1.1 Air Quality: More than Meets the Eye

**NGSS Disciplinary Core Ideas:**
- MS-PS1-4
- MS-ESS3-4

**NGSS Science and Engineering Practices:**
- Asking Questions and Defining Problems
- Developing and Using Models
- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data

**NGSS Crosscutting Concepts:**
- Patterns
- Cause and Effect
- Systems and System Models
- Stability and Change

**Colorado Academic Standards:**
- 6th grade Physical Science 1.2
- 6th grade Physical Science 1.3
- 21st Century Skills and Readiness Competencies in Science:
  - Critical Thinking and Reasoning
  - Information Literacy
  - Collaboration

1.2 Oh No, O₃ zone: “Good Up High, Bad Nearby!”

**NGSS Disciplinary Core Ideas:**
- MS-PS1-2
- MS-LS2-5

**NGSS Science and Engineering Practices:**
- Asking Questions and Defining Problems
- Developing and Using Models
- Analyzing and Interpreting Data
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

**NGSS Crosscutting Concepts:**
- Patterns
- Cause and Effect
- Scale, Proportion, and Quantity
- Systems and System Models
- Stability and Change

**Colorado Academic Standards:**
- 6th grade Physical Science 1.2
- 6th grade Life Science 2.1
- 21st Century Skills and Readiness Competencies in Science:
  - Critical Thinking and Reasoning
  - Information Literacy
  - Collaboration

Know Your AQ: Tracking Air Quality in Colorado
1.3 Sherlock NOx: Solving the Mystery of Unnatural Pollution in Natural Places

**NGSS Disciplinary Core Ideas:**
- MS-LS2-4
- MS-LS2-5
- MS-ESS3-3

**NGSS Science and Engineering Practices:**
- Asking Questions and Defining Problems
- Analyzing and Interpreting Data
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

**NGSS Crosscutting Concepts:**
- Patterns
- Cause and Effect
- Scale, Proportion, and Quantity
- Energy and Matter
- Stability and Change

**Colorado Academic Standards:**
- 6th grade Life Science 2.1
- 6th grade Life Science 2.2
- 8th grade Life Science 2.1
- 21st Century Skills and Readiness Competencies in Science:
  - Critical Thinking and Reasoning
  - Information Literacy

1.4 Carbon Gases CSI: Mobile Lab, Methane & More

**NGSS Disciplinary Core Ideas:**
- MS-LS2-3
- MS-PS1-1
- MS-ESS3-5

**NGSS Science and Engineering Practices:**
- Asking Questions and Defining Problems
- Analyzing and Interpreting Data
- Engaging in Argument from Evidence
- Obtaining, Evaluating, and Communicating Information

**NGSS Crosscutting Concepts:**
- Patterns
- Cause and Effect
- Scale, Proportion, and Quantity
- Energy and Matter
- Stability and Change

**Colorado Academic Standards:**
- 6th grade Physical Science 1.2
- 6th grade Life Science 2.2
- 6th grade Earth Science 3.3
- 21st Century Skills and Readiness Competencies in Science:
  - Critical Thinking and Reasoning
  - Information Literacy
  - Collaboration

Know Your AQ: Tracking Air Quality in Colorado
The “Know Your AQ” learning objectives apply Bloom’s Taxonomy (revised):

○ Educational psychologist Benjamin Bloom developed the Bloom’s Taxonomy of Educational Objectives in 1956. During the 1990’s, Lorin Anderson and David Krathwohl, former students of Bloom, led a new group of experts in updating the taxonomy to be relevant to 21st century student learning goals.

○ The six educational objectives of *Bloom’s Taxonomy* classify the levels of intellectual behavior important in learning. The objectives are sequential from lower order thinking skills to higher order thinking skills. Each element of the model and its focus from student perspective are:

   1. Remember – retrieve relevant knowledge from long-term memory
   2. Understand – construct meaning from instructional messages, including oral, written and graphic communication
   3. Apply – carry out or use a procedure in a given situation
   4. Analyze – break material into constituent parts and determine how parts relate to one another and to an overall structure or purpose
   5. Evaluate – make judgments based on criteria or standards
   6. Create – put elements together to form a coherent or functional whole; reorganize elements into a new pattern or structure

Source: Bloom’s Taxonomy of Educational Objectives (revised):

http://www.celt.iastate.edu/teaching-resources/effective-practice/revised-blooms-taxonomy/

The “Know Your AQ” curriculum applies the 5E Instructional Model:

○ Biological Sciences Curriculum Study (BSCS) developed the *BSCS 5E Instructional Model* in 1987. The model’s five phases are designed to facilitate the process of conceptual change.

○ The use of this model brings coherence to different teaching strategies, provides connections among educational activities, and helps science teachers make decisions about interactions with students.

○ Each phase of the model and its purpose from a student perspective are:

   1. Engagement - students’ prior knowledge accessed and interest engaged in the phenomenon
   2. Exploration - students participate in an activity that facilitates conceptual change
   3. Explanation - students generate an explanation of the phenomenon
   4. Elaboration - students’ understanding of the phenomenon challenged and deepened through new experiences
   5. Evaluation - students assess their understanding of the phenomenon

5E Instructional Model website:

http://www.bscs.org/bscs-5e-instructional-model