| **Virginia Board of Education Agenda Item** | **Seal of the Commonwealth of Virginia** |
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# Agenda Item: E

## Date: June 28, 2018

### Title: First Review of the Proposed Revisions to the *Science Standards of Learning*

#### Presenter: Dr. Anne Petersen, Science Coordinator, Office of Science, Technology, Engineering, and Mathematics

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## Purpose of Presentation:

Action required by Board of Education regulation.

## Executive Summary:

The Standards of Learning are a critical communication with the citizens of the Commonwealth, parents, the business community, and higher education, because the standards convey expectations and intended outcomes for K-12 education. Equally as important, the standards and the frameworks serve as the key guidance for instructional leaders and teachers of science (elementary, middle, high school) in planning science curricula and science programming.

The Board of Education approved the 2010 *Science* *Standards of Learning* on January 14, 2010. The currentstandards may be viewed online at <http://www.doe.virginia.gov/testing/sol/standards_docs/science/index.shtml>.

The *Science Standards of Learning* (SOL) were first developed in 1983 with subsequent revisions in 1988, 1995, 2003, and again in 2010. Periodic revisions are necessary to update science content, fine tune and clarify important concepts, and refocus emphasis on emerging areas of importance. On January 28, 2016, the Board accepted the timeline for the review of the current standards. The timeline was revised and an Issue Brief was provided to the Board on February 14, 2017. Upon acceptance of the timeline, the following action occurred:

The current *Science Standards of Learning* were adopted in 2010 and were scheduled for review in 2017. On January 28, 2016, the Board delayed the review of the science standards. The rationale behind the delay was to lessen the impact on teachers and administrators due to simultaneous revision and implementation of both English and Science Standards of Learning. The revision of the standards were further delayed in order to incorporate initiatives in the proposed Standards of Accreditation. In accordance with the revised timeline, the Department of Education took the following steps to produce the proposed revised *Science Standards of Learning* for the Board’s first review:

* posted Superintendent’s Memo #052-16, March 11, 2016, which 1) solicited review input from teachers, administrators, curriculum supervisors, and the general public, and 2) requested division superintendents to submit nominations for participants on the Standards of Learning review teams;
* received and reviewed 258 online comments from 38 different sources on the 2010 *Science Standards of Learning* from stakeholders including teachers, parents, and administrators,;
* identified SOL review team members for each discipline from school division nominations;
* met for four days on July 12-15, 2017, with a committee that consisted of science educators and division supervisors to review the public comments, consider recommendations and reports from stakeholder groups, and consider documents such as the Next Generation Science Standards, *Science Framework for the 2015 National Assessment of Educational Progress* (NAEP), Trends in Mathematics and Science Studies 2015 Science Framework (TIMSS), College Board Advanced Placement Course Descriptions (2014), *Working with Big Ideas of Science Education* (2015), and science standards and frameworks and from other states including Rhode Island (2011) and Ohio (2014);
* met with stakeholders including informal education agencies, businesses, and representatives from higher education to garner additional input;
* met with a steering committee of science supervisors to review the proposed revised *Standards of Learning* through the lens of Profile of a Graduate and the 5C’s;
* developed the proposed revised *Science Standards of Learning;*
* worked collaboratively with the Virginia Department of Education Mathematics Instruction team to ensure that mathematics skills were appropriately integrated into the proposed revised *Science Standards of Learning*;
* facilitated the creation of a secure website that allowed a committee of external stakeholders representing institutions of higher education, STEM businesses, science organizations, and the Virginia Education Science Leaders Association to review and comment on the proposed *Science Standards of Learning*;
* received feedback from the Student Assessment Office, the American Chemical Society, Virginia Science Education Leaders Association, James Madison University, and the Virginia Resource Use Education Council; and
* developed the proposed revised *Science Standards of Learning* found in Attachment A.

## Action Requested:

Action will be requested at a future meeting. Specify anticipated date below:

October 18, 2018

## Superintendent’s Recommendation:

The Superintendent of Public Instruction recommends that the Board accept for first review the Proposed Revisions to the *Science Standards of Learning*.

## Background Information and Statutory Authority:

The Board of Education has made a commitment to maintain rigorous and relevant expectations for student learning that meet or exceed national and international benchmarks for college and career readiness. The proposed revised *Science Standards of Learning* reflect rigorous, concise, and measurable standards for these courses in Virginia.

*Code of Virginia*, Section 22.1-253.13:1-B… “The Board of Education shall establish a regular schedule, in a manner it deems appropriate, for the review, and revision as may be necessary of the Standards of Learning in all subject areas. Such review of each subject area shall occur at least once every seven years. Nothing in this section shall be construed to prohibit the Board from conducting such review and revision on a more frequent basis…”

This Board item relates to Priority 1 of the *Virginia Board of Education Comprehensive Plan: 2018-2023* to provide high-quality, effective learning environments for all students.

Summary of Online Comments on Virginia’s 2010 *Science Standards of Learning*

A total of 258 comments from 38 sources were received online from individuals and groups on the 2010 *Science Standards of Learning* in Kindergarten through Grade 12 during the 30-day public comment period from March 11, 2016, through April 15, 2016. Thirty-three of the comments were concerning the SOL assessments. The comments submitted for K-5 included:

* reorganize standards within and between grade levels;
* explicitly tie standards to a concept that can be used to drive instruction;
* reduce the number of science standards at the elementary level due to a lack of instructional time to instruct all science content in depth;
* review the vertical alignment of standards;
* consider the appropriateness and depth of the science standards in terms of students’ cognitive ability (i.e. matter in 5th grade);
* enrich the framework to provide teachers with activities, lessons, performance assessments, and vocabulary lists aligned to the science standards;
* include opportunities for teachers to intentionally incorporate scientific investigation into content areas;
* use sources such as NGSS to inform the formation of the new science standards (i.e. cross-cutting themes);
* increase opportunities for critical thinking;
* decrease rigor of the standards in elementary science; and
* align science standards to mathematics standards.
* The comments submitted for 6-12 included:
* reduce the content in the *Science Standards of Learning* at all grade levels; content is “a mile wide and an inch deep”;
* reduce topics to allow teachers to focus on a fewer number of concepts in a more thorough manner;
* reduce rigor in middle school and high school courses; expectations too high for average students;
* eliminate standard CH.6 *(this standards relates to organic chemistry and biochemistry)*;
* increase alignment and eliminate redundancy of standards in middle and high school
* courses; and
* incorporate opportunities for scientific investigation and engineering design.

Public comment, science educators and leaders, and trends in current national and international science instruction inform the proposed 2018 Science Standards of Learning. Science content, overall, has not changed significantly; however, the structure of the Science Standards has changed to better support science instruction. These changes include:

* rewording of the standards to be more conceptual in nature and to support the development of essential questions and deeper learning;
* reorganization of the science skills and processes to show vertical alignment and to support the integration of scientific inquiry and engineering design into content instruction;
* explicit integration of the 5C’s into the science processes and skills;
* introduction of yearly themes for grades K-6 to support interdisciplinary lessons; and
* increased vertical alignment of science concepts.

## Timetable for Further Review/Action:

Public comment will be solicited from June 29, 2018- September 15, 2018. The traditional time allotted for public comment is extended to accommodate school calendars. Two public hearings will be held; one in August and one in September 2018. The public comment period and the public hearings will be announced through Superintendent’s Memo.

## Impact on Fiscal and Human Resources:

The Department of Education administers the state standards review process and the implementation of those standards, once approved by the Board. The agency’s existing resources can absorb the standard review responsibility at this time.