

June 30, 2023

Jack I. Eisenbach, P.E.
President
EISENBACH & RUHNKE ENGINEERING, P.C.
315-735-1916: Office
315-335-1103: Cell

Dear Eisenbach,

This report summarizes the findings from our June 28, 2023 site inspection, air monitoring and surface sampling of representative areas of the Warwick Valley Schools Administrative Offices, Middle School, Transportation Office as well as School buses being considered for summer school. This assessment was conducted at your request due to the fire which initiated on a Convergent Energy Lithium Battery Storage unit, located approximately 900 feet from the Administrative Office/Middle School building. School bus parking and the transportation garage were also in the vicinity of the fire. It is our understanding that the fire started on Tuesday June 27, 2023, and shortly thereafter, the Facilities Department for the district took actions to close the school and deactivate rooftop air handling units to reduce the potential for entrainment of fire - related smoke and odors within the building. At the time of our June 28, 2023 inspection, the fire was still actively burning and smoke was being released.

Based upon the above, the purposes of the inspection were the following:

- Determine if all accessible air handling units on the Administrative and Middle School buildings were deactivated.
- Determine if there were any signs of smoke-related residues in representative offices, classrooms, gymnasium or cafeteria or common space areas.
- Determine if there were smoke-related odors in representative areas
- Determine if there were unusual airborne levels of volatile organic compounds or carbon monoxide measured within representative offices and classrooms which may be associated with the fire.
- Determine if there were measurable residues of lithium or unusual levels of fluoride ion on representative surfaces of the administrative, middle school, transportation office and school buses.
- Determine recommended steps to reduce potential smoke-related risks prior to returning to normal use of the building by students and staff.

Dr. Richard M. Lynch, Ph.D., CIH of Environmental Safety Management Corporation conducted this assessment with the assistance of yourself, and facilities staff of the Warwick Valley School District.

Executive Summary of Preliminary Findings

The fire was actively burning at the time of our June 28, 2023 inspection. Depending on wind direction, low-level smoke odors were detectable, and low elevations of volatile organic compounds and carbon monoxide were detected outside of the building and on the rooftop. Most rooftop air handlers had been deactivated. Low level smoke-like odors were detectable in a few offices and classrooms, however there were no visible signs of smoke residues on surfaces of supply air diffusers, walls, desktops, or floors of the Administrative/Middle School building at the time of inspection. There were no significant elevations of volatile organic compounds detected in any indoor locations. Airborne particulate matter levels were all lower than outdoor levels. No lithium, fluoride or bromide residues were detected on surfaces of classroom or office desks, file cabinets or floors, nor on steering wheels, controls or driver or passenger seats within buses planned for use during summer school. Recommendations for keeping the building closed until the County HazMat team provides the All Clear, replacing rooftop air handling filters, and precautionary cleaning of offices and classrooms including walls, desks, floors and carpets where odors are detected, as well as for precautionary cleaning of summer school-planned buses are contained at the end of this report.

I. Methods

The full scope of emissions from Lithium ion cell battery fires is currently under study. The current literature indicates that in addition to lithium fumes, gases and vapors released from Lithium-Ion battery fires may include carbon dioxide, carbon monoxide, hydrogen fluoride, phosphoryl fluoride and volatile organic compounds.

Based upon the above, the following methods were addressed during this assessment:

- A visual inspection of representative offices, classrooms and bus surfaces was conducted to determine the presence of smoke-like odors and signs of smoke or combustion residues
- Air monitoring was conducted for airborne particulate matter, carbon monoxide, carbon dioxide, hydrogen sulfide, volatile organic compounds, and temperature in approximately 16 representative classrooms and offices throughout the administrative and middle school building.
- Surface wipe samples were collected for lithium and anion (fluoride) residues in approximately 20 offices, classrooms and buses (including the transportation office).
- Samples were hand-delivered for Lithium analysis via Inductively Coupled Plasma-Mass Spectrophotometry, and fluoride and bromide anion analysis via Ion Chromatography.

II. Findings and Results

Findings revealed the following:

- The fire was actively burning at the time of our June 28, 2023 inspection. Depending on wind direction, low-level smoke odors were detectable,
- Low levels of volatile organic compounds and carbon monoxide were detected outside of the building (ground levels and on the rooftop) up to 0.1 to 0.5 parts per million (100 to 500 parts per billion). Most rooftop air handlers had been deactivated.
- Low level smoke-like odors were detectable in a few offices and classrooms as shown in Table #1 at the end of this report.
- There were no signs of smoke residues on surfaces of supply air diffusers, walls, desktops or floors of the Administrative/Middle School building at the time of inspection.
- There were no elevations of volatile organic compounds or carbon monoxide detected in any indoor locations. Hydrogen sulfide levels were all below 0.2 parts per million.

- Indoor airborne particulate matter levels within the school and administrative offices were all lower than outdoor levels.
- There were no smoke-like odors in the 4 buses reported to be planned for use during summer school (Bus 355, 356, 360 and 376).
- Surface sampling for Lithium revealed no detected lithium (< 0.250 micrograms per square foot) from any office, classroom or bus surfaces sampled.
- No bromide or fluoride were detected from any of the sampled locations ($< 25 \mu\text{g}/\text{ft}^2$)

All monitoring and sampling results are shown on Table #1 at the end of this report. Laboratory results are attached.

III. Conclusions and Recommendations

Based upon the findings of this inspection, the deactivation of air handling units immediately upon the onset of the fire appear to have been helpful in reducing entrainment of smoke and residues associated with the burning Lithium-Ion batteries located at the southeast corner of the property. There were no signs of smoke residues in any of the classrooms or offices inspected within the administrative, middle school or transportation offices. There were no smoke-like odors in the 4 buses reported to be planned for use during summer school. No lithium, bromide or fluoride, residues were detected in classrooms, offices or bus surfaces sampled.

- Continue to keep the Administrative and Middle School classrooms closed with air handlers deactivated until the fire has terminated and the County HazMat Team has issued the "All Clear."
- After the "All Clear" filters in all rooftop air handlers should be removed and replaced and rooftop air handlers should be reactivated to ventilate the building and return temperature and humidity to normal levels.
- Custodial cleaning of classrooms and offices where smoke-like odors are detected should occur to include detergent cleaning and rinsing of desks and floor surfaces using cleaning agents normally used by custodial staff within the school e.g. Ecolab FaciliPro 77 Bio Enzymatic Odor Eliminator (already present in custodial closets throughout the school). Disposable vinyl gloves and eye protection, commonly used during routine custodial cleaning should be worn.
- If smoke-like odors remain in carpeted rooms (e.g. media center, main office, etc,) conduct carpet cleaning and water extraction.
- The Transportation Office and Facilities Offices which were closest to the fire should be detergent cleaned and rinsed. Buses used for summer school should be cleaned including the driver and passenger areas, using detergent and water. Disposable vinyl gloves and eye protection, commonly used during routine custodial cleaning should be worn.

Thanks for the opportunity to assist you. Please contact me at 856-764-3557 with any questions.

Sincerely,

Richard M. Lynch

Richard M. Lynch, Ph.D., CIH, CMC, CMRS, CHFM
 President - Environmental Safety Management Corporation
Certified Industrial Hygienist
Certified Microbial Consultant
Certified Microbial Remediation Supervisor
Certified Healthcare Facility Manager
NJ Licensed Indoor Environmental Consultant
www.esmcorp.com

School Name

Warwick School District

Inspection Type

Air Quality Inspection/Convergent Lithium Ion Battery Fire

Date of inspection

6/28/2023

Inspected by:

Dr. Richard M. Lynch, Ph.D., CIH, CMC, CMRS, CHFM - President - www.esmcorp.com



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Location	HVAC / Unit Ventilator Running?	Windows Open?	Smoke Odors?	Visible Smoke Residue?	Carbon Dioxide (ppm)	Carbon Monoxide (ppm)	oF	H2S	Volatile Organics (ppb)	pm 2.5 ug m3	surface lithium (ug/ft2)	surface FF/HBr (ug/ft2)	Comments
Outdoor Rooftop					350	2.5	79		100 to 500	10.2			
District Offices													
cse meeting	no	n/a	no	no	488	0	74	0.13	294	3.3	<0.250	<25	
break room	no	no			561	0	74	0.15	294	4.4	<0.250	<25	
conference room	no	no			436	2.4	74	0.11	292	4.6	<0.250	<25	
board room	yes	n/a	no	no	418	2.4	72	0.08	222	3	<0.250	<25	
Middle School											<0.250	<25	
gym	no	n/a	yes	no	444	2.3	73	0.19	311	6.1	<0.250	<25	custodial clean surfaces
cafeteria	yes	n/a	no	no	362	c.4	73	0.13	312	5.5	<0.250	<25	deactivated during inspection
main office/ guidance	no	no	yes	no	372	2.4	72	0.1	317	4.4			custodial clean surfaces
faculty room	no	n/a	no	no	368	2.4	75	0.12	310	7.5			custodial clean surfaces
Delta 3 Classrooms	no	no	no	no	356	2.3	73	0.14	318	11.8			
Delta 7	no	no	no	no	382	2.3	73	0.11	322	6.2	<0.250		
Gamma 9	no	no	no	no	400	2.3	73	0.1	307	6.4	<0.250		custodial clean surfaces
Gamma 3	no	no	yes	no	361	2.3	73	0.14	286	7	<0.250		custodial clean surfaces
Middle School Media Center	no	n/a	yes	no	355	2.2	72	0.09	292	7.1			custodial clean surfaces
Beta 4	no	no	yes	no	358	2.2	72	0.1	283	6.2	<0.250		custodial clean surfaces
Alpha 8	no	no	no	no	375	2.2	72	0.09	285	5.6	<0.250		
Art2	no	no	yes	no	361	2.2	73	0.06	307	5.1	<0.250		custodial clean surfaces
outdoors @ art					350	2.6	78	0.01	268	8.9	<0.250		custodial clean surfaces
Transporation Office											<0.250	<25	custodial clean surfaces
Bus 355											<0.250	<25	custodial clean surfaces
Bus 356											<0.250	<25	custodial clean surfaces
Bus 360											<0.250	<25	custodial clean surfaces
Bus 376											<0.250	<25	custodial clean surfaces
blank											<0.250	<25	custodial clean surfaces
					400	2	73	0.12	297	5.9		-	-

Conclusions & Recommendations

No smoke-like residues observed at time of inspection. Minor smoke odors detected where indicated. Reactivate air handlers to ventilate and control temperature and humidity. Conduct precautionary cleaning of surfaces and carpets where odors exist following termination of fire.



EMSL Analytical, Inc.

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Phone: (856) 858-4800
Fax: (856) 786-0392

Attn.: Dr. Richard Lynch
Environmental Safety Management Corp.
21 E. Scott Street
Riverside, NJ 08075
RLynch@ESMCorp.com
Phone: (856) 764-3557

EMSL Case No.: 362302164
Sample(s) Received: 6/29/2023
Date Reported: 6/30/2023
Date Printed: 6/30/2023
Reported By: D. Macready

Laboratory Report

Procurement of Samples and Analytical Overview:

The samples (twenty-eight, wipes) arrived at EMSL Analytical (Cinnaminson, NJ) on June 29, 2023 in good condition. The samples were submitted for the purpose of lithium, fluoride, and bromide analysis. The data reported herein has been obtained using the following equipment and methodologies.

Methods: Inductively Coupled Plasma-Mass Spectrometry (ICP-MS)
Hot Block Digestion
Ion Chromatography (IC)

Lithium was analyzed by ICP-MS.
Fluoride and Bromide were analyzed by IC.

Analyzed by:

June 30, 2023

Daniel Macready
Senior Materials Science Engineer

Joel Keller
Laboratory Technician

Date

Reviewed/Approved:

Eugenia Mirica, Ph.D.
Laboratory Director

June 30, 2023

Date



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EMSL Case No.: 362302164
Sample(s) Received: 6/29/2023
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Results:

Sample Number:	Not Specified	
COC Sample ID:	Field Blank	
EMSL Sample Number:	362302164-0001	
Analyte	Result (µg/wipe)	Limit of Quantitation/LOQ (µg/wipe)
Lithium (Li)	< LOQ	0.250
Fluoride (F ⁻)	< LOQ	25.0
Bromide (Br ⁻)	< LOQ	25.0

Sample Number:	Not Specified	
COC Sample ID:	Bus 355	
EMSL Sample Number:	362302164-0002	
Analyte	Result (µg/wipe)	Limit of Quantitation/LOQ (µg/wipe)
Lithium (Li)	< LOQ	0.250
Fluoride (F ⁻)	< LOQ	25.0
Bromide (Br ⁻)	< LOQ	25.0

Sample Number:	Not Specified	
COC Sample ID:	Bus 356	
EMSL Sample Number:	362302164-0003	
Analyte	Result (µg/wipe)	Limit of Quantitation/LOQ (µg/wipe)
Lithium (Li)	< LOQ	0.250
Fluoride (F ⁻)	< LOQ	25.0
Bromide (Br ⁻)	< LOQ	25.0



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Sample Number:	Not Specified	
COC Sample ID:	Bus 360	
EMSL Sample Number:	362302164-0004	
Analyte	Result (µg/wipe)	Limit of Quantitation/LOQ (µg/wipe)
Lithium (Li)	< LOQ	0.250
Fluoride (F ⁻)	< LOQ	25.0
Bromide (Br ⁻)	< LOQ	25.0

Sample Number:	Not Specified	
COC Sample ID:	Bus 376	
EMSL Sample Number:	362302164-0005	
Analyte	Result (µg/wipe)	Limit of Quantitation/LOQ (µg/wipe)
Lithium (Li)	< LOQ	0.250
Fluoride (F ⁻)	< LOQ	25.0
Bromide (Br ⁻)	< LOQ	25.0

Sample Number:	Not Specified	
COC Sample ID:	Transportation	
EMSL Sample Number:	362302164-0006	
Analyte	Result (µg/wipe)	Limit of Quantitation/LOQ (µg/wipe)
Lithium (Li)	< LOQ	0.250
Fluoride (F ⁻)	< LOQ	25.0
Bromide (Br ⁻)	< LOQ	25.0



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EMSL Case No.: 362302164
Sample(s) Received: 6/29/2023
Date Reported: 6/30/2023
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Sample Number:	1	
COC Sample ID:	CSE File	
EMSL Sample Number:	362302164-0007	
Analyte	Result (µg/wipe)	Limit of Quantitation/LOQ (µg/wipe)
Lithium (Li)	< LOQ	0.250
Fluoride (F ⁻)	< LOQ	25.0
Bromide (Br ⁻)	< LOQ	25.0

Sample Number:	2	
COC Sample ID:	Admin B.R.	
EMSL Sample Number:	362302164-0008	
Analyte	Result (µg/wipe)	Limit of Quantitation/LOQ (µg/wipe)
Lithium (Li)	< LOQ	0.250
Fluoride (F ⁻)	< LOQ	25.0
Bromide (Br ⁻)	44.8	25.0

Sample Number:	3	
COC Sample ID:	Conf table	
EMSL Sample Number:	362302164-0009	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250

Sample Number:	4	
COC Sample ID:	Board Room	
EMSL Sample Number:	362302164-0010	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250



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Sample Number:	5	
COC Sample ID:	Gym Floor	
EMSL Sample Number:	362302164-0011	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250

Sample Number:	6	
COC Sample ID:	Cafe Stage	
EMSL Sample Number:	362302164-0012	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250

Sample Number:	7	
COC Sample ID:	Art Sink	
EMSL Sample Number:	362302164-0013	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250

Sample Number:	9	
COC Sample ID:	Faculty Table	
EMSL Sample Number:	362302164-0014	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250

Sample Number:	11	
COC Sample ID:	Delta 7	
EMSL Sample Number:	362302164-0015	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250



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Sample Number:	12	
COC Sample ID:	Gamma 9	
EMSL Sample Number:	362302164-0016	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250

Sample Number:	13	
COC Sample ID:	Gamma 3	
EMSL Sample Number:	362302164-0017	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250

Sample Number:	14	
COC Sample ID:	Media Circle	
EMSL Sample Number:	362302164-0018	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250

Sample Number:	15	
COC Sample ID:	Beta 4	
EMSL Sample Number:	362302164-0019	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250

Sample Number:	16	
COC Sample ID:	Alpha 8	
EMSL Sample Number:	362302164-0020	
Analyte	Result (µg/100cm ²)	Limit of Quantitation/LOQ (µg/100cm ²)
Lithium (Li)	< LOQ	0.250



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Important Terms, Conditions, and Limitations:

Sample Retention: Non-perishable samples analyzed by EMSL will be retained for 60 days after analysis date at room temperature conditions. Perishable samples will be retained for maximum of 30 days in refrigerated conditions. Storage beyond this period is available for a fee with written request prior to the initial 30 day period. Samples containing hazardous/toxic substances which require special handling may be returned to the client immediately EMSL reserves the right to charge a sample disposal or return shipping fee.

Change Orders and Cancellation: All changes in the scope of work or turnaround time requested by the client after sample acceptance must be made in writing and confirmed in writing by EMSL. If requested changes result in a change in cost the client must accept payment responsibility. In the event work is cancelled by a client, EMSL will complete work in progress and invoice for work completed to the point of cancellation notice. EMSL is not responsible for holding times that are exceeded due to such changes.

Warranty: EMSL warrants to its clients that all services provided hereunder shall be performed in accordance with established and recognized analytical testing procedures and with reasonable care in accordance with applicable federal, state and local laws. The foregoing express warranty is exclusive and is given in lieu of all other warranties, expressed or implied. EMSL disclaims any other warranties, express or implied, including a warranty of fitness for particular purpose and warranty of merchantability.

Limits of Liability: In no event shall EMSL be liable for indirect, special, consequential, or incidental damages, including, but not limited to, damages for loss of profit or goodwill regardless of the negligence (either sole or concurrent) of EMSL and whether EMSL has been informed of the possibility of such damages, arising out of or in connection with EMSL's services thereunder or the delivery, use, reliance upon or interpretation of test results by client or any third party. We accept no legal responsibility for the purposes for which the client uses the test results. EMSL will not be held responsible for the improper selection of sampling devices even if we supply the device to the user. The user of the sampling device has the sole responsibility to select the proper sampler and sampling conditions to ensure that a valid sample is taken for analysis. Any resampling performed will be at the sole discretion of EMSL, the cost of which shall be limited to the reasonable value of the original sample delivery group (SDG) samples. In no event shall EMSL be liable to a client or any third party, whether based upon theories of tort, contract or any other legal or equitable theory, in excess of the amount paid to EMSL by client thereunder.

The data and other information contained in this report, as well as any accompanying documents, represent only the samples analyzed. They are reported upon the condition that they are not to be reproduced wholly or in part for advertising or other purposes without the written approval from the laboratory.



Warwick School
225 West St • Warwick, NY 10990
Wed, Jun 28 09:59 AM
by Richard Lynch



Warwick School
225 West St • Warwick, NY 10990
Wed, Jun 28 10:04 AM
by Richard Lynch



Warwick School
225 West St • Warwick, NY 10990
Wed, Jun 28 10:33 AM
by Richard Lynch



Warwick School
225 West St • Warwick, NY 10990
Wed, Jun 28 10:35 AM
by Richard Lynch



Warwick School
225 West St • Warwick, NY 10990
Wed, Jun 28 10:35 AM
by Richard Lynch



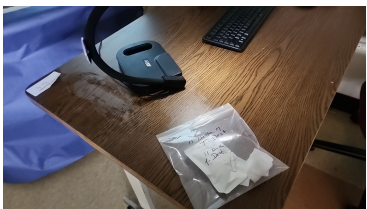
Warwick School
225 West St • Warwick, NY 10990
Wed, Jun 28 10:38 AM
by Richard Lynch



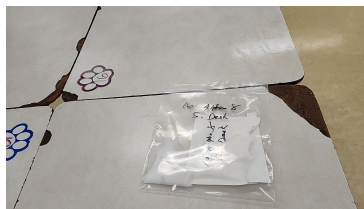
Warwick School
225 West St • Warwick, NY 10990
Wed, Jun 28 02:35 PM
by Richard Lynch



Warwick School
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Wed, Jun 28 02:57 PM
by Richard Lynch



Warwick School
225 West St • Warwick, NY 10990
Wed, Jun 28 02:57 PM
by Richard Lynch



Warwick School
225 West St • Warwick, NY 10990
Wed, Jun 28 03:16 PM
by Richard Lynch



Warwick School
225 West St • Warwick, NY 10990

*Wed, Jun 28 03:56 PM
by Richard Lynch*



Warwick School
225 West St • Warwick, NY 10990

*Wed, Jun 28 04:09 PM
by Richard Lynch*