



DEPARTMENT OF CONSERVATION

CALIFORNIA GEOLOGICAL SURVEY

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TO: Phil Jenkins, Chief
Off-Highway Motor Vehicle Recreation Division
California State Parks

FROM: Will J. Harris, Senior Engineering Geologist
California Geological Survey

DATE: July 19, 2012

SUBJECT: Overview of Scientific Concerns Regarding Rule 1001 by the San Luis
Obispo Air Pollution Control District

This memorandum is in response to your request to present the technical, geological concerns associated with an air quality control rule imposed on California State Parks (CSP) by the San Luis Obispo County Air Quality Control District (SLOAPCD). The rule regards the Oceano Dunes State Vehicular Recreation Area (Oceano Dunes SVRA), which has been managed by CSP since 1982.

The memorandum was prepared subsequent to a June 29, 2012 meeting about the SLOAPCD rule held at the Sacramento office of the California Natural Resources Agency (Resources Agency). The meeting was requested by the SLOAPCD and included representatives from the Resources Agency, the California Coastal Commission, the California Air Resources Board, California State Parks, the California Geological Survey (CGS), and SLOAPCD.

The purpose of this memorandum is to summarize specific findings presented in a SLOAPCD study that were used as the basis for developing the SLOAPCD rule and to detail why those findings are not supported by data presented in the SLOAPCD study.

* * *

The SLOAPCD rule, known as Rule 1001 or the Dust Rule, regards 1) the coastal sand dunes of southern San Luis Obispo County (SLO County), 2) a rural residential area several miles downwind of the dunes known as Nipomo Mesa (Mesa), and 3) off-highway vehicle (OHV) recreation that occurs on that portion of the dunes designated as the Oceano Dunes SVRA (Figure 1).

The Dust Rule was prepared in response to a 2010 air quality study by the SLOAPCD. The study, informally called Phase II, documented that concentrations of dust, including airborne particulate matter with a diameter of 10 microns or less (PM10), detected on the Mesa increase when seasonal prevailing winds increase—primarily in the spring. These winds blow shoreward from the west-northwest, over the coastal dunes and the agricultural fields that lie between the dunes and the Mesa (Figure 1). The study also found that most of the

PM10 detected was “crustal,” meaning it came from earth materials (e.g., rocks, soils, sand, etc.), as opposed to materials generated from combustion.

Based on the data presented in the SLOAPCD document, the Phase II authors concluded that elevated concentrations of PM10 detected on the Mesa were due to OHV recreation at Oceano Dunes SVRA. Consequently, the Dust Rule focuses solely on operations at Oceano Dunes SVRA as a means to reduce PM10 levels on the Mesa.

The California Geological Survey and other technical experts, including environmental and air quality professionals, extensively reviewed the Phase II study and its appendices (CGS, 2010; I&R, 2010; TRA, 2010). From these reviews, as well as from subsequent analyses of available and acquired data performed by CGS (CGS, 2011A and 2011B) and TRA (2011), it was determined that the Phase II conclusion attributing elevated concentrations of PM10 on the Mesa to OHV recreation at the Oceano Dunes SVRA was not supported by the data presented in the Phase II document.

The Phase II document is voluminous and the review documents by CGS and others are extensive. As this memorandum is a synopsis, the Phase II rationale used to conclude a linkage between OHV recreation and PM10 on the Mesa is condensed to four Phase II findings. Each finding is accompanied by a comment which explains why the finding of linkage is invalid. Web URL links to the Phase II document and the review documents are provided at the end of this memorandum if further detail is desired.

- *Phase II Finding 1:* The dune sand in the OHV riding area of Oceano Dunes SVRA moves with less forceful wind when compared to an area south of the SVRA that is undisturbed by OHV recreation. This is of concern because when prevailing winds blow forcefully enough to move sand and create dunes, finer particles can be released, generating airborne particulate. Because sand moves with less wind in the OHV riding area, that area generates more airborne particulate.

Comment 1: Sand movement measurements in the OHV riding area of the dunes were incorrectly coupled with wind data collected two miles inland and outside of the active dune environment. The wind speeds measured at this location (CDF Station—see Figure 1) are markedly less than wind measured in the dunes of the OHV riding area. For example, a review of May 2012 anemometer data shows that when winds in the OHV riding area of the dunes are 39+ miles per hour (mph), winds measured at the CDF station are about 15 mph. Sand and wind measurements for the dunes south of the riding area were more appropriately coupled because they were collected in the same dune environment. But the data were meaningless for comparison purposes with the inland wind data. The comparison was nonetheless made, which led to the incorrect Phase II finding that sand in the OHV riding area moves under less wind force than elsewhere in the dunes. In a November 2011 document, the SLOAPCD concurred that coupling dune sand movement with winds measured at the CDF Station was not representative of true conditions in the dunes (SLOAPCD, 2011).

- *Phase II Finding 2:* Presently, there is less vegetation on the dunes than there was previous to OHV recreation on the dunes. With less vegetation, there is more open-sand acreage, allowing for more sand movement to occur. This in turn generates more airborne particulate.

Comment 2: An analysis of current and historical aerial photography of the dunes shows that vegetation in the dunes covers 650 more acres now than what existed in the 1930's, a time that essentially predates OHV recreation in the dunes (CGS, 2011B). That is an increase in sand-covering dune vegetation of nearly 20 percent.

- Phase II Finding 3: There is a protective "crust" on the dunes that is destroyed by OHV recreation. Once destroyed, the sand moves more readily—with less wind—and generates more dust.

Comment 3: The Phase II authors incorrectly characterized dune layering as a "crust," and improperly equated the coastal dune environment to Owens Lake, a high desert playa east of the Sierra Nevada, to explain the formation of their observed "crust." Owens Lake is a broad, very shallow basin with no outlet. Waters that flow into the basin are mineral-rich and eventually evaporate, leaving behind a durable crust of mineral salts around the lake shoreline. In the most basic of ways, the coastal dunes of SLO County differ from the Owens Lake playa because they are "dunes," not a dry lakebed, and because they are on the coast, not the high desert. Dunes are composed from top to bottom of layers of sorted sand. The layers form and obliterate as dunes form and migrate landward. Topmost layers of dunes form whenever the wind blows forcefully enough to move dune sand downwind, and the layers are obliterated whenever those winds shift. There is no crustal layer in the coastal dunes as there is in the salt flats of the Owens Lake playa. There is only layer upon ephemeral layer of sorted sand throughout the coastal dunes, including the dunes within the SVRA.

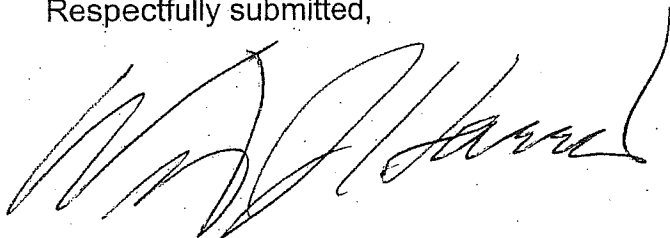
- Phase II Finding 4: An analysis of high attendance days at Oceano Dunes SVRA and elevated PM10 days showed a slight correlation, demonstrating a connection between OHV activity and PM10 on the Mesa.

Comment 4: To demonstrate a correlation between OHV activity and downwind PM10, the Phase II authors presented results of an analysis of 12 months of PM10 data and corresponding attendance numbers at the SVRA. The Phase II report concluded from the results that there was a slight correlation between SVRA attendance and downwind particulate concentrations—enough of a correlation to draw the conclusion that OHV activity has some limited, immediate effect on downwind PM10 concentrations. The data and analysis on which this conclusion was based were not in the Phase II document but were later provided by the SLOAPCD. In its review of the provided data and analysis, TRA (2010) showed there was zero correlation between OHV activity and detected PM10, and that 13 months of airborne particulate data were incorporated into the analysis, rather than 12 months. March, which is typically the windiest month in the region and correspondingly has more days with elevated particulate concentrations, was counted twice by the SLOAPCD.

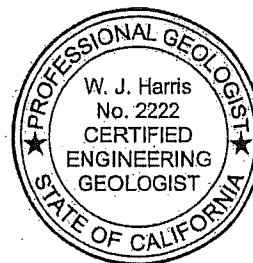
The Phase II report also discounted other significant sources of airborne particulate, such as the silt- and clay-rich agricultural fields and dirt roads that lie between the dunes and the Mesa (CGS, 2010 and 2011A). The diameter of a clay particle is less than 10 microns, and based on a county soil survey, the agricultural fields have soils that are more than 30% clay (Natural Resources Conservation Service (NRCS), 2008). By comparison, the dune sands have less than 0.5% clay (NRCS, 2008; CGS, 2011A).

In summation, the Phase II investigation failed to define any PM10 contribution from OHV activity, and instead incorrectly ascribed PM10 generated from geogenic processes of dune formation to human activities. Additionally, obvious PM10 sources, such as the clay-rich agricultural fields between the dunes and the Mesa, were not adequately evaluated.

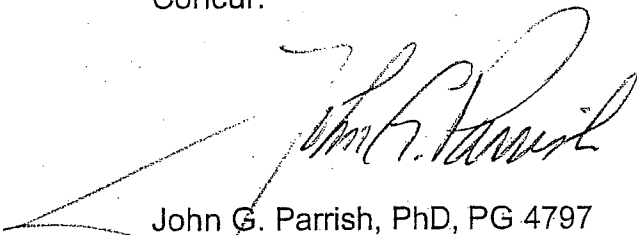
Respectfully submitted,



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Concur:



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cc: Janelle Beland, Undersecretary, Resources Agency
Liane Randolph, General Counsel, Resources Agency

Figure 1 attached.

References cited:

California Geological Survey, 2010, Evaluation of the San Luis Obispo County Air Pollution Control District report, "South County Phase 2 Particulate Study," prepared for the Off-Highway Motor Vehicle Recreation Division of California State Parks. March 18, 2010.

California Geological Survey, 2011A, Oceano Dunes SVRA – Sand Grain Analyses, Part 1, Comparison of Sieved Sand Samples with NRCS Soils Data, prepared for the Off-Highway Motor Vehicle Recreation Division of California State Parks. February 18, 2011.

California Geological Survey, 2011B, An Analysis of Wind, Soils, and Open Sand Sheet and Vegetation Acreage in the Active Dunes of the Callender Dune Sheet, San Luis Obispo County, California, prepared for the Off-Highway Motor Vehicle Recreation Division of California State Parks. November 1, 2011.

Illingworth and Rodkin, Inc., 2010, Comments on Meteorological Data Used for the South County Phase 2 Particulate Study, prepared for Paula Hartman, President, TRA Environmental Science, Inc., March 19, 2011.

Natural Resources Conservation Service, 2008, Soil Survey of San Luis Obispo County, California, Coastal Part: United States Department of Agriculture, <http://websoilsurvey.nrcs.usda.gov/>, Survey Area Version: 4, January 2, 2008.

San Luis Obispo Air Pollution Control District, 2011, Staff Report to the Board of the SLOAPCD, Proposed Rule 1001, Coastal Dunes Dust Control Requirements, Public Hearing – November 16, 2011, page 125.

TRA Environmental Sciences, Inc., 2010, Published Phase 2 Report Data Does not Support Claims of Association between Oceano Dunes State Vehicular Recreation Area Visitor Numbers and PM10 downwind, prepared for the Off-Highway Motor Vehicle Recreation Division of California State Parks, May 18, 2010.

TRA Environmental Sciences, Inc., 2011, New Information on Oceano Dunes SVRA Vehicle Activity and downwind PM10 that affects Rule 1001, prepared for the Off-Highway Motor Vehicle Recreation Division of California State Parks, November 2, 2011.

Web URL link to referenced documents by CGS, I&R, and TRA and Rule 1001:
http://ohv.parks.ca.gov/?page_id=26918

Web URL link to SLOAPCD Phase II Report:
http://www.slocleanair.org/pdf/PM2-final_report.pdf

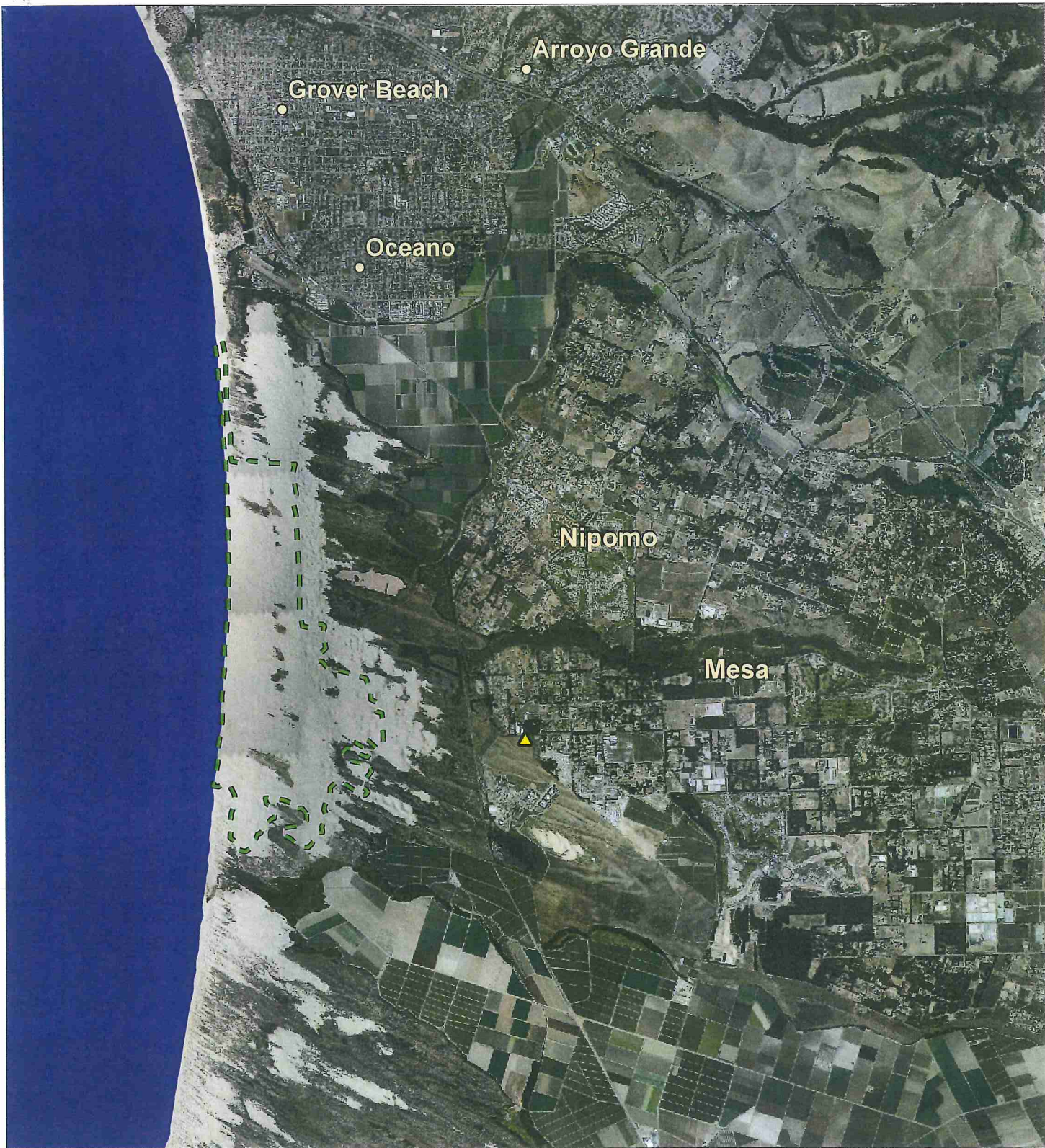


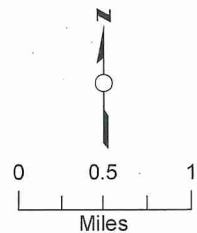


Figure 1

Oceano Dunes State Vehicular Recreation Area and Vicinity

-  Off-Highway Vehicle Riding Area
-  CDF Station



Map Scale: 1:70,000