

Bill Allen
44 Holmesbrook Road
Basking Ridge, NJ 07920
908-766-2876
wwallen29@verizon.net

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To: **Members of Bernards Township Planning Board**

Subject: **Quarry Rehabilitation Plan: New Sorge Data and ELM Report**

Comments below are for presentation at hearing on January 31, 2013.

A. Background: Joseph M. Sorge is the principal in JM Sorge, Inc., an environmental consulting firm retained by MQI. He uses the abbreviation JMS in his reports and I will do that here.

Dr. Jennifer L. Wollenberg and Kenneth T. Hart are members of The Elm Group, an environmental consulting firm retained by the Planning Board.

Documents, testimony and dates below are relevant in this discussion.

- JMS report to DEP entitled "Phase II Remedial Investigation Work Plan" and dated March 2011. It includes what Mr. Sorge calls the Phase I data. The report was on a CD with other documents and posted on the township website after his testimony on December 20, 2011.
- Sorge testimony at hearing on December 20, 2011.
- ELM report to board on February 7, 2012, signed by Dr. Wollenberg and Mr. Hart. It uses data from the JMS report of March 2011.
- Wollenberg testimony at hearing on July 17, 2012. ELM report of February became a part of the public record.
- Allen statement for board dated May 5, 2012, revised and submitted to board on August 21. Included analysis of monitoring well data in JMS report of March 2011.
- Allen testimony on August 21, 2012. Statement of May 5 made part of hearing record.
- JMS report to DEP entitled "Phase II Remedial Investigation Report / Soil Remedial Action Workplan / Groundwater Remedial Investigation Workplan" and dated August 2012. It includes the Phase I data and new Phase II data. It is in a huge 5921-page pdf file on a CD that was submitted to Fran Florio on August 23, 2012, but was not put on line for public review. I purchased a CD copy on October 13. This report was cited in the second ELM report. Mr. Sorge has not appeared to testify on it, and it is not part of the hearing record. It is the latest information from Mr. Sorge that I have.

- ELM report to board on October 4, 2012, signed by Dr. Wollenberg and Mr. Hart. It cites data in the JMS report of August 2012.
- Public comments were closed on December 4, 2012.
- Hart testimony on December 4, 2012. This occurred after public comments were closed. The ELM report of October became a part of the hearing record.

It has been standard practice for an expert to submit a report in advance of his [or her] testimony, and for the report to become part of the hearing record on the date of the testimony. The public is given the opportunity to question the expert on his report and testimony. When all experts have testified and been questioned, the public is invited to comment.

The ELM report of October 4 and the Hart testimony of December 4 are new evidence received after public comments were officially closed on December 4. Board questioning of Mr. Hart continued to midnight. The hour was late and people were tired. The hearing was adjourned without an opportunity for the public to question Mr. Hart or to comment on the new evidence.

I understand that neither Mr. Hart nor Dr. Wollenberg will attend the hearing on January 31. The comments that follow could be the basis for questions. I propose to submit them as comments on the new evidence.

B. Lake Water Quality: My focus here is on the adverse impacts that harmful substances in the imported fill may have on the quality of water in the future lake.

We have this reassuring statement from Mr. Sorge: "No SPLP results exceed the default leachate criteria standards established by NJDEP for any soil impact parameter. ... In addition the SPLP results confirm that future groundwater impact is not a concern at the site." [page 20 of JMS report of August 2012] SPLP stands for Synthetic Precipitation Leaching Procedure.

And on December 4, 2012, Mr. Hart said: "As far as the SPLP leaching procedure test, based on everything we have seen, the soil is not mobile, it is not leaching contaminants. Therefore, that is not an ongoing issue." [transcript page 202]

I think we would all like to believe that the contaminants in the fill pose no risks for the lake water quality. And then go out and tell future users of the lake and the general public that there is nothing to worry about. Unfortunately, the data from the monitoring wells is not so reassuring.

I presented some data and analysis in my report to the board and testimony last August. The data were chemical analyses of five rounds of water samples taken from three monitoring wells in the MOA areas and posted in the JMS report of March 2011. I have extended the analysis here to include the results from four more rounds of sampling and one more well. Data is from the JMS report of August 2012.

C. SVOC and PAH: In his reports Mr. Sorge uses the term SVOC [semi-volatile organic compound] as the name for a group of compounds. Dr. Wollenberg and Mr. Hart use the term PAH [polyaromatic hydrocarbon] for the same group. I don't know if the groups referenced by these terms are identical or just overlap. I will use Mr. Sorge's term.

Let's look at the spreadsheet in Attachment 1. The first section is an expanded version of what I presented last August. The data are concentrations in well water for all the SVOCs tested for and reported by JMS.

Initially there were five quarterly rounds of samples [from January 2010 thru January 2011]. Four rounds have been added [for May 2011 thru February 2012]. Well MW-4 has been added with three rounds of samples [July 2011 thru February 2012].

The SVOC names are in the first column and the concentration limits established by DEP are in the second. Concentrations greater than these limits are called "exceedances". Testing results are to the right for each of the wells and sampling dates. Cells with exceedances are shaded gray.

The shaded cells show exceedances in eight of the nine rounds of samples in well MW-1 and in one of three rounds in MW-4. More interesting is the analysis of the magnitude of these exceedances.

Six SVOCs have limits less than 1 ppb and show exceedances. I replicate the data for these six in the middle section of the spreadsheet. I have calculated the average concentration for each sampling round and plot these in the chart at the bottom.

The first five columns in the chart were visible when I testified in August and suggested an orderly upward trend. The good news is that this trend up did not continue. The bad news is that the data fluctuations are very large and there is no clear pattern or trend.

The results for well MW-4 that begin in July 2011 appear to track those for MW-1. This may be significant, but I won't pursue that further here.

When confronted with this kind of data, one should ask two questions.

- First: Are the large fluctuations produced by real changes in the thing being measured, or are they caused by variations in the measurement procedure. In other words, are the test results accurate?

A friend who is a chemical engineer told me that these measurements are very difficult when the concentrations are in the low parts per billion.

Joe Sorge reported a problem during the Phase I testing in his 2012 report on page 12: "The groundwater results obtained by JMS show levels of ... [he lists eleven substances from Benzo(a)Anthracene to p,p'-DDT] ... in well MW-1. ICON results did not confirm the JMS results." ICON Engineering is a consulting firm retained by the township.

There is good reason to be skeptical regarding the measurements that show very low concentrations. There is no justification for taking the results from the last round of testing in February 2012, that show no exceedances, and conclude that there is now no problem.

- Second: If the fluctuations in concentration are real, then what causes them? I can conjure up multiple explanations, but they would be speculative, and I won't do that here. I do believe, however, that it would be productive for Mr. Sorge and the other consultants to weigh in with their explanations for these fluctuations and the implications for future lake water quality.

Remember that the measured concentrations of these harmful substances in the monitoring wells are sometimes 40 times the DEP limits. What is the likelihood that these high concentrations will show up in the lake?

D, Synthetic Precipitation Leaching Procedure: Mr. Sorge and the ELM consultants rely more on the results of the synthetic tests than on the measurements of actual concentrations in the monitoring wells.

Mr. Sorge said on December 20, 2011: "As I have said, the results have all shown that the impacted soil in Area A is not mobile." [transcript page 39] Note also the statements from Mr. Sorge and Mr. Hart that open Section B above.

I have not found any explanation for placing more reliance on the SPLP test results than on the measurements of actual well-water concentrations. One is needed. [I am reminded of this from Groucho Marx: "Who are you going to believe: me or your lying eyes?"]

E. Metals: The Phase I data showed few exceedances for metals in the well-water concentrations. This changed dramatically with Phase II data. Let's look at the spreadsheet in Attachment 2.

The top section shows the quantity of exceedances for each of the four groups of substances and for each of four wells for each group. These are identified in the left two columns. To the right are the quantities of exceedances for each of the nine sampling dates [except where the cell is shaded and there is no data] and also the totals over all dates.

Chart A is a column chart for SVOCs exceedances and Chart B is the same for metals. I won't dwell on Chart A because I believe the variable data in Attachment 1 is more informative.

Chart B shows a significant rise in exceedances for metals, starting in July 2011. This data first appeared in the JMS report of August 2012. I don't recall any discussion of these exceedances and believe there should be some discussion.

F. Time Line: The JMS report for August 2012 has a projected time line. [In Table 4 on page 45. There are comments on page 28.] It shows the start of physical work to move

material and grade the MOA area in October 2012, the end of the physical work in June 2014, and the issuance of a groundwater Remedial Action Report in December 2014 after the most recent groundwater test results will have been evaluated.

I don't know if this work has begun. However, it looks as if we will have to wait at least through 2014 before we will know the final plan for the groundwater.

G. Classification Exception Area: Mr. Sorge ends the narrative of his August 2012 report with the comment that follows: "Once sufficient data is available to determine the appropriate groundwater remedy for the site, a groundwater RAW will be proposed. The RAW would include a specification of the proposed remedy. Based on the data currently available, the anticipated remedy will include establishing a CEA for the Deed Noticed area with monitored natural attenuation. However, the final remedy can't be determined until sufficient groundwater data is collected after installation of the engineering control." [page 28]

RAW stands for Remedial Action Workplan and CEA for Classification Exception Area.

I don't recall any discussion of a Remedial Action Workplan for groundwater or of a Classification Exception Area. What kind of exception might be required? Does Mr. Sorge fear that the lake water quality will not meet standards for fishing and swimming, and that these activities will be proscribed? Or something worse? We need discussion of these potential outcomes.

H. Wrapup: Joe Sorge has done an enormous amount of work and produced a large quantity of good data. I believe there has been too little analysis and discussion of this data and the potential implications. My comments above are intended to show this,

I urge you to invite Mr. Sorge back to submit any new water quality data he has, to testify, and to answer questions. Then hold an in-depth discussion of this data and its implications.

Thank you for considering these comments and suggestions.

Bill Allen

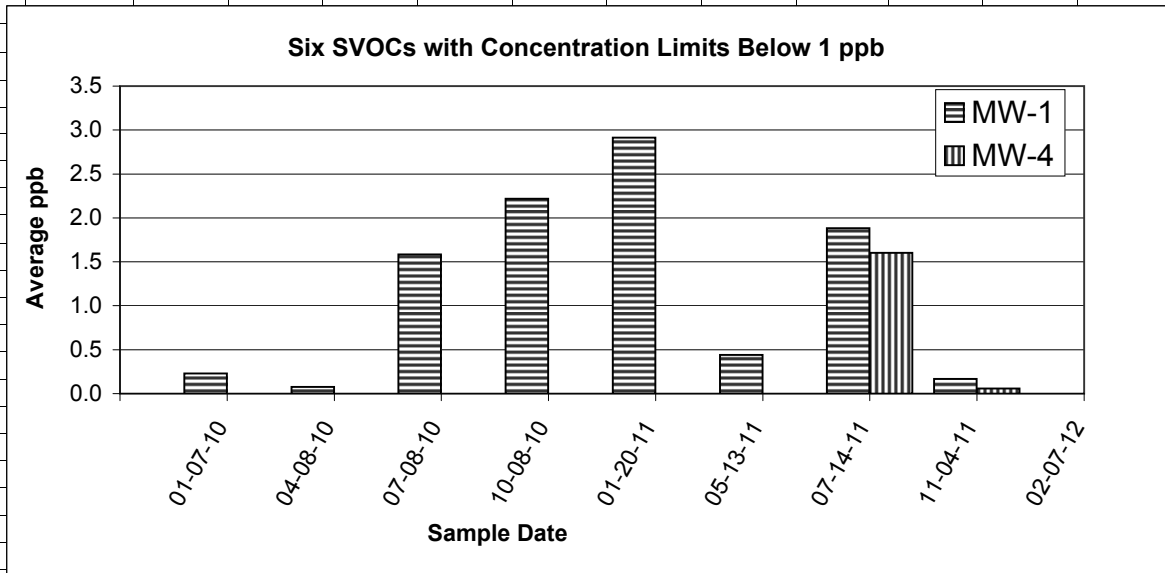
Attachment 1: Groundwater Tests for MW-1 and MW-4 in Area A.

Attachment 2: Groundwater Tests for Wells in Areas A and C.

GROUNDWATER TESTS FOR MW-1 AND MW-4 IN AREA A							01-29-13		rev				
Data from Table 3 in JMS report of August 2012.													
SVOC	Limit ppb	Reported Concentrations by Sample Date for MW-1									Data for MW-4		
		01-07-10	04-08-10	07-08-10	10-08-10	01-20-11	05-13-11	07-14-11	11-04-11	02-07-12	07-14-11	11-04-11	02-07-12
2-Methylnaphthalene	30	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acenaphthene	400	ND	ND	ND	ND	2.2	ND	ND	ND	0.438	ND	ND	0.287
Acenaphthylene	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.148
Acetophenone	700	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Anthracene	2000	ND	ND	ND	ND	ND	ND	ND	ND	0.146	ND	ND	0.287
Benzo(a)anthracene	0.1	0.46	0.15	2.4	3.1	4.1	0.7	3.3	0.31	ND	2.5	0.1	ND
Benzo(a)pyrene	0.1	0.29	0.1	2.4	2.7	4.2	0.63	3.1	0.21	ND	2.5	0.074	ND
Benzo(b)fluoranthene	0.2	0.33	0.12	2.7	3.6	5.2	0.73	3.7	0.21	ND	3.1	0.091	ND
Benzo(k)fluoranthene	0.5	0.12	0.04	1	2	1.2	0.2	1.2	0.11	ND	0.85	0.031	ND
Benzo(g,h,i)perylene	NA	ND	ND	ND	ND	2.7	ND	ND	ND	ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	3	ND	ND	2.9	4.9	4.1	ND	5.1	ND	ND	3.5	ND	ND
Caprolactam	5000	ND	ND	ND	12	ND	11	ND	ND	ND	ND	ND	ND
Chrysene	5	ND	ND	2.2	2.9	4.3	ND	3.6	ND	ND	2.5	ND	ND
Dibenzo(a,h,)anthracene	0.3	0.04	ND	0.21	0.4	0.49	0.078	ND	0.035	ND	0.34	ND	ND
Fluoranthene	300	ND	ND	5.5	6.5	8.6	ND	6.8	ND	0.27	4.9	ND	0.108
Fluorene	300	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.121
Hexachlorobenzene	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachloroethane	7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	0.2	0.14	0.05	0.79	1.5	2.3	0.31	ND	0.12	ND	1.1	0.044	ND

Shaded cells above contain exceedances.

Six SVOCs with Llimits below 1 ppb	MW-1									MW-4			
	01-07-10	04-08-10	07-08-10	10-08-10	01-20-11	05-13-11	07-14-11	11-04-11	02-07-12	07-14-11	11-04-11	02-07-12	
Benzo(a)anthracene	0.1	0.460	0.150	2.400	3.100	4.100	0.700	3.300	0.310	0.000	2.500	0.100	0.000
Benzo(a)pyrene	0.1	0.290	0.100	2.400	2.700	4.200	0.630	3.100	0.210	0.000	2.500	0.074	0.000
Benzo(b)fluoranthene	0.2	0.330	0.120	2.700	3.600	5.200	0.730	3.700	0.210	0.000	3.100	0.091	0.000
Benzo(k)fluoranthene	0.5	0.120	0.040	1.000	2.000	1.200	0.200	1.200	0.110	0.000	0.085	0.031	0.000
Dibenzo(a,h,)anthracene	0.3	0.040	0.000	0.210	0.400	0.490	0.078	0.000	0.035	0.000	0.340	0.000	0.000
Indeno(1,2,3-cd)pyrene	0.2	0.140	0.050	0.790	1.500	2.300	0.310	0.000	0.120	0.000	1.100	0.044	0.000
Average		0.230	0.077	1.583	2.217	2.915	0.441	1.883	0.166	0.000	1.604	0.057	0.000



GROUNDWATER TESTS FOR WELLS IN AREAs A and C											01-29-13	rev
Data from Table 3 in JMS report of August 2012.												
Wells MW-1 and MW-4 are high on the embankment in Area A and MW-2 is low..												
Well MW-3R is high on the embankment in Area C.												
Category	Well	Reported Exceedances by Test Date									Totals for All Dates	
		01-07-10	04-08-10	07-08-10	10-08-10	01-20-11	05-13-11	07-14-11	11-04-11	02-07-12		
SVOC (or PAH)	MW-1	3	1	5	7	7	4	5	3	0	35	
	MW-2	0	0	0	0	0	0		0	0	0	
	MW-3R		0	0	0	0	0		0	0	0	
	MW-4							7	0	0	7	
PP Metals	MW-1	2	1	2	2	2	2	6	6	6	29	
	MW-2	1	0	0	1	0	1		4	5	12	
	MW-3R		0	0	0	0	0		1	1	2	
	MW-4							5	6	6	17	
Organochlorine Pesticides	MW-1	0	0	0	1	1	0	0	1	0	3	
	MW-2	0	0	0	0	0	0		0	0	0	
	MW-3R		0	0	0	0	0		0	0	0	
	MW-4							6	0	0	6	
PCB	MW-1	0	0	0	0	0	0	0	0	0	0	
	MW-2	0	0	0	0	0	0		0	0	0	
	MW-3R		0	0	0	0	0		0	0	0	
	MW-4							1	0	0	1	

There is no data for the shaded cells above.

Chart A: Ground Water Exceedances by Well for SVOCs

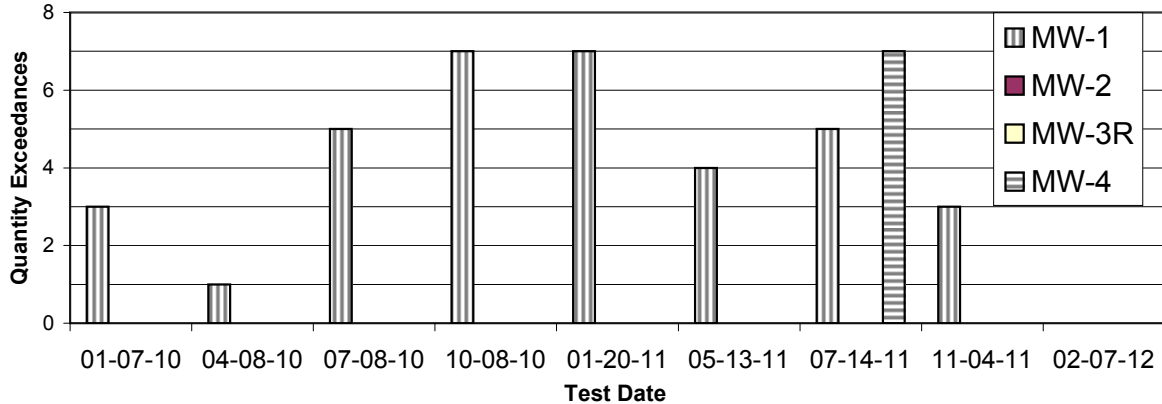


Chart B: Ground Water Exceedances by Well for Metals

