1. A public hearing was held on the above regulation on July 23, 2013 at 10:00 a.m. in the State Board Room, Kentucky Department of Education, 500 Mero Street, 1st Floor, Frankfort, Kentucky.

2. The following individuals attended this public hearing or submitted written or verbal comments:

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<thead>
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<td>Sheila Anderson</td>
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<td>Todd Belcher</td>
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<td>Blaine Ferrell</td>
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<td>Trent Garrison</td>
<td>American Institute of Professional Geologists</td>
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<td>Valerie O-Rear</td>
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<td>Dr. Don Patton</td>
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<td>Daniel Phelps</td>
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<td>Reverend Matthew John Singleton</td>
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<td>Dr. Tom Tretter</td>
<td>University of Louisville</td>
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Christopher Woods
Brittany Slabach
Molly M. Boggess
Cean Peevey Rosenthal
Sandy Sasso
Kathy Long
Jennifer Connor
Sarah Gutwirth
David W. Anderson
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Vernell Larkin
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Frank Tomeo
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Bryan [no last name provided]
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Professor of Geography and Earth Science
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Jan Garrett
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Reda Bianchi
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Gina Kleinhelter
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L. Helm
Donna [no last name provided]
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Kelly Quade
Lorah Palmer
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Ivory Moore
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Ann Walthall
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Claudia Reeves
Amy Spurlock  
Jen Walters Petry  
Brent Williams  
Armando J. Prats  
Teresa [no last name provided]  
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Louis Moseson  
Glenn Prezocki  
Susan Byars  
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Jeremiah Floyd  Citizen
Denise Luellen  Citizen
Lori Pierce  Citizen
Cheryl Dee Morgan Scaggs  Citizen
Michael Miller  Citizen
Tama [no last name provided]  Citizen
Jeremy Wooldridge  Citizen
George Weems  Citizen
Stephanie Rommel  Citizen
Karl Wheeler  Citizen
Marilyn Willhoit  Citizen
Rachael Edmiston  Citizen
Tee [no last name provided]  Citizen
Monica Unseld, Ph. D  Citizen
James Edwards  Citizen
Carl R. Hausman  Citizen
Macenzie Brown  Citizen
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Barbara Tuttle  Citizen
Keegan McGee  Citizen
Michaela L. Stanley  Citizen
Linda Powe  Citizen
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Susan Laforge [no last name provided]  Citizen
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Liang Liang  Citizen
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Marsha Andrews Citizen
Christian Huggins Citizen
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Lisa Willner Citizen
Barbara Steinbock Citizen
Cristen Olson Citizen
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Penelope Louise Jones Citizen
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Matt Brewington Citizen
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Suzanne Froelich Citizen
John Brown Citizen
Lorraine Hammerbeck Citizen
Ted Michalik Citizen
Peggy Ryker Citizen
Kay Anne Wilborn Citizen
Carissa Lenfert Citizen
Kirk Hoskins Citizen
Jim Combs Citizen
Wendy Rowland Citizen
Whitney Bennett Citizen
Barbara Bickett Citizen
Amanda Lillard Citizen
Jen [no last name provided] Citizen
Dana Marie Ward Citizen
Kathy Bartlett Citizen
Dr. Thomas Kerby Neill Citizen
Karen Bright Citizen
Jesse L. Weil Citizen
Kenny Westerman Citizen
Terry Ann Maciula Citizen
Abe Rabiner Citizen
Albert Plucknett Citizen
Laura Lea Duckworth Citizen
Nadia Rasheed Citizen
Melanie Shapiro  Citizen
Patricia J McCarty  Grandparent
Tim Curry  Citizen
Ella Stinson  Citizen
Guy [no last name provided]  Citizen
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Carrie Ray  Citizen
William McClanahan  Citizen
Jane Pearson  Citizen
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Roger Weller  Citizen
Elizabeth Thrasher  Citizen
Laura Reece  Citizen
Joyce Ogden  Citizen
Marguerite Shulhafer  Former Teacher-Bullit Co.
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Yvonne Hileman  Citizen
Natasha Hughes  Citizen
W. David Klingman  Citizen
Sherry Cornell  Citizen
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Donna Moore  Citizen
Bill Harrison  Citizen
Betty M. Wray  Citizen
Margret Collins  Citizen
Larry Marshall  Citizen
Shevawn Akers  Citizen
Sandra M. Almas  Citizen
Allyson Kale  Citizen
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Tanja Eikenboom  Citizen
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Nick Swinford  Citizen
Angela Mimms  Citizen
Amanda Schott  Citizen
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Joan Hendrix
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Craig King
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Laura Cuarta
Mitch Harris
Pamela Glaze

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Edward Reeves  
Edward M. Brown, Jr.  
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Barbara Gail Howser  
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Krisia Rosa Citizen
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Jane [no last name provided] Citizen
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Sue Foster  Citizen
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Reva Williams  Citizen
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Sheila [no last name provided]  Citizen
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William McAuliffe  Citizen
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Kyle [no last name provided]  Citizen
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Janet Overman  Citizen
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Sharon Davis                  Citizen
Gregory [no last name provided]  Citizen
Yolanda Morris                Citizen
Mary Buckley                  Citizen
Karl Heidbrink                Citizen
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Hamid [no last name provided] Citizen
Alycia Ware                   Citizen
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Shirl Atwell                  Citizen
Jeffrey Burns                 Citizen
Shelby Bevins                 Citizen
Ernestine Sharelle Lyons-Goodwin  Citizen
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Olivia Ph.D.  Citizen
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Treva T. Duffy Citizen
Sally Hattemer Citizen
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Pat Osborn  
Charles Thompson  
Mary Schleifer  
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Joe Oldham  
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Teresa White  
Bill Bowman  
Dustin Wygant  
Rodney Ashby  
Jerry Sykes  
Raymond Barry  
Alice Harris  
Enoch Harding  
Shannon [no last name provided]  
Dave Starke  
Anette Engel  
Judith Niles  
Mary Kasarskis  
Brenda K. Fauber  
Kathy Wolfson  
Alison Meehan  
Teresa Osborne  
Anthony Slone
Rachel D. Gati  Citizen
Karen Levy  Citizen
Katherine S. Goetz  Citizen
James [no last name provided]  Citizen
Gerald Glover  Citizen
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Jason D. Gati  Citizen
Hannah Helm  Citizen
James Kimbrough  Citizen
Amber Wilson  Citizen
Wanda Perkins  Citizen
Maureen Gregory  Citizen
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Jenny Minier  Citizen
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Sherry Stillwell  Citizen
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Zachary Pfeiffer  Citizen
James Burton  Citizen
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Sherba Nelson  Citizen
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Cynthia Warner  Citizen
Lois Vpn Nostitz
Matthew Strey
Lucy Stoll
Dan [no last name provided]
Linda Boggs
Michael B. Rhea
Delilah [no last name provided]
Lois Gaines
Melissa Embry
Gwen McDyer
Monica [no last name provided]
Jennifer White
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Marjorie Guyon
Bryan Flanery
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David M Butler
Larry J. Spivey
David Ludden
Charlie [no last name provided]
Ned Smith
Monique Morton
Gretchen Milliken
Russell Moore
Judy Richardson Jett
Rada [no last name provided]
Lisa [no last name provided]
Jeanette Coufal
Joan Tokarz
Peggy Helm
Phyllis [no last name provided]
Keith Bond
Judith Olson
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Scott Hodge
John [no last name provided] Citizen
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Greg Tichenor Citizen
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Greg Miller Citizen
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Cynthia Robinson Citizen
Samantha [no last name provided] Citizen
Rebecca Rumery Citizen
John Youngblood Citizen
Donnie Duncan Citizen
Mary Kroncke Citizen
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Ed [no last name provided] Director, Kentucky Env. Ed. Projects
Stephanie [no last name provided] Citizen
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Suzann O'Koon Citizen
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Julie [no last name provided] Citizen
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Barbara Cambron
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David Shroyer
Carlos Palomino
Jenny Stephenson
Anna [no last name provided]
Rosemarie [no last name provided]
Joe Brackett
Melanie Wyatt
Judy Stice
Mark Steinor
Jackson Reese Faust
Billy Hunt
Elizabeth Coleman
Loyal Jones
Edward Colley
David Underwood-Sweet
Phyllis England
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Nashia Fife
Nathan Womack
Jeanne Marie Hibberd
Cheryl Shuffitt
Tiffany Vair
Victoria Arnett
Christina Stephenson  Citizen
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Thomas GeoGhegan  Citizen
Naomi Schulz  Citizen
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Elizabeth Baber  Citizen
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Shawn Jones  Citizen
Katy Coleman  Citizen
Ivonne Rovira  Citizen
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William Jackson  Citizen
Denny Longsworth  Citizen
Gary Boggess  Citizen
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Lisa Harris  Citizen
Emily Boone  Citizen
Barbara Rathmann  Citizen
John Mccarty  Citizen
Adam Kenter  Citizen
Nancy Caudill  Citizen
Bob [no last name provided]  Citizen
Debra Ezzell  Citizen
Sofia Jozefowicz  Citizen
Louis Larson  Citizen
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Roberta Burnes  Citizen
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Sean Detisch  Citizen
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Brandon M. Sergent Citizen
Kenny [no last name provided] Citizen
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Razia Husain Citizen
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Shelby Livers Citizen
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Doris [no last name provided] Citizen
Andrew [no last name provided] Citizen
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Jeff [no last name provided] Citizen
Rose W. Garden Citizen
Arnita Booth Citizen
Charlotta Norby Citizen
Tim Blair Citizen
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Tova Shinall Citizen
JoAnn Borntrager Citizen
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Andy Wild Citizen
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Delmer Lay Jr Citizen
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Gil Fauber Citizen
Charles Wiley Citizen
Lee Torabi  Citizen
Barbara Hood  Citizen
Vicki Terrell  Citizen
Jan Scherrer  Citizen
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Lesley Lusher  Citizen
Mary Fletcher  Citizen
Julie Pauly  Citizen
Judy Mason  Citizen
Fannie Madden-Grider  Citizen
Thomas Herrick  Citizen
Paul [no last name provided]  Citizen
Nick Moore  Citizen
Delvan Ramey  Citizen
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Diane Chase  Citizen
Sue Mize  Citizen
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Jerry Barnaby  Citizen
Christine Shikenjanski  Citizen
Jessica Muncy  Citizen
Matthew Fraider  Citizen
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Mindy Antonchak  Citizen
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Roger Perrone  Citizen
Jacqueline Cober  Citizen
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Roma Prindle Citizen
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Page 57 of 140
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Madison Moore Future Science Teacher
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Nancy Back
Jeremy Krueger
Gene Lege
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Ray Sabbatine
Laura Hays
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Page 71 of 140
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Michael J Denis  Citizen
Bruce Wilkinson  Citizen
David M. Wimsatt  Citizen
Allie Secor  Citizen
Luke Barlowe  Citizen
Robin Maley  Citizen
Dr. Daniel Gatlin  Citizen
Myrisa Christy  Citizen
Carrie Holstrom  Citizen
Robert Urekew  Citizen
Eileen Arnold  Citizen
Dr. David Bliss  Citizen
Andre Faul  Citizen
Kathleen Gregg  Citizen
Barbara Clewett  Citizen
David Aaron Hiles  Citizen
Deborah Denenfeld  Citizen
William Farley  Citizen
Ed Redmon  Citizen
Darlene Mazzone  Citizen
Vicky Parler  Citizen
Jesse L. Ashcraft  Citizen
Rachel Klein  Citizen
Susan Davis  Citizen
Lynette Rollyson  Citizen
Jeffrey [no last name provided]  Citizen
Kevin Bolser  Citizen
Richard Grossbohlin  Citizen
Pamela Slowkowski  Citizen
Dannette Cook  Citizen
David Gale  Citizen
Dan Davis  Citizen
Gary Parish  Citizen
Luann Davis, RN  Citizen
Eric Russell Lynch  Citizen
Simone Salomon  Citizen
Donna Back  Citizen
Shelly Skees  Citizen
Joe Ann Auslander  Citizen
Gary Bowen  Citizen
Andrew B. Bryan  Citizen
Molly McMasters  Citizen
Darlene H Libbey  Citizen
Harry McNally  Citizen
Anne Mckune  Citizen
Gay Holcomb, Ph.D.  Citizen
Billie Lynn Denzik  Citizen
Anna Imber  Citizen
Casey Jones  Citizen
Lloyd Doering  Citizen
Walter Grover  Citizen
Michael Alt  Citizen
Christopher White  Citizen
Ron Spann  Citizen
Richard Mondy  Citizen
Matt Reno  Citizen
Brenda Jones  Citizen
Fran Taylor  Citizen
Rod Huber  Citizen
Nancy Givens  Citizen
Thomas Avery  Citizen
Ruth [no last name provided]  Citizen
Mary O'Neill  Citizen
Adam Taylor  Citizen
Randall Robinson  Citizen
Barbara Arch  Citizen
Scott Meyer  Citizen
Leslie McColgin  Citizen
Nancy K Noble  Citizen
Elizabeth Drake  Citizen
Sean Stanley  Citizen
Joshua Castlen  Citizen
Ted Withrow  Citizen
Dr. Ouida Meier  Citizen
Susan Heustis  Citizen
Lydia Bond  Citizen
Paul Brinegar  Citizen
Stella Godbey  Citizen
Greg Chinn
Abigail Byrnes
Debbie August
Jennifer Cox
Sister Rosemary Keough
Paula Schoenhoff
Susan Crook
Carmen Ramirez Walker
Patty Coomes
Sarah Murphy
Catherine Jenkins
Roger [no last name provided]
Keith Smith
Dirk May-Fitzgerald
Clyde Sams
Matthew Carr
Heath Eric
Sandra Rippeteo
Charles R. III Honce
Mike Greenwell
LaVerne Waldrop
Erica Bricking
Dave Luckens
Kathleen Myers
Carolyn Campbell
Lon Coleman
Zana Lummus
William Beasley
Hagen Kirk
Karen Conley
Carie Ernst
Wesa-Asgaya K Sweeney
John Hampton Jr.
Curtis Morrison
Mary Love
Mikell Grafton
Garry Shane Baldridge
Kayla Rodgers
Tim Fleischer
Berry Craig IV
Melinda Craig
Berry Craig III
Susan Crook
Carmen Ramirez Walker
Patty Coomes
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John Hampton Jr.
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Garry Shane Baldridge
Kayla Rodgers
Tim Fleischer
Berry Craig IV
Melinda Craig
Berry Craig III
Former Teacher

Page 91 of 140
Troy Richard  Citizen
Renee Boss  Citizen
Lori McDonald  Citizen
Alex Moore  Citizen
Justin Schulte  Citizen
Daniel Mason  Citizen
Dawn Hale  Citizen
Annette Bricca  Citizen
Bert Bruce  Citizen
Peggy Smith-Puckett  Citizen
Angie Reed Garner  Citizen
Frances Englander  Citizen
Dr. Dave Robinson  Citizen
Leigh Furches  Citizen
Chy'anne Krugler  Citizen
James Frank  Citizen
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Robert A. Daniel  Citizen
Merry Jones  Citizen
Richard Ralston  Citizen
David Sumrell  Citizen
Malinda [no last name provided]  Citizen
Richard Cales, MD  Citizen
Terry Olson  Citizen
Bill Thomas  Citizen
Linda Heath  Grandmother
Mary Swinford  Citizen
Kelley Paterno  Citizen
M. Ratledge  Citizen
Jim Reeves  Citizen
Edith Belcher  Citizen
Margaret Snyder  Citizen
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Jeff Keyes  Citizen
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Aaron Martin  Citizen
Kathy Loebbrown  Citizen
Chris Joy  Citizen
Michael J. Seidler  Citizen
Amanda [no last name provided] Citizen
Arnold Johnston Citizen
Gayle Pille Citizen
Kevin Lloyd Citizen
JoEllen [no last name provided] Citizen
Ginny Smith Teacher
Marcia Hopkins Citizen
A. Weingardt Citizen
Michael Bryant Citizen
Robin K Moody Citizen
Stephen Kappeler Citizen
Carol Goodin Citizen
Diana [no last name provided] Citizen
R. Brown Citizen
Melody Nutt Citizen
Theresa Scherf Citizen
Andrea Knarr Citizen
Marlana White Citizen
Jane Brantley Citizen
JP Brantley Citizen
Joshua San Miguel Citizen
JoAnne Sykes Citizen
Dr. Richard A. Weber Citizen
Steve Flora Citizen
Larry Kruse Citizen
Marci Coots Citizen
Bridgit Boggs Citizen
Soma Bose Citizen
Stephanie Frank Citizen
Markeeta Buntin Citizen
Kyle Fannin Citizen
Joseph Bugess Citizen
Jieun K. Han Citizen
Don E. Crisp Citizen
Mike Chmilewski Citizen
Mary Landrum Citizen
Andy Frueh Citizen
Barbara Hollar Citizen
Sam Johnson II Citizen
Sandra Ochs Griggs Citizen
Barry Richardson Citizen
Sabrina McIlwrath Citizen
Rev. Belinda M Curry
Erik [no last name provided]
Jean Christensen
Gary McCoy
Eric Bredemeyer
Natalie Hoffman
Wade McCallum
Jennifer Goetz
Jamie Godby
L. J. Alquizola
Martin Z. Kasdan Jr
Trent Rogers PhD
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John Ivie
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Kristin Hix
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Thomas J. Reece
Derek Obrochta
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Julie Bucknam
Ellen Glatman
Dr. Karen N Janssen
Jon Hardy
Keith Rouda
Derrick Singletary
Sarah Reddick
Ann Kidder
Brian Jackson
Kathy Stauss
Lydia Fuller
Naomi Hodges
Glenda Grace
Virgil Ridings
Joel Woltz
Donna Hazelwood
Samantha Tucker
Vickie Hatton
Jeff Whittinghill
Joan Tighe
Edward Prigge
Ronnie Trogden

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Allan Smith Citizen
Jim Nation Citizen
Sarah Grayson Citizen
R. Wesley Pace Citizen
Joe Armstrong Citizen
Brigette Reed Citizen
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John Rice Citizen
Brian Slone Citizen
Mike Alexander Citizen
Genevieve Apodaca Citizen
Claudia Hargrove Citizen
Jacuelin Burchett Citizen
Colleen Crigler Citizen
Teddy Williams Citizen
Teresa Smith Citizen
Spencer Skaats Citizen
Angela Armato Citizen
Craig Newman Citizen
Jerome Lawson Citizen
Stephanie Ramey Citizen
David Foushee Citizen
Patrick McCamish Citizen
Danny Fletcher Citizen
Dennis Stafford Citizen
James Roark Citizen
Judy Roark Citizen
Billie Stafford Citizen
Linda Rose Citizen
Helen Bloodworth Citizen
Naomi Webb Citizen
Anna Reeder Citizen
Ella Lonas Citizen
Tammy Skaats Citizen
Cheryl Sadler Citizen
Angie Christensen Citizen
Jay Bond, Sr. Citizen
Diane Diggles Citizen
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Charlotte Purcell  Citizen
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Rita Isham  Citizen
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Florance Molnar Citizen
Esther Whitley Citizen
Kim Houlihan Citizen
Regina Smith Citizen
James Champ Citizen
Ralph Hawkins Citizen
Ken Collins Citizen
JoeAnn Collins Citizen
Regina Eckle Citizen
Becky Schimdt Citizen
Amy Meadors Citizen
Sherian Tingle Citizen
Pam Yancy Citizen
Stephen Secchio Citizen
Angela Rankin Citizen
Paul Gross Citizen
Rob Jones Citizen
Karl Dolson Citizen
Jennifer Dolson Citizen
Nancy Carol Fryer Citizen
Joseph P. Straley University of Kentucky
Richard G. Innes Bluegrass Institute for Public Policy Solutions

William (Clint) Hardy Citizen
Nick Brooks, President Kentucky Science Teachers Association
Donnie Wilkerson Teacher
Adrienne Gilbert Citizen
Shannon Buzard Parent
Aaron (Chad) Erhardt Minister
David Robinson Citizen
Maureen Erickson Parent/Grandparent
James Donaldson Citizen
Maureen Carman Citizen
Dena Stewart Gore Parent
Tim Whalen Citizen
Will Knapp Citizen
Martin Cothran Citizen
Elizabeth Schmitz, Executive Director Kentucky Environmental Education Council
Herman Cummings Georgia Resident
Delores Vowels Citizen
Henry Jackson Citizen
<table>
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<td>Elizabeth Powers</td>
<td>Citizen</td>
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<td>Dr. Victoria Carr</td>
<td>Arlitt Child &amp; Family Research &amp; Education Center</td>
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<td>Paul Aud</td>
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<td>Keith L. Hautala</td>
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<td>Roberta Burns</td>
<td>Educator and parent</td>
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<td>Ashley Hoffman</td>
<td>Kentucky Association for Environmental Education</td>
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<td>Malicia T. Hitch</td>
<td>Protection and Advocacy Staff Attorney</td>
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<tr>
<td>Joan Perkins</td>
<td>Citizen</td>
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3. The following people from the promulgating administrative body attended this public hearing or responded to the written comments:

Name and Title
Kevin C. Brown, General Counsel/Associate Commissioner, Office of Guiding Support Services
Amy Peabody, Assistant General Counsel, Office of Guiding Support Services
David Wickersham, Assistant General Counsel, Office of Guiding Support Services
Tracy Herman, Legislative Liaison, Office of Guiding Support Services
Robin Chandler, Policy Advisor, Office of Next Generation Learners
Sean Elkins, Consultant, Division of Program Standards
Christine Duke, Consultant, Division of Program Standards
Melinda Curless, Consultant, Division of Program Standards
Chad Collins, General Counsel, Kentucky High School Athletic Association

Summary of Comments and Responses

(1) Subject Matter: Support for the adoption of the Next Generation Science Standards (NGSS)

(a) Comment: Commenters stated that the adoption of the Next Generation Science Standards would be beneficial for Kentucky children.

Commenters stated that Kentucky students deserve the most up-to-date science education, and that an up-to-date science education includes learning about climate change.

Commenters stated that the adoption of the Next Generation Science Standards will help prepare Kentucky students for the challenges and opportunities they will face later in the 21st Century.

Commenters stated that the Kentucky Core Academic Standards for Science reflect the state of modern, mainstream science.

A commenter stated that university science professors expect incoming students to know the climate change standards contained in the Kentucky Core Academic Standards for Science and that students learning under those standards would be well-prepared for careers in fields that require knowledge of science, technology, engineering, and mathematics.

A commenter endorsed the adoption of the standards, stating they are research-based, grounded in inquiry, rich in content, and internationally benchmarked. The commenter expressed confidence in the process by which the standards were developed.

A commenter asked that the standards be implemented as presented, stating that much intellectual capital was expended in their development. The commenter also stated that
the Next Generation Science Standards represent the best pedagogical knowledge for teaching science, and that picking and choosing individual standards would harm their coherence and value.

A commenter strongly encouraged the full adoption of the Next Generation Science Standards.

A commenter stated that the Kentucky section of the American Institute of Professional Geologists unanimously supports implementing the standards as written.

A commenter stated that adoption of the Next Generation Science Standards will be a foundation for improving the quality of science education in Kentucky.

A commenter stated that including evolution and climate change in state standards protects teachers from being bullied into teaching creationism or bad science, and that opposition to science is an attack on liberty.

A commenter praised the progression of topics and the emphasis on evidence promoted by the standards. This commenter asked that the standards be adopted as written, without alterations.

A commenter stated that the standards will be beneficial for students who struggle with disabilities because they will be able to engage with science concepts as they move from abstract paper and pencil concepts into exploration.

A commenter recommended that Kentucky adopt and implement the Next Generation Science Standards as an effective, research-based way to transform science education.

A commenter stated that adoption of the Next Generation Science Standards would ensure that Kentucky students are well prepared to compete with their peers, both nationally and internationally, for educational and career opportunities.

A commenter expressed admiration for the Kentucky Department of Education for taking a leadership role in the development of the standards.

Another commenter expressed a hope that the Next Generation Science Standards will be fully adopted with no omissions or compromise. The commenter stated that the proposed standards will make hands-on learning a greater part of the education process, and moves learning to be more student centered and less rote.

A commenter stated that the Next Generation Science Standards encourage active learning through the use of modeling, investigation, and the application of the student’s knowledge.

Those speaking or providing written comments in support of the adoption of the Next Generation Science Standards were: Blaine Ferrell (Kentucky Academy of Science),
Tom Tretter (Kentucky Science Teachers Association), Daniel Phelps (Kentucky Paleontological Society), Trent Garrison (American Institute of Professional Geologists, Kentucky Section), Rick Clewett (Climate Parents), Robert Bevins (Kentuckians for Science Education), David Robinson (Citizen), Joseph Straley (University of Kentucky), Donnie Wilkerson (Citizen), Elizabeth Schmitz (Kentucky Environmental Education Council), Scott Blome (Citizen), Janie Blome (Citizen), Henry Jackson (Citizen), Ryan Lawson (Citizen), Haley Lawson (Citizen), Stephanie Evitts (Citizen), John Brice (Citizen), Sheila Anderson (Climate Parents) [who submitted comments in the form of a petition signed by three thousand eight hundred ninety-four (3,894) individuals], Nick Brooks (Kentucky Science Teachers Association), Amanda Underwood (Kentucky Science Teachers Association), David Helm (Kentucky Science Teachers Association), Sherry Fox (Kentucky Science Teachers Association), Clara Fulkerson (Kentucky Science Teachers Association), Rita Jane Shelton (Kentucky Science Teachers Association), Sondra Cook (Citizen), David L. Evans, PhD (National Science Teachers Association), John Walker, PhD (Teacher), Dr. Victoria Carr (Arlett Child & Family Research & Education Center), Roberta Burns (Educator and parent), Ashley Hoffman (Kentucky Association for Environmental Education), and Keith L. Hautala (Citizen).

(b) Response: No changes will be made in response to comments in support of the adoption of the Next Generation Science Standards as the Kentucky Core Academic Standards for Science. The agency has determined that, in addition to these commenters, other individuals, organizations, and businesses have publically supported the adoption of the Next Generation Science Standards. Those individuals, organizations, and businesses include: American Chemical Society, American Meteorological Society, American Physical Society, American Society of Plant Biologists, Association of Presidential Awardees in Science Teaching, Association of Public and Land Grant Universities, National Association of Gifted Children, Bruce Alberts (Stanford University / Past President, National Academy of Sciences), Andy Anderson (Michigan State University), Wolfgang Bauer (Michigan State University), Rodolfo Dirzo (Stanford University), James Paul Holloway (University of Michigan), Jonathan Osborne (Stanford University), Helen Quinn (Stanford University), Carl Wieman (Stanford University / Nobel Laureate), Battelle Memorial Institute, Bayer Cooperation, Carolina Biological Supply Company, Chevron, CISCO Systems, Comcast, Corning, Inc., Dell Inc., Dupont, Eaton, Eli Lilly, IBM, and the Microsoft Corporation.

The agency has determined that the comment recommending that Kentucky adopt and implement the Next Generation Science Standards as an effective, research-based way to transform science education was provided by the President of the National Science Teachers Association on behalf of over 55,000 members consisting of science teachers, science supervisors, administrators, scientists, business and industry representatives, and others involved in and committed to science education.
(2) Subject Matter: General opposition to the adoption of the Next Generation Science Standards as the Kentucky Core Academic Standards for Science

(a) Comment: Commenters requested that the agency not adopt the Next Generation Science Standards as the Kentucky Core Academic Standards for science and that the agency not adopt any common core standards.

Those speaking or offering written comments opposing the adoption of the Next Generation Science Standards as the Kentucky Core Academic Standards for Science and the adoption of common core standards were: Sarah Reddick (Citizen), Ann Kidder (Citizen), Brian Jackson (Citizen), Kathy Strauss (Citizen), Lydia Lynne Coates Fuller, (Citizen), Naomi Hodges (Citizen), Glenda Grace (Citizen), Virgil Ridings (Citizen), Joel Woltz (Citizen), Donna Hazelwood (Citizen), Samantha Tucker (Citizen), Vickie Hatton (Citizen), Angela Rankins (Citizen), Jeff Whittinghill (Citizen), Joan Tighe (Citizen), Edward Prigge (Citizen), Ronnie Trogden (Citizen), Candace Granstaff (Citizen), Allan Smith (Citizen), Jim Nation (Citizen), Sarah Grayson (Citizen), R. Wesley Pace (Citizen), Joe Armstrong (Citizen), Bridgett Reed (Citizen), Amanda Bifone (Citizen), William Bishop (Citizen), Randall Lamb (Citizen), John Rice (Citizen), Stephen Secchio (Citizen), Brian Slone (Citizen), Pam Yancy (Citizen), Sherian Tingle (Citizen), Mike Alexander (Citizen), Genevieve Apodaca (Citizen), Claudia Hargrove (Citizen), Jacqueline Burchett (Citizen), Colleen Crigler (Citizen), Teddy Williams (Citizen), Teresa Smith (Citizen), Spencer Skaats (Citizen), Angela Armato (Citizen), Craig Newman (Citizen), Jerome Lawson (Citizen), Stephanie Ramsey (Citizen), David Foushee (Citizen), Patrick McCamish (Citizen), Amy Meadors (Citizen), Danny Fletcher (Citizen), Dennis Stafford (Citizen), James Roark (Citizen), Judy Roark (Citizen), Billie Stafford (Citizen), Linda Rose (Citizen), Helen Bloodsworth (Citizen), Naomi Webb (Citizen), Anna Reeder (Citizen), Ella Lonas (Citizen), Becky Schmidt (Citizen), Tammy Skaats (Citizen), Cheryl Sadler (Citizen), Angie Christensen (Citizen), Jay Bond, Sr. (Citizen), Diana Diggles (Citizen), Linda Bryant (Citizen), Charlotte Purcell (Citizen), Regina Eckle (Citizen), Donald F. Inks, Jr. (Citizen), Rita Isham (Citizen), Erin Seaman (Citizen), Jay Dargan (Citizen), Jim McHale (Citizen), Tim Boll (Citizen), Sherry Gaines (Citizen), Brenda Kabler (Citizen), Steve Flinchum (Citizen), William Marvel (Citizen), Gary Rogers (Citizen), Randy Riblet (Citizen), Johnny E. Evans (Citizen), Debra Smith (Citizen), Marvin Oliver (Citizen), Terry Sears (Citizen), John Sparks (Citizen), Eileen Serke (Citizen), Frank Simon (Citizen), Mary McClendon (Citizen), Gary Buckley (Citizen), Beverly Buckey (Citizen), Roberta Dorsey (Citizen), Velma Newsom (Citizen), Steve Rudy (Citizen), Ken Collins (Citizen), JoeAnn Collins (Citizen), Vickie Hatton (Citizen), Elsie R. Hall (Citizen), Esther Whitley (Citizen), Florence Molnar (Citizen), Regina Smith (Citizen), Bobby Alexander (Citizen), Steve Lorimer (Citizen), JoAnn Davis (Citizen), Kimberly Wood (Citizen), Glenda M. Cogan (Citizen), Frank Simon (Citizen), Sharon Almquist (Citizen), Rob Jones (Citizen), James Champ (Citizen), Ralph Hawkins (Citizen), Stephan Schick Sr. (Citizen), Linda Horback (Citizen), Colin Bruner (Citizen), David Bartsch (Citizen), Delores Vowels (Citizen), Kim Houlihan (Citizen), Shirley Mayrand (Citizen), Michelle Truitt (Citizen), Aaron Erhardt (Citizen), Trivida Embry (Citizen), Marvin Embry (Citizen), Ronald Tucker (Citizen), Cindy Tucker
(b) Response: No changes have been made in response to comments opposed to the adoption of the Next Generation Science Standards as the Kentucky Core Academic Standards for Science or in opposition to the adoption of common core standards. The Next Generation Science Standards are not a part of the Common Core State Standards initiative. The Next Generation Science Standards were developed through a different process than the Common Core State Standards. The Next Generation Science Standards have been under development for two years and meet the statutory mandates of SB 1 (2009). Kentucky joined 25 states to develop the Next Generation Science Standards through a collaborative process. About 40 Kentuckians, including K-12 science teachers, state science and policy staff, administrators, higher education and faculty, scientists, and engineers were involved in the development process. The standards focus on topics and content, required as a pre-requisite by colleges science courses. The agency has determined that the adoption of the Next Generation Science Standards is necessary and appropriate, to ensure college and career readiness for Kentucky students.

(3) Subject Matter: Removal of evolution from the Kentucky Core Academic Standards for Science

(a) Comment: Commenters objected to the continued inclusion of evolution in the science standards and stated that the teaching of evolution will lead to a variety of negative social consequences, including the negation of religious belief, the marginalization of students with religious beliefs, the promotion of socialism and resulting genocide and murder, drug abuse, suicide, hopelessness, the limitation of personal freedom, and the belief that might makes right.

A commenter expressed concerns that humans are classified with primates because primates have four hands, not two.

A commenter stated that the science curriculum should not include Darwinism.

A commenter stated that asking educators to teach evolution would violate the educators’ right to exercise their moral and religious beliefs.

A commenter stated that outsiders are imposing the elitist and rich man’s religion of evolution on the families of public school students, taking away the right to worship God.

Commenters stated that if evolution is in the standards, and taught, they will remove their children from the public schools and homeschool their children.

Those speaking or offering written comments seeking the removal of evolution from the Kentucky Core Academic Standards for Science were: Annice Milliner (Citizen), Matt Singleton (Citizen), Dena Stewart-Gore (Citizen), Maureen Erickson (Citizen), James Donaldson (Citizen) Valarie O’Rear (Citizen), Kim Houlihan (Citizen), Delores Vowels
(Citizen), Chad Erhardt (Citizen), James Donaldson (Citizen), Joe Armstrong (Citizen), and Kathrene Lewis (Citizen), RR (Citizen), RP (Citizen), and Ralph Hawkins (Citizen).

(b) Response: No changes have been made in response to comments requesting the removal of evolution from the Kentucky Core Academic Standards for Science. Biological evolution is the fundamental, unifying theory that underlies all the life sciences. It has formed the basis of productive research for over a century. Few scientific theories have had as transformative and widespread impact on their respective fields as has evolution. This is why evolution is universally accepted among professional biology researchers. According to the Association of College and University Biology Educators (ACUBE), knowledge of evolutionary theory is essential for success in every biology course of study. There is no significant ongoing debate within the scientific community regarding the legitimacy of evolution as a scientific idea.

Comments regarding the negative societal impact of teaching evolution appear to be based on personal opinion.

Evolution is a scientific theory, and is not a religion. Nothing in the Next Generation Science Standards restricts the religious freedom of Kentucky families or educators.

The agency notes that the concept of evolution already exists in the current version of the Kentucky Core Academic Standards for Science, and has been assessed since those standards were adopted in 2006. In fact, the Next Generation Science Standards contain a decreased number of standards related to biological evolution, compared to the standards currently in place.

The decision to homeschool a child rather than sending that child to public school is an individual parental choice and is beyond the scope of this regulation.

(4) Subject Matter: Support for the continued inclusion of evolution in the Kentucky Core Academic Standards for Science

(a) Comment: A commenter stated that evolution is thoroughly supported by many decades of scientific research.

A commenter stated that including evolution and climate change at the level of state standards protects teachers from being bullied into teaching creationism or bad science.

A commenter stated that meaningful debate on evolution has ceased and that there are observed examples of evolution.

Commenters stated that evolution and climate change are controversial topics, but the controversy is political, and not scientific.
A commenter stated that learning about evolution in high school would have been beneficial. The commenter stated that a lack of knowledge of evolution was a disadvantage when competing with other students entering the medical field.

Those speaking or offering written comments supporting the continued inclusion of evolution in the Kentucky Core Academic Standards for Science were: Paul Vincelli, Ph.D. (Citizen), Robert Bevins (Citizen), Regina Smith (Citizen), Elizabeth Power (Citizen), Roberta Burns (Educator and parent) and Keith L. Hautala (Citizen).

(b) Response: No changes have been made in response to comments in support of the continued inclusion of evolution in the Kentucky Core Academic Standards for Science. The theory of evolution is included in Kentucky’s present Core Academic Standards for Science, and has been assessed since the standards were adopted in 2006. The agency has determined that the theory evolution continues to be universally accepted among professional biology researchers and other scientists.

Biological evolution is the fundamental and unifying theory that underlies all of the life sciences. It has formed the basis of productive research for over a century. Few scientific theories have had as transformative and widespread impact on their respective fields as has evolution. The reasoning that underlies the development of the theory of evolution exemplifies the process of science, which process is fundamental to all scientific disciplines. Students should continue to be given the opportunity to examine the logical process and scientific evidence that led to the development of this foundational scientific idea. Students with a thorough grounding in all areas of science are better equipped to compete for careers and selective college admission. Scientific literacy is essential for success in the twenty-first century, especially in science, technology, engineering, and mathematics-related careers.

(5) Subject Matter: The inclusion of creationism and intelligent design, without supernatural or theological explanations, in the Next Generation Science Standards.

(a) A commenter requested that creationism and intelligent design be included in the standards, but through a secular approach, free from supernatural or theological explanations.

A commenter stated that it is a good idea to discuss intelligent design from both a secular and a religious viewpoint.

Those speaking or offering written comments on the inclusion of creationism and intelligent design, free from supernatural or theological explanations were: William Hardy (Citizen) and Dena Stewart-Gore (Citizen).

(b) Response: No change has been made in response to these comments. The agency has determined that the omission of creationism and intelligent design from the standards was based primarily on overwhelming scientific consensus. The agency has determined that the overwhelming majority of scientists do not consider creationism and intelligent
design as scientific theories. Accordingly, their omission from the Next Generation Science Standards reflects the consensus view among professional scientists and science educators. Even if it were possible to reword the basic ideas of creationism to exclude a theological or supernatural creator, or to discuss intelligent design without discussing the identity of the hypothesized designer (thus avoiding the legal objection), those ideas would still lack meaningful scientific support.

Additionally, courts have repeatedly declared unconstitutional the teaching of creationism and intelligent design on the basis that such teaching violates the Establishment Clause of the First Amendment to the United States Constitution. See, for example, Tammy Kitzmiller, et al. v. Dover Area School District, et al., 400 F. Supp.2d 707 (M.D.Pa. 2005) and Daniel v. Water, 515 F.2d 485 (6th Cir. 1975).

The Next Generation Science Standards do not attempt to explain the origin of life. Creationism and intelligent design attempt to explain the origin of life. Evolution does not conflict with creationism or intelligent design because the ideas do not attempt to explain the same things.

(6) Subject Matter: Additional revision of the Kentucky Core Academic Standards for Science.

(a) Comment: Commenters asked that additional revision be made to the Kentucky Core Academic Standards for Science for the purpose of refuting evolution and climate change.

Commenters requested the addition of: epigenetic factors, the improbability of random mutation as a driving factor in genetic change, the ideas of the Altenberg 16 in opposition to evolution, Flavius Josephus’ study of the accuracy of scripture, the observations of Moses, the existence of man-made metal spheres in the Precambrian, canopy theory, dynamic decay theory, the hydro-plate theory, research on the effect of solar flares on the earth’s magnetic field, and other ideas not contained in the proposed science standards.

Commenters requested that intelligent design be added to the standards.

A commenter stated that the Next Generation Science Standards do not reflect the most recent research on evolutionary theory.

A commenter stated the adoption of the Next Generation Science Standards would violate KRS 158.6451 because the standards do not provide for instruction in different theories on such topics as climate change and evolution.

A commenter provided a DVD titled Confronting Evolution, containing a creation seminar promoting a curriculum critical of evolution, as an example of how the proposed science standards should teach evolution.

Those speaking or offering written comments requesting additional revision to the Kentucky Core Academic Standards for Science were: Todd Belcher (Citizen), Matt
(b) Response: No changes have been made in response to comments requesting the additional revision of the Kentucky Core Academic Standards for Science. The Next Generation Science Standards include only ideas that are widely supported within the scientific and science education communities and represent core disciplinary ideas that have wide utility for students. The agency has determined that many of the ideas proposed for inclusion are not widely recognized. In scientific fields as large as biology and paleontology, there are many thousands of individuals engaging in research. It would be virtually impossible for scientists to agree upon every minute detail of every scientific concept. The fact that a small number of scientists present ideas contrary to the widely accepted scientific consensus does not automatically give their ideas equal weight and
credibility. If those ideas gain wide support within the scientific and scientific education communities, it is more likely that they will be included in future revisions of the Kentucky Core Academic Standards for Science. Only scientific ideas are eligible for inclusion in science standards. A number of the ideas suggested for inclusion (canopy theory, for one example) are not accepted as scientific theories by the scientific community and are, accordingly, not included.

The Next Generation Science Standards do not attempt to explain the origin of life. Creationism and intelligent design attempt to explain the origin of life. Evolution does not conflict with creationism or intelligent design because the ideas do not attempt to explain the same things. Ideas, theories, hypotheses, or beliefs concerning the ultimate origin of life are not included in the Next Generation Science Standards.

The standards represent a ‘floor’ in terms of content students are required to master, not a ‘ceiling’. Every school and district has the freedom to supplement the standards to create curricula appropriate for their students, and to add additional topics as they see fit.

The agency has determined that the proposed standards are consistent with KRS 158.6451, which requires the agency to prepare and disseminate a model curriculum framework, and requires the agency, pursuant to KRS 158.6453, to make revisions to the content standards that shall:

- Focus on critical knowledge, skills, and capacities needed for success in the global economy;
- Result in fewer, but more in-depth standards to facilitate mastery learning;
- Communicate expectations more clearly and concisely to teachers, parents, students, and citizens;
- Be based on evidence-based research;
- Consider international benchmarks; and
- Ensure that the standards are aligned from elementary to high school to postsecondary education so that students can be successful at each education level.

Different theories on such topics as climate change and evolution may be selected, by a local district, as the district exercises its control over curriculum, or may be included in revisions to content standards as those different theories withstand the scientific scrutiny applied to screen the present content of the standards.

While the agency appreciates the submission of the DVD presentation, the instructional presentation it contains is an example of a science curriculum. Since curriculum is a local decision, this submission falls outside the scope of the regulation under consideration.

(7) Subject Matter: Evolution is not settled science. Evolution is theory, not fact.

(a) Comment: Commenters stated that evolution is not settled science.

Commenters stated that evolution is not a scientific idea.
Commenters stated that evolution is only a theory and is not a fact.

Commenters stated that the teaching of evolution misleads students.

Commenters stated that there is not a consensus within the scientific community regarding evolution as the primary mechanism to explain the diversity of organisms.

A commenter stated that the theory of evolution is the result of the logical fallacy of inductive reasoning because history has not been witnessed.

A commenter stated that evolution is not settled science because it cannot be expressed as a formula, such as work.

A commenter stated that the fossil record does not support the idea of evolution and that the fossil record delights creationists and causes headaches for evolutionists.

A commenter objected to the idea of scientific consensus, and referred to scientific consensus as fact by popular vote.

A commenter stated that the authors of the Next Generation Science Standards are either misleading or are underprepared and underinformed.

A commenter stated that the standards are a curriculum that favors the theory of evolution over creation and that evolution is not a fact.

Those speaking or offering written comments that evolution is not settled science, and is not fact, were: Todd Belcher (Citizen), Matt Singleton (Citizen), Dena Steward-Gore (Citizen), Adrian Gilbert (Citizen), Dr. Don Patton (Arkansas resident), Valerie O’Rear (Citizen) Steve Shreeve (Citizen), Tim Whalen (Citizen), Sarah Reddick (Citizen), Ann Kidder (Citizen), Brian Jackson (Citizen), Kathy Strauss (Citizen), Lydia Lynne Coates Fuller, (Citizen), Naomi Hodges (Citizen), Glenda Grace (Citizen), Virgil Ridings (Citizen), Joel Waltz (Citizen), Donna Hazelwood (Citizen), Samantha Tucker (Citizen), Vickie Hatton (Citizen), Angela Rankins (Citizen), Jeff Whittinghill (Citizen), Joan Tighe (Citizen), Edward Prigge (Citizen), Ronnie Trogden (Citizen), Candace Granstaff (Citizen), Allan Smith (Citizen), Jim Nation (Citizen), Sarah Grayson (Citizen), R. Wesley Pace (Citizen), Joe Armstrong (Citizen), Amanda Bifone (Citizen), William Bishop (Citizen), Randall Lamb (Citizen), John Rice (Citizen), Stephen Secchio (Citizen), Brian Slone (Citizen), Pam Yancy (Citizen), Sherian Tingle (Citizen), Mike Alexander (Citizen), Genevieve Apodaca (Citizen), Claudia Hargrove (Citizen), Jacqueline Burchett (Citizen), Colleen Crigler (Citizen), Teddy Williams (Citizen), Teresa Smith (Citizen), Spencer Skaats (Citizen), Angela Armato (Citizen), Craig Newman (Citizen), Jerome Lawson (Citizen), Stephanie Ramsey (Citizen), David Foushee (Citizen), Patrick McCamish (Citizen), Amy Meadors (Citizen), Danny Fletcher (Citizen), Dennis Stafford (Citizen), James Roark (Citizen), Judy Roark (Citizen), Billie Stafford (Citizen), Linda Rose (Citizen), Helen Bloodsworth (Citizen), Naomi Webb
(Citizen), Anna Reeder (Citizen), Ella Lonas (Citizen), Becky Schmidt (Citizen), Tammy Skaats (Citizen), Cheryl Sadler (Citizen), Angie Christensen (Citizen), Jay Bond, Sr. (Citizen), Diana Diggles (Citizen), Linda Bryant (Citizen), Charlotte Purcell (Citizen), Regina Eckle (Citizen), Donald F. Inks, Jr. (Citizen), Rita Isham (Citizen), Erin Seaman (Citizen), Jay Dargan (Citizen), Jim McHale (Citizen), Tim Boll (Citizen), Sherry Gaines (Citizen), Brenda Kabler (Citizen), Steve Flinchum (Citizen), William Marvel (Citizen), Gary Rogers (Citizen), Randy Riblet (Citizen), Johnny E. Evans (Citizen), Debra Smith (Citizen), Marvin Oliver (Citizen), Terry Sears (Citizen), John Sparks (Citizen), Eileen Serke (Citizen), Frank Simon (Citizen), Mary McClendon (Citizen), Gary Buckley (Citizen), Beverly Buckey (Citizen), Roberta Dorsey (Citizen), Velma Newsom (Citizen), Steve Rudy (Citizen), Ken Collins (Citizen), JoeAnn Collins (Citizen), Vickie Hatton (Citizen), Elsie R. Hall (Citizen), Esther Whitley (Citizen), Florence Molnar (Citizen), Regina Smith (Citizen), Bobby Alexander (Citizen), Steve Lorimer (Citizen), JoAnn Davis (Citizen), Kimberly (Citizen), Rob Jones (Citizen), James Champ (Citizen), Ralph Hawkins (Citizen), Stephan Schick Sr. (Citizen), Linda Horback (Citizen), Colin Bruner (Citizen), David Bartsch (Citizen), Shirley Mayrand (Citizen), Aaron (Chad) Erhardt (Citizen), Herman Cummings (Georgia resident), Michelle Truitt (Citizen), RR (Citizen), RP (Citizen), Misty Pack (Citizen), Shannon Alexander (Citizen), and Paul Aud (Citizen).

(b) Response: No changes have been made in response to comments that evolution is not settled science or a fact. The agency has determined that, in the scientific and science education communities, a theory is a statement of general ideas that explains many observations of the natural world. In the scientific and science education communities, the word “theory” is a very precise term that identifies a concept that has great utility in explaining phenomena in the natural world. Ideas only rise to the level of scientific theories if they have withstood scrutiny and are exceptionally useful in explaining a wide variety of independent observations. Any scientific theory can be altered or replaced if the theory cannot adequately explain new observations or new scientific evidence.

In the field of science, facts do not become theories. Rather, theories explain facts. No theory is immune from revision or replacement in the face of new facts. There is a substantial difference between the everyday and conversational meaning of the word "theory," and the scientific meaning of the word. In everyday conversation, an idea is often labeled a theory for the purpose of painting it as little more than a guess. As explained above, the scientific meaning of the term is much narrower. The Next Generation Science Standards employ the scientific meaning of “theory.” Referring to biological evolution as a theory, for the purpose of contesting it, does not weaken the acceptance of biological evolution within the scientific and science education communities.

There is no significant ongoing debate within the scientific community regarding the legitimacy of evolution as a scientific idea. Inconsistencies and unknown details exist in all areas of scientific research and knowledge. The existence of inconsistencies and unknown factors does not negate the dramatically larger body of evidence supporting the prevailing theories in those areas of research.
The agency has determined that professional scientific bodies and organizations supporting the legitimacy of the concept of biological evolution as a cornerstone of the science of biology include:

- Alabama Academy of Science
- American Anthropological Association
- American Association for the Advancement of Science
- American Association of Physical Anthropologists
- American Astronomical Society
- American Chemical Society
- American Geological Institute
- American Geophysical Union
- American Institute of Biological Sciences
- American Physical Society
- American Psychological Association
- American Society of Biological Chemists
- American Society of Parasitologists
- American Sociological Association
- Association of College and University Biology Educators
- Association of Southeastern Biologists
- Association for Women Geoscientists
- Australian Academy of Science
- Biophysical Society
- Botanical Society of America
- California Academy of Sciences
- Committee for the Anthropology of Science, Technology, and Computing
- Committee for Scientific Investigation of Claims of the Paranormal
- Ecological Society of America
- Federation of American Societies for Experimental Biology
- Genetics Society of America
- Geological Society of America
- Society of Australia
- Georgia Academy of Science
- History of Science Society
- Idaho Scientists for Quality Science Education
- InterAcademy Panel
- Iowa Academy of Science
- Kansas Academy of Science
- Kentucky Academy of Science
- Kentucky Paleontological Society
- Louisiana Academy of Sciences
- National Academy of Sciences
- New Mexico Academy of Science
- New Orleans Geological Society
- New York Academy of Sciences
North American Benthological Society
North Carolina Academy of Science
Ohio Academy of Science
Ohio Math and Science Coalition
The Paleontological Society
Pennsylvania Academy of Science
Pennsylvania Council of Professional Geologists
Philosophy of Science Association
Research! America
Royal Astronomical Society of Canada - Ottawa Centre
Royal Society
Royal Society of Canada
Royal Society of Canada, Academy of Science
Sigma Xi, Louisiana State University Chapter
Society for Amateur Scientists
Society for Integrative and Comparative Biology
Society for Neuroscience
Society of Physics Students
Society for the Study of Evolution
Society of Systematic Biologists
Society of Vertebrate Paleontology
Southern Anthropological Society
Tallahassee Scientific Society
Tennessee Darwin Coalition
Virginia Academy of Science
West Virginia Academy of Science

Educational organizations supporting the legitimacy of the concept of biological evolution as a cornerstone of the science of biology include:

American Association of Physics Teachers
American Association of University Professors
American Association of University Women
Arkansas Science Teachers Association
Association of College and University Biology Educators
Association of Pennsylvania State College and University Biologists
Auburn University Faculty Senate
Authors of Biology Textbooks
Biological Sciences Curriculum Study
California Science Teachers Association
Empire State Association of Two Year College Biologists
Georgia Citizens’ Educational Coalition
Idaho Science Teachers Association
Illinois Community College Faculty Association Delegate Assembly
Inter-University Council of Ohio
In light of the wide, and deep, support for the teaching of biological evolution, the agency has determined that biological evolution should remain an element of the Kentucky Core Academic Standards for Science.

The agency reiterates that the standards are not a curriculum. Nothing in the Kentucky Core Academic Standards for Science discusses or requires certain curricula.

(8) Subject Matter: Non-religious objection to the theory of evolution

(a) Comment: A commenter stated there are non-religious objections to evolution, and cited the works of Cambridge biochemist Douglas Axe, Moeller and Newman, epigenetics, the work of the Altenberg 16, University of San Francisco paleontologist Paul Chien, and others. He asked that students be taught alternative scientific explanations to evolution and to reject the proposed standards related to evolution.
Those speaking or offering written comments regarding non-religious objections to the inclusion of the theory of evolution in the Kentucky Core Academic Standards for Science were: Todd Belcher (Citizen).

(b) No changes have been made in response to these comments. The agency has determined that the ideas of evolution, included in the standards, reflect the consensus of the overwhelming majority of scientists. There is no longer scientifically significant debate on the role of evolution in the modern study of biology. This is evidenced by the omission of the suggested ideas from the Framework for K-12 Science Education, published by the National Research Council of the National Academy of Science. The Framework represents core knowledge in the biological sciences. The exclusion of the suggested theories is evidence that those theories are not components of core biological knowledge, and are peripheral to science education.

The Next Generation Science Standards include only ideas that are widely supported within the scientific and science education communities and represent core disciplinary ideas that have wide utility for students. The agency has determined that many of the ideas proposed for inclusion are not widely recognized. If those ideas gain wide support within the scientific and scientific education communities, it is more likely that they will be included in future revisions of the Kentucky Core Academic Standards for Science.

(9) Subject Matter: Opposition to the teaching of climate change through the Kentucky Core Academic Standards for Science

(a) Comment: A commenter stated that standards overemphasize global warming, to the neglect of other concepts.

A commenter noted the omission of scientific terms such as “hormone” and “kinesis” in the Kentucky Core Academic Standards.

A commenter stated that she opposes teaching climate change as “settled” science because there is ongoing debate, and more scientists are coming out against it.

A commenter stated that carbon dioxide is not the most common greenhouse gas, and suggested that Climategate and the global carbon tax be studied by the agency.

Commenters questioned the emphasis on climate change in the Next Generation Science Standards, based on the frequency with which the word “climate” appears.

A commenter stated that climate change is junk science.

A commenter stated that theories about manmade global warming are imposed upon children from kindergarten.

A commenter stated that a few decades ago, many thought the earth was cooling, illustrating how quickly the assumptions of men can change.
Speaking or offering written comments in opposition to the teaching of climate change were: Annice Milliner (Citizen), William Hardy (Citizen), Robert Hall (Citizen), Valerie O’Rear (Citizen), Aaron (Chad) Erhardt (Citizen), Martin Cothran (Citizen), Greg Cordier (Citizen), and Kimberly Wood (Citizen).

(b) Response: No changes have been made in response to these comments. The agency has determined that global climate research is increasing in prominence and importance within the scientific and science education communities. Including climate research as part of the Kentucky Core Academic Standards for Science accurately reflects the current state of scientific thought. The Framework for K-12 Science Education includes the study of climate as one of the foundational concepts of the Next Generation Science Standards.

The agency has determined that the basic ideas of climate science, as included in the Next Generation Science Standards, have been described as a scientific consensus by a number of scientific bodies, including:

- American Association for the Advancement of Science
- American Chemical Society
- American Geophysical Union
- American Institute of Biological Sciences
- American Meteorological Society
- American Society of Agronomy
- American Society of Plant Biologists
- American Statistical Association
- Association of Ecosystem Research Centers
- Botanical Society of America
- Crop Science Society of America
- Ecological Society of America
- Natural Science Collections Alliance
- Organization of Biological Field Stations
- Society for Industrial and Applied Mathematics
- Society of Systematic Biologists
- Soil Science Society of America
- University Corporation for Atmospheric Research

The Next Generation Science Standards do not advocate any particular public response, policy change, or civic action regarding climate change. Instead, the standards ask students to consider the evidence for the factors influencing climate change. The standards do not require students to engage in any sort of civic or legal course of action. While such lessons might be included in individual school or district curriculum, such curriculum decisions are under local control. In fact, such curricula could be taught under the current set of standards if individual schools and teachers so desire. The agency has determined that, given its prominence in current scientific research, climate change is possibly already the topic of lessons in science classrooms across the Commonwealth.
Some comments specifically objected to a perceived overemphasis on climate science, based on the number of standards addressing climate change as opposed to other areas of science. The agency suspects that these comments were based upon a simple word search of the science standards, rather than a count of actual performance expectations (standards). Words such as “global”, “warming”, and “climate” may appear in the standards in isolated uses that are not related to the concept of climate change. The agency has also determined that there may be a misperception that every standard addressing weather or climate is related to climate change. The study of weather, and the factors influencing weather, has been included in science standards for many years, predating the present study of climate change. The agency has determined that comments asserting a heavy weighting toward climate science, to the exclusion of other disciplines, are not supported by a careful examination of the standards themselves.

Political matters, such as a global carbon tax and Climategate are beyond the scope of this regulation.

(10) Subject Matter: Support for the inclusion of climate change/global warming concepts in the Kentucky Core Academic Standards for Science

(a) Comment: A commenter stated that, while not he is not a climate scientist, he has intensively studied hundreds of peer-reviewed research articles on climate science, has attended three scientific conferences on climate change, and has found that mainstream climate scientists practice the same scientific methods as any community of scientists he has been associated with in 35 years.

A commenter stated that the scientific community is not having any debate about the climate change standards included in the Kentucky Core Academic Standards for Science; that climate change is addressed in respected college texts, and would not be in the absence of consensus in the science community; and that the existence of a human impact on climate change is accepted in mainstream science.

A commenter stated that climate science is a mature science that has existed for more than 150 years, and that scientific data indicates the earth is continuing to warm.

A commenter stated that climate change education is needed because present energy production schemes are irreversibly altering the climate.

A comment stated that Kentucky student deserve the most up-to-date science education, including learning about climate change.

A commenter stated that he was pleased to see the inclusion of standards related to climate and weather because they are needed to help prepare for increasingly severe weather events.
Those speaking or offering written supporting the inclusion of climate change/global warming concepts in the Kentucky Core Academic Standards for Science were: Paul Vincelli, (Ph.D), Rick Clewett (Climate Parents), Robert Bevins (Kentuckians for Science Education), Joseph Straley (University of Kentucky), Donnie Wilkerson (Citizen), and Sheila Anderson (Citizen) who submitted comments in the form of a petition signed by three thousand eight hundred and ninety-four (3,894) individuals.

(b) Response: No changes have been made in response to comments supporting the inclusion of standards relating to climate change and global warming.

(11) Subject Matter: Criticisms of the content and rigor of the Next Generation Science Standards, including criticisms made in the Thomas B. Fordham Foundation Report

(a) Comment: Commenters stated that a report by the Fordham Foundation assigned the Next Generation Science Standards a grade of “C”, and cited the Fordham Foundation report.

A commenter stated that the concerns expressed in the Fordham Foundation Report should delay adoption of the Next Generation Science Standards as the Kentucky Core Academic Standards for Science.

A commenter cited the Fordham Foundation Report, stated that the Next Generation Science Standards blur the true meaning of engineering, and stated that the Standards do not expect much math from students.

A commenter stated that the standards take a process-over-content approach, while SB 1 (2009) requires that the standards be based on evidence-based research.

A commenter stated that there is an imbalance in the presentation and emphasis of subjects such as climate change, as determined by the number of times certain words appear.

A commenter stated that there is not enough emphasis on topics such as Universal Gas Law, current flow in closed electrical circuits, or other physical science content in the high school curriculum. The commenter stated that it would be impossible to derive a high school physics or chemistry course from the standards.

A commenter stated that the proposed standards are not content-driven but are process- and skill-driven. The commenter stated that Senate Bill 1 requires that standards cover academic content.

A commenter stated that the standards are not as rigorous as Kentuckians desire and that a complete rejection of the 2013 standards is needed.

A commenter addressed objections raised by the Fordham Foundation Report and stated that standards and curriculum are misunderstood. The commenter stated that standards
are not detailed and filled with vocabulary words. Standards are the wrong place to look for this detail.

Those speaking or offering written comments supporting concerns raised by the Fordham Foundation Report were: Annice Milliner (Citizen), Adrian Gilbert (Citizen), Valerie O’Rear (Citizen), Richard G. Innes (Bluegrass Institute for Public Policy Solutions), Martin Cothran (Citizen), Cindy Rausch (Citizen), Maureen Carman (Attorney), and Sandra Stotsky (Professor).

Those speaking or offering written comments in opposition to concerns raised by the Fordham Foundation were: Robert Bevins (Kentuckians for Science Education).

(b) Response: No changes have been made in response to criticisms of the content and rigor of the Next Generation Science Standards, including those published by the Thomas B. Fordham Foundation. The agency has determined that, historically, the Fordham grades of science standards have not successfully predicted how well students perform on a common assessment of science proficiency. In a comparison between 2011 8th grade National Assessment of Educational Progress (NAEP) scores and Fordham 2012 science standards grades as reported in their publication The State of State Science Standards 2012:

The two highest scoring states on the NAEP (North Dakota and Montana) received a grade of F from Fordham on their state science standards.

The lowest scoring state on the NAEP (District of Columbia) received a grade of A from Fordham on their state science standards. Six of the top 10 highest scoring states received a grade of D (Maine, Colorado, and New Hampshire) or F (North Dakota, South Dakota, and Montana). The remaining four received two C’s (Vermont and Minnesota), one B (Utah), and a single A (Massachusetts).

The five lowest scoring states on the NAEP received two A’s (District of Columbia and California), two D’s (Alabama and Hawaii), and one C (Mississippi).

The agency has concluded that the examples above indicate that Fordham’s scores have limited predictive reliability as regards student achievement in science.

The agency notes that the Fordham review grade of “C” for the Next Generation Science Standards represents an improvement over the grade of “D” that Fordham assigned to Kentucky’s present science standards.

The agency has determined that the Fordham report does not accurately evaluate the Next Generation Science Standards. The Fordham report represents the opinion of nine (9) individuals. The review judged the standards in comparison to a set of content expectations created by Fordham and used in their previous reviews of state science standards. These content expectations are very narrowly focused upon content detail.
Such a narrowly-focused set of criteria are not well suited to evaluate content standards that were written to give as much emphasis to the processes and concepts of science as they give to the content.

The absence of specific scientific terms from the standards does not imply their absence from the science curricula of individual schools and districts. Science is not a list of vocabulary words and formulas to be memorized. Facts and formulas can be retrieved instantly in our information-rich society, but they are only valuable when students have an understanding of how to use those facts and formulas to solve meaningful scientific problems.

Standards and curricula are written to different levels of detail. Schools and districts will continue to control curriculum development despite the adoption of revised science standards. Many of the foundational ideas behind concepts detailed in the standards will continue to appear in daily lesson plans at the discretion of the teachers writing and implementing those plans.

It is not the purpose of science standards to define individual course curricula, especially for courses such as chemistry and physics. The standards describe expectations of every student, not just those students wishing to pursue careers in science or Science, Technology, Engineering and Mathematics (STEM) fields. Course requirements for graduation are a matter of local curriculum. Therefore, chemistry and physics are not required for graduation. The current science standards also do not define the curriculum of a complete high school chemistry or physics course. Those curriculum decisions are left to individual schools and districts under Kentucky law.

The agency has learned that the Division of Chemical Education of the American Chemical Society and the American Physical Society endorse the Next Generation Science Standards. These professional groups advocate for the advancement of chemistry and physics in the United States. Their statements of support are below:

The Division of Chemical Education recognizes the achievement that is present in the Next Generation Science Standards, including their basis in research on teaching and learning, their formulation as performance standards, and their basis in the NRC framework and its dimensions of Science and Engineering Practices, Disciplinary Core Ideas, and Cross Cutting Concepts. We endorse the Standards as a document that is broadly applicable as a basis for K-12 science instruction and call upon the Division to develop innovative programming to support the implementation of the Standards.

The American Physical Society Committee on Education endorses the physics content of the Next Generation Science Standards. The Committee recognizes that the Next Generation Science Standards are intended to promote broad science literacy, and urges K-12 education policy-makers in all states to adopt these standards and implement the necessary teacher support to attain them.
These statements of support should be balanced against comments critical of the physical science content of the standards. The agency has determined that the opinions of these professional organizations should be given greater weight based on their preeminence in their respective fields, and the esteem in which practitioners of the sciences hold them.

The agency notes that every topic page of the Next Generation Science Standards is correlated with the Kentucky Core Academic Standards for Mathematics. The experts who reviewed the Next Generation Science Standards have stated that great attention was paid to ensure continuity with the mathematics standards. The Fordham Foundation final report, dated June 13, 2013, acknowledged that Fordham has not yet thoroughly reviewed the new and clearly more extensive Next Generation Science Standards appendix. (Appendix L: Connections to CCSS-Mathematics). As noted above, the absence of specific mathematical concepts from the standards does not imply that those concepts will be absent from curricula developed from those standards. Curricula provide a greater level of content specificity than is included in the standards.

The agency has studied the comment attributing to the Fordham Report criticism that the Next Generation Science Standards blur the true meaning of engineering. This statement was published on Fordham’s Edexcellence.net website on February 6, 2013, in response to the January 2013 NGSS public draft. The agency was unable to locate a similar comment in the June 13, 2013 Fordham report that was based on the final released version of the proposed standards. Because there was significant revision of the Next Generation Science Standards between the January 2013 public draft and the final released version, and because this particular criticism appears not to have survived the editing of the Fordham final Report, the agency assumes that the revision of the Next Generation Science Standards satisfied Fordham’s concerns, and this comment, regarding the true meaning of engineering.

Kentucky’s 2009 Senate Bill 1, codified as KRS 158.6453, mandated revision of all content standards and a number of criteria by which those standards were to be developed or selected. Pursuant to Section 2(b), revisions to the content standards shall:

1. Focus on critical knowledge, skills, and capacities needed for success in the global economy;
2. Result in fewer but more in-depth standards to facilitate mastery learning;
3. Communicate expectations more clearly and concisely to teachers, parents, students, and citizens;
4. Be based on evidence-based research;
5. Consider international benchmarks; and
6. Ensure that the standards are aligned from elementary to high school to postsecondary education so that students can be successful at each education level.

A number of concepts were removed from Next Generation Science Standards to meet the requirements of SB1 (2009), and new standards were required to address critical
knowledge, skills and capacities. The narrowly defined and discrete content requirements used by Fordham in their review conflicts with the requirements of SB1.

A commenter asserted that SB1 (2009) requires a focus on academic content, but this term is absent from the statute. The statute requires that the standards focus on “critical knowledge, skills, and capacities needed for success in the global economy.” The agency has determined that the proposed science standards fully meet the requirements of SB 1 (2009), as enacted.

The agency is unable to identify a mechanism that would quantify the degree of rigor desired by Kentuckians. However, the overwhelming ratio of supporters to detractors offering public comments on the standards suggests that Kentuckians approve of the level of rigor contained in the Next Generation Science Standards.

Inclusion of the concepts in the Next Generation Science Standards was guided by the foundational document from which they were created, the *Framework for K-12 Science Education*. The *Framework* was published by the National Research Council of the National Academy of Science and provides a sound, evidence-based foundation for standards by drawing on current scientific research—including research on the ways students learn science effectively—and identifies the science all K–12 students should know.

The opinion that the Next Generation Science Standards emphasize practices over content is subjective. The agency notes that the developers of the Next Generation Science Standards assert that process and content, as a result of extensive research, are intentionally given equal prominence. The agency has learned that Achieve (Achieve, Inc., an independent, bi-partisan, non-profit education reform organization led by a Board of Directors consisting of governors and business leaders) cited seventy-seven (77) papers and research studies in support of the three dimensional structure (practices, core ideas and cross cutting concepts) of the Next Generation Science Standards, and finds that the standards appropriately attend to process and content.

(12) Subject Matter: Discussion of the scientific process and scientific method

(a) Comment: A commenter stated that the standards do not sufficiently address the scientific process.

A commenter stated that the term “scientific method” does not appear in the standards and that it appears that the Next Generation Science Standards completely overlooked the first, but fundamentally important, introductory chapter of the book on science.

A commenter questioned whether training in scientific reasoning should have less of a role in the proposed science standards than climate science.
Those speaking or offering written comments about the scientific process and the scientific method were: Richard G. Innes (Bluegrass Institute for Public Policy Solutions), Martin Cothran (Citizen), and Valerie O’Rear (Retired Colonel/Parent).

(b) Response: No changes have been made in response to these comments. The agency has determined that, in scientific fields, there is no single definition of the term ‘scientific method’. Accordingly, textbooks that introduce ‘the’ scientific method as a rigidly defined series of rote steps do not accurately reflect the nature of science as it is most frequently practiced.

The scientific method is not universally defined. The scientific method is often presented as exclusively consisting of five steps, usually including (1) defining the problem, (2) forming a hypothesis, (3) making observations, (4) testing the hypothesis, and (5) drawing conclusions. In the practice, and teaching, of science, observation may be the first step. The scientific method is a fluid process that does not necessarily employ each of the five steps listed above, nor dictate the order in which the steps should be applied. The agency recognizes that science professionals and teachers may validly employ other models of scientific practice.

The agency has determined that the proposed standards instill the practices of science (including scientific reasoning) and engineering through performance expectations, rather than separating them into a set of steps to be memorized, tested, and then forgotten. This approach asks students to employ the practices of science every day. One of the three dimensions of the proposed science standards, Science and Engineering Practices, exemplifies the critical attributes of scientific reasoning. These Practices are included in every performance expectation contained in the proposed standards.

The comment that inquired whether training in scientific reasoning should have less of a role in the proposed science standards than climate science poses a question, and not a comment upon the regulation, and no agency response is required.

(13) Subject Matter: The adoption of the Next Generation Science Standards as the Kentucky Core Academic Standards will impact college and career readiness:

(a) Comment: Commenters expressed support for the adoption of the Next Generation Science Standards and stated that the Standards will help improve the college and career readiness of Kentucky students.

A commenter expressed confidence that the adoption of the standards will lead to scientifically literate graduates who are ready for college and careers and will understand how science impacts their lives.

Commenters stated that the new standards will increase the likelihood that students entering college science classes will be better prepared than current graduates who are now entering Kentucky’s universities.
A commenter stated that the Next Generation Science Standards are not about high quality national education standards, but are rather about how to lower the level of academic achievement required for high school diplomas and for admission to public colleges.

Commenters stated that the new standards will result in more Kentucky students being able to enter science, technology, engineering, and mathematics-related career fields.

A commenter stated that the standards will lead to students who are ready to enter the workforce immediately upon graduation.

A commenter stated that the Next Generation Science Standards will help students see the connection between their actions and the world, in tangible ways, and will prepare them for 21st Century jobs.

A commenter stated that the Next Generation Science Standards are supported by strong research and that Kentucky must embrace 21st Century science if we expect our students to compete in an international job market.

Those speaking or offering written comments that the adoption of the Next Generation Science Standards will impact college and career readiness were: Blaine Ferrell (Kentucky Academy of Science), Tom Tretter (Kentucky Science Teachers Association), Daniel Phelps (Kentucky Paleontological Society), Trent Garrison (American Institute of Professional Geologists, Kentucky Section), Rick Clewett (Climate Parents), David Robinson (citizen), Joseph Straley (Professor), Elizabeth Schmidt (Kentucky Environmental Education Council), Elizabeth Power (Citizen), Roberta Burns (Educator and parent), Sandra Stotsky (Professor) and Ashley Hoffman (Kentucky Association for Environmental Education).

(b) Response: No changes have been made in response to comments of support. The agency agrees that the proposed Kentucky Core Academic Standards for science will increase the college and career readiness of Kentucky graduates by giving them a grounding in the skills of scientific literacy needed to enter science, technology, engineering, and mathematics-related preparatory programs and rigorous college coursework.

No changes have been made in response to the comment that the purpose of the Next Generation Science Standards is to lower the academic requirements of high school graduation and college admission. The agency has determined that this comment represents a conclusory statement of opinion and not a critique of the regulation to which a response can be made.
(14) Subject Matter: The adoption of the Next Generation Science Standards as the Kentucky Core Academic Standards for Science will impact the economy in a positive way.

(a) Comment: A commenter stated that Kentucky has a biology-based economy and that students need to understand biology or Kentucky will be left behind economically. The commenter stated that industries will go elsewhere if Kentucky does not adopt the Next Generation Science Standards.

A commenter stated the Next Generation Science Standards should be adopted to help produce the number and quality of scientists needed to sustain this country and its economy.

Commenters stated that the focus on science education exemplified by the Next Generation Science Standards can raise the public’s scientific understanding and help areas of the state that are in deep poverty.

A commenter stated that in order to keep pace with the rest of the country and give them [students] the best opportunity for their future, the new science standards should be adopted.

A commenter stated that the approach of the Next Generation Science Standards will have a beneficial impact on the Commonwealth, preparing students for science, technology, engineering, and mathematics fields in industry and manufacturing, boosting the economy, and supplying much-needed jobs to students who are ready to enter the workforce immediately upon graduation.

A commenter stated that adoption of the Next Generation Science Standards will help Kentucky be more economically competitive in the future by attracting high-tech industries.

Those speaking or offering written comments on the positive economic impact of the Next Generation Science Standards were David Robinson (Citizen), Rick Clewett (Citizen), Ryan Lawson (Citizen), Haley Lawson (Citizen), Stephanie Evitts (Citizen), Elizabeth Schmidt (Kentucky Environmental Education Council), and Keith L. Hautala (Citizen).

(b) Response: No changes have been made in response to these supportive comments. The agency agrees that failure to implement the Next Generation Science Standards as the Kentucky Core Academic Standards for Science will place Kentucky at an economic disadvantage with states that adopt and implement the Standards.

The agency notes that in 2007 a Carnegie Foundation commission of distinguished researchers and public and private leaders concluded that the nation’s capacity to innovate for economic growth and the ability of American workers to thrive in the modern workforce depend on a broad foundation of math and science learning, as do hopes for preserving a vibrant democracy and the promise of social mobility that lie at
the heart of the American dream. The Carnegie Foundation noted, however, that the U.S. system of science and mathematics education is performing far below par and, if left unattended, will leave millions of young Americans unprepared to succeed in a global economy.

These findings bolster the agency’s commitment to the high quality education that Kentucky’s students deserve, and the embodiment of that commitment through appropriate education standards.

(15) Subject Matter: Race to the Top funds and Common Core Standards.

(a) Comment: A commenter stated that Kentuckians ought to be embarrassed that their political leaders were so easily bribed by the current federal administration to sell their rights to control local curriculum. The commenter also stated that Secretary of Education Arne Duncan used the Race to the Top funds to get states to adopt common core standards because of the “hodgepodge” of state standards.

Those speaking or providing written comments regarding Race to the Top and common core standards were: Annice Milliner (Citizen)

b) Response: No changes have been made in response to these comments. Kentucky did not adopt new English/language arts and mathematics standards to compete for Race to the Top funds, but instead due to the mandates of SB 1 (2009). Kentucky had already adopted standards for English/language arts and mathematics before the Race to the Top Competition started. SB 1 (2009) required the revision of all content area standards, but did not include a budget allocation for the mandated work. SB 1 (2009) required the agency to consider standards that had been adopted by national content advisory groups and professional education consortia. SB 1 (2009) also required dissemination and training on the standards for all teachers, administrators, and higher education faculty. Kentucky voluntarily submitted an application to support the implementation of the standards, not for development and adoption, as was the case in some other states that competed for Race to the Top funds.

A goal of the state-led Common Core Initiative is to establish rigorous standards that are consistent across states and that are aligned to college-and-career readiness goals. The purpose of standardization is to avoid a “hodgepodge” of standards. Students moving from state to state would experience inconsistencies in standards. This variance in standards also does not support students’ ability to compete nationally and globally.

(16) Subject Matter: Opposition to the use of the Common Core State Standards, adopted as Kentucky Core Academic Standards for English/language arts and mathematics.

(a) Comment: Commenters stated there have been numerous articles and experts talking about the Common Core Standards.
Commenters stated that the Common Core Standards are not good for our students.

Commenters stated that the Common Core Standards are a way of dumbing down Kentucky’s students and asked that no Common Core Standards be used in Kentucky Schools.

A commenter stated that the Common Core Standards are not rigorous, and lack a research base, international comparisons, and credible authors.

A commenter stated that the Kentucky Core Academic Standards for English/language arts and mathematics were not field-tested and were not endorsed by two of the twenty-nine members of the validation committee.

A commenter stated that the content in the Common Core Standards was too complex. The commenter stated that his young child has Asperger Syndrome, and when asked what he was studying, the child reported that he was study protagonists and thesis statements.

A commenter stated that the Common Core Standards do not allow for innovation by students, and used the China as an example of a country with common standards but that lacks innovation among students.

Commenters stated that the cost of implementation of the Common Core is unsustainable.

A commenter stated that the Common Core was created by the big business elite, including Bill and Melinda Gates.

A commenter stated that the Common Core Standards were a fascist method, used by the government to control students.

A commenter stated that the social studies standards do not include the important term “republic,” even though the United States is a republic.

Those speaking or submitting written comments of opposition to the Common Core State Standards, adopted as Kentucky Core Academic Standards for English/language arts and mathematics, were: Sarah Reddick (Citizen), Ann Kidder (Citizen), Brian Jackson (Citizen), Kathy Strauss (Citizen), Lydia Lynne Coates Fuller, (Citizen), Naomi Hodges (Citizen), Glenda Grace (Citizen), Virgil Ridings (Citizen), Joel Woltz (Citizen), Donna Hazelwood (Citizen), Samantha Tucker (Citizen), Vickie Hatton (Citizen), Angela Rankins (Citizen), Jeff Whittinghill (Citizen), Joan Tighe (Citizen), Edward Prigge (Citizen), Ronnie Trogden (Citizen), Candace Granstaff (Citizen), Allan Smith (Citizen), Jim Nation (Citizen), Sarah Grayson (Citizen), R. Wesley Pace (Citizen), Joe Armstrong (Citizen), Bridgett Reed (Citizen), Amanda Bifone (Citizen), William Bishop (Citizen), Randall Lamb (Citizen), John Rice (Citizen), Stephen Secchio (Citizen), Brian Slone (Citizen), Pam Yancy (Citizen), Sherian Tingle (Citizen), Mike Alexander (Citizen), Genevieve Apodaca (Citizen), Claudia Hargrove (Citizen), Jacqueline Burchett (Citizen), Colleen Crigler (Citizen), Teddy Williams (Citizen), Teresa Smith (Citizen), Spencer
Skaats (Citizen), Angela Armato (Citizen), Craig Newman (Citizen), Jerome Lawson (Citizen), Stephanie Ramsey (Citizen), David Foushee (Citizen), Patrick McCamish (Citizen), Amy Meadors (Citizen), Danny Fletcher (Citizen), Dennis Stafford (Citizen), James Roark (Citizen), Judy Roark (Citizen), Billie Stafford (Citizen), Linda Rose (Citizen), Helen Bloodsworth (Citizen), Naomi Webb (Citizen), Anna Reeder (Citizen), Ella Lonas (Citizen), Becky Schmidt (Citizen), Tammy Skaats (Citizen), Cheryl Sadler (Citizen), Angie Christensen (Citizen), Jay Bond, Sr. (Citizen), Diana Diggles (Citizen), Linda Bryant (Citizen), Charlotte Purcell (Citizen), Regina Eckle (Citizen), Donald F. Inks, Jr. (Citizen), Rita Isham (Citizen), Erin Seaman (Citizen), Jay Dargan (Citizen), Jim McHale (Citizen), Tim Boll (Citizen), Sherry Gaines (Citizen), Brenda Kabler (Citizen), Steve Flinchum (Citizen), William Marvel (Citizen), Gary Rogers (Citizen), Randy Riblet (Citizen), Johnny E. Evans (Citizen), Debra Smith (Citizen), Marvin Oliver (Citizen), Terry Sears (Citizen), John Sparks (Citizen), Eileen Serke (Citizen), Frank Simon (Citizen), Mary McFlower (Citizen), Gary Buckley (Citizen), Beverly Buckey (Citizen), Roberta Dorsey (Citizen), Velma Newsom (Citizen), Steve Rudy (Citizen), Ken Collins (Citizen), JoeAnn Collins (Citizen), Vickie Hatton (Citizen), Elsie R. Hall (Citizen), Esther Whitley (Citizen), Florence Molnar (Citizen), Regina Smith (Citizen), Bobby Alexander (Citizen), Steve Lorimer (Citizen), JoAnn Davis (Citizen), Kimberly Wood (Citizen), Glenda M. Cogan (Citizen), Frank Simon (Citizen), Sharon Almquist (Citizen), Rob Jones (Citizen), James Champ (Citizen), Ralph Hawkins (Citizen), Stephan Schick Sr. (Citizen), Linda Horback (Citizen), Colin Bruner (Citizen), David Bartsch (Citizen), Shirley Mayrand (Citizen), Michelle Truitt, (Citizen), Karl and Jennifer Dolson (Citizen), Maureen Carman (Citizen), Valerie O’Rear (Retired Colonel and mother), Steve Shreeve (Parent), Shannon Buzard (Parent), Matt Singleton (Citizen), Sandra Stotsky (Professor), Elsie Hall (Citizen), and Glenda Cogan (Citizen).

(b) Response: No changes have been made in response to these comments. The Kentucky Board of Education reaffirmed its support of the Kentucky Core Academic Standards for English/language arts and mathematics at its April 2013 meeting.

The agency has determined that the federal government played no role in the development of the Common Core State Standards and does not govern the Common Core State Standards initiative. The Common Core State Standards are not a curriculum. They are a clear set of expectations for the knowledge and skills will help students succeed. Nothing in the Kentucky Core Academic Standards discusses or requires curriculum. In Kentucky, the state determines academic standards, or the goals for what each child should know and be able to do by the end of each grade level. Curriculum is set at the local level. Local school districts determine the best curriculum to help the teachers in their schools meet these academic standards. It remains up to each local school district, not the state or federal government, to select curriculum.

The agency notes that states do not field-test standards. Standards are goals and cannot be field-tested. The agency has been unable to locate scholarly research on the viability of, or mechanism for, field testing educational standards.
The agency has determined that the twenty-five member validation committee referenced in a comment was composed of those leading the field of standards development. The members of the validation committee were selected by six governors and chief state school officers, based on nominations. All selected members had demonstrated experience in national and international standards development, or had a reputation of expertise in English/language arts, mathematics, or a related field such as special education, English language learners, assessments, or curriculum development. The validation committee’s charge was to validate the process used to develop the standards and assess the evidence-base for the standards. Twenty-three of the twenty-five members validated the development and evidentiary basis of the standards. The agency has determined that the ninety-two percent (92%) agreement rate among the members of the validation committee is sufficient to grant weight to the conclusions of the committee.

The agency notes that the National Governors Association and the Council of Chief State School Officers accepted applications, from across the nation, of content experts to serve on the standards drafting team. While no Kentuckians were selected to serve on the drafting team for the standards, during the drafting process Kentucky teachers, administrators, higher education officials, education partners, the public, and the staffs of the three participating agencies (Council on Postsecondary Education, Education Professional Standards Board, the Kentucky Department of Education) had several opportunities to provide feedback on drafts of the standards. Subsequent drafts reflected the feedback provided by Kentuckians. Several versions of the standards were publicized for teacher and public feedback. Kentucky teachers were very positive about the standards and expressed that their collective voices had been heard.

The agency has determined that the Common Core Standards, adopted in Kentucky as the Kentucky Core Academic Standards for English/language arts and mathematics, are considerably more rigorous than Kentucky’s previous standards. An independent study by the Thomas B. Fordham Institute gives the Kentucky Core Academic Standards considerably better grades in content, rigor, clarity, and specificity than previous standards that it called “among the worst in the country.” Kentucky’s colleges and universities and the business community have advised the agency that students who graduate from high school with mastery of these standards will be prepared for the rigors of postsecondary education and the workforce. These standards were developed to be comparable with those of any other state in the nation and with the standards of any other country in the world.

Comments regarding the rigor of the standards were inconsistent. While some commenters stated that the standards are dumbing down students, others indicated concern that the standards are too complex. Given the wide range of opinions, the agency is unable to reconcile these opposing comments and chooses to rely upon the expertise of the content specialists involved in the development of the content standards.

Innovation may be a part of the classroom experience for every student, irrespective of the standards adopted at the state level. Curriculum decisions and teacher attitudes and behaviors have far more impact on innovation than state standards. Since curriculum
decisions are made at the local, not state, level, the agency has determined that the proposed standards will not have a negative impact on student innovation. Recent Districts of Innovation legislation supports local districts in providing innovation opportunities for their students, as well.

The agency notes that the Common Core Standards are now in their third year of implementation. While early results have shown lower test scores in the elementary grades, as the material being taught and tested has become more rigorous, the college readiness of high school graduates entering postsecondary education in Kentucky has increased dramatically.

The first year the Kentucky Core Academic Standards were implemented in Kentucky schools, the percentage of students prepared to take credit-bearing college courses increased more than six percent, as measured on the ACT college entrance exam. In Education Week’s 2012 “Quality Counts” report on key education indicators, policy efforts and outcomes, Kentucky ranked 10th in the nation—moving up from 34th place in 2010.

The current social studies standards have not been revised since 2006, and are not part of the Common Core Standards or the Next Generation Science Standards, both adopted as Kentucky Core Academic Standards. The current social studies standards are being amended at this time. “Republic” is specifically mentioned in the standards at the 6th grade level.

(17) Subject Matter: Sharing personal student information:

(a) Comment: A commenter stated a concern about the sharing of a child’s personal information through the Individual Learning Plan (ILP). The commenter stated that the ILP is used to plan for course offerings, and contains personal information about a child’s academic progress that should not be shared. The commenter has indicated these concerns to the child’s school. The commenter expressed concern about the credits required of students, including electives connected to the ILP. The commenter also expressed concern about the protection of the student’s health information because HIPPA does not allow access to that information. The commenter stated that schools are not medical institutions, but that schools need medical information when a student registers.

A commenter stated that he was against using a P-20 data system to conduct “surveillance” on students.

Those speaking or submitting written comments on sharing personal student information were: Shannon Buzard (Parent), Steve Shreeve (Parent), Maureen Carman (Attorney), and Kim Houlihan (Parent).

(b) Response: No changes have been made in response to these comments. The agency has determined that the Next Generation Science Standards, to be adopted as the
Kentucky Core Academic Standards for Science, do not address the collection of personal information on students, but confine themselves to content standards.

No new data collection is required as part of the standards initiative and standards are not tied to data collection at the state or local level. Neither the agency nor local school districts have collected data, for example, on religious affiliation. Neither the agency nor local school districts have the technology to collect biometric data on students. Student data are highly protected, and agency efforts around student data systems fully comply with the law by adopting data privacy and security protections that meet the highest industry standards, exceed federal (Family Educational Rights and Privacy Act or FERPA) requirements, and are designed to ensure that student data are used only for agreed-upon education purposes and not further disclosed. In no case would student data be sold. The data is owned by school districts, and the agency protects data in compliance with federal and state laws.

Personal information about an individual student (including identifying information, assessment results, interests, and abilities) in the Kentucky Individual Learning Plan (ILP) is only visible viewed by the student, the parent(s), the student’s advisor, the ILP coordinator at the school, and the ILP coordinator at the district level. No individual student data is reported publicly for the ILP. The “Invite Others Option” of the ILP allows a student to invite colleges, scholarship opportunity providers, or potential employers to view selected portions of the ILP for a limited amount of time. However, parents may choose to disable this option for their student.

Safety and confidentiality are very important to the agency, which will continue to protect all student information.

(18) Subject Matter: The development and adoption process for the Kentucky Core Academic Standards for Science

(a) Comment: Commenters referred specifically to the development and adoption process for the Next Generation Science Standards, adopted as the Kentucky Core Academic Standards for Science, stated that they had confidence in the process used to develop the standards, and thought that the adoption process was strong.

A commenter stated that the adoption process allowed the standards to be well-vetted by those knowledgeable in content, and recommended that the Next Generation Science Standards be adopted, as the Kentucky Core Academic Standards for Science, in their entirety.

A commenter supported the introduction of science concepts in early grade levels, and stated that the standards should be adopted and implemented as written.

One commenter stated that Kentucky should invite input on the standards from Kentucky post-secondary institutions.
A commenter stated that development and adoption of all academic standards needs to be done slowly, and standards that have been adopted need to be revisited.

A commenter stated that the adoption of the Kentucky Core Academic Standards for Science was rushed and the standards were not available long enough for independent review.

A commenter stated that the Next Generation Science Standards were not created through the process outlined in Senate Bill 1 (2009) and did not involve Kentucky educators and parent in any meaningful way because the proposed standards were developed at the national level.

Those speaking or offering written comments on the development and adoption process were: Blaine Ferrell (Kentucky Academy of Science), Tom Tretter (Kentucky Science Teachers Association), Daniel Phelps (Kentucky Paleontological Society), James Donaldson (Citizen), Maureen Carman (Citizen), Valerie O’Rear (Citizen), and Richard Innes (Bluegrass Institute for Public Policy Solutions), Martin Cothran (Citizen), Cindy Rausch (Citizen), Sandra Stotsky (Professor), Nick Brooks (Kentucky Science Teachers Association), Amanda Underwood (Kentucky Science Teachers Association), David Helm (Kentucky Science Teachers Association), Sherry Fox (Kentucky Science Teachers Association), Clara Fulkerson (Kentucky Science Teachers Association), and Rita Jane Shelton (Kentucky Science Teachers Association).

(b) Response: No changes have been made in response to these comments. The Common Core Standards, adopted as the Kentucky Core Academic Standards for English/language arts and mathematics, went through a rigorous drafting and review process.

The agency notes that the National Governors Association and the Council of Chief State School Officers accepted applications, from across the nation, of content experts to serve on the standards drafting team. While no Kentuckians were selected to serve on the drafting team for the standards, during the drafting process Kentucky teachers, administrators, higher education officials, education partners, the public, and the staffs of the three participating agencies (Council on Postsecondary Education, Education Professional Standards Board, the Kentucky Department of Education) had several opportunities to provide feedback on standards drafts. Subsequent drafts reflected the feedback provided by Kentuckians. Several versions of the standards were publicized for teacher and public feedback. Kentucky teachers were very positive about the standards and expressed that their collective voices had been heard.

The agency has determined that the Common Core Standards, adopted in Kentucky as the Kentucky Core Academic Standards for English/language arts and mathematics, are considerably more rigorous than Kentucky’s previous standards. An independent study by the Thomas B. Fordham Institute gives the Kentucky Core Academic Standards considerably better grades in content, rigor, clarity, and specificity than previous standards which it called “among the worst in the country.” Kentucky’s colleges and universities and the business community have advised the agency that students who
graduate from high school with mastery of these standards will be prepared for the rigors of postsecondary education and the workforce. These standards were developed to be comparable with those of any other state in the nation and with the standards of any other country in the world.

The National Research Council (NRC), the staff arm of the National Academy of Sciences, began the drafting of the Next Generation Science Standards by developing the Framework for K–12 Science Education. The Framework was a critical first step because it is grounded in the most current research on science and science learning and identified the science all K–12 students should know. To undertake this effort, the NRC convened a committee of 18 individuals nationally and internationally known in their respective fields. The committee was composed of practicing scientists, including two Nobel laureates, cognitive scientists, science education researchers, and science education standards and policy experts. In addition, the NRC used four design teams to develop the Framework. These design teams, in physical science, life science, earth/space science, and engineering, developed the framework for their respective disciplinary area. A public draft was released in July of 2010. The NRC reviewed comments and considered all feedback prior to releasing the final Framework on July 19, 2011.

In a process managed by Achieve, states led the development of K–12 science standards, rich in content and practice, arranged in a coherent manner across disciplines and grades to provide all students an internationally-benchmarked science education. The Next Generation Science Standards are based on the Framework and will prepare students for college and careers. The Next Generation Science Standards were developed collaboratively with states and other stakeholders in science, science education, higher education and industry. Additional review and guidance was provided by advisory committees composed of nationally-recognized leaders in science and science education as well as business and industry. As part of the development process, the standards underwent multiple reviews, including two public drafts, allowing all who have a stake in science education an opportunity to inform the development of the standards. The standards underwent significant revision based upon the feedback received. According to Achieve, Kentucky residents responded to the first public draft at the highest percentage rate of any state, and were in the top 15% of states in responding to the second public release.

Kentucky was one of the 26 states that partnered in this collaborative state-led drafting process. About 40 Kentuckians, including P-12 science teachers and (including teachers specifically representing the Kentucky Education Association and Kentucky Science Teachers Association), state science and policy staff, higher education faculty, scientists and engineers were involved in multiple reviews of draft documents over the course of the standards development process.

The agency has determined that standards were developed slowly and thoughtfully, with input from stakeholders, and that the development and adoption process has been transparent and thorough.
(19) Subject Matter: Role of state and local district in standards and curriculum decisions

(a) Comment: A commenter stated that Senate Bill One did not authorize educational standards. The same commenter stated that Section 2 of the Kentucky Constitution requires the legislature to vote upon standards, and that Federal Law Section 1905 forbids federal control of curriculum.

A commenter indicated that he contacted his local school about curriculum so that he could see how the Kentucky Core Academic Standards for English/language arts and mathematics were being taught.

Commenters stated that vocabulary should play an important role in a student’s instruction and that they were surprised to not see certain vocabulary words in the standards.

A commenter expressed concern about the absence of famous scientists and the history of science from the Next Generation Science Standards.

Commenters stated that parents should have a voice in the curriculum that is taught in their schools and that curriculum had led to the decision to homeschool their children.

A commenter stated that Kentucky law (KRS 156.438) provides a statutory right to challenge curriculum errors.

A commenter stated that, if the new curriculum is adopted, parents should pull their children out of public school.

A commenter stated that, based upon the commenter’s review of the minutes of the March 22, 1999 Education and Assessment and Accountability Review Subcommittee, and the indication in those minutes that an agency employee stated that if core content was adopted in regulation form, it would be a violation of law for a teacher not to teach in the classroom, a legal concept known as “Fair Notice” probably means that subjects omitted from the Next Generation Science Standards cannot be tested in any Kentucky high school assessments.

Those speaking or providing written comments regarding the role of the state and local school districts in standards and curriculum decisions were: Steve Shreeve (Parent), Sharron Buzard (Parent), Kim Houlihan (Parent), Aaron (Chad) Erhardt (Citizen), Adrien Gilbert (Citizen), Maureen Carman (Citizen), Richard G. Innes (Bluegrass Institute for Public Policy Solutions), and Martin Cothran (Citizen).

(b) Response: No change has been made in response to these comments. SB 1 (2009) amended KRS 158.6453. Section (2) (a) directed the Kentucky Department of Education, within thirty (30) days of March 25, 2009, to plan and implement a comprehensive
process for revising the academic content standards in science. Section (2) (b) compels the Kentucky Department of Education to revise content standards to:

- Focus on critical knowledge, skills, and capacities needed for success in the global economy;
- Result in fewer but more in-depth standards to facilitate mastery learning;
- Communicate expectations more clearly and concisely to teachers, parents, students, and citizens;
- Be based on evidence-based research;
- Consider international benchmarks; and
- Ensure that the standards are aligned from elementary to high school to postsecondary education so that students can be successful at each education level.

Because SB 1 (2009) both authorizes and expressly compels the revision of science content standards, the agency has determined that, contrary to comment, the proposed regulation fully complies with the letter and intent of the authorizing statute.

Section Two of the Kentucky Constitution states as follows: *Absolute and arbitrary power over the lives, liberty and property of freemen exists nowhere in a republic, not even in the largest majority.* In promulgating this administrative regulation, the agency has complied with the directives of the legislative branch of government as memorialized in KRS 158.6453. The agency’s compliance with statutory mandate does not constitute the exercise of absolute or arbitrary power as contemplated by Section Two of the Kentucky Constitution. The commenter may, through other means, challenge the constitutional validity of KRS 158.6453, the enabling statute, upon which the agency has relied in promulgating this regulation.

The agency has determined that the comment regarding a prohibition against federal control of curriculum regards 20 USC § 6575, which states: *Nothing in this title shall be construed to authorize an officer or employee of the Federal Government to mandate, direct, or control a State, local educational agency, or school’s specific instructional content, academic achievement standards and assessments, curriculum, or program of instruction.*

The standards are not a curriculum. The standards are a clear set of expectations for what knowledge and skills will help students succeed. Nothing in the Kentucky Core Academic Standards discusses or requires certain curriculum. In Kentucky, the state sets academic standards, or the goals for what each child should know and be able to do by the end of each grade level. Curriculum is set at the local level. This division between goals and curriculum remains in place under these standards. Local school districts determine the best curriculum to help the teachers in their schools meet these academic standards. Decisions about curriculum at the school level are made by the School Based Decision Making (SBDM) Council. KRS 160.345 gives the SBDM council control of the curriculum of the school and the council must be composed of three (3) teachers, two (2) parents, and one administrator. The control of curriculum rests with the council.
Regarding the process of correcting claims of factual errors in curriculum, KRS 156.438 directs the Kentucky Board of Education to promulgate administrative regulations to establish procedures for reviewing and resolving claims of factual errors found in textbooks after adoption by the State Textbook Commission. This 2011 statute provides an opportunity for an individual to file notice of what is believed to be a factual error, or factual errors, in a textbook that has been adopted by the Kentucky Textbook Commission. The proposed regulation does not involve adopted textbooks, and the procedure cited by the commenter does not apply to the proposed regulation.

The agency has carefully considered the comment regarding “fair notice” and relating to assessment, which is outside the scope of this regulation. 704 KAR 3:303 relates entirely to academic standards and not to assessment. The commenter cited the minutes of the March 22, 1999 Education and Assessment and Accountability Review Subcommittee as binding legal precedent that controls the Next Generation Science Standards and the Kentucky Core Academic Standards for Science. The agency does not agree. While KRS 61.835 provides that the minutes of action taken at every meeting of a public agency, such as the Education and Assessment and Accountability Review Subcommittee, set forth an accurate record of votes and actions at such meetings, the agency is unaware of any authority for the proposition that such minutes set forth an accurate record of responses given in answer to questions posed by representatives. In other words, the minutes do not pretend to serve as an official transcript of all statements made during subcommittee meetings. Regardless, the commenter suggested that a statement made by an employee of the agency, regarding regulation in existence in 1999, binds present action by the agency.

Legal authority on “fair notice” is normally applied in the context of criminal prosecutions. The Due Process provisions of the Fifth Amendment to the United States Constitution require that citizens be afforded fair notice of precisely what conduct is prohibited. See, for example, U.S. v. Blaszak, 349 F.3d 881 (6th Cir. 2003.) The comment suggests a novel application of constitutional due process protections.

In any event, 704 KAR 3:303 has been amended repeatedly in past fourteen years, and the agency is obligated to honor the directives imposed upon it by the legislature as the legislature has also amended the statutes from which the agency’s regulatory authority is drawn. The agency is compelled to adhere to present law and does so in promulgating this regulation. While the 1999 legislative record has historic value, it does not constrain the agency’s obligations under present law.

(20) Subject Matter: Religious neutrality of the Next Generation Science Standards.

(a) A commenter stated that the standards promote evolution as faith rather than the fact of creationism.

A commenter stated the standards employ the rule of methodological naturalism. The commenter asserted that it is the goal of the Framework that children develop a
materialistic/atheistic religious worldview and that the Framework usurps the religious rights of parents, students and taxpayers.

A commenter stated that atheists dominate the field of science and proselytize for atheism as a religion using public funds. The commenter stated that atheism is a religion of a denial of reality, teaching that there is no other entity greater than self.

A commenter stated that the standards are not religiously neutral but that they promote the religious viewpoint of human secularism. The commenter cited the case of McCowan and Maryland for the proposition that there can be both theistic and atheistic religions.

Those speaking or offering written comments on the religious neutrality of the Next Generation Science Standards were: Adrian Gilbert (Citizen), Valerie O’Rear (Citizen), Robert P. Lattimer, Ph.D (Citizens for Objective Public Education), and Herman Cummings (Georgia resident).

(b) Response: No changes have been made in response to comments regarding the religious neutrality of the Next Generation Science Standards. Evolution is long established as a scientific theory and not a religious doctrine. The wide acceptance of the idea of evolution is the result of the consideration of physical and observational evidence. The acceptance of a set of religious beliefs is based largely on faith. There is no conflict between holding faith-based religious beliefs and also accepting the evidence supporting biological evolution. This is evidenced by the fact that practitioners of many different religious faiths are also biologists who study and apply the ideas of evolution in their everyday professional practice.

Case law establishes that evolution is not a religion and that teaching evolution does not violate the Establishment Clause. Epperson v. Arkansas, 393 U.S. 97 (1968). In McGowan v. Maryland, 366 U.S. 420 (1961), the United States Supreme Court held that laws with religious origins are not unconstitutional if they have secular purpose. Subsequent United States Supreme Court jurisprudence (Epperson, supra, Edwards v. Aguillard, 482 U.S. 578 (1987)) invalidated laws that, respectively, prohibited the teaching of evolution and required that creation science be taught in public schools. As noted in Edwards, the Establishment Clause forbids the enactment of any law “respecting an establishment of religion.” Id. at 582. A three-pronged test determines whether legislation comports with the Establishment Clause. First, the legislature must have adopted the law with a secular purpose. Second, the statute's principal or primary effect must be one that neither advances nor inhibits religion. Third, the statute must not result in an excessive entanglement of government with religion. Id. at 583. State action violates the Establishment Clause if it fails to satisfy any of these prongs. Id.
comment that the Next Generation Science Standards present a constitutionally impermissible human secularism represents a conclusion of law, rather than a comment upon the content of the standards, and no change has been made in response.

(21) Subject Matter: Impact of the Next Generation Science Standards on the SAT

(a) Comment: A commenter asked how the standards being considered impact the SAT

Those speaking or providing written comments on the impact of the SAT were: Susan Buzard (Citizen).

(b) Response: No changes have been made in response to these comments. Science is not a component of the Scholastic Achievement Test. The Scholastic Achievement Test is a product of the College Board. The inherent nature of the proposed science standards, with their focus on science and engineering practices aligned to literacy practices, should result in increased performance on any test used to predict college success.

(22) Subject Matter: Impact of standards revision on students with disabilities

(a) Comment: A commenter stated that parents of children with disabilities who have trouble with science and math will object to the standards because the standards will marginalize these students.

A commenter stated that the standards will benefit students who struggle with disabilities because they will be able to engage with science as it moves from abstract paper and pencil concepts into exploration.

Those speaking or providing written comments regarding the impact of standards revision on students with disabilities were: Dena Stewart-Gore (citizen), Steve Shreeve (citizen), and Elizabeth Schmitz (Kentucky Environmental Education Council).

(b) Response: No changes have been made in response to these comments. Standards exist for all students without regard to disabilities. It is the responsibility of all teachers of students with disabilities to provide appropriate modifications and accommodations based on the child’s specific disability and the child’s Individual Education Plan.

The agency agrees that the Next Generation Science Standards will benefit all students, regardless of their disability status. Appendix D of the Next Generation Science Standards contains case studies illustrating how the standards can be effectively implemented with diverse students, including those with disabilities.
(23) Subject Matter: General Comments Related to Assessment

(a) Comments: A commenter said that the people writing the assessments are communists.

Commenters posed questions regarding assessment under the Next Generation Science Standards.

Those speaking or offering written comments were: Richard G Innes (Bluegrass Institute for Public Policy Solutions), Elsie Hall (Citizen), Maureen Carman (Attorney), and Cindy Rausch (Citizen).

(b) Response: No changes have been made in response to these comments. The agency has not investigated the political beliefs of the drafters of assessment tools and so cannot respond to the factual allegation regarding communism. The proposed regulation relates entirely to academic standards, and not to assessment, so no response to this comment is required.

(24) Subject Matter: General Regulation Changes

(a) Comment: Commenters requested four (4) changes to the document incorporated into this regulation (by reference) to ensure alignment with recent changes to 704 KAR 3:305.

Speaking or offering written comments requesting changes to the terms contained in the regulation were: Malicia T. Hitch (Protection and Advocacy).

(b) Response: No changes have been made in response to these comments. The agency agrees that these comments are well taken and the changes to the document incorporated by reference should be made, although it is most efficient to change the document incorporated by reference after all standards have been revised, as mandated by SB 1 (2009), rather than making such changes piecemeal, upon the revision of each set of standards.

Summary of Statement of Consideration and Action Taken by Promulgating Administrative Body

The agency has received significant comment related on 704 KAR 3:303, Required Academic Standards. Comments may be broadly categorized as: 1) general support for the science standards, 2) statements related to the continued inclusion of evolution, 3) statements related to the inclusion of climate change, 4) college and career readiness and economic impact, and 5) the lack of clarity regarding the roles of standards versus curriculum in education and implications of local control in curriculum decisions.

The agency received overwhelming support for the proposed science standards. A petition with 3700 names was submitted in support of the standards. Statements of support were
received from organizations such as the National Science Teachers Association, the Kentucky Science Teachers Association, the Kentucky Academy of Sciences, the Council of State Science Supervisors, the Kentucky Environmental Education Council, the Kentucky Section of the American Institute of Professional Geologists, and the Kentucky Association for Environmental Education. Supportive comments were also received from individual citizens. Common reasons cited in support of the standards included: positive economic impacts, improved college and career readiness, improved scientific literacy, and the need to foster the skills required to compete in the 21st Century.

The agency also received statements of support related to the inclusion of particular science topics such as climate change and evolution, stating that meaningful scientific debate on the validity of evolution and climate science has ceased. Proponents of the continued inclusion of evolution pointed to the overwhelming acceptance of evolution in the biological science community. Proponents of the inclusion of climate change education contend that Kentucky students deserve the most up to date science education, which includes climate change.

The agency also received comments in opposition. Over one hundred substantially identical emails were received stating an opposition to the continued inclusion of evolution in the proposed standards, characterizing evolution as a theory and not a fact. These commenters asked that intelligent design be added to the standards. Other commenters questioned the scientific validity of evolution. The agency also received several comments specific to the inclusion of climate change in the proposed standards, including concerns that climate change science was overemphasized to the neglect of other science concepts or that climate change is not a settled issue in the scientific community.

Some commenters cited a Thomas B. Fordham Institute report as a basis for opposing the adoption of the proposed science standards, claiming insufficient rigor for high school science courses. Some commenters expressed concern that the proposed standards will exclude many students with disabilities due to the standards’ complexity. Conversely, other commenters expressed confidence that the standards will lead to scientifically literate graduates that will be better prepared than current graduates who are beginning post-secondary experiences and will contribute meaningfully to Kentucky’s economy as members of a better prepared workforce.

Some comments reflected a lack of familiarity with the distinction between curriculum and standards, and the role of local district control of curriculum. Commenters suggested the inclusion of specific scientific topics that were not in the proposed standards. Several comments were not within the scope of this regulation.

The agency received comments in opposition to the Common Core standards. Those standards were adopted by the Kentucky Board of Education in 2010 and are not the focus of this regulation revision. The agency received comments on these standards because they are included in the document incorporated by reference in this regulation. Commenters in opposition to the Common Core claimed the Common Core standards are not rigorous, were developed by the federal government, have not been field tested, are not evidence-based, will be excessively costly to implement and were not validated by the entire validation
committee. Some commenters said the Common Core allow personal information to be collected on students.

The agency, having given thoughtful consideration to all comments submitted by the public, has made no changes to the proposed regulation.