

SUPPORTING DOCUMENT 3: SAN DIEGO REGIONAL BOARD
 RESPONSES TO COMMENTS FOR TENTATIVE ORDER NO R9-2008-0081

A. Comments submitted by Delta Consultants dated September 9, 2008 and OnMaterials™ Manufacturer of Z-Loy™ Nanoscale Materials for Environmental Remediation dated September 29, 2008

GENERAL COMMENTS & MAJOR CONCERNS	REGIONAL BOARD RESPONSES
<p>1. <u>Delta Consultants, on behalf of Atlantic Richfield Company, requested the addition of surfactant injection to Section A, "Conditions of eligibility" of the general WDRs. It is stated in the request that "the Orange County Health Care Agency has recently approved surfactant flushing to help remediate the site, and therefore, Delta would like to have surfactant injection added to Tentative Order No. R9-2008-0081."</u></p>	<p>At this time, the Regional Board has not included surfactant in the tentative Order based on the following considerations:</p> <ol style="list-style-type: none"> 1. <u>Different reaction mechanisms:</u> the chemicals and reactive materials listed under Section A "Condition of Eligibility" of the tentative Order remove ground water pollutants by directly destroying the pollutants at the site, transforming them to non (or less) toxic forms via oxidation, reduction, or biological reactions; whereas surfactant interacts with pollutants by promoting the partition of pollutants into the dissolved (aqueous) phase, which needs subsequent/additional treatment to destroy/ transform pollutants. 2. <u>More strict requirements of monitoring:</u> surfactant enhances the partitioning of pollutants into the aqueous phase thereby enhancing pollutant mobility and creating the potential for the pollutant(s) plume to migrate into groundwater beyond the treatment zone. As a result, more effective hydraulic control processes and more stringent groundwater monitoring requirements, e.g., for denser /more closely placed monitoring well network, and more frequent monitoring frequency, etc., may be necessary to ensure that injected surfactants will not cause spreading of the pollutant plume and impacting ground water quality beyond the treatment zone. 3. <u>Relatively limited application of the proposed surfactant:</u> the chemicals and reactive materials listed under Section A.1 were carefully selected based on their histories of successful applications at various cleanup sites throughout the State of California. The approval for use of the proposed surfactant at one site by Orange County Health Care Agency does not necessarily by itself qualify the proposed surfactant to be included in the tentative Order. <p>Based on the above considerations, the Regional Board decided that surfactant addition is more appropriately regulated by individual WDRs considering site specific conditions.</p>

**SUPPORTING DOCUMENT 3: SAN DIEGO REGIONAL BOARD
RESPONSES TO COMMENTS FOR TENTATIVE ORDER NO R9-2008-0081**

GENERAL COMMENTS & MAJOR CONCERNS	REGIONAL BOARD RESPONSES
<p>2. <u>OnMaterialsTM suggested changing Zero Valent Iron in Section A, "Conditions of eligibility", 1.a. to Zero Valent Metals, including iron, aluminum, and magnesium.</u></p>	<p>Zero valent aluminum and magnesium may be eligible treatment processes classified as reactive material creating reducing conditions, and may be proposed to be used at cleanup sites in the San Diego Region under the coverage of the general WDRs, provided that all provisions and prohibitions required in the tentative Order will be met. However, the Regional Board did not make the requested change to the tentative Order due to the following considerations:</p> <ol style="list-style-type: none"> 1. The reactive materials named in Section A.1 "Conditions of eligibility" serve as examples that create certain conditions favorable to the degradation of groundwater pollutants. The listed reactive materials are not intended to be used as an exclusive list of amendments that are permitted to be employed in treatment systems at cleanup sites. 2. The reactive materials listed under Section A.1, "Conditions of Eligibility" in the general WDRs have been carefully selected based on their histories of successful applications at various cleanup sites throughout the State of California. Compared to the use of Zero Valent Iron (ZVI), the application of aluminum and magnesium, (as well as low level palladium as commented in 5), is limited in number of sites and application history at cleanup sites in California and especially in the San Diego region.
<p>3. <u>OnMaterialsTM suggested including propylene glycol as an easily degraded carbon sources in Section A, "Conditions of eligibility", 1.a. Propylene glycol has been used in Pittsburg, CA for bioremediation.</u></p>	<p>No changes made in the general WDRs.</p> <p>Although propylene glycol (PG) has been generally recognized as "safe to use" as a direct food additive, it has been explored in recent researches that PG is toxic to certain plants (e.g. corn and soybean, Niu, G., Macconnell, L.L., Reddy, V., 2005, <i>Journal of Environmental Science and Health</i>, 40 (3), page 443-448). Some States have regulated PG as a contaminant, e.g. at a MCL of 1 mg/L at the State of New York. (http://www.health.state.ny.us/environmental/water/drinking/part5/tables.htm)</p> <p>Until more information is available regarding the potential / actual ecologic effect of PG, the Regional Board believes it is prudent to not include PG as a</p>

**SUPPORTING DOCUMENT 3: SAN DIEGO REGIONAL BOARD
RESPONSES TO COMMENTS FOR TENTATIVE ORDER NO R9-2008-0081**

GENERAL COMMENTS & MAJOR CONCERNS	REGIONAL BOARD RESPONSES
	reactive treatment medium in the tentative Order at this time.
<p>4. <u>OnMaterials™ suggested including buffer solution, in particular calcium carbonate, sodium bicarbonate, and sodium tetraborate, in Section A.1 "Condition of eligibility"</u></p>	<p>A category of amendments for "Buffer solutions" has been added to Section A, 'Condition of eligibility' .1.d. as follows:</p> <p>"d. Buffer solutions, such as sodium bicarbonate, which create groundwater pH conditions favorable to degradation of groundwater pollutants."</p>
<p>5. <u>OnMaterials™ suggested including hydrogenation catalyst, such as adding 0.02% palladium (Pd) to iron and/or aluminum powder, in Section A "Conditions of eligibility".1. of the tentative Order.</u></p>	<p>Low level Pd coupled with zero valent iron (ZVI) may be an eligible treatment process classified as reactive materials for creating reducing conditions, and may be proposed for use at cleanup sites in the San Diego Region under the coverage of the general WDRs, provided that all provisions and prohibitions required in the tentative Order are met.</p> <p>The Regional Board did not make the requested change to the tentative Order mainly due to the considerations listed in Response to Comment number 2. Additionally, it is the Regional Board understanding that the proposed technology - adding Pd to facilitate pollutant reduction by ZVI (most of time at nano-scale Pd-ZVI) – as an innovative remedial technology, is still undergoing extensive bench/pilot scale research and testing at cleanup sites in the United States. The Regional Board also considers that the existing provisions and prohibitions contained in the tentative Order might require modification, i.e., to accommodate applicable regulations on the use of nano-technology, for cleanup work employing the proposed remedial technology.</p>