



**PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY**

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November 3, 2011

**VIA ELECTRONIC FILING**

Honorable Kimberly D. Bose, Secretary, and  
Nathanial J. Davis, Sr., Deputy Secretary  
ATTN: OEP/DHAC  
FEDERAL ENERGY REGULATORY COMMISSION  
888 First Street, NE  
Washington, DC 20426

Re: **Lake Chelan Hydroelectric Project No. 637-043**  
**Article 403 – Stehekin Area Dust Emissions 5-Year Report**

Dear Secretary Bose and Deputy Secretary Davis:

On May 6, 2008, the Federal Energy Regulatory Commission (Commission) issued the “*Order on Modifying and Approving the Stehekin Area Implementation Plan Under Article 403*” for the Lake Chelan Hydroelectric Project (Project).<sup>1</sup> In accordance with Section 2.5 of the approved Stehekin Area Implementation Plan, the Public Utility District No. 1 of Chelan County, Washington (Chelan PUD), is scheduled to file a report for Commission approval in years 5, 10, 15 and 20 of the license detailing the measures implemented to reduce dust emissions, results of the total suspended particulate sampling, and any recommendations for additional measures to achieve a reduction in the magnitude and duration of dust events by 50 percent by year 20 of the license. The first 5-year report is due November 6, 2011.

In accordance with the above license requirements, Chelan PUD hereby files the Stehekin Area Dust Emissions 5-Year Report for Commission approval. The report was developed in consultation with the National Park Service (NPS).

If you require additional information, please contact me or Gene Yow at (509)661-4305.

Sincerely,

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Licensing and Compliance Manager  
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(888) 663-8121, Ext. 4180

cc: Erich Gaedeke, FERC  
Vicki Gempko, NPS  
Gene Yow, Chelan PUD

Enclosure: Stehekin Area Dust Emissions 5-Year Report

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<sup>1</sup> 123 FERC ¶ 62,100, p. 2

**STEHEKIN AREA DUST EMISSIONS  
5-YEAR REPORT  
FERC License Order 403**

**Final**

**LAKE CHELAN HYDROELECTRIC PROJECT  
FERC Project No. 637**

**November 3, 2011**



**Public Utility District No. 1 of Chelan County  
Wenatchee, Washington**

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## ***BACKGROUND***

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On November 6, 2007, the Public Utility District No. 1 of Chelan County, Washington (Chelan PUD), submitted the Stehekin Area Implementation Monitoring Plan (Plan). Section 2 of the Plan addresses dust emissions from Stehekin Flats, including the steps contemplated to mitigate dust events, a tentative implementation schedule, plans for monitoring to evaluate results, and a schedule for reporting steps taken and results. On May 6, 2008, the Federal Energy Regulatory Commission (FERC or Commission) approved the Plan.

The Plan states that Chelan PUD will file a report compiled in coordination with the National Park Service (NPS) on the mitigation measures and monitoring results, as required by article 403, by November 6 of 2011, 2016, 2021, and 2026. The report is to include details of measures implemented to reduce dust emissions, results of total suspended particulate sampling, and recommendations for additional measures.

The schedule for this work anticipated the investigation of treatment options and small-scale testing of one or more possible approaches in 2008 and 2009. Depending on results of those tests, full-scale implementation was anticipated in 2010 through 2012.

## ***PROGRESS TO DATE***

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Discussion of feasible and preferred approaches to dust abatement began in May 2008, very shortly after the Plan was approved. The Plan notes two potential approaches to dust abatement: placement of large woody debris as windbreaks, and irrigation of the dust source areas. In the discussions between Chelan PUD and NPS it became clear that both parties had reservations about anchoring large woody debris on the lakebed of Stehekin Flats to provide windbreaks. In addition to uncertainty about the efficacy of this approach there were concerns about the wood being a hazard when placed in a popular area for recreational boating.

Currently, the preferred approach to dust abatement is some form of irrigation to dampen the dust source areas. During 2008 and 2009, the NPS investigated various options for irrigation systems and water sources, working on plans for a test of the effect of irrigation. They also carefully observed conditions on Stehekin Flats in an effort to better delineate the dust source area(s) and, therefore, the area where irrigation should be tested.

Observations from the spring of 2009:

- The primary area from which most of the dust originates was delineated (see photo 1). It is an area of about 19 acres that dries out relatively early.
- There were several substantial rain events. These were observed to have a significant dampening effect on the dust. For example, a rain of 0.38 inches kept the dust down all day in winds of about 20 to 25 mph. This strongly suggests that irrigation to control the dust is likely to be effective.

Also in 2009, NPS staff set up monitoring plots on the flats in an effort to measure the amount of sediment that accumulates in a year. No noticeable amount of sediment has been deposited or eroded since the monitoring began. It is important to note that there has not been a high flow event (flood or quick runoff) in the Stehekin River or other Stehekin area tributaries since monitoring began in 2009.

In the winter of 2009-2010, the snow pack in the Stehekin River watershed was relatively low. This led to Lake Chelan being drawn down less than normal in early 2010, which resulted in less of Stehekin Flats being exposed to drying and to the exposure lasting a shorter time. For this reason, it was impractical to perform the planned irrigation test in the spring of 2010. Despite this, some worthwhile observations were made. During the time when the Flats area was exposed, persistent rain occurred which kept the dust source area damp much of the time. As a result there were no dust events, regardless of wind conditions. This provided a strong indication that an appropriately designed irrigation system can successfully control the dust.

In 2010, a nephelometer was purchased. In addition to total suspended particulates (TSP) it is equipped to measure wind speed and direction. The nephelometer was installed in early 2011, near the uptake end of Stehekin Landing, in the same location used for testing in 2000. It was operated from April 12 through June 28, 2011. Results from this testing will be available from the NPS around the end of 2011. The NPS will continue to use the nephelometer to collect TSP and wind data to monitor the extent of success of dust abatement work. The objective is to reduce the duration of dust events and the concentration of TSP measured at Stehekin Landing during dust events by at least 25 percent within the first 10 years of the License period, to reach the goal of 50 percent total reduction by year 20 of the License period, and to continue at that level or better for the remainder of the License. Results will be included in the 2016 5-year report.

A test pattern of irrigation equipment was placed in the dust source area in the spring of 2011. The irrigation system was operated from June 2 through June 11, 2011. The system consisted of 28 rotary sprinklers, 2,800 ft of nylon hose and two Mark-3 pumps, all borrowed from the NPS's Fire Division. Each sprinkler had a wetting radius of 15 ft to 20 ft. The amount of water release was approximately 50 gallons/minute. The system covered approximately 4 acres, and wetted "islands" within the 4 acre area (see photo 2).

The plan was to wet the source area in the morning, prior to a wind event. However, during testing it became evident that running the system during a wind event, in addition to wetting the area prior to the wind event, was most effective. This approach reduced the amount of dust generated from the pre-wetted area and the spray also knocked down any dust that entered the sprinkler's path.

Based on observations during the 2011 test period, the effectiveness of the sprinklers at reducing dust at Stehekin Landing was dependent on wind direction, wind speed and lake level (see photos 4 and 5). As mentioned previously, due to spring snow conditions, the 2011 drawdown was exceptionally low. Consequently, an additional 15 acres of Stehekin Flats were exposed downlake from the sprinkler site. This contributed additional dust at Stehekin Landing (see photo 3).

Presently, NPS staff is researching issues of water rights that will have to be addressed to develop a reliable source of water for ongoing use of an irrigation system on the Stehekin Flats.

## ***SUMMARY OF RESULTS***

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Chelan PUD and the NPS have learned some key things from the observation, planning and testing to date. These are summarized in the following paragraphs.

1. Based on testing in 2011 and on observation of the effect of rainfall in other years, an appropriately designed irrigation system has good potential for addressing the problem of dust from Stehekin Flats.
2. Normal year-to-year variations in lake level cycle and weather can produce major differences in the dust source area and the frequency and severity of dust events. This is noted in the Plan and has been reinforced by the last few years. 2009 and 2010 were years of relatively low snow pack, with correspondingly higher lake levels through the spring. This resulted in less exposure of the dust source area, both in terms of area exposed and duration of exposure. By way of contrast, the Stehekin River watershed had a record snow pack in 2011, with corresponding unusually low spring lake levels. This meant that more of the dust source area was exposed and it was exposed for a longer time in 2011. This difference had a significant influence on the number and severity of dust events.

The large potential impact of the lake level cycle and weather will need to be considered and carefully evaluated as we continue to develop solutions and measure their effectiveness. This could slow the process of testing and development in two ways. One is that approaches or specific designs may require testing for more than one year in an effort to avoid results that are skewed by unusual conditions. The other is that there may be years, such as 2010, when testing is impractical.

## ***RECOMMENDATIONS AND NEXT STEPS***

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Based on the progress so far, the most appropriate direction is to continue to pursue a system to irrigate the dust source areas on Stehekin Flats. The following points outline next steps in that direction:

- Evaluate the results of the 2011 spring testing, within the NPS, to determine whether sufficient testing has been done to justify proceeding to design of a permanent system, or if another year of testing would be beneficial.
- Look for opportunities to improve the irrigation system such as better sprinkler heads and pumps.

- Design a permanent irrigation system to cover what is believed to be the key dust source area.
- Based on the system design, estimate the amount of water needed. Plan and design a water source, potentially a well.
- Pursue water rights, as necessary, for the water source.
- Construct the system and monitor its performance.

## ***PHOTOGRAPHS***

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Photo 1: Stehekin Flats during spring drawdown. The ellipse indicates the primary dust source area.



Photo 2: Stehekin Flats, exposed during spring drawdown. Note the irrigation pattern near the photo's center.



Photo 3: The “circled” area is more than 15 acres, exposed in June 2011. This area is inundated by the lake earlier in the spring of more typical years.



Photo 4: The primary dust source area with a wind speed of about 10 mph.



Photo 5: Dust source area with a 20 to 25 mph wind speed.