

## INTRODUCTION

This report documents and summarizes the monitor well drilling and installation of a piezometer (MW-11) to the northeast of the existing SCA#2 Ash Landfill. The drilling and installation occurred on October 19-21, 2015. The well is 65 feet deep and reaches into the impervious Mancos Shale bedrock which underlies the landfill. Wellhead is shown in photo below.

The groundwater monitoring program for the SCA #2 Ash Landfill is intended to verify protection of groundwater resources in the vicinity of the ash landfill. There are three existing monitoring wells located below the landfill and this report documents this new monitor well located above the landfill.



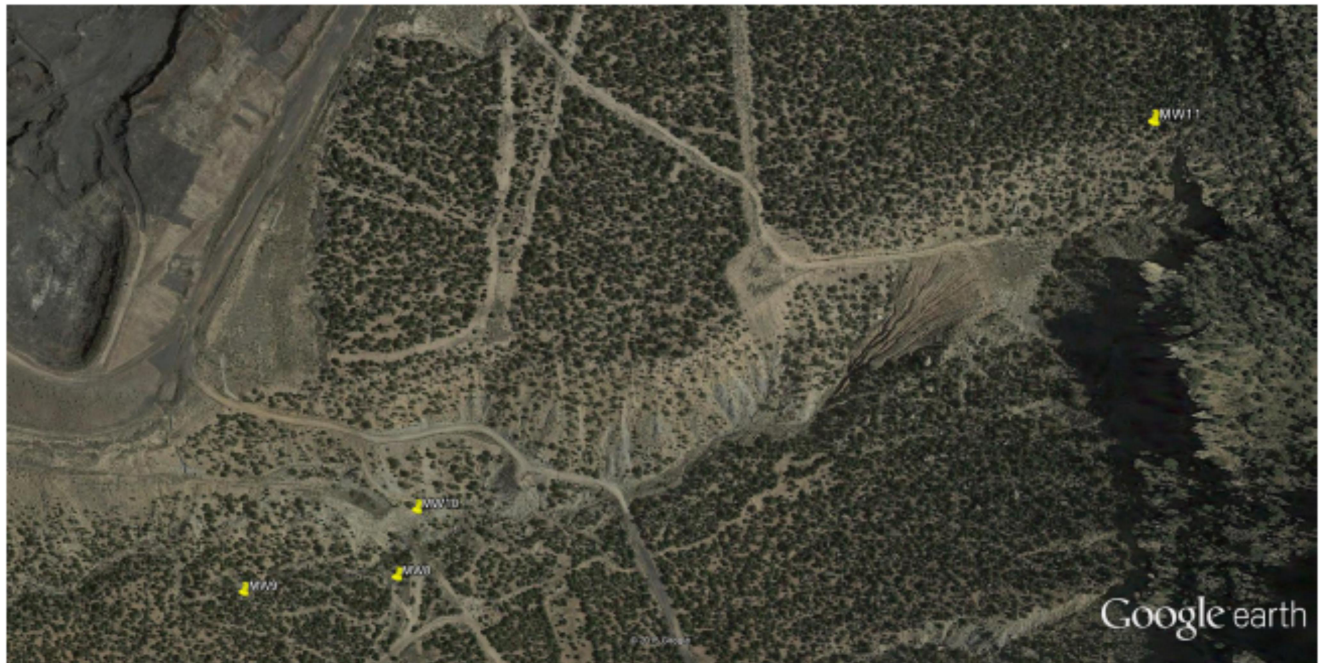
## LOCATION

The location for monitoring well MW-11 was selected in the Summer 2015 as a joint effort by SCA, Twin Peaks and three members of the Utah DEQ, Division of Waste Management and Radiation Control. As sites were reviewed, this location was jointly determined to be the best available location to install a monitoring well to represent the up-gradient condition in compliance with the new EPA CCR rule § 257.91.

The site for this dry ash landfill was selected because of the lack of water in the vicinity. It is expected that little to no groundwater is located below the ash landfill and this is a positive condition for the facility.

The SCA #2 Ash Landfill has one up-gradient monitor well (MW-11) and three down-gradient monitor wells (MW-8, MW-9, MW-10). These wells are located at the approximate latitude/longitude and elevations. All four monitor wells (and the SCA#2 Ash Landfill) are located on private property owned by SCA. See well locations on figure below.

MW-11	N 39°32'31.0" and W 110°22'40.6" with elevation 6785 ft +/-
MW-10	N 39°32'20.5" and W 110°23'04.3" with elevation 6423 ft +/-
MW-9	N 39°32'18.0" and W 110°23'10.6" with elevation 6362 ft +/-
MW-8	N 39°32'18.6" and W 110°23'05.0" with elevation 6397 ft +/-





DRILLER

Monitoring well MW-11 was drilled by Cascade Drilling LP, of Peoria, Arizona on October 19-21, 2015. A permits were provided by Utah Division of Water Rights (See driller start card below).

**DRILLER (START) CARD for MONITOR WELL#: 1591004M00**

IMPORTANT: THIS CARD MUST BE RECEIVED BY THE DIVISION OF WATER RIGHTS PRIOR TO THE BEGINNING OF WELL CONSTRUCTION -- REQUIRED ONLY FOR WELLS DEEPER THAN 30 FT.	
OWNER/APPLICANT NAME:	SUNNYSIDE COGENERATION ASSOCIATES
MAILING ADDRESS:	C/O RUSTY NETZ, ONE POWER PLANT ROAD, SUNNYSIDE, UT
PHONE NUMBER:	435-888-4476
WELL LOCATION:	N 57' E 1268' from SW Cor. S05, T15S, R14E, SLB&M.
WELL UTM COORDINATES:	Northing: 4376896 Easting: 553511
WELL ACTIVITY:	NEW <input checked="" type="checkbox"/> REPAIR ( ) REPLACE ( ) ABANDON ( ) CLEAN <input checked="" type="checkbox"/> DEEPEN ( )

For surface seals in unconsolidated formations (clay, silt, sand, and gravel), will you be using a temporary conductor casing or other formation stabilizer (e.g., drilling mud) in the surface seal interval to maintain the required annular space?

**YES** or NO (Circle one).

Answering 'NO' suggests that you will be placing the surface seal in an open and unstabilized annular space, which may require onsite inspection of seal placement by the State Engineer's Office.

PROPOSED START DATE: 10-19-15

PROJECTED COMPLETION DATE: 11-19-15

LICENSE #: 626 LICENSEE/COMPANY: Tim Stine / Cascade Drilling

T 10-15-15

Licensee Signature

Date

NOTICE TO APPLICANT: THIS CARD IS TO BE GIVEN TO A UTAH LICENSED WATER WELL DRILLER FOR SUBMITTAL TO THE DIVISION OF WATER RIGHTS PRIOR TO WELL CONSTRUCTION.
STATE OF UTAH DIVISION OF WATER RIGHTS Phone No. 801-538-7416 Fax No. 801-538-7467

COMMENTS: \_\_\_\_\_

### WELL DESCRIPTION

The MW-11 monitoring well was completed to 65 feet below ground surface with a 20 foot screen section utilizing 0.010 sized slots and a sand pack filter consisting of 10x20 washed Silica Sand to approximately 1 foot above the top of the screen. This was followed by a blank PVC pipe, a 5 ft bentonite chip seal, and then grouted to the surface. A 3 foot high above ground locking monument finished the installation. Well installation details are shown on the Well Construction Report and diagram below.

## Well Construction Report

Job Name Sunnyside CO-gen      Well Name MW-11  
 Job Number 3572      Driller Daniel Dodge  
 Location Sunnyside UT.      Helper I. Reynolds Gr. Cupp  
 Date Installed 10-20-2015

Type of Well:  
 Water Table Observation  
 Piezometer  
 Other \_\_\_\_\_

A. Height of Well Casing above ground 3 ft.  
 B. Diameter of Well Casing 2 in.  
 C. Surface Seal Bottom \_\_\_\_\_ ft.  
 D. Well Casing: Flush Threaded PVC  
 Schedule 40  
 Schedule 80  
 Other \_\_\_\_\_

E. Bentonite Seal Top 38' ft.  
 F. Fine Sand Top \_\_\_\_\_ ft.  
 G. Filter Pack Top 43 ft.  
 H. Screen Joint Top 45 ft.  
 I. Well Bottom 65 ft.  
 J. Filter Pack Bottom 65 ft.  
 K. Borehole Bottom 65 ft.

1. Locking Cap?  Yes  No  
 2. Protective Cover: a. Inside diam. 8 in.  
 b. Length 5 ft.  
 c. Material  Steel  
 Other \_\_\_\_\_  
 d. Bumper Post \_\_\_\_\_ qty  
 \_\_\_\_\_ 3" \_\_\_\_\_ 4"

3. Surface Seal:  Bentonite  
 Concrete  
 Other \_\_\_\_\_

4. Material between Casing and Protop:  
 Bentonite  
 Other sand

5. Annular Space Seal:  
 Granular Bentonite  
 Bentonite Slurry  
 Cement-Bentonite Grout  
 Other \_\_\_\_\_

How Installed:  
 Gravity  
 Tremie Pumped

6. Bentonite Seal:  Granules 3/8  
 Pellets

7. Type of Fine Sand: \_\_\_\_\_

8. Type of Filter Pack: 10x20 sand 7x bags

9. Screen Material:  
 Type:  Factory Cut  
 Continuous Slot  
 Slot Size: \_\_\_\_\_ in.  
 Length: 20 ft.

10. Backfill Material: (Below filter pack)  
 None  
 Other \_\_\_\_\_

Cascade Drilling LP

## GROUNDWATER

Groundwater was not encountered during the drilling of MW-11 and the soil samples were dry. Screen was installed at the bottom of the well such that in the event that groundwater exists at some time in the future, it can be detected and monitored in this well.

## GEOLOGY

The sonic drilling method used provided continuous sampling with depth. Based upon the site investigations previously conducted by PSI (April 6, 2012 and March 25, 2015) and the observations of the drill samples obtained from this monitoring well MW-11, the site consists of alluvial and colluvial materials (silty sands with gravel) underlain by lean clays and sandy silt with cobbles and boulders. The soils are underlain by an impervious layer of Mancos Shale bedrock. The depth to bedrock in MW-11 was approximately 53-59 feet below ground surface. Details regarding the soils encountered during the drilling of MW-11 can be observed on the photographs below showing the samples obtained during the drilling.

## WELL DRILLER'S REPORT

Cascade Drilling has submitted their Well Driller's Report to the state. A copy of that report has been inserted after the photos.

## SUMMARY

MW-11 was installed up gradient from the SCA#2 Ash Landfill for the purpose of monitoring groundwater flowing beneath the landfill. The well was completed with a piezometer reaching to a depth of 65 feet below ground surface (approximately 10 feet into the impervious Mancos Shale bedrock layer which lies beneath the landfill). A 20 ft. screened section was installed at the bottom of the piezometer.

No groundwater was encountered during the drilling of this well. This appears to confirm expectations that little to no groundwater is flowing under the landfill and that this is an ideal location for the landfill. Monitoring of this well and the other existing monitor wells throughout the coming years will assist in observing groundwater conditions in and around the landfill.



MW-11      0 - 2.5 ft      Surface conditions



MW-11      2.5 - 5 ft      Silty Sand



MW-11      5 - 7.5 ft      Silty Sand with boulder



MW-11      7.5 - 10 ft      Silty Sand with boulder



MW-11      10 - 12.5 ft      Silty Sand



MW-11      12.5 - 15 ft      Silty Sand



MW-11      15 - 16 ft      Silty Sand



MW-11      16 - 18 ft      Silty Sand



MW-11 18 - 20.5 ft Silty Sand



MW-11 20.5 - 23 ft Silty Sand with boulder



MW-11 23 - 25 ft Silty Sand



MW-11      25 - 27.5 ft      Silty Sand



MW-11      27.5 - 30 ft      Silty Sand



MW-11      30 - 32.5 ft      Silty Sand



MW-11      32.5 - 35 ft      Silty Sand



MW-11      35 - 37 ft      Silty Sand



MW-11      37 - 40 ft      Silty Sand



MW-11      40 - 43 ft      Silty Sand



MW-11      43 - 45 ft      Silty Sand with intermittent clay



MW-11      45 - 47 ft      Silty Sand with intermittent clay/shale



MW-11      47 - 49 ft      Silty Sand with intermittent clay/shale



MW-11      49 - 50 ft      Some clay / shale with some Silty Sand



MW-11      50 - 52.5 ft      Some clay / shale with some Silty Sand



MW-11      52.5 - 55 ft      Clay / Shale



MW-11      55 - 57 ft      Clay / Shale



MW-11      57 - 59 ft      Clay / Shale



MW-11      59 – 62.5 ft      Clay / Shale



MW-11      62.5 - 65 ft      Clay / Shale

## WELL DRILLER'S REPORT

State of Utah  
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

<b>Well Identification</b>	Non-Production Well: 1591004M00	WIN: 439081
----------------------------	---------------------------------	-------------

<b>Owner</b>	<i>Note any changes</i> SUNNYSIDE COGENERATION ASSOCIATES C/O RUSTY NETZ ONE POWER PLANT ROAD SUNNYSIDE, UT 84539	Contact Person/Engineer: <u>Rusty Netz / Sunnyside</u>
--------------	---	--

<b>Well Location</b>	<i>Note any changes</i> N 57 E 1268 from the SW corner of section 05, Township 15S, Range 14E, SL B&M
----------------------	--

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #)

<b>Drillers Activity</b>	Start Date: <u>10-19-15</u>	Completion Date: <u>10-21-15</u>	
Check all that apply: <input checked="" type="checkbox"/> New <input type="checkbox"/> Repair <input type="checkbox"/> Deepen <input type="checkbox"/> Clean <input type="checkbox"/> Replace <input type="checkbox"/> Public Nature of Use: <u>monitor well</u>			
If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing well			

DEPTH (feet)		BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
FROM	TO			
0	65	7	Sonic	N/A

Well Log		WATER	CLAY	SAND	GRAVEL	COBBLES	BOULDER	ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistency, water bearing, odor, fracturing, mineralogy, texture, degree of weathering, hardness, water quality, etc.)
0	45		X	X	X				Brown	
45	65	X	X	X	X				"	

<b>Static Water Level</b>	Date <u>10-20-15</u>	Water Level <u>45</u> feet	Flowing? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
Method of Water Level Measurement <u>WCF</u> If Flowing, Capped Pressure <u>N/A</u> PSI				
Point to Which Water Level Measurement was Referenced <u>ground level</u> Elevation <u>N/A</u>				
Height of Water Level reference point above ground surface <u>N/A</u> feet Temperature <u>N/A</u> degrees <input type="checkbox"/> C <input type="checkbox"/> F				

Construction Information									
DEPTH (feet)		CASING			DEPTH (feet)		<input checked="" type="checkbox"/> SCREEN <input type="checkbox"/> PERFORATIONS <input type="checkbox"/> OPEN BOTTOM		
FROM	TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	FROM	TO	SCREEN SLOT SIZE OR PERP SIZE (in)	SCREEN DIAM. OR PERP LENGTH (in)	SCREEN TYPE OR NUMBER PERP (per round/interval)
0	45	2" sch. 40 pvc	40	2	45	65	.010	2	factory sh

Well Head Configuration: Above grade completion Access Port Provided?  Yes  No  
 Casing Joint Type: Flush Thread Perforator Used: N/A  
 Was a Surface Seal Installed?  Yes  No Depth of Surface Seal: 4.5 feet Drive Shoe?  Yes  No  
 Surface Seal Material Placement Method: Premie cement and bentonite  
 Was a temporary surface casing used?  Yes  No If yes, depth of casing: 65 feet diameter: 6 inches

DEPTH (feet)		SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION		
FROM	TO	SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	38	Cement Bentonite	12 BAGS	50 lbs each
38	43	Bentonite chips	3 BAGS	" "
43	65	10-20 siliceous sand	14 BAGS	" "

Well Development and Well Yield Test Information						
DATE	METHOD	YIELD	Units Check One		DRAWDOWN (ft)	TIME PUMPED (hrs & min)
			GPM	CFS		
	<u>N/A</u>					

**Pump (Permanent)**  
 Pump Description: N/A Horsepower: \_\_\_\_\_ Pump Intake Depth: \_\_\_\_\_ feet  
 Approximate Maximum Pumping Rate: \_\_\_\_\_ Well Disinfected upon Completion?  Yes  No

**Comments** Description of construction activity, additional materials used, problems encountered, extraordinary circumstances, abandonment procedures. Use additional well data form for more space.  
N/A

**Well Driller Statement** This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.  
 Name CASCADE DRILLING, L.P. License No. 626  
 Signature [Signature] Date 11-5-15  
(Licensed Well Driller)