Science Standards March 2018 DRAFT – Expert Panel Review

Reviewer Name <u>Malcolm B. Butler</u>

Introduction Section

As you conduct your review of the introduction, please consider the following questions.

A. Does the introduction provide sufficient information and guidance on how to read the standards?
B. Does the introduction provide sufficient information on how the standards are structured?
C. Is there anything missing that should be included in the introduction?

Please provide feedback on the Introduction section. Include strengths and well as suggestions for refinements.

Figure 1 is an excellent visual and quite informative.

Consider mentioning engineering in this introduction (preferably within the first two paragraphs), as it is a key component of the standards.

Under Practices, there is no mention of "inquiry". Was this omission intentional?

In the Core Ideas section, change the order of the three disciplines in the text to align with how they are listed in the standards: Physical Science, Earth and Space, and Life Science.

p. 4- Evolution as a theory- Yea!!!

p. 5- In the Design section, consider moving the sentence that begins, "The standards present a vision . . ." to the beginning of the Introduction. That sentence gives the reader a strong sense of the purpose of these standards.

p. 6- The Time Allocation chart is important, especially for new teachers and curriculum developers.

p. 7- Need to include references for EPA and OSHA. Consider referencing NSTA's guidelines about safety in the science classroom.

p. 8- Need to label the figure. On the figure, in the box on the bottom right, 'U2' should be 'U3'.

Appendix Section

As you conduct your review of the appendices, please consider the following questions.

A. Do the appendices provide sufficient information and guidance on implement the standards?
B. Is there anything missing that should be included in the appendices?
C. Is there anything that should be removed from the appendices?

Please provide feedback on the Appendix section. Include strengths and well as suggestions for refinements.

Appendix 1: Crosscutting Concepts

Good as written

Appendix 2: Science and Engineering Practices

Chart is very informative, with relevant science and engineering examples

Appendix 3: Core Ideas

Good as written

Appendix 4: Interdisciplinary Connections

p. 81- mentioning of Citizen Science (in social studies) is a great idea!

Appendix 5: Equity and Diversity in Science

p. 82- How do teachers acquire these 'effective strategies'?

The list of girls' achievement (all three of them) is much more generic than the other seven (7) groups' strategies. I suggest this list be revised.

Standards Section by Grade Level

As you conduct your review of the grade band/level standards, please consider these questions.

A. Does the introductory information for the grade band and for each grade level provide enough context to understand how the standards connect within the grade and between grades within each band?
B. Does each standard clearly state what students should know and be able to do?
C. Can the standard be measured?
D. Are there any ambiguous or unclear words/phrases?
E. Do the standards in each section have appropriate **breadth**?
F. Do the standards in each section have appropriate **depth of content and rigor** for the grade level?
G. Is there meaningful alignment and development of skills/knowledge within each grade and from one grade band/grade level to the next?

1. Please provide feedback on Kindergarten-Grade 2 Band:

p. 9- "In second grade . . ." sentence is not clear.

P.9- Skip a line after the last bulleted item.

p. 9- Consider adding the sentence from p. 21 that begins, "These practices and crosscutting concepts help students . . . "

A. Please provide feedback on Kindergarten:

p. 11- K.L2.U2.6- Key Concepts: Nonliving "properties" are actually properties.

B. Please provide feedback on Grade 1:

p. 15- Last word on page should be "attributes".

C. Please provide feedback on Grade 2:

p. 20- Distribution of K-2 Standards Table is very informative and will be helpful to a teacher.

2. Please provide feedback on Grade 3-5 Band:

This preamble is excellent and should be replicated for the other bands.

A. Please provide feedback on Grade 3:

Excellent set of standards.

B. Please provide feedback on Grade 4:

p. 27- 4.L4U2.12 could prove controversial (implies evolution); will need to prepare teachers to handle potential pushback.

C. Please provide feedback on Grade 5:

p. 30- 5.L4U4.11- implies climate change and may be controversial in some sectors of Arizona.

3. Please provide feedback on Grade 6-8 Band:

p. 33- consider adding sentence from p. 21 related to "These practices and crosscutting concepts help students . . ."

A. Please provide feedback on Grade 6:

p. 35- 6.E2U1.7: in the Key concepts column, 'plants' should be 'planets'.

B. Please provide feedback on Grade 7:

C. Please provide feedback on Grade 8:

p. 43, 8.L4U2.11, Key concepts column, Give the last sentence ("Hardy Weinberg equilibrium calculations are not introduced until high school") a Note heading.

4. **Please provide feedback on the High School Standards:**

p. 47- Statement about international system of units is an important statement- for students and teachers!

   A. **Please provide feedback on high school core standards:**

   B. **Please provide feedback on high school plus standards:**

Standards Section organized by Core Idea/learning progression

You have also been provided with each standard organized by core idea to review and provide feedback on the development of the learning progression for each core idea. As you conduct your review of the progression, please consider the following questions.

A. Does the standard address meaningful content within both core ideas?
B. Do the standards within each progression have appropriate **depth of content and rigor**?
C. Is there meaningful alignment and development of skills/knowledge within each grade and from one grade band/grade level to the next for each progression?

I do not consider myself an expert in Learning Progressions. However, based on my experiences as a curriculum writer, science teacher, and science teacher educator, my review of the standards organized around core ideas leads me to believe that these standards are stellar in considering the cognitive development of learners. The flexibility at the high school (see the High School Plus standards) should also be a part of the elementary and middle school standards, especially when it comes to implementation.

5. **Please provide feedback on Core Ideas for Physical Science:**

   A. **Please provide feedback on the progression for P1:**

   B. **Please provide feedback on the progression for P2:**

   C. **Please provide feedback on the progression for P3:**

   D. **Please provide feedback on the progression for P4:**

6. **Please provide feedback on Core Ideas for Earth/Space Science:**

   A. **Please provide feedback on the progression for E1:**

   B. **Please provide feedback on the progression for E2:**

7. **Please provide feedback on Core Ideas for Life Science:**

   A. **Please provide feedback on the progression for L1:**

   B. **Please provide feedback on the progression for L2:**

   C. **Please provide feedback on the progression for L3:**

   D. **Please provide feedback on the progression for L4:**

8. **Please provide feedback on Core Ideas for Using Science:**

   A. **Please provide feedback on the progression for U1:**

   B. **Please provide feedback on the progression for U2:**

   C. **Please provide feedback on the progression for U3:**

   D. **Please provide feedback on the progression for U4:**

9. **Please provide any additional comments about this draft that you want the revision committee to consider.**