Executive Summary Excerpts

For further details please refer to ESi’s report
ESi was contacted by Flagler County Engineering to provide assistance in investigating air quality concerns reported by the employees occupying the building for the Flagler County Sheriff’s Department Operations Center, 901 East Moody Boulevard, Bunnell, Florida 32110.

A number of the employees expressed concerns about air quality in the building and have complained about experiencing various symptoms including headaches, rashes, watery eyes, and itchy skin.
SBS – Sick Building Syndrome

• EPA term "sick building syndrome" (SBS) is used to describe situations in which building occupants experience acute health and comfort effects that appear to be linked to time spent in a building, but no specific illness or cause can be identified. The complaints may be localized in a particular room or zone or may be widespread throughout the building.

• This is what ESi was presented with at the beginning of the investigation.
In contrast, the term "building related illness" (BRI) is used when symptoms of diagnosable illness are identified and can be attributed directly to airborne building contaminants.

The affected employees reported complaints that could be related to SBS.

BRI requires medical evaluation of employees.

As of the writing of this report ESi has received no information that would support BRI has been evaluated or established with respect to the operations center.

The attorneys representing the employees declined to provide any information that could be evaluated by medical professional.

For this reason BRI was not established.
Symptoms

• The symptoms described by the employees can be due to many different reasons and causes. Determining the actual cause or combination of causes can be an extensive task that requires analysis of the affected individual’s medical histories, combined with investigation into work and non-work-related exposures.

• ESi proceeded with the investigation and hypothesis development assuming that the complaints were valid as if already verified through medical confirmation of BRI and the symptoms reported were potentially caused by the conditions in the building.
Exposure Pathway

- Source: Public Health Assessment Guidance Manual (2005 Update)
- Chapter 6: Exposure Evaluation: Evaluating Exposure Pathways
- ASTDR – Agency for Toxic Substances and Disease Registry

Figure 6-2. Site Conceptual Model – Exposure Pathway Schematic
Hypothetical migration of moisture and contaminants from under the slab at the Sheriff’s Center

VOCs and Moisture
Investigative Approach

• The exposure pathways that ESi considered significant to the investigation as they related to air quality included dermal contact and inhalation during the time the employees spent in the building.

• ESi used scientific methodology to conduct the investigation starting with background research that allowed development of a hypothesis of how, and to what, the employees could potentially be exposed.

• Historical investigations and more recent air quality investigations were also used to supplement the hypothesis development.

• After development of the hypothesis was completed a testing protocol was established to test the hypothesis.
Investigative Approach (cont.)

• The testing performed by H2H and Mold Spec were relied upon and the ESi testing supplemented the results of those investigations in order to generate more complete information.

• ESi did not attempt to duplicate or repeat tests that were already done in these investigations but instead expanded the scope of tests and used employee representatives input to focus the investigation and provide additional supplemental data.

• All the testing results (from all available data and tests) were used to evaluate the hypothesis.
Air Quality Impacts Considered

- The investigation considered the potential impact on air quality in the building, from the occupants, the HVAC system, the possible pollutant pathways and possible contaminant sources.
- Temperature relative humidity, carbon monoxide, carbon dioxide, oxygen, water vapor and ammonia were evaluated.
- The mold investigation was supplemented by testing for total mold biomass.
- The sampling for Volatile Organic Compounds (VOCs) was supplemented by 7.5 hours of sampling in two locations under the slab and 5 locations in the building.
- XRF (X-Ray Fluorescence) was used to gain elemental information on the slab, precast walls, block walls, painted and unpainted drywall, dust accumulation above the drop ceiling, ceiling tile, and dust in the occupant space under the ceiling.
Summarized Conclusions

• The results of the investigation indicated that the hypothesis, regarding contaminants and moisture migrating from under the slab into the building at sufficient rates to impact the air quality of the building, is not supported by the test results and should be rejected.
Summarized Conclusions (cont.)

- The results of the investigation indicate that improved (Heating Ventilating and Air Conditioning) HVAC management, particularly with respect to ventilation, temperature and relative humidity, are likely to result in improvements in air quality and comfort levels in the building. This is likely to involve further analysis of the HVAC system based on the occupant load during the day and night, the typical and atypical use (higher occupant load such as during classroom training, meetings etc.) of certain portions of the building.
The observations and discussions with building personnel and employee representatives during ESi’s investigation indicate that an improved understanding of air quality control by occupants, people responsible for housekeeping and people in charge of the operations and adjustment of the HVAC systems is likely to lead to improvements and minimize the impact of inappropriate attempts to improve air quality by opening doors, overuse of fans, deodorants, aerosols, potpourri, antibacterial chemicals and disinfectants. Many of these approaches can actually adversely impact the air quality and interfere with the proper operation of the system.
• ESi is of the opinion that at the time of the investigation and at the observed temperature settings the HVAC system in the building was not removing sufficient humidity from the air inside the building.

• Appropriate and effective ventilation temperature and humidity control is a complex issue and ESi suggested that a mechanical engineer review the design and operation of the system and make appropriate recommendations.

• The historical documentation on the HVAC operations of the building and the assessment of the HVAC operation by the mechanical engineer may become useful to the medical professional evaluating the employees’ specific symptoms.
• The relative humidity measured at the building were around 60%. People living in hot and humid climates are often exposed to environments where the relative humidity level is a lot higher. During fog or rain the relative humidity outdoors is close to 100% even though the temperature may be cool.

• The relative humidity levels in houses and other buildings that are frequented by employees including outdoor levels could be significantly higher. ESi has not been provided with any information regarding the employee exposures to high humidity in these other environments that can comprise 2/3 of the time during a typical day that they do not spend in the operations center building. Potential for those exposures should also be considered by medical professionals when evaluating employee symptoms and exposures and when attempting to establish and validate BRI connection to the operations building.
Mold Evaluation

- It is ESi’s opinion that the operations center is not adversely impacted with mold.
- None of the sample results indicated current mold growth or mold contamination.
- The source of the water damaged area between the walk-in refrigerator and walk-in cooler needs to be fixed. The water damaged drywall including any water impacted insulation needs to be replaced or repaired as required.
- Improved housekeeping and humidity control should be sufficient to return locations of the building that tested with category B levels to Level A – Normal background levels.
- The results are representative of relatively low mold levels at the sheriff’s operations building. The mold levels in houses and other buildings that are frequented by employees could be significantly higher. ESi has not been provided with any information regarding the employee exposures to mold in these other environments that can comprise up to 2/3 of the time during a day that they do not spend in the building. Potential for those exposures should be considered by medical professionals when evaluating employee symptoms and exposures and when attempting to establish and validate BRI connection to the operations building.
XRF (X-Ray Fluorescence) Screening

- The construction material test results did not reveal any anomalies.
- There was no evidence that would support the hypothesis that the building materials from the former hospital building contain toxic compounds (heavy metals) that are being released into the indoor environment of the building above normal background levels. (also see VOC section)
- The dust sample analysis confirmed that the origin of the white particles in the dust is from the drop ceiling tile. Improved housekeeping and humidity control should be sufficient measure to minimize the potential for employee exposure to these particles.
- The results are representative of relatively low levels of white particles in the dust of the building. The dust levels and different components of dust irritants in houses and other buildings that are frequented by the employees could be significantly higher. ESi has not been provided any information regarding the employee exposures to dust in these other environments that can comprise up to 2/3 of the time during a typical day that they spend outside of the building. Potential for those exposures should be considered by medical professionals when evaluating employee symptoms and exposures and when attempting to establish and validate BRI connection to the operations building.
Volatile Organic Compounds Testing

• The VOC test results did not reveal any VOC levels in the building above currently accepted guidelines. The results for VOC in the operations center as compared with criteria for residential and office environment fall into an ideal category for off gassing and are below the criteria for individual compounds proposed by ASHRAE and LEEDS.

• The results do not support the hypothesis that there are significant levels of toxins under the slab of the building and that toxins are migrating through the slab into the air of the building.

• The test results indicate that the soil under the former hospital building does not contain a sufficient quantity of toxic compounds that are resulting in vapor intrusion and being released into the indoor environment of the building.
Volatile Organic Compounds Testing (cont.)

- Carbon dioxide levels during the ESi sampling on all (7) samples ranged from 600 to 660 ppm. Given the concentrations obtained during ESi testing the CO2 levels were typical of occupied indoor spaces with good air exchange and did not reach the level of poor air quality complaints in occupied indoor spaces.

- The results of this VOC investigation are consistent with, and supplement, the results of the H2H investigation.

- The results are representative of very low levels of VOCs being released into the building. The VOC levels in houses and other buildings that are frequented by the employees could be significantly higher. ESi was not provided with any information regarding the employee exposures to VOCs in these other environments that can comprise 2/3 of the time during a typical day that they spend outside of the building. Potential for those exposures should be considered by medical professionals when evaluating employee symptoms and exposures and when attempting to establish and validate BRI connection to the operations building.
Table 7. Total VOC results and adjusted VOC results for the seven canister tests. The results are in Micrograms per cubic meter. The adjusted VOC exclude Alcohol and Isopropanol values.

<table>
<thead>
<tr>
<th>Sample Id</th>
<th>Total VOC</th>
<th>Adjusted VOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Secure Corridor between Evidence Cage 137 and Narcotics Rm 138</td>
<td>150</td>
<td>77</td>
</tr>
<tr>
<td>2 - SUB-SLAB, next to plumbing repair in slab, RM 134 Evidence Forensics (Just outside the corridor where Sample 1 is)</td>
<td>730</td>
<td>696</td>
</tr>
<tr>
<td>3- SUB-SLAB, Supervisors RM 129 (Main Room)</td>
<td>2000</td>
<td>1970</td>
</tr>
<tr>
<td>4- Supervisors RM 129- Main Room Outside supervisor's office (door open)</td>
<td>190</td>
<td>114</td>
</tr>
<tr>
<td>5- Main Hall outside Commanders RM152</td>
<td>220</td>
<td>119</td>
</tr>
<tr>
<td>6- RM 103 Records</td>
<td>640</td>
<td>90</td>
</tr>
<tr>
<td>7- RM 111 Investigations</td>
<td>220</td>
<td>88</td>
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### Total VOCs in Air

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Limiting Factors

• ESi’s investigation was limited by a number of factors such as time, lack of BRI information, budget and conditions in the building due to relocation.

• ESi is committed to solving any of the issues it was asked to assist with and would welcome other parties input.

• ESi would welcome any additional input from FDOH, CDC and EPA and ESi would be happy to cooperate and share all of its data and information and answer any questions related to the investigation.

• ESi attempted to seek assistance of some of these resources specifically the FDOH to assist in the investigation prior to ESi testing. The State of Florida graciously provided assistance with the radiation investigation but at the time had no funds budgeted to support or assist in other investigative AIQ matters leaving it to ESi and the County to conduct a reasonable and timely effort at evaluating the situation.