



MEMORANDUM

TO Sophia Granchinho – NIRB
Karen Kharatyan - NWB

DATE June 19, 2017

CC Golder - Lasha Young, Jen Range

FROM Agnico Eagle - Ryan Vanengen

REFERENCE No. 1658927-Commitment 34

COMMITMENT 34 – NEMO LAKE WATER BALANCE

Introduction

During the Technical Meeting and Pre-hearing Conference, held in Baker Lake, Nunavut on April 28 to May 2, 2017 the Nunavut Water Board (NWB) requested Agnico Eagle to provide water balance data for Nemo Lake to the NWB and parties for review (Commitment 34).

The derived water balance for Lake C38 (Nemo Lake) is provided below based on climate input and watershed characteristics as described in the Project's Final Environmental Impact Statement, and planned freshwater withdrawals from Lake C38 (Nemo Lake) as summarized in the Type A Licence 2AM-MEA1525 amendment application¹.

Lake C38 (Nemo Lake) Water Balance

A water balance is provided from 2017 (i.e., baseline conditions) to 2025 (i.e., when Lake C38 [Nemo Lake] is anticipated to permanently return to baseline conditions) is presented in Figure 1 below.

During construction (in 2018 and 2019), Agnico Eagle are estimating a maximum of 174,708 m³/year of freshwater use; during operations the expected freshwater use will be 191,052 m³/year from Nemo Lake (presented by month on right y-axis of Figure 1). Table 1 shows a summary of the yearly total freshwater intake from Nemo Lake and estimated outflow.

Table 1: Summary of Intake and Outflow per Year

Year	Freshwater Intake	Total Outflow (Lake C38)
	[m ³]	[m ³]
2017	0	462,914
2018	111,559	434,795
2019	174,708	549,745
2020	191,052	773,449
2021	191,050	773,449
2022	191,050	416,279
2023	191,050	416,279
2024	191,052	416,279
2025	0	462,914

¹ NIRB File No. 16MN056 Application No: 124683/ NWB File No. 2AM WTP ---- : NWB Consideration of Agnico Eagle Mines Ltd's "Whale Tail Pit" Project Proposal and revised Water License Applications (2AM MEA-1525 Amendment Application and New license 2AM WTP ---). Submitted May 25, 2017 to Nunavut Water Board.



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The total natural detailed annual water yield of the Nemo watershed is presented in Figure 1 and Table 2.

From analysis using a monthly timestep with mean annual climate inputs, freshwater withdrawals from Lake C38 (Nemo Lake) are anticipated to:

- result in little to negligible effects to discharges from Lake C38 (Nemo Lake) prior to the North-East Diversion to Lake C38 (Nemo Lake);
- reduce the potential increase in discharges from Lake C38 (Nemo Lake) during the North-East Diversion to Lake C38 (Nemo Lake); and
- reduce low discharges from Lake C38 (Nemo Lake) following the North-East Diversion to Lake C38 (Nemo Lake).

These conclusions are similar to those presented in the Project's Environmental Impact Statement, though the findings in this memo are based on finer modelling.

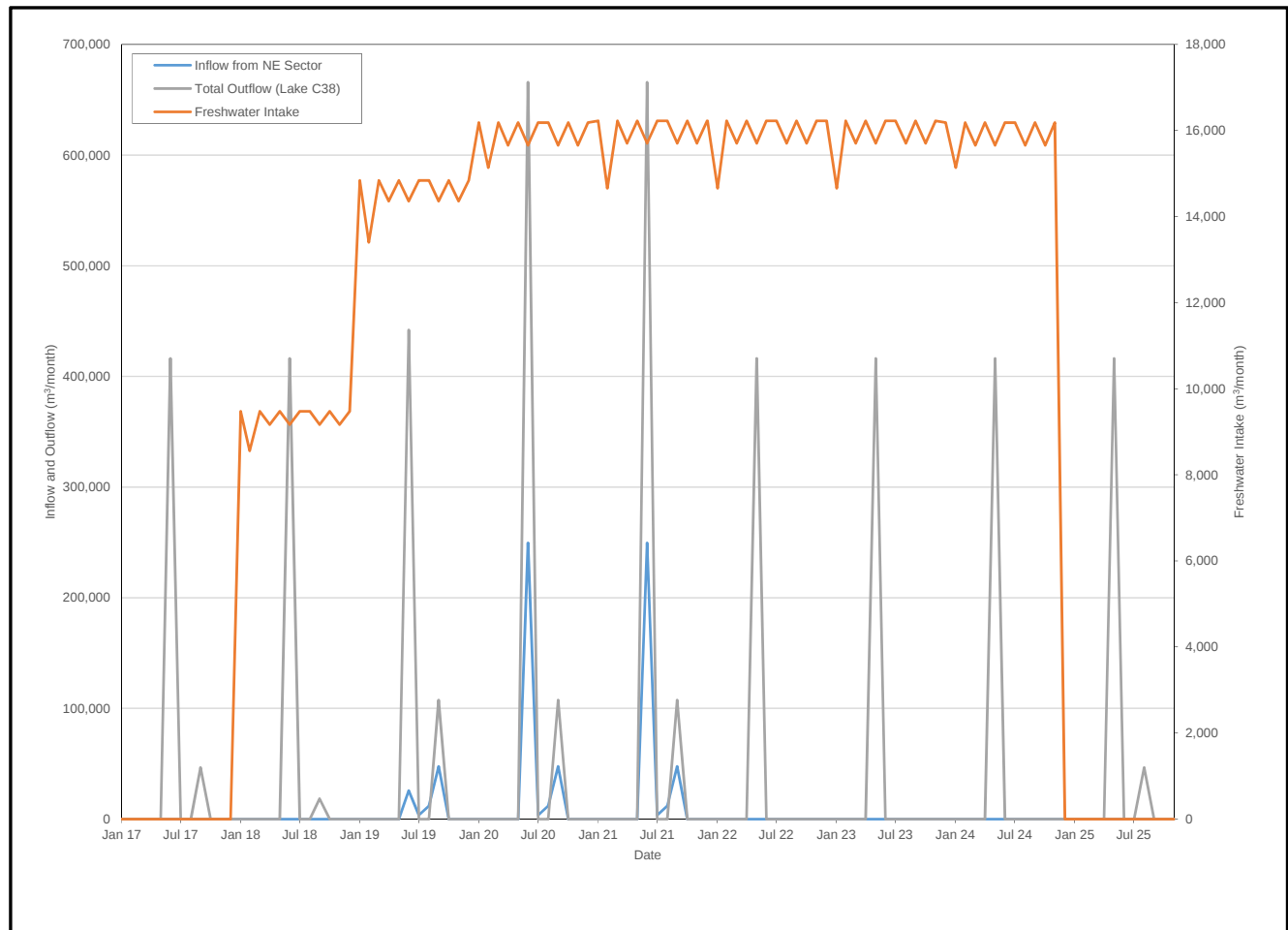


Figure 1: Lake C38 (Nemo Lake) Water Balance from 2017 to 2025



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Table 2: Lake C38 (Nemo Lake) Detailed Water Balance from 2017 to 2025

Date	Temperature	Snowfall	Max Snow Sublimation	Snowpack	Rainfall	Total Runoff	Inflow from NE Sector	Total Inflow	Lake Evaporation	Maximum Evapotranspiration	Total Inflow Net from Evaporation	Freshwater Intake	Lake Storage	Total Outflow (Lake C38)	Drainage Area	Lake + Tributary Area
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m²]	[m²]
													8,360,000			1,300,100
Jan 17	-31.3	37,791	31,914	236,682	72	0	0	0	0	0	0	0	8,360,000	0	3,546,000	1,300,100
Feb 17	-31.1	34,299	31,914	239,068	129	0	0	0	0	0	0	0	8,360,000	0	3,546,000	1,300,100
Mar 17	-26.3	50,054	31,914	257,208	117	0	0	0	0	0	0	0	8,360,000	0	3,546,000	1,300,100
Apr 17	-17.0	73,019	31,914	298,313	1,710	0	0	0	0	0	0	0	8,360,000	0	3,546,000	1,300,100
May 17	-6.4	44,485	31,914	310,884	21,072	0	0	0	0	0	0	0	8,360,000	0	3,546,000	1,300,100
Jun 17	4.9	16,472	0	0	73,844	434,718	0	434,718	11,701	6,738	416,279	0	8,360,000	416,279	3,546,000	1,300,100
Jul 17	11.6	31	0	0	157,010	157,010	0	157,010	128,710	71,869	0	0	8,316,431	0	3,546,000	1,300,100
Aug 17	9.8	3,366	0	0	171,808	171,808	0	171,808	130,010	71,869	0	0	8,286,360	0	3,546,000	1,300,100
Sep 17	3.1	37,435	0	0	141,338	141,338	0	141,338	52,004	29,197	60,138	0	8,346,498	46,635	3,546,000	1,300,100
Oct 17	-6.5	123,373	31,914	148,763	25,995	0	0	0	0	0	0	0	8,346,498	0	3,546,000	1,300,100
Nov 17	-19.3	91,172	31,914	208,021	794	0	0	0	0	0	0	0	8,346,498	0	3,546,000	1,300,100
Dec 17	-26.8	54,698	31,914	230,805	101	0	0	0	0	0	0	0	8,346,498	0	3,546,000	1,300,100
Jan 18	-31.3	37,791	31,914	236,682	72	0	0	0	0	0	0	9,475	8,337,023	0	3,546,000	1,300,100
Feb 18	-31.1	34,299	31,914	239,068	129	0	0	0	0	0	0	8,558	8,328,465	0	3,546,000	1,300,100
Mar 18	-26.3	50,054	31,914	257,208	117	0	0	0	0	0	0	9,475	8,318,990	0	3,546,000	1,300,100
Apr 18	-17.0	73,019	31,914	298,313	1,710	0	0	0	0	0	0	9,169	8,309,820	0	3,546,000	1,300,100
May 18	-6.4	44,485	31,914	310,884	21,072	0	0	0	0	0	0	9,475	8,300,345	0	3,546,000	1,300,100
Jun 18	4.9	16,472	0	0	73,844	434,718	0	434,718	11,701	6,738	416,279	9,169	8,360,000	416,279	3,546,000	1,300,100
Jul 18	11.6	31	0	0	157,010	157,010	0	157,010	128,710	71,869	0	9,475	8,306,956	0	3,546,000	1,300,100
Aug 18	9.8	3,366	0	0	171,808	171,808	0	171,808	130,010	71,869	0	9,475	8,267,410	0	3,546,000	1,300,100
Sep 18	3.1	37,435	0	0	141,338	141,338	0	141,338	52,004	29,197	60,138	9,169	8,318,378	18,516	3,546,000	1,300,100
Oct 18	-6.5	123,373	31,914	148,763	25,995	0	0	0	0	0	0	9,475	8,308,903	0	3,546,000	1,300,100
Nov 18	-19.3	91,172	31,914	208,021	794	0	0	0	0	0	0	9,169	8,299,734	0	3,546,000	1,300,100
Dec 18	-26.8	54,698	31,914	230,805	101	0	0	0	0	0	0	9,475	8,290,259	0	3,546,000	1,300,100
Jan 19	-31.3	37,791	31,914	236,682	72	0	0	0	0	0	0	14,838	8,275,421	0	3,546,000	1,300,100
Feb 19	-31.1	34,299	31,914	239,068	129	0	0	0	0	0	0	13,402	8,262,019	0	3,546,000	1,300,100
Mar 19	-26.3	50,054	31,914	257,208	117	0	0	0	0	0	0	14,838	8,247,181	0	3,546,000	1,300,100
Apr 19	-17.0	73,019	31,914	298,313	1,710	0	0	0	0	0	0	14,360	8,232,821	0	3,546,000	1,300,100
May 19	-6.4	44,485	31,914	310,884	21,072	0	0	0	0	0	0	14,838	8,217,983	0	3,546,000	1,300,100
Jun 19	4.9	16,472	0	0	73,844	434,718	25,804	460,522	11,701	6,738	442,083	14,360	8,360,000	442,083	3,546,000	1,300,100
Jul 19	11.6	31	0	0	157,010	157,010	3,592	160,602	128,710	71,869	0	14,838	8,305,185	0	3,546,000	1,300,100
Aug 19	9.8	3,366	0	0	171,808	171,808	12,036	183,844	130,010	71,869	0	14,838	8,272,312	0	3,546,000	1,300,100
Sep 19	3.1	37,435	0	0	141,338	141,338	47,524	188,862	52,004	29,197	107,662	14,360	8,360,000	107,662	3,546,000	1,300,100
Oct 19	-6.5	123,373	31,914	148,763	25,995	0	0	0	0	0	0	14,838	8,345,162	0	3,546,000	1,300,100
Nov 19	-19.3	91,172	31,914	208,021	794	0	0	0	0	0	0	14,360	8,330,802	0	3,546,000	1,300,100
Dec 19	-26.8	54,698	31,914	230,805	101	0	0	0	0	0	0	14,838	8,315,964	0	3,546,000	1,300,100
Jan 20	-31.3	37,791	31,914	236,682	72	0	0	0	0	0	0	16,182	8,299,782	0	3,546,000	1,300,100



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Table 2: Lake C38 (Nemo Lake) Detailed Water Balance from 2017 to 2025

Date	Temperature	Snowfall	Max Snow Sublimation	Snowpack	Rainfall	Total Runoff	Inflow from NE Sector	Total Inflow	Lake Evaporation	Maximum Evapotranspiration	Total Inflow Net from Evaporation	Freshwater Intake	Lake Storage	Total Outflow (Lake C38)	Drainage Area	Lake + Tributary Area
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m²]	[m²]
Feb 20	-31.1	34,299	31,914	239,068	129	0	0	0	0	0	0	15,138	8,284,644	0	3,546,000	1,300,100
Mar 20	-26.3	50,054	31,914	257,208	117	0	0	0	0	0	0	16,182	8,268,462	0	3,546,000	1,300,100
Apr 20	-17.0	73,019	31,914	298,313	1,710	0	0	0	0	0	0	15,660	8,252,802	0	3,546,000	1,300,100
May 20	-6.4	44,485	31,914	310,884	21,072	0	0	0	0	0	0	16,182	8,236,620	0	3,546,000	1,300,100
Jun 20	4.9	16,472	0	0	73,844	434,718	249,507	684,225	11,701	6,738	665,787	15,660	8,360,000	665,787	3,546,000	1,300,100
Jul 20	11.6	31	0	0	157,010	157,010	3,592	160,602	128,710	71,869	0	16,182	8,303,841	0	3,546,000	1,300,100
Aug 20	9.8	3,366	0	0	171,808	171,808	12,036	183,844	130,010	71,869	0	16,182	8,269,624	0	3,546,000	1,300,100
Sep 20	3.1	37,435	0	0	141,338	141,338	47,524	188,862	52,004	29,197	107,662	15,660	8,360,000	107,662	3,546,000	1,300,100
Oct 20	-6.5	123,373	31,914	148,763	25,995	0	0	0	0	0	0	16,182	8,343,818	0	3,546,000	1,300,100
Nov 20	-19.3	91,172	31,914	208,021	794	0	0	0	0	0	0	15,660	8,328,158	0	3,546,000	1,300,100
Dec 20	-26.8	54,698	31,914	230,805	101	0	0	0	0	0	0	16,182	8,311,976	0	3,546,000	1,300,100
Jan 21	-31.3	37,791	31,914	236,682	72	0	0	0	0	0	0	16,226	8,295,750	0	3,546,000	1,300,100
Feb 21	-31.1	34,299	31,914	239,068	129	0	0	0	0	0	0	14,656	8,281,094	0	3,546,000	1,300,100
Mar 21	-26.3	50,054	31,914	257,208	117	0	0	0	0	0	0	16,226	8,264,867	0	3,546,000	1,300,100
Apr 21	-17.0	73,019	31,914	298,313	1,710	0	0	0	0	0	0	15,703	8,249,164	0	3,546,000	1,300,100
May 21	-6.4	44,485	31,914	310,884	21,072	0	0	0	0	0	0	16,226	8,232,938	0	3,546,000	1,300,100
Jun 21	4.9	16,472	0	0	73,844	434,718	249,507	684,225	11,701	6,738	665,787	15,703	8,360,000	665,787	3,546,000	1,300,100
Jul 21	11.6	31	0	0	157,010	157,010	3,592	160,602	128,710	71,869	0	16,226	8,303,797	0	3,546,000	1,300,100
Aug 21	9.8	3,366	0	0	171,808	171,808	12,036	183,844	130,010	71,869	0	16,226	8,269,536	0	3,546,000	1,300,100
Sep 21	3.1	37,435	0	0	141,338	141,338	47,524	188,862	52,004	29,197	107,662	15,703	8,360,000	107,662	3,546,000	1,300,100
Oct 21	-6.5	123,373	31,914	148,763	25,995	0	0	0	0	0	0	16,226	8,343,774	0	3,546,000	1,300,100
Nov 21	-19.3	91,172	31,914	208,021	794	0	0	0	0	0	0	15,703	8,328,071	0	3,546,000	1,300,100
Dec 21	-26.8	54,698	31,914	230,805	101	0	0	0	0	0	0	16,226	8,311,844	0	3,546,000	1,300,100
Jan 22	-31.3	37,791	31,914	236,682	72	0	0	0	0	0	0	16,226	8,295,618	0	3,546,000	1,300,100
Feb 22	-31.1	34,299	31,914	239,068	129	0	0	0	0	0	0	14,656	8,280,962	0	3,546,000	1,300,100
Mar 22	-26.3	50,054	31,914	257,208	117	0	0	0	0	0	0	16,226	8,264,736	0	3,546,000	1,300,100
Apr 22	-17.0	73,019	31,914	298,313	1,710	0	0	0	0	0	0	15,703	8,249,033	0	3,546,000	1,300,100
May 22	-6.4	44,485	31,914	310,884	21,072	0	0	0	0	0	0	16,226	8,232,806	0	3,546,000	1,300,100
Jun 22	4.9	16,472	0	0	73,844	434,718	0	434,718	11,701	6,738	416,279	15,703	8,360,000	416,279	3,546,000	1,300,100
Jul 22	11.6	31	0	0	157,010	157,010	0	157,010	128,710	71,869	0	16,226	8,300,205	0	3,546,000	1,300,100
Aug 22	9.8	3,366	0	0	171,808	171,808	0	171,808	130,010	71,869	0	16,226	8,253,907	0	3,546,000	1,300,100
Sep 22	3.1	37,435	0	0	141,338	141,338	0	141,338	52,004	29,197	60,138	15,703	8,298,342	0	3,546,000	1,300,100
Oct 22	-6.5	123,373	31,914	148,763	25,995	0	0	0	0	0	0	16,226	8,282,116	0	3,546,000	1,300,100
Nov 22	-19.3	91,172	31,914	208,021	794	0	0	0	0	0	0	15,703	8,266,413	0	3,546,000	1,300,100
Dec 22	-26.8	54,698	31,914	230,805	101	0	0	0	0	0	0	16,226	8,250,187	0	3,546,000	1,300,100
Jan 23	-31.3	37,791	31,914	236,682	72	0	0	0	0	0	0	16,226	8,233,960	0	3,546,000	1,300,100
Feb 23	-31.1	34,299	31,914	239,068	129	0	0	0	0	0	0	14,656	8,219,304	0	3,546,000	1,300,100
Mar 23	-26.3	50,054	31,914	257,208	117	0	0	0	0	0	0	16,226	8,203,078	0	3,546,000	1,300,100



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Table 2: Lake C38 (Nemo Lake) Detailed Water Balance from 2017 to 2025

Date	Temperature	Snowfall	Max Snow Sublimation	Snowpack	Rainfall	Total Runoff	Inflow from NE Sector	Total Inflow	Lake Evaporation	Maximum Evapotranspiration	Total Inflow Net from Evaporation	Freshwater Intake	Lake Storage	Total Outflow (Lake C38)	Drainage Area	Lake + Tributary Area
	[°C]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m³]	[m²]	[m²]
Apr 23	-17.0	73,019	31,914	298,313	1,710	0	0	0	0	0	0	15,703	8,187,375	0	3,546,000	1,300,100
May 23	-6.4	44,485	31,914	310,884	21,072	0	0	0	0	0	0	16,226	8,171,149	0	3,546,000	1,300,100
Jun 23	4.9	16,472	0	0	73,844	434,718	0	434,718	11,701	6,738	416,279	15,703	8,360,000	416,279	3,546,000	1,300,100
Jul 23	11.6	31	0	0	157,010	157,010	0	157,010	128,710	71,869	0	16,226	8,300,205	0	3,546,000	1,300,100
Aug 23	9.8	3,366	0	0	171,808	171,808	0	171,808	130,010	71,869	0	16,226	8,253,907	0	3,546,000	1,300,100
Sep 23	3.1	37,435	0	0	141,338	141,338	0	141,338	52,004	29,197	60,138	15,703	8,298,342	0	3,546,000	1,300,100
Oct 23	-6.5	123,373	31,914	148,763	25,995	0	0	0	0	0	0	16,226	8,282,116	0	3,546,000	1,300,100
Nov 23	-19.3	91,172	31,914	208,021	794	0	0	0	0	0	0	15,703	8,266,413	0	3,546,000	1,300,100
Dec 23	-26.8	54,698	31,914	230,805	101	0	0	0	0	0	0	16,226	8,250,187	0	3,546,000	1,300,100
Jan 24	-31.3	37,791	31,914	236,682	72	0	0	0	0	0	0	16,182	8,234,005	0	3,546,000	1,300,100
Feb 24	-31.1	34,299	31,914	239,068	129	0	0	0	0	0	0	15,138	8,218,867	0	3,546,000	1,300,100
Mar 24	-26.3	50,054	31,914	257,208	117	0	0	0	0	0	0	16,182	8,202,685	0	3,546,000	1,300,100
Apr 24	-17.0	73,019	31,914	298,313	1,710	0	0	0	0	0	0	15,660	8,187,025	0	3,546,000	1,300,100
May 24	-6.4	44,485	31,914	310,884	21,072	0	0	0	0	0	0	16,182	8,170,843	0	3,546,000	1,300,100
Jun 24	4.9	16,472	0	0	73,844	434,718	0	434,718	11,701	6,738	416,279	15,660	8,360,000	416,279	3,546,000	1,300,100
Jul 24	11.6	31	0	0	157,010	157,010	0	157,010	128,710	71,869	0	16,182	8,300,249	0	3,546,000	1,300,100
Aug 24	9.8	3,366	0	0	171,808	171,808	0	171,808	130,010	71,869	0	16,182	8,253,996	0	3,546,000	1,300,100
Sep 24	3.1	37,435	0	0	141,338	141,338	0	141,338	52,004	29,197	60,138	15,660	8,298,474	0	3,546,000	1,300,100
Oct 24	-6.5	123,373	31,914	148,763	25,995	0	0	0	0	0	0	16,182	8,282,292	0	3,546,000	1,300,100
Nov 24	-19.3	91,172	31,914	208,021	794	0	0	0	0	0	0	15,660	8,266,632	0	3,546,000	1,300,100
Dec 24	-26.8	54,698	31,914	230,805	101	0	0	0	0	0	0	16,182	8,250,450	0	3,546,000	1,300,100
Jan 25	-31.3	37,791	31,914	236,682	72	0	0	0	0	0	0	0	8,250,450	0	3,546,000	1,300,100
Feb 25	-31.1	34,299	31,914	239,068	129	0	0	0	0	0	0	0	8,250,450	0	3,546,000	1,300,100
Mar 25	-26.3	50,054	31,914	257,208	117	0	0	0	0	0	0	0	8,250,450	0	3,546,000	1,300,100
Apr 25	-17.0	73,019	31,914	298,313	1,710	0	0	0	0	0	0	0	8,250,450	0	3,546,000	1,300,100
May 25	-6.4	44,485	31,914	310,884	21,072	0	0	0	0	0	0	0	8,250,450	0	3,546,000	1,300,100
Jun 25	4.9	16,472	0	0	73,844	434,718	0	434,718	11,701	6,738	416,279	0	8,360,000	416,279	3,546,000	1,300,100
Jul 25	11.6	31	0	0	157,010	157,010	0	157,010	128,710	71,869	0	0	8,316,431	0	3,546,000	1,300,100
Aug 25	9.8	3,366	0	0	171,808	171,808	0	171,808	130,010	71,869	0	0	8,286,360	0	3,546,000	1,300,100
Sep 25	3.1	37,435	0	0	141,338	141,338	0	141,338	52,004	29,197	60,138	0	8,346,498	46,635	3,546,000	1,300,100
Oct 25	-6.5	123,373	31,914	148,763	25,995	0	0	0	0	0	0	0	8,346,498	0	3,546,000	1,300,100
Nov 25	-19.3	91,172	31,914	208,021	794	0	0	0	0	0	0	0	8,346,498	0	3,546,000	1,300,100
Dec 25	-26.8	54,698	31,914	230,805	101	0	0	0	0	0	0	0	8,346,498	0	3,546,000	1,300,100