A. Science Connections

CONTENT STANDARD A: Students in the Union Grove area schools will understand that there are unifying themes: systems, order, organization, and interactions; evidence, models and explanations; constancy, change, and measurement; evolution, equilibrium, and energy; form and function among scientific disciplines.

Rationale: These unifying themes are ways of thinking rather than theories or discoveries. Students should know about these themes and realize that the more they learn about science the better they will understand how the themes organize and enlarge their knowledge. Science is a system and should be seen as a single discipline rather than a set of separate disciplines. Students will also understand science better when they connect and integrate these unifying themes into what they know about themselves and the world around them.

A.4.1 **Science Themes:** When conducting science investigations*, *Ask and answer questions that will help decide the general areas of science being addressed.*

3

- Understand how the following science themes can be applied to the natural world: measurement (temperature, speed), change (erosion/weathering), order, energy (friction, push and pull, work), organization (animal families), constancy (freezing and boiling points), model (water cycle, plate tectonics), evidence (data), systems (body systems, i.e., skeletal and muscular), **interactions** (chemical changes, food chain), explanations and **evolution** (land form changes) with more independence.

A.4.2 **Applying Prior Knowledge:** When faced with a science-related problem, *Decide what evidence*, models*, or explanations* previously studied can be used to better understand* what is happening now.*

3

- Decide what evidence, **models**, or explanations previously studied can be used to better understand what is happening now. (i.e. how plate tectonics helps to explain why and where earthquakes happen).

A.4.3 **Collecting Data:** When investigating* a science-related problem, *Decide what data can be collected to determine the most useful explanations**.

3

- Work as a group to determine the data needed before a science investigation takes place.

A.4.4 **Connecting Themes:** When studying science-related problems, *Decide which of the science themes* are important.*

3

- Recognize when the measurement (temperature, speed), change (erosion/weathering), order, energy (friction, push and pull, work), organization (animal families), constancy (freezing and boiling points), model (water cycle, plate tectonics), evidence (data and observations), systems (body systems, i.e., skeletal and muscular), **interactions** (chemical changes, food chain), and **evolution** (land form changes) themes apply.

A.4.5 **Change:** When studying a science-related problem, *Decide what changes* over time are occurring or have occurred.*

3

- Identify things that change over time. (i.e. oxidation or rust, erosion).

B. Nature of Science

CONTENT STANDARD B: Students in the Union Grove area schools will understand that science is ongoing and inventive, and that scientific understandings have changed over time as new evidence is found. Students should develop an understanding of science as a human endeavor.

Rationale: Students will realize that scientific knowledge is developed from the activities of scientists and others who work to find the best possible explanations of the natural world. Researchers and those who are involved in science follow a generally accepted set of rules to produce scientific knowledge that others can confirm with experimental evidence. This knowledge is public, replicable, and undergoing revision and refinement based on new experiments and data.

B.4.1 **Using Sources:** Use encyclopedias, source books, texts, computers, teachers, parents, other adults, journals, popular press, and various other sources, to help *answer science-related questions and plan investigations*.
3

- Independently use resources to answer science related questions and plan an investigation with assistance (i.e. students participate in the planning of an investigation - inventions/machines).

B.4.2 **Contributors to Science:** *Acquire information about people who have contributed to the development of major ideas in the sciences and learn about the cultures in which these people lived and worked.*
3

- Research a scientific contributor (i.e. inventors) related to the topics being studied in science.

B.4.3 **Change in Scientific Knowledge:** *Show* how the major developments of scientific knowledge in the earth and space, life and environmental, and physical sciences have changed over time.*
3

- Recognize that there have been changes in scientific knowledge (i.e. agriculture [advances in production], transportation [development of automobile], forecasting [Farmer's Almanac vs. Doppler Radar], communication [Morris Code vs. internet]) WC, NC

C. Science Inquiry

CONTENT STANDARD C: Students in the Union Grove area schools will investigate questions using scientific methods and tools, revise their personal understanding to accommodate knowledge, and communicate these understandings to others. Students should develop abilities necessary to do scientific inquiry and an understanding about scientific inquiry.

Rationale: Students should experience science in a form that engages them in actively constructing ideas and explanations and enhances their opportunities to develop the skills of doing science. Such inquiry (problem solving) should include questioning, forming hypotheses, collecting and analyzing data, reaching conclusions and evaluating results, and communicating procedures and findings to others.

C.4.1 **Language of Science:** Use the vocabulary of the unifying themes* to *Ask questions about objects, organisms, and events being studied.*

3

- Give examples of **evidence, change, systems, order, models, explanations,** and evolution related to land forms and animals.

C.4.2 **Using Science Content:** Use the science content being learned to *Ask questions, plan investigations*, make observations*, make predictions*, and offer explanations**.

3

- After planning an investigation as a group, make observations, make predictions, and offer explanations.

C.4.3 **Using Information:** Select multiple sources of information to help *Answer questions selected for classroom investigations** .

3

- Use technology to search (internet, CD-ROMs, etc.) for answers to questions.
- Use printed materials, audio-visual materials and observations to answer questions related to scientific topics.
- Know how to evaluate resources, with teacher guidance, to determine if the information being provided is correct.

C.4.4 **Using Science Equipment:** Use simple science equipment safely and effectively, including rulers, balances, graduated cylinders, hand lenses, thermometers, and computers, to *Collect data relevant to questions and investigations**.

3

- Use simple science equipment (balance scale, **spring scale**, hand lens, thermometer, **graduated cylinder,** standard and metric rulers, and computers) to collect data.
- Determine what science equipment is appropriate for a given science activity.

C.4.5 **Using Data:** Use data they have collected to *Develop explanations* and answer questions generated by investigations**.

3

- Use data related to plate tectonics to explain why a particular location could experience earthquakes.
- Understand that data is used by scientists to develop explanations and answer questions.

C.4.6 **Communicating Results:** *Communicate the results of their investigations* in ways their audiences will understand* by using charts, graphs, drawings, written descriptions, and various other means, to display their answers.

3

- Communicate the results of investigations by using age appropriate charts, graphs, drawings, verbal and written descriptions, and various other means.

C.4.7 **Supporting Conclusions:** *Support their conclusions with logical arguments*

3

- Support their conclusions with logical arguments in verbal or written form.

C.4.8 **Further Questioning:** *Ask additional questions that might help focus or further an investigation**
3

- Following an investigation, students will work as a group to develop additional questions that could be investigated further.

D. Physical Science

CONTENT STANDARD D: Students in the Union Grove area schools will demonstrate an understanding of the physical and chemical properties of matter, the forms and properties of energy, and the ways in which matter and energy interact. (See Appendix A for NSES details on these fundamental concepts and principles.)

Rationale: Knowledge of the physical and chemical properties of matter and energy is basic to an understanding of the earth and space, life and environmental, and physical sciences. The properties of matter can be explained in terms of the atomic structure of matter. Natural events are the result of interactions of matter and energy. When students understand how matter and energy interact, they can explain and predict chemical and physical changes that occur around them.

D.4.1 **Physical and Chemical Properties:** *Understand* that objects are made of more than one substance*, by observing, describing and measuring the properties of earth materials, including properties of **size**, **weight**, **shape**, **color**, **temperature**, and **the ability to react with other substances**.
3

- Describe properties of earth materials, using science equipment to obtain exact measurements.
- Collect, sort, and classify earth materials according to size, weight, shape, color and ability to react with other substances.

D.4.2 **Grouping and Classifying:** *Group* and/or classify objects and substances* based on the properties of earth materials.
3

- Classify objects according to their properties and give reasons for the groupings.
- Know that substances can be classified by their physical and chemical properties (e.g., boiling and melting points).

D.4.3 **States of Matter:** *Understand* that substances can exist in different states*-**solid**, **liquid**, **gas**.
3

- Group earth materials into solids, liquids, and gases.
- Identify and describe water's three states of **matter**.

D.4.4 **Change:** *Observe* and describe* changes* in form, **temperature, color, speed,** and **direction of objects** and construct* explanations* for the changes.*
3

- Know that when a force is applied to an object, the resulting change is that the object either speeds up, slows down or goes in a different direction.

D.4.5 **Constructing Models of Change:** *Construct* simple models* of what is happening to materials and substances undergoing change**, using simple instruments or tools to aid observations and collect data.
3

- Know that matter has different states (i.e., solid, liquid, gas) and that each state has distinct physical properties; some common materials such as water can be changed from one state to another by heating or cooling.
- Construct a model that illustrates water undergoing change.

D.4.6 **Objects at Rest or in Motion:** *Observe* and describe* physical events in objects at rest or in motion.*
3

- Know that gravity pulls an object toward the earth.
- Know that when a force is applied to an object, the object either speeds up, slows down or goes in a different direction.

D.4.7 **Changes in Properties:** *Observe* and describe* physical events involving objects and develop record-keeping systems to follow these events* by measuring and describing changes in their properties, including position relative to another object, motion over time, and position due to forces.
3

- Know that an object's location can be described by tracing and measuring its position over time.

- Describe how the properties of water change as temperature changes (ice, water, water vapor).

D.4.8 **Differences in Substances:** *Ask questions and make observations to discover* the differences between* ***substances that can be touched*** **(matter)** *and* ***substances that cannot be touched*** **(forms of energy**, **light**, **heat**, **electricity**, **sound**, and **magnetism**)
3

- Know that forms of matter can be touched and forms of energy cannot be touched and be able to give examples of both matter and energy. WGSD, WC, NC

E. Earth and Space Science

CONTENT STANDARD E: Students in the Union Grove area schools will demonstrate an understanding of the structure and systems of earth and other bodies in the universe and of their interactions. (See Appendix A for NSES details on these fundamental concepts and principles.)

Rationale: By studying the earth, its composition, history and the processes that shape it, students gain a better understanding of the planet on which they live. In addition, all bodies in space, including the earth, are influenced by forces acting throughout the solar system and the universe. Studying the universe enhances students' understanding of the earth's origins, its place in the universe, and its future. Understanding these geologic, meteorological, astronomical and oceanographic processes allows students to make responsible choices and to evaluate the consequences of their choices.

E.4.1 **Rocks and Soils**: *[Investigate **rocks, minerals,** and **soils** and use the scientific vocabulary for rocks, minerals and soils during these investigations.]* Investigate* that earth materials are composed of rocks and soils and correctly use the vocabulary for rocks, minerals, and soils during these investigations.

3

- Understand there are different types of soil and be able to describe them (i.e. silt, **humus**, clay, sandy).

E.4.2 **Physical and Chemical Properties of Earth Materials:** *Show* that earth materials have different **physical and chemical properties**,* including the properties of soils found in Wisconsin.

3

- Know the composition and properties of soils (e.g., components of soil such as weathered rock, living organisms, products of plants and animals; properties of soil such as color, texture, capacity to retain water, ability to support plant growth).
- Know that smaller rocks come from the breakage and weathering of larger rocks and bedrock.
- Collect and sort earth materials according to their physical and chemical properties.

E.4.3 **Describing the Earth:** *Develop descriptions* of the **land and water masses** of the earth and of **Wisconsin's rocks and minerals,*** using the common vocabulary of earth and space science.

3

- Use a drawing or model to illustrate land and water (rivers and lakes) in our area. √

  √ In the WGSD this benchmark is addressed in social studies.

E.4.4 **Celestial Objects:** *Identify* celestial objects* (**stars, sun, moon, planets**) *in the sky, noting changes in patterns of those objects over time.*

3

- Use a model to demonstrate how the earth moves around the sun (revolution, rotation, orbit, and axis).
- Compare and contrast other planets with earth.
- Explain the relationship between the earth's rotation and night and day.

E.4.5 **Wisconsin Weather:** *Describe* the weather commonly found in Wisconsin* in terms of **clouds, temperature, humidity, and forms of precipitation**, *and the changes* that occur over time*, including **seasonal changes**.

3

- Know the processes involved in the water cycle (e.g., evaporation, condensation, precipitation, surface run-off, percolation) and their effects on climatic patterns.
- Explain how temperature, cloudiness, and forms of **precipitation** in WI change and season by season (**humidity, evaporation, condensation).**
- Know what weather can be described in measurable quantities (i.e. temperature, wind direction, speed and precipitation).

E.4.6 **Earth Patterns and Cycles:** Using the science themes*, *Find patterns and cycles in **the earth's daily, yearly, and long-term changes**.*

3

- Identify and explain how location on earth influences the climate (**equator, hemisphere, tropical, polar, climate).**
- Give examples of long-term changes caused by temperature changes (**global warming, Ice Age)**.

E.4.7 **Use of Resources:** Using the science themes, *Describe** ***resources used in the home, community, and nation as a whole.***

3

- Identify natural resources used in home and community (petroleum products). √

  √ This benchmark is addressed in social studies.

E.4.8 **Human Resources**: *Illustrate* resources humans use in* ***mining****,* ***forestry****,* ***farming****, and* ***manufacturing in Wisconsin and elsewhere in the world****.*

3

- Give examples of resources humans use in forestry, farming, and manufacturing in WI, the United States and the world.

  √ This benchmark is addressed in social studies.

F. Life and Environmental Sciences

CONTENT STANDARD F: Students in the Union Grove area schools will demonstrate an understanding of the characteristics and structures of living things, the processes of life, and how living things interact with one another and their environment. (See Appendix A for NSES details on these fundamental concepts and principles.)

Rationale: Students will enhance their natural curiosity about living things and their environment through study of the structure and function of living things, ecosystems, life cycles, energy movement (transfer), energy change (transformation), and changes in populations of organisms through time. Knowledge of these concepts and processes of life and environmental science will assist students in making informed choices regarding their lifestyles and the impact they have on communities of living things in their environment.

F.4.1 **Survival Needs:** *Discover* how each organism meets its* ***basic needs for water, nutrients, protection, and energy**** *in order to survive.*

3

- Investigate a variety of living **organisms**, including animals and humans, to determine how each meets its basic needs.
- Explain how plants and animals are dependent on each other to meet their needs (**food chain, energy**).
- Understand that carnivores and herbivores have characteristics to help them survive (i.e. grasshopper, bird, etc.).

F.4.2 **Internal and External Cues:** *Investigate* how organisms*, <u>especially</u> plants, *respond to* ***both internal cues*** **(the need for water)** ***and external cues*** **(changes in the environment)**

3

- Understand that animals respond to **internal** (need for water, nutrients, etc.) and **external cues** (temperature, wind, weather) and give examples of those cues.

F.4.3 **Life Cycles of Organisms:** *Illustrate* the different ways that* ***organisms grow through life stages and survive to produce new members of their type****.*

3

- Identify the life stages that an organism passes through and how they produce new members of their type.
- Identify characteristics of organisms that are inherited.

F.4.4 **Living and Non-living Things:** <u>Using</u> the science themes*, *Develop explanations* for the* ***connections among living and non-living things in various environments****.*

3

- Describe ways that living things use their environment to survive (food and protection).

F.4.5 **Categorization of Living Things**

3

- This standard is not addressed in third grade.

G. Science Applications

CONTENT STANDARD G: Students in the Union Grove area schools will demonstrate an understanding of the relationship between science and technology and the ways in which that relationship influences human activities.

Rationale: Science and technology compliment each other. Science helps drive technology and technology provides science with tools for investigation, inquiry and analysis. Together, science and technology applications provide solutions to human problems, needs and aspirations. Students should understand that advances in science and technology affect the earth's systems.

G.4.1 **Technology:** *Identify* the technology used by someone employed in a job or position in Wisconsin and explain* how the technology helps.*

3

- Give examples of Wisconsin industries and the technologies they use. √

√ This benchmark is addressed in social studies.

G.4.2 **Technology and Careers:** *Discover* what changes in technology have occurred in a career chosen by a parent, grandparent, or an adult friend over a long period of time.*

3

- Interview parents or adult friends about how technology has changed their careers. √

√ This benchmark is addressed in social studies and reading.

G.4.3 **Workplace Technology:** *Determine what science discoveries have led to changes in technologies that are being used in the workplace by someone employed locally.*

3

- Describe scientific discoveries that have affected local work places. √

√ This benchmark is addressed in social studies.

G.4.4 **Simple Machines:** *Identify* the combinations of simple machines in a device used in the home, the workplace, or elsewhere in the community, to make or repair things, or to move goods or people.*

3

- Give examples of at least two simple machines that work together (i.e. levers and wheels to propel bicycle forward).
- Identify simple machines or combinations of simple machines that are used in homes, workplaces and communities.

G.4.5 **Invention and Production:** *Ask questions to find answers about how devices and machines were invented and produced.*

3

- Give examples of devices and machines that were invented and are still useful today.
- Give examples of devices and machines that you feel should be invented and explain how they could be used (Invention Convention).

H. Science in Social and Personal Perspectives

CONTENT STANDARD H: Students in the Union Grove area schools will use scientific information and skills to make decisions about themselves, Wisconsin, and the world in which they live. Students should develop an understanding of personal health and the role of science and technology in local challenges.

Rationale: An important purpose of science education is to give students a means to understand and act on personal, economic, social, political and international issues. Knowledge and methodology of the earth and space, life and environment, and physical sciences facilitate analysis of topics related to personal health, environment, and management of resources, and help evaluate the merits of alternative courses of action.

H.4.1 **Progress Through Science and Technology:** *Describe* how science and technology have helped, and in some cases hindered, progress in providing better food, more rapid information, quicker and safer transportation, and more effective health care.*

3

- Give examples of how technology has improved food, communications systems, transportation (social studies) and health care.

H.4.2 **Science and Issues/Problems:** Using the science themes**, Identify* local and state issues that are helped by science and technology and explain* how science and technology can also cause a problem.*

3

- Identify ways technology has helped solve state and local issues and times it has caused problems at the state and local level (i.e. crop rotation, pollution from automobiles, communication, surface mining etc.).

H.4.3 **Science and Personal Needs:** *Show* how science has contributed to meeting personal needs*, including hygiene, nutrition, exercise, safety, and health care.

3

- Give examples of how science and technology have contributed to our hygiene and health care needs (vaccinations, antibacterial soap, etc.).

H.4.4 **Science and Decision Making:** *Develop* a list of issues that citizens must make decisions about and describe* a strategy for becoming informed about the science behind these issues.*

3

- Give an example of a science-related issues that citizens have needed to make a decision about preserving habitats.

  This benchmark is also addressed in social studies (i.e. Media unit).