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Air Quality and Confined Spaces

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Indoor Air Quality

- Air quality can pose a significant risk to health and human safety and can make people sick with allergic reactions, reparatory problems, eye irritation, sinusitis, bronchitis and even pneumonia

- Factors that can affect air quality
  - Mold
  - Mildew
  - Spores
  - Smoke
  - Chemicals off gassed by surroundings

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Indoor Air Quality and “Sick Building” Syndrome

- “Sick Building” Syndrome is a common term for buildings that cause people to become ill by being inside them and have major IAQ problems
- Ways to prevent “Sick Building” Syndrome include
  - Proper ventilation
  - Increased air infiltration rates
  - Increased airflow rates in ducting
  - Regular duct cleaning
  - Increased airflow in occupied areas
  - Fume exhausts

ANSI Z9.8 outlines the requirements for HVAC in a building

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Toxic Mold and IAQ

- Toxic mold can present many health risks both acute and chronic
  - Coughing, atypical asthma, nasal congestion, sinusitis, skin rashes and fatigue
  - If someone is overly exposed or extremely sensitive it can even cause death
- OSHA recommends a three step process to investigate the possibility of toxic mold in the workplace
  - Check outdoor intakes and verify there is no associated health risk (not near trash dumps or standing water)
  - Check for accumulation of standing water in ducting and check drip pans
  - Test duct work to make sure that they are dry and clean

If symptoms are occurring in a workplace, it might require a test to be completed for mold

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Outdoor Air Quality

- The measure of the amount of pollution that is present in the air outside of buildings often referred to as the Air Quality Index (AQI)
- This can be a major issue for people who work outside and can cause health issues such as asthma, chronic lung diseases, cardiovascular disease and even cancer
- An AQI of 50 or lower is considered good air, while anything over 300 represents hazardous air quality

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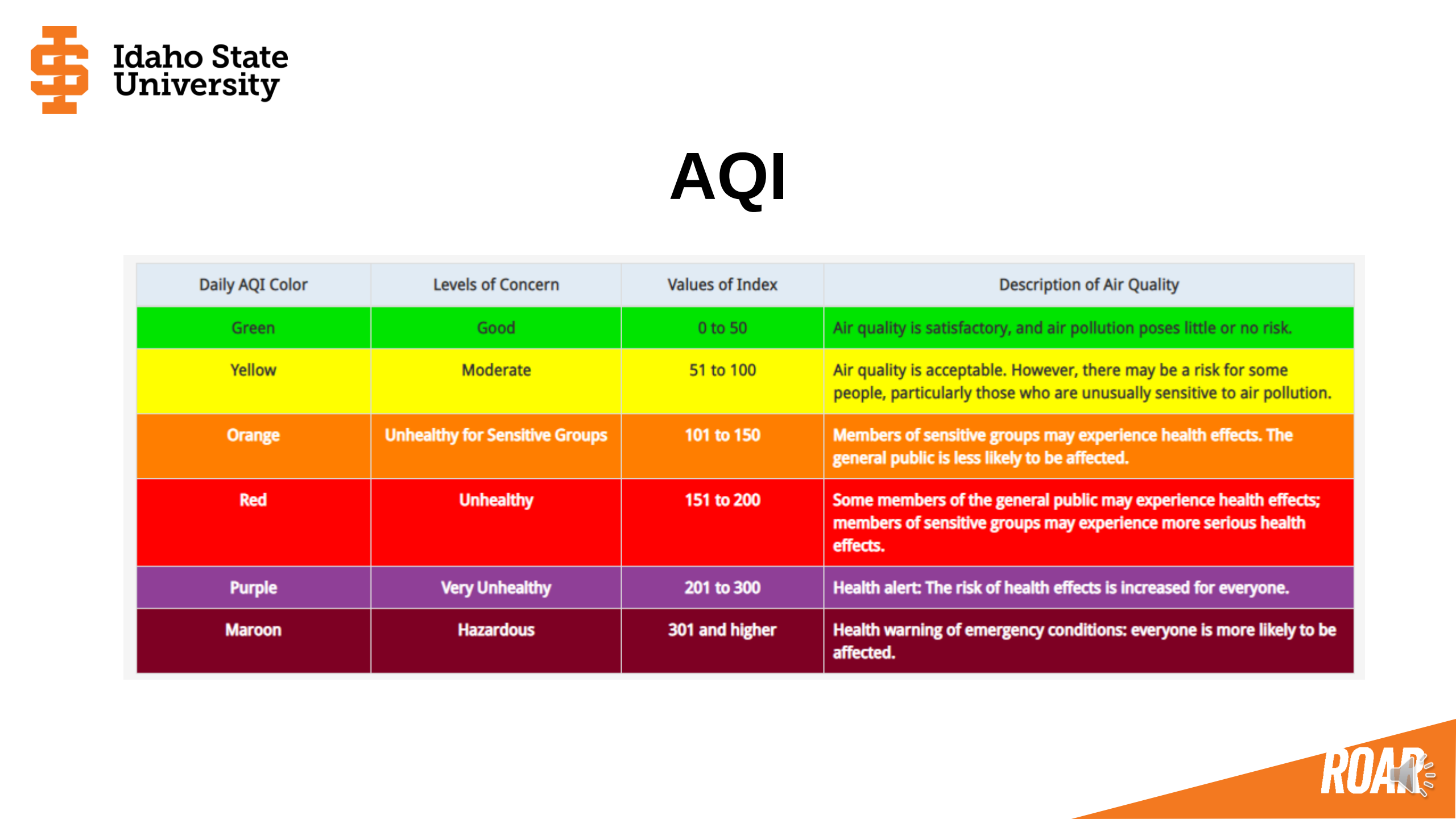
AQI

Daily AQI Color	Levels of Concern	Values of Index	Description of Air Quality
Green	Good	0 to 50	Air quality is satisfactory, and air pollution poses little or no risk.
Yellow	Moderate	51 to 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 to 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 to 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 to 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.



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Knowledge Check 1

- If the air quality is measured at 105 ppm which groups are at risk for adverse health effects?

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Knowledge Check 1

- At 105 ppm the general public should be fine but sensitive groups may experience adverse effects (color orange)

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Confined Spaces

A confined space is an area **with limited means of entry and exit** that is **large enough for a person to fit into** but **is not designed for occupancy**

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Confined Spaces

- Vaults, vats, silos, tanks, ship compartments, train compartments, sewers and tunnels are all examples of confined spaces
- These spaces also have the ability to trap toxic and/or explosive vapors or gasses
- Entry into a confined space is defined as any time any part of the person entering breaks the plane of the opening to the space

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Confined Space Work

- There is a few requirements that need to be met to work in a confined space
  - A person must be authorized to enter a confined space, there is often additional training to enter a confined space. This person is called a "authorized entrant"
  - An "attendant" must be stationed outside the confined space while it is occupied and monitors the authorized entrant.
  - Entry into a confined space must be accompanied by a written document called "Entry Permit" that states the conditions of the work and the hazards that may be associated and testing procedure. It is important to validate that the permit is valid before beginning work in any confined space
    - This is often signed by the entry permit supervisor, or a designated safety representative

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Permit Required Confined Spaces

A permit is required for all confined spaces that meet the following criteria

- Contains or has the potential to contain a hazardous atmosphere
- Contains a material that has the potential to engulf an entrant
- Has an internal configuration that could trap, or asphyxiate an entrant
- Contains any other recognized serious safety or health hazard

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Knowledge Check 2

- True or False: If your arm crosses the threshold of a confined space, you have entered a confined space

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Knowledge Check 2

- True: anytime ANY part of your body has crossed the threshold of a confined space, you have entered a confined space

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Confined Spaces and Hazardous Gasses and Vapors

- Confined spaces often don’t have proper ventilation and can be used to store hazardous material. It is easy for them to trap hazardous gasses and vapors that may be harmful to humans if the space is entered without PPE

- Often, employers will have a testing program to check for these harmful chemicals prior to entering the confined space

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Hazardous Gasses and Vapors Vocab

- LFL – lower flammability limit
- LEL – lower explosive limit
- UEL – upper explosive limit
- PPM - parts per million

To enter a confined space, the measured gas must be below 10% of the LEL

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Confined Spaces and Hazardous Gasses and Vapors

- A Hazardous Atmosphere is an atmosphere that may expose employees to the risk of death, incapacitation, impairment of the ability to self rescue, injury, acute illness and is caused by
  - Flammable gas, vapor, or mist in excess of 10 percent of its LFL
  - Airborne combustible dust at a concentration that meets or exceeds its LEL
  - Atmospheric oxygen below 19.5% or above 23.5%
  - Atmospheric concentrations of any substance for which a dose or permissible exposure limit is above what is allowable
  - Any other atmospheric condition that is immediately dangerous to life or health

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Testing the Atmosphere

1. Test for oxygen
2. Test for combustible gasses
3. Test for toxic gasses and vapors

- All of the test concentrations must be recorded on the entry permit
- The space must routinely be tested (especially before reentry) to verify the gas or vapor concentrations remain at a safe level
- Gas testing equipment must be routinely calibrated to ensure they are functioning properly

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Emergency Situations

- The attendant is responsible for monitoring the entrant's current state
  - Communication equipment is necessary
  - May enter a confined space for rescue if they have been fully trained and equipped
- It is vital to develop a plan to summon emergency services and rescue of personnel prior to entering the confined space
- At least one person from the rescue team needs to be trained and have an active certification in CPR
- The authorized entrants must wear a harness that would allow to safe retrieval
- It is also important to re-test the space to verify that it maintains a safe working atmosphere
  - If a hazardous atmosphere is detected, then each employee will leave the area immediately

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Knowledge Check 3:

- What is the max percentage of LEL is considered safe for entry?

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Knowledge Check 3:

- The measured value must be below 10% of the LEL for gasses to enter a confined space

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End of Show

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