

August 8, 2013

Mr. Weiquan Dong, PE  
Bureau of Corrective Actions, Special Projects Branch  
Nevada Division of Environmental Protection  
2030 E. Flamingo Rd., Suite 230  
Las Vegas, Nevada 89119

**Re: Response to Environmental Footprint Analysis Request**

Dear Mr. Dong:

On behalf of the Nevada Environmental Response Trust (the "Trust" or "NERT"), ENVIRON International Corporation (ENVIRON) is providing this inventory of the energy and materials used, wastes generated, and activities and services conducted at the NERT site for the purpose of an Environmental Footprint Analysis, as requested by the Environmental Protection Agency (EPA) Region 9 and the Nevada Division of Environmental Protection (NDEP).

Much of the information was obtained from internal records maintained by the Trust and the former operator of the treatment plant, Veolia Water North America (Veolia). In addition, existing documents produced by ENVIRON (e.g., the 2012 Draft Remedial Investigation and Feasibility Study Work Plan) were used for general treatment process information. As necessary to fill remaining data gaps, ENVIRON solicited input from the current treatment plant operator (effective July 24, 2013), Envirogen Technologies, Inc. (Envirogen). In cases where specific information was not available, estimates have been provided based on professional judgment.

Should you have any questions concerning this inventory, please contact John Pekala at (602) 734-7710 or [jpekala@environcorp.com](mailto:jpekala@environcorp.com).

Sincerely,



John M. Pekala, CEM #2347  
Senior Manager



Allan J. DeLorme, PE  
Principal

**Energy Usage**

<b>Energy Used On-Site</b>	<b>Notes</b>	<b>Amount</b>	<b>Units</b>	<b>Source</b>	<b>Ref.</b>
Grid electricity					
Treatment plant	A	4,591,971	kWh/yr	Colorado River Commission of NV	1
Wells and pumps stations	B	1,437,336	kWh/yr	NV Energy	1
Natural gas	C	NA	ccf/yr		
Diesel fuel	C	NA			
Gasoline	D	1,435	gal/yr	Estimate	2
Other fuel/energy sources		NA			
Renewable fuel/energy sources		NA			

NA = Not Applicable

**Notes:**

A) Colorado River Commission of Nevada purchases power on the open market to support the manufacturing companies that comprise the Basic Management Industries (BMI) complex.  
 (<http://crc.nv.gov/index.asp?m=faq&s=eneg#q2>)

B) Nevada Energy is listed as the electricity provider on invoices for the off-site wells and pump stations.

C) Diesel fuel and natural gas are not used on site.

D) Personnel with Envirogen Technologies, Inc. (Envirogen) provided information on routine truck use, which was used to estimate gasoline consumption based on an assumed fuel efficiency of 10 miles per gallon.

**Materials Usage**

Materials Used On-Site	Notes	Amount	Units	Location of Manufacture	% from Recycle	Ref.
Ferrous sulfate (FeSO <sub>4</sub> )	A	21,900	gal/yr	California	Not reported	3
Polymer ICS-DW 2533	A	219	gal/yr	California	Not reported	3
Dry Polymer Dewatering ICS-6545	A	4,745	lb/yr	California	Not reported	3
DAF polymer ICS-2835B	A	5,840	gal/yr	California	Not reported	3
Lime (hydrated lime)	A	6,205	lb/yr	Missouri	Not reported	3
Ethanol (190 proof)	A	127,750	gal/yr	Illinois	Not reported	3
Phosphoric acid (H <sub>3</sub> PO <sub>4</sub> ) (37.5%)	A	9,490	gal/yr	California	Not reported	3
pH Adjustment (NaOH 25% by weight)	A	34,675	gal/yr	California	Not reported	3
Micronutrients (VWNA micronutrient)	A	12,775	gal/yr	California	Not reported	3
Hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> ) (35%)	A	23,725	gal/yr	California	Not reported	3
Ferric chloride (FeCl <sub>3</sub> )	A	22,630	gal/yr	California	Not reported	3
Ammonia	B	0	gal/yr	NA	NA	2
Granulated activated carbon (GAC)	C	12,000	lb/yr	Not reported	Not reported	3
Filter materials	D	NA				
Other consumable materials	E	NA				

NA = Not Applicable

**Notes:**

Quantity information was determined from internal treatment operator records provided by Veolia Water North America (Veolia). All information about specifications and formulations was obtained from Material Safety Data Sheets maintained at the site.

A) Table 1 (below) provides information on the specifications and formulations of process materials.

B) Envirogen personnel reported that ammonia is present in sufficiently high concentrations in extracted water such that an external source of ammonia has not been necessary during this period of performance.

C) According to Veolia personnel, the GAC is replaced every five years. The estimated annual GAC usage of 12,000 pounds is based on the fact that there are three GAC vessels, each of 20,000 pound capacity.

D) Envirogen personnel reported that there are no waste streams from other filter materials. Solids captured by the sand filter are recycled in the treatment plant.

E) No other process materials are used in significant quantities.

**Table 1: Specifications and Formulations of Process Materials**

<b>Material</b>	<b>Specification</b>	<b>Formulation</b>
Ferrous sulfate (FeSO <sub>4</sub> )	Aqueous solution; Specific gravity 1.203 @20°C; Density 10.02	Ferrous sulfate, heptahydrate 30+/- 2- by wt; Sulfuric acid 0.3 +/- 0.1% by wt
Polymer ICS-DW 2533	Aqueous solution; Specific gravity 1.02-1.07; Liquid density 8.5-9 lbs/gal	Light distillate 20-40%; Ethoxylated alcohol 1-10%
Dry Polymer Dewatering ICS-6545	Powder; Bulk density 0.8	Not reported
DAF polymer ICS-2835B	Aqueous solution; Specific gravity 1.02-1.03; Liquid density 8.5-8.6 lbs/gal	Light distillate 20-40%; Ethoxylated alcohol 1-10%
Lime (hydrated lime)	Powder; Specific gravity 2.2	Calcium hydroxide; Crystalline silica (quartz) <0.10-.2%
Ethanol (190 proof)	Aqueous solution; Specific gravity 0.817 @60°F	Ethanol 88.19% by vol; Water 7.26% by vol; Ethyl acetate 4.55% by vol
Phosphoric acid (H <sub>3</sub> PO <sub>4</sub> ) (37.5%)	Aqueous solution; Specific gravity 1.20-1.26 @20°C	Phosphoric acid 30-40% by wt
pH Adjustment (NaOH 25% by weight)	Aqueous solution; Specific gravity 1.2764 @20°C; Density 10.64 lbs/gal	Sodium hydroxide 25% by wt
Micronutrients (VWNA micronutrient)	Aqueous solution; Specific gravity 1.1075 @20°C; Density 10.64 lbs/gal	Hydrochloric acid; Ferrous sulfate; Sodium molybdate; Manganese sulfate monohydrate; Aluminum sulfate; Copper sulfate; Zinc sulfate monohydrate; Nickel chloride hexahydrate
Hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> ) (35%)	Aqueous solution; Specific gravity 1.1327 @18°C; Density 9.44 lbs/gal	Hydrogen peroxide 35% by weight
Ferric chloride (FeCl <sub>3</sub> )	Aqueous solution; Specific gravity 1.37-1.46	Ferric chloride 25-45%; Hydrochloric acid <.5%; Water 55-65%

**Water Usage**

<b>Water Used On-Site</b>	<b>Notes</b>	<b>Amount</b>	<b>Units</b>	<b>Use/Fate</b>	<b>Ref.</b>
Groundwater	A	842	gpm	treat & discharge to LV Wash	4
Lake Mead	B	3,000,000	gal/yr	treat & discharge to LV Wash	3
Other water source	C	NA			
<b>Losses</b>	D				
GW-11 evaporation	E	See Table 2 below for evaporation rates			5

NA = Not Applicable

**Notes:**

A) Figure 4-1 of the RI/FS notes an effluent discharge of 901 gpm from the treatment system to the Las Vegas Wash and a groundwater extraction rate of 842 gpm for the three well fields (combined annual average) from July 2011 through June 2012. The discrepancy is due to flow into and out of GW-11 as well as additions of Lake Mead water, which is used to maintain the mechanical pump seals.

B) Lake Mead water (approximately 250,000 gallons per month) is used for GAC backwash events, which occur on average twice per month. Lake Mead water is also used to wash down equipment in the treatment plant, as bathroom water, and to keep solids covered in AP-5; however, these amounts are not tracked. After use, Lake Mead water is discharged to GW-11 and then eventually treated and discharged to the Las Vegas Wash, except for bathroom water which is discharged to an on-site septic system.

C) No other sources of water are used at the site.

D) There are no significant water losses other than evaporation from GW-11. No water is discharged to the local POTW.

E) Information provided by Veolia to ENVIRON indicates the following evaporation rates for GW-11:

**Table 2: Estimated Evaporation Rates for GW-11**

<b>Month</b>	<b>Inches/month</b>	<b>Million gallons/month</b>
January	3.7	1.09
February	4.6	1.36
March	7.8	2.31
April	10.7	3.16
May	14.7	4.35
June	16.9	5
July	17.3	5.12
August	15.5	4.58
September	12	3.55
October	8.2	2.42
November	4.6	1.36
December	5.3	1.57
<b>Total 2011-2012</b>	<b>121.3 inches</b>	<b>35.87 million gallons</b>

**Waste Generated**

Waste Generated	Haz Waste?	Notes	Amount	Units	Treatment/disposal Site	Ref.
FBR sludge	No	A	144.7	metric tons	Disposed at Apex Industrial Solid Landfill in Apex, NV	5
GWTP sludge	No		0.2	tons/day	Disposed at Apex Industrial Solid Landfill in Apex, NV	4
Spent GAC		B	12,000	lb/yr	Disposal on a non-routine basis	3
Other wastes generated		C	NA			

**Notes:**

A) This value is the total dry metric tons of FBR sludge disposed of as waste during the period between July 2011 and June 2012. The value was determined from quarterly NPDES permit submittals for that period.

B) There are three GAC vessels, each of 20,000 pound capacity. The estimated annual GAC waste of 12,000 pounds is based on the fact that the GAC vessels are changed out every five years.

C) No other process wastes generated.

**Personnel Transportation**

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<b>Personnel/Activities</b>	<b>Notes</b>	<b>Number of Personnel</b>	<b>Estimated Number of Trips to Site per Person per Year</b>	<b>Average One-way Distance to Site</b>	<b>Ref.</b>
GWETS operations and maintenance		5	144	15	6
Extraction well and conveyance maintenance		2	208	15	6
Groundwater monitoring		1	208	15	6
General site management		2	208	15	6
Other personnel site visits					
Chicago	A	2	12	1,520	7
Phoenix	A	1	12	250	7
San Francisco Bay Area	A	6	4	405	7

**Notes:**

A) Air travel required.

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**Laboratory Analyses**

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<b>Monitoring Event</b>	<b>Notes</b>	<b>Type of Analysis</b>	<b>Number of Analyses</b>	<b>Ref.</b>
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Please see the attached table for a complete list of all analytes tested at the NERT site. The column labeled "Estimated Number of Samples per Year" provides the information requested. The table was developed as a guide for the treatment plant operator and does not include one-time only samples. Estimates of the number of blanks and duplicates required for routine sampling are also included.



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**Contaminants Removed or Destroyed**

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<b>Contaminant</b>	<b>Notes</b>	<b>Amount Removed or Destroyed</b>	<b>Units</b>	<b>Ref.</b>
Perchlorate	A	242	tons	4
Total chromium	A	1.60	tons	4

A) Amount removed from July 2011 through June 2012.

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## References

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### **References:**

- 1) Energy invoices provided by the Nevada Environmental Response Trust.
- 2) Verbal communication with Envirogen Technologies personnel.
- 3) Internal documents maintained by Veolia Water North America (Veolia).
- 4) Draft Remedial Investigation and Feasibility Study Work Plan, Nevada Environmental Trust Site, Henderson, Nevada. ENVIRON. December 17, 2012.
- 5) Supporting documentation for quarterly permit submittals for NPDES Permit NV0023060 and Groundwater Discharge Permit NEV2001515, prepared by Veolia.
- 6) Estimates of travel by Veolia personnel.
- 7) Estimates of travel by ENVIRON.

**Attachment**

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Attachment 1: Estimated Number of Samples per Year

			Weekly					Semi-monthly		Monthly			Quarterly							Semi-Annual	Annual	Estimated Number of Samples per Year					
			GWTP	Inf./Eff. Perc.	Inf./Eff. CBOD	Inf./Eff. Quick TAT	Inf./Eff. Long TAT	Eff. DO	LVW	AP-5 Pond & GW-11 Pond Corners Detection Wells <sup>1</sup>	Inf./Eff. Sulfate/Sulfide/Chlorate	ART & PC Wells	ARP, M, MW, PC Wells	LVW	Inf./Eff.	FBR Solids	Stabilized Lake Mead Water	1st Quarter Wells	2nd Quarter Wells	3rd Quarter Wells	4th Quarter Wells		Iron Oxide Bin	LVW			
2,3,7,8-TCDD	EPA 1613B	Q, A											2												3	11	
2-Chloroethyl vinyl ether	EPA 8260	Q, A											4													6	22
Alkalinity in CaCO <sub>3</sub>	SM 2320B	Q														1											4
Aluminum	EPA 200.8	Q														1											4
Ammonia Nitrogen	EPA 350.1	W, SM, Q				2			2				2					1	1	1	1						164
Anion Sum - Calculated	SM 1030E	Q														1											4
Antimony	EPA 200.8	Q, A											2			1										3	15
Apparent Color	SM 2120B	W, Q						2					3														116
Arsenic	EPA 200.8	Q, A											2			1										3	15
Arsenic	EPA 6010	Q, SA														1								1			6
Asbestos	EPA 100.2	Q, A											2													3	11
Barium	EPA 200.8	Q, SA														1								1			6
Base Neutral Acid Extractables	EPA 625	Q, A											2													3	11
Beryllium	EPA 200.8	Q, A											2			1										3	15
Bicarb. Alkalinity as HCO <sub>3</sub> CALC	SM 2330B	Q														1											4
Boron	EPA 200.7	Q											3	2		1	1	5	5	1							36
Cadmium	EPA 200.8	Q, A											2			1										3	15
Cadmium	EPA 6010	Q, SA														1								1			6
Calcium	EPA 200.7	Q														1											4
Cation Sum - Calculated	SM 1030E	Q														1											4
Cation/Anion Difference	SM 1030E	Q														1											4
C-BOD	SM 5210B	W			2																						104
Chlorate	EPA 300.0	W, M, Q	1																								106
Chloride	EPA 300.0	Q											3	2		1	1	5	5	1							36
Chromium	EPA 6010	Q, SA																									707
Chromium	EPA 200.7 or 200.8	W, Q	3					2					3			1											276
Chromium, Hexavalent	EPA 7196	Q																									64
Chromium, Hexavalent Dissolved	EPA 218.6	W						2																			104
Chromium, Hexavalent Total	SM 3500CrB	W	3																								156
Copper	EPA 200.8	Q, A											2			1										3	15
Copper	EPA 6010	Q																									4
Cyanide, Total	EPA 335.4	Q, A											2													3	11
Dissolved Oxygen	EPA 360.1	W							1																		52
Fluoride	SM 4500F-C	Q														1											4
Iron	EPA 200.7	W, Q						1					3	1		1	1	5	5	1							84
Lead	EPA 200.8	Q, A											2			1										3	15
Lead	EPA 6010	Q, SA																						1			6
Magnesium	EPA 200.7	Q														1											4
Manganese	EPA 200.7 or 200.8	Q											3	2		1	1	5	5	1							36
Mercury	EPA 245.1	Q, A											2			1										3	15
Mercury	EPA 7471A	Q, SA																						1			6
Molybdenum	EPA 6010	Q																									4
Nickel	EPA 6010	Q																									4
Nickel	EPA 200.8	Q, A											2			1										3	15
Nitrate + Nitrite as N by RFA	EPA 353.2	W	1																								52
Nitrate as Nitrogen by IC	EPA 300.0	W, Q, SM				2			1				2			1	1	30	1	1							173
Nitrate as NO <sub>3</sub> - CALC	EPA 300.0	Q														1	1	1	1	1							8
Nitrite Nitrogen by IC	EPA 300.0	W, Q, SM				2			1				2			1	1	1	1	1							144
Nitrogen, Kjeldahl	EPA 351.2	W						2																			104
Oil & Grease	EPA 1664	Q, A											2														8
Percent Moisture	EPA 160.1	Q																									4
Perchlorate Sterile Filtered	EPA 314.0	W, M, Q, SM	3	2									1			1	148	283	148	148							1573
Pesticides & PCBs	EPA 608	Q, A											2	1												3	15

Attachment 1: Estimated Number of Samples per Year

			Weekly					Semi-monthly		Monthly			Quarterly								Semi-Annual	Annual	Estimated Number of Samples per Year	
			GWTP	Inf./Eff. Perc.	Inf./Eff. CBOD	Inf./Eff. Quick TAT	Inf./Eff. Long TAT	Eff. DO	LVW	AP-5 Pond & GW-11 Pond Corners Detection Wells <sup>1</sup>	Inf./Eff. Sulfate/ Sulfide/ Chlorate	ART & PC Wells	ARP, M, MW, PC Wells	LVW	Inf./Eff.	FBR Solids	Stabilized Lake Mead Water	1st Quarter Wells	2nd Quarter Wells	3rd Quarter Wells	4th Quarter Wells	Iron Oxide Bin		LVW
pH	SM 4500HB	W, Q, SM					1		1						1	148	283	148	148			785		
Phenols	EPA 420 / SW 9066	Q															4	4				8		
Potassium	EPA 200.7	Q																				4		
Selenium	EPA 200.8	Q, A											2		1							3	15	
Selenium	EPA 6010	Q, SA												1						1		6		
Semivolatile Organics	EPA 525.2	Q, A											2									3	11	
Silver	EPA 6010	SA																		1		2		
Silver	EPA 200.8	Q, A											2		1							3	15	
Sodium	EPA 200.7	Q													1		4	4					12	
Specific Conductance	SW 9050	Q															4	4					8	
Sulfate	EPA 300.0	M, Q													1		4	4					36	
Sulfide	SM 4500SD / EPA 376.2	M																					24	
TCLP	EPA 1311	Q												1									4	
TDS	SM 2540C / EPA 160.1	M, SM, Q							1		17	31	3	2	1	148	283	148	148				1329	
Thallium	EPA 200.8	Q, A												2	1							3	15	
TOC	SM 5310C	Q															4	4					8	
Total Inorganic Nitrogen - CALC	CALC EPA 300.0	W, SM, Q				2		1					2			1	1	1	1				140	
Total Organic Halides (Quad)	SW 9020 / SM 5320	Q															4	4					8	
Total Phosphorus as P	SM 4500PE / EPA 365.1	W, SM, Q					2	1							1								132	
TSS	SM 2540D	W					1																52	
Volatile Organics	EPA 624	Q, A											4		1								6	26
Zinc	EPA 6010	Q												1									4	
Zinc	EPA 200.8	Q, A											2		1								3	15
<b>Events per Year</b>			<b>52</b>	<b>52</b>	<b>52</b>	<b>52</b>	<b>52</b>	<b>52</b>	<b>24</b>	<b>See Footnote</b>	<b>12</b>	<b>12</b>	<b>12</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>7,045</b>
<b>Total Number of Samples</b>																					<b>7,045</b>			

<sup>1</sup> Sample collected and analyzed only when water is detected between pond liners