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SENT ELECTRONICALLY: tanci.mintz@alaska.gov

State Leasing & Facilities Manager
Department of Administration
Division of General Services
550 W 7th Ave, Suite 1970
Anchorage, AK 99501

ATTN: Tanci Mintz
State Leasing & Facilities Manager

**RE: Indoor Air Quality Assessment**
**Bill Ray Center, 1108 F Street, Juneau, Alaska**

Tanci:

This letter report summarizes the indoor air quality (IAQ) assessment of the Bill Ray Center located at 1108 F Street in Juneau, Alaska. The following is synopsis of the IAQ effort including Background, Scope of Work, Methodology, Field Activities and Sampling, Results and Analysis with conclusions and recommendations where appropriate.

**Background and Scope of Work**

The State of Alaska leases the 22,000 square foot, two story Bill Ray Center at 1108 F Street in downtown Juneau, Alaska. Currently, the building is being used as offices for both the State of Alaska Department of Fish and Game (ADF&G), as well as the Department of Corrections (ADOC) while the building they are usually in is being renovated. With the onset of colder fall weather, the occupants of the building have complained of poor air quality, and the State of Alaska requested an IAQ assessment of the building. ***NORTECH's*** scope or work was to compete a preliminary IAQ assessment within this space, focusing on the areas where the majority of the complaints stemmed from.

**Methodology**

The IAQ assessment methodology included a review of available records, and a site inspection. The assessment used standard industrial hygiene practices dedicated to the anticipation, recognition, evaluation and control of those factors or stresses arising in or from the workplace, which may cause sickness, impaired health and well-being, or significant discomfort among workers or citizens of the community. While an IAQ assessment would normally include interviews with site personnel, the State of Alaska requested that ***NORTECH*** not interact with the building occupants, and no interviews were conducted. All work was performed by a qualified and experienced technician under the guidance and oversight of a Certified Industrial Hygienist (CIH).

The indoor air quality assessment was conducted in accordance with standards set by the American Industrial Hygiene Association (AIHA) for the evaluation of air quality in buildings. ANSI/ASHRAE Standard 62.1-2010 "Ventilation for Acceptable Indoor Air Quality" and ANSI/ASHRAE Standard 55-2010 "Thermal Environmental Conditions for Human Occupancy" were used as references. To assess regulatory compliance

monitoring results was compared to the U.S. Occupational Safety and Health Administration (OSHA)-legal Permissible Exposure Levels (PEL), American Conference of Governmental Industrial Hygienists (ACGIH)-Industry Threshold Limit Values (TLVs) and the National Institute of Occupational Safety and Health (NIOSH) Recommended Exposure Limits (REL).

***NORTECH*** used a 3M Quest EVM Series Environmental Monitor, Model EVM 7 that provides real time data of CO, $CO_2$, Temperature, Humidity, volatile organic compounds (VOCs), and airborne particulates.

Current regulatory requirements and common sense necessitates management of IAQ in an occupied facility and to notify occupants of conditions present. However, it is important to understand that no matter how comprehensive (or expensive) the preliminary IAQ assessment effort, it cannot be expected to uncover or identify all concerns. Hidden hazards and unknown conditions may still exist. In this case the State specifically restricted the scope of work to IAQ monitoring. The completed assessment efforts were based on information provided and services requested. Changes in the conditions of the workplace may occur with the passing of time. In the event that additional concerns are identified supplementary follow up services may be required.

**Field Activities and Sampling**
A familiarization site visit and building walk through was completed by ***NORTECH***'s Jason Ginter and Jen Davis on October 14, 2014. They set up Model EVM 7 monitors in five locations within the Bill Ray Center, four in areas where air quality complaints originated: rooms 153, 155, 205 and just outside room 205, and one monitor was placed in room 230 within the Department of Corrections area.

Weather conditions outside the Bill Ray Center during the monitoring period ranged from a low of 38 degrees F to a high of 61 degrees F with an average of 47 degrees F. The area received 3.37" of rain during this time period.

The building is steel and concrete construction, and is served by an HVAC system with the fresh air intake located on the south-west side of the first floor.

The walkthrough and site observation provided the following IAQ comments/observations:

- Up to 160 state employees are located at the Bill Ray Center,
    - ADF&G employees are located throughout the first floor and the east half of the second floor
    - ADOC employees are located on the west half of the second floor
- The west side of the building (1970s era) is about 10 years older than the east side, none of the complaints of poor air quality were noted on the west side of the building.
- The building's HVAC system appears to have been designed for the older (west) portion of the building, and has had retrofits to service the newer, east side of the building.
- The vent and fill piping for the underground heating oil storage tank are within 15 feet of the building's air intake.
- An ongoing new building construction project is underway on the adjacent lot, with equipment and tools used and stored within 20 feet of the Bill Ray Center's air intake.
- Air quality inside the Bill Ray Center is noticeably "stale".

Five Quest EVM 7 Environmental Monitors supplied by TTT Environmental of Anchorage, Alaska were used to provide real time data measurement of CO, CO2, dust particulates, VOC's temperature and humidity within the area of the corridor during the seven day monitoring period. Some of the monitors timed out during the State holiday three day weekend that occurred during the monitoring period, these were re-started on Tuesday 10/21 after we were notified by the State of Alaska that some of the monitors were off. The monitors were placed in typical breathing zones within the subject areas, whether on desks or cabinets in non-descript locations. The instruments were calibrated before and after sample data collection.

**Results with Analysis**
Real time data is summarized as follows:

| PARAMETER | | Rm 155 | Rm 153 | Rm 205 | FG 057 | DOC 37 | ASHRAE |
|---|---|---|---|---|---|---|---|
| Carbon Dioxide | Ave | 2,064 | 465 | NA | 590 | 465 | 800-1,000 |
| ppm | Max | **4,061** | **2,121** | NA | **2,219** | **2,121** | ppm |
| Dust | Ave | 0.001 | .003 | 0.0 | .006 | .003 | < 0.150 |
| $mg/m^3$ | Max | **0.197** | .035 | .067 | .027 | .035 | $mg/m^3$ |
| Temperature | Ave | 68.4 | 68.9 | 68.5 | 71.1 | 68.9 | 69-76 $^0F$ |
| $^0F$ | Max | 71.8 | 71.1 | 72 | 73.4 | 71.1 | |
| Humidity | Ave | 31.2 | 37.6 | 34.5 | 30.6 | 37.6 | 30-60% |
| % | Max | **25.3**-34.9 | **29.4**-42.3 | **28.4**-47.2 | **25.3**-34.9 | 29.4-42.3 | |

Bolded values exceed ASHRAE guidance

**Carbon Monoxide** – None detected on any of the monitors

**Temperature** – Monitoring reported temperature ranges on the cooler end of ASHRAE recommended levels 69-76 degrees Fahrenheit.

**Humidity** – Monitoring reported humidity in a range from 25.3 up to 47.2% on the lower end of ASHRAE recommended guidance of 30-60%. Humidity values are representative of ambient conditions.

**Volatile Organic Compounds (VOC's) -** No VOC's were detected

**Particulates/Dust** – Total particulates were detectable. Particulates ranged from 0.000 – 0.197 $mg/m^3$. The maximum value of 0.197 $mg/m^3$ reported in Room 155 exceeded the ASHRAE recommended IAQ total particulates criteria of less than 0.150 $mg/m^3$. The other four monitoring locations were less than the ASHRAE guidance. These elevated levels of particulates are likely caused by ambient conditions in the fresh air makeup that maybe impacted by daytime activities in the general neighborhood, including construction activities in close proximity to the fresh air intake as well as the effectiveness of the HVAC filtration system.

**Carbon Dioxide** - Data reported higher than normal maximum $CO_2$ levels in all areas of the building monitored. Carbon Dioxide (CO2) levels ranged from 465 to 4,061 within the building are indicative of inadequate ventilation. All of the maximum values at all five locations significantly exceeded the ASHRAE guidance of keeping $CO_2$ to less than 800-1,000 ppm.

Elevated CO2 levels and potential health problems are:

- 250 - 350 ppm – background (normal) outdoor air level

- 350- 1,000 ppm - typical level found in occupied spaces with good air exchange.
- 1,000 – 2,000 ppm - level associated with complaints of drowsiness and poor air.
- 2,000 – 5,000 ppm – level associated with headaches, sleepiness, and stagnant, stale, stuffy air. Poor concentration, loss of attention, increased heart rate and slight nausea may also be present.
- >5,000 ppm – this indicates unusual air conditions where high levels of other gases could also be present. Toxicity or oxygen deprivation could occur. This is the permissible exposure limit for daily workplace exposures.
- >40,000 ppm - this level is immediately harmful due to oxygen deprivation.

Site inspection and monitoring observations suggest the building is inadequately ventilated. It does not appear that the current ventilation system is adequately providing fresh air to the entire facility, the newer east side of the building in particular. It is recommended that a more detailed **IAQ assessment** and **retro-commissioning** of the HVAC mechanical systems be undertaken with a goal to provide necessary fresh air and ASHRAE acceptable IAQ for the current and planned occupancy of the facility. The assessment should include additional monitoring of IAQ and mechanical system functions as well as visual observation of space functions, location of supply and return air duct diffusers and grills, and verification of outside air quantity and quality vs recommended levels for the current number of occupants and space use. With consideration of occupancy ventilation controls the upgraded system will likely reduce associated energy costs for the facility.

It is further recommended that an **IAQ central point of contact (POC**) with a standard questionnaire be established for all employees to report future IAQ concerns. Reported concerns can be tracked and forwarded to facility maintenance for immediate action if appropriate and summarized for ACS management on monthly or quarterly basis.

**Conclusions and Recommendations**
Based on the preliminary indoor air quality assessment (IAQ) of the Bill Ray Center facility we provide the following conclusions.

- Non-detectable and/or ASHRAE acceptable levels of the following IAQ parameters monitored
    - Volatile Organic Compounds (VOC),
    - Humidity,
    - Temperature and
    - Carbon Monoxide
- Elevated levels, in excess of ASHRAE guidance, were reported for:
    - Carbon dioxide and
    - Total particulates/dust

The elevated Carbon Dioxide conditions are caused by inadequate HVAC ventilation for the current occupant load. The elevated particulate levels are most likely caused by outdoor fresh air ambient conditions that may be diurnally impacted by business day air quality, construction activity in close proximity to the fresh air impact and the HVAC system's filtration effectiveness.

Recommendations include completing

- Additional IAQ monitoring
- Retro-commissioning of the HVAC mechanical systems.
- Establishing a IAQ Central Point of Contact (POC).

It is further recommended that the State of Alaska provide and explain this report, and included results, to all employees involved that work within the office facility.

We trust this meets with your needs at the present time. If you have any questions or require additional professional services or advice, please let us know.

Sincerely,
***NORTECH***

Jason Ginter, CEA

John Hargesheimer, PE, CIH, DEE
Principal & CEO