

**SAB Research Budget Work Group Draft Report (03/17/11) for review by the Chartered SAB
on March 22, 2011 -- Do not Cite or Quote**

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EPA-SAB-11-xxx

The Honorable Lisa P. Jackson
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Subject: Science Advisory Board Comments on the President's Requested FY
2012 Research Budget.

Dear Administrator Jackson:

The Science Advisory Board (SAB) has a long history of reviewing the President’s budget request for the Office of Research and Development (ORD). This year, the SAB requested specific budget-related materials from ORD and reviewed those documents including excerpts from the “Budget in Brief” describing “Transformational Solutions through Science Innovation”, a 4-page summary of the categorized ORD budget, which details the cross-walk and realignment of budget categories in the FY2012 President’s Budget with earlier budgets; and a 71-page ORD-budget narrative showing the major programs that were enhanced, preserved, or cut in the FY 2012 budget request. In addition, the ORD Assistant Administrator and Deputy Assistant Administrator for Science and ORD interim National Program Directors (iNPDs) and the Director of the Office of Policy’s National Center for Environmental Economics presented highlights of their budget plans to members of the SAB Budget Work Group at a public meeting on March 3, 2011. On March 4th, the SAB Budget Work Group met to ask further questions from iNPDs by teleconference, and formulated the attached report. The Budget Work Group appreciated the quality of the presentations made by ORD and the diligent effort in explaining the main points of the budget in a compressed time frame.

EPA ORD has reorganized its research from 13 project-areas, defined by specific problems and media-type, into four integrated programs (Air, Climate and Energy; Safe and Sustainable Water Resources (water quality plus drinking water); Sustainable and Healthy Communities; and Chemical Safety for Sustainability) and two cross-cutting areas (Human Health Risk Assessment and Homeland Security Research). Motivation for this consolidation and realignment of programs reflects an emphasis on integrated transdisciplinary research, multi-pollutant exposures, and sustainability. Considerable synergies will be realized in combining these projects into the four programmatic areas. We commend ORD for a dramatic response to past SAB recommendations concerning realignment of research areas and transdisciplinary research for protecting human health and the environment.

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1 ORD is moving from a risk assessment/risk management paradigm, which has guided
2 and influenced research over the past two decades, towards a sustainability paradigm and we
3 applaud that effort. This change is analogous to the 1980s when the Agency first began to
4 consider “Pollution Prevention” rather than end-of-pipe treatment as a more effective method to
5 protect the environment. ORD’s move from risk assessment to defining holistic “healthy and
6 sustainable communities” is akin to a public health approach, which makes sense and will
7 become more cost effective over time.
8

9 The work of EPA improves the quality of life in America and saves health care dollars.
10 Classic success stories are evidenced by improvements in air quality, declines of lead in the
11 blood of children, and safe drinking water. The improvement in health outcomes due to
12 regulation of fine particulate matter (PM_{2.5}) alone has been a gain of 0.61 years of life
13 expectancy per 10 ug/m³ decline in PM_{2.5} in the United States. (Pope et al., 2009). That is
14 equivalent to the gain in life expectancy that would be realized from overcoming the current
15 obesity epidemic in the United States (Olshansky et al., 2005). Earlier this month, EPA issued
16 *The Benefits and Costs of the Clean Air Act from 1990 to 2020*, which estimated the direct
17 benefits from the 1990 Clean Air Act Amendments to be almost \$2 trillion for the year 2020,
18 exceeding costs by a factor of more than 30 to one. Still, U.S. citizens are exposed to chemicals
19 such as particulate matter, ozone, mercury, endocrine disrupting chemicals, asbestos, arsenic,
20 chromium, and radon that impair their health each day. Climate change will exacerbate many of
21 these exposures (e.g., particulates, ozone, mold spores/pollen/allergens) and cause declines in
22 environmental quality (e.g., flooding and nutrient pollution).
23

24 Budgets for climate change research must be strengthened, not weakened, because we are
25 already living with climate change (e.g., melting glaciers, more intense storms and frequent
26 floods) and it is likely to increase in coming years. Sensitive populations suffer the most from
27 chemical exposures exacerbated by a warmer, wetter climate (e.g., childhood asthma); and
28 environmental injustice is also linked (e.g., roadside air pollution). We cannot change our genes,
29 but we can change our environment. Ensuring pure air and clean water is the statutory role of
30 EPA. Epigenetics, including how genes express themselves in the face of chemical exposures, is
31 one area identified as a high priority for EPA ORD by the SAB Budget Work Group. Innovation
32 in this area could provide a “game-changing” strategy as we can begin to understand the role of
33 the environment in making us more (or less) susceptible to disease.
34

35 The relative priority given to ORD in the requested budget (i.e., a budget of \$584.1M, a
36 2.1% cut, as compared to a 13% decrease in EPA’s overall budget) reflects an appropriate
37 investment in innovative research to save lives and public health dollars. We believe that ORD’s
38 targeted cuts and investments, rather than an across-the-board cut, makes sense in general.
39

40 Because ORD’s restructured research programs are so new and ambitious, the FY 2012
41 budget does not contain a great amount of detail describing research activities and the breakout
42 of funding. As a result, the SAB cannot fully comment at this time on the adequacy of the
43 requested budget for advancing the research visions in each of the four new programmatic areas.
44 At ORD’s request, the SAB plans to hold a joint public advisory meeting (June 29-30, 2011)
45 with ORD’s Board of Scientific Counselors to review in detail the draft frameworks that ORD

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1 has committed to develop for each new research program. At that time the SAB will have
2 additional advice regarding budget planning for FY 2013.

3
4 The SAB is pleased to have again reviewed the EPA research budget and looks forward
5 to continued work with you to strengthen the Agency's vital research base that supports your
6 priorities. We look forward to your response to this review and to continuing our interactions
7 with EPA to develop future advice on the Agency's science program.

8
9 Sincerely,

10
11
12
13 Dr. Deborah L. Swackhamer
14 Chair
15 Science Advisory Board
16

Dr. Jerald Schnoor
Chair
SAB Research Budget Work Group

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NOTICE

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3 This report has been written as part of the activities of the EPA Science Advisory Board (SAB),
4 a public advisory group providing extramural scientific information and advice to the
5 Administrator and other officials of the Environmental Protection Agency. The SAB is
6 structured to provide balanced, expert assessment of scientific matters related to problems facing
7 the Agency. This report has not been reviewed for approval by the Agency and, hence, the
8 contents of this report do not necessarily represent the views and policies of the Environmental
9 Protection Agency, nor of other agencies in the Executive Branch of the Federal government, nor
10 does mention of trade names of commercial products constitute a recommendation for use.
11 Reports of the SAB are posted on the EPA Web site at <http://www.epa.gov/sab>.

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EXECUTIVE SUMMARY

The President's Fiscal Year (FY) 2012 budget request recommends a 13% decrease in EPA's budget, a 2.6% cut to Science and Technology programs within the Agency, and a 2.1% cut to EPA's Office of Research and Development (ORD). Funding for ORD declined more than 20% (in GDP indexed dollars) from the high in 2004 to the low in 2008, and had only begun to recover slightly in 2009 and 2010. The proposed reductions in FY 2012 reverse the very appropriate trend toward recovery in levels of investment in science and technology to support EPA's efforts to protect human health and the environment.

Overall, the SAB Work Group recognizes the difficult budget environment with which the nation is dealing in 2012, and although we consider these planned cuts to EPA's budget to be extremely unfortunate, we understand that they may be necessary to reduce overall government spending. Given the dire need for more cost-effective research on human health and the environment, the EPA SAB Budget Work Group agrees that it is more important to promote innovative, job-creating research than it is to preserve the EPA Agency budget as a whole. Thus, the SAB members understand the relative priority given to ORD in this budget, but also recognize that Agency cuts do not come from fat, but rather from the marrow of its activity and mission. The United States cannot ignore threats to air quality, ecosystems, and climate change for long before these threats will significantly reduce the health of the American people and the vitality of the American economy and ecosystems. It is also important to bear in mind that research has consistently strengthened the economy, in part by creating new kinds of jobs. CERES, an organization that articulates the views of major American corporations on their social responsibilities, recently estimated that the National Ambient Air Quality Standards alone will result in the creation of 1.5 million jobs over the next five years. The country needs clean energy and clean air as well as jobs, and the former can augment the latter.

Over the last 6-12 months the EPA has realigned its research organization from 13 project-areas, defined by specific problems and media-type, into four integrated programs and two cross-cutting areas (Human Health Risk Assessment and Homeland Security Research). Motivation for this consolidation and realignment of programs reflects an emphasis on integrated transdisciplinary research, multi-pollutant exposures, and sustainability. These are not new programs, but represent a new way of thinking about programs. Considerable synergies will be realized in combining research into the four programmatic areas: Air, Climate and Energy; Safe and Sustainable Water Resources (water quality plus drinking water); Sustainable and Healthy Communities; and Chemical Safety for Sustainability. The SAB strongly commends ORD for a dramatic response to SAB past recommendations concerning its realignment of research areas and dedication to transdisciplinary research for protecting human health and the environment.

ORD's realignment is ambitious and moves EPA research in a new and bold direction. ORD is moving from a *risk management paradigm*, which has guided and influenced research over the past two decades, towards a *sustainability paradigm* and that effort is welcome. It is consistent with the public health approach of prevention rather than a medical approach to

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1 treating disease after it occurs, and recognizes that environment and health are an interconnected
2 system. The SAB recognizes that this is a significant challenge, and the Agency must consider
3 how to translate research results from this new approach into science-informed environmental
4 policy and decisions. The Board looks forward to providing continued advice to ORD as it
5 develops strategic plans for each of its newly restructured research programs.

6
7 In the President's FY2012 budget request, the Office of Research and Development
8 (ORD) has received a reduced budget of 2.1% relative to the FY2010 enacted budget, including
9 significant reductions to research in the areas of homeland security, human health, ecosystems,
10 waste cleanup, and air/climate/energy research. These programs provide needed knowledge and
11 data, as well as guidance and expertise to EPA Offices charged with the mission of maintaining
12 homeland security, improving air quality, mitigating climate change, and cleaning-up our
13 environment while promoting sustainable and livable communities.

14
15 Homeland Security Research (HSR) is slated for a 24 % budget reduction, from \$35.0 in
16 the FY 2010 enacted budget to \$26.7M in the FY 2012 President's budget request. The HSR
17 program has developed emergency response products for water and wastewater treatment plants
18 and buildings under threat of a chemical, biological, or radiological attack. The SAB
19 understands that these programs are considered "mature", but the products that have been
20 developed are widely considered to be of very high quality. Now, activities like "safe buildings"
21 and "analytical methods developments" are being curtailed, and any new emphases related to the
22 sustainability of "resilient infrastructure" cannot be supported. The SAB believes that at a
23 minimum, more funds should be provided to the Agency to disseminate their knowledge and
24 software to the states and communities. These products could help to make the nation's water
25 infrastructure more sustainable in the event of either terrorist attack or natural disasters.

26
27 Within the new Sustainable and Healthy Communities (SHC) research program, the
28 President's FY 2012 budget request calls for reductions in funding for human health research [a
29 16% reduction from \$54.2M in the FY 2010 enacted budget (-\$8.8M) to \$45.4M in the FY 2012
30 President's budget request] and ecosystem research [a 15% reduction from \$71.7 in the FY 2010
31 enacted budget (-\$10.8M) to \$60.9M in the FY 2012 President's budget request].

32
33 A consequence of reductions in human health research makes it impossible for EPA to
34 conduct major epidemiological studies. Future budgets need to provide for more high-quality
35 epidemiological studies to better understand exposures, especially for susceptible and vulnerable
36 populations, and dose-responses of hazards so as to develop regulations to protect public health
37 using the best possible science.

38
39 Reductions in ecosystems services research will slow programs for valuing species, and
40 research on the prevention of environmental degradation through utilization of behavioral
41 science. Within the SHC program, research on waste clean-up undergoes a substantially reduced
42 budget (Hazardous Substances Superfund, a 16.9% reduction from \$21.3M in the FY 2010
43 enacted budget to \$17.7 in the FY 2012 President's budget request). Such reductions
44 significantly slow the rate of research intended to mitigate exposures to vulnerable populations.

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2 Funds for ORD research on Air, Climate and Energy (ACE) would decline 3 % from
3 \$111.1M in the FY 2010 enacted budget (-\$3.4 M) to \$108.M in the FY 2012 President's budget
4 request. Relative to other budget cuts, this is modest, and it indicates that certain aspects of
5 biofuels (-\$2.2M) and mercury-in-air research (-\$2.4M) are being completed. But there are cuts
6 in resources to the Clean Air Research Program for source-receptor and dose-effect research that
7 investigate human exposure to air pollutants and resulting health effects in the nation's major
8 cities (-\$ 0.150M) which is a high priority, and also cuts in research on the effects of climate
9 change on estuaries (-\$0.625M). Funds for modeling research to support the development of
10 State Implementation Strategies will be reduced (-\$ 0.762M).

11 The SAB strongly supports the largest increases for ORD in the President's FY2012
12 budget request: new funds for Chemical Safety and Sustainability (CSS) research [a 22.9%
13 increase over the \$77.8M in the FY 2010 enacted budget (+17.7M) to \$95.7M in the FY 2012
14 President's budget request] and for Safe and Sustainable Water Resources (SSWR) research [a
15 6.9% increase over the \$111.1M enacted budget (+\$7.7M) to \$118.8M in the FY 2012
16 President's budget request]. The Board also especially applauds the 56% increase over the
17 \$11.1M FY 2010 enacted budget for the Fellowship program (+\$6.2M to \$17.3M), which
18 includes a Presidential Science Technology Engineering and Math (STEM) initiative.

19 The requested increase in the CSS budget appears justified given the ambitious goals of
20 this newly aligned multidisciplinary program. Realignment allows EPA to streamline its work
21 and be more effective in achieving public health and environmental protection. By leveraging
22 the talents and expertise of existing ORD staff within disciplines to work with each other toward
23 common new research goals, the EPA will be able to successfully implement true multi-
24 disciplinary research. The SAB supports the investments in endocrine disrupting chemicals
25 research [+48% increase over the \$11.4M in the FY 2010 enacted budget (+\$5.5M) to \$16.9M in
26 the FY 2012 President's budget request], the new green chemistry and design for the
27 environment initiative (+\$5.4 M), and next-generation computational toxicology tools (+\$2 M).

28 Given the planned shift toward multipollutant cumulative risk assessment and the
29 backlog of ten thousand of chemicals that need to be assessed, there is a need to invest in
30 modernizing the human risk assessment approach to move beyond the one-pollutant-at-a-time
31 framework. The Agency needs to develop a clear plan for how the outputs of the CSS program
32 (e.g., Tox 21, NexGen) will be used by the ORD Human Health Risk Assessment program.
33 With a flat budget for Human Health Risk Assessment, it is unclear how innovation and
34 modernization of the risk assessment program will be achieved.

35 In the Safe and Sustainable Water Resources SSWR program, the SAB recommends an
36 increased focus on viewing water and wastewater holistically as an integral part of the overall
37 water cycle. Wastewater is a resource providing water, nutrients, and energy for harvest and
38 reuse, and it can be used to make communities more socially, economically, and environmentally
39 sustainable. This is in concert with EPA's changing role from purely a regulatory agency, to one
40 that participates and promotes Sustainable and Healthy Communities.

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After reviewing the President’s FY 2012 budget request in light of *EPA’s Fiscal Year 2011-2010 EPA Strategic Plan*, the SAB finds ORD’s plan to structure its four major research programs around the Administrator’s four major goals meritorious. The SAB recommends that ORD develop an additional research strategy to be added centering on Decision, Social, and Behavioral Sciences. EPA should build a cross-cutting program within ORD in Decision Science to study ways of obtaining environmental goals other than command-and-control regulations. Research in Decision Science is required to understand human behavior, market approaches, and innovative incentives to conserve resources and emit less pollution.

The SAB advises ORD to assume leadership in this area and expand its mandate to include the behavioral and social sciences more broadly as an explicit research enterprise. This need not be a new program, but can be accomplished effectively by treating it as a cross cutting strategy. This recommendation seems especially pertinent during ORD’s realignment of programs because each of the four research programs has an acknowledged set of issues in the decision, behavioral, and social sciences, ranging from decision analysis/structuring to risk communication to behavior change and beyond; yet none seem to have devoted any resources to it. Research in these areas is inexpensive relative to the costs involved in much of the physical and biological sciences. Relatively modest investments in this cross-cutting domain could have large future payoffs.

The SAB makes several other general recommendations to enhance budget planning and implementation: 1) Collaborate even more extensively with the other science and research agencies to achieve desired research outcomes; 2) Expand research integration among the realigned programs (e.g., energy/water interactions, atmospheric deposition to watersheds); and 3) Communicate more effectively the tremendously favorable benefit/cost ratio and jobs creation potential of clean air and clean water programs at EPA.

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**Science Advisory Board Comments on the President's Requested FY 2011
Research Budget.**

1. Background

The Budget Work Group reviewed the President's request for each of ORD's six research areas (Air, Climate and Energy; Safe and Sustainable Water Resources; Sustainable and Healthy Communities; Chemical Safety for Sustainability; Human Health Risk Assessment; and Homeland Security), plus a seventh research area, Economics and Decision Science, directed by the National Center for Environmental Economics (NCEE) in EPA's Office of Policy. The Work Group addressed five common questions to each program area:

1. How well will the requested budget permit EPA to advance its strategic research directions and meet EPA priorities?
2. Are the changes since the FY 2010 enacted budget and EPA's research budget trends appropriate, taking into consideration overall resources, FTEs, intramural and extramural resources?
3. Are there well defined objectives/work products for next year's budget? Can these be accomplished with the given resources?
4. Are there pivotal, "game changing" investments that can advance the science?
5. Are there investments that will serve multiple program or multiple priority needs?

In addition to the detailed Budget Narratives and presentations provided by ORD and NCEE, which described the major programs that were enhanced, preserved, or cut in the FY 2012 budget request, the work group drew on three information items extracted for them by ORD from EPA's *FY 2012 Budget in Brief*:

- Transformational Solutions through Science Innovation (fact sheet)
- EPA Office of Research and Development FY 2010 to FY 2012 in NEW Program/Project Structure
- EPA Office of Research and Development FY 2010 to FY 2012 in FORMER Program/Project Structure.

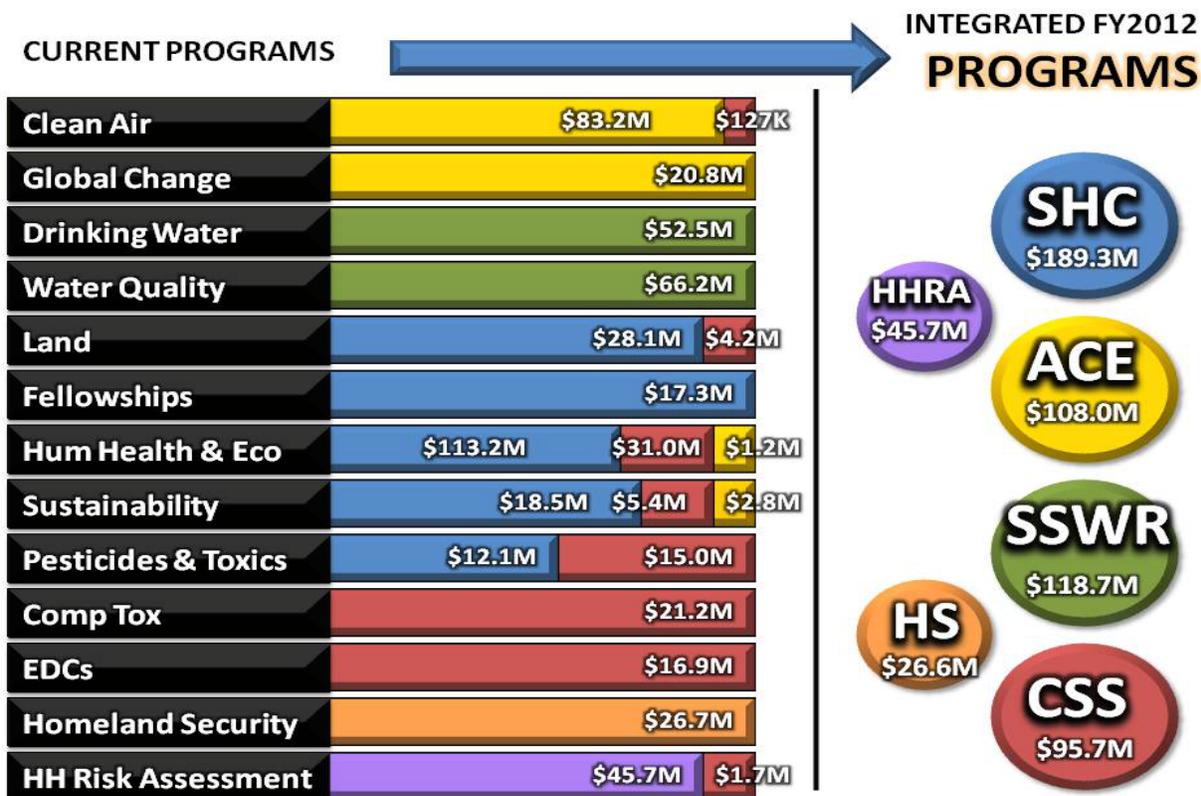
This information provides an overview of the changes for ORD associated with the President's Budget request and is included as Attachment A to this report. The overview information details the cross-walk and realignment of budget categories in the FY2012 President's Budget with earlier budgets. In this context, it is important to note that many of the "decreases" and "increases" in budgets for individual program areas described in the SAB report represent reallocations from "old program" structures to new FY 2012 research program structures. The graphic below, provided by ORD to the SAB Research Budget Work Group Meeting on March 3, 2012, provides an overview of these complex budget reallocations.

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Transfer of funds to ORD Integrated FY 2012 Programs



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Key to ORD Program Acronyms

ACE	Air, Climate and Energy Research Program
CSS	Chemical Safety and Sustainability Research Program
HHRA	Human Health Risk Assessment
HSR	Homeland Security Research Program
SHC	Sustainable and Healthy Communities Research Program
SSWR	Safe and Sustainable Water Resources Research Program

11
12

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1 **2. Air, Climate, and Energy**

2 ORD identified the problem statement that shaped the goals of this research program as
3 follows:

4 Protecting health and the environment from the impacts of climate change and air
5 quality are central 21st century challenges. These challenges are complicated by
6 the interplay between air quality, the changing climate, and emerging energy
7 options.

8 The vision of the Air, Climate and Energy program is to “provide cutting-edge scientific
9 information and tools to support EPA’s strategic goals to protect and improve air quality and
10 take action on climate change.”

11 **2.1. How well will the requested budget permit EPA to advance its strategic research**
12 **directions and meet EPA priorities?**

13 ORD research on Air, Climate and Energy (ACE) is slated to decrease by \$3.4 million
14 dollars from \$111.4 million in 2010 (enacted budget) to \$108 million in the President’s 2012
15 proposed budget – a decline of about 3 %. Relative to other budget cuts, this is modest, and it
16 indicates that certain aspects of biofuels (-\$2.2 M) and mercury-in-air research (-\$2.4 M) are
17 being completed and are no longer in the budget. But there are cuts in resources to the Clean Air
18 Research Program for source receptor and dose-effect research that investigate human exposure to
19 air pollutants and resulting health effects in Detroit and elsewhere (-\$150 K) and also cuts in
20 research on the effects of climate change on estuaries (-\$625 K). Funds for modeling research to
21 support development of State Implementation Strategies will be reduced (-\$ 762 K). Overall,
22 CERES (2011) estimates that the National Ambient Air Quality Standards alone will result in the
23 creation of 1.5 million jobs over the next five years. The country needs clean energy and jobs.
24 Finally, clean air is one of EPA’s success stories. Ambient pollution levels have steadily
25 decreased since the establishment of EPA and the enactment of the Clean Air Act. Earlier this
26 month, EPA issued *The Benefits and Costs of the Clean Air Act from 1990 to 2020*. According to
27 this study, the direct benefits from the 1990 Clean Air Act Amendments are estimated to be
28 almost \$2 trillion for the year 2020, exceeding costs by a factor of more than 30 to one.

29 **2.2. Are the changes since the FY 2010 enacted budget and EPA’s research budget trends**
30 **appropriate, taking into consideration overall resources, FTEs, intramural and**
31 **extramural resources?**

32 There is not enough detail in EPA’s budget narrative or presented to the SAB to say with
33 certainty whether the budget trends are appropriate. Certainly ACE should be a priority for the
34 agency. Although air quality has improved over the decades as a result of EPA research,
35 monitoring, and enforcement, fine particulate matter and ozone are responsible for a large
36 fraction of the human health effects in the United States each year caused by pollution, and OMB
37 estimates that the benefits of air pollution regulations far exceed their costs. In addition, climate

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1 change and energy choices are among the most important issues looming before the country, and
2 they should be made an extremely high priority for EPA to research the most cost-effective, job-
3 creating, policies possible to ensure our safe energy future. Climate change mitigation is roughly
4 without change in the President's 2012 budget compared to the 2010 enacted budget, but it
5 should be a high priority for more funding on both mitigation *and* adaptation.

6 **2.3. Are there well defined objectives/work products for next year's budget? Can these be**
7 **accomplished with the given resources?**

8 Yes, there are well-defined objectives and expected accomplishments for the 2012 budget
9 year, but ORD did not communicate to the SAB exactly the stage of each of those investments.
10 Furthermore, there are certain objectives that seem to be missing. For example, the ACE
11 "Theme 2," *Develop integrated approaches to assess how social and economic factors affect*
12 *vulnerability to air pollution and climate change*" but ORD did not present to the Research
13 Budget Work Group plans for social and economic research to address this item. Research is
14 needed in how to encourage *behavior* that sustains and improves the environment, such as
15 driving habits, recycling, reducing carbon footprints, which are small investments with big
16 returns.

17 **2.4. Are there pivotal, "game changing" investments that can advance the science?**

18 Yes, there are initiatives to develop and implement a new air monitoring network using
19 the latest breakthroughs in technology which promise to be much more cost-effective and
20 enlightening for mixtures of air pollutants. The Near Road program promises important new
21 information on road-side exposures, an important human health and environmental justice issue.
22 However, the SAB recommends that the Agency implement another game-changing investment
23 in the social sciences as they relate to behavior. By a small investment in behavioral science,
24 EPA ORD could research how to accomplish regulatory goals much less expensively with
25 alternate incentives other than enforcement actions. There should be an entire new research
26 effort in alternate means to attain improvements in air quality and greenhouse gas emissions
27 without the traditional command-and-control options and enforcement actions. This would
28 revolutionize the way we protect humans and the environment and may prove popular with
29 citizens, business, and Congress alike.

30 **2.5. Are there investments that will serve multiple program or multiple priority needs?**

31 ACE is already a realignment that makes much sense and brings together ORD programs
32 with tremendous synergy. There are many cross-cutting issues between ACE and the other
33 research areas as well: atmospheric nitrogen deposition to watersheds, social and behavioral
34 science on changing climate and water resources, and the energy-water nexus just to name a few.
35 The United States cannot have clean energy resources in the future without water availability,
36 and it cannot create clean water by desalination or water reuse if the country does not have
37 abundant energy supplies.
38

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1 One of the model projects for which the SAB applauds ORD is the cook stove project.
2 Two Memoranda of Understanding were recently signed with the Peace Corps to expand the use
3 of safe cook stoves in developing countries. It may be possible to collaborate and use the
4 expertise of 60 universities who have Peace Corps M.S. training programs to involve graduate
5 students both before and after their service to expand greatly the efficacy of this program.

6 **3. Safe and Sustainable Water Resources**

7 ORD identified the problem statement that shaped the goals of this research program as
8 follows:

9 Increasing demands for sources of clean water combined with changing land use
10 practices, growth, aging infrastructure, and climate change and variability, pose
11 significant threats to our Nation's water resources. Failure to manage our Nation's
12 waters in an integrated, sustainable manner will limit economic prosperity and
13 jeopardize both human and aquatic ecosystem health.

14 The vision of the Safe and Sustainable Water Resources program is to “use an integrated,
15 systems approach to research for the identification and development of the scientific,
16 technological and behavioral innovations needed to ensure clean and adequate and equitable
17 supplies of water that support human well-being and resilient aquatic ecosystems.”
18

19 **3.1. How well will the requested budget permit EPA to advance its strategic research** 20 **directions and meet EPA priorities?**

21 The SAB agrees with the reallocation of funds and the overall increase in the FY 2012
22 budget for Safe and Sustainable Water Resources (SSWR), a 6.9% increase over the \$111.1M
23 enacted budget (+\$7.7M) to \$118.8M in the FY 2012 President’s budget request.
24

25 **3.2. Are the changes since the FY 2010 enacted budget and EPA’s research budget trends** 26 **appropriate, taking into consideration overall resources, FTEs, intramural and** 27 **extramural resources?**

28 Realignment of Drinking Water and Water Quality programs into integrated water
29 resources and water infrastructure will increase efficiency and foster transformative research that
30 focuses on entire watersheds for both ecological and human health. It is clear that by
31 implementing this alignment and integration that the Agency is responding to recent
32 recommendations and suggestions of the SAB and other external advisory groups.
33

34 The realignment integrates drinking water and water quality, two mature ORD water-
35 related components, and appears to represent more of a merger of two strong, effective,
36 programs rather than a significant restructuring of either component. In either case, this move
37 represents a positive step forward. These program components have a proud history of

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1 delivering sound scientific and technological advice to inform EPA regulatory decisions and
2 initiatives, and the SAB expects that with adequate budgetary support, the realigned SSWR
3 program will continue to maintain its high level of performance.
4

5 As the nation engages the daunting environmental challenges of the 21st Century the
6 critical nexus that exist between the water-energy, water-food, water-health, and water-
7 environment interfaces cannot be overemphasized, and the SAB recommends that this newly
8 integrated SSWR program continue to receive the budgetary support that it deserves. All of
9 these interfaces together demand abundant supplies of water with very specific quality
10 requirements which are necessary to preserve and maintain the nation's health and economic
11 viability. Without a vibrant and productive SSWR program, the EPA would be severely
12 handicapped to fulfill its mandate to protect the nation's health and environment, a significant
13 portion of which is production of safe drinking water, and the maintenance of appropriate water
14 quality nationally.

15 **3.3. Are there well-defined objectives/work products for next year's budget? Can these be**
16 **accomplished with the given resources?**

17 Yes, clearly defined research goals are stated for the FY 2012 budget, and the Work
18 Group believes that great strides will be made towards meeting ORD's objectives.

19 **3.4. Are there pivotal, "game changing" investments that can advance the science?**

20 The investment in "green infrastructure" is potentially "game changing". But more
21 detailed, specific information is needed to evaluate the project as a whole. It seems to be focused
22 largely on storm-water management, and it should be broadened in the future.

23 **3.5. Are there investments that will serve multiple program or multiple priority needs?**

24 The SAB is very supportive of the \$6.0M increase to develop innovative new tools and
25 information research in the development of green water infrastructure, especially in the face of
26 nationally restricted financial resources. However, the Research Budget Work Group has several
27 concerns regarding the precise nature of the program and whether funding is sufficient to meet a
28 broader based perspective. In 2012, SSWR appears to generally focus on urban systems, and
29 specifically the management of storm-water. This is too narrow.
30

31 First and foremost, given the tight integration of larger watersheds with urban water
32 resources (as sources of water and downstream end members), larger watersheds need to be
33 explicitly studied. Only in this manner can specific program goals be obtained, which focus on
34 innovative solutions to reducing and managing groups of chemicals and pathogens and nitrogen
35 and phosphorus pollution.
36

37 The new paradigm in wastewater management is to view wastewater not as a waste, but
38 rather as a resource that can provide water, nutrients, and energy to meet social, economic, and
39 environment needs. This paradigm fits within ORD's focus of sustainability and a systems

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1 approach, and it links management of wastewater with issues of food production, land use, water
2 quality, and energy production. It also provides opportunities to advance science in
3 understanding the direct and indirect energy use in public infrastructure, as well as understanding
4 risk associated with use of non-potable water. There is also a strong social/behavioral
5 component to this type of research. The SAB recommends that ORD demonstrate a leadership
6 role in this effort to assist the many water/wastewater utilities in the Nation make critical
7 advances in these areas.

8
9 The SAB is very supportive of the \$4.2M increase in funding to assess the potential
10 public health and environmental risks associated with hydraulic fracturing. The combination of
11 three retrospective analyses and two new case studies are necessary and, as an SAB panel is now
12 pointing out in a separate SAB advisory activity, may not even be sufficient to critical
13 knowledge on the large-scale impacts of these processes from an ecological and human health
14 perspective. While the funding is sufficient for this fiscal year, we want to encourage the SSWR
15 program to ensure that new case studies are conducted, which expand the knowledge gained
16 from this initial program. Proposed funding levels for 2012 are likely insufficient for the out-
17 years.

18
19 The SAB Research Budget Work Group understands the \$2M reduction in the Beaches
20 Program as it draws to a conclusion. However, these studies are still critical and the SAB
21 advises the program to provide a phased reduction approach that maintains the high quality of
22 research and management guidelines that has already emanated from this program.

23 **4. Sustainable and Healthy Communities**

24 ORD identified the problem statement that shaped the goals of this research program as
25 follows:

26 Communities face social, economic, and environmental trade-offs in a resource-
27 constrained world. These trade-offs are often not well characterized in terms of
28 the implications and interactions between human health, ecosystem services,
29 economic vitality, and social equity. Conventional decision-making often does not
30 adequately characterize these complex interactions. Communities therefore need
31 holistic, integrated, and functional science and practical technical tools and
32 support to find solutions that are sustainable: that is, they are equitable, efficient,
33 and effective.

34 ORD described the “expected broad outcomes” for the Sustainable and Health
35 Communities as follows: “Local, regional and national decision-makers will have tools to more
36 equitably weigh and integrate social (including human health), economic, and environmental
37 factors in order to promote human health and welfare and to ensure that nature’s benefits are
38 available to generations to come.”

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1 **4.1. How well will the requested budget permit EPA to advance its strategic research**
2 **directions and meet EPA priorities?**

3 The 2012 President's FY 2012 budget request calls for reductions in funding within the
4 Sustainable and Healthy Communities program for human health research [a 10% reduction from
5 \$210.3M in the FY 2010 enacted budget (-\$21M) to \$189.3M in the FY 2012 President's budget
6 request]. The President's FY 2012 research budget creates this new program by combining five
7 programs (Fellowships, Human Health and Ecosystems, Sustainability, Land Protection and
8 Restoration, and Pesticides and Toxics), which existed in the FY 2010 enacted budget, into one
9 transdisciplinary program. This restructuring appears appropriate based on the following budget
10 narrative descriptions for this program:

11
12 The SHCRP will focus primarily on environmental sustainability at the
13 community scale. The SHC program aims to conduct research and development
14 that will help communities assess their current health and environmental condition
15 and identify strategies that increase ecosystem services while decreasing
16 community health risks. Healthy communities will translate to healthy economies.

17
18 The resources in the requested budget will support the SHC research program in
19 developing an integrated systems approach to provide information and tools for decision makers
20 and stakeholders in four core areas:

- 21 • Pilot on urban communities
- 22 • Human health protection
- 23 • Barriers to community sustainability
- 24 • Performance measures

25
26 The positive aspect of the new approach is that it potentially can offer communities (using
27 a broad definition of communities) an integrated understanding of the issues and solutions for not
28 only protecting citizens from hazardous materials and activities but also the potential of using the
29 "nature on which they depend" to help achieve a "sustainable and healthy community." This
30 approach offers communities research that informs an integrated understanding of the science
31 essential to moving those communities toward sustainability and good health. That integrated
32 understanding encompasses both protection from pollution and hazards and identifying
33 opportunities to make better use of the ecosystems and renewable resources on which every
34 community depends

35
36 Since the new research will use an integrated approach that looks at problems from a
37 systems perspective, research will cut across the several areas that are now included in SHC
38 research program. There is an opportunity to explain ways in which an integrated approach can
39 minimize the damage from the significant reductions in the FY 2012 budget request. The SAB
40 recommends that ORD provide a better mapping between outcomes and FTE and budget to
41 demonstrate how the requested budget for the SHC research program will permit EPA to
42 advance its strategic research directions and meet EPA priorities

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1 **4.2. Are the changes since the FY 2010 enacted budget and EPA's research budget trends**
2 **appropriate, taking into consideration overall resources, FTEs, intramural and**
3 **extramural resources??**

4 Within the SHC there are several areas of specific reductions of concern to the SAB
5 Research Budget Work Group. Reductions in funding for human health research [a 16%
6 reduction from \$54.2M in the FY 2010 enacted budget (-\$8.8M) to \$45.4M in the FY 2012
7 President's budget request] include a -\$3M loss of the Congressionally-directed FY 2010
8 Appropriation for children's environmental health research and also effectively eliminate EPA's
9 capability to conduct major epidemiology studies. Such studies are needed to better understand
10 exposures, especially for susceptible and vulnerable populations, and dose-responses of hazards
11 so as to develop regulations to protect public health using the best possible science.
12

13 Reductions in ecosystem research [a 15% reduction from \$71.7 in the FY 2010 enacted
14 budget (-\$10.8M) to \$60.9M in the FY 2012 President's budget request] include a -\$1.7M cut in
15 mapping and modeling research on ecosystem services, which has been a major focus of ORD's
16 ecological research program in recent years, supported by the SAB [*Consultation on EPA's*
17 *Implementation of the Ecosystem Services Research Program* (EPA-SAB-09-019), *SAB Advisory*
18 *on the EPA Ecological Research Program Multi-Year Plan* (EPA-SAB-08-011)]. Reductions in
19 research in valuing impacts on ecological systems and services will slow progress made in recent
20 years in characterizing a fuller suite of ecological benefits from environmental protection actions
21 for decision makers and the public. This reduction in ecosystems research follows a dramatic
22 long-term downward trend since 2004 when the EPA ORD budget was nearly double ((\$108 M)
23 what is recommended for FY 2012. Furthermore, the Budget Work Group views mapping and
24 modeling as a critical component for integrating disciplines to solve community problems. EPA
25 should be cognizant of this potential impact for the future direction of the Sustainable Healthy
26 Communities program.
27

28 Reductions in research on waste clean-up are substantial (Hazardous Substances
29 Superfund, a 16.7% reduction from \$21.3M in the FY 2010 enacted budget (-\$3.6) to \$17.8 in
30 the FY 2012 President's budget request). These cuts will impact future programs in OSWER
31 and will affect the health and well-being of communities and environmental justice.
32

33 The Research Budget Work Group supports two areas of proposed investments identified
34 in the President's FY 2012 requested research budget. The 56% increase over the \$11.1 FY
35 2010 enacted budget for the Fellowship program (\$+6.2M to \$17.3M), which includes a
36 Presidential Science Technology Engineering and Math (STEM) initiative, is an important
37 investment to stimulate research and training for scientists in a fashion that supports the
38 emphasis on sustainability announced the new budget.. Within this fellowship investment, there
39 is a 45% increase over the \$7.7M FY 2010 enacted budget for the STAR Fellowship program
40 (\$+6.3M) to \$14.1M. In addition, the investment of +\$2M in a long-term review of EPA's
41 overall laboratory network is well-timed. With increasing integration, ORD, program, and
42 regional laboratories could integrate activities generally and across disciplines to save funds and
43 use laboratory resources in a more effective, efficient fashion.

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1 **4.3. Are there well-defined objectives/work products for next year's budget? Can these be**
2 **accomplished with the given resources?**

3 The SHC objectives are defined, but EPA is still in the process of developing a detailed
4 plan outlining research products, timelines, and deliverables. The objectives are reasonable,
5 globally, but many specifics remain to be articulated. The objectives require alignment with the
6 research products, FTE and budget. ORD committed to provide a draft plan for SAB review in
7 June 2011 describing a proposed timeline and a strategy for multi-year investments.
8

9 The realignment into this SHC program is an exciting and courageous effort to shift
10 towards a community-based approach to risk assessment and management, with all its multi-
11 stressor/multimedia, cumulative risk complexities. It is the right direction and the Agency is
12 correct to pursue it. However, in the current political and fiscal climate, there are significant
13 dangers to such innovation. Many of the other realigned programs (ACE, CSS, SSWR) have
14 been able to quickly and clearly define expected outcomes based on earlier accomplishments
15 within the more traditional programs from which they were formed. SHC, on the other hand, has
16 not presented as clear a picture of what will be accomplished with the \$ 189 M allocated in the
17 President's 2012 Budget. This is understandable as the SHC program is not so much a collection
18 of previous programs as it is an entirely new way of conceptualizing the interrelated human
19 health and environmental protection goals and the science and policy approaches for
20 accomplishing them. EPA/ORD needs to be very careful how this radical new program is
21 presented and evaluated as it gains traction.

22 **4.4. Are there pivotal, "game changing" investments that can advance the science?**

23 Yes, pivotal game changing investments are evident in the SHC research area presented
24 to the SAB Research Budget Work Group. These investments include:
25

- 26 • Identification of barriers to community sustainability,
- 27 • Tools designed to inform local decision makers and stakeholders so that they can
28 move their communities toward greater sustainability.
- 29 • General modeling approaches and pilot projects that may advance environmental
30 justice and equitable solutions.
- 31 • STAR funding to build a workforce that can pursue sustainability as an investment in
32 innovation because there is a need to create an integrated understanding of human
33 communities and their natural settings.
34

35 In addition, SAB members commented on four additional game changing investments that
36 should be included in the 2012 priorities. First, research on life stage susceptibility is important
37 at both ends of the life cycle. Second, cumulative risk assessments should be part of projects that
38 consider interactions among human health, ecosystems as well as economic, social, and
39 nonchemical stressors. Members suggest that the new SHC program should incorporate
40 cumulative risk assessment as part of the framework. Third, as projects investigate interactions

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1 among human health and chemical stressors, there is a need to explore the epigenetic effects that
2 can potentially result in transgenerational changes.

3
4 Finally, there is a need for ORD to invest in evaluating the SHC research area as the “test
5 bed” for integrated transdisciplinary research that takes a systems approach and develops
6 innovative solutions for environmental problems. It will be important to invest in *evaluation* to
7 test the concept and measure its impact. SHC is an appropriate test-bed, since EPA’s work in
8 ecosystem services—now integrated within SHC--- has laid the groundwork for the realignment
9 to emphasize sustainability. The community-based approach offers a unique opportunity to
10 determine what specific “mixes” of threats (cumulative risks over stressors and media) in
11 particular social contexts are faced by actual communities. This would provide an empirical
12 basis for orienting the multi-stressor research in the other programs.

13 **4.5. Are there investments that serve multiple programs?**

14 Yes, there are investments that may potentially serve multiple programs including a
15 community-focused exposure and risk tool, technical guidance for environmental justice,
16 development of non-invasive methods for mold and asthma, green infrastructure, and a decision
17 framework for communities. EPA ORD has an opportunity to develop transdisciplinary research
18 through this consolidation of SHC programs. However, more detail needs to be provided on
19 outcomes, objectives, timelines, FTE realignment, and the budget.

20 **5. Chemical Safety and Sustainability**

21 ORD identified the problem statement that shaped the goals of this research program as
22 follows:

23 Although chemicals are essential to modern life, we lack innovative, systematic,
24 effective, and efficient approaches and tools to inform decisions that reduce
25 negative environmental and societal impacts of chemicals.

26
27 The vision of the Chemical Safety and Sustainability program is “EPA science will lead
28 the sustainable development, use, and assessment of chemicals by developing and applying
29 integrated chemical evaluation strategies and decision support tools.”

30 **5.1. How well will the requested budget allow EPA to advance its strategic research
31 directions and meet EPA priorities?**

32 The President’s requested increase for this program [a 22.9% increase over the \$77.8M in
33 the FY 2010 enacted budget (+17.8M) to \$95.7M in the FY 2012 President’s budget request]
34 appears justified and should allow the program to achieve its goals as the interim National
35 Program Director outlines them. Ensuring the safety of chemicals and preventing pollution is a
36 high priority for the Administrator.
37

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1 This new research program consolidates chemical safety-related research programs from
2 eight previous ORD programs (Endocrine Disrupting Chemicals, Computational Toxicology,
3 Pesticides and Toxics, Land Protection and Restoration, Human Health and Ecosystems,
4 Sustainability (E-waste), Human Health Risk Assessment, and Clean Air). The realignment will
5 allow the Agency to streamline its work and be more effective in achieving public health and
6 environmental protection.

7 **5.2. Are the changes since the FY 2010 enacted budget and EPA's research budget trends**
8 **appropriate, taking into consideration overall resources, FTEs, intramural and**
9 **extramural resources?**

10 The changes in the proposed budget relative to FY 2010 appear to be fully cognizant of
11 the overall resources, FTEs and intramural/extramural resources. The agency has needed to
12 develop more robust transdisciplinary research directions, and the articulation of the ORD's
13 realignment is a good step in this direction. It leverages the talents and expertise of existing
14 ORD staff to go beyond individual disciplines. The staff is well trained to conduct excellent
15 research. By realigning these scientists to work with each other toward common new research
16 goals, the Agency will be able to successfully implement the goal of true multi-disciplinary
17 research. The Agency should take the time to ensure that staff scientists are formally developed
18 as this program progresses and that they are brought on board this new initiative. Clearly, this
19 research capacity is important for the success of the realignment.

20 **5.3. Are there well-defined objectives/work products for next year's budget? Can these be**
21 **accomplished with the given resources?**

22 The specific objectives for next year's budget period could be better defined. This is a new
23 program consolidating the strengths and assets of numerous former programs, so it is
24 understandable that there are ambiguities in the presentation of specific objectives and the
25 specific timeline for these goals. Some research areas appear overly broad, such as "Targeted
26 high priority needs". The program is taking on former programs that identified focused and
27 useful activities (i.e., computational toxicology, pesticides, endocrine disrupting chemicals, etc.)
28 yet the new research areas appear somewhat vague at the present time. Therefore, it is difficult
29 to assess whether the objectives can be accomplished with the given resources. However, the
30 broad objectives do represent Agency steps toward conducting more transdisciplinary research.

31
32 This program appears to be forward-looking and visionary. If given more resources, it
33 appears that it could lead EPA in a number of other areas, including improved ecological risk
34 assessment through modeling and simulation, improved exposure assessment (a critical need as
35 EPA moves forward with developing routine aggregate exposure and cumulative risk
36 assessments), and computational approaches to green chemistry. More funding should be
37 allocated in the future to these areas.

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1 **5.4. Are there pivotal, “game changing” investments that can advance the science?**

2 The program has the potential to make game-changing contributions in predictive
3 toxicology and in decreasing uncertainty in risk assessment through the use of state-of-the-art
4 screening methods and computational approaches.
5

6 Of all the new program areas, this one has the most potential to accomplish game-
7 changing objectives. These include: 1) development of approaches to assess multiple
8 contaminant exposures; 2) reducing the use of animal models to assess toxicity and relying more
9 on predictive models; 3) developing tools that can be used in the medical field to further our
10 understanding of individualized medicine and individualized toxicology. The program has been
11 very creative in accessing data sources (e.g., data on discontinued pharmaceuticals) at no cost to
12 the Agency.
13

14 The program could serve as a model for the rest of ORD in the use of computer modeling
15 and simulation as a first step, rather than empirical testing. By combining the endocrine
16 disrupter screening program with the computational toxicology program, there is a significant
17 opportunity for the former to be modernized and provide much more valuable information for
18 decision-making.
19

20 Placing the NextGen risk assessment program in the Chemical Safety and Sustainability
21 program makes sense in that it will allow more seamless transfer of basic science into the risk
22 assessment methodology; however, special attention will be required to ensure that the
23 methodology is being carried-over into practice, as this is still within the purview of the Human
24 Health Risk Assessment program. Combining multiple programs under CSS makes sense from a
25 green chemistry standpoint, but there was not a lot of emphasis on life-cycle assessment in this
26 program. If it's still there, EPA should emphasize it more.
27

28 There was concern that there is no pro-active initiative to develop ways of employing
29 high throughput data into hazard or risk assessment. This is a significant weakness.

30 **5.5. Are there investments that will serve multiple program and multiple priority needs?**

31 Much of the work in this program will serve other programs and other priority needs.
32 One could make the argument that this program will generate information that will be required
33 across programs within EPA and across different federal agencies. The SAB hopes that EPA and
34 the federal government will be able to provide the investments to help make this happen.
35

36 Health and environmental implications of nanotechnology appeared throughout the
37 presentations and was included for CSS as well. However, NIH and other federal programs are
38 actively and heavily funding the development of nanotechnology for commercialization of
39 products. The budget appropriated to evaluating the health and environmental impacts of
40 nanotechnology is not sufficient for EPA to stay out in front of this technology development. Is
41 there any attempt for EPA to work together with other funding agents to reconcile the federal

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1 government's priority to develop and commercialize nanotechnology with the need to assess the
2 impacts of nanotechnology on human health and the environment? Resources committed to
3 developing nanotechnology by private companies dwarf those allocated for assessing its impacts.

4 **6. Human Health Risk Assessment**

5
6 ORD described this program as providing an interface between researchers in other ORD
7 programs who are generating new findings and data, and those regulators in the EPA program
8 and regional offices who make regulatory, enforcement, and remedial action decisions. The
9 three parts of the program are: 1) IRIS and other priority health hazard assessments; 2) Risk
10 assessment models, methods, and guidance; and 3) Air quality Integrated Science Assessments.

11 **6.1. How well will the requested budget allow EPA to advance its strategic research** 12 **directions and meet EPA priorities?**

13 Inasmuch as the 2012 budget represents only a slight reduction [a 1% reduction from
14 \$46.2 in the FY 2010 enacted budget (-\$0.6M) to \$5.7M in the FY 2012 President's budget
15 request], the Human Health Risk Assessment (HHRA) program appears to be in reasonable
16 shape to maintain its strategic research and meet its top priorities. The increase in FTEs by 13
17 also appears to be appropriate – presumably many of these will be EPA scientists with
18 specialized risk assessment training. However, the IRIS reviews in progress are ambitious and
19 the Agency will be required to manage these reviews carefully. Moreover, it will be challenging
20 for the Agency to incorporate new information – and new types of information resulting from
21 Tox21 program – into IRIS and other assessments. Assessments for the Integrated Risk
22 Information System (IRIS) and the Integrated Science Assessments for National Ambient Air
23 Quality Standards are important products that provide a foundation for protection of the public
24 from chemical risks. The SAB is pleased that ORD is increasing the speed of producing these
25 assessments. Given the basically flat budget, it is hoped that this increased efficiency will allow
26 increasing focus on cumulative risk assessment or groups of chemicals. The plan for a transition
27 to multipollutant assessment needs to be clarified.

28 **6.2. Are the changes since the FY 2010 enacted budget and EPA's research budget trends** 29 **appropriate, taking into consideration overall resources, FTEs, intramural and** 30 **extramural resources?**

31 It will be difficult for the Agency to keep abreast of the “-omics” revolution and be able
32 to use the latest computational toxicology tools to protect public and environmental health. So,
33 the budget changes since 2010 do not appear to be sufficient for innovation and modernization of
34 risk assessment for the Agency. As EPA moves from risk management paradigm to
35 sustainability paradigm, increased resources are needed. If the Agency is to make appreciable
36 progress dealing with the tens of thousands of chemicals of concern, it will be necessary to make
37 an investment in using computational toxicology methods and conducting multipollutant risk
38 assessment rather than only focusing on one chemical at a time.

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1 **6.3. Are there well-defined objectives/work products for next year's budget? Can these be**
2 **accomplished with the given resources?**

3 The objectives/work products for the next year were well articulated and it appears that
4 the modest goals as outlined can be accomplished with the given resources, as they were in 2010
5 and 2011. But eventually more funds will be needed as explained in Section 6.2 above.

6 **6.4. Are there pivotal, "game changing" investments that can advance the science?**

7 Integrating Tox21 data into risk assessment will require investments that will be essential
8 to modernize our ability to predict human and environmental health risks. It is not clear to the
9 SAB who makes these investments at EPA. Formalizing and clarifying the linkage between the
10 Chemical Safety for Sustainability research program and Human Health Risk Assessment will
11 assist in ensuring that output from CSS is used by HHRA in a scientifically sound and defensible
12 way.

13
14 The multi-pollutant, cumulative risk approach is a potential paradigm shift in how to assess
15 chemical risks. Perhaps the ambient air pollution multi-pollutant science assessment under way
16 could be considered a pilot for evaluating multi-pollutant assessments.

17 **6.5. Are there investments that will serve multiple program and multiple priority needs?**

18 The HHRA program inherently serves multiple program needs. The Integrated Risk
19 Information System (IRIS) assessments clearly link to all the other integrated ORD programs.
20 The IRIS assessments are used by basic science programs as well as regulatory programs not just
21 in EPA but in other agencies and by states as well. This program is a shared federal resource.

22
23 The Integrated Science Assessments are extremely important to the National Ambient Air
24 Quality Standard reviews and thus are integrally related to the ACE program.

25
26 There are strong potential linkages to the CSS program – the HHRA program will clearly
27 need to work with CSS to use the CSS output appropriately and maximally.

28 **7. Homeland Security**

29
30 ORD described three major responsibilities of the Homeland Security research program:

- 31
32
- 33 • Protect water systems from attacks and for detecting and recovering from successful
34 attacks affecting water systems.
 - 35 • Decontaminate buildings and outdoor areas impacted by a terrorist attack by leading
36 efforts to establish clearance goals and clean up.
- 37

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- Develop a nationwide laboratory network with the capability and capacity to analyze for chemical, biological and radiological agents for routine monitoring and in response to a terrorist attacks.

7.1. How well will the requested budget allow EPA to advance its strategic research directions and meet EPA priorities?

This program has a very well defined mission. The Center for Homeland Security was initially charged to develop and deliver products quickly, with the plan that Homeland Security Research Center would be sunset after three years. However, it has been positively received within the Agency and by the users of its products and continues to enjoy support from many stakeholders. Therefore, EPA ORD has supported maintaining the program because it recognizes its value. However, in the FY 2012 President's budget, it is slated for a 24.9 % reduction (from \$35.0M in the FY 2010 enacted budget to \$26.7M in the FY 2012 President's budget request) due mostly to maturation of its initial research products.

Over half of the \$24.684 million request is directed towards monitoring and decontamination after a chemical, biological, or radiological (CBR) release, including response to wide area anthrax attack. The safe buildings program was zeroed out for the proposed 2012 budget. Remaining funds of \$9.047 million are allocated to an "other" category.

The program activities related to developing contamination approaches to wide areas is limited because of budget restrictions that only allow for smaller pilot level tests. The efforts are focused on evaluating single agent releases and no budget is provided to address release of mixtures. This is in line with other EPA activities in the past for evaluating exposure to single chemicals.

It is important that the Homeland Security program see EPA's regional and program offices as clients for its water related research. It would be helpful to clarify the basis for EPA's conclusion that the Water Security Initiative (WSI) is maturing so that its budget can now be reduced. Does the HS Program consider water utilities to be clients for its real-time water monitoring and decision-making tools and products? If so, how does the Program communicate with the water utilities about their needs for these tools and their experience with these tools? The Budget Work Group considers that these models and real-time tools are a public service that should be developed for states and communities to use. Are the changes since the 2010 budget and EPA's research budget trends appropriate, taking into consideration overall resources, FTEs, intramural and extramural resources?

A 75% reduction in methods development for analyses of chemical, biological and radiological warfare agents is a huge reduction in a single program. The changes since the 2010 budget may be appropriate as several programs within the Center for Homeland Security are mature. We caution however, that many of the proposed 2012 activities are related to data collection that are resource intensive activities, especially given the nature of potential releases.

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1 **7.2. Are there well-defined objectives/work projects for next year's budget? Can these be**
2 **accomplished with the given resources?**

3 The objectives appear to be very broad and the SAB Research Budget Work Group was not
4 provided with adequate information on the research tasks that are going to be performed to
5 achieve these objectives. For example, in “developing microbial risk assessment
6 methodologies,” is the need really to develop methods? Or is it to develop more data that could
7 be used in these risk assessments? The Center has a record of developing and releasing guidance
8 materials in a timely manner that are well respected within and outside the Agency. The
9 program has plans to disseminate water security related products to its users at the State and local
10 level. Many of the 2012 activities are related to data collection efforts, which are resource
11 intensive in terms of this particular research area and may be damaged if budgets are cut
12 rapidly.”

13 **7.3. Are there pivotal “game changing” investments that can advance the science?**

14 There do not appear to be investments aimed at understanding the factors that shape the
15 resilience of infrastructure and communities that have experienced disruptions associated with
16 attack or natural disaster. The disaster-response research community has investigated this
17 question from a social science perspective, and it would make sense for the Homeland Security
18 staff to engage with that group of research scholars and the governmental and nongovernmental
19 entities making use of their findings. ORD efforts in this area could benefit many parties.

20 **7.4. Are there investments that will serve multiple program or multiple priority needs?**

21 The majority of proposed research activities are directed to monitoring and
22 decontamination after a chemical, biological, or radiological release. EPA makes a significant
23 contribution to the nation's ability to respond to natural disaster and unconventional warfare,
24 because of the Agency's expertise in identifying and handling toxic substances in environmental
25 media. Within the Agency and ORD's emphasis on sustainability, we believe the organizing
26 theme of the homeland security activities should be resilience in the face of sudden disruptions.
27 This would meet multiple agency needs and also provide opportunities for game changing
28 investments.

29
30 It is relevant to note that some dimensions of resilience are rooted in social capital and
31 landscape-level environmental design. Social capital is a measure of the capacity of a human
32 community to mobilize under surprising and stressful conditions, drawing upon relationships that
33 were not developed with emergency response in mind. Stable, sustainable human communities
34 are more likely to possess social capital that can add to resilience. The ecosystems providing
35 essential services to people, such as water supply, food distribution networks, and the capacity to
36 cleanse polluted air, also contribute to resilience after sudden disruption. Strengthening social
37 capital and adding to the resilience of ecosystem services are tasks that are not conventionally
38 included in “homeland security,” but their essential role in social and environmental policy
39 should be taken into account when targeted expenditures are sharply reduced, as is proposed.
40

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1 EPA could make some game changing investments in this area that would cross over to
2 other programs (such as water reclamation/reuse) if they added resilient infrastructure to this
3 area. This would allow EPA to study the deployment of infrastructure in a decentralized or
4 centralized manner, which will impact design and operation and performance, but also draws in
5 issues of evaluating new technology, which is integrated with issues of individual, household,
6 and community behavior, along with policy initiatives. The recent example of the Christchurch
7 earthquake provides a great example related to dependence on centralized water and sanitation
8 provisions.

9 **8. Economics and Decision Science**

10 Sustainability is a challenge grounded in the human dimensions of a coupled human and
11 natural system: humans are the driving force of environmental changes both good and bad, and
12 human institutions and behavior will have to change if a transition toward a sustainable economy
13 is to be achieved. It is accordingly striking that EPA's budget accords so little explicit attention
14 to research on the human elements of coupled systems. Economics remains a stepchild of EPA,
15 and decision sciences were eliminated altogether in the 2008 reorganization that transferred the
16 Economics and Decision Science extra-mural research program to National Center for
17 Environmental Economics (NCEE)." The fragments of social science research continue to be
18 exposed to the harsh winds of a declining budget. A long-term dataset, the Pollution Abatement
19 Cost and Expenditure survey series, is a casualty of these cuts, limiting our ability to understand
20 the economic implications of environmental regulation. This is a serious loss because of the
21 length of time needed to collect data on industries making long-term capital investments in
22 response to globalization and national economic shifts, as well as environmental regulations.
23 NCEE retains a function as an internal consultant group, available for studies in the Office of
24 Policy and elsewhere within the Agency. This is a potentially important function, not only for
25 EPA's immediate responsibilities, but as a way to maintain awareness within EPA of the
26 perspectives and utility of understanding the human dimensions of environmental problems.
27
28

29 Social science has no explicit place within the four major research programs around
30 which ORD is being reorganized. The SAB appreciates the understanding displayed by
31 Assistant Administrator Anastas about the need for social science as a cross-cutting theme, but
32 that understanding needs to be translated into a durable institutional presence in the Agency if
33 the human dimensions of sustainability are to become a permanent part of EPA's approach.
34

35 The neglect of social and behavioral science is a problem of long standing, on which the
36 SAB has commented repeatedly through the years. A time of politically frightening budget
37 deficits is not a moment for a sweeping vision of investment in the social sciences. But people
38 and the institutions that shape human behavior, including markets and informal norms, as well as
39 the regulations and laws that fall within EPA's legal responsibility-are central to sustainability.
40 The nation can't get there from here without engaging with those dimensions.

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1 **8.1. How well will the requested budget allow EPA to advance its strategic research**
2 **directions and meet EPA priorities?**

3 It appears that the total budget devoted to Economics and Decision Science is \$1M (plus
4 an additional \$0.4M for NCEE) with a total of 3+ FTEs (a reduction of \$.2M from FY 2010
5 enacted funding of 1.2M). This is barely enough to keep the Center and the program alive, much
6 less to advance strategic directions.

7 **8.2. Are the changes since the FY 2010 enacted budget and EPA's research trends**
8 **appropriate, taking into consideration overall resources, FTEs, intramural and**
9 **extramural resources??**

10 The FY2 012 Economics and Decision Science budget represents a 17% decrease from
11 the FY10 level of \$1.2M. Recognizing that budgets must decrease, the SAB nevertheless thinks
12 that the EDS budget should have moved in the other direction. Economic and especially
13 decision sciences cut across the Agency's goals, yet the budget marginalizes them. This is
14 misguided, because relatively small investments in these areas can provide large benefits.

15 **8.3. Are there well defined objectives/work products for next year's budget? Can these**
16 **be accomplished with the given resources?**

17 It appears that efforts will be directed towards children's health protection and water
18 valuation, but only two projects seem to be well defined, both under water valuation. These are
19 modeling cost-effective nutrient management options for the Chesapeake Bay and modeling
20 welfare impacts of ocean acidification.

21
22 The very limited budget makes it difficult to accomplish very much, and these few
23 projects may be sensible, given that they address problems that cut broadly across the Agency.

24 **8.4. Are there pivotal, "game changing" investments that can advance the science?**

25 In a word, no. The budget is too small to be game changing in any sense. The SAB
26 applauds the fact that NCEE is directing a substantial portion of its limited funds to external
27 grants, especially for graduate student research, as this is a good way to leverage resources and to
28 bring new economists into environmental research. However, there is little evidence that this
29 program can similarly affect the other social, behavioral and decision sciences.

30
31 The SAB deplores the elimination of decision sciences from the portfolio. It is apparent
32 in the Agency's strategic plan that the decision sciences, and more generally the behavioral and
33 social sciences, should be playing increasing roles in EPA's portfolio of research activities.
34 They are mentioned throughout, but receive no funding.

35 **8.5. Are there investments that will serve multiple programs or multiple priority needs?**

36 In a sense the entire budget serves multiple programs.

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1 **8.6. Final comments and two recommendations**

2 Economics and Decision Science (EDS) was moved from ORD to NCEE in 2008. It seems
3 that within these three years, the DS was dropped from EDS, and we think that is a mistake. The
4 SAB advises EPA to consider bringing the decision sciences back into ORD and expanding its
5 mandate to include the behavioral and social sciences more broadly as an explicit research
6 enterprise. This need not be a new program, but can be accomplished effectively by treating it as
7 a cross cutting strategy.

8

9 The SAB makes two overall policy recommendations.

10

11 First, for ORD: The SAB advises EPA to bring the decision sciences back into ORD and
12 expand its mandate to include the behavioral and social sciences more broadly as an explicit
13 research enterprise. This need not be a new program, but can be accomplished effectively by
14 treating it as a cross cutting strategy. This recommendation seems especially pertinent in that
15 each of the four research programs has acknowledged sets of issues in the decision, behavioral,
16 and social sciences, ranging from decision analysis/structuring to risk communication to
17 behavior change and beyond; yet none seem to have devoted any resources to it.

18

19 Two examples of the activities that would be encompassed by this strategy are:

20

- 21 • Develop models and methods for engaging communities in dialogs to help identify
22 and define human health and environmental protection goals and to help communities
23 construct desired future conditions.
- 24 • Support the research necessary to encourage environmentally-friendly behaviors,
25 such as altering driving habits, increasing recycling, making better use of energy
26 labeling in purchasing decisions, investing in home insulation, adopting smart
27 electricity meters, and more.

28

29 Research in these areas is inexpensive relative to the costs involved in much of the
30 physical and biological sciences. Therefore, relatively modest investments in this cross-cutting
31 domain could have large payoffs down the road.

32

33 Second, for EPA as a whole: EPA's FY 2011-2015 Strategic Plan focuses on five strategic
34 goals and five cross-cutting strategies. The SAB recommends that a sixth cross-cutting strategy
35 be added and funded in the future. This strategy would be: *Working to encourage behavior and
36 facilitate decision making that sustains and improves the environment.* By including this
37 strategy, EPA will focus attention and modest resources to stimulate scientific advances and
38 problem-solving and will attract social, behavioral, and decision scientists to work on
39 environmental issues.

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TABLE OF ACRONYMS

ACE	Air, Climate and Energy Research Program
CSS	Chemical Safety and Sustainability Research Program
HHRA	Human Health Risk Assessment
HSR	Homeland Security Research Program
iNPD	Interim National Program Director
IRIS	Integrated Risk Information System
ORD	Office of Research and Development
SBIR	Small Business Innovation Research
SHC	Sustainable and Healthy Communities Research Program
SSWR	Safe and Sustainable Water Resources Research Program

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1 Attachment A: Extracts from *EPA's FY 2012 Budget in Brief* for the SAB

Transformational Solutions through Science Innovation

EPA's Office of Research and Development provides critical support to the Agency's environmental policy decisions and regulatory actions to protect human health and the environment. EPA research has provided effective solutions to environmental problems for the past 40 years. The Agency's research has informed risk reduction approaches that have resulted in cleaner air, land and water. However, today's increasingly complex public health and environmental problems require an evolved approach to research. Scientific innovation is needed to produce transformational solutions beyond those more narrowly targeted to single chemicals or problems.

To address these new challenges, in FY 2012 EPA is strengthening its planning and delivery of science by implementing an integrated research approach that looks at problems from a systems perspective. Research will leverage the diverse capabilities of in-house scientists and engineers and bridge traditional scientific disciplines. In addition, research plans will incorporate input from external stakeholders such as Federal, State, and local government agencies, non-governmental organizations, industry, and communities affected by environmental problems.

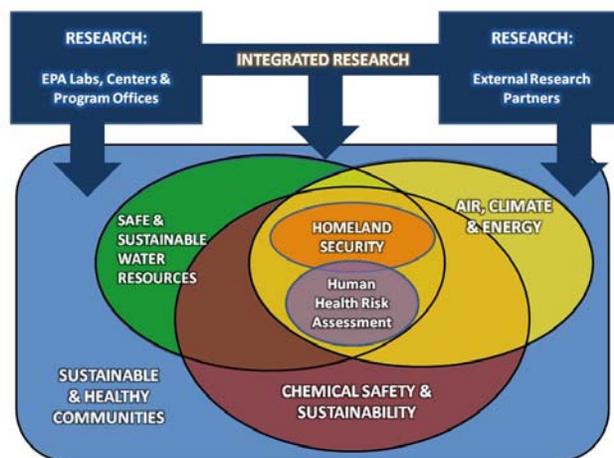
EPA will implement this new approach by realigning and integrating the work of twelve of its base research programs into four new research programs:

- **Air, Climate, and Energy**
- **Safe and Sustainable Water Resources**
- **Sustainable and Healthy Communities**
- **Chemical Safety and Sustainability**

This integration capitalizes on existing capabilities and promotes the use of a transdisciplinary perspective to further EPA's mission.

For example, available tools have failed to fully address complex aspects of chemical risk such as the impact of life-stage vulnerability, genetic susceptibility, disproportionate exposures, and cumulative risk. By formally integrating chemicals research, EPA will combine developments in computational, physico-chemical, and biological science to advance science in the sustainable development, use, and assessment of chemicals.

Within the new integrated programs, EPA will continue research to address targeted, existing problems and provide technical support, with an emphasis on sustainable applications and outcomes. The Human Health Risk Assessment and Homeland Security Research programs also will continue as key components of EPA's overall research portfolio.



EPA Office of Research and Development FY 2010 to FY 2012 in NEW Program/Project Structure¹

Appropriation	Program/Project	2010 Enacted		2011 CR ²		2012 Pres Bud ³		2012 vs 2010		
		\$000	FTE	\$000	FTE	\$000	FTE	\$000	FTE	
Science & Technology	Earmarks	\$4,700	0.0	\$4,700	0.0	\$0	0.0	-\$4,700	0.0	
	Homeland Security	Total Program	\$32,861	55.5	\$32,861	55.5	\$24,684	62.7	-\$8,177	7.2
		Decontamination	\$20,890	40.2	\$20,890	40.2	\$15,637	44.0	-\$5,253	3.8
		Safe Buildings	\$1,996	0.0	\$1,996	0.0	\$0	0.0	-\$1,996	0.0
		Other Research	\$9,975	15.3	\$9,975	15.3	\$9,047	18.7	-\$928	3.4
	Human Health Risk Assessment	\$42,899	167.6	\$42,899	167.6	\$42,400	180.9	-\$499	13.3	
	Research: Air, Climate and Energy	Total Program	\$111,449	313.6	\$111,449	313.6	\$108,000	309.6	-\$3,449	-4.0
		Global Change Research	\$20,822	35.5	\$20,822	35.5	\$20,805	41.2	-\$17	5.7
		Clean Air Research	\$81,605	268.5	\$81,605	268.5	\$83,102	261.8	\$1,497	-6.7
		Other Research	\$9,022	9.6	\$9,022	9.6	\$4,093	6.6	-\$4,929	-3.0
	Research: Safe and Sustainable Water Resources	Total Program	\$111,073	427.0	\$111,073	427.0	\$118,776	439.6	\$7,703	12.6
		Drinking Water Research	\$49,129	190.2	\$49,129	190.2	\$52,521	196.2	\$3,392	6.0
		Water Quality Research	\$61,944	236.8	\$61,944	236.8	\$66,255	243.4	\$4,311	6.6
	Research: Sustainable and Healthy Communities	Total Program	\$188,095	551.1	\$186,095	551.1	\$170,528	529.7	-\$17,567	-21.4
		Human Health Research	\$54,180	106.7	\$53,180	106.7	\$45,392	112.2	-\$8,788	5.5
		Ecosystems Research	\$71,698	272.4	\$70,698	272.4	\$60,906	255.7	-\$10,792	-16.7
		Other Research	\$62,217	172.0	\$62,217	172.0	\$64,230	161.8	\$2,013	-10.2
	Research: Chemical Safety and Sustainability	Total Program	\$77,831	283.7	\$77,831	283.7	\$95,657	292.7	\$17,826	9.0
		Endocrine Disruptors Research	\$11,350	50.1	\$11,350	50.1	\$16,883	46.1	\$5,533	-4.0
		Computational Toxicology Research	\$20,044	32.7	\$20,044	32.7	\$21,209	34.4	\$1,165	1.7
Other Research		\$46,437	200.9	\$46,437	200.9	\$57,565	212.2	\$11,128	11.3	
S&T Appropriation Total		\$568,908	1798.5	\$566,908	1798.5	\$560,045	1815.2	-\$8,863	16.7	
LUST	Research: Sustainable and Healthy Communities	\$345	1.9	\$345	1.9	\$454	1.6	\$109	-0.3	
Inland Oil Spills	Research: Sustainable and Healthy Communities	\$639	0.9	\$639	0.9	\$614	0.9	-\$25	0.0	
Superfund	Homeland Security	\$2,166	2.0	\$2,166	2.0	\$1,968	2.0	-\$198	0.0	
	Human Health Risk Assessment	\$3,404	14.9	\$3,404	14.9	\$3,342	14.9	-\$62	0.0	
	Research: Sustainable and Healthy Communities	\$21,264	93.1	\$21,264	93.1	\$17,706	89.5	-\$3,558	-3.6	
	Superfund Appropriation Total	\$26,834	110.0	\$26,834	110.0	\$23,016	106.4	-\$3,818	-3.6	
GRAND TOTAL		\$596,726	1911.3	\$594,726	1911.3	\$584,129	1924.1	-\$12,597	12.8	

NOTES:

¹ FY 2010 Enacted includes the \$2M supplemental for research to determine human health and environmental impacts of oil spill dispersants. Differences in totals between new and former program areas reflect transfers and cross-walk adjustments for workforce support costs.

² FY 2011 CR represents an annualized continuing resolution based on FY 2010 Enacted levels excluding supplemental appropriations.

³ FY 2012 total for Research: Sustainable and Healthy Communities excludes \$0.5M in Agency green conferencing resources not included as part of the Office of Research and Development budget.

EPA Office of Research and Development FY 2010 to FY 2012 in FORMER Program/Project Structure ¹

Appropriation	Program/Project	2010 Enacted		2011 CR ²		2012 Pres Bud ³		2012 vs 2010		
		\$000	FTE	\$000	FTE	\$000	FTE	\$000	FTE	
Science & Technology	Earmarks	\$4,700	0.0	\$4,700	0.0	\$0	0.0	-\$4,700	0.0	
	Homeland Security	Total Program	\$32,861	55.5	\$32,861	55.5	\$24,684	62.7	-\$8,177	7.2
		Decontamination	\$20,890	40.2	\$20,890	40.2	\$15,637	44.0	-\$5,253	3.8
		Safe Buildings	\$1,996	0.0	\$1,996	0.0	\$0	0.0	-\$1,996	0.0
		Other Research	\$9,975	15.3	\$9,975	15.3	\$9,047	18.7	-\$928	3.4
	Human Health Risk Assessment	\$44,789	173.7	\$44,789	173.7	\$44,108	187.4	-\$681	13.7	
	Research: Global Change	\$20,826	35.5	\$20,826	35.5	\$20,810	41.2	-\$16	5.7	
	Research: Clean Air	\$81,917	269.5	\$81,917	269.5	\$83,313	262.8	\$1,396	-6.7	
	Research: Drinking Water	\$49,155	190.2	\$49,155	190.2	\$52,547	196.2	\$3,392	6.0	
	Research: Water Quality	\$61,918	236.8	\$61,918	236.8	\$66,229	243.4	\$4,311	6.6	
	Research: Human Health and Ecosystems	Total Program	\$161,511	484.9	\$159,511	484.9	\$145,446	475.0	-\$16,065	-9.9
		Human Health Research	\$84,904	211.2	\$83,904	211.2	\$45,392	112.2	-\$39,512	-99.0
		Ecosystems Research	\$76,607	273.7	\$75,607	273.7	\$60,906	255.7	-\$15,701	-18.0
		Other Research ⁴	\$0	0.0	\$0	0.0	\$39,148	107.1	\$39,148	107.1
	Research: Land Protection	\$14,111	58.8	\$14,111	58.8	\$13,601	57.3	-\$510	-1.5	
	Research: Fellowships	\$11,083	2.6	\$11,083	2.6	\$17,261	6.4	\$6,178	3.8	
	Research: Sustainability	\$27,287	70.8	\$27,287	70.8	\$26,788	67.0	-\$499	-3.8	
	Research: Pesticides and Toxics	\$27,347	137.4	\$27,347	137.4	\$27,159	135.3	-\$188	-2.1	
	Research: Endocrine Disruptors	\$11,355	50.1	\$11,355	50.1	\$16,888	46.1	\$5,533	-4.0	
	Research: Computational Toxicology	\$20,048	32.7	\$20,048	32.7	\$21,211	34.4	\$1,163	1.7	
S&T Appropriation Total		\$568,908	1798.5	\$566,908	1798.5	\$560,045	1815.2	-\$8,863	16.7	
LUST	Research: Land Protection	\$345	1.9	\$345	1.9	\$454	1.6	\$109	-0.3	
Inland Oil Spills	Research: Land Protection	\$639	0.9	\$639	0.9	\$614	0.9	-\$25	0.0	
Superfund	Homeland Security	\$2,166	2.0	\$2,166	2.0	\$1,968	2.0	-\$198	0.0	
	Human Health Risk Assessment	\$3,404	14.9	\$3,404	14.9	\$3,342	14.9	-\$62	0.0	
	Research: Sustainability	\$73	0.0	\$73	0.0	\$0	0.0	-\$73	0.0	
	Research: Land Protection	\$21,191	93.1	\$21,191	93.1	\$17,706	89.5	-\$3,485	-3.6	
	Superfund Appropriation Total		\$26,834	110.0	\$26,834	110.0	\$23,016	106.4	-\$3,818	-3.6
GRAND TOTAL		\$596,726	1911.3	\$594,726	1911.3	\$584,129	1924.1	-\$12,597	12.8	

NOTES:

¹FY 2010 Enacted includes the \$2M supplemental for research to determine human health and environmental impacts of oil spill dispersants. Differences in totals between new and former program areas reflect transfers and cross-walk adjustments for workforce support costs.

²FY 2011 CR represents an annualized continuing resolution based on FY 2010 Enacted levels excluding supplemental appropriations.

³FY 2012 total for Research: Sustainable and Healthy Communities excludes \$0.5M in Agency green conferencing resources not included as part of the Office of Research and Development budget.

⁴FY 2012 resources for nanotechnology and other areas will now appear separately from the Human Health and Ecosystems research areas.