SECTION 5

2011 SURFACE WATER MONITORING

5.0 2011 Surface Water Monitoring

The KCP discharges HVAC condensate, fire protection water test flows and rain event run-off, through four NPDES permitted outfalls (Missouri State Operating Permit # MO-0004863). This permit requires weekly monitoring of the four permitted outfalls and periodic monitoring of the six surface water sites on the Blue River and Indian Creek near the KCP (Figure 5.1). In addition, Special Permit Condition III.A.5. of the Post Closure Permit requires surface water monitoring to be conducted concurrently with the first semi-annual groundwater sampling event. Weekly monitoring of wastewater discharges from Outfall 002 for PCBs and VOCs is also stipulated. Special Permit Condition III.A.4. of the Post Closure Permit requires development of a comprehensive monitoring plan to sample for VOCs and PCBs associated with water discharged from Outfall 002. The 95th Terrace Corrective Measures Study (CMS) also requires semi-annual monitoring of outfalls and surface water for PCBs analyzed by EPA Method 1668a. The above requirements (annual surface water monitoring and Outfall 002 monitoring) are addressed in Appendix F, of the Sampling and Analysis Plan (DOE 2008). Surface water monitoring data collected during calendar 2011 concurrently from the four permitted outfalls and six surface water monitoring sites is discussed in the following sections.

5.1 Outfalls / Receiving Streams

As required by Appendix F of the Sampling and Analysis Plan, annual sampling of the four regulated outfalls and six surface water sites was conducted concurrent with the 2011 first semi-annual groundwater sampling event. The purpose of this sampling is to characterize the effect stormwater discharges from the KCP have on receiving streams. As required by the KCP's NPDES permit, all data presented in the following sections have been previously provided to the MDNR Water Pollution Control Division. Correlations between groundwater and surface water monitoring results are discussed in the following text.

Semi-Annual groundwater sampling was conducted April / May 2011, during which the four regulated stormwater outfalls and six surface water sites were sampled (Figure 5.1). The list of parameters analyzed is consistent with those outlined under Section 2.1.2, Appendix F of the Sampling and Analysis Plan and results are provided on Table 5.1. Values listed under the *Surface Water Standard* column of Table 5.1 are taken from 10 CSR 20-7.031 Table A, *Criteria for Designated Uses* that are applicable to streams bordering the KCP. 10 CSR 20-7.031, Table H, *Stream Classifications and Use Designations,* provides the following classifications and designations for surface waters bordering the KCP:

The reach of the Blue River bordering the KCP is a Class P stream meaning permanent flow is maintained even in drought periods (10 CSR 20-7.031(1)(F)). Designated uses are; AQL – protection of warm water aquatic life, human health / fish consumption, WBC – whole body contact recreation, LWW – livestock & wildlife watering, and BTG – boating and canoeing.

The reach of Indian Creek bordering the KCP is a Class C stream meaning flows may cease in dry periods but permanent pools are maintained which support aquatic life (10 CSR 20-7.031(1)(F)). Designated uses are; AQL – protection of

Monitoring Locations

Water

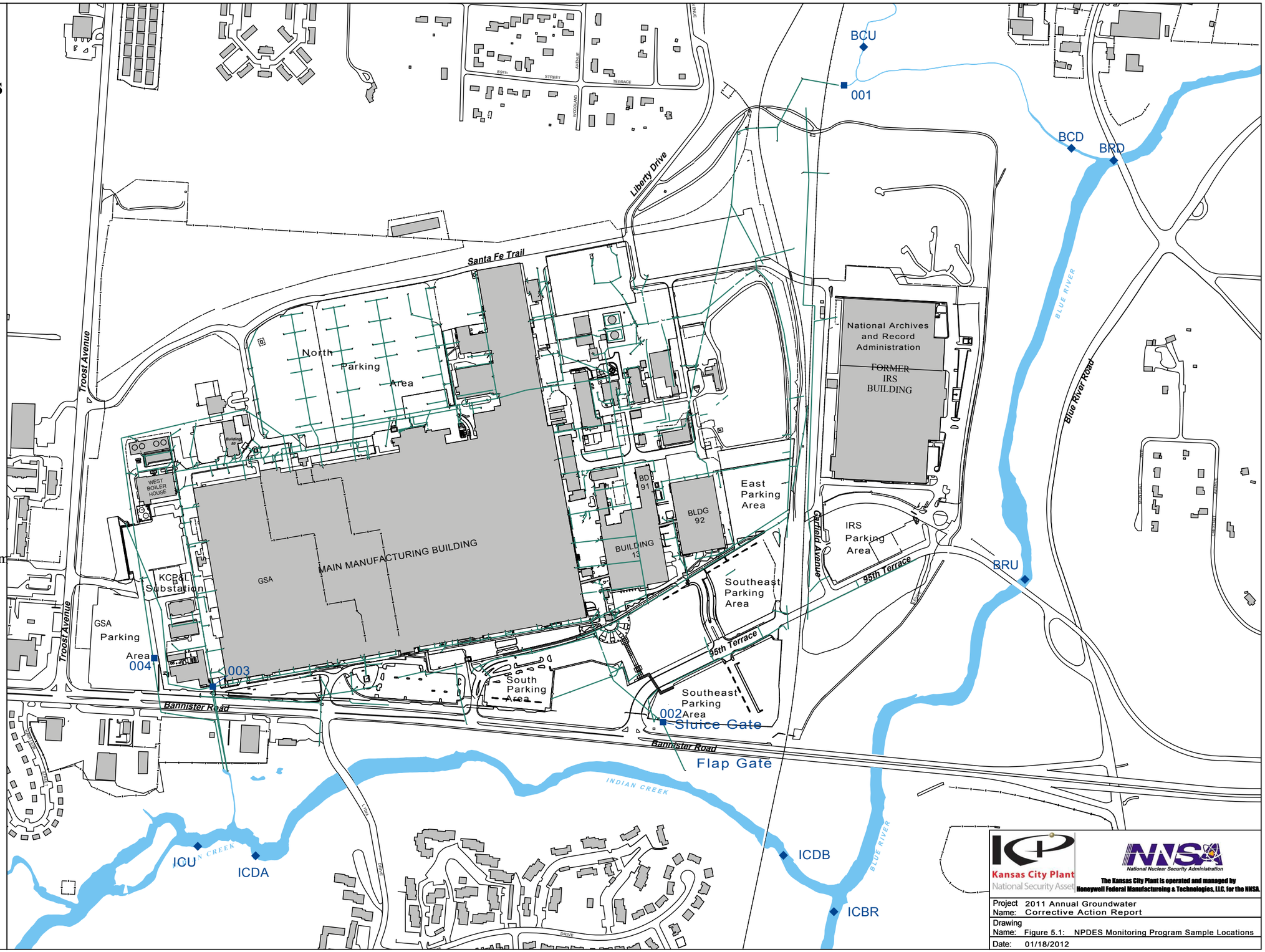
- Outfall
- Surface Water

Drains:

- Stormwater Lines

Abbreviations:

BRD	Blue River Downstream
BRU	Blue River Upstream
ICU	Indian Creek Upsream
ICDA	Indian Creek Downstream A
ICDB	Indian Creek Downstream B
ICBR	Confluence of Indian Creek and Blue River
BCU	Boone Creek Upstream
BCD	Boone Creek Downstream
001	Permitted Outfall
002	Permitted Outfall
003	Permitted Outfall
004	Permitted Outfall



Kansas City Plant
National Security Asset

National Nuclear Security Administration

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Project Name:	2011 Annual Groundwater Corrective Action Report
Drawing Name:	Figure 5.1: NPDES Monitoring Program Sample Locations
Date:	01/18/2012

Table 5.1
Surface Water Sampling Results

Date	Parameter	Surface Water Standard	Unit	OF001	OF002	OF003	OF004	SWBRDD	SWBRU	SWICBR	SWICDA	SWICDB	SWICU
05-May-11	1,2-Dichloroethene (Total)	140000	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
05-May-11	Aluminum	750***	ug/L	93.1	204	< 75	89	469	347	472	119	140	150
05-May-11	Arsenic	20***	ug/L	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
05-May-11	Barium	2000*	ug/L	159	< 10	270	440	108	106	116	87.9	91.2	89.1
05-May-11	Beryllium	5***	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
05-May-11	Biochemical Oxygen Demand, 5d		mg/L	5.5	3.3	< 2	< 2	2.2	3.4	3.7	3.7	8.4	6.5
05-May-11	Boron		ug/L	< 100	< 100	< 100	< 100	< 100	< 100	< 100	126	127	128
05-May-11	Chemical oxygen demand		mg/L	20.2	27.4	12.8	18.4	27.1	23.3	16.2	27.1	26.7	27.2
05-May-11	Chlorine, Total Residual	permit	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
05-May-11	Chromium	74 - 117***	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
05-May-11	Copper	7 - 12***	ug/L	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	13
05-May-11	Cyanide	5***	mg/L	0.0079	< 0.005	< 0.005	< 0.005	0.0078	0.0059	< 0.005	0.014	0.012	0.015
05-May-11	Iron	1,000***	ug/L	570	215	195	690	552	447	497	191	230	208
05-May-11	Lead	3 - 5***	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
05-May-11	Mercury	0.5***	ug/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
05-May-11	Nickel	52 - 84	ug/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
05-May-11	Nitrate as N	10*	mg/L	0.62	0.26	2.4	0.79	3.5	3.6	0.84	6.5	6.3	6.6
05-May-11	Nitrite as N		mg/L	<0.1	< 0.1	< 0.1	< 0.1	0.12	0.13	< 0.1	0.32	0.26	0.32
05-May-11	Nitrogen, Ammonia		mg/L	< 0.1	0.28	< 0.1	< 0.1	< 0.1	< 0.1	0.27	0.31	< 0.1	0.24
05-May-11	Oil and Grease	permit	mg/L	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
05-May-11	PCB-1016 (Aroclor 1016)		ug/L	< 0.5	< 0.53	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
05-May-11	PCB-1221 (Aroclor 1221)		ug/L	< 0.5	< 0.53	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
05-May-11	PCB-1232 (Aroclor 1232)		ug/L	< 0.5	< 0.53	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
05-May-11	PCB-1242 (Aroclor 1242)		ug/L	< 0.5	< 0.53	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
05-May-11	PCB-1248 (Aroclor 1248)		ug/L	< 0.5	< 0.53	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
05-May-11	PCB-1254 (Aroclor 1254)		ug/L	< 0.5	< 0.53	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
05-May-11	PCB-1260 (Aroclor 1260)		ug/L	< 0.5	< 0.53	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5

Date	Parameter	Surface Water Standard	Unit	OF001	OF002	OF003	OF004	SWBRDD	SWBRU	SWICBR	SWICDA	SWICDB	SWICU
05-May-11	pH	permit	Std. Unit	7.6	7	7.6	7.3	8	8	8.1	8	7.9	7.6
05-May-11	Phenolics, Total Recoverable	100***	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
05-May-11	Phosphorus		mg/L	< 0.1	< 0.1	< 0.1	< 0.1	0.46	0.44	< 0.1	0.99	0.88	0.6
05-May-11	Potassium		ug/L	2350	775	2520	2400	6220	6290	3740	8990	8710	9070
05-May-11	Selenium	5***	ug/L	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
05-May-11	Silver	3.2 - 8.4***	ug/L	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7	< 7
05-May-11	Strontium		ug/L	1000	154	775	1470	469	472	426	514	508	518
05-May-11	Sulfate	250*	mg/L	76.6	8.1	51.8	72.6	83.4	84.8	45.5	125	123	120
05-May-11	Temperature	permit	deg C	10.7	15.4	11.2	12.8	14.2	15	15.1	17.3	14.6	16.9
05-May-11	Thallium	6.63**	ug/L	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
05-May-11	Titanium		ug/L	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
05-May-11	Total Organic Carbon		mg/L	2.8	3.7	1.2	1.4	5	4.8	3.8	5.8	6.2	5.3
05-May-11	Total Settleable Solids	permit	mL/L/hr	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
05-May-11	Trichloroethene	80**	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
05-May-11	Vinyl Chloride	525***	ug/L	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
05-May-11	Zinc	129-165***	ug/L	< 50	188	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50

Surface Water Standards are taken from 10 CSR 20-7.031 Table A. Where applicable, the lowest designated use standard is used in the "Surface Water Standard" column. Where an applicable standard was not available the drinking water standard was used, if available.
PCB results are included in a separate table showing Method 1668 results.
*drinking water standard - designated use and associated standard does not apply to surface water near the KCP. Referenced as other standards do not provide a value.
**human health protection - fish consumption
***protection of aquatic life
[1]Dissolved metal
[2]Hardness dependant. Assume receiving water hardness in the 121 - 180 range. Based on chronic standard.

warm water aquatic life, human health / fish consumption, WBC – whole body contact recreation, LWW – livestock & wildlife watering, and IND – industry.

The designated use of the water body determines the appropriate surface water standard.

Analytical results from samples collected from the six surface water monitoring sites were below the surface water quality standards (reference Table 5.1).

5.2 VOCs

Groundwater contaminated with VOCs impacts stormwater discharges from the KCP to a minor degree. With the exception of Outfall 001, groundwater infiltration rates are generally less than 5 gpm in each outfall. As discussed below, the majority of groundwater that infiltrates into Outfall 001 is captured and routed to the groundwater treatment system. The occurrence of VOCs in stormwater discharges was noted on the occasions listed in Table 5.2 during 2011. All results were below drinking water standards. The KCP's NPDES Permit requires quarterly monitoring for TCE, 1,2-DCE, and vinyl chloride (chloroethene). There are no discharge limits. A "notification limit" of 100 µg/L is established under the permit. While "notification" has not been made as none of these parameters has exceeded 100 µg/L, these results are included with quarterly reports submitted to the MDNR Water Pollution Control Division. Results were within the historic range for each outfall.

Table 5.2
VOC Sample Results – Outfalls 001, 002, 003, and 004
(results in µg/L)

Outfall	001			002			003			004		
Date	**TCE**	**1,2-DCE**	**Vinyl Chloride**	**TCE**	**1,2-DCE**	**Vinyl Chloride**	**TCE**	**1,2-DCE**	**Vinyl Chloride**	**TCE**	**1,2-DCE**	**Vinyl Chloride**
3/1/11	<1	2.8	<1	<1	<1	<1	<1	1.2	<1	5.8	<1	<1
5/4/11	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
6/7/11	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
9/6/11	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
12/7/11	<1	2.2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

*Outfall 002 sample collected on 2/7/11.
**Outfall 002 sample collected on 5/5/11.
***Outfall 002 sample collected on 6/16/11.
****Outfall 002 sample collected on 9/18/11.
*****Outfall 002 sample collected on 11/7/11.

Drinking water maximum contaminant levels (MCLs):
TCE – 7 µg/L
1.2-DCE – 70 µg/L

Outfall 001

Historically, Outfall 001 has routinely detected VOCs. Past Interim Measures to address the occurrence of VOCs in Outfall 001 included the installation of a groundwater collection system to prevent the migration of contaminated groundwater into Outfall 001 (DOE 1993a). The Outfall 001 Interceptor System was installed during 1993 to capture VOC contaminated groundwater before it infiltrates the 001 storm sewer system. The 001 Interceptor System delivers the groundwater it captures to the Groundwater Treatment System. This portion of Outfall 001 lies in relatively low area where the storm