



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IX

75 Hawthorne Street
San Francisco, CA 94105-3901

OFFICE OF THE
REGIONAL ADMINISTRATOR

FEB 04 2016

Mr. Nolan Hirai
Manager, Clean Air Branch
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801

Dear Mr. Hirai:

This letter responds to Hawaii Department of Health's (HDOH) December 17, 2015 submittal regarding exceedances of the 2010 1-hour SO₂ National Ambient Air Quality Standard (NAAQS) that occurred at the Hilo Air Monitoring Station (AQS ID: 15-001-1006), Mountain View Air Monitoring Station (AQS ID: 15-001-2023), Ocean View Air Monitoring Station (AQS ID: 15-001-2020), and the Pahala Air Monitoring Station (AQS ID: 15-001-2016) in 2012 – 2014.¹ Specifically, HDOH addresses 4,546 hours as listed in Appendix D of HDOH's *Documentation for Natural Events Excluded Data Hilo Air Monitoring Station, AQS ID 15-001-1006, Mountain View Air Monitoring Station, AQS ID 15-001-2023, Ocean View Air Monitoring Station, AQS ID 15-001-2020, Pahala Air Monitoring Station, AQS ID 15-001-2016, 2012-2014 Sulfur Dioxide (SO₂) Exceedances Final Report, January 2016*. HDOH's submittal included documentation that these exceedances were caused by exceptional events due to volcanic emissions. With the U.S. Environmental Protection Agency's (EPA's) concurrence on the 4,546 hours, the 2014 design values for the four monitors do not violate the 2010 1-hour SO₂ NAAQS.²

EPA has reviewed the documentation provided by HDOH to demonstrate that the exceedances during these hours meet the criteria for an exceptional event in the Exceptional Events Rule (EER).³ Based on the weight of evidence, EPA concurs that the exceedances were caused by volcanic exceptional events and finds that HDOH has successfully made the demonstrations referred to in 40 CFR §50.14. In addition, HDOH has met the schedule and procedural requirements in section 50.14(c) with respect to the same data. EPA's detailed assessment of HDOH's submittal is enclosed.⁴ EPA will enter "concurrence flags" for these data into EPA's Air Quality System (AQS) data system.

¹ On January 13, 2016, HDOH transmitted additional pages from Appendix D that had been inadvertently omitted from its December 17, 2015 submittal. Here forward, the terms "2015 Demonstration" and "Appendix D" refer to December 2015 and January 2016 submittals.

² The 4,546 hour are associated with 44 days at the Hilo monitor (20 in 2012, 14 in 2013, 10 in 2014), 64 days at Mountain View (20 in 2012, 17 in 2013, 27 in 2014), 386 days at Ocean View (177 in 2012, 116 in 2013, 93 in 2014), and 681 days at Pahala (293 in 2012, 214 in 2013, 174 in 2014).

³ 40 CFR 50.14 and 50.1(j); 72 FR 13560 (March 22, 2007).

⁴ See enclosed document *EPA Review of Hawaii Department of Health's "Documentation for Natural Events Excluded Data Hilo Air Monitoring Station, AQS ID 15-001-1006, Mountain View Air Monitoring Station, AQS ID 15-001-2023, Ocean View Air Monitoring Station, AQS ID 15-001-2020, Pahala Air Monitoring Station, AQS ID 15-001-2016, 2012-2014 Sulfur Dioxide (SO₂) Exceedances Final Report, January 2016" Regarding Exceedances of 1-hour SO₂ NAAQS in 2012-2014*.

Based on our review of and concurrence with HDOH's submittal, EPA will exclude these data from the following types of calculations and activities:

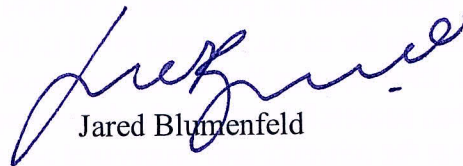
- EPA's AQS will not count these days as exceedances when generating user reports, or include them in design values estimates, unless the AQS user specifically indicates that they should be included.
- EPA will accept the exclusion of these data for the purposes of selecting appropriate background concentrations for New Source Review air quality analyses.⁵
- The data will continue to be publicly available, but EPA's publications and public information statements on the status of air quality in the affected area will not reflect these data in any summary statistic of potential regulatory application, unless such inclusion is specifically noted.⁶

The concurrences conveyed in this letter apply only to determinations by the Administrator with respect to incorporating the submitted data relative to the 2010 1-hour SO₂ NAAQS.

In February 2016, EPA anticipates transmitting to Governor Abercrombie our intended designation for the 2010 1-hour SO₂ NAAQS for Hawaii County, which will consider the concurrences conveyed in this letter regarding exceedances of the 2010 1-hour SO₂ NAAQS that occurred in 2012-2014. We will also announce in the *Federal Register* the availability of EPA's responses to state and tribal designation recommendations and accept public comments on these responses, including comments on your exceptional events submission and the concurrences conveyed in this letter. If we receive comments, we must consider and respond to those comments before taking final regulatory action. Accordingly, the concurrences conveyed in this letter do not constitute final EPA action. Final action will take place only after EPA completes notice and comment rulemaking.

If you have any questions or wish to discuss this matter further, please contact Elizabeth Adams, Acting Director of the Air Division at (415) 972-3183.

Sincerely,



Jared Blumenfeld

Enclosure

cc: Lisa Young, HDOH

⁵ If we are the permitting authority, we will propose permits on this basis. If we are commenting on another permitting authority's proposed action, our comments will be consistent with the concurrences in this letter.

⁶ These data may be included in statistics intended to describe trends in actual air quality in the area.

**EPA Review of
Hawaii Department of Health's**

**“Documentation for Natural Events Excluded Data
Hilo Air Monitoring Station, AQS ID 15-001-1006
Mountain View Air Monitoring Station, AQS ID 15-001-2023
Ocean View Air Monitoring Station, AQS ID 15-001-2020
Pahala Air Monitoring Station, AQS ID 15-001-2016
2012-2014 Sulfur Dioxide (SO₂) Exceedances
Final Report, January 2016”**

**Regarding Exceedances of the 2010 1-hour SO₂ NAAQS
in 2012-2014**

US Environmental Protection Agency, Region 9
January 2016

Contents

1.	Introduction.....	3
2.	Summary of the Events.....	5
3.	Requirements of the Exceptional Events Rule (EER).....	5
4.	Clear Causal Relationship (CCR).....	6
5.	Concentrations in Excess of Normal Historical Fluctuations (HF).....	9
6.	No Exceedance But For the Event (NEBF).....	10
7.	Criteria Set Forth in 40 CFR §50.1(j).....	10
7.1.	Affects Air Quality (AAQ).....	10
7.2.	Natural Event.....	11
7.3.	Not Reasonably Controllable or Preventable (nRCP).....	11
8.	Procedural Requirements.....	13
9.	Conclusion.....	13

1. Introduction

On March 22, 2007, EPA adopted a final rule, *Treatment of Data Influenced by Exceptional Events* (EER), to govern the review and handling of certain air quality monitoring data for which the normal planning and regulatory processes are not appropriate.¹ Under the rule, EPA may exclude data from use in determinations of National Ambient Air Quality Standard (NAAQS) exceedances and violations if a state demonstrates that an “exceptional event” caused the exceedances. Before EPA can exclude data from these regulatory determinations, the state must flag the data in EPA’s Air Quality System (AQS) database and, after notice and opportunity for public comment, submit a demonstration to justify the exclusion. After considering the weight of evidence provided in the demonstration, EPA decides whether or not to concur with each flag.

On December 17, 2015, Hawaii Department of Health (HDOH) submitted documentation to EPA to demonstrate that exceedances of the 2010 1-hour SO₂ NAAQS² that occurred in 2012-2014 at the Hilo (AQS ID: 15-001-1006), Mountain View (AQS ID: 15-001-2023), Ocean View (AQS ID: 15-001-2020), and Pahala (AQS ID: 15-001-2016) Air Monitoring Stations located on the Island of Hawaii (Figure 1) resulted from volcanic-related exceptional events (“2015 Demonstration”).³ This document sets forth the basis for EPA’s concurrence with HDOH’s claim that the exceedances summarized in Table 1 and listed in the 2015 Demonstration, Appendix D⁴ were the result of volcano-related exceptional events:

Number of Days for EPA Concurrence			
Station	2012	2013	2014
Hilo	20	14	10
Mountain View	20	17	27
Ocean View	177	116	93
Pahala	293	214	174

Table 1. Number of days with hours requested for EPA Concurrence (from 2015 Demonstration, Figure I-1, Procedure 2).⁵

¹ 72 FR 13560, March 22, 2007. EPA has proposed revisions to the 2007 EER (80 FR 224, November 20, 2015). Those changes have not yet been finalized. Accordingly, in making this concurrence determination, EPA is relying on the existing regulations, with additional support as provided in our 2013 Interim Guidance on implementing those regulations. See Stephen Page, Director, Office of Air Quality Planning and Standards to Regional Air Directors, “Interim Guidance to Implement Requirements for the Treatment of Air Quality Monitoring Data Influenced by Exceptional Events” and “Interim Exceptional Events Rule, Frequently Asked Questions,” U.S. EPA, May 2013.

² The 2010 1-hour SO₂ NAAQS is 75 parts per billion (ppb). 40 CFR 50.17(a); 75 FR 35520 (June 22, 2010).

³ “Documentation for Natural Events Excluded Data Hilo Air Monitoring Station, AQS ID 15-001-1006, Mountain View Air Monitoring Station, AQS ID 15-001-2023, Ocean View Air Monitoring Station, AQS ID 15-001-2020, Pahala Air Monitoring Station, AQS ID 15-001-2016, 2012-2014 Sulfur Dioxide (SO₂) Exceedances, Final Report, January 2016” (“2015 Demonstration”).

⁴ On January 13, 2016, HDOH transmitted additional pages from Appendix D that had been inadvertently omitted from its December 17, 2015 submittal. Here forward, the terms “2015 Demonstration” and “Appendix D” refer to December 2015 and January 2016 submittals.

⁵ 40 CFR 50, Appendix T, 5(a)(i)(2).

On June 3, 2010, the EPA revised the primary (health based) SO₂ NAAQS by establishing a new one-hour standard at a level of 75 parts per billion (ppb) which is attained when the 3-year average of the 99th percentile of one-hour daily maximum concentrations does not exceed 75 ppb.⁶ EPA is concurring on specific hours within each of the days identified in Table 1, totaling 4,546 hours from the four monitors across the 3-year period of 2012-2014. A full list of dates and hours concurred upon are listed in the 2015 Demonstration, Appendix D. With EPA's concurrence on these hours, the 2014 design values, which are calculated from 2012-2014 data, for the Hilo, Mountain View, Ocean View, and Pahala monitors do not violate the 2010 SO₂ NAAQS.



Figure 1. Topographical map of Hawaii with locations of the Halema'uma'u and Pu'u O'o vents, air monitoring stations (regulatory: Hilo, Mountain View, Pahala, Ocean View, Kona; non-regulatory: Puna E, NPS Visitor's Center, NPS Observatory), and power plants (from 2015 Demonstration, Figure 2-12).

⁶ 75 FR 35520, June 22, 2010.

2. Summary of the Events

Volcanic emissions primarily consist of water vapor, carbon dioxide and SO₂. Kilauea Volcano, located on the southeastern shore of the Island of Hawaii, has been erupting almost continuously since 1983 resulting in releases of gas from vents located at the Halema'uma'u summit and Pu'u O'o rift zone craters (Figure 1). In 2008, a new gas vent opened at Halema'uma'u, increasing emissions at this location by a factor of 10.⁷ Elevated emissions have persisted since then with total Kilauea emissions estimated at 2,140,183 tons SO₂ in 2014 (~93% from Halema'uma'u).⁸ HDOH explains that Kilauea emissions are blown by prevailing northeasterly trade winds towards the Pahala and Ocean View monitoring stations and less frequently by southerly (also referred to as Kona winds) towards the Hilo and Mountain View air monitoring stations, causing exceedances at these locations (Figure 2).⁹

HDOH submitted the 2015 Demonstration to show that emissions emanating from Kilauea Volcano are natural volcanic exceptional events and that the exceedances summarized in Table 1 and listed in the 2015 Demonstration, Appendix D were caused by these natural volcanic exceptional events.



Figure 2. Hawaii wind patterns (from 2015 Demonstration, Figure 2-9).

3. Requirements of the Exceptional Events Rule (EER)

Pursuant to 40 Code of Federal Regulations (CFR) §50.14(c)(3)(iv), a request for EPA's concurrence on an exceptional event flag must be accompanied by a demonstration that:

⁷ See 2015 Demonstration, p.18.

⁸ See 2015 Demonstration, pp.33 and 88.

⁹ See 2015 Demonstration, p.3.

- A. The event satisfies all of the criteria set forth in 40 CFR §50.1(j). It affects air quality; is not reasonably controllable or preventable; and is caused by human activity that is unlikely to recur at a particular location, or is a natural event; and is determined by the Administrator in accordance with 40 CFR 50.14 to be an exceptional event; and
- B. There is a clear causal relationship between the measurement under consideration and the event that is claimed to have affected the air quality in the area;
- C. The event is associated with a measured concentration in excess of normal historical fluctuations, including background; and
- D. There would have been no exceedance or violation but for the event.

The EER also has procedural requirements. 40 CFR §50.14(c)(2)(iii) requires that data claimed to be due to an exceptional event be flagged in the AQS database, and that an initial description of the event be provided to EPA; both must occur by July 1 of the year following the event. In addition, 40 CFR §50.14(c)(3)(i) requires that the State:

- submit a demonstration to EPA within three years of the calendar quarter of the event or 12 months prior to an EPA regulatory decision;
- provide notice and opportunity for public comment; and
- submit any public comments along with the demonstration.

The following sections provide EPA's review of HDOH's demonstration for the hours in question with respect to these requirements.

4. Clear Causal Relationship (CCR)

EPA considers a variety of evidence when evaluating whether there is a clear causal relationship between the measurements under consideration and the event that an air agency claims affected the air quality in the area. Demonstrations typically include documentation showing that the events in fact occurred and that emissions related to the event were transported in the direction of the monitor(s) where elevated concentrations measurements were recorded; the size of the area affected by the transported emissions; the relationship in time between the event, transport of emissions, and recorded concentrations; and, as appropriate, pollutant species-specific information supporting a causal relationship between the event and the measured concentration.

Section 2 of the 2015 Demonstration includes a comprehensive conceptual model of the events, including details of the air monitoring stations, description of the topography and climate of Hawaii, a discussion of trade winds and Kona winds, and a summary of additional analyses presented. Section 3 presents HDOH's analysis to demonstrate that the CCR criterion is met. Section 6 of the 2015 Demonstration also summarizes the CCR element. We review HDOH's analysis of CCR below.

Kilauea emissions were estimated at 2,140,183 tons SO₂ in 2014 (~93% from Halema'uma'u), accounting for 99.9% of SO₂ emissions from the Island of Hawaii.¹⁰ Illustrating the dominance of volcanic SO₂ emissions on the Island of Hawaii, the 2015 Demonstration includes satellite-based measurements that show elevated SO₂ columns originating near Kilauea Volcano and being blown by trade winds to the southwest and around the southern portion of the island, while nitrogen dioxide columns (NO₂), an indicator of anthropogenic pollution, are elevated around the Island of Oahu, but low over the entire Island of Hawaii.¹¹

HDOH's 2015 Demonstration describes two predominant regimes: (1) during prevailing trade wind conditions, emissions from Kilauea Volcano are blown to the southwest toward the Pahala and Ocean View monitors; and (2) during episodic Kona wind conditions, volcanic emissions are blown to the north toward the Mountain View and Hilo monitors. Focusing on the two monitors to the south of the volcano during prevailing trade wind conditions, the Pahala monitor, which is located closer to the volcano, measured both the higher 2014 design value (712 ppb, compared to 533 ppb at Ocean View) and the higher number of days with hours requested for exceptional event concurrence (681 days from 2012-2014, compared to 386 days during 2012-2014 for Ocean View). Regarding the two monitors to the north of the volcano during (less frequent) Kona winds, the Mountain View monitor, which is located closer to the volcano, had a 2014 design value of 279 ppb and 64 days with hours requested for exceptional events concurrence, while the Hilo monitor had a 2014 design value of 180 ppb and 44 requested days.

HDOH also examined 2012-2014 normalized daily mean SO₂ values at the HDOH monitors and at two monitors operated by the National Park Service (NPS) near Halema'uma'u: the HAVO-OB monitoring site (AQS ID: 15-001-0007), located 2 kilometers (km) to the north of the vent at the observatory, and the HAVO-VC (AQS ID: 15-001-0005) site located 4 km to the northeast of the vent at the visitor's center (See Figure 1).¹² The HAVO-VC and HAVO-OB sites are well correlated ($r = 0.62$). The HAVO-VC site is similarly correlated with Mountain View ($r = 0.64$) and Hilo ($r = 0.53$). These correlations are consistent with transport of SO₂ from the vents to the NPS stations, continuing north toward Mountain View, and further north to the Hilo monitor.

In contrast, when SO₂ concentrations are high at the Pahala and Ocean View monitors, concentrations at the Mountain View and Hilo monitors are often low. There is also a slight negative correlation during these circumstances between the Pahala and Mountain View monitors ($r = -0.21$), and the Pahala and Hilo monitors ($r = -0.17$).¹³ These results are consistent with volcanic emissions being transported by trade winds to Pahala and Ocean View and conversely during Kona winds to Hilo and Mountain View.

Monitors north of Kilauea: Hilo and Mountain View Specific Analysis

The majority of anthropogenic SO₂ emissions on the island are from the Kanoiehua Hill and Puna electric power plants with combined 2014 SO₂ emissions of 2,376 tpy (2015

¹⁰ See 2015 Demonstration, pp.33 and 88.

¹¹ See 2015 Demonstration, Figures 2-20 and 2-21.

¹² See 2015 Demonstration, Figures 3-2 – 3-13. A summary of correlations between all the sites is presented in the 2015 Demonstration, Table 3-5 at p.77

¹³ See 2015 Demonstration, p.40.

Demonstration, Figure 1). Kanoelehua Hill (1,852 tpy SO₂ in 2014) is located 4.1 miles to the east of the Hilo monitor and Puna (524 tpy SO₂ in 2014) is located 4.1 miles to the northeast of the Mountain View monitor. Due to the proximity and magnitude of these sources, HDOH performed additional analysis to assess the effects of the power plants on monitored concentrations and to add to the weight of evidence supporting the conclusion that emissions from the volcano caused the flagged exceedances.

Figure 3-15 in the 2015 Demonstration shows a distinct seasonal cycle in monthly mean and maximum SO₂ concentrations at the Hilo and Mountain View monitors.¹⁴ Concentrations peak October – March and are at a minimum during trade wind months of April – September. The correlation between monthly mean and monthly maximum concentrations at the two sites are $r = 0.94$ and 0.68 , respectively. Figures 3-23 through 3-25 show 2012-2014 daily average power generation at the Kanoelehua Hill and Puna facilities. No significant seasonal cycle is seen in this data that would explain the observed seasonal cycle in monthly mean and maximum SO₂ concentrations. Additionally, the atmospheric lifetime of SO₂ peaks in summer when cloud cover is smallest, so the observed SO₂ seasonality cannot be attributed to atmospheric chemistry.¹⁵ The seasonal cycle is consistent with persistent trade winds blowing Kilauea emissions to the south in the summertime and Kona wind conditions blowing volcanic emissions toward the Mountain View and Hilo monitors in the wintertime.

Figure 3-16 in the 2015 Demonstration shows wind roses at the Hilo and Mountain View monitors. The area is governed by a land sea-breeze with winds approaching from the west (from the land) in the evening/night and from the northeast (from the sea) in the morning/afternoon. SO₂ pollution roses show that generally the highest SO₂ concentrations at both locations are associated with winds approaching from a southerly direction, consistent with the location of Kilauea Volcano.

To quantify the impact of the power plants, HDOH analyzed hourly SO₂ monitored values from the Hilo and Mountain View monitors in a two-step approach to select data that were less likely to be influenced by the volcano. First, to remove days influenced by Kona winds, which transport volcanic emissions to Mountain View and Hilo, HDOH removed monitored values when winds were from the south for the measurement day or the preceding day.¹⁶ Next, to focus on power plant-influenced hours, HDOH selected data to focus on local winds arriving from the power plants' general direction: north of Mountain View (0-90°, 270-360°) and east of Hilo (0 - 180°). Based on this filtered 2012-2014 dataset, HDOH concluded that the maximum SO₂ concentrations at the Hilo and Mountain View monitors that could be attributed to power plants would be 15.8 ppb and 12.3 ppb, respectively.¹⁷ While the filtered dataset could have some remaining volcanic influence (e.g., from the rift zone or due to recirculation), HDOH asserts

¹⁴ See 2015 Demonstration, Figure 3-15 at p. 53.

¹⁵ The atmospheric lifetime is the average time an SO₂ molecule will spend in the atmosphere before being chemically converted to sulfate aerosol or removed by dry/wet deposition.

¹⁶ HDOH used wind data from the NPS HAVO-VC monitoring site to reflect when southerly winds were transporting Kilauea emissions to the north toward Hilo and Mountain View.

¹⁷ At Hilo, 12.3 ppb was the maximum value of the filtered dataset. At Mountain View, two data points were removed, 72.4 and 20.2 as being consistent with volcanic emissions. No data points at either site exceeded the NAAQS.

these results are a conservative estimate for the maximum concentrations attributable to the power plants at Mountain View and Hilo.¹⁸ Both results are well below the 2010 1-hour SO₂ NAAQS of 75 ppb.

Monitors South of the Volcano: Pahala and Ocean View Specific Analysis

Mean and maximum SO₂ concentrations at Pahala correlate reasonably well with those at Ocean View ($r = 0.34$ and $r = 0.26$, respectively). While the magnitude of these values is not as large as those associated with correlations between Hilo and Mountain View, this observation is consistent with the complexity of the transport path from Pahala to Ocean View. Specifically, SO₂ is transported clockwise around the southern edge of the island and up the leeward coast to Kona. Throughout this process, diurnal winds move the SO₂-containing air mass out over the water and back inland. Concurrently, SO₂ is removed from the air mass through dilution processes (e.g., conversion to sulfate particulates). In addition, when the very large magnitude of the SO₂ concentration levels at Pahala (frequently more than 500 ppb to more than 1000 ppb) and Ocean View (frequently about 300 ppb to more than 1000 ppb) are considered, along with the lack of nearby significant sources, Kilauea Volcano is the only reasonable source of exceedances at these monitors.

Flagged Data

HDOH reviewed the hourly SO₂ concentrations associated with the Hilo, Mountain View, Pahala, and Ocean View monitors with respect to the winds measured at the HAVO-OB monitor. For Hilo and Mountain View, if any measured winds from HAVO-OB were from the south, HDOH concluded that volcanic emissions caused all flagged measurements in AQS greater than or equal to 75.5 ppb for that day. For Pahala and Ocean View, if any measured winds from the HAVO-OB were from the north, HDOH concluded that volcanic emissions caused all flagged measurements in AQS for that day.¹⁹

EPA has reviewed HDOH's analysis, as summarized above, and EPA concurs that there was a clear causal relationship between uncontrollable emissions generated from Kilauea Volcano and the exceedances measured at the Hilo, Mountain View, Ocean View, and Pahala air monitoring stations.

5. Concentrations in Excess of Normal Historical Fluctuations (HF)

Pursuant to 40 CFR § 50.14(c)(3)(iv)(C), the demonstration must show that “the event is associated with a measured concentration in excess of normal historical fluctuations.” There is no “bright line” or specific threshold test for this requirement, but concentrations in the high percentiles can provide supporting evidence.²⁰

¹⁸ For a full description of the approach see 2015 Demonstration, Section 3.2.5.5, pp. 72-74.

¹⁹ HDOH repeated this analysis using the HAVO-VC data and found no inconsistencies in SO₂ measurements flagged. See 2015 Demonstration p.78.

²⁰ 72 FR 13569, March 22, 2007.

The 2015 Demonstration, Figure 5-1 shows the 99th percentile SO₂ concentrations measured at the Hilo air monitoring station for 2000-2014. A spike is seen in the 2008 value, coinciding with the opening of the new Halema'uma'u vent. From 2000-2007, values range from 121 ppb to 267 ppb (before Halema'uma'u event). The value spikes again in 2010 to 745 ppb despite the significant decrease in SO₂ emissions from Hilo power plants beginning in 2010 (2015 Demonstration, Figure 4-2). No large spikes are recorded at the monitor in 2005, 2006, 2007, and 2009 when emissions from power plants on the Hilo side of the island were high relative to those from 2010 to 2014 (2015 Demonstration, Figure 4-2). The large spikes appear to be associated with increased SO₂ emissions at the volcano's summit after the Halema'uma'u vent opened in 2008. As shown in the 2015 Demonstration, Figure 2-16, higher amounts of SO₂ were discharged from the summit between 2008 and 2014 relative to that between 1992 and 2007. EPA concurs that HDOH's analysis sufficiently establishes that the SO₂ concentrations measured at Kilauea were in excess of normal historical fluctuations.

6. No Exceedance But For the Event (NEBF)

The NEBF demonstration is similar to and informed by the demonstration of the nRCP and CCR requirements and is expected to show that the measured concentration would have been below the applicable NAAQS without the effect of the event.

HDOH provided a summary of the analyses and information regarding both the nRCP (discussed below) and CCR requirements and stated that, "on the basis of the weight of evidence described above, the federal 1-hour SO₂ standard in 2012-2014, in the Hilo, Mountain View, Ocean View, and Pahala areas would not have occurred but for the continuous volcanic emissions from Kilauea volcano."²¹

Based on the 2012-2014 data, the maximum SO₂ concentrations at the Hilo and Mountain View stations that could be attributed to power plants in the vicinity of these monitors would be 15.8 ppb and 12.3 ppb, respectively, well below the 2010 1-hour SO₂ NAAQS of 75 ppb.

EPA considered the previously-discussed analysis of volcanic emissions versus anthropogenic emissions, satellite information regarding SO₂ and NO₂ concentrations, SO₂ monitoring concentrations and wind data, analysis of emission source locations and transport pathways, and estimates of the effects of local anthropogenic sources. Based on our review of this information, EPA concurs that HDOH's analyses satisfy the NEBF criterion.

7. Criteria Set Forth in 40 CFR §50.1(j)

7.1. Affects Air Quality (AAQ)

As stated in the preamble to the EER, the event in question is considered to have affected air quality if it can be shown that there is a clear causal relationship between the monitored exceedance and the event, and that the event is associated with a measured concentration in excess of normal historical fluctuations.²² The criteria and the evidence supporting this criterion

²¹ See 2015 Demonstration, p. 117.

²² 72 FR 13569, March 22, 2007.

are discussed in detail in Sections 5.0 and 6.0 above and allow EPA to reasonably concur that the volcanic events in question affected air quality.

7.2. Natural Event

The EER states a “[n]atural event means an event in which human activity plays little or no direct causal role.”²³ Therefore, ambient SO₂ concentrations due to volcanic emissions will be considered for treatment as an exceptional event. The analysis submitted by HDOH and reviewed by EPA above, shows that Kilauea volcanic emissions caused each of the identified exceedances (Section 4.0 of this TSD) and that the exceedances would not have occurred but-for the volcano (Section 6.0 of this TSD). We concur that the events identified should be considered natural, volcanic events.

7.3. Not Reasonably Controllable or Preventable (nRCP)

A determination of whether a particular event was reasonably controllable or preventable depends on the specific facts and circumstances surrounding the event. Therefore, EPA addresses this and other criteria of the EER on a case-by-case basis.²⁴ We conclude that HDOH has demonstrated that the flagged exceedances were caused by natural, volcanic events. Volcanic emissions cannot be prevented and are uncontrollable, therefore EPA concurs that HDOH has satisfied the nRCP criterion.²⁵

HDOH provided additional information on the current set of required controls for all stationary permitted sources, temporary permitted sources, and airports (together, “anthropogenic sources” or “anthropogenic emissions”). While we are not reviewing this material for the purposes of evaluating the nRCP element, we summarize the provided information below. HDOH included the following: facility name, distance from the monitoring stations, equipment type, emission totals, applicable regulatory measures, and compliance information during exceedance days.²⁶ Air pollution control measures for minimizing SO₂ from permitted sources include Hawaii Administrative Rules (HAR), Hawaii’s Renewable Energy Portfolio Standard (RPS), Hawaii’s Energy Efficiency Portfolio Standard (EEPS), Prevention of Significant Deterioration/Best Available Control Technology (PSD/BACT), New Source Performance Standards (NSPS), and National Emission Standards for Hazardous Air Pollutants (NESHAP).

The majority of anthropogenic SO₂ emissions on the island are from the Kanoelehua Hill and Puna electric power plants, which emitted 1,852 and 524 tons SO₂ in 2014, respectively. By comparison, total SO₂ emissions from anthropogenic sources on the Island of Hawaii were 2,711 tons in 2014. Kanoelehua Hill is located 6.5 km to the east of the Hilo monitoring station. Puna is located 6.6 km to the northeast of the Mountain View station, and is 9 km south of Kanoelehua

²³ 72 FR 13580, March 22, 2007.

²⁴ 72 FR 13562, March 22, 2007.

²⁵ For uncontrollable natural events, such as wildfires, EPA has stated that air agencies can document reasonable controls with a brief statement. See, “Interim Exceptional Events Rule, Frequently Asked Questions,” U.S. EPA, May 2013, at pp. 23-24; see also, Stephen Page, Director, Office of Air Quality Planning and Standards to Regional Air Directors, “Interim Guidance to Implement Requirements for the Treatment of Air Quality Monitoring Data Influenced by Exceptional Events,” May 10, 2013, at pp. 4-5, footnote 10.

²⁶ See 2015 Demonstration, Chapter 4.

Hill (Figure 1). These power plants are subject to Hawaii Administrative Rules, PSD, NSPS, and NESHAP requirements as described in 2015 Demonstration Tables 4-2, pages 85-86 and 4-23, pages 108-109. There are no significant sources of anthropogenic SO₂ located near the Pahala and Ocean View monitors.

According to the 2015 Demonstration, SO₂ emissions from the power plants on the Hilo side of the Island of Hawaii have decreased significantly starting in 2010 as a result of Hawaii's Renewable Portfolio Standard and Energy Efficiency Portfolio Standard, which establish reductions in greenhouse gases and increase use of renewable energy. Emissions are projected to decline further as the facilities are planned for closure and decommissioning.²⁷ HDOH inspects permitted sources regularly, with Title V sources inspected each year and minor sources inspected at least every 3 to 5 years to ensure equipment is operated within the terms of the permits. HDOH also investigates public complaints that may involve Title V or minor sources. Additionally, as part of preparing its exceptional events demonstration, HDOH reviewed inspection reports and correspondence from 2012 to 2014 and found no indication of source noncompliance with standards involving SO₂ emissions.²⁸

The United States Geological Survey (USGS) provides daily reports of volcanic emissions from Kilauea.²⁹ It should be noted that, starting in 2014, USGS began using a more accurate technique to report emissions from the Halema'uma'u vent, resulting in a two to four-fold increase in reported values when compared to previous years. This increase reflects the change in technique rather than a change in the volcanic emission rates. Pu'u O'o emissions are approximately an order of magnitude lower than emissions from Halema'uma'u. Reported 2014 SO₂ emissions from both locations at the Kilauea Volcano were 2,140,183 tons. A comparison of volcanic emissions to those from anthropogenic sources on the Island of Hawaii (2,711 tons SO₂ in 2014) shows that SO₂ from anthropogenic sources comprise 0.1% of the combined yearly emissions from anthropogenic and volcanic SO₂ sources.³⁰

The State of Hawaii, including Hawaii County (*i.e.*, the Island of Hawaii), is currently designated "better than national standards" for the 1971 primary and secondary SO₂ NAAQS.³¹ To date, EPA has not promulgated area designations for either the State of Hawaii or Hawaii County for the 2010 1-hour primary SO₂ NAAQS.³²

Based on the above, EPA concurs that HDOH's exceptional events analyses satisfy the nRCP element.

²⁷ The Puna facility is scheduled to be deactivated in 2018 and decommissioned in 2020, Kanoelehua Hill 5 is scheduled to be deactivated in 2018 and decommissioned in 2022, and Kanoelehua Hill 6 is scheduled to be deactivated in 2022 and decommissioned in 2024. *See* 2015 Demonstration, p.87. Emissions from power plants near Hilo are projected to decrease to a total of 1,852 tons per year (tpy) by 2018, 1,148 tpy by 2020, and 0.2 tpy SO₂ by 2022. *See* 2015 Demonstration Figure 4-3 at p. 88

²⁸ *See* 2015 Demonstration, p.111.

²⁹ USGS, Hawaiian Volcano Observatory, "Recent Kilauea Status Reports, Updates, and Information Releases, HAWAIIAN VOLCANO OBSERVATORY DAILY UPDATE": <http://hvo.wr.usgs.gov/activity/kilaueastatus.php>.

³⁰ *See* 2015 Demonstration, Figure 4-7 at p.103.

³¹ *See* 40 CFR §81.312.

³² 78 FR 47191, August 5, 2013.

8. Procedural Requirements

The EER at 40 CFR §50.14(c) requires that data claimed to be due to an exceptional event must be flagged in the AQS database and an initial description of the event be provided to EPA by July 1 of the year following the event. The EER at 40 CFR §50.14(c)(3)(i) requires that the State submit a demonstration to EPA within 3 years of the event that has been subject to public notice and opportunity for comment, and that any public comments be submitted along with the demonstrations.

HDOH flagged the events in AQS in accordance with 40 CFR §50.14. On December 17, 2015 HDOH submitted a package to EPA for the 2012-2014 events. By publication in two local newspapers, HDOH notified the public of an opportunity to comment on the 2015 Demonstration from November 16, 2015 to December 16, 2015. In addition, HDOH posted the 2015 Demonstration on its website. No public comments were received.

Immediate public notification of NAAQS exceedances is provided on the HDOH website.³³ Notification of the 2012-2014 exceedances of the 1-hour SO₂ NAAQS were also posted once the data were validated. In addition, the State of Hawaii's Clean Air Branch maintains a publically available SO₂ advisory page, Hawaii Short Term SO₂ Alert Index,³⁴ and advises residents to receive updates and advice from the website and Hawaii Civil Defense local radio broadcasts. Additionally, the Big Island (*i.e.*, the island of Hawaii) Emergency Operations Center coordinates efforts from various government agencies. Based on this information, EPA concurs that HDOH has met the EER procedural requirements for this demonstration.

9. Conclusion

Documentation submitted by HDOH claims that emissions emanating from the Kilauea Volcano are natural, volcanic exceptional events, which caused the flagged exceedances listed in the 2015 Demonstration, Appendix D at the Hilo, Mountain View, Ocean View, and Pahala air monitoring stations. As described above, EPA has reviewed this information and determines that the weight of evidence submitted by HDOH is sufficient for concurrence on the flagged data for the monitors identified in the 2015 Demonstration, Appendix D. These concurrences do not constitute final EPA action to exclude these data from consideration for purposes of determining the attainment status of the area. Final actions will come only after EPA completes notice and comment rulemaking on any such determinations.

³³ <http://health.hawaii.gov/cab/notification-of-exceedance-of-a-national-ambient-air-quality-standard>

³⁴ <http://www.hiso2index.info>