SCIENCE ADVISORY BOARD
A Federal Advisory Committee to the U.S. Environmental Protection Agency

March 5, 2021

EPA-SAB-21-003

The Honorable Jane Nishida
Acting Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20460

Subject: Transmittal of the Science Advisory Board Report titled "SAB Recommendations for EPA's FY 2020 Scientific and Technological Achievement Awards"

Dear Acting Administrator Nishida,

The EPA Science Advisory Board (SAB) is pleased to transmit its recommendations for the EPA's FY 2020 Scientific and Technological Achievement Awards (STAA). The STAA program was established by the Agency in 1980 to recognize EPA employees who made outstanding contributions to the advancement of science and technology through their publications in peer-reviewed: journals, books, or EPA reports. Additional objectives of the STAA program include making the general public more aware of the quality and depth of EPA science, and improving the credibility of the science underpinning Agency decisions. The SAB has been asked by EPA's Office of Research and Development (ORD) to review EPA's nominated scientific publications and make recommendations for awards. The SAB is pleased to continue to serve in this important role.

The SAB STAA Committee's review consisted of a two-step process: an independent review of each STAA nomination by two Committee members, followed by a Committee discussion of all nominations. Each nomination included a maximum of three publications for consideration of STAA recognition. This year, the SAB reviewed a total of 54 nominations comprised of 96 publications within 12 research categories.

The SAB commends the EPA scientists and engineers for their publications and finds that the 2020 STAA nominations were of high quality. The SAB recommends: 0 nominations for Level I,

the highest award; 6 nominations for Level II; 14 nominations for Level III; and 24 nominations for Honorable Mention. The SAB's award recommendations are provided in the enclosed report.

The SAB appreciates the efforts that the Agency has made to implement SAB's previous recommendations for improving the nomination procedures and administration of the STAA program. While some of the SAB's previous recommendations have been incorporated into the STAA nomination process and program, the SAB is concerned that several previous SAB recommendations have not been incorporated. In Section 4 of this report, some of these recommendations are reiterated and additional recommendations are provided to further strengthen and improve the STAA program. In particular, the SAB recommends that the EPA:

- Continue to improve its internal procedures to ensure all STAA nominations are complete before being provided to the SAB;
- Provide specific criteria (or other guidance) to the SAB for evaluating nominations that encompassed review article(s) and include this information in the EPA's Nomination Procedures and Guidelines document;
- Provide better documentation of previously submitted STAA nominations, including an award history, to ensure that current nominations meet the eligibility requirements and to track whether related work has been previously nominated and/or recognized by the SAB; and,
- Evaluate why during the last decade there has been over a 50% decrease in STAA nominations and identify actions to further promote the STAA program, if deemed appropriate.

The SAB commends the Agency for successfully conducting its annual STAA program and applauds the EPA's public recognition of the scientific and technological achievements of EPA scientists and engineers that is published in peer-reviewed literature. Thank you for the opportunity to assist the Agency with this important program. The SAB looks forward to reviewing the FY 2021 STAA nominations.

Sincerely,

/s/

John D. Graham, Ph.D.
Chair
EPA Science Advisory Board

/s/

Jay R. Turner, Ph.D.
Chair
EPA SAB STAA Committee (2019-2021)

Enclosure

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SAB Recommendations for EPA's FY 2020 Scientific and Technological Achievement Awards (STAA)

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ACRONYMS AND ABBREVIATIONS

AO	Office of the Administrator
EPA	U.S. Environmental Protection Agency
FACA	Federal Advisory Committee Act
OAR	Office of Air and Radiation
ORD	Office of Research and Development
PDF	Portable Document Format
SAB	EPA Science Advisory Board
STAA	Scientific and Technological Achievement Awards

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1. INTRODUCTION

EPA's Scientific and Technological Achievement Awards (STAA) program was established in 1980 to recognize the Agency's scientists and engineers who publish their technical work in peer-reviewed literature. The STAA program is administered and managed by the EPA's Office of Research and Development (ORD). This year, the EPA Science Advisory Board (SAB) was asked to review the nominated scientific publications and make recommendations for STAA awards in consideration of the EPA's criteria. On April 1, 2020, the EPA announced the opening of the 30-day electronic nomination period for the 2020 STAA program to senior managers and employees. The nomination period closed on April 30, 2020. ORD screened the nominations for conformance with EPA's 2020 STAA Nomination Procedures and Guidelines (Guidelines). The Guidelines describe the award levels, eligibility criteria, and factors that the SAB considers during its review of STAA nominations. Publications from the previous five years were eligible to receive STAA awards (i.e., nominated publication(s) must have been published on or after January 1, 2015, and on or before January 1, 2020).

The Agency's charge to the SAB was to consider which nominations for the 2020 STAA program deserved recognition. The SAB considered the following criteria defined by the Agency for STAA recognition:

- Level I Awards are for nominees who have accomplished an exceptionally high-quality research or technological effort that is highly relevant to EPA's mission, and has demonstrated a direct influence on EPA's mission and policies. The awards recognize the creation or general revision of a scientific or technological principle or procedure, or a highly significant improvement in the value of a device, activity, program, or service to the public. The award recognizes research resulting from substantial originality, creativeness, initiative, and problem-solving ability of the researchers, as well as substantial level of effort required to produce the results. Awarded research is of national significance or has high impact on a broad area of science/technology. In addition, the awarded research has timely consequences and is recognizable as a major scientific/technological achievement within its discipline or field of study.

- Level II Awards are for nominees who have accomplished a notably excellent research or technological effort that has qualities and values similar to, but to a lesser degree, than those described under Level I. Awarded research has timely consequences and contributes as an important scientific/technological achievement within its discipline or field of study.

- Level III Awards are for nominees who have accomplished an unusually notable research or technological effort. The awards are for a substantial revision or modification of a scientific/technological principle or procedure, or an important improvement to the value of a device, activity, program, or service to the public. Awarded research relates to a mission or organizational component of the EPA, or significantly affects a relevant area of science/technology.

- Honorable Mention Awards acknowledge research efforts that are noteworthy but do not warrant a Level I, II or III award. Honorable Mention applies to research efforts that: (1) may not quite reach the level described for a Level III award; (2) show a promising area of research that should be encouraged; or (3) show an area of research that is too preliminary to warrant an award recommendation at this time.

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As described in the Agency's Nomination Procedures and Guidelines, the SAB reviewed the nomination packages in consideration of the above criteria and the following factors:

1. The extent to which the work reported in the nominated publication(s) resulted in either new or significantly revised knowledge. The accomplishment is expected to represent an important advancement of scientific knowledge or technology relevant to environmental issues and EPA's mission.

2. The degree to which the accomplishment is a product of the originality, creativeness, initiative, and problem-solving ability of the researchers, as well as the level of effort required to produce the results.

3. The extent to which environmental protection has been strengthened or improved, whether of local, national, or international importance.

4. The extent of the beneficial impact of the accomplishment and the degree to which the accomplishment has been favorably recognized outside of EPA.

5. The nature and extent of peer review, including stature and quality of the peer-reviewed journal or the publisher of a book for a review chapter published therein.

In response to the EPA's request, the SAB Scientific and Technological Achievement Awards Committee (2019-2021) (the SAB STAA Committee) held a closed virtual meeting on January 11-12, 2021, to review the nominations submitted by the Agency. This meeting was closed to the public because the deliberations involved the identification of employees, including the relative merits of the scientific contributions of EPA's STAA nominees. Such disclosure is considered a personnel matter with privacy concerns, which is exempt from public disclosure pursuant to section 10(d) of the Federal Advisory Committee Act (FACA) and sections (c)(2) and (c)(6) of the Government in the Sunshine Act. Detailed information about the review procedures is provided in this report. A Federal Register Notice announcing this closed meeting was published on December 9, 2020, and is available at: https://www.govinfo.gov/content/pkg/FR-2020-12-09/pdf/2020-26996.pdf.

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2. SAB REVIEW PROCEDURES

In May 2019, the SAB Staff Office formed the SAB STAA Committee (2019-2021) to review EPA's STAA nominations. The Committee was formed by the SAB Staff Office Director in accordance with the SAB process described in the SAB 2002 publication, *Panel Formation Process: Immediate Steps to Improve Policies and Procedures* (U.S. EPA Science Advisory Board, 2002).

ORD submitted to the SAB Staff Office a total of 55 nominations for 2020 STAA recognition within 12 science and technology research categories. Table 1 shows the number of EPA nominations submitted in each category. The nominated publications, along with the evaluation criteria, were provided to the SAB STAA Committee in advance of the Committee's review meeting.

Table 1. 2020 STAA Nominations by Research Category

Research Category	Number of Nominations Submitted to the SAB
Control Systems and Technology	1
Ecological Research	7
Environmental Policy and Decision-Making Studies	4
Health Effects Research and Human Risk Assessment	17[a]
Homeland Security	1
Industry and the Environment	2
Integrated Risk Assessment	3
Monitoring and Measurement Methods	5
Other Environmental Research	3
Review Articles	6
Sustainability and Innovation	5
Transport and Fate	1
Total	**55**

[a] A total of 55 nominations were submitted by ORD to the SAB STAA Committee. Nomination 20-121, under research category *Health Effects Research and Human Risk Assessment*, was removed by the STAA Committee because it contained only one publication (dated 2010) and, therefore, the nomination was not eligible for the STAA 2020 Review. The 2010 publication included in nomination 20-121 was also included as part of nomination 20-133 as supporting documentation. The total number of nominations reviewed by the STAA Committee is 54, as reflected in Table 2 and Table 3.

The SAB STAA Committee review consisted of a two-step process: an initial independent review of each nomination by two Committee members, followed by a STAA Committee discussion and review of all nominations. The Chair of the SAB STAA Committee assigned 6-8 nominations to each Committee member for review based on their expertise. Each nomination was independently reviewed by two Committee members prior to the meeting, with one Committee member assigned to be the lead discussant. Committee members assigned to complete the initial review of each nomination provided their preliminary recommendations for STAA recognition, which included written summaries of their preliminary assessments taking into consideration the EPA's award criteria and additional factors described above. This preliminary review information was distributed to all Committee members before the January 2021 Committee meeting.

During the SAB STAA Committee's closed virtual meeting on January 11-12, 2021, the Committee discussed the award recommendations for the EPA's 2020 STAA program. As previously mentioned, the Committee's deliberations were closed to the public because they concerned identification of employees who should receive awards, a personnel matter with privacy concerns. Disclosure of this

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information would be a clear unwarranted invasion of personal privacy. Such information is exempt from public disclosure pursuant to section 10(d) of the Federal Advisory Committee Act (FACA) and sections (c)(2) and (c)(6) of the Government in the Sunshine Act.

At the January 11-12, 2021 STAA Committee meeting, each nomination was discussed separately by Committee members using the following process:

1. The Committee member assigned as lead discussant presented a summary of the nomination and started the discussion about its initial ranking;
2. The second reviewer also provided an evaluation of the nomination;
3. The Committee at large discussed the nomination; and,
4. The Committee aimed to reach a consensus position on the recommended award rating.

If there were divergent rating recommendations for awards at this stage of the discussion, the STAA Committee Chair implemented one of two options: (1) requesting further discussion of the nomination later in the meeting, or (2) conducting a vote on final rating recommendations. To avoid an appearance of bias or a loss of impartiality, one member was recused from the Committee deliberations on one nomination. The STAA Committee Chair also served as an additional reviewer if members were unavailable to discuss their preliminary evaluations or reviews.

During the meeting, the STAA Committee Chair requested that the Committee members submit recommendations for EPA to further strengthen the STAA program, facilitate the SAB review of future STAA nominations, and refine the overall review process.

The Chartered SAB reviewed the 2020 report of the SAB STAA Committee and on March 5, 2021, it was approved for transmittal to the EPA Administrator.

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3. AWARD RECOMMENDATIONS

The STAA Committee agreed upon the final rankings and recommendations for awards during the meeting held on January 11-12, 2021. Table 2 summarizes previous recommendations for STAA awards by year, including the recommendations for this review cycle. In 2020 the SAB STAA Committee recommends: 0 nominations for Level I, the highest award; 6 nominations for Level II; 14 nominations for Level III; and 24 nominations for Honorable Mention. Table 3 summarizes the distribution of 2020 award recommendations by category for all nominations reviewed by the STAA Committee. Appendix A lists the EPA nominations recommended for each of the award levels.

Table 2. Comparison of Award Recommendations Over Time

Award Level	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018-2019	FY 2020
Nominations Reviewed	140	130	109	121	130	104	117	72	116	75	58	53	54
Level I	5 (4%)	5(4%)	3 (3%)	5 (4%)	3 (2%)	4 (4%)	0	1 (1%)	1 (1%)	0	3[a] (5%)	1 (2%)	0
Level II	13 (9%)	16 (12%)	22 (20%)	14 (12%)	13 (10%)	10 (10%)	10 (9%)	2 (3%)	3 (3%)	8 (11%)	4 (7%)	3 (6%)	6 (11%)
Level III	37 (26%)	30 (21%)	31 (28%)	42 (35%)	35 (27%)	29 (28%)	27 (23%)	20 (28%)	38 (33%)	13 (17%)	18 (32%)	16[a] (31%)	14 (26%)
Honorable Mention	45 (32%)	43 (33%)	25 (23%)	33 (27%)	44 (34%)	36 (35%)	45 (38%)	29 (40%)	42 (36%)	32 (43%)	18 (32%)	24 (46%)	24 (44%)
Not Recommended	40 (29%)	36 (28%)	28 (26%)	27 (22%)	35 (27%)	25 (24%)	35 (30%)	20 (28%)	32 (27%)	22 (29%)	14 (24%)	8 (15%)	10 (19%)

[a] In 2019, the SAB combined two nominations into one because they covered related research.

Table 3. Summary of Award Recommendations by Category for FY2020

Research Categories	Total Nominations Reviewed	Award Levels				Honorable Mention
		I	II	III	Total	
Control Systems and Technology	1	0	0	0	0	1
Ecological Research	7	0	0	3	3	4
Environmental Policy and Decision-Making Studies	4	0	1	0	1	3
Health Effects Research and Human Risk Assessment	16	0	3	4	7	6
Homeland Security	1	0	0	0	0	1
Industry and the Environment	2	0	0	0	0	1
Integrated Risk Assessment	3	0	0	2	2	0
Monitoring and Measurement Methods	5	0	1	1	2	3
Other Environmental Research	3	0	0	1	1	1
Review Articles	6	0	0	2	2	2
Sustainability and Innovation	5	0	0	1	1	2
Transport and Fate	1	0	1	0	1	0
TOTALS:	**54**	**0**	**6**	**14**	**20**	**24**

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4. ADMINISTRATIVE RECOMMENDATIONS

The SAB appreciates the Agency's efforts to implement recommendations provided during previous SAB review cycles of STAA nominations. The EPA is progressively responding to recommendations and the SAB commends the EPA for this effort. The SAB concludes that the substantial majority of the 2020 nominations adhered to existing STAA program guidelines, and that these guidelines helped the STAA Committee conduct a well-informed and balanced review of each nomination. The SAB has the following recommendations to further strengthen the STAA program in future years:

I. Recommendations to Strengthen Submission Packages

- Submission Timeline of Nominations: The 2020 STAA Nomination Procedures and Guidelines stated that publications are eligible to receive STAA awards for five years based on publication date. The document also noted that "*It may be to your advantage to wait a few years before submitting your nomination, allowing the importance and the impact on the ability of the Agency to better accomplish its mission to be more fully realized.*" The SAB continues to support this recommendation and finds it should be reinforced with award applicants and managers. [1]

  The SAB finds that there is value in waiting to submit a STAA nomination to show impact, as it is a key criterion during the evaluation process (i.e., allowing more time for the impact to be demonstrated through agency actions and citations). The SAB notes that the extent of the utility or application of some STAA nominations were not demonstrated during this review cycle because the work was recently published. The lack of demonstrated impact weighed against potential recommendations to receive a higher-level award. Several nominations in the 2020 award cycle could have benefited from additional time and publications prior to a STAA submission.

  Furthermore, the SAB evaluates nominated STAA research based on its contribution beyond previously nominated work on the same research topic/area. Over the years, there have been several highly impactful research initiatives that were not recognized at the highest STAA award level because a series of related nominations were previously recognized. The SAB finds that combining the most impactful publications as part of the submission package (with ancillary publications provided as supporting documentation) may increase the likelihood of scientists to be recognized at the highest levels. This approach would also allow the SAB STAA Committee to evaluate the long-term impacts and overall completeness of the research initiative.

- Impact Description of Nominations: The SAB notes that measures of impact were not provided consistently across nominations. This is an area that should be reported more uniformly. Some nominations demonstrated sound science but did not rise to the level of an Honorable Mention because the contribution to EPA's mission was not clear and/or the work was considered

[1] One SAB member suggests that changing the publication dates for award eligibility could allow a better assessment of the importance and impact on EPA's mission.

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incremental, routine, or not innovative. Nominees should clearly state how their work contributed to EPA's mission and how the work advanced the science field. [2]

As part of the impact description included in the submission package, nominations should mention the specific EPA programs or efforts that have benefited from the research. Moreover, impact descriptions should include, but not be limited to, the following:

1. Short- and long-term impacts of the research on EPA's goals;
2. Level of impact on a broad area of science and technology; and,
3. Detailed information on national and international significance.

The SAB notes that indicators of external impact vary significantly across nominations (i.e., from providing the number of citations in the peer reviewed literature to extensive description of multiple levels of indicators including when publications were referenced in newspapers and social media outlets). The SAB encourages the applicants to use the EPA library services for reporting indicators of impact for each publication (e.g., one of the nominations reviewed during the 2020 cycle successfully utilized library services to provide evidence of impacts, including a robust citation analysis from various scientific databases).

- Nominations Under the Review Articles Research Category: The STAA evaluation of review articles should be based on the extent to which they include: a critical synthesis and evaluation of the literature; identify key knowledge gaps in the literature; and provide current and future perspectives to advance the field (U.S. EPA SAB, 2016). The SAB notes that the review articles submissions in this review cycle have improved when weighed against these criteria. However, most nominations of review articles still lacked a critical analysis and a discussion on future perspectives to be suitable for STAA recognition. While review articles that summarize a body of literature are useful and important, the SAB finds that review articles that critically synthesize and evaluate information and lead to new insights are most consistent with the criteria established by the STAA program. The SAB recommends that nominations containing one or more review articles include an additional justification to demonstrate: a critical synthesis and evaluation of the literature; evidence that the nominated review article provides novel insights and scientific contributions to a particular research field based on this synthesis; and a commentary on future perspectives, including scientific recommendations to advance the field.

- Nominations with Previous STAA Recognitions: Given that many current STAA nominations build on work previously submitted for STAA recognition, the SAB recommends that the *STAA Nomination Procedures and Guidelines* document that submission of information about previous STAA recognitions and/or award to provide a synoptic view of the nominations and award history. The SAB STAA Committee appreciated that most nominations received during this review cycle did list information about previously submitted nominations and awards for the authors.

  To facilitate the submission of this information, decrease redundancy in the submission package and provide a clear summary of previous STAA recognitions for review, the SAB recommends

[2] One SAB member notes that, in considering the value of research projects supporting EPA's mission, it is important to identify projects that address critically important scientific issues and those that add positive value by identifying compounds that are not risky and therefore do not need regulatory attention.

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that the EPA applicants present this information in a table format (i.e., listing the year of the prior award, level of award (if applicable), title of the publication(s), and names of the authors in the current nomination that were also authors in the prior nomination). The table could be followed by a succinct explanation of overlap between each prior nomination and the current one. This information could be included in the submission package as an appendix. The SAB notes that explanations provided about whether, how, and to what extent prior nominations support the work in a current STAA submission need to be more informative in terms of how they provided a foundation for the current nomination/research work.

- Aggregated Feedback to Inform Future Nominations: In previous years, the STAA Committee has discussed whether nomination-specific feedback should be provided to the nominees. The SAB affirms this would not be appropriate. However, the STAA Committee would like to provide aggregated feedback to inform future STAA submissions. Such feedback includes, but is not limited to, how the STAA Committee weighs the merit of an extraordinary, long-term research effort against the nomination history. For example, if work related to a current nomination has been previously awarded by the STAA program, then the current work will likely be deemed by the STAA Committee as an incremental contribution. The STAA Committee Chair welcomes the opportunity to give a briefing to the EPA on behalf of the Committee regarding what members look for in a nomination, including a summary of common strengths and weaknesses. This interaction could help clarify the reasoning for the award ratings (e.g., work did not have enough time to demonstrate its utility; Committee wants to encourage this research in the future, or related work was previously recognized with a higher-level award). Subsequently, the EPA could determine whether and how to disseminate this information to future applicants.

II. Completeness and Clarity of Nomination Packages

The EPA has incorporated an automated nomination and award processing system to improve the STAA nomination and award process. This system has generated more consistent nomination packages. With each review cycle, there are fewer occurrences of incomplete nominations and the SAB commends ORD for this attention. That stated, some packages were incomplete during this review cycle. To further improve the process, the SAB recommends that the EPA or contractor staff perform the functions noted below:

- Assure that each nomination provides all information required to be included within a complete nomination package. The SAB continues to encourage ORD to review each nomination for completeness to identify submission gaps and resolve them in a timely manner. Applications that have missing publications or duplicated publications should be sent back to the authors. Therefore, to rectify any potential errors, the SAB recommends that the EPA consider providing the principal author of each submitted nomination a copy of the PDF file of each nomination that the Agency downloaded from the electronic nomination system. The Agency could request the principal author to review the complete nomination and bring errors or omissions to the Agency's attention. This step should be completed after the nomination period ends but before the consolidated PDF files are submitted to the SAB.

- Additional administrative improvements to refine the overall clarity and quality of the nomination packages were identified by the Committee and will be will be documented in the

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STAA Committee's meeting minutes (e.g., eligibility checklist, front pages, file names, and page limits, among others).

III. Other Recommendations

The SAB provides the following additional recommendations to improve the STAA program:

- Evaluation of EPA's Long-Term Cumulative Research Contributions: Currently, there is no mechanism for the SAB to recognize the cumulative impact of long-term research initiatives that cut across multiple disciplines and nomination cycles. The SAB recommends that the EPA consider a separate award program to recognize the achievements of such long-term endeavors. The SAB evaluates nominated STAA research based on its contribution beyond previously nominated work on the same research topic/area. Previously nominated work is considered the foundation, and the review of a current nomination is focused on the progress above that foundation. This means that in some cases, significant overall contributions by a long-term research effort have been rendered incremental from the STAA awards perspective because the STAA Committee has already reviewed (and often awarded) various milestones along the research pathway. Therefore, the SAB finds that a mechanism for awards is needed to recognize the impact of scientific and technological long-term cumulative research conducted by EPA employees.

- Previous Five Years STAA Nominations: During the 2016-2017 STAA program review, a master index (an Excel file) of the previous five-year STAA nominations was provided to the SAB listing all nominations and identifying whether an STAA award was conferred for each current-year author. The STAA Nomination Procedures and Guidelines prohibit resubmission of publications nominated for STAA recognition in prior years. The SAB recommends that the EPA provide a master index for future STAA reviews to ensure compliance with this STAA requirement.[3]

  Furthermore, since nominated STAA research is evaluated based on its contribution beyond previously nominated work on the same research topic/area, this master index will assist the Committee members in their review. The master index will help the Committee assess the innovativeness and novelty of the author's nominated research, whether the nomination represents a continuation of previous research, and whether publications nominated in prior years have been resubmitted. The master index should be sorted alphabetically by author and indicate any author who has been nominated more than once during the previous five years (and in such cases, note the titles of that author's previously nominated publications). The SAB continues to emphasize the importance of this recommendation.

- Assessment of STAA Nominations Decrease Trend: The total number of STAA nominations have been steadily decreasing over the past decade. The graph below reflects this trend (Figure 1). The SAB suggests that the EPA assess the reasons for this trend. In particular, the SAB recommends that the Agency assess whether this trend is due to onerous and time-consuming nomination requirements or other barriers. To help inform the decrease in submissions for STAA

[3] One SAB member notes that prohibiting resubmission of publications nominated for STAA recognition in prior years may be an unnecessary disincentive to strengthening and resubmitting a research portfolio (and perhaps contributes to the decline in nominations in recent years).

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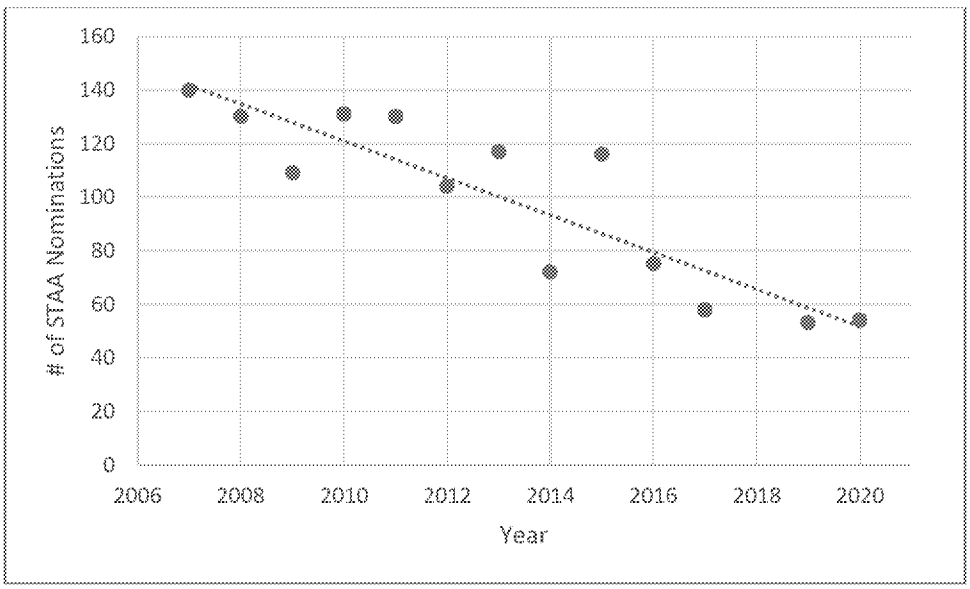
recognition, the SAB suggests that the EPA assess temporal trends in both the total number of authors and publications included in STAA nominations to determine if the observed trends simply reflect nominations with more authors and/or publications (or if the number of authors/publications included in the program are in fact decreasing) as well as surveying nominees to gather information on actions that could be taken to encourage future nomination submissions.

Figure 1. Decreasing trend in STAA nominations over time.



- **<u>Feedback to Improve the Review Process</u>**. Finally, additional recommendations to the SAB Staff Office to improve the review process and future STAA Committee meetings (virtually and/or in-person) were provided and documented in the STAA Committee's meeting minutes.

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REFERENCES

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APPENDIX A: RECOMMENDATIONS FOR 2020 STAA AWARDS

Note: The percentages given after each name represent the percent of the total level of effort as documented in the EPA nomination.

Nominations Recommended for a Level II Award – Total of 6		
Nomination ID	**Publication**	**Authors and Nominating Organization**
20-072	Temporal Variability of Pyrethroid Metabolite Levels in Bedtime, Morning, and 24-h Urine Samples for 50 Adults in North Carolina	EPA: Marsha K. Morgan - 30%; Carry Croghan - 2%; Jon Sobus - 20%; Denise MacMillan - 10%; Fu-Lin Chen - 1%; Maliha Nash - 10%; James Starr - 10%; Matthew Clifton - 3%; Erik Andersen - 1%; Non-EPA: Dana Boyd Barr - 10%; Lillian Alston - 1%; Richard Walker - 1%; Dan Zehr - 1% Nominating Organization: EPA ORD
20-075	Community Vulnerability to Health Impacts of Wildland Fire Smoke Exposure	EPA: Jeanette Reyes - 10%; Ana Rappold - 27%; Wayne Cascio - 5%; David Diaz-Sanchez - 5%; George Pouliot - 10%; Neal L. Fann - 18%; Non-EPA: Richard Broome - 5%; Breanna Alman - 10%; Fay Johnston - 5%; Geoff Morgan - 5% Nominating Organization: OAR
20-084	Development of the Larval Amphibian Growth and Development Assay: Effects of Chronic 4-tert-octylphenol or 17β-trenbolone Exposure in *Xenopus laevis* from Embryo to Juvenile	EPA: Jonathan Haselman - 22%; Rodney Johnson - 5%; Sigmund Degitz - 22%; Joseph Korte - 12%; Patricia Kosian - 12%; Non-EPA: Allen Olmstead - 22%; Taisen Iguchi - 5% Nominating Organization: ORD

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20-106	Impact of Enhanced Ozone Deposition and Halogen Chemistry on Tropospheric Ozone over the Northern Hemisphere	EPA: Golam Sarwar - 30%; Kristen Foley - 10%; Rohit Mathur - 9%; Brett Gantt - 20%; Donna Schwede - 6%; William T. Hutzell - 2%; Kathleen Fahey - 3%; Daiwen Kang - 2%; Heather Simon - 2%; Tanya L. Spero - 2%; Non-EPA: Alfonso Saiz-Lopez - 6%; Jia Xing - 4%; William T. Hutzell - 2%; Tomás Sherwen - 2%; Hosein Foroutan - 2% Nominating Organization: EPA ORD
20-108	Identification of Per- and Polyfluoroalkyl Substances in the Cape Fear River by High Resolution Mass Spectrometry and Nontargeted Screening	EPA: Seth Newton - 7%; Andrew Lindstrom - 7%; Mark J. Strynar - 40%; James P. McCord - 30%; Erik Andersen - 2%; Non-EPA: Larry McMillain - 2%; Sonia Dagnino - 2%; Shuang Liang - 2%; Carol Ball - 2%; Michael Thurman - 2%; Rebecca McMahen - 2%; Imma Ferrer - 2 % Nominating Organization: EPA ORD
20-131	Disinfection By-Product Exposures and the Risk of Specific Cardiac Birth Defects	EPA: John M. (Michael) Wright - 60%; Michael Narotsky - 10%; Non-EPA: Amanda Evans - 10%; John Kaufman - 10%; Zorimar Rivera-Nunez - 10% Nominating Organization: EPA ORD

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Nominations Recommended for a Level III Award – Total of 14		
Nomination ID	**Publication**	**Authors and Nominating Organization**
20-073	Toxicological Perspective on The Osmoregulation and Ionoregulation Physiology of Major Ions by Freshwater Animals: Teleost Fish, Crustacea, Aquatic Insects, And Mollusca	EPA: Michael B. Griffith - 100% Nominating Organization: EPA ORD
20-087	Fish Connectivity Mapping: Linking Chemical Stressors by Their Mechanisms of Action-Driven Transcriptomic Profiles	EPA: Ronglin Wang - 48%; Adam Biales - 6%; Daniel Villeneuve - 6%; Gerald T. Ankley - 6%; David Bencic - 6%; Non-EPA: Cataia Ives - 8%; Stephen Edwards - 8%; Natalia Garcia-Reyero - 6%; Edward Perkins - 6% Nominating Organization: EPA ORD
20-090	Toxicokinetic Triage for Environmental Chemicals	EPA: Barbara Wetmore - 5%; Rocky Goldsmith - 4%; Richard Judson - 5%; Russell Thomas - 10%; Woodrow Setzer - 10%; Imran Shah - 4%; John F. Wambaugh - 20%; Non-EPA: Sieto Bosgra - 10%; Robert Pearce - 10%; Cory Strope - 4%; Alexander Sedykh - 10%; James Sluka - 4%; Alex Tropsha - 4% Nominating Organization: EPA ORD
20-094	Phthalate Exposure and Male Reproductive Outcomes: A Systematic Review of the Human Epidemiological Evidence	EPA: Elizabeth Radke - 20%; Todd Blessinger - 14%; Susan Euling - 12%; Xabier Arzuaga - 3%; Glinda Cooper - 6%; Lily Wang - 5%; Laura Dishaw - 1%; Brandiese Beverly - 3%;

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		Christine Cai - 3%; Andrew Hotchkiss - 1%; Anuradha Mudipalli - 2%; Andre Weaver - 2%; Gary Klinefelter - 2%; Nagalakshmi Keshava - 2%; Karen Hogan - 2%; Susan Markis - 1%; Erin E. Yost - 15%; Non-EPA: Anne-Marie Saillenfait - 2%; Joseph Braun - 2%; John Meeker - 2% Nominating Organization: EPA ORD
20-095	The Geographic Distribution and Economic Value of Climate Change-related Ozone Health Impacts in United States in 2030	EPA: Neal Fann - 30%; Amanda Curry Brown - 5%; Christopher Nolte - 30%; Tanya Spero - 13%; Sharon Phillips - 5%; Susan Anenberg - 5%; Patrick D. (Pat) Dolwick - 12% Nominating Organization: EPA OAR
20-096	A National Statistical Survey Assessment of Mercury Concentrations in Fillets of Fish in the U.S. EPA National Rivers and Stream Assessment of the Continental USA	EPA: Angela Batt - 28%; John Wathen - 27%; Athony Olson - 15%; Thomas Kincaid - 10%; James M. (Jim) Lazorchak - 20% Nominating Organization: EPA ORD
20-107	MOAtox: A Comprehensive Mode of Action and Acute Aquatic Toxicity Database for Predictive Model Development	EPA: Todd Martin - 25%; Crystal Lilavois - 10%; Mace Barron - 45%; Douglas Young - 3%; John Carriger - 17% Nominating Organization: EPA ORD
20-109	Measuring Community Resilience to Natural Hazards: The Natural Hazard Resilience Screening Index (NaHRSI) Development and Application to the United States	EPA: J. Kevin Summers - 33%; Lisa M Smith - 17%; Linda Harwell - 18%; Kyle Buck - 26%; Non-EPA: Stephen Hafner - 6% Nominating Organization: EPA ORD
20-110	Cardiac Effects of Seasonal Ambient Particulate Matter and Ozone Co-exposure in Rats	EPA: Aimen K. Farraj - 12%; Mehdi S Hazari - 12%; Wayne E. Cascio - 3%;

		David Davies - 3%; Rachelle Duvall - 3%; Ian Gilmour - 4%; Todd Krantz - 4%; Jonathan Krug - 3%; Najwa Haykal-Coates - 7%; Mark Higuchi - 4%; Kasey Kovalcik - 4%; John McGee - 5%; Charly King - 4% Allen Ledbetter - 3%; Joseph Patrick Pancras - 3%; Leslie Thomspon - 7%; Leon Walsh - 7% Charles Wood - 3% Darrell Winsett (Deceased) - 2%; Non-EPA: Fatiha Malik - 2%; Brandi Martin - 2%; Kimberly Stratford - 3% Nominating Organization: EPA ORD
20-115	Linking High Resolution Mass Spectrometry Data with Exposure and Toxicity Forecasts to Advance High-Throughput Environmental Monitoring	EPA: Jon R. Sobus - 20%; John Wambaugh - 5%; Antony Williams - 5%; Mark Strynar - 5%; Kristin Isaacs - 5%; Elin Ulrich - 5%; Ann Richard - 5%; Christopher Grulke - 5%; Seth Newton - 5%; Richard Judson - 5%; Non-EPA: Julia Rager - 20%; Andrew McEachran - 5% Shuang Liang - 5%; Rebecca McMahen - 5% Nominating Organization: EPA ORD
20-117	Spatial Variability of Sediment Methane Production and Methanogen Communities within a Eutrophic Reservoir: Importance of Organic Matter Source and Quantity	EPA: Jake J. Beaulieu - 16%; William C. Squier - 6%; Christopher T. Nietch - 6%; Michael G. McManus - 6%; J. T. Walker - 6%; K. M. White - 6%; Non-EPA: Trinity L. Hamilton - 6%; Sarah Waldo - 6%; Ishi Buffam - 6%;

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		John A. Harrison - 6%; David Balz - 6%; Megan E. Berberich - 6%; M. Keith Birchfield - 6%; J. L. Young - 6%; Michelle C. Platz - 6% Nominating Organization: EPA ORD
20-124	Exposure to Perfluorinated Alkyl Substances and Health Outcomes in Children: A Systematic Review of the Epidemiologic Literature	EPA: Evan Coffman - 30%; Erin K. Hines - 25%; Kristen M. Rappazzo - 45% Nominating Organization: EPA ORD
20-125	Application of Passive Sampling for Measuring Dissolved Concentrations of Organic Contaminants in the Water Column at Three Marine Superfund Sites	EPA: Robert M. Burgess - 25%; Monique Perron - 15%; Mark Cantwell - 15%; Non-EPA: Rainer Lohmann - 15%; Joseph Schubauer-Berigan - 10%; Pamela Reitsma - 10%; Lisa Lefkovitz - 10% Nominating Organization: EPA ORD
20-142	Coastal Wetland Support of Great Lakes Fisheries: Progress from Concept to Quantification	EPA: Joel C. Hoffman - 25%; Anett Trebitz - 25%; Michael Sierszen - 25%; Non-EPA: Matthew Cooper - 5%; Donald Uzarski - 5%; Lee Schoen - 10%; Jessica Kosiara - 5% Nominating Organization: EPA ORD

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Nominations Recommended for Honorable Mention – Total of 24		
Nomination ID	**Publication**	**Authors and Nominating Organization**
20-071	A Simple Decontamination Approach Using Hydrogen Peroxide Vapour for *Bacillus anthracis* Spore Inactivation	EPA: Joseph P. (Joe) Wood - 20%; M. Worth Calfee - 15%; Shawn Ryan - 5%; Leroy Mickelsen - 10%; Non-EPA: Vipin Rastogi - 15%; Matthew Clayton - 10%; Dahman Touati - 10%; Nicole Griffin-Gatchalian - 5%; Lisa Smith - 10% Nominating Organization: EPA ORD
20-082	Potential Toxicity of Complex Mixtures in Surface Waters from a Nationwide Survey of United States Streams: Identifying in Vitro Bioactivities and Causative Chemicals	EPA: Brett R. Blackwell - 28%; Matthew Martin - 1%; Gerald Ankley - 12%; Keith Houck - 6%; Elizabeth Murphy - 1%; Richard Judson - 3%; Edwin Smith - 1%; Daniel Villeneuve - 12%; Non-EPA: Shibin Li - 1%; Alex Medvedev - 1%; Paul Bradley - 3%; Sergei Makarov - 1%; Steven Corsi - 6%; Laura DeCicco - 6%; Anthony Schroeder - 3%; Joseph Swintek - 15% Nominating Organization: EPA ORD
20-086	Sustainable Water Systems for the City of Tomorrow – A Conceptual Framework	EPA: Xin (Cissy) Ma - 84%; Jennifer Cashdollar - 10%; Jay Garland - 2%; Non-EPA: Xiaobo Xue - 2%; Alejandra González-Mejía - 2% Nominating Organization: EPA ORD
20-097	Effectiveness of Point-of-Use/Point-of-Entry Systems to Remove Per-and-Poly-fluoroalkyl Substances from Drinking Water	EPA: Craig Patterson - 40%; Jonathan Burkhardt - 15%; Danielle Kleinmaier - 5%; Steven B. Merritt - 5%;

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		Stephen Dyment - 5%; Lawrence Zintek - 5%; Non-EPA: Donald Schupp - 20%; E. Radha Krishnan - 5% Nominating Organization: EPA ORD
20-099	Proteomic Responses of BEAS-2B Cells to Nontoxic and Toxic Chromium: Protein Indicators of Cytotoxicity Conversion	EPA: Yue Ge - 50%; Jeffrey Ross - 10%; Maribel Bruno - 40% Nominating Organization: EPA ORD
20-104	Estimating Potential Increased Bladder Cancer Risk Due to Increased Bromide Concentrations in Sources of Disinfected Drinking Waters	EPA: Michael S. Elovitz - 10%; Michael Messner - 15%; John Michael Wright - 5%; Jimmy Chen - 20%; Rex Pegram - 5%; Stig Regli - 30%; Non-EPA: Susan Richardson - 5%; T.J. Pepping - 5%; Frank Letkiewicz - 5% Nominating Organization: EPA ORD
20-105	Increasing Prevalence Rate of Nontuberculous Mycobacteria Infections in Five States, 2008-2013	EPA: Maura J. Donohue - 90%; Larry Wymer - 10% Nominating Organization: EPA ORD
20-112	Eco-Health Linkages: Assessing the Role of Ecosystem Goods and Services on Human Health using Causal Criteria Analysis	EPA: Rebeca de Jesus Crespo - 55%; Richard Fulford - 20%; Susan Yee - 5%; Non-EPA: Jianyong Wu - 10%; Mark Myer - 10% Nominating Organization: EPA ORD
20-113	Linking Water Quality to *Aedes aegypti* and Zika in Flood-Prone Neighborhoods	EPA: Rebeca de Jesus Crespo - 40%; Susan Yee - 28%; Stephanie Friedman - 5%; Autumn Oczkowski - 5%; Non-EPA: Donald Yee - 10%; Pablo Mendez Lazaro - 7%; Fengwei Bai - 5%; Nominating Organization: EPA ORD
20-114	In Vivo Dermal Absorption of Pyrethroid Pesticides in the Rat	EPA: Brenda C. Edwards - 20%; David Ross - 20%; James Starr - 20%;

		Michael F. Hughes - 15%; Michael J. DeVito - 5%; Kevin Crofton - 5%; Edward Scollon - 5%; Non-EPA: Marcelo Wolansky - 10% Nominating Organization: EPA ORD
20-116	A Comprehensive Framework for Evaluating the Environmental Health and Safety Implications of Engineered Nanomaterials	EPA: William K. (Will) Boyes - 5%; Kim Rogers - 5%; Elaine Cohen Hubal - 5%; Souhail Al-Abed - 5%; Christian Andersen - 5%; Robert Burgess - 5%; Dermont Bouchard - 5%; Kay Ho - 5%; Michael Hughes - 5%; Kirk Kitchin - 5%; Jeffrey Ross - 5%; Jay Reichman - 5%; Paul Rygiewicz - 5%; Richard Zepp - 5%; Kirk Scheckel - 5%; Sheau-Fung Thai - 5%; Robert Zucker - 5%; Non-EPA: Lila Thornton - 15% Nominating Organization: EPA ORD
20-118	Assessing Land Use, Sedimentation, and Water Quality Stressors as Predictors of Coral Reef Condition in St. Thomas, U.S. Virgin Islands	EPA: Leah Oliver - 33%; Deborah Santavy - 22%; Patricia Bradley - 20%; William Fisher - 5%; Non-EPA: Leska Fore - 5%; Amelia Smith - 8%; Jeroen Gerritsen - 7% Nominating Organization: EPA ORD
20-122	Biophysical Comparison of Four Silver Nanoparticles Coatings using Microscopy, Hyperspectral Imaging and Flow Cytometry	EPA: Robert M. Zucker - 23%; William Boyes - 23%; Kim Rogers - 4%; John McGee - 4%; Laura Degn - 11%; Non-EPA: Alice Goldstein-Plesser - 4%; Jayna Ortenzio - 22%; Jeremy Lerner - 5%; Jana Navaratolova - 4%

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		Nominating Organization: EPA ORD
20-123	The Effects of Marine Vessel Fuel Sulfur Regulations on Ambient PM2.5 at Coastal and Near Coastal Monitoring Sites in the U.S.	EPA: Robert A Kotchenruther - 100% Nominating Organization: EPA OAR
20-126	Molecular Survey of Occurrence and Quantity of *Legionella* spp., *Mycobacterium* spp., *Pseudomonas aeruginosa* and Amoeba Hosts in Municipal Drinking Water Storage Tanks Sediments	EPA: Jingrang Lu - 64%; Nick Ashbolt - 4%; Darren Lytle - 5%; Jorge Santo Domingo - 3%; Non-EPA: Ke Qin - 12%; Ian Struewing - 9%; Sheron Yelton - 3% Nominating Organization: EPA ORD
20-127	Exacerbation of Ozone-Induced Pulmonary and Systemic Effects by β2-adrenergic and/or Glucocorticoid Receptor Agonist/s	EPA: Urmila P. Kodavanti - 35%; Mette C. Schladweiler - 10%; Samantha Snow - 10%; Prasada Kodavanti - 3%; Janice A. Dye - 5%; Allen Ledbetter - 3%; Judy Richards - 3%; Anna Fisher - 3%; Hongzu Ren - 3%; NonEPA: Colette N. Miller - 5%; Andres Henriquez - 10%; Marie McGee - 3%; Matthew Valdez - 3%; John House - 4% Nominating Organization: EPA ORD
20-128	A Watershed Integrity Definition and Assessment Approach to Support Strategic Management of Watersheds	EPA: Joseph E. Flotemersch - 40%; John L. Stoddard - 10%; Scott G. Leibowitz - 35%; Non-EPA: Ryan A Hill - 5%; Rebecca E Tharme - 5%; Martin C Thoms - 5% Nominating Organization: EPA ORD
20-130	Removal of Phosphate using Calcium and Magnesium-Modified Iron-Based Absorbents	EPA: Mallikarjuna N. Nadagouda - 64%; Jay Garland - 3%; Thomas Speth - 3%; Non-EPA: Jacob Lalley - 10%; Han Changseok - 7%;

		Nidhi Iyanna - 3%; Dion Dionysiou - 7%; Gayathri Rammohan - 3% Nominating Organization: EPA ORD
20-132	Using Data Derived From Cellular Phone Locations to Estimate Visitation to Natural Areas: An Application to Water Recreation in New England, USA	EPA: Nathaniel H. Merrill - 20%; Kate K. Mulvaney - 20%; Justin Bousquin - 20%; Marisa J. Mazzotta - 20%; Non-EPA: Sarina F. Atkinson - 20% Nominating Organization: EPA ORD
20-134	A Systematic Evaluation of the Potential Effects of Trichloroethylene Exposure on Cardiac Development	EPA: Susan L. Makris - 13%; Andrew Hotchkiss - 8%; Xabier Arzuaga - 8%; John Fox - 8%; Thomas Knudsen - 8%; Susan Euling - 8%; Christina Parsons - 5%; Jennifer Jinot - 5%; Karen Hogan - 5%; Barbara Abbott - 8%; E. Sidney Hunter - 8%; Michael Narotsky - 8%; Non-EPA: Cheryl Siegel Scott (deceased) - 8% Nominating Organization: EPA ORD
20-135	Reactivity of Graphene Oxide with Reactive Oxygen Species (Hydroxyl Radical, Singlet Oxygen, and Superoxide Anion)	EPA: Richard G. Zepp - 50%; Non-EPA: Hsin-Se Hsieh - 50% Nominating Organization: EPA ORD
20-137	VOC Emissions and Formation Mechanisms from Carbon Nanotube Composites During 3D Printing	EPA: Souhail R. Al-Abed - 50%; Non-EPA: Phillip Potter - 20%; Slawomir Lomnicki - 15%; Dean Lay - 15% Nominating Organization: EPA ORD
20-139	Comparing Measures of Estuarine Ecosystem Production in a Temperate New England Estuary	EPA: Autumn J. Oczkowski - 60%; Donald Cobb - 2%; Adam Pimenta - 2%; Alana Hanson - 3%; Rick McKinney - 3%; Sandra Robinson - 1%; Non-EPA: Jason Krumholz - 2%;

		Kenneth Miller - 5%; Christopher Hunt - 7%; Courtney Schmidt - 5%; Scott Nixon - 1%; Emily Santos - 3%; Leslie Smith - 1%; Candace Oviatt – 3%; Leanna Heffner - 1%; Joaquin Chavez - 1% Nominating Organization: EPA ORD
20-140	The Impacts of Environmental Regulation on the U.S. Economy	EPA: Ann Wolverton - 25%; Alex Marten - 25%; Ann E. Ferris - 25%; Richard Garbaccio - 25% Nominating Organization: EPA AO

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