Indoor Air Quality Investigation SOP

Concerns about indoor air quality are common among employees in a wide range of workplace settings. Employees may be bothered by unpleasant odors or experience symptoms such as headache, fatigue, dizziness, respiratory difficulties, etc. The causes are often difficult to identify but can be due to increased levels of volatile organic compounds (VOCs), dust, carbon monoxide, formaldehyde, mold, or could be psychogenic. When investigating indoor air quality concerns, it is important to have a systematic and thorough approach so that issues are efficiently and effectively mediated.

COMMON CAUSES OF INDOOR AIR POLLUTION:

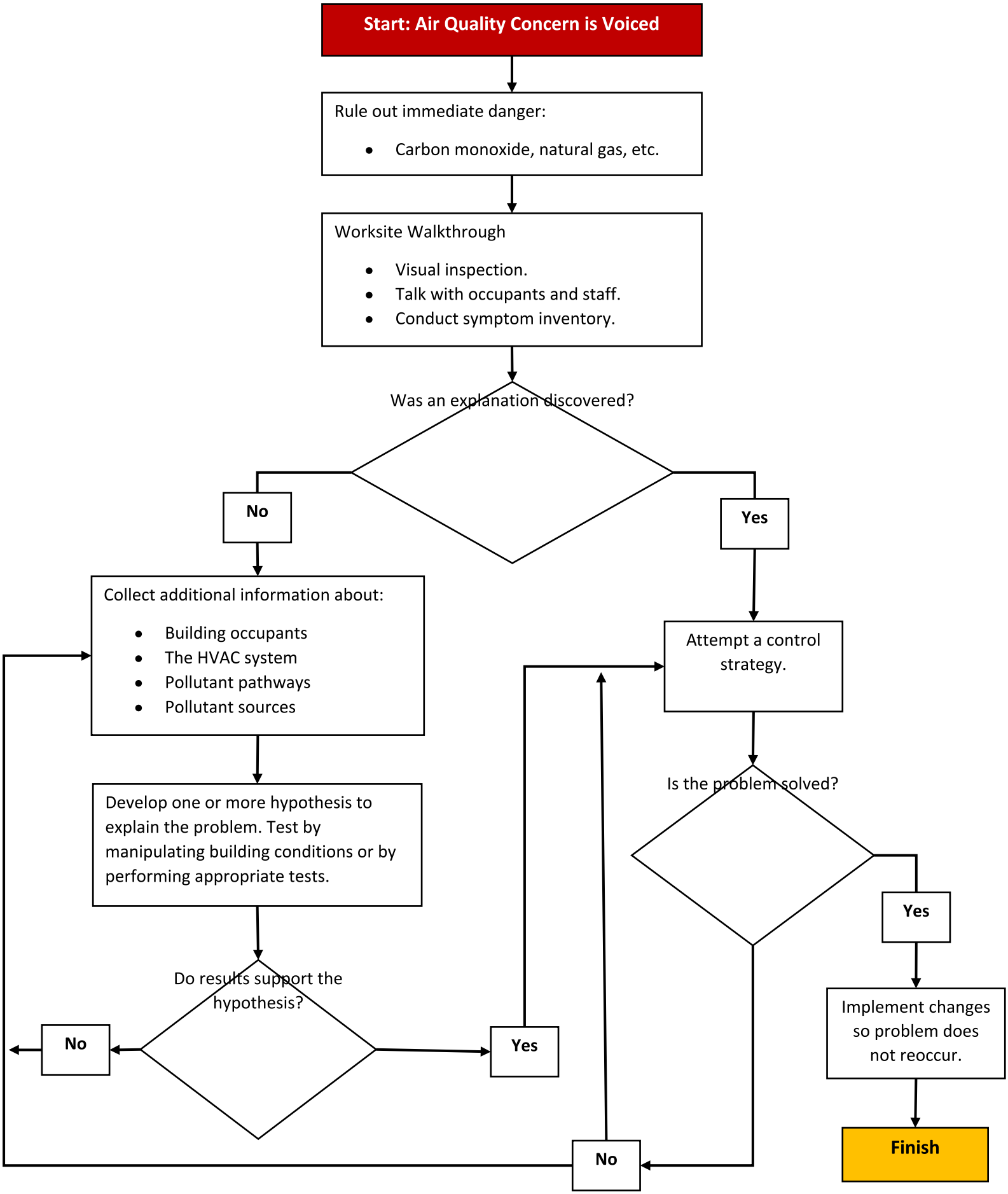
- Ambient air pollution: fossil fuel combustion byproducts, dust
- Animals: dander and other allergens
- Construction/renovation materials: urea formaldehyde insulation
- Textiles/carpet: off gassing VOCs
- Kitchen combustion byproducts: VOCs and PM2.5
- Parking garage: carbon monoxide
- Ventilation system and air conditioning: water contamination and mold
- Cleaning agents: VOCs

DIFFERENTIAL DIAGNOSIS FOR BUILDING-RELATED OUTBREAKS

- Building-associated disease: Legionella, hypersensitivity pneumonitis, droplet-borne infections (COVID-19, Influenza, etc.)
- Allergic reactions: mold, plants, animals, etc.
- Pollutants, poor ventilation leading to tight building syndrome.
- Low Humidity.
- Exaggerated response to odor with possible vasovagal reaction.
- Psychogenic outbreak: anxiety, employee dissatisfaction, deliberate provocation.
- Community-based disease: respiratory infections, waterborne or foodborne infections.

GENERAL APPROACH TO TRIAGE AND ASSESS INDOOR AIR QUALITY

1. Rule out the possibility that there is a life-threatening hazard. Example: natural gas or carbon monoxide.
2. Perform a workplace walk-through for overview of ventilation pathways, pollutant pathways, HVAC systems, cleanliness, contaminant sources and to guide further investigation.
3. Check air exchange rate, temperature, and humidity and determine if and when recent changes to the building were made.
4. Conduct a symptom inventory using the provided questionnaire, which should include assessment of timing of symptoms (pre-post shift, beginning-end of week, seasonality, etc). Analyze patterns of symptoms for evidence of common source transmission (characteristic of problematic air quality) verses person-to-person transmission (characteristic of psychogenic outbreaks).
5. Initiate a limited industrial hygiene survey emphasizing ventilation, carbon monoxide (revisited because it may be intermittent), VOCs, dust, and odors. This may be conducted simultaneously with step 4.
6. If the above measures do not identify a root cause, proceed to comprehensive hygiene investigation.
7. If a cause is found, attempt a correction and repeat measurements.
8. If the correction worked, implement changes that fix the underlying problem so that it does not happen again.


Start: Air Quality Concern is Voiced
Rule out immediate danger:
Carbon monoxide, natural gas, etc.
Worksite Walkthrough
Visual inspection.
Talk with occupants and staff.
Conduct symptom inventory.
Was an explanation discovered?
No
Yes
Collect additional information about:
Building occupants
The HVAC system
Pollutant pathways
Pollutant sources
Develop one or more hypothesis to explain the problem. Test by manipulating building conditions or by performing appropriate tests.
Do results support the hypothesis?
No
Yes
Attempt a control strategy.
Is the problem solved?
Yes
No
Implement changes so problem does not reoccur.
Finish

References

Environmental Protection Agency. (2019). Diagnosing IAQ Problems. In *epa.gov*. https://www.epa.gov/sites/default/files/2014-08/documents/sec_6.pdf

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