RESPONSE TO COMMENTS RECEIVED

ON THE

November 16, 2012

FINAL STAFF REPORT ON THE ORIGIN AND DEVELOPMENT OF THE KEELER DUNES

By

Great Basin Unified Air Pollution Control District

December 10, 2012

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List of written comments received by the District

The comment period for the Final Staff Report began on November 16, 2012. For written comments to be included in the Board Packet they were required to be submitted to the District by November 28, 2012. Comments will also be accepted at the Public Hearing on December 13, 2012.

The following comment letters were received prior to November 28, 2012:

1. City of Los Angeles Department of Water and Power, November 28, 2012

(No other written comments were received prior to the Public Hearing.)

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DISTRICT RESPONSES TO COMMENTS FROM THE DWP

District Introduction

The District Governing Board directed District staff to complete a staff report on the origin and development of the Keeler Dunes. As such, on September 7, 2012, the District completed a Preliminary Staff Report and made it available for review and comment to all interested parties along with the technical analyses, data and other materials from the completed studies. The comment period ended October 26, 2012. The only written comments received by the District were from the Los Angeles Department of Water and Power (DWP) on October 19, 2012. The District carefully considered and evaluated each comment made by the DWP and provided detailed point-by-point responses to each comment. These responses were made available on November 16, 2012 at the same time as the Final Staff Report.

Based on all comments received and considered, on November 16, 2012, the District issued a Final Staff Report on the origin and development of the Keeler Dunes and made it available for review and comment to all interested parties along with the technical analyses, data and other materials from the completed studies. The Final Staff Report and supporting technical materials were revised primarily to provide more detail and clarification of the technical scientific research based on the comments received from the DWP. Additionally, to support the District's conclusions, the results of a few analyses completed after September 7, 2012 were included in the Final Staff Report.

Announcement of the availability of the Final Staff Report and technical materials was distributed to all participants of public workshops (held on January 20, 2011 and August 24, 2011) on the Keeler Dunes as well as those that have requested to be on the District's distribution list. Additionally, an announcement of the Final Staff report and the schedule for comments was published in the *Inyo Register* and on the District's website. In order for comments to be included in the Board packet the District required that comments be received by November 28, 2012. The only written comments received by the District were from the DWP on November 28, 2012. The District has carefully considered, evaluated and responded to each comment made by the DWP.

The following are the District's comments and responses regarding the DWP's letter titled *"Preliminary Response to Final Staff Report on the Origin and Development of the Keeler Dunes"* dated November 28, 2012. Each comment by the DWP was carefully evaluated and considered.

It is important to note before responding in detail to the DWP's comments that a number of comments by the DWP do not relate to the materials presented in the Final Staff Report. These

include comments on policy issues and legal interpretations of local, state and federal air pollution control laws. The District responds to these issues as a courtesy and for a complete record. In no way does the District's response to non-technical issues indicate the District agrees they relate to the determination on the origin and development of the Keeler Dunes.

Format of District Comments

In order to assist the reader, the District quotes sections of the DWP's comments and encloses the quotes in boxes like this:

DWP COMMENT [Example]

> The Final Staff Report indicates that the region between the Keeler Dunes and the historical shoreline was disturbed by humans during historic times,[3] but it failed to discuss the potential impacts of anthropogenic activities in and around the Keeler Dunes. Moderate to high surface disturbance (e.g., fire, road construction, grazing) may produce accelerated surface erosion and sand motion.

DISTRICT RESPONSE

The District's response to those comments is shown as text outside boxes.

DISTRICT RESPONSES TO COMMENTS FROM THE DWP

DWP COMMENT

The City of Los Angeles acting by and through the Los Angeles Department of Water and Power (LADWP) submits-the following Preliminary Response to Great Basin Unified Air Pollution Control District's (District) Final Staff Report on the Origin and Development of the Keeler Dunes, dated November 16, 2012 (Final Staff Report). These comments are in addition to, and are intended to supplement, LADWP's October 19, 2012, Technical Response to the Preliminary Staff Report (Technical Response) submitted to the District's September7, 2012 (Preliminary Staff Report). A copy of the District's Preliminary Staff Report is attached hereto as Exhibit A, and a copy of LADWP's Technical Response is included in Appendix 1 of the Final Staff Report.

As discussed further below, District staff has included substantial new data and information in its Final Staff Report which is now over 700 pages in length. The new data and information included in the Final Staff Report do not address the points raised by DWP in its Technical Response, but instead is offered as further data and information in support of District staffs original unfounded conclusion that LADWP, and LADWP alone is responsible for the Keeler Dunes.

DISTRICT RESPONSE

The District carefully considered and prepared detailed responses to each comment from the DWP on the Preliminary Staff Report. The Final Staff Report and supporting technical materials include 755 pages of reports and data, an increase of 225 pages from the Preliminary Staff Report. The increase in the length of the staff report is the result of two main factors:

1) Response to comments by the DWP. This includes not only a detailed point-by-point District response to comments (Appendices 1 and 2 of the Final Staff Report) but also revision of technical materials to incorporate expanded detailed discussion to include the content of the responses into the final reports. The number of pages added from these factors is about 200.
2) Additional data. As indicated in the Preliminary Staff Report, some of the analytical results were pending on September 7, 2012 and therefore could not be included in the report. The results of these analyses are provided in the Final Staff Report and include two XRF mineralogical analyses and eight age date analyses. Also added to the Final Staff Report were five historical photos/re-photos that compare the landscape of the Keeler Dunes from various times in the past to the landscape present in 2012. The number of pages added for the additional lab results and historical photos is about 25.

The results of the investigations and research conducted by the District clearly indicate that the modern Keeler Dunes formed in direct response to wind erosion and transportation of exposed

lake bed material following the historic desiccation of Owens Lake and the resulting transportation of a portion of this material onto the Keeler Fan.

Detailed responses to comments from the DWP on specific components of the District's research are provided in the following response sections.

DWP COMMENT

> By including a substantial amount of new data and information in the Final Staff Report, District Staff is depriving LADWP and the public of the opportunity to adequately review, analyze, and fully respond to this new data and information in direct contravention of the intent of the" District Governing Board (District Board). The District Board intended to give LADWP and the public 60days within which to respond to the information and analysis provided by District staff in support of its conclusions regarding the origin and development of the Keeler Dunes. Instead of fully disclosing in its Preliminary Staff Report all of the data and information being relied upon by District staff in its analysis, District staff chose to withhold much of the data and information until issuing its Final Staff Report on November 16, 2012. A simple comparison of the Preliminary Staff Report and the Final Staff Report reveals the extent of how much data and information has been withheld.

DISTRICT RESPONSE

The process leading up to the Public hearing on the Keeler Dunes with the completion of the Preliminary Staff Report, review and comment period, completion of the Final Staff Report, and second comment period has been very open and transparent to the public. This process was discussed at length at the July 19, 2012 Governing Board Meeting and followed the direction provided by the District Board at that meeting (at this meeting, the DWP agreed to the procedure – see below). An announcement of the process was distributed to all parties on July 27, 2012. All materials for each step in the process were made available through the District website and through published public announcements.

District staff did not and would not withhold information in the preparation of the Preliminary or Final Staff Reports. The statement by the DWP that "District staff chose to withhold much of the data and information until issuing its Final Staff Report on November 16, 2012" (see text box, above) is false and insulting to District staff.

The vast majority of material on the origin and development of the Keeler Dunes was provided to all parties on September 7, 2012 – over three months in advance of the Public Hearing. As discussed above, revisions of the Preliminary Staff Report were made primarily based on comments received by the DWP in an effort by the District to thorough and complete. Minor revisions were also made to incorporate the results of recently completed lab data and

additional historical photos. In doing this, the District followed standard practice of the presentation of scientific work.

DWP COMMENT

> District Staff has required that any written response to its Final Staff Report be received no later than November 28, 2012, if the response is to be included in the Board packet for the hearing scheduled December 13, 2012. The Final Staff Report was issued on Friday, November 16, just prior to the Thanksgiving holiday, making it impossible for LADWP or the public to adequately respond by the arbitrary November 28 deadline selected by District staff for inclusion in the Board packet, or even by the December 13, 2012, hearing date. In addition, the District has not complied with LADWP's California Public Records Act (CPRA) request for documents and information relating to the District's analysis of the Keeler Dunes, and the Bureau of Land Management has also not complied with a similar Freedom of Information Act (FOIA) request made by LADWP. As such, LADWP requests that the hearing be postponed for at least two months to allow additional time to review the new material and to receive and review the documents responding to LADWP's CPRA and FOIA requests.

DISTRICT RESPONSE

The procedure and schedule for the Keeler Dunes origin and development hearing was discussed at length with the DWP at the District Governing Board's July 19, 2012 meeting. In fact, Mr. David Edwards, the DWP's attorney present at the meeting, suggested the ultimate procedure used by the District. When the procedure used was summarized by Board member Tim Hansen, Mr. Edwards responded, "I am sure that would be workable for the department." (July 19, 2012 minutes, page 12) District staff followed the schedule agreed to by the DWP and directed by the District Board.

With regard to the DWP's claim that the District has not complied with the California Public Records Act, the District disagrees. The DWP requested District records, the District promptly identified applicable records and, upon receipt of a check for reproduction costs, immediately sent the records to the DWP. The District cannot comment of the Bureau of Land Management's compliance with Freedom of Information Act requests.

In summary, DWP proposed and agreed to the procedure used for the Keeler Dunes origin and development hearing. There is no reason to postpone the hearing. District staff will recommend the District Board proceed as planned (and agreed to by the DWP).

DWP COMMENT

> LADWP provides these preliminary comments based on its initial review of the new information in the Final Staff Report. These comments are not comprehensive and LADWP reserves the right to supplement these comments at the District's Governing Board hearing and afterwards. In sum, LADWP objects to the District's Keeler Dunes conclusions for the following reasons:

- The District's investigation was not an objective evaluation to determine the origin of the Keeler Dunes and the causes leading to the observed increase in surface activity, but rather a narrowly focused series of studies designed to confirm the District's predetermined conclusion that LADWP is solely responsible for the formation of the dunes and, therefore, the dust emissions from them.

DISTRICT RESPONSE

The research conducted by the District on the origin of the Keeler Dunes was complete and comprehensive and included seven categories that evaluated the formation of the modern dunes in relationship to multiple time perspectives ranging from pre-historic (geomorphic and geologic studies) to historic (search and analysis of documents, maps, and photos since the 1850's) to modern (analysis of sand transport, dune movement and imagery since 2000). The results from all of the District's work provide information that supports the conclusion made in the Final Staff Report that the modern dunes formed in response to sediment erosion on the bed of Owens Lake and the transportation of this material onto the downwind alluvial fan adjacent to the exposed playa.

The District in no way pre-determined this conclusion, as evidenced by the broad breadth of the research. Investigations and research were undertaken that looked at the question regarding the origin of the modern dunes from multiple disciplines, multiple time perspectives, and multiple angles with the collective results of this work dictating the overall conclusion on how and when the modern dunes formed and the cause for their formation.

DWP COMMENT

- District staff admits that the Keeler Dunes pre-date the Los Angeles Aqueduct and was a natural feature for thousands of years. Therefore, the origin of the Keeler Dunes was not the result of man-made activities; rather, it was and is a natural feature within the surrounding desert landscape. District staff is improperly attempting to require LADWP to control this natural source by inventing an unsupported theory that the Keeler Dunes were at one time "inactive" and are now "active" and expanding solely because of LADWP's water gathering activities. Even if this theory had scientific support, which it does not, the District staff has failed to demonstrate that the dust emissions from "active" dunes are higher than "inactive" dunes, or that any expansion changed the emissivity of the dunes. Very likely, the "older" Keeler Dunes and surrounding desert have always been natural sources of dust in the Owens Valley. Therefore, irrespective of whether "new" sand has been added on top of "old" sand, the Keeler Dunes would still be a natural source of dust. Because the Keeler Dunes are a natural source, the contributions of any emissions towards any monitored national ambient air quality standards (NAAOS) exceedances should be removed under the United States Environmental Protection Agency's (EPA) Exceptional Events Rule (EER).

DISTRICT RESPONSE

District staff does not agree with the statements made here by the DWP. In their comments, it is clear that the DWP does not recognize the basic difference in the dunes that have been identified. As shown by the geomorphic mapping and geologic investigation, the stratigraphy of the area is complicated. The definition used by the DWP for the "Keeler Dunes" is incorrect. The term, as used by the District, only consists of the modern active dunes and sand sheet deposits. It does NOT include the former dunes that developed at various times in the past in association with ancient shoreline features. This distinction is important in understanding the development of the landscape. The former natural dunes were morphologically different, restricted in extent and significantly older than the anthropogenic modern active and emissive current Keeler Dune field.

As explained previously, in the response to the DWP's comments on the Preliminary staff Report, the Exceptional Events rule does not apply to violations caused by emissions from the Keeler Dunes for two main reasons: 1) the Keeler Dunes are anthropogenic and 2) BACM has not been implemented in the dunes. The PM_{10} emissions from the Keeler Dunes form a severe health hazard to the local resident, worker, and travelling population and must be controlled.

DWP COMMENT

- District staff solely focused on LADWP as the presumed cause and, as a result, failed to consider other obvious sources of any "new" sand on top of the "old" sand at Keeler Dunes, which might be completely unrelated to LADWP's water gathering activities. The lack of objectivity by the District staff seriously undermines the integrity of the entire Final Staff Report.

DISTRICT RESPONSE

The District conducted an analysis of the possible sand sources for development of the Keeler Dunes and included the results in the Final Staff Report (see Section 4.5 and Attachment E). Sources evaluated include alluvial material from the Inyo Mountains, erosion of older sand deposits associated with Holocene shoreline features, the Swansea Dunes as well as the exposed bed of Owens Lake. Based on this analysis, the exposed bed of Owens Lake is the source of material for the modern Keeler Dune deposit. The results of the sand source evaluation shows that other potential sources do not have the right chemical composition, are insufficient in extent and volume, or are not in the correct location to have supplied the sand for the modern Keeler Dunes.

DWP COMMENT

- District staff is advocating a significant policy position, which is contrary to the Clean Air Act and other air districts' interpretation of the Act that natural sources should be controlled. lf the District Governing Board decides to issue a dust control order for this natural desert feature, this will have far reaching consequences for the vast desert areas controlled by the Bureau of Land Management and others within the Owens Valley.

DISTRICT RESPONSE

The DWP's contention that the Clean Air Act does not require or provide that natural sources be controlled has no bearing on the origin and development of the Keeler Dunes. Nevertheless, its contention is mistaken. The Act requires that National Ambient Air Quality Standards be met. It does, however, provide some limited exception for uncontrollable natural and exceptional events (e.g., wildfires and volcanic eruptions). The emissions from the Keeler Dunes are reasonably controllable and they do not fall into any regulatory exception categories. In addition, the emissions directly and routinely impact the health and property of the residents, employees and visitors of Keeler (including scores of DWP employees).

DWP COMMENT

- The 2008 State Implementation Plan (SlP) demonstrates that the Owens Valley Planning Area will attain the NAAQS for PM10 without dust controls on the Keeler Dunes. The Board Order in the 2008 SIP does not require dust controls on the Keeler Dunes. Will the District Governing Board now declare the 2008 SIP a failure?

DISTRICT RESPONSE

The DWP's assertion regarding the 2008 SIP's Keeler Dunes requirements has no bearing on the origin and development of the Keeler Dunes. Nevertheless, its assertion is incorrect. Section 7.5 of the SIP's control strategy and attainment demonstration clearly states that Keeler Dunes emissions "contribute significantly to exceedances of the federal PM_{10} standard in the town" and that the District will "develop a plan to control dust emissions from the Keeler Dunes." The 2008 SIP clearly and specifically acknowledges the public health threat caused by Keeler Dunes emissions and provides for the control of these emissions. The DWP did not object to or challenge this provision of the SIP when it was adopted in 2008. This provision is now a requirement of law.

DWP COMMENT

- District staffs attempt to bifurcate the decision on the origin of the Keeler Dunes from an order to install dust controls is in violation of Health and Safety Code Section 42316 (Section 42316).

DISTRICT RESPONSE

The Clean Air Act and the 2008 SIP require that the exceedances caused by PM_{10} emissions from the Keeler Dunes be controlled. However, the manner in which the controls are ordered are dependent on the party or parties responsible for control. If the District determines the dunes and their PM_{10} emissions are anthropogenic (human-caused) and controllable, then, at a future date, the responsible party or parties will be ordered to implement controls. If the emissions are determined to be anthropogenic and the City of Los Angeles is determined to be a responsible party, an order under Section 42316 may be appropriate. If, however, the emissions are deemed to be natural and controllable, then it is likely the underlying property owners would be responsible for controls and the District would conduct an abatement hearing and issue orders under other provisions of District regulations or state law. If the emissions are determined to be natural and uncontrollable, then there may be no further action taken. Therefore, until the District makes a determination as to the origin and development of the Keeler Dunes, the path forward to control is unknown and it is appropriate that the origin/development decision not be conflated with the PM_{10} control decision.

DWP COMMENT

- The decision regarding the origin of the Keeler Dunes is part of a "project" under the California Environmental Quality Act (CEQA). The District cannot piecemeal the project approvals in an attempt to avoid its obligations under CEQA.

DISTRICT RESPONSE

The DWP is incorrect in its assertion that the decision regarding the origin of the Keeler Dunes is a project under the California Environmental Quality Act. The origin/development decision is an analysis of historic and scientific data and does not result in any physical change to the environment. At this time, the scope of a proposed control project is not being considered or approved. In addition, the District's collection of the information used to make the origin/development decision is exempt from CEQA under 14 Cal Code Regs §15306 (Class 6 exemption – Information Collection). However, the District acknowledges that if an order to control the Keeler Dunes emissions is ultimately issued, environment impact analyses will likely be required.

DWP COMMENT

1. There Remain Significant Technical Defects With the Final Staff Report

The Final Staff Report summarized the results of seven categories of research, ranging from comparisons of "before" and "after" photographs to geomorphic mapping to sand flux modeling. Only three of the seven sections (Sections 4.3, 4.5, and 4.6), however, provide any evidence or

discussion pertaining to the causes of the observed changes in the Keeler Dunes over the past 70 years. The other four sections (Sections 4.1, 4.2,4.4, and 4.7) are either silent on the subject of causation, or simply presumed that the cause was the desiccation of Owens Lake following LADWP's water gathering activities in the early part of the 20th century. Of the three sections that discussed likely causes, two of them (Sections 4.3 and 4.6) presented evidence suggesting that the causes are natural in origin. None of the evidence presented in the Final Staff Report supports the District's position that the recent development in the Keeler Dunes was caused solely by sand transport from the desiccated playa in the last 70 years.

DISTRICT RESPONSE

The results of all the research by the District on the Keeler Dunes needs to be evaluated together to form a complete picture of the dune development. The DWP inappropriately refers to isolated portions for individual sections to state that the Keeler Dunes are natural without providing the proper context and support for their position. The DWP is incorrect that Section 4.3 (Aerial Photograph and Satellite Image Analysis (1944-2010) and Section 4.6 (Analysis of Surface Change in the Northeast Portion of Owens Lake) present "evidence suggesting that the causes are natural". Instead, the results from both studies indicate that material for the formation of the Keeler Dunes came from a west to northwesterly direction from the exposed bed of Owens Lake.

DWP COMMENT

Like the Preliminary Staff Report, the Final Staff Report is rife with unanswered questions and inconsistencies. For example, Section 4.3, Aerial and Satellite Image Analysis, notes that the Swansea Dunes have remained stable for the last 300-400 years. lf a large influx of sand from the Owens playa caused the recent changes in the Keeler Dunes, as the District states repeatedly in the Final Staff Report without supporting evidence, then why weren't similar changes observed in the Lizard Tail and Swansea dunes, both located adjacent to the Keeler Dunes along the east shoreline of Swansea Bay? This is only one indication in the Final Staff Report that the changes in the Keeler Dunes might be caused by something other than sand from the Owens playa. Similarly, Section 4.3 states that even now, ten years after dust controls were constructed on the North Sand Sheet, the Keeler Dunes have "not yet an equilibrium with sand supply" and continue to expand. This could imply that other sources of sand continue to feed the Keeler Dunes, independent of sand from the Owens playa.

DISTRICT RESPONSE

Analysis of the wind and sand flux data (Final staff report, pg. 38) shows that the predominant wind-blown transportation direction in the area is from the west-northwest. From examining the local topography, it is evident that the Keeler alluvial fan extends to the southwest towards Owens Lake forming a distinct topographic feature. This prominent feature forces the base of the alluvial fan (where the modern Keeler Dunes are formed) into the main sand transport path from the exposed North Sand Sheet.

The geographic location of the Swansea Dunes, at the far eastern side of the "Swansea Bay", is protected from this main sand transport pathway and therefore the Swansea Dunes were protected from the more recent changes that occurred on the Keeler Fan where the Keeler Dunes formed. Similarly, the Lizard Tail Dunes, located along the far northeast corner of Owens Lake, are not in the correct location to receive substantial sediment input from wind-blown erosion of the exposed lake bed. This is also supported by the preservation of lake plain deposits along the northeast portion of the lake bed (see Lancaster and Bacon, 2012b) adjacent to both the Lizard Tail and Swansea Dunes.

The continued migration and spreading of the Keeler Dunes sand deposit to the southeast demonstrates that the modern Keeler Dunes have not reach equilibrium. Although the upwind margin of the Keeler Dunes has experienced significant erosion, such that the deposit is no longer connected to the North Sand Sheet, the deposit is steadily moving toward the community of Keeler. If the deposit were in equilibrium, the Keeler Dunes would not be moving on either its north or sound edges as is currently the case.

DWP COMMENT

> Section 4.4, Geomorphic Mapping and Analysis, presents evidence that other natural sand sources have long existed in the vicinity of the Keeler Dunes, including old shoreline beach deposits dating back the late Pleistocene epoch, the shorelines exposed by the periodic, natural desiccation of Owens Lake, and the shoreline area along Swansea Bay created by the 1872 earthquake and tectonic uplift, to name just a few. The Final Staff Report identified these natural sources but failed to evaluate their possible influence on the Keeler Dunes.

DISTRICT RESPONSE

An analysis of potential sand sources for the Keeler Dunes is provided in the Final Staff Report and in Attachment E). Based on the mineralogical composition, volumetric requirements on the amount of sand needed, and the direction of transport necessary, all but the exposed bed of Owens Lake were eliminated as significant sources of sand for the development of the Keeler Dunes. An estimated amount of sand needed to for documented and observed growth of the modern Keeler Dunes is approximately 600,000 m^3 (Lancaster and Bacon, 2012b and Lancaster and Holder, 2012).

The alternative possible sources of sand suggested by the DWP in the text box above are discussed here:

- Late Pleistocene shorelines. The Late Pleistocene shoreline terraces (Ql2 and Ql1 units) mapped in the vicinity of the Keeler Dunes are only exposed to the north and east of the modern Keeler Dunes deposit. The total extent of these Late Pleistocene deposits within the overall mapped area is 63.8 acres (258,189 m^2). As noted by Bacon and Lancaster

(2012) (page A-33 of Attachment D) these deposits consist of "subrounded to well rounded and oblate, bladed, and equant shaped gravel. Surfaces also have a well developed desert pavement with moderately to well developed varnish coating on gravel clasts." Given these two factors (clast size and desert pavement) along with the limited areal extent of the deposits and the absence of significant erosion of this material it highly unlikely that this source contributed any significant amount of material to the current Keeler Dunes. Furthermore, even if the material was the correct particle size (sand), the location of the deposits to the north and east of the Keeler Dunes are incorrect for wind-blown transport to the existing Keeler Dunes. Also, these Late Pleistocene deposits are not located upslope from the Keeler Dunes such that erosion by water would not move the material down into the Keeler Dunes.

- Shorelines exposed by the periodic natural desiccation of Owens Lake. The extent of contribution of Early and Late Holocene shorelines features within the Keeler Dunes is difficult to assess but overall they appear to play a minor role in supplying the modern Keeler Dune field. This is in part due to the varied nature of these deposits within the mapped area (mapped as both beach ridge and lake plain) as well as the fact that many of these deposits are buried by the modern active dune field. The total extent of the Early and Late Holocene lacustrine deposits in the vicinity of the Keeler Dunes is 108 acres (437,870 m^2). This total includes both the beach ridge deposits as well as the lake plain deposits many of which are covered by a layer of gravel and are vegetated and do not display signs of significant erosion. The thickness of the Late Holocene units is measured at a maximum of about 1.5 m, thus essentially all of these units would have to have eroded to supply the sand for the Keeler Dunes. Since the Late Holocene deposits are not completely eroded but are instead in large part buried or covered by (and therefore protected in place by) the modern Keeler Dunes, their contribution is can only be minimal.
- Shoreline area along the Swansea Bay created by the 1872 earthquake. According to accounts of the 1872 earthquake seismic event, the position of the water in Owens Lake shifted approximately 200 feet westward as a result of the tectonic movement. These anecdotal reports are supported by the results of the geomorphic analysis conducted by Bacon and Lancaster (2012) and the mapped boundary between the Ql7(p) and the Ql9(p) units . The area exposed corresponds to about 35-40 acres (140,000 to 160,000 m^2) of exposed lake bed in the upwind vicinity of the Keeler Dunes. Given that over 600,000 m^3 of material is needed to supply the growth of the Keeler Dunes deposit and assuming all of the eroded material consists of sand, this corresponds to approximately 12-14 feet (3.75 to 4.2 m) of erosion. There is no evidence of erosion to this extent anywhere on the lake bed, much less along the area exposed in 1872.

The large volume of material required for the development of the Keeler Dunes requires a large sediment source supply. The sources suggested by DWP are not sufficient to supply the modern Keeler Dunes with the volume of sand required for their growth over the last 77 years. With over 6,016 acres (9.4 mi^2 or 23.2 km^2) of eroded deposits mapped on the lake bed below the historic shoreline only 2.5 cm of erosion is needed over the area to supply the volume of material required for the development of the modern Keeler Dunes. This amount is well within the range determined from analysis of the sand transport data.

DWP COMMENT

> Section 4.5, Chronology and Stratigraphy, notes that stable, greasewood-anchored dunes (nebkahs) existed in the area of the Keeler Dunes until the 1960s, and then goes on to state without supporting evidence, here or elsewhere) that an influx of sand from the Owens playa buried the vegetation, further exposing the dune surfaces to wind erosion and triggering the development of the Keeler Dunes. The District presumed that this was the cause, but failed to support their hypothesis with any studies, data, or analysis. Yet another deficiency: Section 4,5 presented some estimates of the amount of sand on the Owens playa "available" for transport into the Keeler Dunes. However, the District made no attempt to estimate the volume of sand that was actually transported into the area of the dunes, from this or any other possible sand source.

DISTRICT RESPONSE

The Final Staff Report and supporting materials (Lancaster, 2012; Lancaster and Bacon, 2012b; and Lancaster and Holder, 2012) clearly state that the estimated volume of sand in the Keeler Dunes ranged from about 200,000 m^3 in the 1940's – 1950's to about 500,000 m^3 in the 1970's and 600,000 m^3 in the 1990's-2010. These estimates are based on an analysis of the air photos and satellite imagery, as well as an evaluation of the long term wind data within the region. Based on the geomorphic mapping, Bacon and Lancaster (2012) estimate that over 9.4 mi^2 (6,016 acres) of lake bed east of the delta show distinct evidence of erosion as a result of the exposure caused by the historic desiccation of Owens Lake.

DWP COMMENT

> The single greatest deficiency in the Final Staff Report is the lack of a comprehensive sand-source apportionment study: that is, a study that identifies the likely sources of sand contributing to the Keeler Dunes, with estimates of the volume of sand contributed from each source. A comprehensive study would include the following sources: the Owens playa above and below the natural low water mark, the Swansea Dunes, the deflating portions of the Keeler Dunes, the new and old Slate Canyon alluvial fan deposits, and the exposed shorelines predating the most recent desiccation of Owens Lake, among others. The District cannot conclude that the Owens playa is the sole source of sand feeding the Keeler Dunes without supporting information from this type of study. Circumstantial evidence (e.g., data showing that sand of similar origin exists on both the dunes and playa) is not sufficient; the District must demonstrate where and when sand was transported from the playa, and compare the estimates to those from other possible sources.

DISTRICT RESPONSE

The District conducted an analysis of the sources of sand for the Keeler Dunes. The results of this analysis are provided in the Final Staff Report and in Attachment E (Lancaster and Bacon, 2012b). Additionally, detailed responses to similar comments by the DWP on the Preliminary Staff Report were previously completed and are provided as Appendix 2 of the Final Staff Report.

DWP COMMENT

> It is clear from the Final Staff Report that the District's position is "all or none" with regard to attributing responsibility for the sand in the Keeler Dunes. The District staff apparently seeks a single, simple cause for the myriad of changes that have been observed in the Keeler Dunes. Case in point: Section 4.5 acknowledges that the ancient dune deposits underlying the active portions of the Keeler Dunes are a possible source of sand contributing to the current expansion of the dune field. But later in the section, the District inexplicably dismisses this source entirely because it could not account for all of the "new" sand feeding the Keeler Dunes. Instead, the District fell back on the well-practiced but unsupported charge that the large volume of sand in the active Keeler Dunes could only have originated from the Owens playa within the last 70 years.

DISTRICT RESPONSE

Once again, it is clear from the results of the District's research that the modern Keeler Dunes did form in direct response to erosion of the exposed historic lake bed. This is based on the combined results of detailed mapping, geologic analysis, historic photos, analysis of air photos and satellite imagery, and sand transport analysis. Given the extent and thickness of the "ancient" dunes (mentioned by the DWP in the text box above), it is not physically possible for these deposits to have provided significantly to the volume of material required for the development of the modern Keeler Dunes (Lancaster and Bacon, 2012b). (see previous District response) The DWP criticizes the District's analyses but it provides no real evidence or analysis of an alternative theory for the formation of the modern Keeler Dunes – it only provides speculation meant to induce doubt. The DWP has had nearly two years (since the District's concerted efforts began with the first public meeting in January 2011) to conduct its own analysis and develop a theory supported by fact. It has failed to do so.

DWP COMMENT

> The Final Staff Report is focused almost entirely on explaining the origin and development of the sand in the Keeler Dunes, presumably because the generally accepted mechanism for generating dust emissions is sand motion and abrasion. However, by focusing solely on sand motion, the District ignored other evidence that might explain why the Keeler Dunes are so much more emissive than other nearby dunes. For example, Section 4.5 notes that flashflood silt deposits have been ponding behind the ancient barrier beach dunes for the past 2,000 years. These highly emissive silt deposits, which continue to be replenished with each new flash flood event, including the one that occurred on September 12, 2012, have no doubt contributed greatly to the

dust plumes that are now observed in the Keeler Dunes. This also suggests that the Keeler Dunes have been producing dust emissions for at least the last 2,000 years, undermining the District's argument that the "older" Keeler Dunes were inactive and non-emissive.

DISTRICT RESPONSE

The flood silt deposits in the Keeler Dunes are limited in extent within the Keeler Dune field mapped area (7 acres or 0.03 km^2) and are trivial in size to the approximately 840 acres of the active Keeler Dunes deposit. These flood deposits are exposed as isolated and irregular patches concentrated along elevations associated with the 1101 and 1103 m shoreline features. Although locally eroded, these flood silts generally form competent units that do not show evidence of significant dust emissions. The statement by the DWP "that the Keeler Dunes have been producing dust emissions for at least the last 2,000 years" is not supported by any evidence provided by the DWP nor by the results of the research conducted by the District. The DWP's statements appear to be based on both a misunderstanding of how the landscape has changed over time and are a selective use of the information provided in the Final Staff Report.

DWP COMMENT

The surface change analysis in Section 4.6 of the Final Staff Report is perplexing because it completely undercuts the District's much-repeated conclusion that the sand in the active Keeler Dunes was contributed solely by the Owens playa over the last 70 years. In fact, the sand-motion estimates presented in Section 4.6 do not support the District's position that a massive influx of sand from the Owens playa occurred in the last 70 years; they show that very little sand originated from the playa. The District's sand flux modeling analysis shows that an overall net loss of sand occurred in the Keeler Dunes during the pre-dust control period (loss of -0.1 cm/year). This belies the District's position that the Keeler Dunes accumulated sand prior to the shallow flood dust controls on Owens Lake. The District's sand flux modeling for the post-dust control period shows nearly the same result: a net loss of 0.13 cm/year within the Keeler Dunes. The relative lack of change in the Keeler Dunes following the construction of shallow flooding also supports the opinion that the Owens playa was not an important source of sand for the Keeler Dunes. Clearly, other sources have contributed to the recent dune activity.

DISTRICT RESPONSE

The comparison of the pre-dust control surface change (-0.1 cm/year) and the post-control surface change (-0.13 cm/yr) is not for the Keeler Dunes, but for the average surface change for entire northeast study area. The negative surface change indicates that the average surface elevation is deflating and that more sand is leaving the study area boundary than is coming in. Nevertheless, the surface change analysis of the conditions on the lake bed prior to dust control implementation provides only a two-year glimpse at how sand motion in the northern portion of the exposed Owens Lake bed could have contributed to the accumulation of sand in the area of the Keeler Dunes. The process of wind erosion on the lake bed has been going on for 85 years, since the lake bed was fully exposed in 1924-1926. The surface change analysis examines

the direction of sand movement for only the last two years (2000 and 2001) before the installation of the shallow flood dust control project, which effectively controlled much of the source of sand upwind from the Keeler Dunes. The amount of sand movement during the study period (2000-2001) was among the lowest in the eleven years of sand flux measurements in the Keeler Dunes (see page 66 of Appendix 2 of the Final Staff Report) and less than half of the overall measured average from 2000 to 2012. Because of the relatively short duration of the measured pre-dust control period and the low sand flux rates, the results should be viewed qualitatively to help understand the direction of sand movement in the northern part of Owens Lake, and should not be interpreted as a quantitative assessment of long-term dune formation.

With that said, the calculated average rate of surface loss in the North Sand Sheet of 0.1 cm/yr could reasonably create the amount of material needed to fuel the development of the Keeler Dunes. Using a time period of 77 years starting in 1924 (when the lake bed was completely exposed to an elevation similar to the brine pond) and ending in 2001 (when controls on the North Sand Sheet were implemented) and multiplying by the calculated average erosion rate (0.1 cm/yr) yields a result of 7.7 cm of overall deflation on the North Sand Sheet.

In a previous response, a calculation was made that took the areal extent of eroded lake bed 24.4 km^2) and divided it into the volume of sand required for the development of the Keeler Dunes (600,000 m^3) to estimate that an average of 2.5 cm of erosion across this eroded area was needed to supply the Keeler Dunes. Given the fact that not all of the eroded lake bed consists of 100% sand size particles combined with the fact that much of the material eroded from the North Sand Sheet was transported southward, remaining on the lake bed, and not moved up into the Keeler Dunes, this result compares well to the calculated amount of erosion based on sand transport data.

The similarity of the average surface change amount of 0.1 cm/yr (from the 2000 to 2001 period prior to dust controls on the lake bed) to the amount of surface change in 2009-2012 (after dust controls) is not surprising given the locations of the monitoring sites within the dunes and on the lake bed. No monitoring sites are presently located in the area along the northwestern edge of the Keeler Dunes where there has been extensive removal of wind-blown sand since 2001. The closest site to the eroded upwind portion of the Keeler Dunes is site 9808. It is instructive to note that the amount of erosion for the areas associated with site 9808 from 2009-2012 was 3.8 cm/yr, well above the overall average of 0.13 cm/yr.

DWP COMMENT

> According to the District's analysis, only one sand-motion monitoring site (7199) exhibited any sand flux into the Keeler Dunes during the pre-dust control period. However, the net sand flux at

this location was tiny: an average of 0.14 cm/year. At this rate, it would take roughly 250 years to deposit the amount of sand in the Keeler Dunes that the District claims originated from the Owens playa in the last 70 years. If the results shown in Figure 4.6-5 of the Final Staff Report are used, the fluxes are even smaller (essentially zero), ranging from an erosion rate of -0.005 cm/yr to a deposition rate of 0.005 cm/yr. Using the highest rate, it would take roughly 8,000 years to deposit all of the sand that is now active in the Keeler Dunes. Either way, the District's sand-motion analysis is defective or there are other sources of sand feeding the Keeler Dunes, or both. Using the District's own data, the sand fluxes from the playa are too low to account for all the sand in the active Keeler Dunes.

DISTRICT RESPONSE

The DWP provides no support for its 250-year and 8,000-year contentions and it is unclear how the DWP arrived at these values. Comparison of the calculated estimate of overall surface change to the areal extent of eroded lake bed shows a good correlation between the two. Only a fraction of the amount of material eroded on the lake bed is needed to supply the Keeler Dunes with the sand for their development (see previous responses above). As stated in the Final Staff Report and Appendix 2 (District response to DWP's comments on the Preliminary Staff Report) the Dust ID program was not designed to monitor the transport of material from the lake bed to the Keeler Dunes and the information should be taken qualitatively to show the overall direction of transport.

As mentioned above, the District staff was unable to figure out where the DWP's claimed net sand flux rates came from or how they did their mathematical calculations. The DWP's use of sand flux units of cm/yr are inconsistent with the sand flux units used in the District's report, $g/cm^2/yr$ and they provided no documentation on their calculations. It should also be noted that, as stated in the District's response to comments, the sand motion data used for the two years for the pre-dust control period were collected during the lowest 2-year period for sand flux activity in the entire 12 year period since monitoring began (See Figure 4.7-1 in response to Comments, 11/16/2012). Lancaster's (2012) review of the long-term wind record and drift potential also found that the 2-year period used for the sand motion study came at a time when the amount of sand moving into the dune area was in decline. The sand motion results provided a qualitative method of determining net sand motion directions during the available study periods, and, due to the limited history of the available data record, cannot be used as a quantitative method to account for all the sand in the Keeler Dunes.

DWP COMMENT

Although most of the key studies in the Final Staff Report were conducted by highly regarded scientists from the Desert Research Institute and elsewhere, most of the emphasis was on characterizing the dunes, with much less focus on gaining a better understanding of the events that triggered the observed changes in the dunes over the last 70 years. No studies were performed to apportion the sand in the Keeler Dunes to various sources, leaving open the question

about what, or who, is responsible for the recent activity. Nearly all of the evidence presented by the District points to the conclusion that the dunes are natural in origin and have existed in the area for the past 2,000 years or more. Given their location at the toe of a very large and active alluvial fan with frequent influxes of flashflood sediments, there is every reason to believe that the ancient dunes were not only active but also highly emissive.

DISTRICT RESPONSE

Although the District appreciates the DWP's regard for the District's research team, it strongly disagrees with the comments made regarding the nature of the studies conducted on the Keeler Dunes. The scientific research conducted by the District and its consultants presented in the Final Staff Report and Technical Attachments was completed with the specific goal of determining the timing and nature of the formation of the modern Keeler Dunes and not on dune characterization. The work on dune characterization is being conducted separately and is being used in the development of the dust control strategy.

As discussed in previous responses, a study by the Desert Research Institute (Lancaster and Bacon, 2012b) focused specifically on potential sand sources. The results of the sand source study, as well as the other studies completed by the District, show that the sand for the development of the modern Keeler Dunes came from the historically exposed bed of Owens Lake that resulted from diversion of inflowing waters. Due to this connection between the formation of the Keeler Dunes and the desiccation of Owens Lake, it is clear that the modern Keeler Dunes are NOT natural and formed due to anthropogenic causes. These modern Keeler Dunes are distinct from the former dunes that formed in the Holocene epoch along ancient shoreline features. The Holocene dunes are natural in origin. It is clear to District staff and its highly-regarded scientific team that the modern Keeler Dunes are anthropogenic in origin.

DWP COMMENT

In its haste to find LADWP responsible for the dust emissions in the Keeler Dunes, the District failed to prove that the Keeler Dunes have only been emissive in the last 70 years, and to investigate the causes leading to the observed changes in the Keeler Dunes. The District's position that the observed changes in the Keeler Dunes were caused solely by the desiccation of Owens Lake is not supported by any of the evidence in the Final Staff Report.

DISTRICT RESPONSE

The District has conducted air monitoring in Keeler since the early 1990's that shows that the emissions from the Keeler Dunes cause frequent and continual exceedances of state and federal air pollution standards. These exceedances are a de facto threat to the public health of Keeler-area residents, visitors and employees, including District and DWP employees. As documented by multiple scientific studies, the formation of the current Keeler Dune deposit occurred after desiccation of Owens Lake. While there is

no air quality data from the 1920s to the early 1990s, it is logical to conclude that this modern Keeler Dune deposit has had significant dust emissions since its initial development. However, this question is irrelevant to the question on the nature and timing of the development of the dunes. The important facts are that all of the studies completed by the District lead to the conclusion that the Keeler Dunes are anthropogenic and that the emissions from these anthropogenic dunes cause violations of the federal and state PM10 standards within the community of Keeler.

DWP COMMENT

2. Final Staff Report Fails to Address Other Sources of "New" Sand in the Keeler Dunes.

Even if the District could establish with substantial evidence that the Keeler Dunes are anthropogenic in origin, which it cannot and has not, the District staffs investigation and analysis in the Final Staff Report ignores other sources of the "new" sand on top of the "old" sand at Keeler Dunes, which are completely unrelated to LADWP's water gathering activities. LADWP is presently concluding its study regarding the source of the "new" sand, and hopes to have study documentation completed in time to submit to the District at the December 13, 2012, hearing.

DISTRICT RESPONSE

2. The detailed comprehensive scientific investigations presented in the Preliminary and Final Staff Reports clearly demonstrate that the modern Keeler Dunes are anthropogenic and that they formed in response to wind erosion and transportation of exposed Owens Lake bed material due to diversion of inflowing water. As part of the completed investigations, an analysis of reasonable sand sources for the Keeler Dunes was examined. Based on these investigations, the dried Owens Lake bed was the only source that fit the mineralogical, sand transportation direction, and volumetric requirements necessary to form the Keeler Dunes.

   The District has requested the results of work being conducted in the Keeler Dunes by the DWP since January 2011. It is unclear why those results (even preliminary results) could not be provided with the comments submitted by the DWP on the Preliminary and Final Staff Reports. Instead, no technical information has been provided to support the statements made by the DWP in their review of the District's investigations. District staff will recommend that the District Governing Board reject the DWP's unsupported and unsubstantiated conclusions and find that the current emissive Keeler Dunes are anthropogenic in nature.

DWP COMMENT

3. **District's Release of Significant New Information and Data Demonstrates the District's Process is Flawed and Designed to Avoid Transparency and Full Participation by the LADWP**

Although the ultimate (erroneous) conclusions in the Final Staff Report remained the same as the Preliminary Staff Report - i.e., that the Keeler Dunes are anthropogenic in origin and sand from the Owens playa is the sole cause of the recent expansion of the dunes - the Final Staff Report is significantly different from the Preliminary Staff Report. Among other things, the Final Staff Report includes 7 new and/or revised reports prepared by District staff and consultants that were not part of the Preliminary Staff Report, 23 completely new/updated figures, 4 new tables and at least 17 new references added to the body of the Final Staff Report alone. This excludes the additional data, figures, tables and references cited in the various new/updated reports included as Attachments A through G to the Final Staff Report, as well as District staff's 80 page response to LADWP's October 19, 2012, comments on the Preliminary Staff Report, attached as Appendix 2 to the Final Staff Report.

DISTRICT RESPONSE

3. As explained previously in this response, the changes and revisions of the Preliminary Staff report were completed: 1) to thoroughly respond point-by-point to comments made by the DWP and 2) to incorporate those responses into the reports. These revised reports and the detailed District responses were published as the Final Staff Report and supporting Technical Attachments and Appendices. Additionally, two of the sections in the Final Staff Report and supporting material were revised to provide the results of lab analyses that were received after the Preliminary Staff Report and to include five additional historic photos. Overall, only 25 pages of new material were added to the Preliminary Staff Report and Technical Attachments due to the newly reported data.

DWP COMMENT

The District staff fails to provide any explanation for why these new data and reports were not included as part of the Preliminary Staff Report in accordance with the District Governing Board's express verbal and written direction, and the parties' understanding and assumption - confirmed repeatedly by both District staff (the Air Pollution Control Officer included) and attorney - that the Preliminary Staff Report and technical attachments posted on the District's website on September 7 ,2012, represented the District's full and complete report on the origin and development of the Keeler Dunes, The District Governing Board was clear and unequivocal in its verbal and written directions to District staff that the Preliminary Staff Report and technical attachments were to include all of the "technical and scientific research, data and investigations conducted by the District pertaining to the origin and development of the Keeler Dunes" in order to allow sufficient opportunity for all interested parties, including LADWP, to review and provide comments. (September 5, 2012, Board Packet, pp. 124,126.) LADWP, like all other members of the public with an interest in the Keeler Dunes, could not provide full and complete comments without having had an opportunity to review and consider **all** of the relevant reports and appendices supporting the findings and conclusions set forth in the Report.
[foot note omitted]

DISTRICT RESPONSE

As discussed previously, very little additional data was included in the Final Staff Report. District staff carefully followed the direction from the Governing Board in the preparation, content and schedule for the Preliminary and Final Staff Reports. All of the materials that were complete in September 2012 were included in the Preliminary Staff report. Based on the comments received by the DWP on this report, revisions were made to the staff report to provide more detailed discussions and clarifications on the completed data and results. These revisions were included in the Final Staff Report issued on November 16, 2012. Also included in the Final Staff Report were the results of the pending lab analyses and a few additional historic photos that the District found after September 2012. The DWP and the public have had over three months to evaluate the materials presented.

DWP COMMENT

> The District staff's failure and refusal to include these significant additional data and studies as part of the Preliminary Staff Report, or to adequately explain why the materials were not previously disclosed, severely restricts LADWP's ability to thoroughly consider and respond to District staffs findings regarding the origin and development of the Keeler Dunes. The excuse proffered by District staff that they withheld these additional research, data and reports from the Preliminary Staff Report pending receipt of "information from the LADWP on the work they have conducted in the dunes" (Final Staff Report, Appendix 2, p. 50), is illogical and misunderstands the parties' respective roles and obligations regarding the Keeler Dunes. The District bears the burden to support its own conclusions. LADWP had no duty to conduct its own investigation into the origin of the Keeler Dunes to supplement or support the District staffs concurrent research and studies, much less to share the results of any such investigation with District staff. LADWP's sole responsibility as an interested member of the regulated public was to review the Preliminary Staff Report and its technical attachments - assumed to reflect the District staff's entire investigation on the Keeler Dunes – and comment on its adequacy, accuracy and completeness. LADWP did just that in its October 19, 2012, Technical Response. Moreover, the suggestion by District staff that these relevant data and studies were withheld from the Preliminary Staff Report in order to use the data to respond to and/or refute LADWP's anticipated comments and investigation evidences the District staffs disregard for the Governing Board's wishes that the investigation regarding the origins and development of the Keeler Dunes be openly objective and comprehensive.

DISTRICT RESPONSE

The DWP dwells on the fact that there was a relatively small amount of new data in the Final Staff Report, yet it provides no meaningful comment on these data. All of the materials and reports that were completed as of September 7, 2012 were made available in the Preliminary Staff Report and Technical Attachments. As stated in the Preliminary Staff Report, a few analytical results were not complete at the time of publication of the Preliminary Staff Report and therefore could not be included in the report. The District was very open about the fact

that they were awaiting the data from the lab analyses and that the data would be provided in the Final Staff Report. The pending data consisted of two mineralogical analyses and eight age date analyses. Additionally, the District found five more historic photos after the publication of the Preliminary Staff Report. The analytical data were received by the District in October and November 2012 and were included in the Final Staff Report in November 2012 along with the additional historical photos. Absolutely no information was withheld by the District at any point during the process.

The DWP indicated to the District multiple times (starting in August 2011 and as recently as July 2012) that they had retained a consultant to conduct research in the Keeler Dunes. The District requested information concerning the nature of the research and the results of the work. In October 2011, at a video meeting specifically scheduled to discuss the Keeler Dunes and the work that the DWP was conducting, District staff were told by the DWP that the information would be provided once the studies were complete. This was reiterated at the Governing Board meeting on July 19, 2012 by Mr. David Edwards, a City of Los Angeles Deputy Attorney representing the DWP, when he confirmed to the District Board that the DWP had a consultant working on the Keeler Dunes project "for quite some time" and indicated that the DWP would provide the information from that work as part of its review of the District's Preliminary Staff Report.

Based on this sequence of events, it is logical that District staff would expect to receive the results of the DWP's work in the dunes in October 2012 as part of their comments on the Preliminary Staff Report. While it is true that the DWP has "no duty to conduct its own investigation into the origin of the Keeler Dunes," the DWP made it clear that it did conduct such an investigation. This information should to be provided to the District in order for the Board to consider it along with the information from the District's research.

As stated in a previous response to the comments from the DWP, virtually all of the changes made to the Preliminary Staff Report were made in response to comments from the DWP. District staff and its consultants carefully evaluated each comment and made revisions to the Preliminary Staff Report and supporting Technical Attachments as a direct result. The revisions made were completed to provide a more thorough discussion and more detailed analysis of the points made by the DWP.

DWP COMMENT

> It is patently unfair and unreasonable for the District staff to expect LADWP to comprehensively review and comment on all of this new data and information – over 700 pages total - within the span of six (6) business days over the Thanksgiving holiday in order to meet the District's

arbitrary November 28, 2012, deadline for submitting comments on the Final Staff Report. Therefore, LADWP requests that the District postpone the December 13, 2012, hearing for a period of at least two months to allow LADWP, and other members of the public, sufficient time to consider all of the new data and materials included in the Final Staff Report and prepare an appropriate response. Should the District fail to do so, LADWP reserves its right to provide additional comments on the Final Staff Report and underlying technical investigations both at the December 13, 2012, hearing and afterwards until such time as LADWP has completed its review and analysis of the Final Staff Report.

Notwithstanding the above, LADWP reserves the right to submit further comments and analysis to the District after December 13, 2012.

DISTRICT RESPONSE

The November 28, 2012 deadline for receipt of written comments on the Final Staff Report was set by the schedule needed for the preparation, production, and mailing of the Board Packets. Per District policy, these materials are provided to the Board about ten days in advance of the Board Meeting in order to give the Board adequate time to review materials. The public announcement issued at the time of the Final Staff Report clearly indicated that comments would also be accepted up to December 13, 2012, the date of the public hearing. The DWP is free to submit additional written and oral comments on the Final Staff Report prior to or at the public hearing.

As explained in previous responses, although the size of the Final Staff Report is substantially larger than the Preliminary Staff Report, virtually all of the added materials are in direct response to comments made by the DWP. Only 10-12% of the increase is the result of new data and historical photos. While these new data and photos provide additional detail on specific parts of the research conducted by the District, they are not critical in the formation of the overall conclusion made by the District that the modern Keeler Dunes formed from material moving off of the exposed lake bed as a result of the historical desiccation of Owens Lake. The DWP has had over three months to review and analyze the materials on the origin and development of the Keeler Dunes.

DWP COMMENT

4. District Staff Admits the Final Staff Report Is Not An Objective Analysis if the Origin and Development of the Dunes

In its October 19, 2012, Technical Response to the Preliminary Staff Report, LADWP asserted that the results of the Preliminary Staff Report had been predetermined by the District in order to justify its prior statements in the 2003 and 2008 Owens Valley SIPs that the Keeler Dunes were created as a result of LADWP's water gathering activities and to ensure that the funding provided by LADWP for dust control – which represents over 90 percent of the District's annual operating budget – remains stable and secure long after LADWP has implemented controls on appropriate areas of the Owens lakebed.

The District staff addressed this issue in the Final Staff Report by stating that the District had not predetermined the results of its Keeler Dunes investigation to find that the dunes developed as a result of LADWP's water gathering activities at Owens Lake, but merely hypothesized that this was the case and intended through its investigations to "test the hypothesis that the dunes are anthropogenic." (Appendix 2, p.14.) In other words, the focus of the District staff's investigation was not - as stated in the Preliminary Staff Report - to objectively determine whether the Keeler Dunes are natural or anthropogenic in origin, but instead to try to prove staffs "working hypothesis" that the Keeler Dunes were created by sand transported from the Owens Lakebed. The District staff's statement that the District would be "more than willing" to accept a contrary conclusion rings hollow (Appendix2, p.14), particularly given that, as discussed above, the District staff and consultants purposefully ignored and/or failed to address the other potential sources of "new" sand in the Keeler Dunes, including the once-buried and now eroding ancient dune deposits underlying the "new" dunes.

DISTRICT RESPONSE

4. The District conducted a complete and detailed program of unbiased scientific investigations to learn about the origin of the Keeler Dunes and their development over time. The District had no idea of the outcome of these investigations prior to their completion. The District followed basic principles of scientific research and openly reported the results of the work completed. The DWP provides no contrary research or analysis, only unwarranted accusations regarding District staff's motivations.

   There is no doubt that the geomorphology and geology of the Keeler Dunes area is more complex than originally thought prior to the investigations and that the research conducted by the District increased the knowledge, not only of the dunes, but also of the history of the Owens Lake basin and the changes that have occurred over time. From a scientific standpoint, the completed work has significantly advanced the understanding of Holocene Owens Lake.

   The DWP is incorrect in stating that "the District staff and consultants purposefully ignored and/or failed to address the other potential sources of 'new' sand in the Keeler Dunes…". The Final Staff Report contains a report specifically written to address the comments made by the DWP concerning the source of the sand for the development of the Keeler Dunes. The DWP is referred to Lancaster and Bacon (2012b) in Attachment E and to Section 4.5 of the Final Staff report for this analysis.

DWP COMMENT

5. Clean Air Act's Exceptional Events Rule Does Not Provide the District With Authority to Require the Control of Emissions from the Keeler Dunes

The District states in the Final Staff Report that it has the authority to require control of natural sources like the Keeler Dunes under the Clean Air Act's Exceptional Events Rule (42 U.S.C. S 7619 [Clean Air Act, S 319]; see also Treatment of Data lnfluenced by Exceptional Events, 72 FR 13560-01), but suggests that the EER does not apply to Keeler Dunes because there are currently no Best Available Control Measures (BACM) in place on the dunes. The District is wrong. Requiring the control of natural undisturbed surfaces is beyond the District's current authority under the Clean Air Act and Section 42316.

The District's staff misunderstands the purpose of the EER and its authority thereunder. The purpose of the EER is to allow for the exclusion of data caused by naturally occurring high wind events that are, by definition, not reasonably controllable or preventable. In other words, the Clean Air Act recognizes that certain NAAQS exceedances cannot be prevented or controlled, regardless of whether BACM has been installed or has proved to be ineffective, and, as a result, permits data from those events to be excluded from NAAQS attainment demonstrations. Thus, the EER is intended to restrict - not broaden - the District staffs regulatory authority to issue control orders necessary to achieve attainment with the NAAQS by removing data from natural events from the attainment equation. Contrary to the District staffs statements in the Final Staff Report, there is no "public policy" exception to the Clean Air Act that authorizes the District to require control of natural sources simply because of the potential impacts to health and safety.

Furthermore, LADWP notes that the District staff has taken inconsistent positions regarding application of the EER in the Owens Valley. On the one hand, the District staff have characterized the EER as having "limited usefulness" in Owens Valley, and categorically refused to consider, much less apply, the EER to potentially eligible wind events on the Owens playa despite multiple requests by LADWP that it do so, (see June 8, 2012, LADWP letter re: May 25, 2012, high wind event; June 2l, 2012, District response re: same.) On the other hand, the District staff cites the EER - and no other authority - in the Final Staff Report as the sole basis for its purported authority to issue dust control orders for natural sources. Thus, according to the District staff, the EER cannot be used in Owens Valley for its intended purpose (i.e., to exclude data from uncontrollable or preventable high wind events), but can be applied for the entirely unrelated and statutorily-unsupported purpose of authorizing the issuance of control orders for naturally-occurring, nonanthropogenic sources of PM10 emissions. The District staffs position in the Final Staff Report that the EER authorizes the control of natural sources is contrary to, and cannot be reconciled with, the plain language of the rule and the District's own prior written statements.

Finally, the District staff fails to understand or acknowledge the serious long-term implications of issuing control orders for naturally-occurring, nonanthropogènic sources of emissions. The Owens Valley is a naturally arid, desert environment that is historically prone to dust storms and high wind events, and, like other desert landscapes, contains a seemingly endless supply of sand dunes and other naturally occurring topographical features that have historically generated, and will continue to generate, PM10 emissions. These emissions are attributable solely to the existing natural environment, and not any anthropogenic cause or effect of land ownershìp. lf the District were to issue an order requiring LADWP to control a natural source of emissions like the Keeler Dunes, this would set a precedent for future control orders to be issued for every other sand dune and natural emission source in the OVPA. There would be virtually no end to the potential sources subject to dust controls, and the individuals and entities liable for implementing such controls, including the State and Federal agencies that hold title to vast swaths of the Owens Valley and other vacant desert lands throughout the United States. Moreover, attempting to control natural, undisturbed sources could, and likely would, render these sources disturbed and thereby transform what was a naturally-occurring element of the desert landscape into an

anthropogenic source of emissions subject to the District's jurisdiction and control. The District's duty under the Clean Air Act and State law is to ensure the control of existing sources of manmade PM10 emissions to the extent necessary to achieve the NAAQS - not to create additional "new" sources and the corresponding justification to order further, otherwise unnecessary, controls. The District's authority with respect to LADWP is limited by Section 42316 to the imposition of reasonable measures to mitigate the impacts of the City's water gathering activities, on the basis of substantial evidence establishing that the City's activities cause or contribute to violations of the NAAQS and prevents the District from mandating measures that affect the City's right to produce, divert, store, or convey water
[footnote omitted]

DISTRICT RESPONSE

5. The DWP's assertions regarding the U.S. EPA's Exceptional Events Rule and guidance have no bearing on the origin and development of the Keeler Dunes. Nevertheless, its assertions are incorrect. The DWP misunderstands the definition of an exceptional event (EE), it incorrectly interprets the EE Rule and it does not properly follow the draft EE guidance. The definition of an EE at 40 CFR §50.1(j) repeats the Clean Air Act definition which provides that an exceptional event is an event that affects air quality, is not reasonably controllable or preventable, and is caused by human activity that is unlikely to recur at a particular location. Therefore, in order for an event to be designated as an EE, it must, among other tests, not be reasonably controllable and be caused by human activity that is unlikely to recur at a particular location. Under any set of origin circumstances, the emissions from the Keeler Dunes are reasonably controllable. The proposed control measure project under development by the District may show that Keeler Dunes dust control can be implemented at costs comparable to or less than Owens Lake bed dust controls. In addition, if the Keeler Dune emissions are determined to be anthropogenic, the emissions fail both tests because, in addition to being reasonably controllable, they are certain to recur until they are controlled.

   The remainder of DWP's comments have no bearing on the issue of the origin and development of the Keeler Dunes and their emissions. There are no relationship or policy implications associated with deploying reasonable controls on air pollution sources that regularly and directly impacts the public health of Keeler residents, employees and visitors and the possibly unreasonable control of natural and/or exceptional air pollution sources.

DWP COMMENT

6. District Staff Fails to Address the the OVPA Will Achieve Attainment According to the 2008 SIPand the 2017 Attainment Strategy Without the Implementation of Controls On Keeler Dunes

As noted in LADWP's October 19 Technical Response to the Preliminary Staff Report (section 3.2), according to the 2008 SlP, LADWP's control of 43 square miles of Owens Valley playa - standing alone and excluding emissions from the Keeler Dunes - is expected to be sufficient to achieve attainment of the PM10 NAAQS by 2017. The Final Staff Report does not, and cannot, refute this fact. Instead, District staff point to language in the 2008 SIP providing that "if" additional mitigation measures are required for the Keeler Dunes to demonstrate attainment, then such controls are required to be ordered by January 1,2012, and implemented by January 1,2014. (Final Staff Report, Appendix 2, p. 18.)

The District cannot issue orders to LADWP to implement dust controls on the Keeler Dunes without the EPA first finding that the current mitigation measures have failed to achieve attainment by the 2008 SIP's projected attainment date of 2017 because of the lack of controls on the Keeler Dunes. The District staff cannot simply determine - on its own and without EPA consultation or approval - that additional controls on the Keeler Dunes above and beyond the 43 square miles of controls prescribed under the 2008 SIP are needed to demonstrate attainment by 2017 because to do so would constitute a de facto amendment to the 2008 SIP. There has been no finding by either the EPA or the District that attainment will not be achieved with these current controls nor could such a finding be made until, at the earliest, 2017. Furthermore, the mere existence of data showing past NAAQS exceedances on the Keeler Dunes - a natural source of natural emissions which data is subject to exclusion from attainment under the EER - does not automatically mean that the current controls required under the 2008 SIP have failed or are otherwise insufficient to meet attainment by the 2017 deadline.

Finally, the District staff appears to confuse and conflate the District's obligations to demonstrate attainment with the federal NAAQS under the 2008 SIP with its concurrent responsibility to protect the health and safety of residents within the Owens Valley. In doing so, the District staff ignores the fact that the 43 square miles of controls prescribed in the 2008 SIP and determined adequate by the District to achieve attainment with the NAAQS are, by their very nature, sufficient to protect the health and safety of local residents in accordance with federal standards. The Clean Air Act instructs EPA to set "ambient air quality standards the attainment and maintenance of which in the judgment of the Administrator... are requisite to protect the public health." (42 u.s.c. S 7409(bX1) [emphasis added; *Whitman v. Am. Trucking Associations* (2001) 531 U.S. 457, 472.) Thus, achieving attainment with the NAAQS in accordance with the measures prescribed in the 2008 SIP will simultaneously ensure the health and safety of Owens Valley residents. If not, then the District has no choice but to declare the SIP a failure.

In sum, the District staff's analysis of the origins and development of the Keeler Dunes, and any dust control order that the District Governing Board may be asked to issue as the result of this report, would be premature and unnecessary because by the District's own determination, the OVPA is expected to achieve attainment with federal PM10 standards under the District's 2008 SIP without the implementation of dust controls on the Keeler Dunes.

DISTRICT RESPONSE

6. The issues raised by the DWP in this section have no bearing on the origin and development of the Keeler Dunes. Nevertheless, its assertions are incorrect. There is no evidence that controlling 43 square miles on the dried Owens Lake bed will somehow result in control of the emissions and associated PM_{10} standard exceedances caused by the Keeler Dunes. The 2008 SIP is very clear in this regard and evidence collected by the District subsequent to

adoption of the 2008 SIP confirms the SIP's assertions. This issue was clearly and definitively addressed by the CARB during the DWP's appeal of the 2011 Supplemental Control Requirements Determination. Quoting on this issue from CARB's April 30, 2012 staff assessment:

> The City also argues that the 2011 SCRD controls are not necessary to attain the PM_{10} NAAQS, and the District is legally prohibited from requiring the City to control any additional areas beyond the 43.0 square miles that the City is already obligated to control, because the 2008 SIP predicted that the Owens Valley will attain the PM_{10} NAAQS by 2017 without controlling any additional areas. ARB staff does not agree. In general, attainment demonstrations in SIPs represent the best prediction of what actions must to taken to reach attainment, based on the best information available the time the SIP was adopted. However, new information is constantly being acquired. Nothing in the CAA prohibits a state from acting to protect public health based on newly learned information. As discussed above, the SCRD Procedure, authorized under State law, is structured to incorporate newly acquired information and expeditiously impose appropriate control measures; it does not require that the 2017 federal attainment deadline be missed before any additional mitigation actions can be taken. (Page 5, line 20ff)

In addition, CARB's November 19, 2012 final Decision and Findings on the 2011 SCRD clearly states the District's position on this issue:

> (1) attainment demonstrations in SIPs represent the best prediction of what actions must be taken to reach attainment based on the best information available at the time the SIP was adopted, although new information is constantly being acquired; (2) nothing in the CAA prohibits a state from acting to protect public health based on newly learned information; (3) the SCRD Procedure, which is authorized under State law and the 2010 CJMP, is structured to incorporate newly acquired information and expeditiously impose appropriate control measures; and (4) the SCRD Procedure does not require that the 2017 federal attainment deadline be missed before any additional mitigation actions can be taken. (Page 11, line 28ff)

The CARB fully supported the District's position and found that the DWP's challenge "is not supported by substantial evidence." Control of the PM_{10} emissions from the Keeler Dunes are within the District's authority and are clearly contemplated by the 2008 SIP.

DWP COMMENT

7. District Final Staff Report Does not Present Substantial Evidence Necessary to Justify A Future Order For Dust Controls On Keeler Dunes Under Section 42316

Among other things, Section 42316 requires the District to demonstrate establish through "substantial evidence" that LADWP's water gathering activities have caused or contribute to an alleged air quality violation before it may lawfully order I-ADWP to implement dust controls. The Final Staff Report, like the Preliminary Staff Report issued on September 7, 2012, does not include any direct evidence showing that LADWP's activities at Owens Lake have caused or contributed to a specific violation of the federal NAAQS, or that any of the other requirements of Section 42316 have been met. Consequently, the Final Staff Report cannot be used as the basis for ordering LADWP.

Contrary to the District staffs statements in the Final Staff Report, the District has no authority besides Section 42316 to order LADWP to control the Keeler Dunes or, for that matter, any other lands within the Owens Valley. Neither the District's own local rules nor any other provision of state or federal law besides Section 42316, grant the District staff the authority to issue dust control orders to LADWP. Thus, absent a showing by the District that all of the criteria set forth in Section 42316 have been met, the District is without authority to order LADWP to implement dust controls on the Keeler Dunes.

Furthermore, the District staff's bifurcation of the control order process for Keeler Dunes does not remove or exempt the District from its statutory obligation to comply with Section 42316, and demonstrate, by substantial evidence, that: (1) the Keeler Dunes are a man-made source of emissions subject to control under the Clean Air Act; and (2) LADWP's water-gathering activities at Owens Lake caused a specific exceedance of the NAAQS at the Keeler Dunes. The District cannot avoid its legislative burdens under Section 42316 by characterizing the Final Staff Report and its analysis of the Keeler Dunes as a mere technical investigation rather than a control order proceeding under Section 42316. The decision on the origin of Keeler Dunes is a necessary and inseparable predicate to a control order,

DISTRICT RESPONSE

7. DWP is incorrect in its assertion that "the District has no authority besides Section 42316 to order LADWP to control the Keeler Dunes or, for that matter, any other lands within the Owens Valley." Section 42316 does not exempt the DWP from all other local, state and federal air pollution control laws; it simply exempts it from the requirement to secure a permit for its water-gathering-activity-caused air pollution in the District and makes other special provisions regarding fees, control orders and appeal procedures. Section 42316 does not give the DWP a license to pollute air in the District.

   The DWP's contentions regarding the requirements of Section 42316 have nothing to do with the procedure (agreed to by the District Board and DWP staff at the District's July 19, 2012 Governing Board meeting) to determine the origin and development of the Keeler Dunes. At the District's December 13, 2012 Board meeting, District staff is not recommending any action be taken to order control of Keeler Dunes PM_{10} emissions and no

Section 42316 proceedings are contemplated. Nevertheless, the Clean Air Act and the 2008 SIP require that the PM_{10} exceedances caused by PM_{10} emissions from the Keeler Dunes be controlled. However, the manner in which the controls are ordered are dependent on the party or parties responsible for control. If the District Board determines the dunes and their PM_{10} emissions are anthropogenic and controllable, then, at a future date, the responsible party or parties will be ordered to implement controls. If the District Board determines the emissions are anthropogenic and that the City of Los Angeles is a responsible party, a future order under Section 42316 may be appropriate. If, however, the emissions are deemed to be natural and controllable, then it is likely the underlying property owners would be responsible for controls and the District would issue orders under other provisions of District regulations or state law. If the emissions are determined to be natural and uncontrollable, then there may be no further action taken. Therefore, until the District makes a determination as to the origin and development of the Keeler Dunes, the path forward to either control or no control is unknown and it is appropriate that the origin/development decision not be conflated with the PM_{10} control decision.

Finally, the District agrees with the DWP that the decision on the origin of Keeler Dunes is a necessary predicate to a control order. However, until the origin decision is made, it is not possible to issue the correct control order. Therefore, the origin decision and control order action are not inseparable, but, by logic, must be separated.

DWP COMMENT

8. District Cannot Meet its Burden of Showing that Keeler Dunes are Anthropogenic in Origin

In order to serve as the predicate for a future order requiring LADWP to install controls on the Keeler Dunes, the Final Staff Report must find that the Keeler Dunes are anthropogenic in origin. The District cannot make this finding because the undisputed evidence - including the District's own evidence in the Final Staff Report - confirms that sand dunes have existed in the area around Keeler for thousands of years and certainly long before LADWP began its water gathering activities at Owens Lake.

Rather than acknowledge this fact, the District staff instead attempt to distinguish these historical dunes from the so-called "modern Keeler Dunes that require dust controls." (Final Staff Report, S 4.5; Appendix 2, p.31; Attachment E to Final Staff Report.) This distinction by District staff is irrelevant, however, because the very fact that sand dunes have historically existed in Keeler long before human settlement in the area and before the recent elevation change at Owens Lake means that the dunes themselves are a natural, nonanthropogenic source of emissions. To the extent that the emissive sand from the current "active" dunes is different in origin from the material comprising the older 'inactive" dunes is not relevant because the District staff cannot show as a matter of scientific fact that the "older" dunes were not themselves emissive. In other words, the fact that some of the sand comprising the top, emissive layer of the current Keeler Dunes may

originate at Owens Lake does not ipso facto establish that the dunes themselves are anthropogenic.

Because neither the Clean Air Act nor any other statute permits the District to order the control of a natural source, the Final Staff Report cannot be used by the District as the foundation for ordering LADWP to install controls at Keeler Dunes.

DISTRICT RESPONSE

8. The results of the District's extensive multi-component detailed scientific research into the origin and development of the Keeler Dunes collectively demonstrate that the modern Keeler Dune deposit formed as a direct result of the desiccation of historic Owens Lake. DWP has provided no data or analysis that disproves the District's conclusions and it has certainly not provided a supported or substantiated alternative theory.

   Although the geological relationships between the older dune deposits and the modern Keeler Dunes, at first glance, is a bit complicated, it is apparent that the modern Keeler Dunes are in no way similar to the much older Late Holocene dunes, other than the fact that they are composed of sand and are situated on the same alluvial fan. The Late Holocene dunes formed along and were restricted to former shoreline features forming a narrow belt at a restricted elevation. The results from the detailed mapping, stratigraphic, and chronologic studies indicate that the Late Holocene dunes were similar to stable dune systems found adjacent to other saline lakes in the Great Basin physiographic province. The modern Keeler Dunes, on the other hand, are not restricted to a set elevation and instead consist of a deposit that has grown and expanded three-fold since the 1940's. The deposit is migrating toward the community of Keeler at an average rate of 33 feet per year. The upwind edge (northwest) is eroding and former alluvial fan and Holocene lake features that were buried for decades are now being exhumed.

   The emissions from stable shoreline dune systems (thought to be an analog to the late Holocene dunes in the study area) are low and irrelevant to the emissions from the modern Keeler Dunes. The argument made by the DWP comparing the two is illogical since the District is not proposing to control the Late Holocene dunes but rather is developing a control measure for the active, emissive, modern, and anthropogenic Keeler Dunes.

   The DWP's logic is faulty—not all dunes are emissive dunes. Careful reading of the Final Staff Report clearly indicates that the prehistoric Keeler Dunes were limited in size and restricted to a narrow band along the lake shore. Using other saline basin lakes as a model, these natural dunes were vegetated and nonemissive. There is no indication that emissive dunes were present prior to the 1940s. On the other hand, the current Keeler Dune field is far larger than would be expected in a natural, lake-side dune field and no argument has been presented that they are not emissive or that they do not pose a public health threat to the residents, employees and visitors of Keeler.

Finally, the DWP is incorrect in its assertion that the District cannot order air pollution from natural sources to be controlled. It is the District's responsibility to protect public health. If reasonable actions can be taken than provide such protection, they can be ordered regardless of the nature of the air pollution. However, if the Keeler Dunes are determined to be caused by human action and those actions were taken by the DWP and are associated with its water diversions, then Section 42316 provides a clear path toward control of this health-threatening air pollution source.

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