AIR SAMPLING REPORT

PERIMETER AIR MONITORING FOR ASBESTOS, CARBON FIBERS, HEAVY METALS AND RESPIRABLE SILICA

12 – 14 December, 2008

for

SITE CLEAN UP

CATHER AVE and HUGGINS ST

SAN DIEGO, CA 92122

Conducted by:

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SITE AIR SAMPLING REPORT

1.0 BACKGROUND

On 8 December, 2008, a United States Marine Corps F/A-18D Hornet crashed in the University City neighborhood of San Diego, California just outside of Marine Corps Air Station (MCAS) Miramar. The Hornet jet aircraft went down at the intersection of Huggins Street and Cather Avenue. The crash resulted in the destruction of the two northern most homes located on the east side of Cather Street.

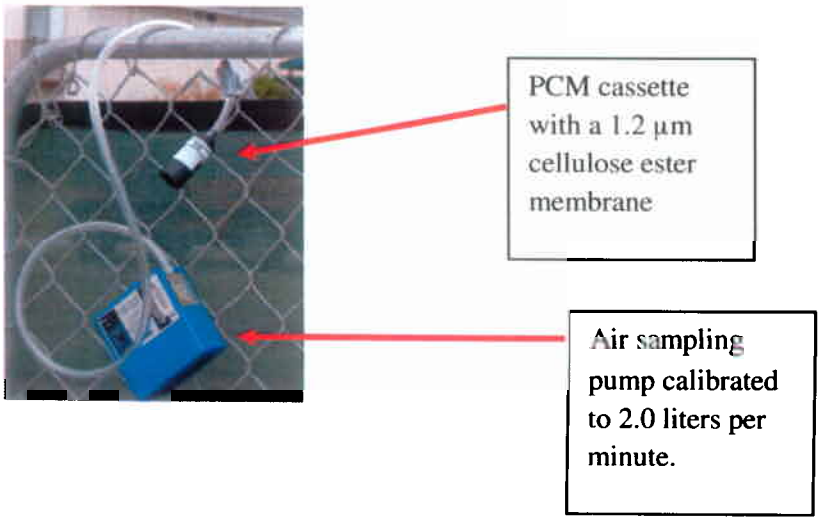
As USMC personnel from the squadron Emergency Reclamation Team were collecting the majority of the aircraft wreckage, Black Gold Industries (BGI) was brought in by Marine Corps Air Station Miramar (MCAS) to complete the demolition and remediation of damage caused to the neighborhood by the impact of the crash.

Occupational Services, Inc. (OSI) was retained by BGI to perform fence line and personnel monitoring of the site cleanup activities. OSI conducted an initial site walk on the evening of Thursday, 11 December 2008. Based on the age of the homes and possible material from the aircraft, OSI in conjunction with BGI and MCAS Environmental Management Division personnel, determined that air monitoring should be conducted for asbestos, composite fibers, metal dust and respirable silica dust during clean-up and demolition operations at the site.

2.0 SAMPLING AND ANALYTICAL METHODS

Asbestos by PCM - For evaluation of asbestos hazards presented by site operations, two methods of sampling were used. The first and most prevalent method for asbestos air sampling was National Institute of Safety & Health (NIOSH) Method 7400, using Phase Contrast Microscopy (PCM) cassettes. To comply with this method, air pumps were calibrated to approximately 2.0 liters per minute (LPM) to draw in air over PCM cassettes with 1.2 µm cellulose ester membranes (Figure 1). Samples were then sent to an American Industrial Hygiene Association (AIHA) accredited laboratory for total fiber counts under a Phase Contrast Microscope. A total of 24 samples were taken via this method over the three day sampling period. Expedited next day analysis results were provided for samples suspected to have the highest potential concentration, normally the samples from the downwind locations. As PCM analysis provides a total fiber concentration, it does not verify the presence or absence of only asbestos fibers. Therefore this method will also detect any carbon composite fibers present in the surrounding air.

Figure 1. Asbestos fiber sampling.



Asbestos by TEM - To verify the presence or absence of asbestos fibers in the air, EPA Level II Method was also used to evaluate the airborne asbestos concentrations by Transmission Electron Microscope (TEM). TEM analysis is more accurate than PCM and can verify the presence or lack of airborne asbestos fibers. This would help quantify any airborne asbestos generated by cleanup operations at the crash site. To comply with this method, air pumps were calibrated to approximately 2.0 LPM minute to draw in air over special TEM cassettes with cellulose ester membranes. Samples were then sent to an AIHA accredited laboratory for fiber count and asbestos verification with TEM analysis. A total of four samples were collected via this method over the three day sampling period.

Metals by Inductively Coupled Plasma - Sampling for airborne metals was done according to NIOSH Method 7300. To comply with this method, air pumps were calibrated to approximately 2.0 LPM to draw in air over cassettes with 0.8-µm, cellulose ester membranes. Samples were then sent overnight to an AIHA accredited laboratory for a nine metal profile analysis. The profile analysis utilizes Inductively Coupled Argon Plasma and Atomic Emission Spectroscopy (ICP-AES) which allows for multiple analyses on a single analytic. The nine metals included in this profile included:

- Arsenic (As)
- Beryllium (Be)
- Cadmium (Cd)
- Chromium (Cr)
- Iron Oxide (FeO_2)
- Lead (Pb)
- Manganese (Mn)
- Nickel (Ni)
- Zinc Oxide (ZnO_2)

A total of 17 samples were collected via NIOSH Method 7300 over the three day sampling period. Expedited analysis was conducted on two of the samples that were considered to have the highest potential for having elevated dust concentrations. Normally the downwind or personnel samples were sent for expedited analysis.

Crystalline Silica – Sampling for Crystalline silica along the fence line at the crash site was performed according to NIOSH Method 7500. As per Method 7500, cassettes with aluminum miniature cyclones with 5µm PVC filters were used as the collection samples of potential respirable dust (Figure 2). Pumps were calibrated to 2.5 LPM and set up at each sampling location. Samples were sent to an AIHA accredited laboratory for analysis by X-Ray Powder Diffraction. A total of 14 samples were collected via NIOSH Method 7500 over the two days sampling period during demolition and removal of the foundation.

Figure 2. Silica dust sampling at the site fence line.

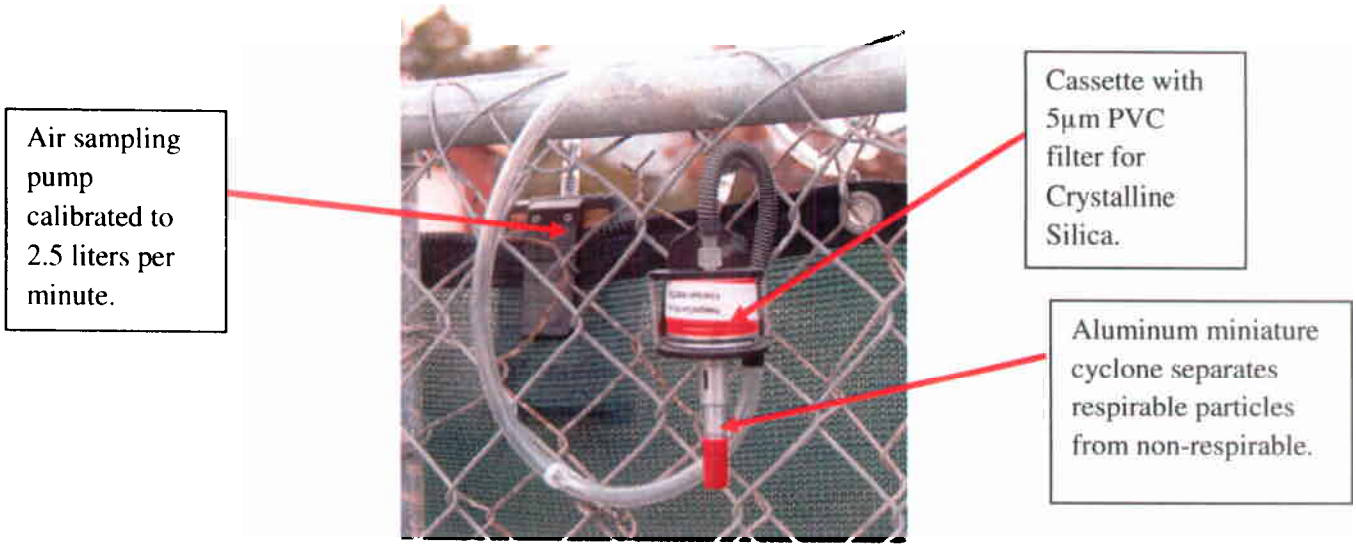


Figure 3. Dust sampling for Metals, Asbestos and Silica at the site fence line (Location D).

3.0 OBSERVATIONS

Fence line sampling was conducted at the crash site for all three days of the site remediation and clean-up activities conducted by Black Gold Industries. Four locations around the perimeter of the fence line were chosen as sampling locations for their ability to monitor air quality at critical points around the crash site. Figure 4 shows an aerial view of the intersection near the crash site.

BGI used a large CAT 330 excavator and numerous dumpsters to haul away debris from the site. Workers used hand rakes and shovels to remove smaller items from the site. Water was frequently sprayed to minimize the generation of dust. The streets and driveways adjacent to the site were washed to cleanup any residual contamination from the crash.

The red-shaded area shows the fenced-in area where site clean-up and demolition was performed.

Figure 4. Aerial view of crash site.

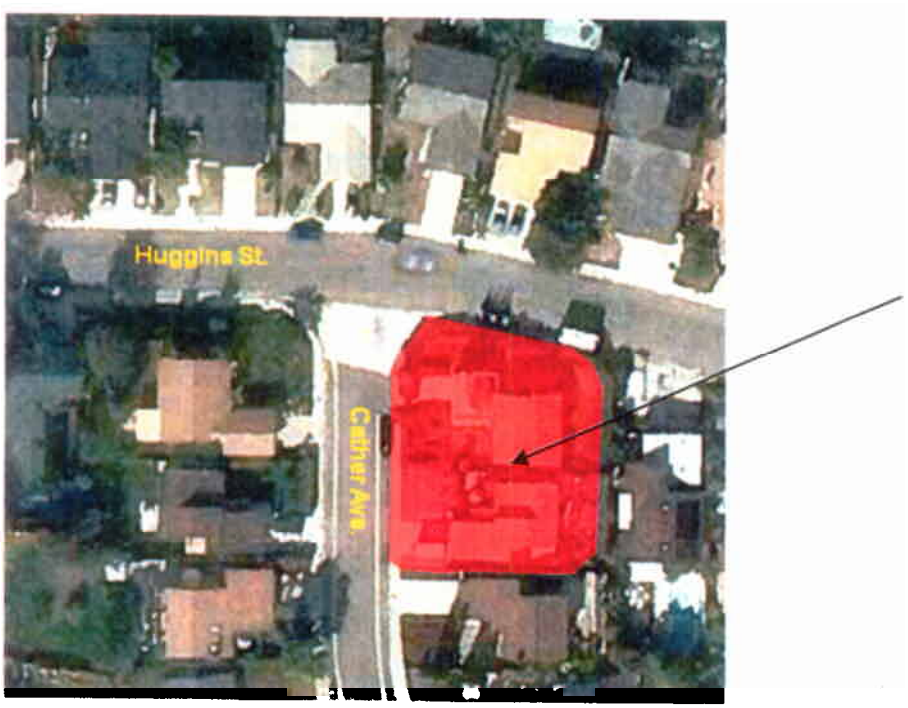
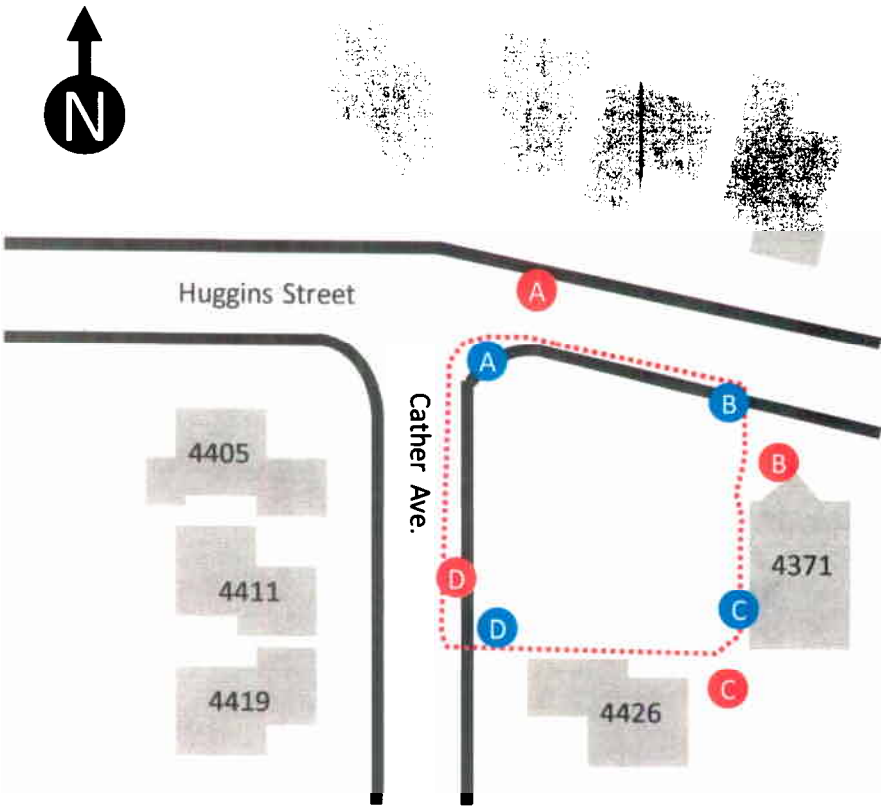


Figure 5 shows the sampling locations where air monitoring equipment was set up each of the three days work was being conducted. The initial sampling locations from Friday 12 December 2008 are marked with red dots. Sampling locations from Saturday and Sunday 13, 14 December are marked with blue dots.

A six foot chain-link construction fence was set up around the excavation site on the morning of 13 December. Once this fence was in place, the sampling locations were changed slightly to move in closer to the activities on the site for the major work on 13 and 14 December. Figures 6 through 10 document some of the clean-up activities at the site throughout the weekend.

Sampling was conducted at each location for asbestos and metal dust throughout the clean-up and demolition. Sampling for silica dust was conducted during the breakup and removal of the concrete foundations and driveways.

Figure 5. Sampling locations around the boundaries of the site



Asbestos Concerns

It was noted at the start of work that the majority of homes in the area were built prior to a nationwide ban on using asbestos containing construction materials. During the demolition, industrial hygienists on-site identified potential asbestos-containing floor tile within the general debris (Figure 6). The finding of this tile does not indicate a serious health risk since these tiles are not friable and do not release fibers readily into the air. Asbestos is primarily a concern when it can be made "friable"[1], or reduced to fibers or finer particles by the action of comparatively little pressure.

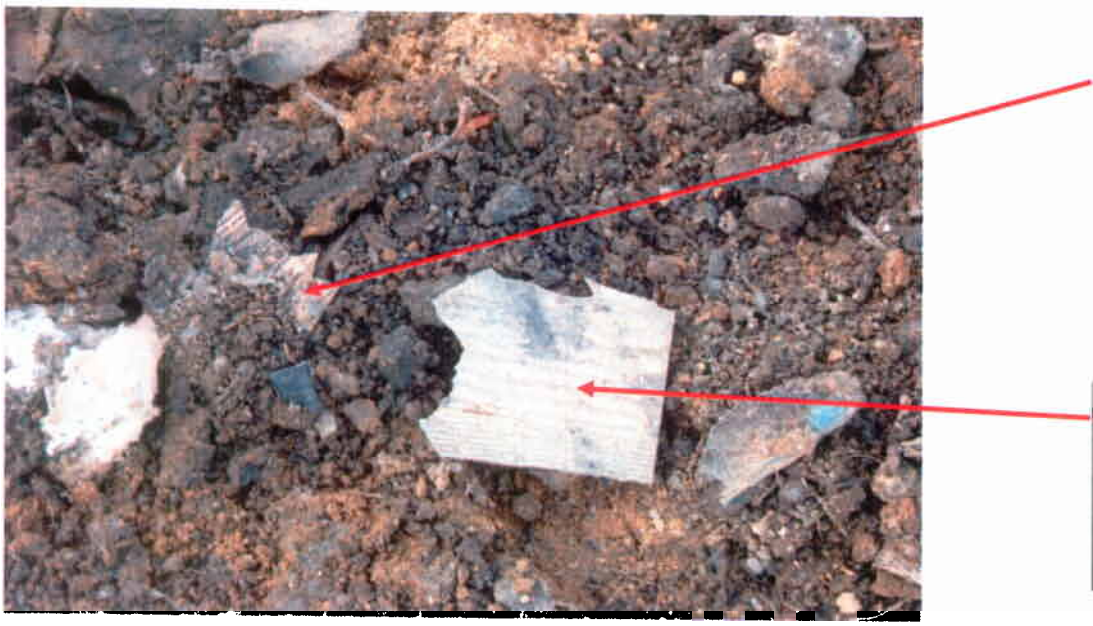
Composite Fiber Concerns

The F/A-18 Hornet, like many modern aircraft, contains a large amount of advanced composite materials such as carbon graphite fibers. Even after the Marine's Emergency Reclamation Team removed the vast majority of the aircraft wreckage, a few small pieces of composite carbon fibers were found at the site. NIOSH Analytical Method 7400 uses Phase Contrast Microscopy (PCM) to detect Asbestos and other

[1] DiNardi, Salvatore. "The Occupational Environment: Its Evaluation, Control and Management." American Industrial Hygiene Association. 2003.

Fibers using a special light microscope. This method does not differentiate between an asbestos fiber and other types of fibers. Since asbestos fibers and carbon fibers have a similar size and shape, if the total fiber count collected on the Asbestos PCM filters are low than the airborne levels of carbon fibers will likewise be low.

Figure 6. Potential asbestos containing floor tile in general debris.



Airborne Metal Dust

Heavy metals such as lead, chromium, iron oxide, were likely to be present at the excavation site, both from the home and any residual contamination from the aircraft. These metals can be found in many household products and are generally not a health concern since they are contained within building materials and appliances. Due to the nature of this excavation, these metals could be liberated and become airborne. When airborne the health hazard associated with metals increases, as fine metal particulate can enter the respiratory system and have both acute and chronic toxic effects.

Crystalline Silica Concerns

For the complete excavation of the site, it was necessary for BGI to break up and remove the concrete foundations of two houses. The breaking up of concrete is a known source for generating airborne Crystalline Silica (Quartz), and presented a possible health hazard worth monitoring.

Weather Effects

Over the three days of the site clean-up and remediation the weather conditions were ideal for limiting the generation of airborne dust with potential concentrations of asbestos, metals and crystalline silica. The wind speeds were light from 4-10 knots with high humidity. There was some light rain on Saturday 13 December, the main day of the remediation effort at the site. Weather conditions for the sampling days are outlined in Table 1.

Table 1. Weather Data for area around MCAS Miramar on 12 – 14 December.

Date	Wind Direction	Wind speed (knots)	Relative Humidity %	Temperature (°F)
Friday 12 Dec 08 (PM)	South	6.0	70.6%	59°
Saturday 13 Dec 08 (AM)	South Southwest	6.3	73.3%	56°
Saturday 13 Dec 08 (PM)	West Southwest	11.9	68.5%	54°
Sunday 14 Dec 08 (AM)	West	10.0	58.6%	53°
Sunday 14 Dec 08 (PM)	South	4.9	62.3%	50°

*AM is defined as being between 0100 and 1200, PM is defined as being between 1300 and 2400.

It rained intermittently for most of the day Saturday. The soil in the site was also partially wet from residual fire fighting water and broken home and irrigation system piping. The effect of this is to bind particulates to water molecules, resulting in much lower levels of airborne dust potentially containing asbestos, metals and crystalline silica. The low wind speeds observed greatly reduces the likelihood of airborne particulates being transported beyond the boundaries of the work site.

Figure 7. Clean-up operations late afternoon 13 December 2008.

Figure 8. Site after home demolition afternoon 13 December 2008.

Figure 9. BGI employee monitored for metals and respirable Silica 14 December 2008.

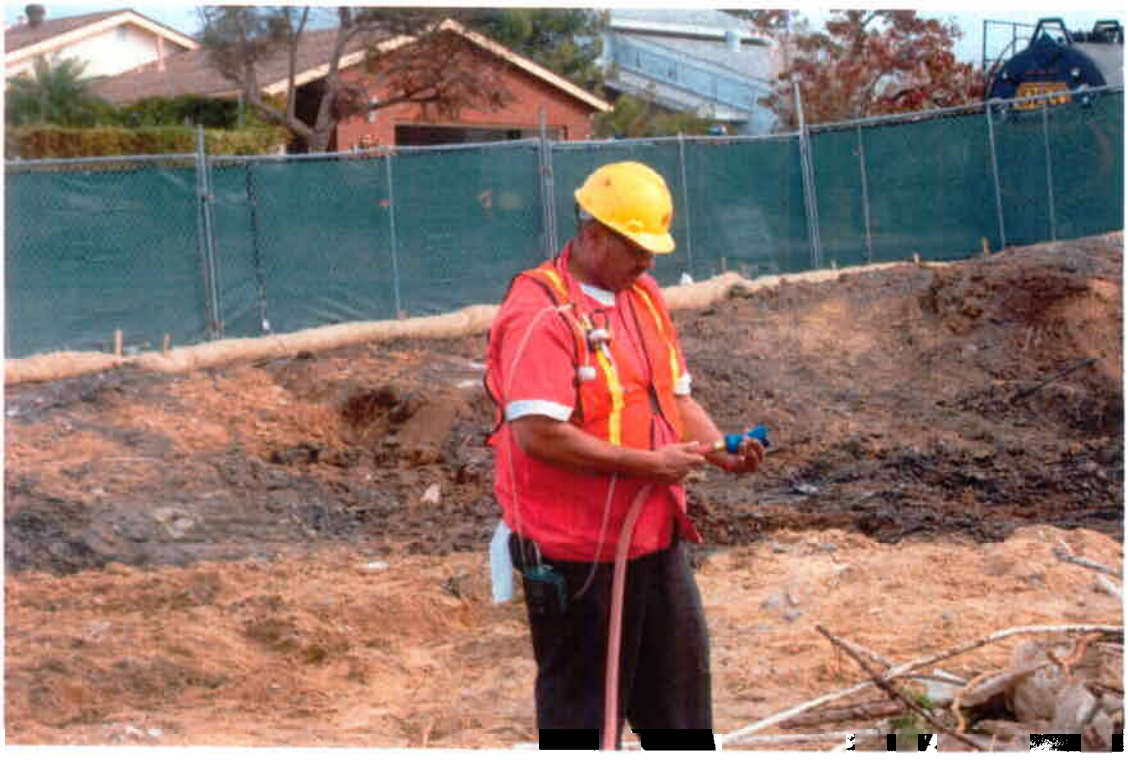


Figure 10. Site after final clean-up afternoon 14 December 2008.

4.0 RESULTS

OSI utilized several different laboratories for sample analysis based on cost and turnaround time for results. For PCM asbestos and other fiber sample results can be found in Appendix A. For TEM asbestos samples results can be found in Appendix B. The PCM and TEM samples found no asbestos or other fibers such as carbon fibers in the air during the site remediation and demolition. For metal scan, crystalline silica and total dust samples results can be found in Appendix C.

The Limit of Quantitation (LOQ) for each of the nine metals included in the analysis are listed in Table 5 at the end of this section. The results of the air monitoring survey are detailed for each day in the tables below.

Table 2.1. Results of Asbestos and other fibers PCM samples taken on 12 Dec 2008.

Sample Location	Sample ID	Time	Total Min	Air Volume (Liters)	Concentration (fibers/cc)
A	2-12	1514-1943	269	551	0.02
B	1-12	1514-1600	44	92	0.05
C	3-12	1521-1941	260	537	0.02
D	4-12	1510-1947	277	589	<0.01

Table 2.2. Results of Metal Profile samples taken on 12 Dec 2008.

Sample Location	Sample ID	Time	Total Min	Air Volume (Liters)	Concentration
A	12-12	1514-1944	270	551	< LOQ
B	49-12	1517-1950	273	593	< LOQ
C	10-12	1520-1941	261	537	< LOQ
D	50-12	1510-1947	277	584	< LOQ

Table 3.1. Results of Asbestos and other fibers PCM sampling conducted 13 Dec.

Sample Location	Sample ID	Time	Total Min	Air Volume (Liters)	Concentration (fibers/cm^3)
A	1-13	0800-1200	240	498	<0.01
B	5-13	0802-1205	243	486	<0.01
C	7-13	0802-1204	242	497	<0.01
D	3-13	0801-1208	247	505	<0.01
A	9-13	1200-1527	207	429	<0.01
B	11-13	1202-1531	209	427	<0.01
C	13-13	1204-1533	209	418	<0.01
C	17-13	1533-1604	31	62	0.02
D	15-13	1528-1700	92	189	<0.01
A	21-13	1527-1729	122	370	<0.01
C	25-13	1733-1834	61	125	<0.01
D	23-13	1729-1831	62	127	0.02
Personal	19-13	1535-1832	177	253	<0.01
Personal	29-13	1301-1535	154	322	<0.01

Table 3.2 Results of TEM sampling conducted 13 Dec.

Sample Location	Sample ID	Time	Total Min	Concentration (structures/mm^2)	Concentration (fibers/cm^3)
D	31-13	1208-1531	203	<10.0	<0.009
B	33-13	1531-1835	184	<10.0	<0.011

Table 3.3. Results of Metal Profile samples taken on 13 Dec.

Sample Location	Sample ID	Time	Total Min	Air Volume (Liters)	Concentration
A	2-13	0800-1559	479	963	< LOQ
B	6-13	0802-1604	480	975	< LOQ
C	8-13	0802-1606	484	987	< LOQ
D	4-13	0801-1601	480	983	< LOQ
A	10-13	1559-1832	153	428	< LOQ
B	14-13	1604-1834	150	304	< LOQ
C	16-13	1606-1836	150	306	< LOQ
D	12-13	1601-1828	147	301	< LOQ

Table 3.4. Results of Crystalline Silica (Quartz) sampling conducted on 13 Dec.

Sample Location	Sample ID	Time	Total Min	Air Volume (Liters)	Concentration (mg/m^3)
A	41-13	1515-1825	190	475	< 0.021
B	42-13	1517-1827	190	478	< 0.021
C	43-13	1518-1829	187	469	< 0.021
D	44-13	1520-1830	185	461	< 0.022

Table 4.1. Results of Asbestos and other fibers PCM sampling conducted on 14 Dec

Sample Location	Sample ID	Time	Total Min	Air Volume (Liters)	Concentration (fibers/cm^3)
A	27-14	0846-1157	191	384	<0.01
B	25-14	0848-1200	192	389	<0.01
D	29-14	0851-1155	184	372	<0.01
B	33-14	1200-1542	172	348	<0.01
C	35-14	1202-1455	173	367	<0.01
D	31-14	1155-1457	182	368	<0.01

Table 4.2 Results of TEM sampling conducted 14 Dec.

Sample Location	Sample ID	Time	Total Min	Concentration (structures/mm^2)	Concentration (fibers/cm^3)
A	41-14	1157-1457	180	<10.0	<0.01
C	39-14	0855-1202	187	<10.0	<0.011

Table 4.3. Results of Metal Profile samples taken on 14 Dec.

Sample Location	Sample ID	Time	Total Min	Air Volume (Liters)	Concentration
A	6-14	0855-1505	370	738	< LOQ
B	4-14	0859-1512	373	772	< LOQ
C	2-14	0901-1510	369	749	< LOQ
D	8-14	0857-1507	370	774	< LOQ
Personal	10-14	1009-1515	306	622	< LOQ

Table 4.4. Results of Crystalline Silica (Quartz) sampling conducted on 14 Dec.

Sample Location	Sample ID	Time	Total Min	Air Volume (Liters)	Concentration (mg/m^3)
A	46-14	0841-1505	386	964	< 0.010
B	47-14	0844-1512	366	966	< 0.010
C	45-14	0842-1505	383	964	< 0.010
D	48-14	0845-1510	385	957	< 0.010
Personal	49-14	1010-1515	305	762	< 0.013

Table 5. Limits of Quantitation for 9 metals included in the Nine Metal Scan.

	Ar	Be	Cd	Cr	FeO_2	Pb	Mn	Ni	ZnO_2
LOQ	0.3 µg	0.15 µg	0.15 µg	1.5 µg	11 µg	0.38 µg	0.15 µg	0.3 µg	1.5 µg

5.0 CONCLUSIONS

Air sampling performed during the entire time of the site cleanup activities conducted by BGI yielded no results that would indicate activities presented any asbestos, composite fibers, crystalline silica or metal dust hazard to workers performing the cleanup, or to the areas surrounding the clean-up site.

Samples taken for airborne metals 12-14 December 2008 were all below the Limit of Quantitation (LOQ) for all nine metals of concern checked for in the analysis.

Samples taken for crystalline silica 12-14 December during the break-up of the foundation were all below the Limit of Quantization (LOQ) for respirable silica dust in the analysis.

Asbestos and other fiber PCM results do not directly indicate the presence of asbestos in the sample. For example, table 3.1 contains data from Asbestos PCM sampling conducted on 13 December. Samples taken at locations C and D had low, but detectable fiber counts. PCM analysis does not distinguish between asbestos and other fibrous materials that can become impacted on the PCM filter media. TEM analysis verifies the presence or lack thereof of asbestos structures versus other fibers; and can even go further to identify the type of asbestos present. None of the TEM samples taken 13 and 14 December yielded any asbestos structures, despite fiber counts on PCM cassettes. As requested, the laboratory also looked for composite fibers on the TEM samples and did not find any carbon fiber structures. Based on the results of the PCM and TEM analysis it is extremely unlikely that any asbestos or carbon fibers at hazardous levels were released from the site during the demolition or clean-up operations.

None of the aggressive air monitoring conducted on all four sides of the work site during the entire time of the clean-up activities detected any concentrations of hazardous dust escaping from the site. The care and professionalism of BGI personnel, and their subcontractors, combined with very favorable weather conditions, helped to ensure that the potential for dust contamination spreading from the site was kept extremely low.

Should you have any questions regarding this report, please contact Jim Breay at (619) 708-8137 or email jim@occserv.com.

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