SSO Volume Estimation Methodology (Revised from 15-Day Report)

The estimated volume of the spill be being revised to reflect further flow meter data, pump run times, and a higher level of analysis that takes into consideration increased flows resulting from the rain event that occurred during the spill time period.

The revised total spill volume was estimated in three parts:

A. Flow Meter Data – Flow meter reading difference between the Coastal Treatment Plant influent flow and the Laguna Beach effluent flow during the time of the spill.

Date	Total Rain Fall During Spill Event (inches)	Laguna Beach Effluent (million gallons)	Coastal Treatment Plant Influent (million gallons)	Unaccounted Flow/Delta (million gallons)	Adjusted Delta value (million gallons)
11/27/19-11/30/19	2.26	6.55	4.71	1.84	1.44

Flow data for Laguna Beach Effluent was calculated by adding the total flow from the City's Bluebird SOCWA Lift Station and Nyes Place Lift Station. The Bluebird SOCWA Lift Station flow is based on the stations totalized flow meter readings that are manually written down by the field crews daily. The Nyes Place Lift Station flows are based on the stations pump run time logs during the time of the spill, the flow was then calculated using the design flow rate of the stations pumps. The location of the spill was between the Laguna Beach effluent and the Coastal Treatment Influent flow readings; therefore, the delta is the amount of flow unaccounted for and assumed to have been released during the spill. The delta value was adjusted because there is a consistent measured difference of .2 MGD between the two flow measurement points which we believe is due to the difference in the calibration of the respective flow meters. Because the meter at the Coastal Treatment Plant is of a higher grade of technology and was installed with the necessary pipe lengths upstream of the meter, the volume data recorded by the CTP flow meter is likely to be more accurate. The consistent difference in the readings of the two meters was confirmed by analysis of the flows from 11/25/19 to 12/2/19, which showed a consistent difference of .2 MGD in the two daily flow measurements.

B. Bluebird SOCWA Bypass Assumed Flow to Storm Drain to Bluebird Beach (Second Spill Point)

Bypass Active (hrs)	Average Flow (gpm)	Total Volume Pumped to Storm Drain (million gallons)
12.25	500	.37

The volume was calculated using the bypass pump curve with the given suction lift and friction loss for the system. The bypass pump ran in 20 minute on/off intervals at 1,000gpm, therefore, the average pump discharge flow was 500gpm if the pump was running continuously through the bypass operation period.

C. Volume of wastewater dewatered from North Coast Interceptor into Aliso Creek while Bluebird SOCWA Bypass was active to depressurize the pipe to make the repair.

Length (ft)	Diameter (in)	Volume (million gallons)
5025	24	.06

The total spill volume is a total of the three parts outlined above:

Flow Meter Data Difference (million gallons)	+	Bluebird SOCWA Bypass Flow (million gallons)	+	NCI Dewatered Volume (million gallons)	=	Total Spill Volume (million gallons)
1.44	**+**	**.37**	**+**	**.06**	**=**	**1.87**

Please refer to the attached spreadsheet for backup to the above summary of calculations.

SSO Volume Estimation Methodology Revised from 15-Day CIWQS Report

A. Flow Meter Data - Difference Between Coastal Treatment Plant Influent Meter vs. BB_SOCWA Lift Station Effluent Meter

	Date	Start Time	End Time (Next Day)	Rain Data (in)	SOCWA Flow Meter (Ave MGD)	BSOCWA Flow Meter (MGD)	Nyes Place Flow Based on Pump Run Time Log (MGD)	Total Laguna Flow (MGD)	Laguna - SOCWA = Amount of Volume Unaccounted For	Adjustment* by .2 MGD for consistent measured diffence between SOCWA and Laguna Flow meters	Total (Million Gallons)
	11/25/2019	7:35am	9:00am	0.00	1.58	1.66	0.15	1.81	0.23	0.03	
	11/26/2019	9:00am	7:50am	0.00	1.42	1.05	0.11	1.16	-0.26	-0.46	
Spill Time	11/27/2019	7:50am	10:15am	0.27	1.32	2.34	0.29	2.63	1.31	1.11	
	11/28/2019	10:15am	9:45am	1.68	1.92	3.69	0.18	3.92	0.53	0.33	1.44
	11/29/2019	9:45am	9:45am	0.31	1.47		0.05				
	11/30/2019	9:45am	8:25am	0.00	1.66	1.82	0.12	1.94	0.28	0.08	
	12/1/2019	8:25am	8:30am	0.00	1.66	1.79	0.12	1.91	0.25	0.05	
	12/2/2019	8:30am	9:30am	0.00	1.56	1.64	0.12	1.76	0.20	0.00	

Total Spill = in Million Gallons: 1.87

Note: Total spill Volume = Flow meter data (A) + BSOCWA Bypass to SD (B) + Volume Dewatered (C)

	Bluebird Raw Data	Cummulative Flow Meter Readings in MG	Time	Difference - to get total flow that day.
	11/25/2019	9,778,980,458	7:35am	1,656,323.00
	11/26/2019	9,780,636,781	9:00am	1,045,678.00
	11/27/2019	9,781,682,459	7:50am	2,341,580.00
	11/28/2019	9,784,024,039	10:15am	3,686,860.00
	11/29/2019			
	11/30/2019	9,787,710,899	9:45am	1,816,069.00
	12/1/2019	9,789,526,968	8:23am	1,792,259.00
	12/2/2019	9,791,319,227	8:30am	1,636,412.00
	12/3/2019	9,792,955,639	9:30am	

Note: The totalized flow was not recorded on 11/29/19 by the field crews.

B. Bluebird SOCWA Bypass Assumed Flow to Storm Drain

	Date	Time	Total Time (hrs)	Ave Flow (GPM)	Total Volume Pumped to SD (Gallons)	Total (Million Gallons)
Start	11/29/2019	12:00am	12.25	500	367,500	0.37
End	11/30/2019	12:15pm				

Note: The bypass pump was in draw fill condition while in operation, at 533rpm the pump was pumping 1,000gpm.
The pump ran roughly in 20 minute On-Off intervals, therefore the average flow was 500gpm if the pumps ran continuously.

C. Volume dewatered from NCI while Bluebird Bypass was Active

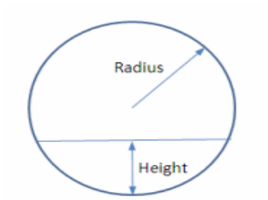
Location	Length (ft)	Diamater (in)	Volume (Gallons)	Aliso Creek during dewatering activity (Million Gallons)
Gravity Section btwn McAulay and Start of Siphon**	4500	24	52,872	0.06
Siphon before spill location	225	24	2,641	
Siphon after spill location	300	24	7,047	

**assume 24in diameter gravity pipe is half full

Calculation Reference

Calculator

Use the calculator below to calculate the segment area given the radius and height of the segment, using the formula described above



Square Ft of Half Full 24-in Pipe

Where Radius = 1 ft
Height of Water = 1 ft

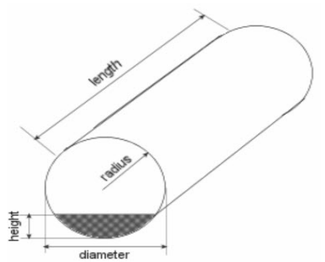
Area = 1.5708 sq ft

1.5708 sf x 4,500ft = 7,068 cu ft
where 1cf = 7.48052 gallons

Radius	1
Segment height	1
Area	1.5708

Calculate Clear

Welcome to OnlineConversion.com
Volume of a Partially Filled Cylinder or Cylindrical Tank

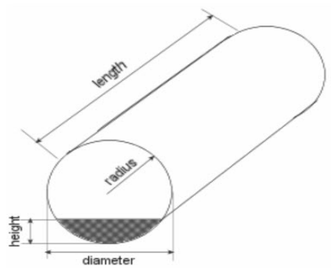


volume = Pi * radius^2 * length

Enter three of the following, the radius/diameter, length, volume, height
The remaining unknown values will be calculated.

Radius	1
Diameter	2
Length	300
Height	2
Volume	942.4777960769379

Welcome to OnlineConversion.com
Volume of a Partially Filled Cylinder or Cylindrical Tank



volume = Pi * radius^2 * length

Enter three of the following, the radius/diameter, length, volume, height.
The remaining unknown values will be calculated.

Radius	1
Diameter	2
Length	225
Height	1
Volume	353.4291735288517

Calculate Reset