

DEPARTMENT OF HEALTH AND HUMAN SERVICES

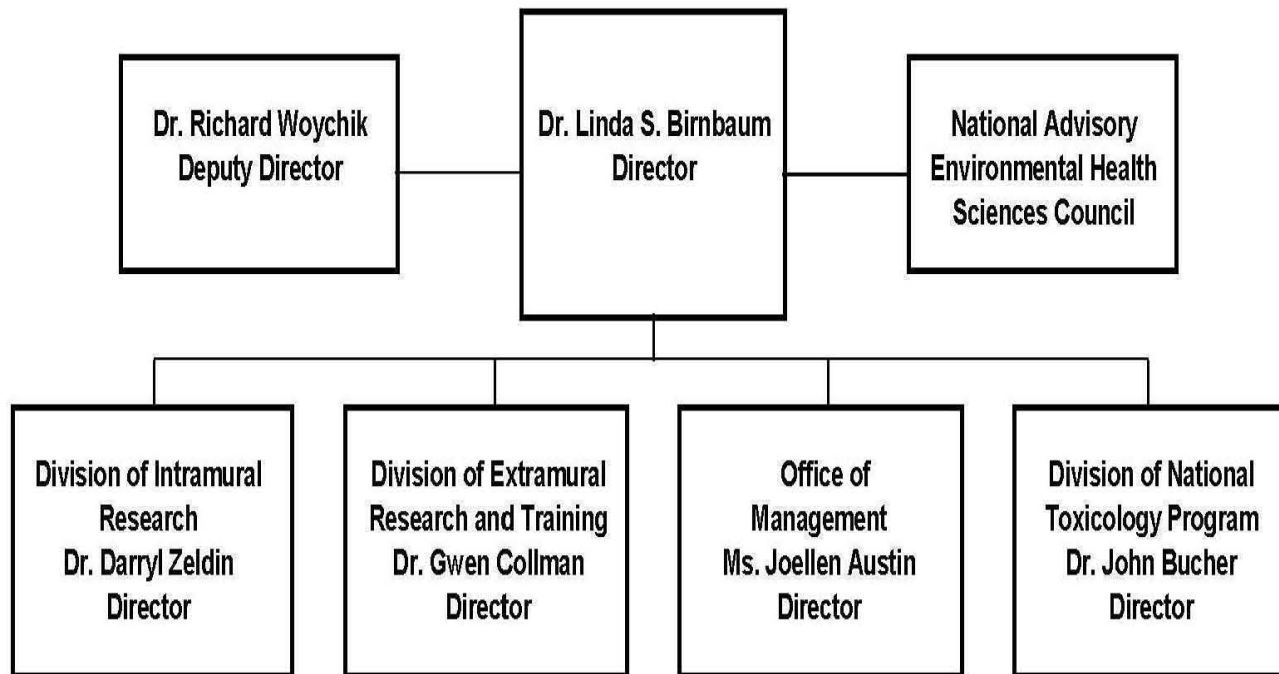
NATIONAL INSTITUTES OF HEALTH

National Institute of Environmental Health Sciences (NIEHS)

<u>FY 2015 Budget</u>	<u>Page No.</u>
Organization Chart.....	2
Appropriation Language.....	3
Amounts Available for Obligation.....	4
Budget Mechanism Table.....	5
Major Changes in Budget Request.....	6
Summary of Changes.....	7
Budget Graphs.....	9
Budget Authority by Activity.....	10
Authorizing Legislation.....	11
Appropriations History.....	12
Justification of Budget Request.....	13
Budget Authority by Object Class.....	23
Salaries and Expenses.....	24
Detail of Full-Time Equivalent Employment (FTE).....	25
Detail of Positions.....	26

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Organization Structure



NATIONAL INSTITUTES OF HEALTH

National Institute of Environmental Health Sciences

For carrying out section 301 and title IV of the PHS Act with respect to environmental health sciences, ~~【\$665,439,000】~~\$665,080,000.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Amounts Available for Obligation¹
(Dollars in Thousands)

Source of Funding	FY 2013 Actual	FY 2014 Enacted	FY 2015 President's Budget
Appropriation	\$685,571	\$665,439	\$665,080
Type 1 Diabetes	0	0	0
Rescission	-1,371	0	0
Sequestration	-34,411	0	0
Subtotal, adjusted appropriation	\$649,789	\$665,439	\$665,080
FY 2013 Secretary's Transfer	-3,791	0	0
OAR HIV/AIDS Transfers	0	0	0
Comparative transfers to NLM for NCBI and Public Access	-767	-915	0
National Children's Study Transfers	551	0	0
Subtotal, adjusted budget authority	\$645,782	\$664,524	\$665,080
Unobligated balance, start of year	0	0	0
Unobligated balance, end of year	0	0	0
Subtotal, adjusted budget authority	\$645,782	\$664,524	\$665,080
Unobligated balance lapsing	-82	0	0
Total obligations	\$645,700	\$664,524	\$665,080

¹ Excludes the following amounts for reimbursable activities carried out by this account:
FY 2013 - \$3,119 FY 2014 - \$3,208 FY 2015 - \$3,254

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences
Budget Mechanism - Total¹

(Dollars in Thousands)

MECHANISM	FY 2013 Actual		FY 2014 Enacted ²		FY 2015 President's Budget		FY 2015 +/- FY 2014	
	No.	Amount	No.	Amount	No.	Amount	No.	Amount
<u>Research Projects:</u>								
Noncompeting	455	\$176,207	452	\$176,510	425	\$171,127	-27	-\$5,383
Administrative Supplements	(21)	1,771	(21)	1,771	(21)	1,771	(0)	0
<u>Competing:</u>								
Renewal	27	10,843	21	9,051	21	9,051	0	0
New	124	41,595	140	46,874	143	47,820	3	946
Supplements	6	2,301	5	2,000	5	2,000	0	0
Subtotal, Competing	157	\$54,738	166	\$57,925	169	\$58,871	3	\$946
Subtotal, RPGs	612	\$232,717	618	\$236,206	594	\$231,769	-24	-\$4,437
SBIR/STTR	45	13,324	47	14,494	47	14,494	0	0
Research Project Grants	657	\$246,041	665	\$250,700	641	\$246,263	-24	-\$4,437
<u>Research Centers:</u>								
Specialized/Comprehensive	19	\$30,213	20	\$32,549	20	\$32,549	0	\$0
Clinical Research	0	0	0	0	0	0	0	0
Biotechnology	0	0	0	0	0	0	0	0
Comparative Medicine	0	0	0	0	0	0	0	0
Research Centers in Minority Institutions	0	0	0	0	0	0	0	0
Research Centers	19	\$30,213	20	\$32,549	20	\$32,549	0	\$0
<u>Other Research:</u>								
Research Careers	49	\$6,427	56	\$6,799	56	\$6,799	0	\$0
Cancer Education	0	0	0	0	0	0	0	0
Cooperative Clinical Research	0	0	0	0	0	0	0	0
Biomedical Research Support	0	0	0	0	0	0	0	0
Minority Biomedical Research Support	0	0	0	200	0	200	0	0
Other	29	3,003	26	2,431	26	2,431	0	0
Other Research	78	\$9,430	82	\$9,430	82	\$9,430	0	\$0
Total Research Grants	754	\$285,685	767	\$292,679	743	\$288,242	-24	-\$4,437
<u>Ruth L Kirchstein Training Awards:</u>	<u>FTTPs</u>		<u>FTTPs</u>		<u>FTTPs</u>		<u>FTTPs</u>	
Individual Awards	42	\$1,981	42	\$2,035	42	\$2,076	0	\$41
Institutional Awards	382	17,009	382	17,477	382	17,826	0	349
Total Research Training	424	\$18,990	424	\$19,512	424	\$19,902	0	\$390
Research & Develop. Contracts <i>(SBIR/STTR) (non-add)</i>	131 (0)	\$140,880 (102)	133 (0)	\$144,988 (176)	133 (0)	\$149,195 (176)	0 (0)	\$4,207 (0)
Intramural Research	536	176,909	536	181,667	536	183,492	0	1,825
Res. Management & Support	136	23,318	136	24,008	136	24,249	0	241
<i>Res. Management & Support (SBIR Admin) (non-add)</i>	(0)	(1)	(0)	(288)	(0)	(288)	(0)	(0)
Construction		0		0		0		0
Buildings and Facilities		0		0		0		0
Total, NIEHS	672	\$645,782	672	\$664,524	672	\$665,080	0	\$556

¹ All items in italics and brackets are non-add entries. FY 2013 and FY 2014 levels are shown on a comparable basis to FY 2015.

² The amounts in the FY 2014 column take into account funding reallocations, and therefore may not add to the total budget authority reflected herein.

Major Changes in the Fiscal Year 2015 President's Budget Request

Major changes by budget mechanism and/or budget activity detail are briefly described below. Note that these highlights will not sum to the total change for the FY 2015 President's Budget for NIEHS, which is \$0.556 million above the FY 2014 Enacted level, for a total of \$665.080 million.

Research Project Grants (RPGs) (-\$4.437 million; total \$246.263 million):

NIEHS plans to support a total of 641 RPG awards in FY 2015. Noncompeting RPGs will decrease by 27 awards and \$5.383 million from the FY 2014 Enacted level. This is primarily due to the completion of seven Requests for Applications (RFAs). Competing RPGs will increase by three awards and \$0.946 million. NIEHS will continue to support new investigators in FY 2015.

Exposure Research (-\$2.686 million; total \$50.325 million):

The decrease in this program is due to the completion of RFA ES-09-011, Engineered Nanomaterials: Linking Physical and Chemical Properties to Biology.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Summary of Changes¹

(Dollars in Thousands)

FY 2014 Enacted				\$664,524
FY 2015 President's Budget				\$665,080
Net change				\$556
CHANGES	FY 2015 President's Budget		Change from FY 2014	
	FTEs	Budget Authority	FTEs	Budget Authority
A. Built-in:				
1. Intramural Research:				
a. Annualization of January 2014 pay increase & benefits		\$78,060		\$197
b. January FY 2015 pay increase & benefits		78,060		585
c. Zero more days of pay (n/a for 2015)		78,060		0
d. Differences attributable to change in FTE		78,060		0
e. Payment for centrally furnished services		22,833		0
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		82,599		1,393
Subtotal				\$2,175
2. Research Management and Support:				
a. Annualization of January 2014 pay increase & benefits		\$16,184		\$41
b. January FY 2015 pay increase & benefits		16,184		121
c. Zero more days of pay (n/a for 2015)		16,184		0
d. Differences attributable to change in FTE		16,184		0
e. Payment for centrally furnished services		1,914		0
f. Increased cost of laboratory supplies, materials, other expenses, and non-recurring costs		6,151		105
Subtotal				\$267
Subtotal, Built-in				\$2,442

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Summary of Changes - Continued¹

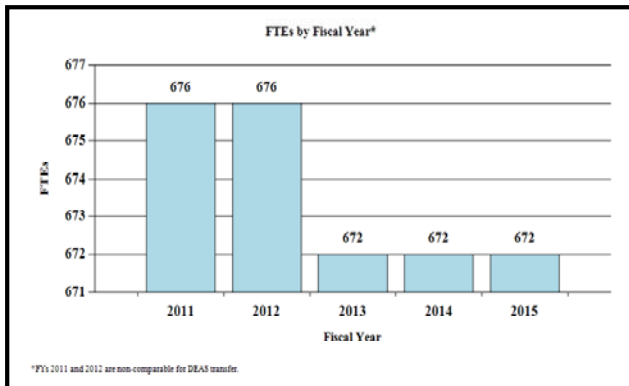
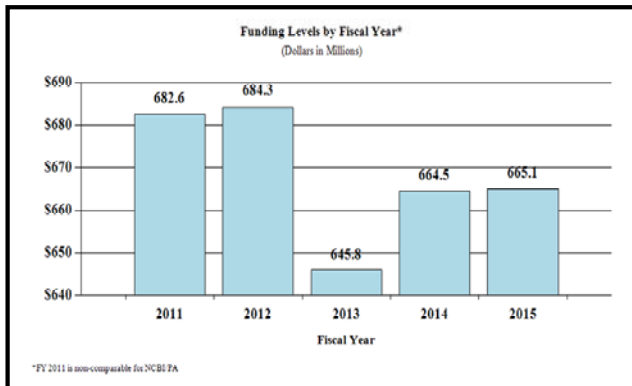
(Dollars in Thousands)

CHANGES	FY 2015 President's Budget		Change from FY 2014	
	No.	Amount	No.	Amount
B. Program:				
1. Research Project Grants:				
a. Noncompeting	425	\$172,898	-27	-\$5,383
b. Competing	169	58,871	3	946
c. SBIR/STTR	47	14,494	0	0
Subtotal, RPGs	641	\$246,263	-24	-\$4,437
2. Research Centers	20	\$32,549	0	\$0
3. Other Research	82	9,430	0	0
4. Research Training	424	19,902	0	390
5. Research and development contracts	133	149,195	0	4,207
Subtotal, Extramural		\$457,339		\$160
6. Intramural Research	<u>FTEs</u> 536	\$183,492	<u>FTEs</u> 0	-\$350
7. Research Management and Support	136	24,249	0	-26
8. Construction		0		0
9. Buildings and Facilities		0		0
Subtotal, Program	672	\$665,080	0	-\$216
Total changes				\$556

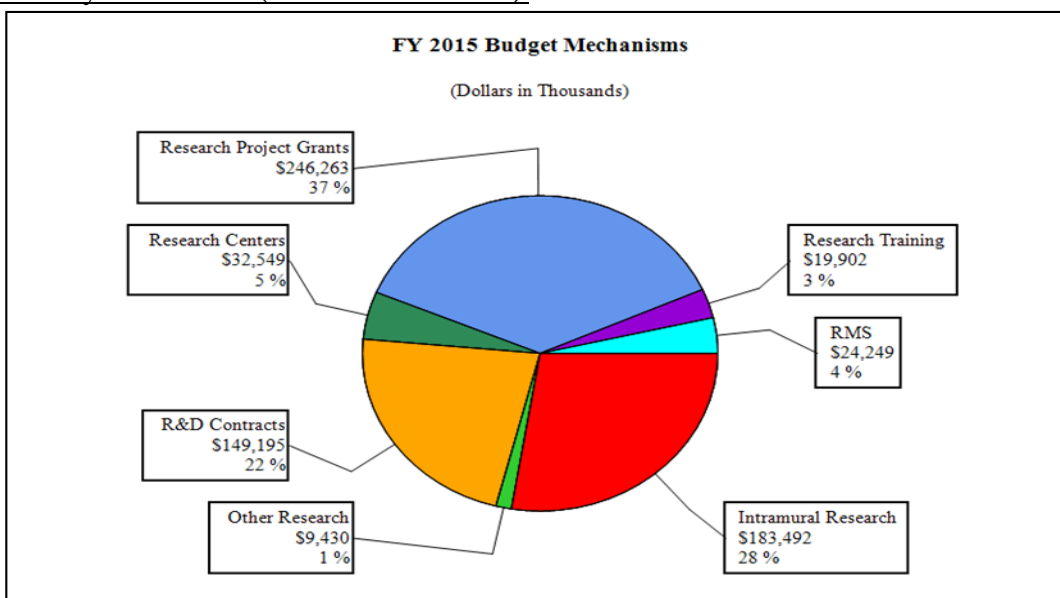
¹ The amounts in the Change from FY 2014 column take into account funding reallocations, and therefore may not add to the net change reflected herein.

Fiscal Year 2015 Budget Graphs

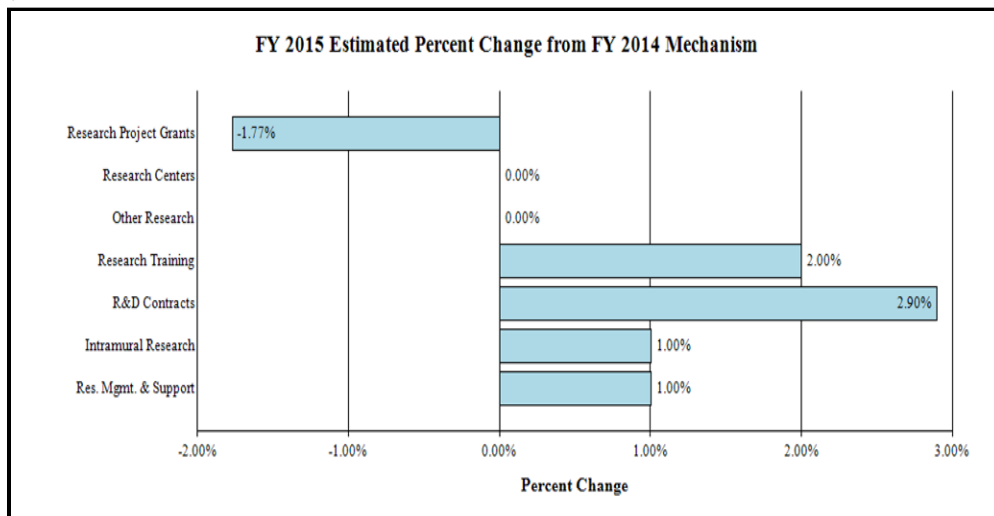
History of Budget Authority and FTEs:



Distribution by Mechanism (dollars in thousands):



Change by Selected Mechanism:



NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Budget Authority by Activity¹
(Dollars in Thousands)

	FY 2013 Actual		FY 2014 Enacted ²		FY 2015 President's Budget		FY 2015 +/- FY 2014	
	FTE	Amount	FTE	Amount	FTE	Amount	FTE	Amount
<u>Extramural Research</u>								
<u>Detail</u>								
Fundamental Research		\$160,307		\$168,072		\$169,708		\$1,636
Exposure Research		57,074		53,011		50,325		-2,686
Translational Research and Special Populations		105,350		109,427		110,247		820
Predictive Toxicology		83,249		85,753		85,753		0
Training and Education		39,574		40,916		41,306		390
Subtotal, Extramural		\$445,555		\$457,179		\$457,339		\$160
Intramural Research	536	\$176,909	536	\$181,667	536	\$183,492	0	\$1,825
Research Management & Support	136	\$23,318	136	\$24,008	136	\$24,249	0	\$241
TOTAL	672	\$645,782	672	\$664,524	672	\$665,080	0	\$556

¹ Includes FTEs whose payroll obligations are supported by the NIH Common Fund.

² The amounts in the FY 2014 column take into account funding reallocations, and therefore may not add to the total budget authority reflected herein.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Authorizing Legislation

	PHS Act/ Other Citation	U.S. Code Citation	2014 Amount Authorized	FY 2014 Enacted	2015 Amount Authorized	FY 2015 President's Budget
Research and Investigation	Section 301	42§241	Indefinite		Indefinite	
National Institute of Environmental Health Sciences	Section 401(a)	42§281	Indefinite	\$664,524,000	Indefinite	\$665,080,000
Total, Budget Authority				\$664,524,000		\$665,080,000

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Appropriations History

Fiscal Year	Budget Estimate to Congress	House Allowance	Senate Allowance	Appropriation
2005 Rescission	\$650,027,000	\$650,027,000	\$655,100,000	\$650,027,000 (\$5,522,000)
2006 Rescission	\$647,608,000	\$647,608,000	\$667,372,000	\$647,608,000 (\$6,476,000)
2007 Rescission	\$637,323,000	\$637,323,000	\$641,292,000	\$642,002,000 \$0
2008 Rescission	\$637,406,000	\$652,303,000	\$656,176,000	\$653,673,000 (\$11,420,000)
2009 Rescission Supplemental	\$642,875,000	\$664,980,000	\$660,767,000	\$662,820,000 \$0 \$3,416,000
2010 Rescission	\$684,257,000	\$695,497,000	\$683,149,000	\$689,781,000 \$0
2011 Rescission	\$707,339,000		\$706,227,000	\$689,781,000 (\$6,057,112)
2012 Rescission	\$700,537,000	\$700,537,000	\$676,033,000	\$686,869,000 (\$1,298,182)
2013 Rescission Sequestration	\$684,030,000		\$686,103,000	\$685,570,818 (\$1,371,142) (\$34,410,941)
2014 Rescission	\$691,348,000		\$686,753,000	\$665,439,000 \$0
2015	\$665,080,000			

Justification of Budget Request

National Institute of Environmental Health Sciences

Authorizing Legislation: Section 301 and title IV of the Public Health Service Act, as amended.

Budget Authority (BA):

	FY 2013 Actual	FY 2014 Enacted	FY 2015 President's Budget	FY 2015 +/- FY 2014
BA	\$645,782,226	\$664,524,000	\$665,080,000	+\$556,000
FTE	672	672	672	0

Program funds are allocated as follows: Competitive Grants/Cooperative Agreements; Contracts; Direct Federal/Intramural and Other.

Director's Overview

A person's health is determined by multiple factors, including their genes, age, and environment. Of these, the only one that can be readily changed or avoided is exposures in the environment. The environment includes everything we touch or consume: our food, water, air, and the other substances we encounter in our daily lives. In seeking to create a knowledge base to prevent and treat disease and disability related to the environment, the National Institute of Environmental Health Sciences (NIEHS) plays a unique role at NIH. The mission of the NIEHS is to discover how the environment affects people in order to promote healthier lives. This mission is accomplished through focused research in basic science, development of new tools and technologies to allow scientific breakthroughs, recruitment of the best minds to the field and state of the science training to push innovation, and integration of all of these efforts to solve the most critical and complicated environmental health problems we face, both as a nation and as a global population.

More and more, we are realizing that the genesis of many of the most devastating diseases and conditions lies in exposures that occur before birth or during early childhood when brains and bodies are just beginning to develop. Such exposures, we now understand, can cause changes that may impact a person's health and ability to contribute to society over a lifetime. Over the last 12 years, the prevalence of all developmental disabilities in the U.S. has increased 17 percent, with the increase in learning disabilities found to be 7.6 percent from 1997-2008.¹ In this area, as in many others, basic research is setting the stage for tomorrow's breakthroughs. NIEHS is leading research efforts to explore the ways in which children's neurodevelopment may be changed or impaired by exposure to toxic chemicals that may result in conditions such as autism, Attention Deficit Hyperactivity Disorder, and a spectrum of other effects. A wide variety of environmental exposures that may impact the very early stages of brain development are being investigated—diet and nutrition, pesticides, air pollution, metals, medications, and

¹ CDC (Centers for Disease Control and Prevention). 2011. *CDC Developmental Disabilities Increasing in U.S.* Available: http://www.cdc.gov/features/dsdev_disabilities [accessed 30 September 2013].

medical procedures. Identifying these risk factors is essential to developing public health prevention efforts to avoid neurotoxic effects.

Studies funded through the NIEHS/EPA Children's Environmental Health and Disease Prevention Research Centers show that children exposed prenatally to high levels of the pesticide chlorpyrifos have both enlargement and thinning of certain brain areas, and lower intelligence testing scores.² In children aged six to seven, high prenatal exposure to Polycyclic Aromatic Hydrocarbons (chemicals found in fossil fuels and as by-products of combustion) has now been shown to be associated with symptoms of anxiety, depression, and attention problems, in addition to previous findings of lowered IQ at five years of age.³

Disturbingly, the prevalence of autism in the U.S. has increased 289.5 percent over the last 12 years.⁴ NIEHS supports a broad array of studies looking at potential environmental risk factors for autism. One study called Markers of Autism Risk in Babies – Learning Early Signs is following 400 women at high risk of giving birth to a child with autism because they already have a child with autism, starting in early pregnancy, and following their children to age three. Many of the NIEHS research efforts address priorities identified in the Interagency Autism Coordinating Committee's Strategic Plan for Autism Research.

A woman in the U.S. has a one in eight chance of invasive breast cancer in her lifetime.⁵ NIEHS supports efforts from basic science to epidemiology to the translation of research into actionable information for women and their doctors. The NIEHS and NCI co-funded Breast Cancer and the Environment Research Program (BCERP) supports multidisciplinary centers of scientists, clinicians, and community partners to study environmental exposures that occur throughout a woman's life that could predispose her to breast cancer. The Institute recently led, with NCI, the Interagency Breast Cancer and the Environment Research Committee, which published in February 2013, a Congressionally-mandated report for the Secretary of Health and Human Services.⁶ The report, *Prioritizing Prevention*, details the state of breast cancer and the environment research in the U.S., and outlines seven key recommendations that highlight the urgent need for coordinated, targeted efforts to identify and mitigate the environmental causes of breast cancer. Another central component of NIEHS breast cancer research efforts is the Sister Study, which is tracking a cohort of more than 50,000 women across the U.S. and Puerto Rico whose sisters had breast cancer, to examine their shared environment, genes, and experiences to help identify risk factors for breast cancer. A recent finding from the Sister Study indicates that

² Rauh VA, Perera FP, Horton MK, Whyatt RM, Bansal R, Hao X, Liu J, Barr DB, Slotkin TA, Peterson BS. 2012. Brain anomalies in children exposed prenatally to a common organophosphate pesticide. *Proc Natl Acad Sci U S A* 109(20):7871-7876.

³ Perera FP, Tang D, Wang S, Vishnevetsky J, Zhang B, Diaz D, Camann D, Rauh V. 2012. Prenatal polycyclic aromatic hydrocarbon (PAH) exposure and child behavior at age 6-7 years. *Environ Health Perspect* 120(6):921-926.

⁴ CDC (Centers for Disease Control and Prevention). 2012. *Autism Spectrum Disorders: Data & Statistics*. Available: <http://www.cdc.gov/ncbddd/autism/data.html> [accessed 30 September 2013].

⁵ HHS (U.S. Department of Health and Human Services). 2011. *Report on Carcinogens, Twelfth Edition*. Washington, D.C.: U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program. Available: <http://ntp.niehs.nih.gov/go/roc12> [accessed 2 October 2012].

⁶ Interagency Breast Cancer and Environment Research Coordinating Committee. 2013. *Breast Cancer and the Environment: Prioritizing Prevention*. Available: http://www.niehs.nih.gov/about/assets/docs/ibcercc_full_508.pdf [accessed 1 November 2013].

decreased DNA methylation, a feature associated with gene and chromosome instability, is associated with an increased risk of breast cancer.⁷ These changes can be identified in blood before breast cancer is clinically detected. Associations between methylation levels, breast cancer risk, and polymorphisms in specific genes for enzymes that affect both folate levels and DNA methylation were detectable. Not only does this finding fit the model of DNA demethylation as an early event in breast cancer carcinogenesis, the focus on these particular polymorphisms may lead the way to improved, patient-specific approaches in “precision medicine” to diagnose the disease and prevent its devastating consequences.

NIEHS continues to push the frontiers of research and medicine for all Americans. In 2010, NIEHS hosted its first conference on the microbiome—the millions of microbes that inhabit the human body. After birth, the microbiome is our first point of contact with the environment – both internally and externally - and microbes can both trigger disease and promote health. New research is showing that disrupting these microbial communities, possibly through exposure to toxic chemicals, may have consequences for diseases including cancers, diabetes, obesity, asthma, and autism.⁸ NIEHS is actively pursuing research to understand the role of the microbiome in environmentally induced disease.

Success in all of these research efforts will require new technologies and approaches that make use of the vast and ever-increasing amounts of data available to inform such studies, sometimes known as “Big Data.” On June 11, 2013, NIEHS and its partners launched an innovative, crowd-sourced computational challenge to spur better ways to predict chemical toxicity and increase our understanding of how a person’s individual genetics can influence their body’s response to exposure to widely used chemicals. The Dialogue for Reverse Engineering Assessments and Methods (DREAM) Toxicogenetics Challenge is a joint effort of Sage Bionetworks, NIEHS, the University of North Carolina at Chapel Hill, and the NIH National Center for Advancing Translational Sciences.

Through such challenges, as well as through continued implementation of its ambitious and visionary strategic plan⁹, NIEHS continues to seek to provide global leadership for innovative research that improves public health by preventing disease and disability.

Overall Budget Policy:

The FY 2015 President’s Budget request is \$665.080 million, an increase of \$0.556 million, or 0.1 percent above the comparable FY 2014 level. The amounts in the FY 2014 columns take into account funding reallocations, and therefore may not add to the total budget authority. NIEHS will continue to support new investigators and maintain the number of competing RPGs. in FY 2015.

⁷ Xu Z, SC Bolick, LA Deroo, CR Weinberg, DP Sandler and JA Taylor. *Epigenome-wide Association Study of Breast Cancer Using Prospectively Collected Sister Study Samples*. 2013. *J. Natl. Cancer Inst.* <http://dx.doi.org/10.1093/jnci/djt045>

⁸ Konkel, L. *The environment within: exploring the role of the gut microbiome in health and disease*. (2013). *Environ. Health Perspect.* 121(9):A276-81.

⁹ *2012-2017 Strategic Plan - Advancing Science, Improving Health: A Plan for Environmental Health Research*. (2012). National Institute of Environmental Health Sciences. Available at: <http://www.niehs.nih.gov/about/strategicplan/index.cfm>

Support for the NRSA training mechanism will increase, reflecting higher stipend levels. NIEHS will continue to support the same number of trainees as in FY 2014.

Program Descriptions and Accomplishments

Fundamental Research: NIEHS's program in Fundamental Research investigates the basic biological processes of how our bodies function and the pathways and systems that are susceptible to the effects of environmental stressors. This research addresses all levels of biological organization—molecular, biochemical pathway, cellular, tissue, organ, model organism, human, and population—and builds on the knowledge from new tools and techniques that allow us to ask more in-depth questions about the effects of our environment on biological systems.

Several studies funded by the NIEHS point to an important role for the immune system in autism etiology. One group of researchers looked at an inflammatory biomarker called gestational C-reactive protein (CRP) in the Finnish Maternity Cohort, which contains an archive of serum samples collected from about 810,000 pregnant women in Finland.¹⁰ They also used national psychiatric registries that contain virtually all treated autism cases in the population. Analysis of CRP in archived maternal serum revealed that the risk of autism among children in the study was increased by 43 percent among mothers with CRP levels in the top 20th percentile, and by 80 percent for maternal CRP in the top 10th percentile. These findings could not be explained by maternal age, paternal age, gender, previous births, socioeconomic status, preterm birth, or birth weight. A report from another study (the CHARGE study, or Childhood Autism Risks from Genetics and Environment) built on previous findings linking maternal autoantibodies to risk of autism by identifying the key brain proteins that are the targets of those maternal antibodies and have important roles in early brain development.¹¹ Children diagnosed with Autism Spectrum Disorder (ASD) and born to mothers with specific reactivity to these proteins had elevated stereotypical behaviors compared with ASD children from mothers lacking these antibodies. While inflammation in pregnancy remains much more common than autism, these results point the way to the possible development of clinically significant biomarkers of autism risk.

Budget Policy:

The FY 2015 President's Budget estimate for this program is \$169.708 million, an increase of \$1.636 million, or 1.0 percent over the FY 2014 level.

¹⁰ Brown AS, Sourander A, Hinkka-Yli-Salomäki S, McKeague IW, Sundvall J, Surcel HM. 2013. Elevated maternal C-reactive protein and autism in a national birth cohort. *Molecular Psychiatry*; doi:10.1038/mp.2012.197 [Online 22 January 2013].

¹¹ Braunschweig D, Krakowiak P, Duncanson P, Boyce R, Hansen RL, Ashwood P, Hertz-Picciotto I, Pessah IN, Van de Water J. 2013. Autism-specific maternal autoantibodies recognize critical proteins in developing brain. *Translational Psychiatry* 3, e277, doi:10.1038/tp.2013.50 [Online 9 July 2013]

Program Portrait: TaRGET: Toxicant Exposures and Responses by Genomic and Epigenomic Regulators of Transcription

FY 2014 Level: \$2.9 million

FY 2015 Level: \$2.9 million

Change: \$0.0 million

The epigenome serves as a junction between our genome and the environment. Its plasticity makes it an excellent candidate for intervention and prevention strategies to protect human health. With the number of scientific publications on epigenetics growing exponentially, NIEHS has been a leader in this important field with robust intramural and extramural research programs that have been at the forefront of environmental epigenomics by identifying epigenetic signatures in development; investigating epigenetic changes in our immune system; studying the role of epigenetics in cancer; and capturing epigenetic changes after exposures to heavy metals, air particulates; and endocrine disrupting chemicals. NIEHS continues to be a significant driver in the field of epigenetics with the launch of the TaRGET program. The TaRGET program is a multi-phase initiative and the first phase, TaRGET I: Chromatin Structure, Genomics, and Transcriptional Responses to the Environment currently funds six R01 grants that are using state of the art technologies to examine a diverse set of epigenetic processes across different environmental exposures and model systems. These grants take into account a wide variety of environmental exposures including arsenic, motor vehicle exhaust, and endocrine disrupting chemicals. Furthermore, this investment strengthens our epigenetic portfolio by focusing on mechanistic research that can link environmental exposures to changes in epigenomic landscapes leading to adverse health outcomes. Future phases of the TaRGET program will focus on resource development for the scientific community, population-based studies, and integrating big data using computational approaches.

Exposure Research: This program is focused on the study of environmental exposures, both internal and external; not only chemical environmental pollutants, but also exposures arising from other sources such as the microbiome and nutritional sources. The program goals are to develop improved methods to detect and measure environmental exposures in humans or other organisms, including biological markers, sensor and detector tools, remote exposures detection, better analytical methods, and informatics technologies.

To study the effects and possible mechanisms of suspected endocrine disrupting compounds (EDCs), a wide variety of assays have been developed. As part of this work, NIEHS-funded researchers generated engineered *Escherichia coli* biosensor strains that can change their growth phenotype to indicate the presence of molecules that bind to estrogen receptors. The modified strains can also differentiate positive and negative effects and give a rough indication of binding affinity via dose-response curves. In initial tests, all three of the strains correctly identified estrogenic test compounds with a high degree of certainty, including the weakly binding test compound bisphenol A (BPA). The modular design of the sensing element in this bacterial strain allows quick development of new species-based biosensors by simple LBD swapping, suggesting its utility in initial comparative analysis of EDC impacts across multiple species.

Budget Policy:

The FY 2015 President's Budget estimate for this program is \$50.325 million, a decrease of \$2.686 million, or 5.1 percent less than the FY 2014 level. The decrease in this program is due

to the completion of RFA ES-09-011, Engineered Nanomaterials: Linking Physical and Chemical Properties to Biology.

Translational Research and Special Populations: This program includes a wide set of research activities encouraging the integration of clinical, population, and community-based research to translate findings into improved public health practice and disease prevention. These activities include research investments targeted towards understanding environmental risks to special populations (elderly people, children, and underserved populations) with an eye to developing interventions and solutions to real-world problems.

NIEHS grantees report that exposure to local traffic-related air pollution and regional air pollution in the womb and during the first year of life is associated with increased risk for autism.¹² The study builds on previous research in which the grantees found that children born to mothers who live within 309 meters (a little over 1,000 feet) of freeways had an increased risk of developing autism. In the new study, the researchers examined data from children enrolled in the Childhood Autism Risks from Genetics and the Environment (CHARGE) study, including 279 children with autism and 245 control children with normal development. They estimated traffic-related pollution exposures using the mother's address combined with U.S. Environmental Protection Agency's Air Quality System measurements of regional pollution. The children with autism were more likely than the control children to live in homes with the highest exposure to traffic-related air pollution during gestation and the first year of life (Gestation: AOR, 1.98 [95 percent CI, 1.20-3.31]; First year: AOR, 3.10 [95 percent CI, 1.76-5.57]). During gestation, exposure to regional nitrogen dioxide and particulate matter less than 2.5 and 10 microns in diameter (PM2.5 and PM10) was also associated with autism. The researchers say that additional population and toxicological studies of likely biological pathways are needed to determine if the air pollution exposure causes the increase in autism risk.

Budget Policy:

The FY 2015 President's Budget estimate for this program is \$110.247 million, an increase of \$0.820 million, or 0.7 percent higher than the FY 2014 level.

¹² Volk HE, Lurmann F, Penfold B, Hertz-Picciotto I, McConnell R. 2012. *Traffic-Related Air Pollution, Particulate Matter, and Autism. Arch Gen Psychiatry*; doi:10.1001/jamapsychiatry.2013.266. [Online November 2012]

Program Portrait: EPA/NIEHS Children’s Environmental Health and Disease Prevention Research Centers: Protecting Children’s Health for a Lifetime

FY 2014 Level: \$30.3 million

FY 2015 Level: \$30.8 million

Change: +\$0.5 million

The Children’s Environmental Health and Disease Prevention Research Centers program is focused on understanding the effects of environmental exposures on children’s health and aims to translate this research into treatment and intervention strategies. With 15 years of program support, the Children’s Centers continue to accomplish program objectives through a well-rounded research portfolio:

- 41 awards totaling more than \$160.0 million since inception
- Largest investments: neurological, birth, reproductive, respiratory outcomes
- Promote multidisciplinary interactions and community outreach
- Over 1,100 peer-reviewed scientific publications to date
- Robust pipeline for training the next generation of children’s environmental scientists

Recent scientific advances under the umbrella of this program have identified links between environmental exposure and asthma in children. The Johns Hopkins Children’s Center found children who had been exposed to indoor pollutants were more susceptible to asthma if they were overweight or obese. This research finding suggests weight loss intervention strategies may effectively prevent asthma in children exposed to indoor pollutants. Research from the University of Southern California’s Children’s Center has suggested children living in stressful households are more susceptible to traffic related air pollution and have a higher risk of developing asthma. Community outreach efforts to discuss the environmental impact of traffic pollution on children included a University of Southern California sponsored forum and school visits by NIEHS Director, Dr. Linda Birnbaum, to schools near high pollution regions.

Program Portrait: Disaster Research Response Project: On-Demand Research Capacity for Public Health Emergency Response

FY 2014 Level: \$0.9 million

FY 2015 Level: \$0.9 million

Change: \$0.0 million

Disasters are spontaneous events that occur with little to no forewarning and can present a threat to public health. Events in recent history, such as the Deepwater Horizon oil spill and the Fukushima Daiichi nuclear reactor disaster, have demonstrated the need for new capabilities to conduct time-critical research immediately during and after such events. In an effort to help address the national needs for improved disaster research response, NIEHS helped develop an NIH/ASPR Workshop to outline priorities in this area and has spearheaded the implementation of an ongoing NIH-wide Disaster Interest Group. NIEHS also represents NIH on the National Science and Technology Council (NSTC) Subcommittee on Disaster Reduction and supports the Institute of Medicine (IOM) Forum for Medical Preparedness for Catastrophic Events. Additionally, the NIEHS-led Disaster Research Response Project, funded by the NIH Office of the Director, aims to deliver a nimble model for rapid response. This NIEHS and NLM collaborative project will develop capabilities in several identified areas needed to support rapid environmental health research including: pre-approved surveys and protocols for both NIH investigators and the extramural community to capture critical baseline health data, a publicly-accessible NIH “Researcher Response” website, and implementation and training for a national network of environmental researchers. The goal includes having a rapidly deployable NIEHS researcher capacity fully integrated into the National Response and Recovery Frameworks by the peak of hurricane season, 2014.

Lurie, N., Manolio, T., Patterson, A.P., Collins, F., Frieden, T. Research as a part of public health emergency response. NEJM 368;13, 1251-1255 (2013).

Predictive Toxicology: This program comprises the NIEHS extramural research investment of the National Toxicology Program (NTP), whose mission is to evaluate environmental agents of public health concern, and generate information to be used by health regulatory agencies to make informed decisions affecting public health. The NTP also works to develop new and improved test methods, including alternatives to animal testing and high-throughput methods to test substances faster, in order to disseminate useful public health information more rapidly. NTP research also helps to develop new and improved models of toxicity that can help to predict cancer and other adverse health outcomes that may result from fetal or early life exposures.

While there is great genetic diversity in human populations, almost all toxicology studies utilize mouse models that are genetically homogenous. Using genetically diverse mouse populations for toxicology studies offers the potential to provide a better indication of the variation in human population response to a given toxicant. To obtain a genetically diverse mouse population, researchers at The Jackson Laboratory crossed different inbred mouse strains to create the diversity-outbred mouse model. The resulting mouse population is estimated to better model genetic diversity that exists in the human population. The NTP, at the NIEHS, carried out inhalation studies with diversity-outbred mice exposed to concentrations of benzene somewhat higher than are found in today's occupational settings, for five days per week for four weeks. Benzene is known to cause hematopoietic cancer and toxicity in both mice and humans. The primary endpoint measured in the NTP studies was micronuclei in blood and bone marrow, an early appearing indicator of genetic damage thought to be involved in the carcinogenic response. The results indicated an over 200-fold difference in sensitivity of individual mice to micronuclei formation from a given exposure to benzene. This finding suggests that uncertainty factors typically used in risk assessments to account for inter-individual sensitivity in humans may be insufficient to reflect the true situation. In addition, the NTP study genotyped each mouse, which provided the opportunity to perform genome-wide association studies resulting in the identification of one or two specific genes that are likely responsible for increased resistance and susceptibility to genotoxicity and hematotoxicity from benzene exposure. The diversity-outbred mouse model described above allows the NTP to perform "rodent epidemiology" studies in a controlled environment, which should lead to an improved estimation of the range of variation in human response to toxicants and predictions of the human genes that may underlie susceptibility and resistance.

Budget Policy:

The FY 2015 President's Budget estimate for this program is \$85.753 million, the same as the FY 2014 level.

Training and Education: This program's goal is to attract the brightest students and scientists into the environmental health sciences field to ensure a cadre of professionals to conduct the interdisciplinary research necessary to solve critical environmental health problems. The program includes efforts at the high school and undergraduate levels (opportunities for laboratory-based training), the graduate level (institutional training grants and individual fellowships), and the faculty level (grants for young investigators).

Ruth L. Kirschstein National Research Service Awards (NRSAs) have been the principal means of supporting graduate level research training in the environmental health sciences since enactment of the NRSA legislation in 1974. While T32 institutional training grants remain the primary NRSA mechanism used by NIEHS to support graduate level research training, new opportunities are being made available. In response to recommendations from the NIH Advisory Council to the Director Biomedical Workforce Task Force, NIEHS will begin accepting NRSA F31 predoctoral fellowships beginning in April 2014. F31 fellowships enable students to apply for up to five years of support leading to their PhD or equivalent research degree. The F31 fellowships augment additional NRSA predoctoral fellowships offered by NIEHS, including the F30 predoctoral fellowships for MD/PhD dual degree students and the F31 predoctoral fellowships to promote diversity. Offering these NRSA fellowships to young investigators ensures that diverse pools of highly trained scientists will be available in adequate numbers and in appropriate research areas in the environmental health sciences to carry out the mission and strategic goals of the NIEHS.

Budget Policy:

The FY 2015 President's Budget estimate for this program is \$41.306 million, an increase of \$0.390 million, or 1.0 percent over the FY 2014 level. The additional funds are needed for stipend increases to support the same number of trainees as in FY 2014.

Intramural Research: The mission of the NIEHS intramural research program is to investigate the role of environmental agents in human disease and dysfunction, and define the important biological and chemical processes that these agents affect. NIEHS intramural research studies are often longer-term and comprise of unique components, such as the NIEHS contribution to the National Toxicology Program (NTP); epidemiological studies of environmentally associated diseases and exposures (including the study of individuals exposed by the Deepwater Horizon oil spill); and intervention and prevention studies in humans to reduce the effects of exposures to hazardous environments. The NIEHS Clinical Research Unit provides opportunities for clinical and basic scientists in the Intramural Program to collaborate and learn how environmental exposures influence human health and disease.

The NIEHS intramural program fosters an environment conducive to high caliber science with high impact breakthroughs such as the recent discovery of a cancer signature in the human genome. NIEHS intramural scientists have leveraged big data from The Cancer Genome Atlas, a NIH-funded resource, to identify a shared mutational signature enriched across multiple distinct human cancer types. They have discovered an enzyme that normally plays an important role in the physiological response to infectious agents can go awry and mediate a pattern of mutations present in breast, bladder, cervical, head and neck, and lung cancers.¹³ Ongoing efforts are being made to tease apart the implied relationship between the immune response, which is often stimulated upon environmental exposures, and cancer. The NIEHS intramural

¹³ Roberts SA, Lawrence MS, Klimczak LJ, Grimm SA, Fargo D, Stojanov P, Kiezun A, Kryukov GV, Carter SL, Saksena G, Harris S, Shah RR, Resnick MA, Getz G, Gordenin DA. An APOBEC cytidine deaminase mutagenesis pattern is widespread in human cancers. *Nature Genetics*. 2013 July 14, doi:10.1038/ng.2702.

scientists' work is an example of how basic science combined with big data can fuel personalized medicine.

Budget Policy:

The FY 2015 President's Budget estimate for this program is \$183.492 million, an increase of \$1.825 million, or 1.0 percent over the FY 2014 level. Additional funds will cover pay related costs, including the pay raise, the increase in retirement contributions, and the increase in federal employee health benefit premiums.

Research Management and Support (RMS): The RMS program provides administrative, budgetary, logistical, and scientific support in the review, award, and monitoring of research grants and training awards. NIEHS oversees approximately 834 research grants and centers. RMS also provides administrative support for the Intramural Research program. Other RMS functions include strategic planning, coordination, and evaluation of NIEHS programs; regulatory compliance; ethics training and compliance; and liaison with other Federal agencies, Congress, stakeholders, and the public.

Budget Policy:

The FY 2015 President's Budget estimate for this program is \$24.249 million, an increase of \$0.241 million, or 1.0 percent over the FY 2014 level. Additional funds will cover pay related costs, including the pay raise, the increase in retirement contributions, and the increase in federal employee health benefit premiums.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Budget Authority by Object Class¹
(Dollars in Thousands)

	FY 2014 Enacted	FY 2015 President's Budget	FY 2015 +/- FY 2014
Total compensable workyears:			
Full-time employment	672	672	0
Full-time equivalent of overtime and holiday hours	1	1	0
Average ES salary	\$168	\$168	\$0
Average GM/GS grade	11.6	11.6	0.0
Average GM/GS salary	\$86	\$87	\$1
Average salary, grade established by act of July 1, 1944 (42 U.S.C. 207)	\$102	\$103	\$1
Average salary of ungraded positions	\$130	\$131	\$1
OBJECT CLASSES	FY 2014	FY 2015	FY 2015
Personnel Compensation			
11.1 Full-Time Permanent	\$41,289	\$41,701	\$412
11.3 Other Than Full-Time Permanent	21,586	21,802	216
11.5 Other Personnel Compensation	185	187	2
11.7 Military Personnel	954	964	10
11.8 Special Personnel Services Payments	8,131	8,212	81
11.9 Subtotal Personnel Compensation	\$72,145	\$72,866	\$721
12.1 Civilian Personnel Benefits	\$19,975	\$20,674	\$699
12.2 Military Personnel Benefits	697	704	7
13.0 Benefits to Former Personnel	0	0	0
Subtotal Pay Costs	\$92,817	\$94,244	\$1,427
21.0 Travel & Transportation of Persons	\$1,666	\$1,666	\$0
22.0 Transportation of Things	386	386	0
23.1 Rental Payments to GSA	0	0	0
23.2 Rental Payments to Others	37	37	0
23.3 Communications, Utilities & Misc. Charges	1,100	1,100	0
24.0 Printing & Reproduction	3	3	0
25.1 Consulting Services	\$561	\$561	\$0
25.2 Other Services	33,760	33,430	-330
25.3 Purchase of goods and services from government accounts	106,334	108,110	1,776
25.4 Operation & Maintenance of Facilities	\$3,813	\$3,813	\$0
25.5 R&D Contracts	97,579	99,190	1,611
25.6 Medical Care	173	173	0
25.7 Operation & Maintenance of Equipment	4,130	4,130	0
25.8 Subsistence & Support of Persons	0	0	0
25.0 Subtotal Other Contractual Services	\$246,350	\$249,407	\$3,057
26.0 Supplies & Materials	\$9,698	\$9,862	\$164
31.0 Equipment	5,440	5,489	49
32.0 Land and Structures	0	0	0
33.0 Investments & Loans	0	0	0
41.0 Grants, Subsidies & Contributions	307,026	302,885	-4,141
42.0 Insurance Claims & Indemnities	0	0	0
43.0 Interest & Dividends	1	1	0
44.0 Refunds	0	0	0
Subtotal Non-Pay Costs	\$571,707	\$570,836	-\$871
Total Budget Authority by Object Class	\$664,524	\$665,080	\$556

¹ Includes FTEs whose payroll obligations are supported by the NIH Common Fund.

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Salaries and Expenses
(Dollars in Thousands)

OBJECT CLASSES	FY 2014 Enacted	FY 2015 President's Budget	FY 2015 +/- FY 2014
Personnel Compensation			
Full-Time Permanent (11.1)	\$41,289	\$41,701	\$412
Other Than Full-Time Permanent (11.3)	21,586	21,802	216
Other Personnel Compensation (11.5)	185	187	2
Military Personnel (11.7)	954	964	10
Special Personnel Services Payments (11.8)	8,131	8,212	81
Subtotal Personnel Compensation (11.9)	\$72,145	\$72,866	\$721
Civilian Personnel Benefits (12.1)	\$19,975	\$20,674	\$699
Military Personnel Benefits (12.2)	697	704	7
Benefits to Former Personnel (13.0)	0	0	0
Subtotal Pay Costs	\$92,817	\$94,244	\$1,427
Travel & Transportation of Persons (21.0)	\$1,666	\$1,666	\$0
Transportation of Things (22.0)	386	386	0
Rental Payments to Others (23.2)	37	37	0
Communications, Utilities & Misc. Charges (23.3)	1,100	1,100	0
Printing & Reproduction (24.0)	3	3	0
Other Contractual Services:			
Consultant Services (25.1)	561	561	0
Other Services (25.2)	33,760	33,430	-330
Purchases from government accounts (25.3)	69,056	67,090	-1,966
Operation & Maintenance of Facilities (25.4)	3,813	3,813	0
Operation & Maintenance of Equipment (25.7)	4,130	4,130	0
Subsistence & Support of Persons (25.8)	0	0	0
Subtotal Other Contractual Services	\$111,320	\$109,024	-\$2,296
Supplies & Materials (26.0)	\$9,698	\$9,862	\$164
Subtotal Non-Pay Costs	\$124,210	\$122,078	-\$2,132
Total Administrative Costs	\$217,027	\$216,322	-\$705

**NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences**

Detail of Full-Time Equivalent Employment (FTE)

OFFICE/DIVISION	FY 2013 Actual			FY 2014 Est.			FY 2015 Est.		
	Civilian	Military	Total	Civilian	Military	Total	Civilian	Military	Total
Division of Extramural Research									
Direct:	64		64	64		64	64		64
Reimbursable:	2		2	2		2	2		2
Total:	66		66	66		66	66		66
Division of Intramural Research									
Direct:	327	4	331	327	4	331	328	4	332
Reimbursable:	1		1	1		1			-
Total:	328	4	332	328	4	332	328	4	332
Division of National Toxicology Program									
Direct:	108	1	109	108	1	109	108	1	109
Reimbursable:			-			-			-
Total:	108	1	109	108	1	109	108	1	109
Office of Management									
Direct:	110	2	112	110	2	112	110	2	112
Reimbursable:			-			-			-
Total:	110	2	112	110	2	112	110	2	112
Office of the Director									
Direct:	51	1	52	51	1	52	52	1	53
Reimbursable:	1		1	1		1			-
Total:	52	1	53	52	1	53	52	1	53
Total	664	8	672	664	8	672	664	8	672
Includes FTEs whose payroll obligations are supported by the NIH Common Fund.									
FTEs supported by funds from Cooperative Research and Development Agreements.	0	0	0	0	0	0	0	0	0
FISCAL YEAR	Average GS Grade								
2011	11.4								
2012	11.5								
2013	11.6								
2014	11.6								
2015	11.6								

NATIONAL INSTITUTES OF HEALTH
National Institute of Environmental Health Sciences

Detail of Positions

GRADE	FY 2013 Actual	FY 2014 Enacted	FY 2015 President's Budget
Total, ES Positions	1	1	1
Total, ES Salary	168,286	168,286	168,286
GM/GS-15	39	39	39
GM/GS-14	46	46	46
GM/GS-13	105	105	105
GS-12	103	103	103
GS-11	94	94	94
GS-10	1	1	1
GS-9	54	54	54
GS-8	17	17	17
GS-7	27	27	27
GS-6	2	2	2
GS-5	3	3	3
GS-4	1	1	1
GS-3	2	2	2
GS-2	0	0	0
GS-1	0	0	0
Subtotal	494	494	494
Grades established by Act of July 1, 1944 (42 U.S.C. 207)	0	0	0
Assistant Surgeon General	0	0	0
Director Grade	5	5	5
Senior Grade	1	1	1
Full Grade	2	2	2
Senior Assistant Grade	0	0	0
Assistant Grade	0	0	0
Subtotal	8	8	8
Ungraded	187	187	187
Total permanent positions	499	499	499
Total positions, end of year	690	690	690
Total full-time equivalent (FTE) employment, end of year	672	672	672
Average ES salary	168,286	168,286	168,286
Average GM/GS grade	11.6	11.6	11.6
Average GM/GS salary	85,201	86,053	86,914

Includes FTEs whose payroll obligations are supported by the NIH Common Fund.