Cornell Engineering Student Project Teams

Composites Working Group

Discussion with EH&S: JanFab Monitoring

March 10, 2020

Thank you for being engaged, asking good questions, and caring about safety!!

Definitions

- Permissible Exposure Limit (PEL) – employee legal limit
- Threshold Limit Value (TLV) – recommended exposure level
- Time-Weighted Average (TWA) – average exposure over an 8 hour workday
- Ceiling – highest exposure allowed, even if TWA is under limit
- Acute vs. Chronic Exposures / Reactions
  - Acute – Short-term / immediate exposure or impact
  - Chronic – Longer term impact or longer term lower level exposures

Background Information

- Dose determines the poison
  - Chocolate – Theobromine
  - Potatoes - Solanine
- Individual Response – levels are based on average response, individuals can have higher sensitivity
- Olfactory Fatigue – your nose stops smelling things after a while

Overview

EH&S conducted inspections and monitoring during JANFAB on the following dates: January 13, 14, 15, 25

The following areas were reviewed:

- General Housekeeping
- Slips, Trips, and Fall Hazards
- General Oil and Chemical Storage
- Container Labeling
- Emergency Preparedness
- Signage
- Monitoring

Observations and recommendations will be communicated directly with teams and incorporated into future facility and safety training.

For review and discussion today.

Sampling Methods – Organic Vapors

Organic Vapor monitoring used 525 TraceAir II badges by Assay Technology with ability to monitor for 25 organic solvents.

Analysis of badges performed by using gas chromatography with flame ionization detector (GC/FID) after desorption in carbon disulfide with a cosolvent.

VOC – Results

The organic solvents that were found above non-detectable levels were Acetone, Methyl Ethyl Ketone, Methyl Isobutyl Ketone, Xylene, Ethyl Acetate, and Styrene.

> Styrene had the highest detectable level but was still below Occupational Health and Safety Administration (OSHA) permissible exposure level (PEL) when calculated time weighted average (TWA).

The other detected chemicals were well below the PELs when the TWAs were calculated.

Results from 1/13/20 (Paint booth)
Table. 1

Chemical	Time sampled (minutes)	Results (PPM)	OSHA 8hr-PEL (PPM)	Over/Under OSHA PEL
Acetone	40	.475	1,000	Under
Ethylacetate	40	.575	400	Under
Methylethyl Ketone	40	.610	200	Under
Styrene	40	.492	100	Under

Results from 1/14/20 area sample (Fiber glass lay-up)
Table. 2

Chemical	Time sampled (minutes)	Results (PPM)	OSHA 8hr-PEL (PPM)	Over/Under OSHA PEL
Acetone	159	.109	1,000	Under
Methylethyl Ketone	159	.013	200	Under
Styrene	159	.993	100	Under

Results from 1/14/20 student sample (Fiber glass lay-up)
Table. 3

Chemical	Time sampled (minutes)	Results (PPM)	OSHA 8hr-PEL (PPM)	Over/Under OSHA PEL
Acetone	165	11.34	1,000	Under
Methylethyl Ketone	165	.180	200	Under
Methyl Isobutyl Ketone	165	.031	100	Under
Styrene	165	44.7	100	Under
Xylenes	165	.009	150	Under

Results from 1/14/20 student #2 sample (Fiber glass lay-up)
Table. 4

Chemical	Time sampled (minutes)	Results (PPM)	OSHA 8hr-PEL (PPM)	Over/Under OSHA PEL
Acetone	160	12.3	1,000	Under
Methylethyl Ketone	160	.130	200	Under
Methyl Methacrylate	160	.013	100	Under
Styrene	160	33.3	100	Under

Results from 1/25/20 Student #1 Vinyl Ester-Resin Sample
Table. 6

Chemical	Time sampled (minutes)	Results (PPM)	OSHA 8hr-PEL (PPM)	Over/Under OSHA PEL
Acetone	65	.80	1,000	Under
Methylethyl Ketone	65	.150	200	Under
Styrene	65	21.6	100	Under

Results from 1/25/20 Student #2 Vinyl Ester-Resin Sample
Table 7.

Chemical	Time sampled (minutes)	Results (PPM)	OSHA 8hr-PEL (PPM)	Over/Under OSHA PEL
Acetone	65	.30	1,000	Under
Methylethyl Ketone	65	.030	200	Under
Styrene	65	5.55	100	Under

Results from 1/25/20 Area Sample Vinyl Ester-Resin Sample
Table. 8

Chemical	Time sampled (minutes)	Results (PPM)	OSHA 8hr-PEL (PPM)	Over/Under OSHA PEL
Acetone	60	.312	1,000	Under
Styrene	60	2	100	Under

Sampling Method – Total Dust

Collection media – 5 micron PVC filter PW (pre-weighed) 37mm cassette

Analyzed by gravimetric (filter weight) method

Total Dust – Results

Total Dust monitoring was conducted for fiberglass sanding procedures and cutting of fiberglass panels/tubes.

Results were well below OSHA's PEL for total dust.

Results from 1/14/20 Total Dust Sample
Table. 5

Sample	Air Volume (Liter)	Total (mg)	Concentration (mg/m3)
1 - Sanding	120	<0.050	<0.42
2 - Sanding	120	<0.050	<.042
3 - Sanding	120	<0.050	<0.42
4 – Saw cutting	12	<0.050	<0.42

Sound Level Monitoring

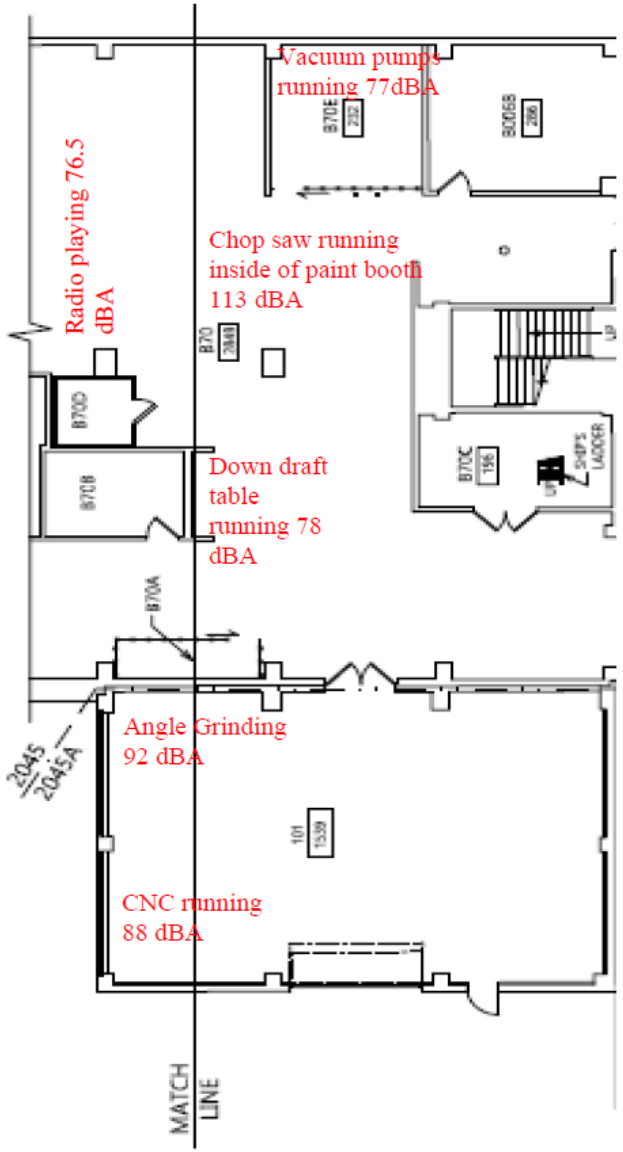
Sound level monitoring was conducted using Quest Technologies SoundPro Sound Level meter

Measured in A frequency weighting due to frequency similar to the response of human ear

Results with no equipment running were between 70-72 dBA.

Room B70 experienced levels between 95-97 dBA with the chop saw running inside of the paint booth.

Noise Results from 1/14/20



Hearing protection recommendations

Hearing protection becomes required when noise levels meet or exceed 85dBA.

Ear Plugs			Description	Grainger Part Number
3M E-A-R Push-Ins with Grip Rings	30		• oft, flexible foam conforms to the unique shape of each ear for comfortable noise reduction • Grip rings gently seal ear canal to enhance fit. • Soft polyurethane foam tips • Flexible stem makes insertion and removal easy and helps keep the tips clean when the wearer's hands are dirty	1VJY3(w/o Cord) 1VJY4(w Cord)
3M E-A-Rsoft Yellow Neons	33		• Soft, pliable foam offers comfort for wearing over an extended time • Low-pressure foam makes plugs less noticeable • Earplugs are easy to roll down for quick and easy insertions	3NZF4 (200 ct.)

Ear Muff	NRR		Replacement Parts	Description	Grainger Part Number
3M Peltor X5A	31		Hygiene Kit HYX5	• Highest NRR (31 dB) for an earmuff on the market which makes them ideal for very high noise situations. • Newly designed spacers, specially formulated earcup liners and innovative foam contained in the cushions. • Earcup pivot points tilt for optimum comfort and efficiency.	21DE18 Hygiene Kit 21DE28

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Recommendations

- Admin will follow up on EXHAUST.
- Work practices and engineering controls will be reviewed and discussed with all teams.
- Uniform PPE requirements will be established and posted!
  - Continue to use N95 disposable respirators for VOCs and particulates
  - ½ face respirators allowed
    - Pre-approval from Project Team Director
    - Fit testing/training required from EH&S (Phil – group sessions)
    - Signed agreement from each member re: safe use and maintenance
  - Hearing protection required with certain activities
    - Angle grinding, CNC running, chop saw use in paint booth

Q&A / Discussion