APPENDIX B
PHYSICAL SETTING/CHEMISTRY CONTENT CONNECTIONS TABLE

STANDARD 4: The Physical Setting

The Content Connections Table has been designed to assist teachers in curriculum writing and lesson planning. Some of the listed major understandings have a related skill and/or real-world connection to a specific content focus area. The scope of the content connections and skills is not meant to be limited; i.e., a skill may be connected to more than one major understanding.

Additionally, real-world connections have been identified only to assist teachers in planning and are not meant to link these connections to any assessment.

Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science.

I. Atomic Concepts				
KEY	**LINK TO APPENDIX A**	**MAJOR UNDERSTANDINGS**	**SKILLS The student should be able to:**	**REAL-WORLD CONNECTIONS**
3.1a	I.1	3.1a The modern model of the atom has evolved over a long period of time through the work of many scientists.	relate experimental evidence (given in the introduction of Key Idea 3) to models of the atom (3.1ii)	
3.1b	I.2	3.1b Each atom has a nucleus, with an overall positive charge, surrounded by negatively charged electrons.	use models to describe the structure of an atom (3.1i)	
3.1c	I.3	3.1c Subatomic particles contained in the nucleus include protons and neutrons.		
3.1d	I.4	3.1d The proton is positively charged, and the neutron has no charge. The electron is negatively charged.		
3.1e	I.5	3.1e Protons and electrons have equal but opposite charges. The number of protons is equal to the number of electrons in an atom.	determine the number of protons or electrons in an atom or ion when given one of these values (3.1iii)	
3.1f	I.6	3.1f The mass of each proton and each neutron is approximately equal to one atomic mass unit. An electron is much less massive than a proton or neutron.	calculate the mass of an atom, the number of neutrons or the number of protons, given the other two values (3.1iv)	◆ lasers

I. Atomic Concepts				
KEY	**LINK TO APPENDIX A**	**MAJOR UNDERSTANDINGS**	**SKILLS** **The student should be able to:**	**REAL-WORLD CONNECTIONS**
3.1h	I.7	In the wave-mechanical model (electron cloud), the electrons are in orbitals, which are defined as regions of most probable electron location (ground state).		
3.1i	I.8	Each electron in an atom has its own distinct amount of energy.		
3.1j	I.9	When an electron in an atom gains a specific amount of energy, the electron is at a higher energy state (excited state).	distinguish between ground state and excited state electron configurations, e.g., 2-8-2 vs. 2-7-3 (3.1v)	
3.1k	I.10	When an electron returns from a higher energy state to a lower energy state, a specific amount of energy is emitted. This emitted energy can be used to identify an element.	identify an element by comparing its bright-line spectrum to given spectra (3.1vi)	◆ flame tests ◆ neon lights ◆ fireworks ◆ forensic analysis ◆ spectral analysis of stars
3.1l	I.11	The outermost electrons in an atom are called the valence electrons. In general, the number of valence electrons affects the chemical properties of an element.	draw a Lewis electron-dot structure of an atom (3.1viii) distinguish between valence and non-valence electrons, given an electron configuration, e.g., 2-8-2 (3.1vii)	
3.1m	I.12	Atoms of an element that contain the same number of protons but a different number of neutrons are called isotopes of that element.		
3.1n	I.13	The average atomic mass of an element is the weighted average of the masses of its naturally occurring isotopes.	given an atomic mass, determine the most abundant isotope (3.1xi) calculate the atomic mass of an element, given the masses and ratios of naturally occurring isotopes (3.1xii)	