

Knockdown Operations in San Francisco Bay

San Francisco Bay Conservation and Development Commission's Perspective

Background: In San Francisco Bay, shoals and high spots often occur in navigational areas such as channels and berthing areas and require attention to prevent hazardous conditions, potential groundings and damage to vessels, including disastrous oil spills. In addition, on occasion small mounds occur along wharf faces that can be reduced by knockdown operations without the need to mobilize a full dredging episode.

Knockdown operations usually include a steel beam hung horizontally from a tug or barge, which is then dragged over the top of the offending shoal or high spot, scrapping the sediment into a low area within the existing dredge footprint. In some instances a clamshell is used in a similar fashion to push the sediment from the high spot to the low area. On a rare occasion, a clamshell is used to pick up sediment, but not lift it out of the water column, and then place the sediment back on the bottom, again in a lower area of the existing dredge footprint.

Knockdowns often receive a Tier One exclusion from testing for three reasons. They are often small volumes of sediment; the material is being moved to an adjacent location and would be tested for disposal and dredged later; and most frequently they are used to remove a navigational hazard, so time is short. In addition, there is often adequate testing history to understand the sediment quality for small operation.

The theory behind knockdowns includes the belief that a knockdown event would have fewer environmental impacts than a full dredging event because they are short in duration and involve a smaller amount of sediment than a full dredging episode. In addition, the sediment is kept within the dredging footprint, so the sediment is eventually dredged and disposed of or beneficially reused when a full dredging episode occurs. They can prevent navigational hazards, save money and reduce impacts to listed species if some work needs to be done outside the environmental work windows. However, as knockdown events increase in size, the rationale that the activity would produce less turbidity and impacts than a full dredging event becomes less certain.

Study of knockdowns: To date three studies have been undertaken to analyze the impacts of knockdown events. The first study was at the Chevron Long Wharf. Unfortunately the contractor was not cooperative and did not drag the bar across the shoal during monitoring efforts. Therefore this study was a failure. There was significant loss of time, funding and effort. The second included a small operation in an enclosed channel of the Port of Oakland. The plume study included information about the period of increased turbidity and its distribution. The third plume study was conducted at Redwood City Channel. It included several knockdown efforts throughout the channel. The monitoring was similar to that at the Port of Oakland project. The findings determined that the turbidity plume at this site was indistinguishable from the existing background turbidity coming out of the sloughs at Bair Island and other adjacent wetlands.

The following information includes language that is typically included in a BCDC permit in which the applicant requested authorization to include knockdown events.

Private Dredging Project, berth or marina type project:

Authorization: Knock down up to XX cubic yards of mounded sediment during each of four discrete episodes, for a total of XX cubic yards, and move mounded sediment to a deeper location within the maintenance dredging footprint area, shown in attached Exhibit X (Amendment No. XX).

Special Conditions:

Knockdown Dredging. Knockdown dredging, or underwater grading of shoals, is an activity proposed by [*Applicant*] to remedy high spots within a berth without the mobilization of a full dredging and disposal episode. The knockdown episodes proposed in this permit must meet the following conditions: (1) the shoal must be located within the maintenance dredging footprint; (2) the depression into which the shoal will be knocked must be located within the maintenance dredging footprint; (3) each shoal to be knocked down must be no greater than [XX] cy; (4) permittee must use either a clamshell or towed I-beam to knock down the shoal into the depression; (5) each knockdown episode must be conducted to minimize the re-suspension of sediment; (6) the knockdown material must meet chemical and biological criteria specified by Regional Water Board and/or BCDC before being knocked down; (7) the permittee must meet the knockdown dredging episode notification requirements in Special Condition II-XX(below).

Knockdown Dredging Episode Notification

1. **Prior Notice of Knockdown Episode.** The permittee shall notify the staff by telephone or in writing at least 14 days prior to undertaking any knockdown dredging episode. At this time, the permittee must also confer with BCDC and the Regional Water Board as to whether any testing for this knockdown material is required, and must submit a description of the project and a pre-dredge hydrosurvey of the knockdown area.
2. **Approval of Knockdown Episode.** Approval (by letter or email) from the Commission's staff authorizing each individual knockdown episode will be required before a knockdown episode may commence. Please be advised that consultation and subsequent approval may be required from appropriate resource agencies before a knockdown episode may commence if the knockdown episode falls within a LTMS restricted period for the area.
3. **Knockdown Dredging Report.** Within thirty (30) days of completion of each knockdown dredging episode authorized by this permit, the permittee shall submit to the Commission a report which contains: (1) a post-dredge hydrosurvey showing (a) the location of all areas authorized to be knocked-down and the authorized depth based on MLLW; and (b) the actual areas, and the depth after completion of the knockdown episode based on MLLW, and any knockdown activity that occurred outside the area authorized to be knocked-down or below the authorized depths; and (2) the actual volume of the material relocated in the knockdown episode.

Knockdown Study Plan. Prior to commencement of any knockdown event larger than 2,500 cy permittee shall implement an approved Knockdown Study Plan for evaluating the potential effects of knockdown events.

This Plan shall include the following components: (1) both pre and post knockdown surveys of the entire berth area at 25 foot intervals with the mound to be knocked down clearly highlighted (the pre-dredge survey to be completed when the knockdown is imminent); (2) an analysis of the potential source of the knockdown material; (3) an analysis of the effectiveness of the knockdown, and the volume of material that was successfully placed in the deeper berth area, the volume of material unaccounted for; (4) an analysis of the accuracy of the measurements; (5) the measurement of total suspended solids, temperature, salinity, transmissivity, depth and conductivity to be made before, during and after the knockdown event; and (6) a map showing the location of instruments which measure the previously listed variables, both upstream, downstream and within the immediate knockdown area.

This plan must be approved by Commission staff prior to a knockdown event greater than 2,500 cy. Results analysis of the study will be submitted to Commission staff in report form within 60 days of the knockdown event for review. Once the report has been reviewed by Commission staff, additions to the study may be required to further (1) refine the study; and/or (2) understand the impacts of knockdown events. In addition, If the study shows adverse environmental impacts, the Commission staff may suspend the authorization for knockdowns or require an environmental impact report prior to authorization of further knockdown events.

Federal Channels

Authorization:

Conduct annual “knockdown events” of up to five percent of any estimated volume, or up to 15,000 cy, whichever is greater (the largest knockdown would be up to 25,000 cy under this scenario);

Special Conditions:

Knockdown Dredging. The knockdown episodes proposed in this consistency determination must meet the following conditions: (1) the shoal must be located within the maintenance dredging footprint of the channel; (2) the depression into which the shoal will be knocked must be located within the maintenance dredging footprint of the channel; (3) each individual shoal to be knocked down must be no greater than 3,000 cy; (4) the Corps must use either a clamshell or towed I-beam to knock down the shoal into the depression; (5) each knockdown episode must be conducted to minimize the re-suspension of sediment; (6) the knockdown material must meet chemical and biological criteria specified by Water Board and/or the Commission before being knocked down; and (7) the Corps must meet the knockdown dredging episode notification requirements in Special Condition G.

Knockdown Dredging Episode Notification

- 1. Prior Notice of Knockdown Episode.** The Corps shall notify the staff by telephone or in writing at least seven days prior to undertaking any knockdown episode. At this time, the Corps must also confer with the Commission and the Regional Water Board as to whether any testing for this knockdown material is required, and must submit a description of the project and a pre-dredge bathymetric survey of the knockdown area.

2. **Approval of Knockdown Episode.** Approval (by letter or email) by the Commission's staff authorizing each individual knockdown episode will be required before a knockdown episode may commence. Please be advised that consultation and subsequent approval may be required from appropriate resource agencies before a knockdown episode may commence if the knockdown episode falls outside the Long Term Management Strategy (LTMS) environmental work windows.
3. **Knockdown Episode Report.** Within thirty days of completion of each knockdown dredging episode authorized by this consistency determination, the Corps shall submit to the Commission a report which contains: (1) a post-dredge bathymetric survey showing (a) the location of all areas authorized to be knocked-down and the authorized depth based on MLLW,

and (b) the actual areas, and the depth after completion of the knockdown episode based on MLLW, and any knockdown activity that occurred outside the area authorized to be knocked-down or below the authorized depths; and (2) the actual volume of the material relocated in the knockdown episode.

4. **Knockdown Study.** If the knockdown episode is larger than 5,000 cy, a plume study will be required, unless and until sufficient information is provided to the Commission staff regarding the potential impact of knockdown episodes. The Corps shall provide the plume study results and analysis to the Commission staff no later than ninety days after the knockdown episode has concluded.

Findings:

Knockdown Events. Knockdown events are assumed to have less environmental impacts than full dredging episodes and may be more economical when small shoals are present. The Commission has requested data on the suspended sediment from knockdown events, and the Corps has committed to providing a knockdown study when individual shoals are larger than 5,000 cy, unless or until information is provided that sufficiently defines the potential environmental impacts of large knockdown events.

The Corps is currently proposing to knock down each year a total of 15,000 cy or up to five percent of the total estimated dredging volume of any one deep draft channel (whichever is greater), if necessary. The largest estimated volume for a deep draft channel is 500,000 cy, therefore the largest knockdown would be 25,000 cy. In shallow draft channels, the total volume considered for a knockdown is 15,000 cy. It is anticipated that these knockdowns would be a series of much smaller volumes within a lengthy channel, and therefore, the Corps does not believe this activity would have a larger impact than dredging within the same area.

Requested Authorizations:

Projects that have requested knockdowns as part of their project have all been authorized to do knockdowns. However, few knockdown events occur annually, less than a single knockdown in most years.