragging bagged material across rugged terrain is strenuous labor which can produce amplified negative impacts to the environment. The net benefit of this method may include a quicker recovery of the area, as the amount residual oil is reduced and duration of sheening is shortened. Some amount of oil will remain to weather naturally.

Sorbents

Sorbents are manufactured in a variety of designs with a variety of operational applications. Selection of the most appropriate type should be left to the discretion of the spill management team. Only sorbent products that are US EPA and State approved will be utilized in any response setting.

Sorbents are manufactured as either pads, sweeps, booms, or pom-poms. They are constructed using hydrophobic and oleophilic materials that collect floating oil. Some of these materials are configured to be anchored in place where they passively catch floating oil moving with the tides and currents. Pads are single sheets of spun polypropylene that are used for hand-wiping oil off of rocks, or floated on the water and later retrieved by hand after they have become saturated, while sweeps are long rolls of the same material. The use of free floating pads would be limited to those near shore tidal areas where deployment and hand retrieval could easily occur without the threat of the pad being swept out to sea. Booms are absorbent materials shaped into tubular lengths of varying length and diameter often strung together to form barriers to prevent floating oil from drifting from a confined area. Pom-poms resemble cheerleader devices but act to snare (or adsorb) floating oil either on the water surface, or subsurface.

Vacuum

Vacuum trucks would have limited access to the shoreline within the park, so their use during a spill response would be limited to the few areas where a hose could be extended to the beach while still maintaining a working suction head. Because of this limitation, vacuum trucks are generally likely to be a limited response option for removing oil along the CMN shoreline. Exceptions may occur when the oil is close enough to shore, and thick enough that it can be skimmed from the water surface using a weir type nozzle, or when a beached vessel's fuel tanks are within the effective reach of the suction hose.

Small portable pumps can be effectively used for transferring oil from the fuel tanks of stranded vessels into transport drums. This method of recovering oil from vessels is especially useful when beach access for larger vacuum trucks is not available. The rugged shoreline of the CNM is generally more conducive to operations using small pumps rather than the larger vacuum trucks.

Debris Removal & Wrack Pre-cleaning

Manual removal of stranded debris and wrack from low elevation beaches aims to reduce the amount of contaminated waste that will otherwise require specialized disposal as hazardous waste. This effort may be combined with strategic relocation of the wrack to higher elevation supra-tidal areas that are securely above the high tide zone. These are labor intensive efforts that best occur before oil arrives on the beach and contaminates these same materials. This work would be done using only hand crews with rakes and shovels to physically remove the debris, or move the wrack to the nearest safe location above the high tide line, as the beaches at the CNM are not accessible to the equipment that is typically used to expedite this effort.

The general description of this work plan is fairly simple: debris is placed in bags and hauled away as ordinary trash and/or the un-oiled wrack is raked or dragged to a place high enough on the beach face so that it is out of danger of becoming oiled. The clean wrack can later be returned to the beach after the threat from oil has passed, thereby reducing disposal costs and minimizing the loss of any ecological value that the wrack normally provides. If for some reason the decision is made to haul away the clean wrack material, it can typically be disposed of as a non-hazardous waste if it has not become oiled.

The practical limits placed on pre-cleaning must consider the amount and type of wrack on the beach, the ability to move the wrack out of the path of oil, and the availability of work crews to complete the work. This effort may be futile on beaches where the wrack load is heavy, especially if there is a large amount of floating material still in the water.

Sediment Reworking/Soil Remediation

Sediment reworking involves the tilling of oiled soils to enhance the rate of microbial biodegradation or photo-oxidation of petroleum products. Nutrients are sometimes turned into the soil to further enhance natural degradation. This process will be limited to hand turning the sand using shovels or rakes on the pocket beaches at CNM without the addition of nutrients as the beach environment is highly energetic and not conducive to nutrient application for the purpose of enhanced bacterial growth.

Flooding

Flooding utilizes very high volume fire fighting pumps to produce a deluge of ambient temperature water that can dislodge moderate to heavy concentrations of oil from rocks, and out of the crevices and interstitial spaces among various beach substrates. The dislodged oil can be collected using floating sorbents that are placed in the immediate work area. It may be appropriate to conduct an on-site demonstration to determine if it is effective and safe for wholesale deployment at any spill response.

Low Pressure Flushing (Ambient Water)

Low pressure ambient water flushing (<50 psi) aims to mechanically loosen and flush heavy concentrations of oil that have become stranded on irregular, rocky shoreline. The mobilized oil is typically collected using sorbent materials as the oil floats free with the rinse water. The soiled sorbents are then bagged and disposed of. This task is accomplished by using trash pumps to draw water from the ocean. The water is then sprayed through a low pressure nozzle directly onto the oiled substrate. This method does nothing to increase the temperature of the water. Nozzle pressure must be controlled to mitigate negative impacts to attached intertidal organisms.

It is recommended that this clean-up method can be evaluated for efficacy by staging an on-scene demonstration to determine the best equipment combination (pumps, hoses, and nozzles) for each of the various substrates to be flushed before use approval is given. During the demonstration the equipment pressure and flow should be manipulated to determine the most suitable combination of pressure and flow to achieve an acceptable level of oil removal. If the method is not effective at removing oil within environmentally acceptable parameters, then the method should not be authorized for operations. Generally, the method is effective only in removing heavy deposits of oil that can easily re-float, and may leave behind a significant quantity of oil that could require additional effort.

High Pressure Flushing (Ambient Water)

High pressure (>50 psi) flushing employs a water stream that can cause significant erosion of the substrate and potentially dislodge attached intertidal organisms from the shoreline substrate. This method is generally discouraged where more substantial attached biological resources occur because the damage to organisms from the force of the high pressure water stream may be more harmful than allowing natural recovery, requiring a significantly longer recovery period. The degree and type of oiling are important considerations.

Generally Disapproved Spill Response Options

Barriers / Berms

While an offshore barrier deployment could theoretically minimize the amount of oil that reaches this shoreline, there is no acceptable physical location to install an effective boom deployment within the boundaries of the park. The shallow nearshore substrate, in combination with tidal changes and wave action, will preclude the effective use of boom along the shoreline off the coast of the national park. Offshore boom tows to collect oil may be feasible outside of the kelp

beds, but the anchoring of a barrier boom to exclude or deflect oil is not reasonably expected to provide a meaningful protection strategy. Berms involve the use sand pushed into piles to restrict the movement of surface flow, or wave action. In the CNM setting it is unlikely this control strategy will have any effective application.

Mechanical Oil Removal

Mechanical removal refers to the operation of heavy (mechanized) equipment on the beaches. The beaches and shoreline of Cabrillo N.M. are generally not accessible, and the working environment is not appropriate for this kind of activity. The only notable exception to this statement could be the use of heavy support equipment on the established roadways for moving materials and waste in and out of the adjacent response area.

Vegetation Removal

The cutting and removal of attached algae in the tidal area is generally disapproved as an initial clean-up method. The cutting and removal of contaminated shoreline vegetation is also generally disapproved. Never the less, the decision to cut, or not to cut, any terrestrial or aquatic vegetation should be made only with, and after, a consultation and approval by the CNM management. Whenever vegetation removal is deemed appropriate, it is advisable to have the work activity closely monitored to avoid unnecessary aggressive cutting or the denuding of substrates. The use and selection of appropriate hand tools and the removal and segregation of the oily wastes should also be included in any vegetative trim plan.

Low Pressure Flushing (Hot Water)

Low pressure hot water flushing (<50 psi) aims to mechanically loosen and flush heavy concentrations of oil that have become stranded on irregular, rocky shoreline. Hot water is generally more effective than ambient for mobilizing stranded oil, but hot water will likely increase the adverse impacts from cleaning upon the localized intertidal biological resources. The mobilized oil is typically collected using sorbent materials as the oil floats free with the rinse water. The soiled sorbents are then bagged and disposed of. This task is accomplished by using trash pumps to draw water from the ocean, and then passed through a heating unit. The hot water is then sprayed through a low pressure nozzle directly onto the oiled substrate. Nozzle pressure must be controlled to mitigate negative impacts to attached intertidal organisms.

Evaluate this method for efficacy by staging an on-scene demonstration to determine the best equipment combination of pumps, hoses, temperature, and nozzle for each of the various substrates to be flushed before use approval is given. During the demonstration the equipment pressure, temperature, and flow should be manipulated to determine the most suitable combination to achieve an acceptable level of oil removal. If the method is not effective at removing oil within environmentally acceptable parameters, then the method should not be authorized for operations.

High Pressure Flushing (Hot Water)

High pressure flushing can cause erosion of some substrates, and dislodge attached intertidal organisms. With the addition of hot water, this method is generally discouraged for response

work at the CNM. The use of high pressure and hot water flushing is likely to be more harmful initially and may also require a significantly longer recovery period than would occur by simply allowing natural recovery. The degree and type of oiling are important considerations, and the method might be acceptable in limited shoreline areas, specifically on heavily oiled riprap that has minimal habitat value.

Steam Cleaning

Steam cleaning of contaminated surfaces is primarily limited to man-made structures such as concrete surfaces, or rip-rap revetments. This method is somewhat effective at removing lingering staining left behind by less aggressive cleaning methods, but generally is not a commonly employed response technique for natural or biologically sensitive sites.

Sand Blasting

Sand blasting is not an acceptable response tool for spill clean-ups on or around tide pool communities of the Cabrillo National Monument. It offers no beneficial advantage to steam cleaning, or any other technique.

Solidifiers

Solidifiers can be used in California only with Regional Response Team (RRT) approval on a case by case basis. Fish and Game OSPR is working on pre-approval for those brands marketed in contained forms, such as Rubberizer® and similar products, but pre-approval is not yet available. Solidifiers work best with relatively large quantities of refined petroleum products such as diesel fuel. One of the important qualities of solidifiers is that they are capable of collecting sheen as well, but this requires relatively quiet water conditions and a “soak” period. Standard sorbents have no affect on sheen. While the use of some types of solidifiers can have a practical application at a response effort at CNM, their use is conditional on RRT approval.

Shoreline Cleaning Agents

Shoreline cleaning agents are a specialized category of products that must be approved by both the U S EPA and the State before they can even be considered. Their use is regulated on a case by case basis (like solidifiers) and must be approved by the RRT. While it is possible that a limited scope of utility might be recognized under a specific set of circumstances during a CNM response effort, this option will be given serious, spill specific scrutiny before it is approved for use on a spill in California.

Nutrient Enrichment

The application of fertilizer to contaminated substrate can stimulate and accelerate the growth of natural oil eating bacteria and “kick start” the bacterial degradation of residual oil. However, the nutrients must be able to remain in contact with the target population of bacteria. Given tidal fluctuation on a high energy coastal setting, the prognosis for a successful outcome is poor.

Natural Microbe Seeding

Application of seed bacteria is a potential accelerant of the degradation of residual oil. But, the

high energy setting and tidal fluctuation that limits the likely success of nutrient enrichment will likely limit the success of this method too.

Oil Clean-Up Matrices Adapted From The ACP

The National Park Service at CNM is concerned not only with the impacts of an oil spill, but also with the impacts associated with cleanup activity. Therefore, the Park Service wishes to utilize response cleanup strategies that will minimize secondary damages while achieving the most efficient removal of contaminates as is feasible. The CNM shoreline habitat is recognized as both highly dynamic, and environmentally fragile. Response planning should utilize methodologies appropriate for the affected habitat, yet only as aggressive as necessary to achieve the end result of a less contaminated shoreline, but still capable of supporting and sustaining marine intertidal flora and fauna.

This section incorporates the four cleanup matrix tables found in the San Diego Area Plan associated with floating oil types. The tables have been modified in two ways, 1) to include only those ESI shoreline types present at CNM, and 2) to prioritize those methodologies deemed appropriate and acceptable to the Park Service with respect to the CNM shoreline habitat (Tables 2,3,4,&5).

While some adjustments may be appropriate and necessary in the event of a cleanup effort, all effort should be made to adhere to these prescribed and preferred methods. Any deviation should be undertaken only with the advice and consent of the National Park Service.

Table 2. GASOLINE PRODUCTS (Category I):

Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats at Cabrillo National Monument and cleanup method priorities.

This table should be used with the accompanying text in the document.

	RELATIVE ENVIRONMENTAL IMPACT						**CNM PRIORITIES FOR INITIAL RESPONSE**					
Response Method	*Exposed Rocky Shores (1a)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Cliff Face*	*Wave-cut Platforms (2a)*	*Sand/ Gravel Beaches (3,4,5, and 6a)*	*Boulder/ Cobble Beaches (1a)*	*Rip-rap (6b)*	
Natural Recovery	A	A	A	A	A	A	1	1	1	1	1	
Barriers/Berms	–	–	B	C	–	–	N/A	N/A	N/A	N/A	N/A	
Manual Oil Removal/Cleaning	–	–	D	D	D	–	2	2	1	2	2	
Mechanical Oil Removal	–	–	D	D	D	–	X	X	X	X	X	
Sorbents	–	–	–	–	–	–	X	2	1	1	1	
Vacuum	–	–	–	–	–	–	N/A	N/A	N/A	1	1	
Debris Removal	–	–	–	–	–	–	N/A	N/A	1	1	1	
Sediment Reworking/Tilling (Hand Tools)	–	–	D	D	D	–	N/A	N/A	3	N/A	N/A	
Vegetation Cutting/Removal	–	–	–	–	–	–	X	X	X	X	X	
Flooding (deluge)	–	–	A	A	A	A	N/A	2	2	2	2	
Low-pressure, Ambient Water Flushing	–	–	B	B	A	A	2	2	2	2	2	
High-pressure, Ambient Water Flushing	–	–	–	–	–	A	3	3	3	3	3	
Low-pressure, Hot Water Flushing	–	–	–	–	–	–	X	X	X	X	X	
High-pressure, Hot Water Flushing	–	–	–	–	–	–	X	X	X	X	X	
Steam Cleaning	–	–	–	–	–	–	X	X	X	X	X	
Sand Blasting	–	–	–	–	–	–	N/A	N/A	N/A	X	N/A	
Solidifiers	–	–	–	–	–	–	N/A	N/A	X	X	X	
Shoreline Cleaning Agents	–	–	–	–	–	–	N/A	N/A	X	X	X	
Nutrient Enrichment	–	–	–	–	–	–	N/A	N/A	X	N/A	N/A	
Natural Microbe Seeding	–	–	–	–	–	–	N/A	N/A	X	N/A	N/A	

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type and define cleanup method priorities.

A = May cause the least adverse habitat impact.	1 = First priority response if conditions permit.
B = May cause some adverse habitat impact.	2 = Second priority response when first priority is in doubt or to augment first priority.
C = May cause significant adverse habitat impact.	3 = Third priority response, when first and second priorities have been ruled out or completed.
D = May cause the most adverse habitat impact.	X = Method not approved by the National Park Service as an initial response option at this site.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated.	"N/A" = Not applicable to this location or situation.
— = Not applicable.	

Table 3. Diesel- Like Products & Light Crude Oils (Category II):
Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats at Cabrillo National Monument and cleanup method priorities.

This table should be used with the accompanying text in the document.

	RELATIVE ENVIRONMENTAL IMPACT						**CNM PRIORITIES FOR INITIAL RESPONSE**					
Response Method	*Exposed Rocky Shores (1a)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Cliff Face*	*Wave-cut Platforms (2a)*	*Sand/ Gravel Beaches (3,4,5, and 6a)*	*Boulder/ Cobble Beaches (1a)*	*Rip-rap (6b)*	
Natural Recovery	A	A	A	A	A	A	2	2	2	2	2	
Barriers/Berms	–	–	B	C	–	–	N/A	N/A	N/A	N/A	N/A	
Manual Oil Removal/Cleaning	–	–	D	D	D	–	1	1	1	1	1	
Mechanical Oil Removal	–	–	D	D	D	–	X	X	X	X	X	
Sorbents	–	–	–	–	–	–	X	1	1	1	1	
Vacuum	–	–	–	–	–	–	N/A	1	3	2	2	
Debris Removal	–	–	–	–	–	–	N/A	N/A	1	1	1	
Sediment Reworking/Tilling (Hand Tools)	–	–	D	D	D	–	N/A	N/A	2	N/A	N/A	
Vegetation Cutting/Removal	–	–	–	–	–	–	X	X	X	X	X	
Flooding (deluge)	–	–	A	A	A	A	N/A	1	2	1	2	
Low-pressure, Ambient Water Flushing	–	–	B	B	A	A	1	1	2	2	2	
High-pressure, Ambient Water Flushing	–	–	–	–	–	A	3	3	3	3	2	
Low-pressure, Hot Water Flushing	–	–	–	–	–	–	X	X	X	X	X	
High-pressure, Hot Water Flushing	–	–	–	–	–	–	X	X	X	X	X	
Steam Cleaning	–	–	–	–	–	–	X	X	X	X	X	
Sand Blasting	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	
Solidifiers	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	
Shoreline Cleaning Agents	–	–	–	–	–	–	N/A	N/A	N/A	X	X	
Nutrient Enrichment	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	
Natural Microbe Seeding	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type and define cleanup method priorities.

A = May cause the least adverse habitat impact.

B = May cause some adverse habitat impact.

C = May cause significant adverse habitat impact.

D = May cause the most adverse habitat impact.

I = Insufficient Information - impact or effectiveness of the method could not be evaluated.

— = Not applicable.

1 = First priority response if conditions permit.

2 = Second priority response when first priority is in doubt or to augment first priority.

3 = Third priority response, when first and second priorities have been ruled out or completed.

X = Method not approved by the National Park Service as an initial response option at this site.

"N/A" = Not applicable to this location or situation.

Table 4. Medium Grade Crude Oils & Intermediate Products (Category III):
Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats at Cabrillo National Monument and cleanup method priorities.
This table should be used with the accompanying text in the document.

Response Method	***RELATIVE ENVIRONMENTAL IMPACT***	**CNM PRIORITIES FOR INITIAL RESPONSE**

	Exposed Rocky Shores (1a)	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Cliff Face*	*Wave-cut Platforms (2a)*	*Sand/ Gravel Beaches (3,4,5, and 6a)*	*Boulder/ Cobble Beaches (1a)*	*Rip-rap (6b)*	
Natural Recovery	A	A	A	A	A	A	3	3	3	3	3	
Barriers/Berms	–	–	B	C	–	–	N/A	N/A	N/A	N/A	N/A	
Manual Oil Removal/Cleaning	–	–	D	D	D	–	1	1	1	1	1	
Mechanical Oil Removal	–	–	D	D	D	–	X	X	X	X	X	
Sorbents	–	–	–	–	–	–	1	2	2	2	2	
Vacuum	–	–	–	–	–	–	N/A	3	3	3	3	
Debris Removal	–	–	–	–	–	–	N/A	N/A	1	1	1	
Sediment Reworking/Tilling (Hand Tools)	–	–	D	D	D	–	N/A	N/A	2	N/A	N/A	
Vegetation Cutting/Removal	–	–	–	–	–	–	X	X	X	X	X	
Flooding (deluge)	–	–	A	A	A	A	N/A	2	2	1	1	
Low-pressure, Ambient Water Flushing	–	–	B	B	A	A	2	2	2	1	1	
High-pressure, Ambient Water Flushing	–	–	–	–	–	A	3	3	3	3	3	
Low-pressure, Hot Water Flushing	–	–	–	–	–	–	X	X	X	X	X	
High-pressure, Hot Water Flushing	–	–	–	–	–	–	X	X	X	X	X	
Steam Cleaning	–	–	–	–	–	–	X	X	X	X	X	
Sand Blasting	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	
Solidifiers	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	
Shoreline Cleaning Agents	–	–	–	–	–	–	N/A	N/A	N/A	X	X	
Nutrient Enrichment	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	
Natural Microbe Seeding	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type and define cleanup method priorities.

A = May cause the least adverse habitat impact.

B = May cause some adverse habitat impact.

C = May cause significant adverse habitat impact.

D = May cause the most adverse habitat impact.

I = Insufficient Information - impact or effectiveness of the method could not be evaluated.

— = Not applicable.

1 = First priority response if conditions permit.

2 = Second priority response when first priority is in doubt or to augment first priority.

3 = Third priority response, when first and second priorities have been ruled out or completed.

X = Method not approved by the National Park Service as an initial response option at this site.

"N/A" = Not applicable to this location or situation.

Table 5. Heavy Crude Oils and Residual Products (Category IV)

Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats at Cabrillo National Monument and cleanup method priorities.

This table should be used with the accompanying text in the document.

Response Method	***RELATIVE ENVIRONMENTAL IMPACT***	**CNM PRIORITIES FOR INITIAL RESPONSE**

	Exposed Rocky Shores (1a)	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Cliff Face*	*Wave-cut Platforms (2a)*	*Sand/ Gravel Beaches (3,4,5, and 6a)*	*Boulder/ Cobble Beaches (1a)*	*Rip-rap (6b)*	
Natural Recovery	A	A	A	A	A	A	3	3	3	3	3	
Barriers/Berms	–	–	B	C	–	–	N/A	N/A	N/A	N/A	N/A	
Manual Oil Removal/Cleaning	–	–	D	D	D	–	1	1	1	1	1	
Mechanical Oil Removal	–	–	D	D	D	–	X	X	X	X	X	
Sorbents	–	–	–	–	–	–	1	2	2	2	2	
Vacuum	–	–	–	–	–	–	N/A	3	3	3	3	
Debris Removal	–	–	–	–	–	–	N/A	N/A	1	1	1	
Sediment Reworking/Tilling (Hand Tools)	–	–	D	D	D	–	N/A	N/A	2	N/A	N/A	
Vegetation Cutting/Removal	–	–	–	–	–	–	X	X	X	X	X	
Flooding (deluge)	–	–	A	A	A	A	N/A	2	2	1	1	
Low-pressure, Ambient Water Flushing	–	–	B	B	A	A	2	2	2	1	1	
High-pressure, Ambient Water Flushing	–	–	–	–	–	A	2	2	X	2	2	
Low-pressure, Hot Water Flushing	–	–	–	–	–	–	X	X	X	X	X	
High-pressure, Hot Water Flushing	–	–	–	–	–	–	X	X	X	X	X	
Steam Cleaning	–	–	–	–	–	–	X	X	X	X	X	
Sand Blasting	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	
Solidifiers	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	
Shoreline Cleaning Agents	–	–	–	–	–	–	N/A	N/A	N/A	x	x	
Nutrient Enrichment	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	
Natural Microbe Seeding	–	–	–	–	–	–	N/A	N/A	N/A	N/A	N/A	

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type and define cleanup method priorities.

A = May cause the least adverse habitat impact.

B = May cause some adverse habitat impact.

C = May cause significant adverse habitat impact.

D = May cause the most adverse habitat impact.

I = Insufficient Information - impact or effectiveness of the method could not be evaluated.

— = Not applicable.

1 = First priority response if conditions permit.

2 = Second priority response when first priority is in doubt or to augment first priority.

3 = Third priority response, when first and second priorities have been ruled out or completed.

X = Method not approved by the National Park Service as an initial response option at this site.

"N/A" = Not applicable to this location or situation.