

## MEMORANDUM

TO: FILE - Denison Mines (USA) Corp

THROUGH: Jay Morris, Minor Source Compliance Section Manager

FROM: Debbie Olson

DATE: June 30, 2008; updated July 9, 2008; revised September 11, 2008

SUBJECT: Denison Mines Corp, B, NESHAP, NSPS, San Juan County, #037-0017

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TYPE OF INSPECTION: annual - partial initial - partial inspection (vanadium circuit still under construction)

DATE OF INSPECTION: May 22, 2008; final info. rec. July 2, 2008

MULTIPLE INSPECTION SOURCE: no

FFY QUARTER ASSIGNED: 3rd qtr FFY 2008

SOURCE LOCATION: 6425 South Highway 191, Blanding (6 miles south of Blanding)

SOURCE CONTACTS: Tanner Holliday, Environmental Tech  
Ryan Palmer, Lead Environmental Tech  
Wayne Palmer, Safety Tech  
Charles Orvin, Lab Tech  
Mike Spillman, Safety Coordinator  
David Turk, Radiation Safety Officer, 435-678-2221  
x113 (primary contact, but out-of-state for this inspection)

OPERATING STATUS: crushing mill operational up to yellow cake precip (uranium precip to sold form)  
Leach tanks, tailings pile and ponds operating  
Drying and packaging n/o; vanadium equipment area still under construction and/or being overhauled.

PROCESS DESCRIPTION:  
The White Mesa Mill uses conventional milling methods including grinding, two-stage acid leaching, solvent extraction, precipitation and thickening, drying and packaging to process uranium and vanadium ores from mines in southeastern Utah and northern Arizona. The mill has a 2,000-tpd ore capacity. The ore is estimated to contain an

average of 0.2%  $U_3O_8$  (2.6 lbs.  $U_3O_8$ /ton) and after processing yields a yellow cake product containing about 90%  $U_3O_8$ . The yellow cake product is transported to uranium enrichment facilities outside of Utah and converted to  $UF_6$  and used as fuel for nuclear reactors to produce electricity. The vanadium circuit operates intermittently depending on ore content and vanadium prices. The products from this circuit are  $V_2O_5$  black flake vanadium and ammonia metavanadate.

Following grinding and leaching, the sand portion of the ore tailings has been pumped to cell 3, which is in the process of being covered and closed. Cell 2 has already been closed. Uranium is stripped from the leachate by solvent extraction. The slimes portion (aq. acid salts known as raffinate, current pH ~1) of the tailings were recycled or pumped to cell 1, or to cells 2 and 3 for dust control. The tailings cells 1-3 are compacted clay-lined ponds constructed below grade. Cells 4a (constructed) and 4b (under construction) have a synthetic liner and were constructed according to 40 CFR 61 Subpart W. The entire tailings facility has up and down gradient monitoring wells, leak detection systems and a particulate monitoring network regulated by the Nuclear Regulatory Commission (NRC).

Since 1990 when production ceased, the slimes content of cell 1 has been pumped and sprayed over cells 2 and 3. When dry, the salts form a stabilizing crust over the sand tailings. On cells 2 and 3, as evaporation has allowed, a 1-4 foot thick soil cover has been advanced. Since 1993, contaminated materials from dismantled mill sites outside of Utah have been deposited in cells 2 and 3. Cell 2 has recently been closed and is now covered by fill material. Cell 3 has been significantly reduced in size as it is also being covered by fill material. Cell 4a is in the process of being rebuilt in preparation for the mill to resume full capacity operations.

APPLICABLE REGS: AO DAQE-AN0112050008-08, March 28, 2008

SOURCE INSPECTION  
EVALUATION:

1. This AO applies to the following company:

Site Office  
Denison Mines (USA) Corp.  
P.O. Box 809  
Blanding, Utah 84511

Corporate Office Location  
Denison Mines (USA) Corp.  
1050 17<sup>th</sup> Street  
Independence Plaza, Suite 950  
Denver, Colorado 80265

Phone Number (435) 678-2221  
Fax Number (435) 678-2224

(303) 628-7798  
(303) 389-4125

The equipment listed in this AO shall be operated at the following location:  
White Mesa Mill, six miles South of Blanding, Utah on Highway 191

Universal Transverse Mercator (UTM) Coordinate System: UTM Datum  
NAD27

4,155.4 km. Northing, 632.2 km. Easting, Zone 12

**Status:** In compliance - The information above is correct.

2. All definitions, terms, abbreviations, and references used in this AO conform to those used in the UAC R307 and Title 40 of the Code of Federal Regulations (40 CFR). Unless noted otherwise, references cited in these AO conditions refer to those rules.

**Status:** Compliance determination not required.

3. The limits set forth in this AO shall not be exceeded without prior approval in accordance with R307-401.

**Status:** In compliance - None of the limitations appear to have been exceeded at the time of inspection.

4. Modifications to the equipment or processes approved by this AO that could affect the emissions covered by this AO must be reviewed and approved in accordance with R307-401.

**Status:** Non-compliance - A baghouse associated with the lab operations was not listed as approved equipment. See condition 8.

Denison received a CA dated July 29, 2008. Part of Denison's response, received as email on September 11, 2008, indicated that calculated emissions from the baghouse are 110 lbs/year. Therefore, no penalty was recommended for this over site, however it was recommended that the baghouse be listed in the permit during the next modification.

5. All records referenced in this AO or in applicable NSPS and NESHAP standards, which are required to be kept by the owner/operator, shall be made available to the Executive Secretary or Executive Secretary's representative upon request. Records shall be kept for the following minimum periods:

- A. Emission inventories Five years from the due date of each emission statement or until the next inventory is due, whichever is longer
- B. All other records Two years

**Status:** In compliance - Records kept by the company were made available either during the inspection or afterwards.

6. Denison Mines (USA) Corp. shall operate the White Mesa Mill in accordance with the terms and conditions of this AO, which was written pursuant to Notice of Intent (NOI) submitted to the Division of Air Quality (DAQ) on December 24, 2007 and additional information submitted to the DAQ on January 29, 2008.

**Status:** In compliance - The facility appeared to be properly maintained and operated at the time of this inspection.

7. This AO shall replace the AO (DAQE-AN11205005-06) dated July 20, 2006.

**Status:** In compliance - Only this AO was used in the compliance determination.

8. The approved installations shall consist of the following equipment or equivalent\*:

A. Uranium Drying and Pollution Control (Yellow Cake Circuit)

- 1) One (1) Yellowcake South Dryer YC

Dryer Type: Six hearth rotary Skinner dryer  
Fuel Type: Propane  
Heat Input Capacity:  $3 \times 10^6$  Btu/hr

- 2) Air Pollution Equipment for the South Dryer: One (1) Ducon Dry Cyclone followed by one (1) Ducon Scrubber with cyclonic separator

Wet Scrubber Model: UW4, Size 36, Scrubber w/demister  
Design Flow Rate: 3,800 acfm (150 °F)\*\*\*  
Estimated Emission Rate: 0.02 gr/dscf, PM, 0.016 gr/dscf  
PM<sub>10</sub>\*\*\*

- 3) One (1) Yellowcake North Dryer (older)\*\*

Dryer Make: 6 hearth rotary Skinner dryer  
Fuel Type: Propane  
Heat Input Capacity:  $2.4 \times 10^6$  Btu/hr

- 4) Air Pollution Equipment for the North Dryer  
Dry cyclonic separator followed by One (1) Ducon Venturi Scrubber with Ducon packed demister

Design Flow Rate: 3,160 acfm (140 °F)\*\*\*  
Estimated Emissions Rate: 0.02 gr/dscf PM; 0.016 gr/dscf  
PM<sub>10</sub>\*\*\*

5) Packaging Area

Baghouse

Both dryers (South & North) discharge into a common hopper located in the enclosed packing area. Packing area is under negative pressure and all the generated dust discharges through a baghouse.

Designed Flow Rate: 5,000 acfm (68 °F)\*\*\*

Estimated Emission Rate: <0.01 gr/dscf, PM\*\*\*

B. Vanadium Dryer and Pollution Control

1) One (1) Ammonium Meta-Vanadate (AMV) Dryer and Two (2) Fusion Furnaces \*\*

AMV Dryer:

Fuel Type: Propane

Heat Input Capacity: 7,740,000 Btu/hr

2) Two (2) Fusion Furnaces and casting wheels\*\* venting through AMV Dryer\*\*

Dryer Make: Single burner for each furnace

Fuel Type: Propane

Heat input Capacity: up to  $1.8 \times 10^6$  Btu/hr, each

3) Air Pollution Equipment for AMV Dryer and Fusion Furnaces  
Dry Cyclone followed by the Sly No 6 Ducon Venturi Scrubber<sup>2</sup>:

Scrubber Flow: 7,910 acfm, Temp. 370°F\*\*\*

4) Two (2) Multi Hearth Dryer Pollution Control<sup>1</sup> System

Kice Dry Cyclone followed by Ducon Venturi Wet Scrubber<sup>2</sup>

Scrubber Flow: 27,800 acfm, Temp 440 °F\*\*\*

<sup>1</sup>Also serves as a backup for the two fusion furnaces

<sup>2</sup>Venturi Scrubbers Systems B.3) & B.4) shall connect in parallel to a mist eliminator and fan which discharges to the final stack

5) One (1) Rotary Calciner\*\*

Dryer Make: Bartlett/Snow Rotary Multi Burner

Fuel Type: Propane

Heat input Capacity:  $4 \times 10^6$  Btu/hr

6) Calciner Pollution Control

System: Dry Cyclone followed by Sly #6 Ducon Venturi Scrubber (B.3)

7) One Mist Eliminator

C. Leaching Process Control

Leach Mist Eliminator

D. Boilers

1) One (1) Superior Boiler (Pre NSPS-Manufactured in 1987)

Fuel Type: Propane  
Type of Burner: 60 ppm NO<sub>x</sub>  
Heat Input Capacity: up to 23.5 x 10<sup>6</sup> Btu/hr

2) One (1) Cyclotherm Boiler

Fuel Type: Propane  
Heat Input Capacity: up to 5 x 10<sup>6</sup> Btu/hr

3) One (1) Low NO<sub>x</sub> Superior Boiler Works (new)

Model: X6-5-3000-5150-PF-LPG  
Fuel type: Propane  
Heat Input Capacity: up to 25.2 x 10<sup>6</sup> Btu/hr

E. Baghouses

1) One (1) Grizzly Baghouse

Design Rate: 5,000 acfm\*\*\*  
Grain Loading: 0.02 grain per acf\*\*\*

2) One (1) Yellow Cake Dryer Enclosures and Hoppers Baghouse

Emission Rate: 0.02 gr/dscf PM (0.73 lb/hr)\*\*\*  
0.016 gr/dscf PM<sub>10</sub> (0.58 lb/hr)\*\*\*

3) Dry Soda Ash Silo Bin Baghouse (Fuller Dracco dust collector), and Packing Area Vents Baghouse

4) Cartridge filter baghouse with 24 cartridges (new)

Design rate: 12,500 acfm\*\*\*  
Grain Loading: 0.0014 grain per scf\*\*\*

F. One (1) Leaching and Vanadium Demister Scrubber

Process Rate: 250 tons/year  
Design Rate: 0.07 lb/hr of SO<sub>2</sub>\*\*\*

G. One (1) Fire Pump

Fuel Type: #2 Diesel  
Rated at: up to 365 bhp

H. One (1) Emergency Generator

Fuel Type: #2 Diesel  
Electrical Output: up to 565 kW

\* Equivalency shall be determined by the Executive Secretary.

\*\* This equipment does not have direct emission point; it vents through control equipment.

\*\*\* This information is provided only for the identification of the equipment.

**Status:**

Compliance pending - the heat input capacity and design flow rate of the equipment listed was not verified during this inspection. Much of the equipment is original, and was utilized when the facility was previous operated. The vanadium circuit (8B4-6) was still under "construction"; equipment was being moved and installed (or overhauled) with the intent to operate in 1-2 months. Therefore, the equipment listed under 8B was not observed in any depth. Company contacts were not aware of where the rotary calciner and control equipment (8B5 and 6) were located. The leaching process (8D) with tanks was operating. The rating of the new low NOx Superior (Seminal) boiler (steam capacity 20,700 lb/hr) could not be found on the plate; Mr. Turk indicated after the inspection that the rating was 20,000,000 Btu. The cartridge filter baghouse (8E4) was still under construction. The emergency generator (8H) was in need of new parts to operate. Also on site were lab fume hoods and a baghouse in the lab bucking area that is infrequently used (only when testing samples). It was recommended that Denison submit information to the DAQ requesting the baghouse be added to the AO.

Denison received a CA dated July 29, 2008. Part of Denison's response, received as email on September 11, 2008, indicated that calculated emissions from the baghouse are 110 lbs/year. Therefore, no penalty was recommended for this over site, however it was recommended that the baghouse be listed in the permit during the next modification.

9. Denison Mines (USA) Corp. shall notify the Executive Secretary in writing when the installation of the equipment listed in Condition #8 D.3 and E.4 has been completed and is operational. To insure proper credit when notifying the Executive Secretary, send your correspondence to the Executive Secretary, attn: Compliance Section.

If the installations have not been completed within eighteen months from the date of this AO, the Executive Secretary shall be notified in writing on the status of the construction and/or installation. At that time, the Executive Secretary shall require documentation of the continuous construction and/or installation of the operation and may revoke the AO in accordance with R307-401-18.

**Status:**

Not applicable at this time - the new boiler is still under startup conditions and the cartridge filter will not begin operations until mid-July. The company was reminded of the need for notification after the boiler begins full operations. Steve Landau (Colorado office) has contacted DAQ several

times to ensure the notification (also required by NSPS regulations) is complete.

10. Emissions to the atmosphere at all times from the indicated emission point(s) shall not exceed the following rates and concentrations:

Source: Vanadium Circuit Scrubbers

<u>Pollutant</u>	<u>lb/hr</u>	<u>grains/dscf</u> (68°F, 29.92 in Hg)
PM <sub>10</sub> .....	2.5.....	0.02

Source: Yellow Cake Dryers Scrubbers

<u>Pollutant</u>	<u>lb/hr</u>	<u>grains/dscf</u> (68°F, 29.92 in Hg)
PM <sub>10</sub>	0.4, each	0.003, each

**Status:**

Not applicable at this time for the vanadium circuit scrubbers - the equipment is still being overhauled after being down for 10+ years. Expected startup 1-2 months. The yellow cake dryer scrubbers were tested in 2/08; however the test report has not yet been submitted or reviewed, therefore a compliance determination will not be made at this time. Previous test 6/27/96 (prior to shutdown). Results = North yellowcake scrubber 0.12 lb/hr (based on test results provided after this inspection).

11. Stack testing to show compliance with the emission limitations stated in the above condition shall be performed as specified below:

A.

<u>Emissions Point</u>	<u>Pollutant</u>	<u>Testing Status</u>	<u>Test Frequency</u>
(Vanadium Circuit Scrubber)	PM <sub>10</sub> .....	*	@
(Yellow Cake Dryers)	PM <sub>10</sub> .....	*	@

B. Testing Status

Initial compliance testing is required. The initial test date shall be performed as soon as possible and in no case later than 180 days after the start up of the emission source.

\* The initial testing has already been performed.

@ Test every five years. The Executive Secretary may require testing at any time.

C. Notification

The Executive Secretary shall be notified at least 30 days prior to conducting any required emission testing. A source test protocol

shall be submitted to DAQ when the testing notification is submitted to the Executive Secretary.

The source test protocol shall be approved by the Executive Secretary prior to performing the tests. The source test protocol shall outline the proposed test methodologies, stack to be tested procedures to be used. A pretest conference shall be held, if directed by the Executive Secretary.

D. Sample Location

The emission point shall be designed to conform to the requirements of 40 CFR 60, Appendix A, Method 1, or other methods as approved by the Executive Secretary. An Occupational Safety and Health Administration (OSHA) or Mine Safety and Health Administration (MSHA) approved access shall be provided to the test location.

E. Volumetric Flow Rate

40 CFR 60, Appendix A, Method 2 or other testing methods approved by the Executive Secretary.

F. PM<sub>10</sub>

For stacks in which no liquid drops are present, the following methods shall be used: 40 CFR 51, Appendix M, Methods 201, 201a, or other testing methods approved by the Executive Secretary. The back half condensibles shall also be tested using the method specified by the Executive Secretary. All particulate captured shall be considered PM<sub>10</sub>.

For stacks in which liquid drops are present, methods to eliminate the liquid drops should be explored. If no reasonable method to eliminate the drops exists, then the following methods shall be used: 40 CFR 60, Appendix A, Method 5, 5a, 5d, or 5e as appropriate, or other testing methods approved by the Executive Secretary. The back half condensibles shall also be tested using the method specified by the Executive Secretary. The portion of the front half of the catch considered PM<sub>10</sub> shall be based on information in Appendix B of the fifth edition of the EPA document, AP-42, or other data acceptable to the Executive Secretary.

The back half condensibles shall not be used for compliance demonstration but shall be used for inventory purposes.

G. Existing Source Operation

The production rate during all compliance testing shall be no less than 90% of the maximum production achieved in the previous three (3) years.

**Status:** Compliance determination pending review of test report. Mr. Turk stated that the company does quarterly sampling for other NRC requirements. Testing was conducted in 2/08 by Tetco (based on a pretest protocol). Mr. Turk stated that he would contact Tetco to ensure that DAQ receives a copy of the test.

12. Visible emissions from the following emission points shall not exceed the following values:

- A. Ore Loading Ares - 15% opacity
- B. Vanadium Circuit - 15% opacity
- C. All Baghouses - 10% opacity
- D. All diesel engines - 20% opacity
- E. Conveyor drop points - 20% opacity
- F. Propane fired, low NO<sub>x</sub> boiler - 10%
- G. All other points - 20% opacity

Opacity observations of emissions from stationary sources shall be conducted according to 40 CFR 60, Appendix A, Method 9.

**Status:** In compliance - no visible or fugitive emissions were observed from the facility that exceeded the above limitations.

13. The following production and/or consumption limits shall not be exceeded:

- A. 720,720 tons of ore processing per rolling 12-month period
- B. Total 2,960,880 gallons of propane per rolling 12-month for the entire source except the Superior Boiler Works below
- C. Total 2,439,249 gallons of propane per rolling 12-month period for Superior Boiler Works model X6-5-3000-5150-PF-LPG

To determine compliance with a rolling 12-month total, the owner/operator shall calculate a new 12-month total by the twentieth day of each month using data from the previous 12 months. Records of consumption/production shall be kept for all periods when the plant is in operation. Ore production shall be determined from plant records. The records of production shall be kept on a daily basis. The source shall maintain separate records of propane consumption for the Superior Boiler Works boiler model number X6-5-3000-5150-PF-LPG. Propane consumption shall be determined from purchase order receipts. Records of purchase orders shall be maintained by the supervisor in a log.

**Status:** In compliance - For June 1, 2007 - May 31, 2008:

- A. 21,567.12 tons
- B. 537,515 gallons for the process and boiler
- C. not fully operational

14. Emergency generators shall be used for electricity producing operation only during the periods when electric power from the public utilities is interrupted, or for regular maintenance of the generators. Records documenting generator usage shall be kept in a log and they shall show the date the generator was used, the duration in hours of the generator usage, and the reason for each generator usage.

**Status:** Non-compliance - records of generator usage were written on the equipment for previous years, however no records were available since the facility has re-opened.

Denison received a CA dated July 29, 2008. In Denison's original response, dated August 11, 2008, they stated that the emergency generator has not operated since 1996. Therefore, no penalty was recommended.

15. Denison Mines (USA) Corp. shall abide by all applicable requirements of R307-205 for Fugitive Emission and Fugitive Dust sources. To be in compliance, the source must operate in accordance with the most current version of R307-205.

**Status:** In compliance - Minimal fugitive dust was observed along the gravel roads, loading areas and surrounding the tailings pile and ponds. The opacity limitation in condition 16 was met.

16. Visible fugitive dust emissions from haul-road traffic and mobile equipment in operational areas shall not exceed 20% opacity. Visible emissions determinations for traffic sources shall use procedures similar to Method 9. The normal requirement for observations to be made at 15-second intervals over a six-minute period, however, shall not apply. Six points, distributed along the length of the haul road or in the operational area, shall be chosen by the Executive Secretary or the Executive Secretary's representative. An opacity reading shall be made at each point when a vehicle passes the selected points. Opacity readings shall be made  $\frac{1}{2}$  vehicle length or greater behind the vehicle and at approximately  $\frac{1}{2}$  the height of the vehicle or greater. The accumulated six readings shall be averaged for the compliance value.

**Status:** In compliance - Haul trucks were observed dumping ore in the storage pile area; minimal fugitive dust was observed. Mobile equipment use observed also resulted in minimal dust.

17. All unpaved roads and other unpaved operational areas that are used by mobile equipment shall be water sprayed and/or chemically treated to control fugitive dust. Treatment shall be of sufficient frequency and quantity to maintain the surface material in a damp/moist condition. The