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2023

Canada

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2023

Permanent link: https://doi.org/10.4095/331878

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Recommended citation

Kingston, A., Jiang, C., Wang, X., and Hobbs, T., 2023. Chemical compositions of flowback and produced water from the Duvernay shale and Montney tight reservoir developments in Western Canada: potential for lithium resources from wastewater; Geological Survey of Canada, Open File 8974, 1 .zip file. https://doi.org/10.4095/331878

Publications in this series have not been edited; they are released as submitted by the author.

ISSN 2816-7155
ISBN 978-0-660-48681-9
Catalogue No. M183-2/8974E-PDF

Abstract:

Increasing global demand for lithium coupled with a need to characterize domestic resources necessitates an expanded assessment for lithium production from unconventional sources. Oilfield brines are known to host elevated lithium concentrations and represent a prime candidate for lithium extraction. The purpose of this report is to expand our knowledge of brine chemistry within the Western Canadian Sedimentary Basin with a focus on the Triassic Montney and Devonian Duvernay formations. Specifically wells that are undergoing hydrocarbon production stimulated via hydraulic fracturing (HF) are sampled with the eventual goal of assessing the suitability of extracting lithium from flowback and produced wastewater. Two water chemistry datasets are presented, the first consisting of samples derived from numerous wells within the Montney and Duvernay formations, and the second dataset includes time series samples from several wells in the Montney and Duvernay formations illustrating temporal variations in water chemistry following the onset of well re-opening and fluid production after HF operations.

The maximum measured lithium concentration in the Montney Fm. is 76.8 mg/L with an average of 52.9 mg/L. Maximum measured lithium concentration in the Duvernay Fm. is 78.6 mg/L with an average of 44.9 mg/L. Comparison of Montney and Duvernay sodium-chloride-bromide system with seawater evaporation trends suggests halite dissolution likely played a role in the evolution of brine chemistry. Lithium concentration in brines is positively correlated with potassium concentration and inversely correlated with pH. Water chemistry time series reveal increasing lithium concentrations over time associated with increasing proportions of formation-derived water in produced fluids. Understanding spatial and temporal variations in lithium concentrations is essential for evaluating the resource potential of oilfield brines as well as informing appropriate extraction technologies.

Introduction:

As we transition away from a reliance on fossil fuels, global demand for energy storage increases resulting in a simultaneous growth in lithium (Li) demand due to its critical role in the production of modern high-density batteries. Along with this is a desire to identify domestic Li resources thereby eliminating dependencies on foreign Li supplies. As such, new sources of Li supply within Canada are required. Oilfield brines in the Western Canadian Sedimentary Basin (WCSB) have previously been shown to have elevated Li concentrations compared to surface water and seawater (Hitchon et al., 1993; Eccles and Berhane, 2011; Jensen, 2018; Huff, 2019; Jiang et al., 2021; Lyster et al., 2022) and may offer one potential source. Extraction of lithium from produced waters associated with hydraulic fracturing (HF) operations could contribute to this lithium demand. The rapid increase in hydrocarbon production from hydraulically stimulated wells has resulted in the generation of large volumes of wastewater (Goss et al., 2015; Kondash and Vengosh, 2015; Kondash et al., 2017). Wastewater composition reflects a mixture of geological formation waters along with HF fluids and an associated array of HF additives (Elsner and Hoelzer, 2016). The mixing of HF fluids with formation water (*in situ* water) during production leads to an enrichment in critical minerals potentially providing a source of these materials and value-added benefits to HF wastewaters.

The Triassic Montney and Devonian Duvernay formations are two highly productive unconventional hydrocarbon reservoirs in the WCSB, which are undergoing extensive exploitation for hydrocarbon extraction. They are responsible for the bulk of HF wastewater production in Canada (Alessi et al., 2017) and therefore represent excellent candidates for exploring the potential for lithium extraction. The objective of this report is to (a) expand the database of lithium occurrences in produced waters, particularly in the Early Triassic Montney Formation, and (b) provide geochemical time series of waters produced during HF operations illustrating the variations in lithium concentrations (and other relevant aqueous geochemical species) in flowback and produced waters (FPW) over time. Here we report two datasets of lithium concentrations in FPW from HF operations. The first dataset includes produced water geochemistry from 74 wells in the Montney Formation and 70 wells from the Duvernay Formation. The second dataset includes time series of FPW geochemistry from five wells in the Montney Formation and three wells in the Duvernay Formation.

Methods and description of produced water chemistry and flowback time series

Aqueous geochemistry properties and species reported include electrical conductivity (EC), pH, chloride (Cl), bromide (Br), sulfate (SO_4), aluminum (Al), boron (B), barium (Ba), calcium (Ca), iron (Fe), potassium (K), lithium (Li), magnesium (Mg), manganese (Mn), sodium (Na), silicon (Si),

strontium (Sr), and total dissolved solids (TDS). Analytical methods used include ion chromatography for major anions (Cl^-, Br^-, SO_4^{2+}); and a combination of ICP-OES and ICP-MS for major, minor, and trace elements (Al, B, Ba, Ca, Fe, K, Li, Mg, Mn, Na, Si, Sr).

Results from Montney and Duvernay FPW aqueous chemistry analyses are shown in Tables 1 and 2 respectively. The Montney and Duvernay FPW chemistry time series are shown in Tables 3 and 4 respectively. In addition, data tables are included as separate files, see *of_8974_Flowback Time Series.xlsx* and *of_8974_Flowback Aqueous Chemistry.xlsx*. Average Li content of Montney produced waters was 52.9 mg/L (σ = 16.1, n = 240) with a maximum and minimum concentration of 76.8 mg/L and 12.6 mg/L respectively. Average Li content of Duvernay produced waters was 44.9 mg/L (σ = 12.8, n = 113) with a maximum and minimum concentration of 78.6 mg/L and 4.9 mg/L respectively. The distribution of both Montney and Duvernay lithium concentrations (Fig. 1) are roughly bimodal which is generally related to regional (i.e., geographical) variations in brine composition.

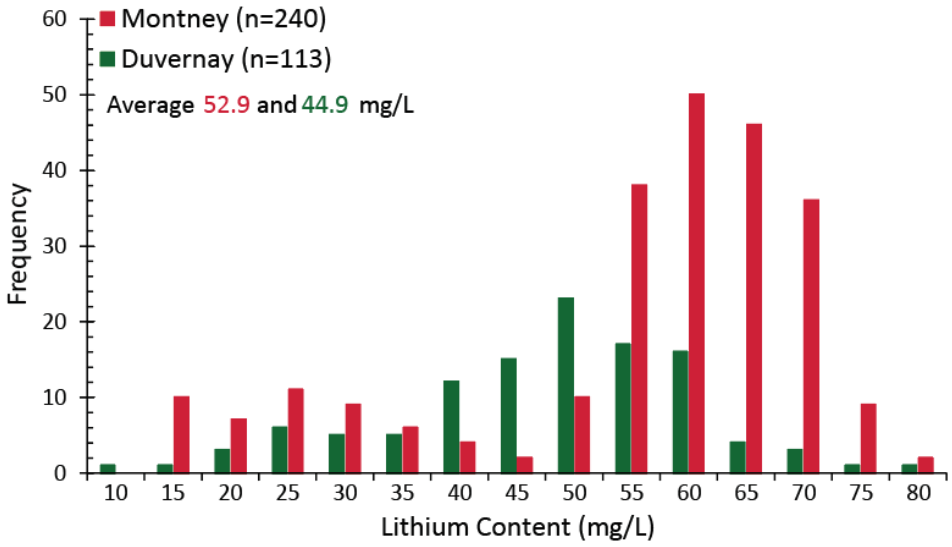

Figure 1: Distribution of Li concentration in Li-enriched oilfield brines from Montney and Duvernay flowback and produced waters.

Regional differences in lithium concentrations

FPW is composed of a mixture of the injected HF fluid and formation water. Water injected during the HF process has lower TDS and lithium concentrations as it is often derived from surface fresh water or a mix of fresh water with produced water in certain proportions. Therefore, the lithium content of pristine formation water for a particular well or location can be generally anticipated to be higher than the analyzed FPW. Based on the results obtained on over 300 FPW samples, it is obvious that formation water in the Duvernay shale contain a higher abundance of lithium in the Fox Creek area of the West

Shale Basin than in the Three Hills area of the East Shale Basin in Alberta (Fig. 2). For the formation water from Montney tight siltstone reservoirs, the Dawson Creek area of northeast BC (Sunrise-Tower fields) displays higher lithium contents than the Swan Lake area of northeast BC (Fig. 3), and the Wembley area of central-west Alberta has higher lithium concentrations than the Kakwa area of central-west Alberta. Moreover, based on this dataset oilfield brines from the Triassic Montney formation in the Dawson Creek area of northeast BC seem to have equivalent or even higher lithium resource potential than brines from the Devonian strata in the Fox Creek area of Alberta (Fig. 1), which was previously identified as a top perspective area for lithium exploitation (Lyster et al., 2022), thus expanding potential lithium resources into the Triassic strata of the WCSB.

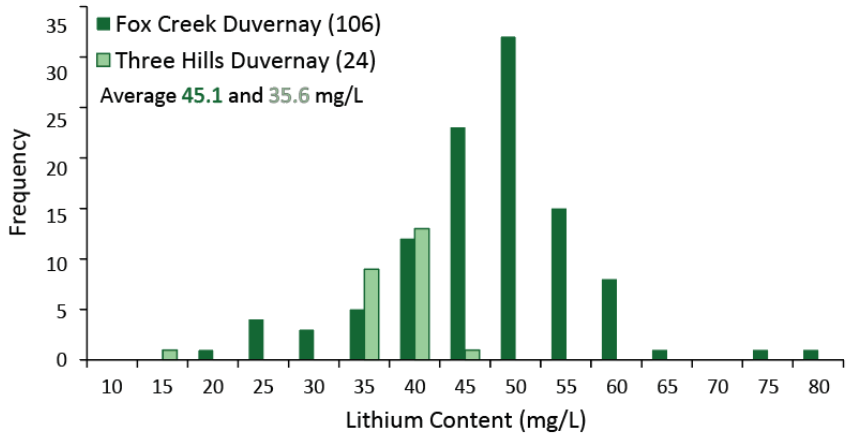

Figure 2: Lithium concentrations from two Duvernay pools (Fox Creek vs Three Hills, Alberta) illustrating the spatially heterogenous distribution of Li-enriched brines within the Duvernay Formation. Note: Three Hills values includes data from a time series.

Produced water time series

The aqueous chemistry time series record the evolution of FPW chemistry over the period of production, generally evolving from a lower TDS and Li concentration composition initially to formation-like brine over time. It is generally agreed that following 12 months of flowback the produced waters are consistent with a formation-like composition (e.g., Kondash et al, 2017; Osselin et al., 2018). Accordingly, when evaluating the geochemical characteristics of HF produced water it is essential to know the time since HF to delineate samples reflecting formation-like composition versus mixtures of HF fluids and formation water. An example times series from a Montney and Duvernay well (Fig. 4) illustrates the evolution of FPW from surface water-like composition (source of HF fluids) to formation-like concentrations of lithium after seven months of production.

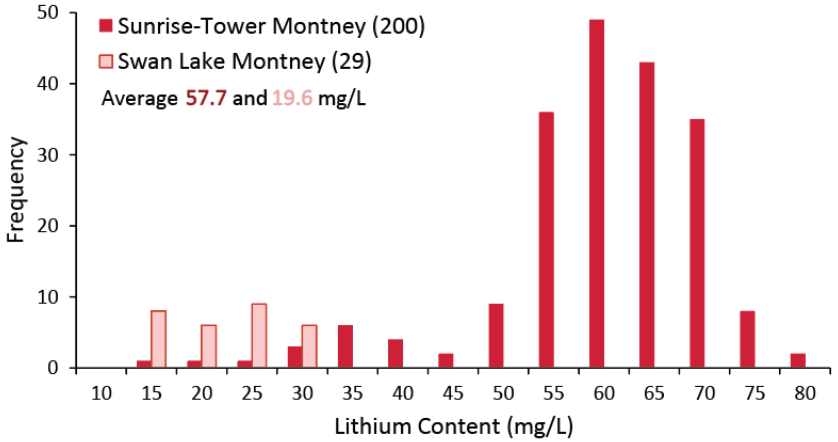

Figure 3: Lithium concentrations from two Montney pools (Sunrise-Tower vs. Swan Lake area, northeast BC) illustrating the spatially heterogenous distribution of Li-enriched brines within the Montney Formation.

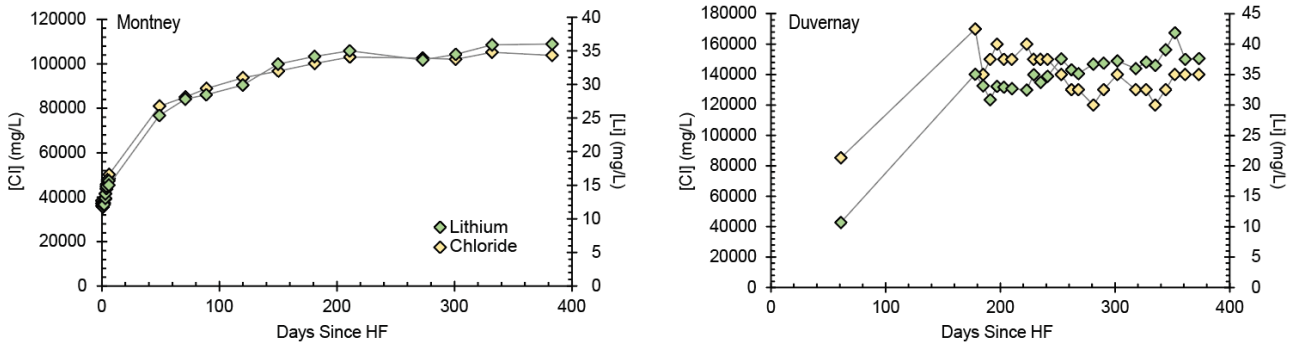

Figure 4: Time series of lithium and chloride concentrations in flowback and produced water from a Montney well in the Kakwa area, west-central Alberta and a Duvernay well in the Three Hills area, Alberta. Note that increasing chloride concentrations are associated with an increase proportion of formation water in produced fluids with maximum chloride signaling near formation water chemistry. Lithium follows a similar trend to chloride indicating Li is coming from formation brines, not hydraulic fracturing fluids.

Na-Cl-Br Systematics and Elemental Correlations

The Na-Cl-Br systematics is often used to evaluate sedimentary brine history differentiating brine sources, evaporative evolution, and effects related to halite (NaCl) dissolution/precipitation (e.g., Rittenhouse, 1967; Connolly et al., 1990; Walter et al., 1990; Rowan et al., 2015). Analysis of Na-Cl-Br chemistry of resultant brines during the evaporation of seawater reveals that Br is increasingly enriched in residual water as it is essentially excluded from incorporation in the halite lattice (McCaffery et al., 1987). Therefore, comparison of Na-Cl-Br chemistry of sedimentary brines with trends from evaporative seawater can provide a measure of the extent of evaporative processes as well as potential Na-Cl contributions from halite dissolution. These relationships can be illustrated in plots of Na/Br

against Cl/Br (Fig. 5a). Brines having undergone evaporative concentrations plot along the seawater evaporation trend, whereas brines that plot above and to the right of this trend have elevated Na and Cl compared with seawater indicating halite dissolution. For example, Li-enriched brine samples from the Devonian Duperow Formation in Saskatchewan often have Na-Cl-Br compositions reflecting seawater evaporation (Rostron et al., 2022). In contrast, all Montney samples and a majority of the Duvernay samples plot in the halite dissolution zone indicating they are depleted in Br and have Na and Cl derived from the dissolution of halite. However, one of the main issues with this interpretation is the absence of halite in the Montney Formation (also absent in under- and overlying formations), suggesting further analysis may be necessary to evaluate alternative mechanism(s) potentially influencing Na-Cl-Br brine chemistry.

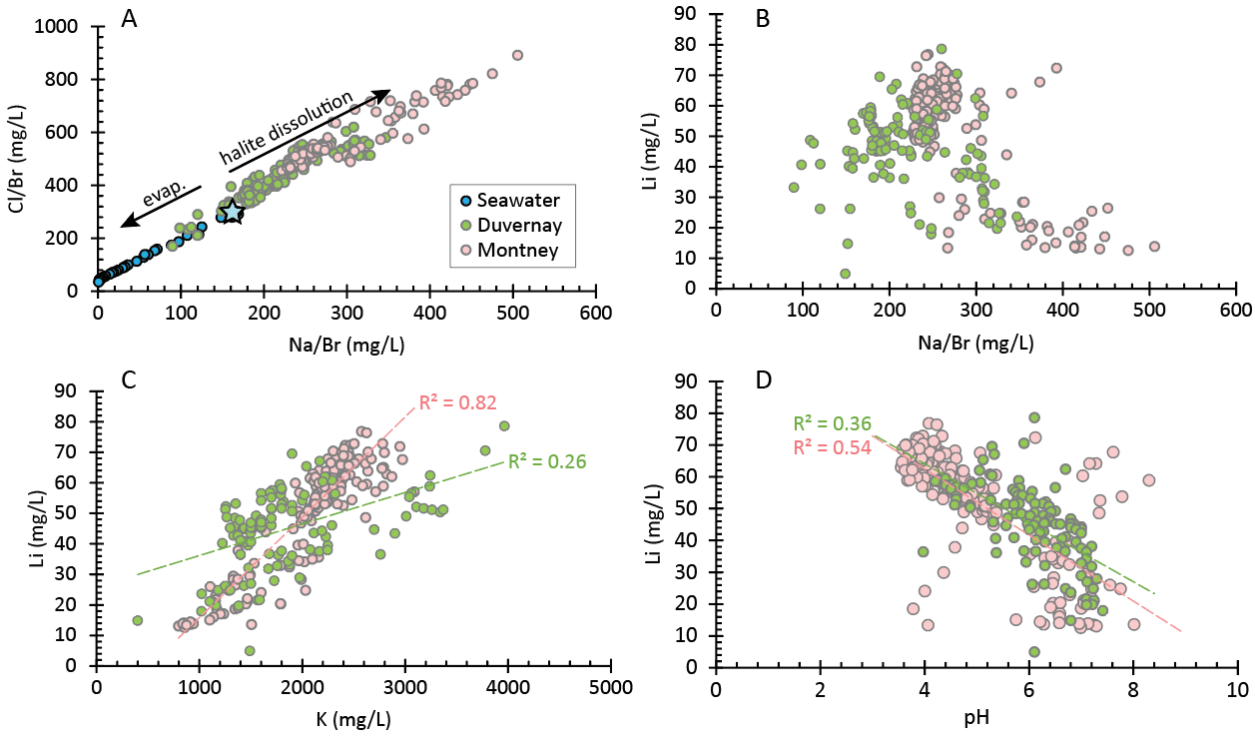

Figure 5: A. Plot of Montney and Duvernay Na/Br against Cl/Br ratios (in mg/L) shown alongside evaporating seawater ratios with seawater composition denoted by blue star. Samples which plot above and to the right of seawater have undergone halite dissolution whereas those below and to the left represent evaporated seawater composition. B. Plot of lithium concentrations against Na/Br ratio. In general lithium concentrations decrease with increasing Na/Br ratios. C. Correlation between lithium and potassium, which is stronger in Montney samples compared with Duvernay samples. D. Correlation between lithium and pH showing higher lithium concentrations are associated with lower pH which again is stronger for Montney samples.

Lithium concentrations decrease with increasing Na/Br values (Fig. 5b) indicating that Li is likely not associated with the halite dissolution process and is derived from alternative sources. One possibility is that formation brines represent the mixing of several water sources with at least one derived from the dissolution of halite giving rise to reduced Br. Elevated Li concentrations are also correlated with higher potassium contents (Fig. 5c), similar to previous findings from Devonian brines in the WCSB (Eccles and Berhane, 2011; Huff, 2019), and lower pH waters (Fig. 5d), however this could be related to acid spikes used in the production process or post-sampling alteration related to extended shelf life, see *Limitations*.

Limitations

The analyzed FPW samples in this study were mostly contributed by operators after long-term storage (e.g., up to 3 years) at various conditions ranging from refrigerated (3°C) to ambient. As such, bicarbonate and carbonate are not reported here. In addition, the concentrations of redox-sensitive cations such iron may also have been affected by sample storage after collection. The precipitation of iron oxide and hydroxide may also have resulted in certain degree of removal of lithium via adsorption. Therefore, caution should be exercised when using these values.

Potential implications for lithium research

Evaluating the relationship between Li and other relevant geochemical species in FPW may help elucidate potential Li sources, thereby identifying regions with economic concentrations of Li in formation waters. Furthermore, understanding variations in Li concentration within FPW through time may have implications for the feasibility and the type of extraction technology selected for economic Li recovery. Recent advancements in direct lithium extraction (DLE) technologies have made lower grade lithium brines economic for lithium recovery. DLE methods include adsorption, ion exchange, solvent extraction, and membrane separation all of which have advantages and disadvantages depending on the characteristics of the initial brine composition (Stringfellow and Dobson, 2021). Several of these technologies are currently being evaluated on oilfield brines including FPW in the WCSB (e.g., Seip et al., 2021). Optimal extraction method may vary during the lifetime of a HF operations especially where the concentrations of Li and other geochemical species are changing through time. Therefore, it is essential to understand variations in flowback water chemistry through time to accurately evaluate produced waters as potential Li resources.

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Table 1. Montney Flowback and Produced Water Chemistry

GSC Sample ID	UWI	Days since HF	Electrical Conductivity (mS/cm)	pH	Cl (mg/L)	Br (mg/L)	SO4 (mg/L)	Al (mg/L)	B (mg/L)	Ba (mg/L)	Ca (mg/L)	Fe (mg/L)	K (mg/L)	Li (mg/L)	Mg (mg/L)	Mn (mg/L)	Na (mg/L)	Si (mg/L)	Sr (mg/L)	TDS (g/L)
C-640035	100010508017W600	128	216.1	4.9	124660	257.6	15.2	4.9	27.6	18.0	15559	1.1	2186.6	53.8	1534.7	4.4	62268	7.3	1432.2	208.0
C-640034	100010508017W600	135	217.5	4.9	123533	257.3	32.7	5.7	28.1	18.6	15666	0.8	2248.2	56.4	1551.5	4.4	62729	7.6	1444.2	207.6
C-640036	100030908017W600	580	224.5	4.6	133173	282.9	44.4	6.7	26.6	12.9	16495	1.0	2289.6	58.2	1731.9	5.2	65323	9.6	1386.6	220.8
C-640037	100030908017W600	625	229.8	4.2	140966	287.1	34.5	6.3	17.3	10.5	17469	0.5	2376.9	66.8	1813.3	5.0	67349	7.8	1286.1	231.7
C-640038	100030908017W600	659	231.5	4.3	144704	289.7	50.8	7.2	27.5	36.4	18883	0.3	2488.1	67.9	1962.9	6.0	71046	7.1	1684.6	241.3
C-640039	100030908017W600	691	231.9	4.0	144948	294.2	53.6	5.1	16.9	9.9	19398	0.3	2190.2	59.7	1689.0	4.7	74167	7.8	1176.8	244.0
C-640040	100032307209W600	434	161.6	7.8	77357	151.0	1334.2	0.8	122.0	1.4	2802	0.2	2117.5	53.8	1090.0	0.2	45222	19.1	191.3	130.5
C-640042	100041507209W600	482	201.3	7.3	104797	205.7	1247.8	1.7	129.1	2.3	3769	0.3	2617.3	48.6	1072.2	0.2	62945	21.2	230.6	177.1
C-640041	100041507209W600	488	174.9	7.4	86845	171.6	1193.9	1.0	140.4	1.2	2784	0.0	2398.1	52.6	1105.6	0.1	49629	26.7	248.7	144.6
C-640043	100041508118W602	542	218.6	4.5	129425	246.4	119.7	6.0	19.2	10.7	15842	0.4	2232.4	57.5	1616.0	4.4	61773	12.0	1132.7	212.5
C-640044	100041508118W602	577	225.8	4.1	137750	259.0	127.8	5.6	17.3	10.3	17308	0.2	2148.1	57.2	1672.9	4.5	66064	8.7	1157.3	226.6
C-640045	100041508118W602	599	227.7	3.8	140752	263.6	134.9	6.7	17.1	9.0	18327	0.3	2416.5	72.2	2028.9	4.8	68951	7.0	1254.6	234.2
C-640046	100041508118W602	638	231.5	3.6	145756	265.1	124.3	7.0	17.8	9.4	19266	0.0	2297.9	62.9	1816.4	5.1	71739	5.4	1236.2	242.6
C-640047	100041508118W602	651	231.4	3.7	146733	263.7	139.5	6.5	27.5	13.0	19209	0.1	2358.9	67.7	2020.0	5.4	71393	6.9	1501.7	243.7
C-640048	100041508118W602	656	231.7	3.8	144312	273.5	126.7	5.5	17.9	8.4	19644	0.5	2289.7	62.2	1805.0	5.1	73061	8.2	1205.8	242.8
C-640049	100041508118W602	691	233.1	3.7	148272	269.4	122.5	6.3	25.7	17.8	20341	0.6	2316.0	63.5	1826.5	5.9	74816	7.4	1551.1	249.6
C-640050	100042207209W600	753	186.1	7.0	93632	187.0	980.3	1.8	135.1	2.1	3526	0.0	2529.4	60.3	1042.3	0.0	56805	22.4	232.3	159.2
C-640051	100050408017W600	70	204.0	5.1	111125	215.3	51.6	5.0	25.5	13.4	13373	3.3	1988.2	46.7	1393.3	4.2	54182	9.4	1215.1	183.7
C-640052	100050408017W600	91	214.2	4.8	122449	246.4	51.7	4.9	27.1	14.5	15066	0.9	2161.0	53.5	1530.3	4.7	59897	9.9	1367.3	202.9
C-640053	100050408017W600	104	216.4	4.8	123515	248.9	46.0	5.6	26.0	14.0	15130	0.9	2120.6	52.0	1551.4	4.7	59861	9.8	1393.9	204.0
C-640054	100051508118W600	399	221.2	4.4	129698	247.1	147.4	6.0	18.4	9.3	15608	0.2	2188.0	57.0	1618.8	4.1	59576	9.4	1119.4	210.3
C-640055	100051508118W600	457	230.7	4.3	143383	270.7	173.3	6.2	17.9	10.8	19248	9.3	2354.0	64.8	1814.5	4.9	69979	10.5	1295.5	238.6
C-640056	100051508118W600	486	232.4	4.1	146474	272.5	147.6	7.1	26.6	23.8	19808	0.2	2412.9	67.8	1942.3	5.9	72331	6.0	1599.4	245.1
C-640057	100051508118W600	506	233.5	3.9	147676	270.0	156.2	7.2	17.3	8.8	19888	1.6	2184.1	63.6	1833.1	4.5	72078	8.4	1101.3	245.3
C-640058	100051508118W600	513	233.1	3.8	146090	273.4	140.9	0.0	45.3	0.6	20191	0.1	1170.4	18.5	923.3	1.2	73269	38.9	141.2	242.3
C-640059	100051508118W600	549	234.5	4.2	150070	275.9	155.2	6.7	17.3	9.6	21112	1.5	2342.9	67.5	1925.5	4.6	75735	7.9	1186.8	252.9
C-640061	100090408017W600	81	220.6	4.7	126142	260.1	67.3	6.5	27.9	7.9	15963	1.8	2247.4	56.7	1674.1	5.2	63487	10.1	1319.7	211.3
C-640062	100090408017W600	106	227.5	4.5	137267	297.7	38.8	6.9	28.8	9.6	17248	1.0	2384.0	60.6	1807.5	5.1	67565	11.4	1454.9	228.2

C-640063	100090408017W600	119	229.8	4.1	146843	296.5	44.0	5.8	29.4	9.9	17800	0.5	2395.9	62.4	1828.0	5.2	68085	11.9	1520.9	238.9
C-640065	100090507714W600	134	104.7	6.6	50517	64.6	50.4	1.7	32.2	17.0	3852	1.4	1235.7	17.0	538.1	3.4	28966	30.7	645.6	86.0
C-640064	100090507714W600	134	104.7	6.6	50015	64.0	66.5	2.3	32.0	19.2	3773	1.3	1205.1	17.0	534.5	3.2	26957	29.2	639.5	83.4
C-640066	100090507714W600	170	114.0	6.6	49754	71.3	57.3	2.2	28.9	22.5	3737	0.0	1137.7	16.0	512.0	2.9	25983	26.3	658.1	82.0
C-640067	100090507714W600	170	113.5	5.8	49236	68.9	54.0	1.6	28.1	20.8	3644	0.4	1100.7	15.1	511.2	3.1	27025	26.7	641.7	82.4
C-640068	100100508017W600	70	206.5	5.0	113127	223.9	62.7	5.0	26.6	10.4	13581	1.9	2059.3	48.9	1436.9	4.2	54820	8.1	1240.7	186.7
C-640069	100100508017W600	92	216.6	4.9	123629	250.3	38.9	6.5	26.5	10.9	15438	1.3	2173.4	54.2	1578.0	4.4	61391	10.4	1368.8	206.0
C-640070	100100508017W600	104	218.5	4.8	128352	257.2	32.9	6.5	27.6	11.2	15926	1.0	2190.9	54.3	1607.3	4.5	62781	7.4	1447.5	212.7
C-640072	100121207715W600	1363	81.5	7.2	35801	48.6	32.4	1.5	28.6	24.0	2340	0.4	828.0	13.4	331.5	1.5	20181	26.5	428.3	60.1
C-640071	100121207715W600	1363	80.8	7.3	35189	46.3	29.2	1.5	29.7	19.2	2245	0.0	796.9	13.1	322.8	1.3	20508	24.4	411.6	59.6
C-640074	100122807714W600	208	133.8	7.2	71423	99.8	115.2	5.3	23.6	7.9	10464	0.1	1286.7	24.8	1601.1	0.7	32749	20.7	975.8	118.8
C-640073	100122807714W600	208	136.0	6.8	66063	96.2	165.6	4.1	21.7	9.8	9552	0.4	1156.8	22.9	1463.2	1.9	29792	31.5	901.9	109.3
C-640075	100122807714W600	367	161.6	7.1	79970	125.2	113.9	4.8	22.8	8.0	12872	0.0	1329.9	29.4	1766.7	2.8	35420	26.9	1170.6	132.9
C-640077	100130308017W600	1627	221.2	4.6	136721	276.1	71.1	5.9	30.8	11.8	16648	0.5	2262.4	59.9	1736.7	4.6	65537	12.2	1303.2	224.7
C-640078	100140508017W600	81	208.9	5.1	113867	244.2	44.0	5.4	25.8	10.7	13972	2.3	2083.4	49.6	1476.0	4.6	55896	11.8	1259.3	189.0
C-636658	100141208118W600	224	166.7	6.6	96200		121.0	<0.20	21.9	4.5	11666	<2.0	1788.1	32.9	1400.5	3.3	51136	<10	1010.0	163.4
C-636659	100141208118W600	326	173.4	6.5	95400		141.0	<0.20	21.8	14.7	12646	<2.0	2022.5	34.1	1521.2	3.0	55280	<10	1050.0	168.2
C-636660	100141208118W600	336	173.8	6.5	95900		123.0	<0.20	23.9	13.4	12341	<2.0	1991.0	28.3	1525.4	3.5	54070	<10	1060.0	167.1
C-636661	100141208118W600	387	174.7	6.3	93500		132.0	<0.20	21.3	15.6	12609	<2.0	1967.5	34.5	1496.1	3.1	54645	<10	1060.0	165.5
C-636662	100141208118W600	437	176.8	6.0	104000		146.0	<0.20	21.5	15.4	14183	<2.0	2159.0	35.6	1677.4	3.4	59026	<10	1140.0	182.4
C-636663	100141208118W600	525	168.1	6.7	98300		176.0	<0.20	21.3	13.2	10611	<2.0	1533.0	33.6	1235.8	2.9	43817	<10	935.0	156.7
C-636665	100141208118W600	548	173.3	6.4	95400		152.0	<0.20	21.5	13.5	14360	<2.0	2098.7	35.0	1685.7	3.0	57338	<10	1000.0	172.1
C-636666	100141208118W600	574	181.7	6.5	103000		152.0	<0.20	21.6	13.4	13529	<2.0	1958.2	39.5	1560.3	3.1	53175	<10	1050.0	174.5
C-636667	100141208118W600	813	157.5	6.8	82100		175.0	1.61	21.8	9.3	11776	<2.0	1876.2	32.4	1380.8	2.3	50919	<10	808.0	149.2
C-640082	100141407715W600	157	113.7	6.1	57314	77.2	16.3	1.7	46.4	159.2	3461	0.0	1238.5	25.4	608.0	2.6	33452	38.0	593.4	97.0
C-640083	100141407715W600	157	81.5	6.3	39435	50.8	88.9	1.3	26.6	11.1	2783	0.0	919.6	13.6	457.4	4.8	21385	32.3	422.6	65.6
C-640084	100150508017W600	84	210.9	5.4	115192	248.0	64.4	5.7	26.2	10.7	14233	0.8	2086.5	50.0	1506.6	4.2	57489	6.5	1244.4	192.2
C-640086	100150508017W600	114	216.8	5.1	123363	243.2	44.3	7.1	26.4	9.3	15301	0.7	2094.9	52.2	1567.3	4.2	60782	9.3	1334.3	204.8
C-640085	100150508017W600	136	219.9	4.7	131280	270.0	36.1	5.6	28.3	10.9	16349	1.3	2287.3	58.0	1668.2	4.5	64229	8.8	1434.2	217.7
C-640088	100151207715W600	378	75.0	7.1	37487	42.0	54.3	1.6	32.1	8.0	2353	0.2	940.9	13.8	364.7	1.3	21264	37.0	378.8	63.0
C-640087	100151207715W600	378	75.2	7.0	34332	41.8	71.8	1.1	29.2	7.5	2134	0.1	855.7	12.6	333.5	1.3	19858	31.3	344.1	58.1

C-640089	100161308118W600	89	233.1	4.1	149282	280.7	199.1	6.3	18.3	9.5	19288	2.0	2442.0	66.8	1933.8	4.9	71850	7.0	1341.1	246.7
C-640090	100161308118W600	116	235.0	4.0	151544	281.0	204.0	6.5	21.0	8.1	20538	1.4	2169.8	63.4	1813.6	4.4	73738	8.2	1090.0	251.5
C-640091	100161308118W600	123	235.1	4.1	152208	285.8	188.6	6.4	25.4	17.5	20435	1.1	2305.0	63.1	1812.6	6.0	73074	8.2	1545.5	252.0
C-640092	100161308118W600	148	236.6	3.6	154463	281.2	191.1	6.5	17.6	10.4	20582	0.5	2438.3	69.9	2007.8	4.9	74564	8.0	1263.0	255.9
C-640093	100161308118W600	165	237.2	3.9	159924	295.7	201.5	6.7	28.8	20.2	21486	0.1	2288.0	65.9	1959.8	5.0	77669	7.5	1438.3	265.4
C-640094	100161308118W600	172	236.9	3.7	154652	289.7	196.3	5.2	17.7	11.6	20548	3.6	2278.3	61.5	1749.0	5.0	74328	10.7	1260.1	255.4
C-640095	100161308118W600	198	237.5	3.8	160962	290.8	176.7	5.2	26.2	22.7	22078	0.7	2283.7	65.6	1948.8	5.2	78874	7.8	1435.5	268.2
C-640096	100163207917W600	123	213.7	5.2	122746	241.8	34.9	5.5	26.7	16.0	14946	3.2	2156.5	53.1	1548.4	4.4	59295	8.6	1399.1	202.5
C-640097	100163207917W600	133	218.0	4.8	123313	257.0	44.7	5.7	28.6	11.5	15370	1.8	2143.5	52.8	1556.9	4.6	61296	7.0	1391.2	205.5
C-640098	100163207917W600	141	217.7	4.9	123537	254.9	30.9	5.7	26.3	11.6	15233	1.1	2160.9	54.1	1582.8	4.6	59949	8.1	1438.3	204.3
C-640099	100163407108W600	226	164.7	7.8	80085	147.2	943.3	0.9	58.9	1.7	3357	0.0	2031.3	24.8	983.0	0.5	46590	33.0	244.8	134.5
C-640101	102010508017W600	127	216.4	4.7	122550	250.4	44.3	6.6	26.8	17.1	15361	1.8	2212.0	54.2	1561.5	4.6	61808	10.9	1390.0	205.3
C-640102	102010508017W600	134	217.8	4.7	125696	255.1	35.4	6.2	27.6	14.4	15785	1.0	2190.0	53.3	1553.2	4.5	63704	9.6	1419.8	210.8
C-640103	102010508017W600	143	218.2	4.4	131325	263.2	29.9	5.7	27.7	16.2	15563	1.1	2251.4	55.0	1596.4	4.7	61715	11.1	1452.0	214.3
C-640104	102011208118W600	73	158.2	4.6	80538	138.8	159.8	3.4	18.4	7.0	9036	2.3	1376.5	37.8	1028.5	3.6	38430	17.6	597.5	131.4
C-640105	102011208118W600	78	162.4	4.7	98566	145.5	165.2	4.5	21.0	7.5	10942	1.0	1645.5	43.9	1237.7	4.7	48742	12.3	724.7	162.3
C-640106	102011208118W600	243	210.9	4.6	120540	224.6	204.2	7.6	17.8	8.8	15668	1.9	2415.6	68.2	1983.7	4.7	59713	8.1	1221.0	202.1
C-640107	102030908017W600	472	218.6	4.6	129120	259.8	57.1	5.6	27.0	9.4	15499	0.4	2167.5	55.0	1655.5	5.0	61780	8.9	1340.6	212.0
C-640108	102030908017W600	521	225.4	4.3	134445	274.8	50.8	6.3	18.5	9.1	17183	0.7	2438.8	67.3	1962.5	5.3	67183	10.2	1316.5	225.0
C-640109	102030908017W600	555	226.9	4.5	138651	278.0	52.8	6.9	17.6	8.1	17602	1.4	2285.1	62.8	1819.0	4.8	67885	6.1	1209.7	229.9
C-640110	102030908017W600	587	228.7	4.4	140027	273.7	60.7	0.2	64.6	1.0	18516	0.1	1494.4	29.9	1089.6	0.4	70396	35.4	240.8	232.2
C-640111	102040408017W600	131	215.1	4.8	121712	261.0	31.2	6.2	26.4	17.7	15081	1.0	2132.2	53.1	1528.8	4.3	60942	6.4	1345.2	203.1
C-640113	102041507209W600	479	100.3	8.0	42060	62.7	327.9	1.2	30.0	1.4	2393	0.3	1508.0	13.5	916.0	0.1	23807	15.2	270.9	71.4
C-640114	102041508118W600	434	224.0	4.5	134233	250.5	164.3	5.3	17.3	8.2	17240	0.5	2155.8	57.2	1703.5	4.5	65083	8.0	1119.8	222.1
C-640115	102041508118W600	456	228.2	4.0	142771	265.5	177.2	6.3	18.3	11.4	19228	3.0	2448.0	67.7	1845.5	5.1	70029	11.4	1330.4	238.2
C-640116	102041508118W600	485	230.7	4.0	142239	265.4	154.5	5.8	26.6	13.2	19693	0.4	2287.2	61.9	1792.6	4.6	71879	8.6	1451.5	239.9
C-640117	102041508118W600	505	231.7	4.0	144821	264.0	145.2	5.1	26.8	13.3	19547	0.4	2205.8	61.3	1810.1	4.6	71508	7.2	1331.6	241.8
C-640118	102041508118W600	548	234.5	3.9	148730	275.4	164.4	5.3	26.4	14.5	21293	1.0	2252.7	59.1	1740.7	4.9	76061	8.4	1424.5	252.1
C-640119	102042407209W600	596	171.8	8.3	87854	166.1	1340.4	1.3	117.4	1.6	2813	0.0	2132.9	58.9	1313.0	0.0	51326	14.1	200.8	147.3
C-640120	102042807714W600	66	139.6	7.6	64424	101.4	114.0	3.4	20.7	20.4	9833	0.0	1105.5	26.0	1366.5	2.3	29068	31.0	998.7	107.1
C-640121	102050107209W600	147	81.9	6.1	33459	54.6	1126.2	6.5	18.1	8.6	1511	1.3	2466.2	72.3	2057.7	5.1	21458	7.7	1264.0	63.5

C-640122	102051508118W600	401	214.1	4.7	121886	230.6	134.1	5.6	17.2	10.4	14286	0.5	2124.2	54.6	1519.2	3.9	56732	9.0	1068.9	198.1
C-640123	102051508118W600	436	222.6	5.3	131486	243.6	119.3	6.4	16.8	9.9	16670	0.1	2156.4	56.5	1647.7	4.4	64231	7.8	1141.8	217.8
C-640124	102051508118W600	459	224.8	4.4	137405	251.6	157.5	7.0	28.0	17.9	17624	0.6	2439.1	67.3	1910.0	5.5	66635	8.9	1612.2	228.2
C-640125	102051508118W600	488	227.3	4.2	138736	256.3	154.5	6.8	17.9	10.2	18425	1.1	2448.8	70.1	2018.5	5.0	69103	8.2	1260.7	232.5
C-640126	102051508118W600	505	227.2	3.9	135440	250.2	144.5	6.2	20.1	10.7	17726	1.9	2163.6	64.0	1716.5	4.6	67427	9.5	1047.3	226.0
C-640127	102051508118W600	515	228.3	4.0	139352	253.6	127.0	1.7	50.0	1.8	18882	0.0	1601.3	24.0	962.1	0.8	71035	34.1	519.5	232.8
C-640128	102051508118W600	551	230.6	4.1	141977	260.5	129.7	6.2	26.9	18.6	19418	0.6	2294.4	62.4	1794.5	5.4	72024	7.4	1476.2	239.5
C-640129	102103207917W600	118	218.2	5.1	126039	272.9	36.6	5.2	27.1	15.7	15780	1.2	2170.2	52.6	1590.2	4.9	62475	8.4	1512.5	210.0
C-640130	102103207917W600	128	221.4	4.7	129178	264.9	14.2	6.2	26.7	18.0	16222	0.9	2243.5	56.7	1625.5	4.8	64413	9.8	1515.0	215.6
C-640131	102120107209W600	151	128.8	7.3	57187	116.9	740.4	6.7	27.3	16.8	2574	0.2	2362.6	64.2	1844.2	5.2	35573	7.0	1542.3	102.1
C-640132	102121008017W600	1171	208.1	4.8	118588	222.4	91.7	5.4	25.5	6.7	13833	1.9	1962.4	50.6	1518.7	4.4	55904	8.1	1089.6	193.3
C-640133	102121008017W600	1251	223.6	4.3	134331	265.3	70.2	7.2	18.7	8.6	17956	2.0	2504.1	72.8	2065.9	5.2	68717	8.2	1273.9	227.3
C-640134	102121008017W600	1265	224.9	4.2	137125	273.2	87.9	5.9	17.6	8.1	17915	1.1	2263.9	62.7	1847.0	4.9	67558	7.8	1222.7	228.4
C-640136	102122807714W600	175	136.9	6.5	72051	100.1	65.6	2.4	32.2	15.4	7606	0.4	1789.9	20.2	1058.4	8.4	35242	29.7	982.4	119.0
C-640135	102122807714W600	175	136.8	6.6	71205	99.6	62.6	3.5	31.5	15.1	7472	0.5	1789.2	20.4	1046.0	8.1	38028	30.6	983.9	120.8
C-640137	102130407714W600	135	118.9	7.0	57896	76.4	55.6	2.7	30.8	20.1	4590	1.3	1346.4	18.6	634.8	3.6	31028	27.7	747.6	96.5
C-640138	102130407714W600	135	120.1	6.4	57564	78.0	47.2	1.5	33.6	29.4	4724	0.7	1375.9	19.0	635.8	3.8	29916	28.7	757.2	95.2
C-640139	102140508017W600	80	220.4	4.9	129553	274.0	36.6	6.1	29.6	11.3	15880	1.4	2211.9	55.7	1628.3	4.9	63333	10.4	1418.7	214.5
C-640141	102140508017W600	112	229.8	4.7	143191	284.7	26.9	7.2	27.5	15.1	17301	1.4	2313.9	58.4	1755.4	5.1	66371	10.8	1591.9	233.0
C-640140	102140508017W600	134	231.9	4.4	146269	304.2	27.6	7.0	30.8	17.3	18660	0.0	2464.5	62.6	1822.1	5.6	70897	9.6	1707.5	242.3
C-640143	102141407715W600	156	79.0	6.6	35226	45.8	96.3	0.6	24.6	11.5	2500	0.2	849.4	14.0	400.4	5.3	18944	25.9	378.2	58.5
C-640142	102141407715W600	156	79.1	7.0	35190	44.8	82.4	1.2	24.5	12.9	2453	0.4	837.2	13.8	399.7	5.2	18512	25.1	374.8	58.0
C-640144	102150508017W600	86	212.4	5.4	118466	252.5	35.6	5.2	27.1	9.9	14507	1.8	2047.4	49.0	1528.0	4.7	58181	5.3	1331.8	196.5
C-640145	102150508017W600	96	216.6	4.8	122659	250.0	41.3	5.6	27.0	10.7	14800	0.7	2122.5	52.0	1565.5	4.5	59107	7.8	1364.2	202.0
C-640147	102150508017W600	109	218.8	4.7	126859	256.3	49.2	6.3	27.0	10.8	15771	2.3	2176.7	53.7	1594.5	4.6	62085	10.5	1422.5	210.3
C-640148	102150508017W600	113	231.5	4.4	147104	294.0	53.6	6.8	28.1	12.8	18495	1.3	2291.6	63.0	1921.3	5.5	71017	11.6	1434.6	242.7
C-640146	102150508017W600	134	223.6	4.6	132828	274.8	51.4	6.3	28.2	12.1	16546	1.4	2278.4	58.0	1677.7	4.9	64071	11.3	1504.2	219.4
C-640149	102153207917W600	841	208.3	5.1	113620	235.1	47.5	6.4	25.5	11.8	14155	0.3	2069.7	51.3	1439.0	3.7	58108	5.2	1261.3	191.0
C-640150	102160408017W600	86	225.4	4.3	133161	282.2	57.3	5.9	29.7	8.4	17156	1.3	2234.0	58.8	1767.3	5.1	67875	10.2	1373.5	224.0
C-640151	102160408017W600	103	223.6	4.6	133154	277.3	54.1	6.4	28.1	8.5	16571	1.7	2178.1	57.8	1741.2	4.8	65035	11.5	1337.7	220.5
C-640152	102161308118W600	61	232.9	5.1	149002	285.7	181.6	6.5	18.0	12.1	19050	0.7	2385.0	67.5	1927.4	4.6	71085	11.6	1206.8	245.2

C-640154	102161308118W600	85	232.4	3.8	149593	279.1	177.7	6.0	17.4	10.9	19449	1.6	2385.3	68.9	1922.3	4.7	71471	9.0	1221.0	246.6
C-640153	102161308118W600	94	233.1	4.1	148564	284.2	181.9	7.2	17.4	10.6	20207	1.4	2371.1	67.8	1940.2	4.8	73458	9.2	1237.1	248.4
C-640155	102161308118W600	115	235.2	3.9	160081	294.2	200.0	7.0	16.8	8.9	21374	1.7	2374.4	69.9	1975.1	4.6	76738	7.8	1235.2	264.4
C-640156	102161308118W600	122	235.8	3.9	159863	297.5	185.5	5.9	17.1	10.3	21250	0.4	2302.4	62.3	1747.9	4.6	76701	8.4	1224.5	263.7
C-640157	102161308118W600	151	237.2	3.7	153492	283.3	167.4	6.1	19.6	8.8	20984	1.6	2234.0	63.8	1803.6	4.5	75320	6.7	1093.3	255.5
C-640158	102162207109W600	126	143.7	7.2	66465	116.0	396.0	6.1	17.6	10.8	5063	0.3	2375.7	64.2	1773.9	4.9	39520	8.4	1277.5	117.1
C-636669	103011208118W600	72			90200		231.0	<0.20	18.2	6.4	10146	<2.0	1487.9	29.4	1107.4	3.0	39448	<10	495.0	143.2
C-636668	103011208118W600	93	168.7	6.8	93400		203.0	<0.20	20.1	5.9	14103	<2.0	2012.1	39.9	1571.3	3.1	52620	<10	631.0	164.7
C-636670	103011208118W600	127	185.3	5.9	116000		285.0	<0.20	20.2	5.8	15851	<2.0	2090.2	47.5	1723.9	3.4	56451	<10	762.0	193.3
C-636672	103011208118W600	168	190.6	5.2	112000		218.0	<0.20	21.0	5.9	15161	<2.0	1986.5	49.2	1652.8	3.6	54304	<10	799.0	186.2
C-636671	103011208118W600	185	194.3	5.0	111000		222.0	<0.20	20.7	5.8	18291	<2.0	2340.4	53.0	1997.3	3.6	63376	<10	814.0	198.1
C-636673	103011208118W600	334	209.0	4.2	135000		226.0	<0.20	21.4	5.9	17147	<2.0	2138.8	61.3	1858.6	4.3	59262	<10	977.0	216.7
C-636674	103011208118W600	522	216.0	4.1	151000		224.0	<0.20	21.8	6.3	21311	2.6	2551.1	67.8	2302.7	4.8	69255	<10	1100.0	247.8
C-636675	103011208118W600	564	216.0	4.1	151000		223.0	<0.20	21.6	6.2	23726	<2.0	2778.4	64.9	2539.6	4.8	74684	<10	1110.0	256.2
C-640162	103040408017W600	130	210.9	5.1	116721	253.2	30.9	5.1	26.7	13.2	14071	0.7	2063.9	51.4	1470.4	4.0	57439	7.3	1293.2	193.5
C-640163	103040408017W600	145	214.4	5.0	122146	247.2	29.7	6.1	26.2	13.4	14382	0.2	2099.6	51.8	1504.0	3.9	57616	9.0	1371.7	199.5
C-640164	103040908017W600	471	226.6	4.4	134514	293.1	59.5	6.0	26.6	19.1	17480	1.1	2356.4	60.4	1795.3	6.1	67298	9.7	1521.6	225.4
C-640165	103040908017W600	520	230.1	4.0	146579	293.1	37.8	5.7	20.1	11.1	18296	4.4	2421.8	68.8	1869.6	5.3	70016	11.6	1330.7	241.0
C-640166	103040908017W600	558	229.9	4.1	139503	285.8	55.1	7.1	19.1	9.0	18786	0.0	2322.9	68.5	1970.4	4.5	71555	6.0	1196.3	235.8
C-640167	103091008017W600	1171	226.3	4.4	139659	274.8	104.8	5.9	26.7	16.8	17200	1.7	2189.4	59.9	1843.2	4.9	67321	9.7	1322.4	230.0
C-640168	103091008017W600	1207	228.3	4.7	140354	278.2	87.6	7.5	26.0	10.4	17466	0.8	2242.0	61.9	1862.8	4.6	66512	10.6	1386.0	230.3
C-640169	103091008017W600	1249	231.4	4.1	145499	293.1	61.1	6.4	17.9	10.9	19190	1.5	2575.5	76.8	2097.8	5.0	71625	7.9	1329.5	242.8
C-640170	103091008017W600	1263	230.4	4.2	147301	286.8	98.2	7.2	18.1	9.7	18523	0.3	2624.3	76.4	2089.3	5.1	69447	6.5	1337.7	241.8
C-640171	103130407714W600	136	106.8	7.2	51847	70.6	21.3	1.3	38.4	137.0	3303	0.2	1158.9	21.7	588.0	2.9	29882	29.4	527.5	87.6
C-640172	103130407714W600	136	106.4	7.2	49195	68.6	40.6	0.9	36.6	52.6	3180	0.1	1128.2	20.9	563.5	2.7	28707	28.5	501.0	83.5
C-640173	103130407714W600	262	130.7	7.2	59322	92.1	20.1	1.8	38.9	287.5	3758	0.0	1328.6	28.3	629.9	2.1	32567	34.3	654.7	98.8
C-640174	103130408017W600	74	214.6	5.2	122052	256.0	56.3	5.7	26.8	8.0	14963	0.6	2128.9	52.7	1575.8	5.0	59786	7.1	1269.7	202.2
C-640175	103130408017W600	94	219.9	4.7	128001	263.9	46.3	6.2	27.6	9.8	16191	1.0	2138.5	53.8	1642.3	4.9	64086	7.9	1368.3	213.8
C-640176	103130408017W600	109	222.0	4.8	130653	260.2	36.8	7.2	27.4	9.6	16279	1.4	2223.4	56.3	1661.5	4.9	64178	10.3	1430.8	216.8
C-640177	103150508017W600	77	220.5	5.1	130470	275.9	44.0	6.8	28.7	13.2	16448	1.8	2305.6	56.4	1668.5	4.8	65952	8.7	1424.4	218.7
C-640179	103150508017W600	108	222.7	4.8	132173	277.1	51.6	6.7	28.2	12.4	16331	1.2	2248.8	56.7	1669.7	4.7	63537	9.7	1493.3	217.9

C-640178	103150508017W600	130	224.8	4.6	136573	281.4	26.9	5.6	28.5	13.0	17087	1.0	2315.4	58.5	1705.5	4.9	66108	12.8	1509.8	225.7
C-640180	103153207917W600	123	210.4	5.3	118903	232.4	36.1	4.5	26.0	10.8	14352	1.9	2075.6	50.3	1493.7	4.0	57572	8.5	1343.8	196.1
C-640181	103153207917W600	131	213.1	5.1	120387	255.7	45.5	5.8	26.5	11.4	14682	2.7	2130.5	50.7	1514.2	4.0	58542	8.1	1337.3	199.0
C-640182	104031308118W600	363	214.0	5.0	125921	226.5	241.0	5.0	19.1	6.2	15299	0.8	1973.4	56.7	1607.1	4.0	58844	9.6	932.8	205.1
C-640183	104031308118W600	395	222.3	4.4	132476	252.1	217.0	5.4	19.7	6.0	16500	0.6	2105.3	63.0	1717.7	4.1	62330	10.1	986.7	216.7
C-640184	104031308118W600	430	223.3	4.2	136453	254.1	240.0	5.7	18.5	5.7	17274	0.5	2077.0	61.5	1738.0	3.9	64799	8.3	990.4	223.9
C-640185	104031308118W600	523	229.4	4.1	143306	262.0	238.8	6.1	18.0	9.2	19806	2.5	2295.1	66.1	1902.7	4.8	72460	9.4	1154.8	241.5
C-640186	104040408017W600	128	209.4	5.0	116616	251.9	43.1	5.7	26.3	17.5	14053	0.8	2156.5	51.8	1476.0	4.4	57990	5.8	1329.8	194.0
C-640187	104040408017W600	148	214.2	5.1	121987	243.4	32.3	7.1	25.8	14.8	14322	1.1	2063.2	50.7	1471.0	4.3	57943	8.7	1351.2	199.5
C-640188	104040907714W600	134	114.2	6.5	61582	78.4	36.1	1.6	46.4	201.4	3756	0.0	1351.2	26.4	650.9	2.7	35421	39.2	625.3	103.8
C-640189	104040907714W600	134	81.4	6.2	36311	55.3	92.2	1.1	24.7	11.6	2733	0.1	913.3	14.4	435.0	4.6	19777	29.9	400.6	60.8
C-640190	104040907714W600	247	134.1	7.1	59174	99.2	15.6	2.5	43.4	264.2	3887	0.3	1373.7	28.4	620.7	2.0	35226	28.4	669.6	101.4
C-640191	104130407714W600	135	134.5	7.1	63405	94.1	48.0	1.8	30.4	32.3	5423	0.6	1468.0	21.1	720.6	4.2	34356	25.8	850.5	106.5
C-640192	104130407714W600	135	133.9	7.1	63352	93.1	51.3	2.1	29.2	35.1	5387	0.1	1452.6	20.2	705.5	4.1	33760	24.8	829.8	105.7
C-640193	104130407714W600	248	142.1	7.2	65293	101.2	38.1	2.7	30.0	46.1	5878	0.0	1467.5	22.0	712.0	3.3	35421	23.6	907.3	109.9
C-640194	104130408017W600	71	215.3	4.8	123899	245.5	49.5	5.8	29.3	10.7	14661	2.5	2134.7	52.7	1579.3	4.8	58375	10.3	1311.4	202.4
C-640195	104130408017W600	93	223.3	4.6	133777	286.0	33.0	6.0	28.7	11.5	16892	1.8	2363.5	58.0	1722.7	5.2	65600	11.1	1453.9	222.2
C-640196	104130408017W600	105	224.3	4.4	134807	276.5	30.8	6.2	27.9	11.8	16846	1.4	2257.0	58.0	1719.2	5.0	66018	9.5	1471.6	223.5
C-640197	104130408017W600	137	229.8	4.0	140493	288.3	41.7	6.1	28.9	13.6	18063	1.4	2332.8	60.4	1799.7	5.1	69487	10.6	1557.6	234.2
C-640198	104140408017W600	93	227.0	4.7	140377	280.9	48.8	5.6	27.1	12.5	18131	1.2	2335.2	60.9	1816.8	6.4	69257	9.0	1511.2	233.9
C-640199	104140408017W600	135	232.9	4.1	149379	304.8	32.6	6.3	28.0	18.5	18481	0.4	2431.6	64.6	1913.4	6.0	70364	9.4	1610.1	244.6
C-640200	104140408017W600	155	231.4	4.6	151276	310.9	31.8	6.2	27.8	17.8	19291	1.1	2458.4	65.8	1920.4	5.9	72295	12.1	1632.2	249.4
C-640201	104140408017W600	165	233.8	4.1	150949	310.6	51.9	6.2	27.5	27.7	19482	0.3	2397.9	66.9	1931.2	5.9	72869	8.4	1633.6	249.8
C-640202	104140408017W600	196	235.6	4.1	154506	303.4	54.2	5.9	17.8	9.6	20335	0.9	2363.1	64.7	1840.2	4.6	75186	8.6	1278.2	256.0
C-640203	104140408017W600	219	236.4	4.0	155620	310.5	70.6	7.5	27.3	21.8	20505	0.0	2335.0	64.1	1856.6	5.3	75587	7.7	1525.8	257.9
C-640204	104150408017W600	65	221.3	4.8	130980	260.9	85.8	5.8	27.4	6.9	16408	1.5	2244.5	56.3	1693.3	5.0	65502	9.7	1298.6	218.6
C-640205	104150408017W600	84	224.0	4.6	130757	268.4	72.0	5.8	27.6	7.6	16675	0.8	2246.3	59.0	1729.8	4.6	66256	9.5	1335.5	219.5
C-640206	104150408017W600	100	228.1	4.3	141030	288.1	48.0	6.5	27.6	7.8	17766	0.5	2301.3	59.5	1800.7	4.8	69590	10.6	1438.9	234.4
C-640207	104153207917W600	121	206.0	5.3	114450	239.7	48.3	5.4	25.5	16.1	14156	2.3	2007.2	48.0	1447.5	4.3	57231	9.0	1330.1	191.0
C-640208	104153207917W600	129	207.4	5.4	112530	241.2	35.2	5.4	25.2	18.0	13813	3.6	2049.5	48.7	1437.9	4.2	55491	7.3	1288.0	187.0
C-640209	105101008017W600	66	223.1	4.7	135255	269.5	100.9	6.4	26.7	7.8	15723	1.2	2140.2	56.0	1802.4	5.6	65226	10.0	1281.3	221.9

C-640210	105101008017W600	124	232.2	4.5	144737	305.9	66.3	6.7	27.8	10.7	18903	0.9	2310.9	62.8	1942.8	5.3	71534	11.7	1451.7	241.4
C-640211	105101008017W600	180	234.7	3.9	152986	309.5	75.5	7.3	17.1	10.6	20810	11.0	2312.1	64.1	1802.6	4.9	76795	9.6	1283.7	256.5
C-640212	105120107209W600	149	108.1	7.6	46525	80.7	1486.9	5.9	18.4	9.9	1850	1.5	2459.2	67.8	1911.2	4.6	30148	8.2	1351.5	85.9
C-640213	105130408017W600	76	220.5	4.9	130839	252.7	57.0	5.2	27.6	10.2	15687	1.7	2198.8	54.8	1638.4	5.0	61974	9.0	1400.8	214.2
C-640214	105130408017W600	92	225.0	4.8	135528	279.9	37.2	6.7	28.5	13.1	16955	1.4	2319.0	59.7	1711.9	5.1	66218	9.6	1485.8	224.7
C-640215	105130408017W600	103	226.0	4.5	138733	278.1	40.6	6.3	27.7	13.2	16989	0.8	2290.7	58.1	1723.4	5.1	66875	9.4	1504.7	228.6
C-640216	105150408017W600	87	225.3	4.5	133482	293.0	73.8	5.5	28.5	8.5	16564	1.2	2276.0	60.5	1759.9	5.1	64890	11.0	1380.5	220.8
C-640217	105150408017W600	97	224.2	4.2	142201	286.3	46.6	6.2	31.8	9.3	16893	1.3	2299.8	61.5	1797.0	5.2	66118	13.3	1382.7	231.2
C-640218	105153207917W600	120	211.8	4.8	120725	242.9	45.6	5.5	26.4	16.4	14302	2.6	2020.2	48.9	1492.0	4.3	56938	8.1	1359.9	197.2
C-640219	105153207917W600	128	215.3	4.8	119128	246.3	33.8	5.7	26.7	16.3	14958	1.7	2125.2	53.3	1538.8	4.6	59334	8.9	1410.0	198.9
C-640220	105160408017W600	67	218.4	4.5	129188	248.2	85.2	5.3	26.6	6.1	15521	2.4	2127.6	55.2	1682.5	5.1	61590	14.9	1247.4	211.8
C-640221	105160408017W600	83	222.2	4.3	131328	280.8	83.4	5.9	27.0	7.7	16366	1.5	2252.1	58.6	1757.6	5.2	63955	12.4	1325.0	217.5
C-640222	105160408017W600	94	222.2	4.9	133084	267.8	77.8	7.3	25.6	6.0	16645	0.3	2191.1	58.2	1741.6	5.3	65140	4.9	1339.2	220.6
C-640223	105160408017W600	130	244.4	4.0	174152	366.9	71.2	8.4	33.8	7.1	21795	1.6	2782.4	72.8	2211.9	6.3	84892	16.6	1699.3	288.1
C-636676	106101008017W600	40	203.0	4.4	129000		104.0	<0.20	26.7	6.5	16520	<2.0	2242.6	53.5	1839.9	6.0	58743	12.0	1140.0	209.7
C-636677	106101008017W600	40	204.0	4.4	128000		104.0	<0.20	26.2	6.5	16585	<2.0	2218.9	53.0	1831.1	5.9	58583	30.0	1120.0	208.6
C-636678	106101008017W600	65	208.0	4.2	137000		91.0	<0.20	25.9	8.2	18674	2.2	2483.9	54.4	2057.6	5.8	64611	12.0	1270.0	226.3
C-636680	106101008017W600	75	213.0	4.1	146000		71.0	<0.20	26.6	9.5	18649	<2.0	2376.7	58.9	2049.0	5.8	62744	12.0	1410.0	233.4
C-636679	106101008017W600	87	214.0	4.0	141000		67.0	<0.20	25.6	10.5	21860	<2.0	2713.6	57.1	2407.9	5.7	71378	12.0	1430.0	241.0
C-636681	106101008017W600	95	215.0	4.0	148000		69.0	0.27	27.1	11.1	20290	<2.0	2626.9	59.5	2241.2	5.9	66168	11.0	1480.0	241.0
C-636682	106101008017W600	122	216.0	4.0	150000		74.0	<0.20	27.0	27.0	20784	<2.0	2637.4	63.8	2290.6	5.7	66526	10.0	1530.0	244.0
C-636683	106101008017W600	133	229.0	4.0	157000		69.0	<0.20	26.0	21.2	23966	<2.0	3088.6	57.0	2643.9	5.4	73487	10.0	1470.0	261.8
C-636684	106101008017W600	164	229.0	3.9	157000		76.0	<0.20	29.6	21.9	22573	<2.0	2789.2	65.0	2479.9	6.2	68912	11.0	1660.0	255.6
C-636685	106101008017W600	178	230.0	4.0	171000		77.0	<0.20	29.8	25.6	20664	<2.0	2509.1	66.4	2248.7	6.1	63360	11.0	1690.0	261.7
C-636687	106101008017W600	421	232.0	3.9	166000		67.0	0.28	31.7	34.3	24769	3.0	2948.1	71.9	2707.4	7.3	70965	10.0	1930.0	269.5
C-636688	106101008017W600	453	232.0	3.8	166000		69.0	<0.20	29.8	32.3	24151	4.3	2975.1	67.6	2639.7	6.8	70325	<10	1780.0	268.1
C-640235	106130408017W600	74	216.6	5.1	124575	258.9	47.5	5.4	26.9	11.1	14808	2.9	2125.8	53.0	1578.9	5.1	59225	10.5	1317.2	204.1
C-640236	106130408017W600	90	221.6	4.5	129588	267.0	30.8	5.5	27.6	12.2	16181	1.1	2372.6	57.3	1655.4	5.1	63765	11.8	1427.0	215.4
C-640237	106130408017W600	102	224.1	4.6	136642	273.2	51.0	5.4	27.0	13.5	16668	1.6	2218.8	55.7	1694.9	5.1	67039	11.1	1465.9	226.2
C-640238	106130408017W600	135	229.2	4.3	139681	295.0	49.2	7.0	28.3	14.4	17639	1.3	2295.9	59.0	1759.3	5.1	68166	11.6	1566.5	231.6
C-640239	106153207917W600	189	204.7	5.3	109911	234.1	26.8	4.8	26.9	21.7	12781	1.5	1911.0	44.9	1421.0	4.1	57683	10.1	1311.0	185.4

C-640240	106153207917W600	202	210.4	5.2	116046	248.5	46.6	5.2	25.8	20.0	14225	1.5	2054.8	50.9	1468.4	4.2	57589	11.1	1348.8	193.1
C-640241	107031308118W600	80	225.1	5.4	135346	259.0	195.7	7.0	19.0	7.6	16522	0.3	2112.8	60.5	1742.6	4.5	64593	6.6	1041.2	221.9
C-640242	107031308118W600	114	227.9	4.7	138445	279.0	192.2	6.7	19.4	8.5	18014	0.8	2130.5	61.8	1792.3	4.5	67954	9.5	1086.0	230.0
C-640243	107031308118W600	180	230.9	4.1	145386	279.9	184.1	6.6	19.5	7.9	18710	0.9	2248.9	67.8	1849.9	4.7	69155	8.3	1110.3	239.0
C-640244	107031308118W600	202	222.4	4.3	132320	254.8	199.3	6.3	16.8	10.3	17240	1.1	2216.9	58.7	1722.4	4.8	65457	8.6	1201.6	220.7
C-640245	107091308118W600	107	231.7	4.0	148734	276.4	182.3	6.7	20.1	6.0	19382	0.3	2301.7	70.4	1901.0	4.4	71503	6.9	1081.1	245.5
C-640246	107091308118W600	114	232.9	3.8	155669	290.9	198.6	7.2	18.4	8.6	20712	2.0	2382.9	70.0	2015.3	5.1	76887	7.9	1225.3	259.5
C-640247	107091308118W600	123	228.8	3.9	139398	265.0	199.5	6.9	18.0	9.4	18901	3.2	2375.7	65.8	1877.0	4.6	69898	7.7	1294.1	234.3
C-640248	107091308118W600	159	235.7	3.7	151709	283.5	182.9	5.8	20.7	6.9	20533	0.2	1932.8	59.9	1557.5	4.0	74847	5.1	932.6	252.1
C-640249	107091308118W600	173	236.6	3.6	154357	286.3	201.9	7.6	19.4	9.6	20745	1.3	2450.1	68.8	1998.8	4.9	75482	7.9	1235.3	256.9
C-640250	107091308118W600	180	237.2	4.1	154928	288.0	204.6	0.8	33.9	0.7	21238	0.7	873.9	13.3	697.5	0.8	76890	30.3	113.6	255.3
C-640251	107091308118W600	206	237.2	3.9	155462	285.7	181.7	5.6	26.4	12.8	21494	0.6	2160.9	59.9	1758.4	4.7	77921	6.6	1304.5	260.7
C-640252	108011308118W600	457	225.5	4.2	141270	261.4	183.7	6.7	17.0	9.7	18346	2.4	2407.1	71.2	1996.0	4.9	69289	8.4	1254.0	235.1
C-640253	108011308118W600	505	228.8	3.9	138429	259.8	172.9	7.1	17.0	9.3	19001	1.0	2400.4	68.9	1963.0	4.4	71018	7.9	1223.4	234.6
C-640254	108042908017W600	233	233.2	4.3	148483	291.5	84.3	6.9	22.0	10.5	18095	1.2	2277.2	66.5	2017.8	4.6	69295	10.6	1489.6	242.2
C-636689	109091308118W600	106	228.0	3.7	152000		189.0	<0.20	20.8	11.7	20766	4.1	2614.1	66.3	2200.9	6.1	63868	13.0	1260.0	243.0
C-636691	109091308118W600	113	228.0	3.7	161000		206.0	<0.20	20.4	12.1	20861	4.1	2671.2	67.8	2227.4	6.4	64400	13.0	1310.0	252.8
C-636690	109091308118W600	122	228.0	3.7	154000		201.0	<0.20	19.4	11.2	23198	3.5	2821.3	62.8	2466.9	5.8	68809	13.0	1220.0	252.8
C-636692	109091308118W600	172	229.0	3.7	158000		196.0	<0.20	16.8	10.2	23141	3.4	2789.0	58.9	2429.9	5.8	68696	12.0	1180.0	256.5
C-636693	109091308118W600	179	229.0	3.6	161000		202.0	<0.20	18.9	11.0	20259	3.2	2451.6	65.6	2127.0	6.5	62137	13.0	1290.0	249.6
C-636694	109091308118W600	205	232.0	3.6	162000		196.0	<0.20	18.7	11.2	21612	3.9	2639.7	70.1	2265.8	6.7	64621	13.0	1380.0	254.8
C-636695	109091308118W600	249	232.0	3.6	160000		191.0	<0.20	19.0	11.2	24251	3.0	2798.7	69.9	2522.6	6.8	69412	15.0	1360.0	260.7
C-636696	109091308118W600	267	232.0	3.6	164000		194.0	<0.20	17.2	9.8	23786	4.0	2774.4	64.7	2470.8	5.9	68766	13.0	1230.0	263.3
C-636697	109091308118W600	466	230.0	3.7	160000		197.0	<0.20	17.4	10.1	21453	6.8	2587.6	59.0	2273.2	5.9	64156	12.0	1230.0	252.0
C-636698	109091308118W600	497	233.0	3.6	166000		196.0	<0.20	16.6	9.2	25223	3.8	2869.6	62.0	2623.0	6.4	70684	11.0	1280.0	269.0
C-636686	106101008017W600	270	231.0	3.8	161000		<60	<0.20	28.1	19.0	20100	2.7	2418.5	62.2	2171.7	6.0	61907	12.0	1650.0	249.4

Table 2. Duvernay Flowback and Produced Water Chemistry

GSC Sample ID	UWI	Days since HF	Electrical Conductivity (mS/cm)	pH	Cl (mg/L)	Br (mg/L)	SO4 (mg/L)	Al (mg/L)	B (mg/L)	Ba (mg/L)	Ca (mg/L)	Fe (mg/L)	K (mg/L)	Li (mg/L)	Mg (mg/L)	Mn (mg/L)	Na (mg/L)	Si (mg/L)	Sr (mg/L)	TDS (g/L)
C-635731	1W0123006421W500	1351	221	5.76	160000	404.5	360.0	0.0	63.3	17.3	22996	83.8	1258	52.2	1892	10.2	64832	182.5	1684.2	251.38
C-635732	100051306522W500	989	233	5.31	170000	402.6	360.0	0.3	65.5	15.4	22075	99.2	1363	45.8	1721	12.1	75229	198.4	1487.3	270.76
C-635733	100082806421W500	229	230	5.74	170000	417.5	420.0	0.1	62.3	11.0	19916	54.9	1345	48.5	1656	10.2	75056	214.8	1393.7	268.43
C-635734	100162106421W500	229	230	5.71	170000	393.5	430.0	0.0	64.4	13.5	20867	56.4	1254	51.3	1688	10.6	74462	146.4	1532.4	268.73
C-635735	100103306320W500	1477	213	6.10	140000	600.1	370.0	0.1	76.3	16.4	16559	39.9	1265	48.7	1330	5.1	65102	205.1	1182.8	224.69
C-635736	100093306320W500	1488	217	6.02	140000	578.3	340.0	0.1	73.3	15.9	17684	56.4	1393	47.7	1426	6.3	64887	202.4	1222.9	225.79
C-635737	103123406320W500	1483	210	5.97	130000	410.3	370.0	0.0	77.0	10.7	15110	90.7	1301	45.2	1252	6.5	62145	202.3	1057.1	210.23
C-635738	102012206320W500	974	216	6.03	140000	366.4	270.0	0.0	79.4	15.4	16521	61.0	1352	53.2	1378	7.3	66333	191.6	1250.3	225.92
C-635739	102053106217W500	2197	179	6.29	92000	436.8	440.0	0.1	81.4	3.4	5547	38.4	1434	26.2	576	3.9	52348	220.9	328.2	152.45
C-635740	100071906318W500	2242	186	5.94	100000	589.1	330.0	0.1	85.8	8.0	8098	104.6	1877	33.2	755	5.9	52820	164.0	575.1	163.95
C-635741	104163406320W500	699	210	6.09	140000	414.5	410.0	0.1	73.8	13.2	16000	50.5	1418	44.7	1390	7.5	65385	166.7	1072.4	224.65
C-635742	100060606419W500	1482	203	6.13	120000	389.8	290.0	0.1	69.9	13.5	13643	52.8	1224	40.1	1198	7.4	59724	154.2	951.6	196.14
C-635743	100141706420W500	484	216	6.28	140000	396.3	320.0	0.1	67.6	13.9	15716	27.5	1331	42.7	1368	6.5	67442	132.7	1016.3	226.24
C-635744	100161706420W500	484	214	6.21	140000	420.9	440.0	0.1	68.8	13.6	15469	26.5	1373	42.7	1372	6.6	66985	117.3	974.5	225.70
C-635745	102023006419W500	703	201	6.30	120000	387.8	520.0	0.0	84.1	8.9	10146	41.7	1473	39.5	939	6.3	60954	106.2	664.7	194.13
C-635746	100060406522W500	179	233	5.71	180000	621.3	360.0	0.0	56.9	12.6	25089	58.7	1427	40.9	2031	16.1	74570	76.9	1748.8	283.50
C-635747	100011106522W500	152	231	5.36	180000	755.0	350.0	0.1	56.2	11.8	27172	60.1	1441	40.6	2145	14.2	74342	60.6	1851.9	285.46
C-639304	100081106225W500	1899	242.0	6.7	174,462	289.2	103.7	6.9	77.9	9.6	18877	0.0	3244	62.4	1356	13.3	86443	18.2	1907.0	286.94
C-639305	100100806321W500	1703	248.7	5.9	202,378	361.3	93.2	8.0	83.1	9.3	23219	0.0	3780	70.5	1653	16.6	100410	18.6	2341.3	334.48
C-639306	100101205627W400	1940	238.3	6.5	165,638	267.3	98.3	7.1	70.5	8.6	17256	0.0	3061	56.6	1247	11.6	82357	21.1	1797.0	271.98
C-639307	102083206221W500	1720	248.7	6.1	211,721	384.3	99.1	8.2	91.7	6.9	24638	0.0	3965	78.6	1801	18.1	99905	14.5	2410.7	345.21
C-639308	102071006225W500	1422	182.4	6.9	98,153	175.5	206.9	6.4	126.9	5.0	5650	0.0	2248	39.5	418	1.2	53713	21.2	754.6	161.62
C-639309	1W0121106225W502	1417	200.5	6.4	109,615	204.6	232.5	3.5	125.4	3.3	7090	0.0	2288	46.0	528	1.5	60087	13.9	826.2	181.11
C-639310	100042506125W500	65	160.9	7.1	79,039	138.3	291.7	3.9	95.9	2.0	5063	0.2	1768	36.3	384	3.1	42870	21.2	674.5	130.49
C-639311	100042506125W500	100	180.8	7.0	93,963	168.1	261.4	2.4	105.5	4.2	6000	0.0	2113	43.5	427	2.9	51405	11.9	793.3	155.42
C-639312	100031806320W500	537	221.4	4.5	138,963	387.4	129.9	6.6	75.2	7.1	16495	10.7	1757	57.5	1208	5.3	68767	18.1	1691.8	229.58
C-639313	1W0051006225W500	73	155.2	7.0	76,991	138.8	336.5	2.0	92.5	2.1	4954	0.0	1757	32.8	390	2.6	42581	23.9	597.9	128.03
C-639314	100080906225W500	74	173.6	7.2	89,254	170.1	360.2	5.0	100.0	2.3	6171	0.6	2077	38.1	469	3.8	49385	17.0	698.3	148.87

C-639315	100080906225W500	102	186.1	7.0	98,671	189.6	310.2	4.6	102.3	2.0	6620	0.2	2229	42.3	483	3.5	54657	8.6	757.3	164.19
C-639316	102012606125W500	66	154.5	7.1	75,502	133.1	306.2	1.6	92.8	2.4	5145	0.7	1862	34.3	399	3.3	42749	19.8	693.2	127.07
C-639317	102012606125W500	103	182.0	7.0	95,871	174.7	280.7	4.0	102.7	2.5	6370	0.4	2191	44.2	466	3.4	52678	9.5	841.2	159.14
C-639318	100020906225W500	69	146.2	7.0	71,317	128.1	319.2	3.8	88.5	1.6	4617	0.2	1976	28.9	369	2.3	39468	16.7	562.0	118.94
C-639319	100020906225W500	101	176.2	7.0	91,666	173.5	307.5	4.5	98.4	2.8	6291	0.6	2166	37.5	478	3.9	50623	6.2	738.1	152.70
C-639320	102140406225W500	76	144.5	7.2	70,195	123.5	255.7	4.6	87.8	4.3	4694	0.4	1671	31.8	401	1.6	38227	17.9	639.3	116.43
C-639321	103140406225W500	69	142.5	7.3	69,334	122.1	306.7	2.5	93.9	2.0	4191	0.4	1727	27.9	343	2.9	37746	15.6	555.9	114.57
C-639322	103140406225W500	118	179.1	6.6	94,434	181.2	288.6	3.3	104.7	3.0	6187	0.5	2245	38.0	478	3.9	51502	3.4	801.9	156.33
C-639323	100021806320W500	60	186.0	6.8	102,930	269.6	250.7	2.8	66.0	2.5	10753	1.0	1524	46.7	920	5.0	52406	15.2	1147.9	170.40
C-639324	100021806320W500	538	220.8	4.4	139,902	392.0	139.2	6.0	78.4	5.6	16237	11.7	1736	57.3	1212	5.3	68805	19.8	1713.2	230.32
C-639325	100041806320W502	536	223.1	4.2	143,649	397.0	139.2	5.3	75.2	5.8	16608	11.1	1790	58.6	1222	5.5	70911	18.1	1745.8	236.64
C-639326	102011806320W500	55	190.8	6.6	107,568	286.4	230.2	4.5	66.4	3.4	11317	0.0	1432	45.1	976	4.9	52898	11.1	1185.4	176.07
C-639327	102011806320W500	539	220.3	4.5	143,959	408.1	158.4	5.5	75.2	7.3	16882	11.7	1709	57.5	1285	5.6	69159	18.0	1726.0	235.47
C-639328	100011806320W500	55	185.3	6.8	102,720	270.9	239.0	3.8	66.0	5.9	10543	0.4	1437	45.1	903	4.7	50917	15.5	1114.4	168.35
C-639329	100011806320W500	540	220.0	4.6	133,766	376.0	148.6	5.7	74.7	6.3	16188	11.4	1684	56.8	1205	5.4	67380	17.4	1659.3	222.59
C-639330	100011306321W500	49	193.3	6.5	105,809	278.8	213.1	4.6	64.5	3.6	11645	0.4	1551	49.3	978	5.0	54530	13.2	1214.7	176.39
C-639331	100011306321W500	541	223.1	4.4	138,471	383.8	134.3	6.0	74.7	6.7	16287	11.8	1782	59.4	1225	5.6	68392	17.9	1690.5	228.55
C-639332	100041006224W500	266	146.2	7.1	67,977	132.3	264.9	2.0	18.4	4.9	1151	0.0	1383	19.7	313	0.0	42867	11.8	236.4	114.57
C-639333	100061006224W500	268	156.2	7.1	74,536	145.0	286.2	2.8	18.7	4.0	1260	0.0	1568	21.6	345	0.0	47580	14.7	258.3	126.19
C-639334	100101006224W500	267	157.5	7.1	75,383	147.2	291.2	1.2	21.2	4.6	1249	0.5	1586	21.6	346	0.1	46337	19.3	220.7	125.79
C-639335	102032506322W500	44	182.9	6.8	96,523	230.5	233.0	2.8	69.6	3.2	9110	0.1	1493	44.1	739	4.6	51802	13.9	879.0	161.23
C-639336	102032506322W500	203	216.3	4.6	130,039	327.4	163.4	4.4	78.4	4.8	12787	4.2	1817	53.9	977	5.1	68513	12.8	1305.5	216.09
C-639337	103022506322W500	44	181.8	6.9	95,627	229.1	233.4	3.1	67.9	2.7	9200	0.2	1498	43.4	748	4.3	51474	13.4	896.3	160.14
C-639338	103022506322W500	206	218.4	4.5	130,508	329.9	154.8	4.8	76.9	4.8	13283	5.6	1792	56.2	1005	5.1	69038	14.5	1360.4	217.37
C-639339	104022506322W500	51	187.5	6.8	99,612	242.6	246.9	3.2	68.5	3.2	9517	0.5	1525	45.3	801	5.0	54069	15.3	957.0	167.20
C-639340	104082506322W500	53	190.3	6.8	101,645	250.2	235.4	3.2	67.4	2.9	9606	0.2	1504	45.3	818	5.2	53647	11.7	985.8	168.92
C-639341	104082506322W500	196	218.7	4.6	130,481	333.7	160.7	4.5	75.3	6.7	13022	6.5	1800	53.0	1004	5.1	68080	13.2	1352.6	216.40
C-639342	100061506323W500	57	114.1	6.7	50,053	90.0	439.1	3.4	85.4	11.3	2978	0.6	1184	24.8	248	0.9	29391	39.2	291.6	84.96
C-639343	102041506323W500	64	110.2	6.8	48,070	82.8	459.3	3.4	80.9	10.6	2897	0.1	1022	23.6	234	0.6	28732	41.4	277.8	82.10
C-639344	102061506323W500	63	145.3	6.3	67,944	128.7	431.9	4.2	95.4	6.0	4188	0.0	1477	32.1	332	4.7	39566	27.0	452.3	114.75
C-639345	100101506323W500	49	163.7	5.9	80,084	157.7	366.2	3.2	88.2	3.3	5577	0.0	1678	36.7	433	4.0	47297	19.6	569.7	136.37

Table 3. Montney Flowback and Produced Water Chemistry Time Series

GSC sample ID	UWI	Days Since HF	Electrical Conductivity	pH	Cl	Br	SO4	Al	B	Ba	Ca	Fe	K	Li	Mg	Mn	Na	Si	Sr	TDS
			(mS/cm)		(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)
C-636658	100141208118W600	224	166.7	6.56	96,200		121	<0.20	21.9	4.45	11666.0	<2.0	1788.1	32.9	1400.5	3.29	51136.5	<10	1010	163384.6
C-636659	100141208118W600	326	173.4	6.46	95,400		141	<0.20	21.8	14.7	12645.6	<2.0	2022.5	34.1	1521.2	3.00	55280.3	<10	1050	168134.2
C-636660	100141208118W600	336	173.8	6.47	95,900		123	<0.20	23.9	13.4	12340.9	<2.0	1991.0	28.3	1525.4	3.52	54069.7	<10	1060	167079.0
C-636661	100141208118W600	387	174.7	6.30	93,500		132	<0.20	21.3	15.6	12609.5	<2.0	1967.5	34.5	1496.1	3.07	54645.4	<10	1060	165484.9
C-636662	100141208118W600	437	176.8	6.02	104,000		146	<0.20	21.5	15.4	14183.0	<2.0	2159.0	35.6	1677.4	3.37	59026.3	<10	1140	182407.6
C-636663	100141208118W600	525	168.1	6.65	98,300		176	<0.20	21.3	13.2	10611.3	<2.0	1533.0	33.6	1235.8	2.90	43816.5	<10	935	156678.6
C-636665	100141208118W600	548	173.3	6.43	95,400		152	<0.20	21.5	13.5	14359.6	<2.0	2098.7	35.0	1685.7	2.95	57337.7	<10	1000.0	172106.7
C-636666	100141208118W600	574	181.7	6.52	103,000		152	<0.20	21.6	13.4	13528.8	<2.0	1958.2	39.5	1560.3	3.12	53175.4	<10	1050	174502.3
C-636667	100141208118W600	813	157.5	6.77	82,100		175	1.61	21.8	9.31	11776.3	<2.0	1876.2	32.4	1380.8	2.32	50918.5	<10	808	149102.3
C-636668	103011208118W600	93	168.7	6.76	93,400		203	<0.20	20.1	5.89	14102.7	<2.0	2012.1	39.9	1571.3	3.14	52619.7	<10	631	164608.8
C-636669	103011208118W600	72			90,200		231	<0.20	18.2	6.40	10146	<2.0	1488	29.4	1107	2.98	39448	<10	495	143173.2
C-636670	103011208118W600	127	185.3	5.94	116,000		285	<0.20	20.2	5.79	15850.74	<2.0	2090.22	47.5	1723.92	3.39	56451.19	<10	762	193240.0
C-636671	103011208118W600	185	194.3	5.02	111,000		222	<0.20	20.7	5.81	18290.51	<2.0	2340.42	53.0	1997.31	3.58	63376.16	<10	814	198123.5
C-636672	103011208118W600	168	190.6	5.19	112,000		218	<0.20	21.0	5.89	15160.64	<2.0	1986.51	49.2	1652.78	3.55	54304.31	<10	799	186200.9
C-636673	103011208118W600	334	209.0	4.19	135,000		226	<0.20	21.4	5.91	17147.20	<2.0	2138.84	61.3	1858.63	4.28	59261.63	<10	977	216702.2
C-636674	103011208118W600	522	216.0	4.06	151,000		224	<0.20	21.8	6.33	21310.94	2.6	2551.11	67.8	2302.72	4.78	69254.57	<10	1100	247846.6
C-636675	103011208118W600	564	216.0	4.10	151,000		223	<0.20	21.6	6.22	23726.27	<2.0	2778.40	64.9	2539.56	4.76	74684.32	<10	1110	256159.0
C-636676	106101008017W600	40	203.0	4.35	129,000		104	<0.20	26.7	6.51	16520.47	<2.0	2242.55	53.5	1839.93	5.99	58743.05	12	1140	209694.7
C-636677	106101008017W600	40	204.0	4.35	128,000		104	<0.20	26.2	6.49	16585.08	<2.0	2218.91	53.0	1831.09	5.92	58582.62	30	1120	208563.3
C-636678	106101008017W600	65	208.0	4.15	137,000		91	<0.20	25.9	8.20	18674.46	2.2	2483.95	54.4	2057.60	5.80	64611.44	12	1270	226296.9
C-636679	106101008017W600	87	214.0	4.00	141,000		67	<0.20	25.6	10.5	21859.97	<2.0	2713.64	57.1	2407.94	5.70	71378.06	12	1430	240967.5
C-636680	106101008017W600	75	213.0	4.07	146,000		71	<0.20	26.6	9.51	18648.97	<2.0	2376.69	58.9	2048.95	5.75	62743.98	12	1410	233412.3
C-636681	106101008017W600	95	215.0	3.99	148,000		69	0.27	27.1	11.1	20290.48	<2.0	2626.89	59.5	2241.19	5.86	66168.35	11	1480	240990.7
C-636682	106101008017W600	122	216.0	4.04	150,000		74	<0.20	27.0	27.0	20783.72	<2.0	2637.35	63.8	2290.55	5.71	66526.10	10	1530	243975.2
C-636683	106101008017W600	133	229.0	4	157,000		69	<0.20	26.0	21.2	23965.75	<2.0	3088.64	57.0	2643.9	5.41	73486.94	10	1470	261843.8
C-636684	106101008017W600	164	229.0	3.9	157,000		76	<0.20	29.6	21.9	22572.71	<2.0	2789.25	65.0	2479.92	6.19	68912.28	11	1660	255623.9

C-636685	106101008017W600	178	230.0	4	171,000		77	<0.20	29.8	25.6	20663.78	<2.0	2509.11	66.4	2248.69	6.11	63359.53	11	1690	261687.0
C-636687	106101008017W600	421	232.0	3.9	166,000		67	0.28	31.7	34.3	24768.96	3.0	2948.05	71.9	2707.38	7.25	70965.11	10	1930	269544.9
C-636688	106101008017W600	453	232.0	3.8	166,000		69	<0.20	29.8	32.3	24150.59	4.3	2975.13	67.6	2639.72	6.79	70324.88	<10	1780	268080.1
C-636689	109091308118W600	106	228.0	3.7	152,000		189	<0.20	20.8	11.7	20765.51	4.1	2614.09	66.3	2200.94	6.10	63867.85	13	1260	243019.4
C-636690	109091308118W600	122	228.0	3.7	154,000		201	<0.20	19.4	11.2	23198.12	3.5	2821.33	62.8	2466.91	5.79	68808.66	13	1220	252831.7
C-636691	109091308118W600	113	228.0	3.7	161,000		206	<0.20	20.4	12.1	20861.47	4.1	2671.22	67.8	2227.44	6.38	64400.27	13	1310	252800.2
C-636692	109091308118W600	172	229.0	3.7	158,000		196	<0.20	16.8	10.2	23141	3.4	2788.98	58.9	2429.87	5.80	68695.9	12	1180	256538.8
C-636693	109091308118W600	179	229.0	3.6	161,000		202	<0.20	18.9	11.0	20258.64	3.2	2451.57	65.6	2126.96	6.47	62136.89	13	1290	249584.2
C-636694	109091308118W600	205	232.0	3.6	162,000		196	<0.20	18.7	11.2	21612	3.9	2639.69	70.1	2265.77	6.71	64621.42	13	1380	254838.5
C-636695	109091308118W600	249	232.0	3.6	160,000		191	<0.20	19.0	11.2	24251.37	3.0	2798.72	69.9	2522.6	6.83	69412.3	15	1360	260660.9
C-636696	109091308118W600	267	232.0	3.6	164,000		194	<0.20	17.2	9.82	23786.33	4.0	2774.44	64.7	2470.76	5.92	68766.35	13	1230	263336.5
C-636697	109091308118W600	466	230.0	3.7	160,000		197	<0.20	17.4	10.1	21452.92	6.8	2587.65	59.0	2273.15	5.87	64155.51	12	1230	252007.4
C-636698	109091308118W600	497	233.0	3.6	166,000		196	<0.20	16.6	9.24	25222.56	3.8	2869.63	62.0	2622.97	6.39	70683.61	11	1280	268983.8

Kakwa	0	89.7	7.5	38403.8	57.3	409.2	2.4	41.3	2.9	2141.1	0.3	1138.6	12.3	469.9	4.7	20274.0	27.7	202.5	63188
Kakwa	0	88.6	7.3	38335.6	57.7	575.2	2.4	41.5	3.1	2101.3	3.1	1184.1	11.9	462.9	4.1	19856.9	33.9	191.3	62865
Kakwa	1	86.8	7.5	37228.2	56.0	530.1	3.0	42.5	4.4	2068.8	0.6	1051.5	11.8	457.0	4.6	19450.9	31.0	188.9	61129
Kakwa	1	87.3	7.4	37095.7	56.9	545.9	4.2	44.2	4.7	2140.4	0.3	1103.0	12.1	465.7	4.8	19742.3	32.3	190.7	61443
Kakwa	2	87.9	7.3	37300.3	55.8	552.7	3.4	42.8	4.2	2151.7	0.1	1142.7	12.1	465.8	4.9	19659.9	31.0	189.6	61617
Kakwa	3	90.3	6.7	39202.6	60.7	565.7	3.6	43.1	3.2	2316.0	0.1	1206.4	13.1	496.4	5.2	20900.1	31.5	202.9	65050
Kakwa	3	94.1	6.7	41619.8	63.3	576.1	3.9	42.8	1.8	2455.8	0.1	1204.7	13.7	518.6	5.3	21968.3	30.9	210.5	68716
Kakwa	4	99.2	6.5	43541.7	67.7	575.9	3.7	44.0	2.6	2678.9	0.6	1261.7	14.5	555.9	5.6	23002.3	25.0	232.6	72013
Kakwa	4	101.8	6.5	45701.2	69.1	525.1	2.4	44.9	2.6	2825.6	0.2	1333.0	14.8	581.2	5.9	23709.5	24.5	241.6	75082
Kakwa	5	105.4	6.4	47288.1	72.1	574.4	3.1	45.4	2.4	3031.2	0.2	1351.0	15.6	604.4	6.1	25032.1	23.9	251.3	78301
Kakwa	5	105.9	6.5	47772.3	73.0	568.2	3.9	45.4	2.5	3101.8	0.2	1317.1	15.8	615.3	6.7	26589.8	23.6	264.1	80400
Kakwa	6	107.6	6.4	48334.9	74.3	557.2	2.7	45.2	2.6	3097.4	0.5	1345.0	15.7	622.1	6.7	25581.3	22.9	263.0	79971
Kakwa	6	110.0	6.4	50175.4	76.3	539.4	4.2	48.6	3.4	3326.8	0.7	1361.0	15.0	644.6	6.7	26756.3	23.4	280.9	83263
Kakwa	49	159.2	6.4	80962.4	125.1	486.0	5.4	57.0	4.1	5955.8	0.4	2021.1	25.4	897.5	5.6	41669.5	27.8	491.2	132734
Kakwa	71	164.9	6.5	85026.8	132.2	495.4	3.9	57.6	7.1	6303.0	0.3	2093.5	27.8	887.7	4.5	44688.9	26.3	511.8	140267
Kakwa	89	171.1	6.7	88907.6	141.9	460.6	3.5	58.9	9.0	6372.7	0.3	2172.9	28.5	870.6	3.9	46481.8	27.5	521.0	146061

Kakwa	120	183.8	7.1	93765.5	137.9	454.0	2.8	61.8	3.0	6478.1	0.0	2350.1	29.9	893.3	3.0	51729.9	29.8	522.7	156542
Kakwa	150	185.8	7.1	96675.3	144.4	457.0	3.8	63.7	2.8	6683.7	0.0	2373.7	33.0	883.5	2.8	54500.9	31.3	529.2	162460
Kakwa	181	188.9	7.1	100113.5	147.8	462.4	2.6	64.7	3.6	6796.3	0.0	2467.1	34.2	888.3	2.9	56256.2	31.4	543.2	167895
Kakwa	211	194.2	6.8	103015.5	151.9	445.3	2.7	65.3	3.4	6902.9	0.0	2492.9	35.0	912.8	3.3	57172.8	29.6	560.7	171996
Kakwa	273	192.0	6.9	102570.4	156.3	590.1	3.5	65.4	4.8	6321.8	0.0	2465.3	33.6	774.5	2.8	58686.8	35.3	444.0	172487
Kakwa	301	191.1	7.0	102044.5	155.6	581.3	4.4	65.9	4.1	6084.9	0.0	2414.4	34.5	766.1	2.3	58822.7	30.4	452.0	171615
Kakwa	332	194.5	6.6	105183.3	158.5	575.9	5.1	67.9	6.2	6180.8	0.0	2426.6	35.9	785.4	2.7	59298.5	30.4	478.0	175466
Kakwa	383	194.9	6.5	103796.9	159.8	578.1	5.2	67.2	7.0	6043.4	0.0	2460.3	36.0	776.8	2.7	58451.2	30.6	474.9	173093

Table 4. Duvernay Flowback and Produced Water Chemistry Time Series

GSC sample ID	UWI	Days since HF	Electrical Conductivity (mS/cm)	pH	Cl (mg/L)	Br (mg/L)	SO4 (mg/L)	Al (mg/L)	B (mg/L)	Ba (mg/L)	Ca (mg/L)	Fe (mg/L)	K (mg/L)	Li (mg/L)	Mg (mg/L)	Mn (mg/L)	Na (mg/L)	Si (mg/L)	Sr (mg/L)	TDS (g/L)
C-635604	100143303222W400	61	n.a.	n.a.	85300	n.a.	1350	0.20	18.9	n.a.	4110	n.a.	7690	10.7	526	n..a.	28400	10.0	144.0	127.7
C-635606	100143303222W400	178	217.0	6.48	170000	653	1100	0.20	33.6	2.4	14179	0.09	3309	35.1	2067	3.54	75628	86.8	458.8	266.3
C-635609	100143303222W400	185	216.0	6.41	140000	998	920	0.27	35.3	2.4	14053	0.22	3137	33.2	2113	3.66	68076	104.1	504.6	228.4
C-635611	100143303222W400	191	215.0	6.18	150000	635	920	0.36	35.0	2.4	14232	0.29	3177	30.9	2111	3.46	69158	122.1	501.5	239.6
C-635613	100143303222W400	197	217.0	5.89	160000	985	980	0.17	36.7	2.4	14960	0.23	3155	33.1	2204	3.50	70043	121.5	521.4	251.4
C-635615	100143303222W400	203	215.0	5.88	150000	669	870	0.20	36.8	2.4	14714	0.27	3062	32.9	2135	3.41	66217	104.1	534.9	237.0
C-635627	100143303222W400	210	216.0	5.80	150000	957	920	0.30	37.0	2.3	14846	0.49	3160	32.7	2256	3.36	66233	99.3	530.5	237.4
C-635631	100143303222W400	223	215.0	5.68	160000	1016	920	0.20	38.4	2.3	15324	0.11	3278	32.5	2356	3.43	65783	95.5	538.8	247.7
C-635633	100143303222W400	229	216.0	5.75	150000	995	920	0.22	39.1	2.4	15143	0.09	3193	35.0	2336	3.40	64232	83.1	563.5	235.9
C-635635	100143303222W400	235	216.0	5.71	150000	884	890	0.20	40.0	2.3	15080	0.22	3187	33.7	2284	3.27	66526	68.6	547.7	238.0
C-635637	100143303222W400	241	212.0	5.70	150000	677	850	0.21	40.0	2.3	15970	0.48	3190	34.7	2407	3.32	66235	98.4	562.9	238.7
C-635639	100143303222W400	253	214.0	5.67	140000	1048	890	0.37	39.6	2.3	16148	0.07	3270	37.6	2502	3.22	66396	6.5	554.5	229.2
C-635641	100143303222W400	262	213.0	5.22	130000	930	820	0.23	41.6	2.3	16088	3.86	3136	35.8	2457	3.65	62780	6.1	574.1	215.3
C-635643	100143303222W400	268	215.0	5.27	130000	1008	850	0.27	39.5	2.3	15524	0.60	3098	35.2	2320	3.57	60444	5.3	570.5	212.2
C-635645	100143303222W400	281	217.0	5.64	120000	876	770	0.27	42.4	2.3	16017	0.11	3199	36.7	2411	3.42	64819	4.5	569.7	207.2
C-635647	100143303222W400	290	218.0	5.69	130000	991	770	0.26	41.9	2.3	15994	0.17	3422	36.9	2421	3.53	65710	4.1	585.1	218.3
C-635649	100143303222W400	302	217.0	5.60	140000	950	860	0.25	43.0	2.3	15763	0.45	3187	37.3	2406	3.30	66056	4.1	581.5	228.3
C-635651	100143303222W400	318	217.0	5.58	130000	1000	840	0.24	42.9	2.2	16225	0.52	3237	36.0	2473	3.15	65621	4.0	575.3	218.4
C-635653	100143303222W400	327	218.0	5.57	130000	994	770	0.26	41.8	2.3	15876	0.43	3291	37.1	2459	3.12	64258	4.5	583.0	216.7
C-635655	100143303222W400	335	216.0	5.57	120000	1035	790	0.31	42.5	2.2	16075	0.52	3143	36.5	2438	3.06	64046	4.7	585.6	206.5
C-635657	100143303222W400	344	217.0	5.88	130000	1026	800	0.26	43.8	2.3	17554	0.28	3526	39.1	2703	3.06	69436	4.1	603.5	224.0
C-635659	100143303222W400	352	217.0	5.65	140000	926	800	0.20	45.1	2.3	16496	0.16	3287	41.9	2474	3.15	64429	4.7	609.9	227.5
C-635661	100143303222W400	361	216.0	5.63	140000	944	790	0.19	44.5	2.2	16178	0.20	3262	37.5	2453	3.07	62816	4.4	599.7	225.5
C-635663	100143303222W400	373	216.0	5.68	140000	716	810	0.26	44.9	2.3	16576	0.09	3201	37.7	2541	3.06	64995	3.8	604.7	228.1
C-636617	100031806320W500	59	169.2	6.88	94,100		308	<0.20	64.2	2.0	8750	<2.0	1390	36.7	696	4.90	42885	15.0	789.0	149.0
C-636618	100031806320W500	60	172.0	6.96	91,300		277	<0.20	63.7	2.1	8750	<2.0	1390	35.6	706	4.60	43650	18.0	792.0	147.0
C-636619	100031806320W500	61	177.2	6.99	102,000		285	<0.20	65.0	2.6	9330	<2.0	1460	36.8	755	4.89	45168	15.0	829.0	159.0

C-636620	100031806320W500	63	186.7	6.67	106,000		241	<0.20	67.3	2.8	10900	<2.0	1570	39.6	850	5.29	49234	12.0	969.0	169.0
C-636621	100031806320W500	64	188.2	6.63	107,000		341	<0.20	67.4	2.6	11300	<2.0	1590	40.9	870	5.35	49347	12.0	978.0	171.0
C-636622	100031806320W500	65	191.1	6.52	111,000	357	213	<0.20	66.1	2.7	11300	<2.0	1570	39.8	869	5.22	50460	20.0	1020.0	175.0
C-636623	100031806320W500	67	194.7	6.39	115,000	560	201	<0.20	65.7	2.8	11800	<2.0	1580	42.2	899	5.42	52905	<10	1050.0	182.0
C-636624	100031806320W500	68	196.0	6.25	119,000	357	204	<0.20	66.6	3.0	12200	<2.0	1640	44.0	921	5.53	54659	<10	1070.0	187.0
C-636625	100031806320W500	69	196.3	6.21	118,000	369	196	<0.20	66.1	3.3	12400	<2.0	1630	43.7	927	5.60	52152	<10	1100.0	185.0
C-636626	100031806320W500	70	196.8	6.07	114,000	572	184	<0.20	66.7	2.9	12300	<2.0	1620	43.0	929	5.68	56267	<10	1070.0	182.0
C-636627	100031806320W500	71	197.9	6.08	113,000	365	179	<0.20	65.6	3.1	12400	<2.0	1620	43.0	925	5.66	51606	<10	1070.0	180.0
C-636628	100031806320W500	72	198.7	5.99	115,000	367	179	<0.20	66.8	3.1	12500	<2.0	1650	45.9	943	5.69	53129	<10	1120.0	184.0
C-636629	100031806320W500	73	199.9	5.95	116,000	600	178	<0.20	66.9	2.9	12500	<2.0	1630	45.7	938	5.70	52579	<10	1110.0	184.0
C-636630	100031806320W500	74	199.4	5.88	118,000	381	178	<0.20	67.6	3.1	12500	<2.0	1640	43.3	939	5.74	53125	<10	1110.0	187.0
C-636631	100031806320W500	76	200.0	5.75	119,000	607	178	<0.20	67.9	3.2	12800	<2.0	1640	46.4	927	5.65	52871	<10	1150.0	186.0
C-636632	100031806320W500	77	200.0	5.81	118,000	363	164	<0.20	68.0	3.6	13100	<2.0	1680	47.3	972	5.85	52955	<10	1120.0	188.0
C-636633	100031806320W500	78	200.0	5.75	120,000	358	189	<0.20	68.7	3.4	12800	<2.0	1650	46.4	953	5.69	54934	<10	1130.0	188.0
C-636634	100031806320W500	79	200.0	5.68	118,000	325	171	<0.20	67.6	3.2	13100	<2.0	1650	48.1	937	5.71	53330	<10	1150.0	187.0
C-636635	100031806320W500	80	201.0	5.69	117,000	361	161	<0.20	66.9	3.4	13100	<2.0	1650	46.3	944	5.82	52248	<10	1140.0	186.0
C-636636	100031806320W500	81	201.0	5.52	120,000	360	164	<0.20	67.5	3.3	13300	<2.0	1660	48.0	942	5.69	53114	<10	1160.0	188.0
C-636637	100031806320W500	82	201.0	5.34	125,000	624	166	<0.20	69.2	3.8	13600	2.60	1720	48.7	998	6.02	53416	<10	1200.0	196.0
C-636638	100031806320W500	83	201.0	5.37	125,000	613	167	<0.20	67.7	3.3	13200	<2.0	1680	47.1	966	5.77	56685	<10	1170.0	194.0
C-636639	100031806320W500	84	201.0	4.20	120,000	614	158	<0.20	67.6	3.8	13000	<2.0	1670	47.3	964	5.61	56814	22.0	1160.0	188.0
C-636640	100041806320W502	59	184.0	6.68	100,000	541	221	<0.20	66.9	2.3	10200	<2.0	1560	43.1	810	4.91	47037	14.0	908.0	158.0
C-636641	100041806320W502	60	186.7	6.58	106,000	331	219	<0.20	67.0	2.4	10500	<2.0	1600	42.6	827	4.93	47391	12.0	916.0	165.0
C-636642	100041806320W502	61	192.5	6.51	117,000	602	222	<0.20	68.2	3.7	11200	<2.0	1650	44.8	866	5.13	49852	15.0	1020.0	178.0
C-636643	100041806320W502	62	194.9	6.22	111,000	588	192	<0.20	66.0	2.8	11400	<2.0	1630	47.5	871	5.25	50721	<10	1060.0	176.0
C-636644	100041806320W502	63	196.7	6.19	113,000	378	185	<0.20	68.1	3.1	12000	<2.0	1670	48.9	907	5.56	51432	<10	1090.0	180.0
C-636645	100041806320W502	64	197.3	5.98	125,000	345	195	<0.20	68.4	2.8	12500	<2.0	1680	49.0	910	5.56	51574	<10	1090.0	194.0
C-636646	100041806320W502	66	199.5	5.91	116,000	385	166	<0.20	65.1	3.0	12300	<2.0	1650	49.6	914	5.56	56009	<10	1110.0	184.0
C-636647	100041806320W502	67	200.0	5.87	124,000	361	222	<0.20	67.7	3.0	12500	<2.0	1680	49.6	924	5.61	53603	<10	1140.0	193.0
C-636648	100041806320W502	68	201.0	5.82	117,000	646	161	<0.20	69.4	3.0	13200	<2.0	1670	49.5	939	5.73	52694	<10	1160.0	188.0
C-636649	100041806320W502	69	201.0	5.76	118,000	642	161	<0.20	69.6	3.1	13000	<2.0	1690	52.0	945	5.82	56044	<10	1150.0	187.0

C-636650	100041806320W502	70	201.0	5.80	121,000	389	157	1.00	70.2	2.9	13200	<2.0	1710	52.1	951	5.87	52790	<10	1180.0	193.0
C-636651	100041806320W502	71	202.0	5.63	119,000	397	154	<0.20	70.5	3.2	13400	<2.0	1700	52.2	940	5.67	53072	<10	1180.0	190.0
C-636652	100041806320W502	73	203.0	5.57	130,000	613	168	<0.20	71.3	3.3	13500	<2.0	1690	52.5	957	5.77	53021	<10	1190.0	202.0
C-636653	100041806320W502	74	204.0	5.58	116,000	592	184	<0.20	71.6	3.1	13800	<2.0	1700	51.6	951	5.73	59044	14.0	1170.0	189.0
C-636654	100041806320W502	75	204.0	5.52	119,000	385	150	<0.20	71.5	3.6	13300	<2.0	1710	52.6	963	5.89	53899	<10	1160.0	192.0
C-636655	100041806320W502	76	205.0	5.39	132,000	373	241	<0.20	72.5	4.2	14100	<2.0	1760	54.0	985	6.09	54137	<10	1200.0	206.0
C-636656	100041806320W502	77	205.0	5.43	124,000	387	155	<0.20	73.1	3.5	14200	<2.0	1700	54.4	965	5.95	54144	<10	1190.0	198.0
C-636657	100041806320W502	78	205.0	5.46	116,000	627	144	<0.20	67.8	3.9	13800	<2.0	1710	51.8	982	5.92	53185	<10	1210.0	189.0