

## MEMORANDUM

**DATE:** April 22, 2010 **PROJECT NO.** 985  
**TO:** Conal McNamara, Assistant Director of Economic Community Development  
**FROM:** Stephen T. Lilburn  
**SUBJECT:** Responses to Questions on Volumes

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### Summary

Criticism has been raised as to the estimate of aggregate volumes presented on the Azusa Rock Quarry site and their representation in the Draft EIR document. Original volume calculations by Lilburn Corporation are attached. We have reviewed volume calculation submitted by AGI and Save Our Canyon (SOC). We believe there are inaccuracies in these calculations which we addressed below. We have stated the volume calculations and presented a comparison in this memo for purposes of clarifying the issue.

In presenting estimates of aggregate volumes for the 2009 VMC Azusa Rock Quarry Application some assumptions were made, these include:

- Volumes would be calculated in cubic yards. This allows for a base volumetric estimate that can be multiplied by a weight factor to estimate tonnage;
- A triangle volumetric technique (a standard methodology to estimate volume) would be used in the calculation;
- Estimates would be subject to a percentage of error typical of USGS base topography; and
- The tonnage multiplier is 2.075 per VMC.

The following are rough volume calculations taken from data submitted to the City of Azusa in the 2009 Azusa Rock Quarry Application and subsequent requests for data from VMC.

**Table 1  
Triangle Volume Report  
(Lilburn Corporation)**

	<b>USGS Based Topo Prior to Mining 1988 Plan Area: 190 acres</b>	<b>Existing Topo 1988 Plan Area: 190 acres</b>	<b>Existing Topo Proposed 2009 Azusa Rock Quarry Plan Area: 190 acres</b>
<b>Original Surface</b>	USGS Before Mining	Existing Topo (5/07)	Existing Topo (5/07)
<b>Design Surface</b>	88 Plan	88 Plan	2009 Proposed Plan
<b>Mode</b>	Entire Surface	Entire Surface	Entire Surface
<b>Cut Factor</b>	1.0	1.0	1.0
<b>Fill Factor</b>	1.0	1.0	1.0
<b>Cut</b>	1,552,051,015.4 cu ft	1,416,978,585.7 cu ft	1,646,544,634.7 cu ft
<b>Fill</b>	6,561,399.1 cu ft	6,366,129.4 cu ft	1,549,171.5 cu ft
<b>Net</b>	1,545,489,616.3 cu ft	1,410,612,456.4 cu ft	1,644,995,463.1 cu ft
<b>Cut</b>	57,483,370.9 cu yd	52,480,688.4 cu yd	60,983,134.6 cu yd
<b>Fill</b>	243,014.8 cu yd	235,782.6 cu yd	57,376.7 cu yd
<b>Net</b>	57,240,356.2 cu yd	52,244,905.8 cu yd	60,925,757.9 cu yd

Note: Volumes are directly from computer printouts attached.

Based on the calculated volumes some comparisons can be made.

**Table 2  
Calculated Volume Comparison  
(Lilburn Corporation)  
(From Table 1)**

<b>Plan</b>	<b>Million Cubic Yards (cy)</b>	<b>Tonnage Multiplier* (Tons Per cy)</b>	<b>Million Tons (MT)</b>
1988 Plan (USGS Topo Prior to Mining)	57.5	x 2.075	119.3
1988 Plan (Current)	52.5	x 2.075	108.9
2009 Proposed Plan	61.0	x 2.075	126.6

\*Most recent weight as provided by VMC  
Volumes rounded to nearest tenth.

**Table 3  
Comparison to Table 3-6, p. 3-27 of the EIR**

<b>Plan</b>	<b>Table 3-6 (DEIR)</b>	<b>VMC Estimate (2010)</b>	<b>Lilburn Estimate</b>
1988 Total Reserves	121.5 MT	--	119.3 MT
1988 Plan (Current 5/07 topo)	--	106.5 MT**	108.9 MT
<u>2009 Proposed Plan</u>			
Aggregate Reserves	105.6 MT	105.6 MT	
Overburden	32.6 MT		
<b>Combined Volume</b>	<b>138.2 MT</b>		<b>126.6</b>

\*\*VMC used a multiplier average of 2.075

These are Lilburn's rough calculations based on available topography excluding actual CAD design drawings. The margin of error is within 10 percent.

## **Alternative calculations and subsequent comparison**

### **VMC Calculation**

In discussions with VMC engineers it is apparent that their 2010 calculations include:

- Elimination of peripheral buffers that extend the excavation to the project boundary
- 1 to 1 slope
- No curving or contouring

This results in a maximized volume calculation. They also indicate an average tonnage multiplier of 2.075.

### **AGI Calculations**

The AGI prepared west quarry calculation is based on graphic contours presented in the Draft EIR (AGI Geotechnical, Inc. April 12, 2010). These are the same as those employed by Lilburn Corporation. The AGI volume on the west quarry utilizing the existing and finished contours calculated a total volume of 61 mcy. (AGI, Plate1)

AGI calculated tonnage volume of 136 MT based on a weight of 165 PCF or a multiplier of 2.22.

Lilburn concurs with the 61 mcy estimate. If a 2.075 multiplier were used, their tonnage figure for the west quarry would be 126.6.

AGI calculated the east quarry utilizing a final contour map that appears as Figure 4.1-9, page 4.1-15 of the Aesthetics analysis of the Draft EIR. Their approach is very similar to that taken by Lilburn Corporation which used the 1988 Plan included in Figure 3-5, page 2-8, Draft EIR, however AGI calculates volume for the east quarry only. A total east quarry volume of 24 mcy is derived but fails to add the volume available on the existing 1988 west quarry (25 mcy approx.) for a total 1988 plan (current) volume of 49 mcy approximate.

### **Save Our Canyon Calculations**

Save Our Canyon (SOC) asserts that the DEIR (and the project application) overestimates the available reserves in the current project (letter O-9, Feb. 20, 2010, P 3 with attachments). SOC outlines their estimates in their attachment 4. They believe that the 1988 plan estimate of 121.5 mt (table 3-6, DEIR) is actually for the entire 270 acre parcel. Instead they rely on another report published by Greystone Environmental Consultants, January 2005. This draft document proposed an estimated total of 125 mt of aggregate production (Greystone, 2005, P. 4). The proposed quarry is a different design with a reconfigured east and west quarry over the entire 270 acres. The report does not segregate the estimated volumes between east and west, it has different quarry elevations (over 250') and a different quarry configuration. The use of this data is a critical assumption that effects the balance of the SOC calculated volumes estimates. VMC estimates for the 1988 plan on 190 acres is 121.2 mt corroborated by Lilburn Corporation at 119.3 mt (see comparison Table 3 above). Based on the Greystone calculation SOC then backs

into estimates of volume by assigning 20 mt of aggregate (source unknown) to the east side (VMC estimate is 106 mt approximate, Lilburn Corporation estimate is 108 mt approximate, see comparison Table 3 above). They calculate the ratio based on area for the west 80 acres, assign a value of 25 mt to the existing west quarry, then combine the east and west values for 45 mt predicting that remaining reserves gained by the proposed plan will be 80 mt compared to 20 million on the east.

Their argument is that east side volumes are overestimated and that west side volumes proposed by this proposal will offset this volume loss. The 80 acre exchange is in fact not equal volumetrically. This is inconsistent with volumes calculated for the east quarry by VMC at 64 mcy, Lilburn Corporation at 60.9 mcy and AGI at 61 mcy. Lilburn Corporation believes the volumes calculated, although varied, are accurate. A mean average volume would be 61.9 mcy based on these calculations.

It appears that SOC underestimates the volumes present in the east quarry. If you total their volume estimates for the west quarry (25 mt + 80 mt) you see a total of 105 mt. This is consistent with VMC calculations (see Table 3).

**Table 4  
Comparison in Cubic Yards**

	<b>DEIR (2.075)</b>	<b>VMC (2.075)</b>	<b>Lilburn Corporation</b>	<b>AGI</b>	<b>SOC (2.075)</b>
1988 Plan	58.55 mcy		57.5 mcy	21.6 mcy	
1988 Current					
East Only				24 mcy	9.6 mcy
Total	58.55 mcy	51.3 mcy	52.5 mcy		
2009 Proposed Plan	66.6 mcy	66.6 mcy	60.9 mcy	61 mcy	28.9 mcy

Weight multiplier of 2.075 tons/cy

### **Conclusion**

It appears that volume calculations presented in the Project Application and analyzed in the EIR and later recalculated and submitted by VMC are accurate and reflect a reasonable approximation of aggregate volumes present and available on site. These volumes are further corroborated by independent calculations.

### **Volume Preparation**

Volumetric calculation on behalf of Lilburn Corporation were made by Troy Goodwalt, Senior Civil/Environmental Designer, Lilburn Corporation. These calculations and assumptions were reviewed by:

Stephen Lilburn, Principal, Lilburn Corporation  
 Martin Derus, Principal, Lilburn Corporation  
 Jay Martin, Principal, CHJ Inc., CEG 1529, PG 4887

Memoranda was prepared by Stephen Lilburn