Bibliometric Analysis

for the U.S. Environmental Protection Agency/Office of Research and Development's Endocrine Disrupting Chemicals (EDCs) Research Program

This is a bibliometric analysis of the papers prepared by intramural and extramural researchers of the U.S. Environmental Protection Agency's (EPA) Endocrine Disrupting Chemicals (EDCs) Research Program. For this analysis, 519 papers were reviewed, and they were published from 1997 to 2007. These publications were cited 8,997 times in the journals covered by Thomson's *Web of Science*[1] and Scopus[2]. Of these 519 publications, 455 (87.7%) have been cited at least once in a journal.

Searches of Thomson Scientific's *Web of Science* and Elsevier's Scopus were conducted to obtain times cited data for the EDCs journal publications. The analysis was completed using Thomson's *Essential Science Indicators (ESI)* and *Journal Citation Reports (JCR)* as benchmarks. *ESI* provides access to a unique and comprehensive compilation of essential science performance statistics and science trends data derived from Thomson's databases. For this analysis, the *ESI* highly cited papers thresholds as well as the hot papers thresholds were used to assess the influence and impact of the EDCs papers. *JCR* is a recognized authority for evaluating journals. It presents quantifiable statistical data that provide a systematic, objective way to evaluate the world's leading journals and their impact and influence in the global research community. The two key measures used in this analysis to assess the journals in which the EPA EDCs papers are published are the Impact Factor and Immediacy Index. The Impact Factor is a measure of the frequency with which the "average article" in a journal has been cited in a particular year. The Impact Factor helps evaluate a journal's relative importance, especially when compared to other journals in the same field. The Immediacy Index is a measure of how quickly the "average article" in a journal is cited. This index indicates how often articles published in a journal are cited within the same year and it is useful in comparing how quickly journals are cited.

The report includes a summary of the results of the bibliometric analysis, an analysis of the 519 EDCs research papers analyzed by *ESI* field (e.g., Environment/Ecology, Pharmacology & Toxicology, Plant & Animal Science), an analysis of the journals in which the EDCs papers were published, a table of the highly cited researchers in the EDCs Research Program, and an indication of whether any patents have resulted from the program.

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[1] Thomson Scientific's *Web of Science* provides access to current and retrospective multidisciplinary information from approximately 8,830 of the most prestigious, high impact research journals in the world. *Web of Science* also provides cited reference searching.

[2] Scopus is a large abstract and citation database of research literature and quality Web sources designed to support the literature research process. Scopus offers access to 15,000 titles from 4,000 different publishers, more than 12,850 academic journals (including coverage of 535 Open Access journals, 750 conference proceedings, and 600 trade publications), 27 million abstracts, 245 million references, 200 million scientific Web pages, and 13 million patent records.

SUMMARY OF RESULTS

1. More than one-quarter of the EDCs publications are highly cited papers. 144 (27.8%) of the EDCs papers qualify as highly cited when using the *ESI* criteria for the top 10% of highly cited publications. This is 2.8 times the 10% of papers expected to be highly cited. 14 (2.7%) of the EDCs papers qualify as highly cited when using the *ESI* criteria for the top 1%, which is 2.7 times the number expected. 4 (0.8%) of these papers qualify as very highly cited when using the criteria for the top 0.1%, which is 8 times the number anticipated. 3 (0.6%) papers actually meet the 0.01% threshold for the most highly cited papers, which is 60 times the expected number for this program.

2. The EDCs papers are more highly cited than the average paper. Using the *ESI* average citation rates for papers published by field as the benchmark, in 11 of the 15 fields in which the 519 EPA EDCs papers were published, the ratio of actual to expected cites is greater than 1, indicating that the EDCs papers are more highly cited than the average papers in those fields. For all 15 fields combined, the ratio of total number of cites to the total number of expected cites (8,997 to 4,582.3) is 2.0, indicating that the EDCs papers are more highly cited than the average paper.

3. Nearly one-half of the EDCs papers are published in high impact journals. 213 of the 519 papers were published in the top 10% of journals ranked by *JCR* Impact Factor, representing 41.0% of EPA's EDCs papers. This number is 4.1 times higher than the expected 52 papers. 228 of the 519 papers appear in the top 10% of journals ranked by *JCR* Immediacy Index, representing 43.9% of EPA's EDCs papers. This number is 4.4 times higher than the expected 52 papers.

4. Four of the EDCs papers qualify as hot papers. Using the hot paper thresholds established by *ESI* as a benchmark, 4 hot papers, representing 0.8% of the EDCs papers, were identified in the analysis. Hot papers are papers that were highly cited shortly after they were published. The number of EDCs hot papers identified is 8 times higher than the expected 0.5 hot papers.

5. The authors of the EDCs papers cite themselves much less than the average author. 418 of the 8,997 cites are author self-cites. This 4.6% author self-citation rate is well below the accepted range of 10-30% author self-citation rate.

6. Seventeen of the authors of the EDCs papers are included in *ISIHighlyCited.com*, which is a database of the world's most influential researchers who have made key contributions to science and technology during the period from 1981 to 1999.

7. No patents were issued and no patent applications were filed by investigators from 1997 to 2007 for research that was conducted under EPA's EDCs research program.

Highly Cited EDCs Publications

All of the journals covered by *ESI* are assigned a field, and to compensate for varying citation rates across scientific fields, different thresholds are applied to each field. Thresholds are set to select highly cited papers to be listed in *ESI*. Different thresholds are set for both field and year of publication. Setting different thresholds for each year allows comparable representation for older and younger papers for each field.

The 519 EDCs research papers reviewed for this analysis were published in journals that were assigned to 15 of the 22 *ESI* fields. The distribution of the papers among these 15 fields and the number of citations by field are presented in Table 1.

Table 1. EDCs Papers by *ESI* Fields

***ESI* Field**	**No. of Citations**	**No. of EPA Papers**	**Average Cites/Paper**
Agricultural Sciences	18	3	6.0
Biology & Biochemistry	961	67	14.3
Chemistry	247	27	9.1
Clinical Medicine	1,124	59	19.0
Computer Science	37	2	18.5
Engineering	2	4	0.5
Environment/Ecology	2,284	152	15.0
Geosciences	3	1	3.0
Microbiology	1	1	1.0
Molecular Biology & Genetics	32	4	8.0
Multidisciplinary	776	11	70.5
Neuroscience & Behavior	213	21	10.1
Pharmacology & Toxicology	2,552	108	23.6
Plant & Animal Science	731	57	12.8
Social Sciences, general	16	2	8.0
	Total = 8,997	**Total = 519**	**17.3**

There are 144 (27.8% of the papers analyzed) highly cited EPA EDCs papers in 10 of the 15 fields—Agricultural Sciences, Biology & Biochemistry, Chemistry, Clinical Medicine, Computer Science, Environment/Ecology, Multidisciplinary, Pharmacology & Toxicology, Plant & Animal Science, and Social Sciences—when using the *ESI* criteria for the **top 10% of papers**. Table 2 shows the number of EPA papers in those 10 fields that meet the **top 10% threshold in *ESI***. Fourteen (2.7%) of the papers analyzed qualify as highly cited when using the *ESI* criteria for the **top 1% of papers**. These papers cover 4 fields—Computer Science, Environment/Ecology, Multidisciplinary, and

Pharmacology & Toxicology. Table 3 shows the 14 papers by field that meet the **top 1% threshold in *ESI***. The citations for these 14 papers are provided in Tables 4 through 7. There were 4 (0.8%) very highly cited EDCs papers in the fields of Environment/Ecology and Multidisciplinary. These papers, which met the **top 0.1% threshold in *ESI*,** are listed in Table 8. Three (0.6%) of the EDCs papers met the **top 0.01% threshold in *ESI***, which is 60 times the expected number of papers that should meet this threshold for this size program. This paper is listed in Table 9.

Table 2. Number of Highly Cited EDCs Papers by Field (top 10%)

***ESI* Field**	**No. of Citations**	**No. of Papers**	**Average Cites/Paper**	**% of Papers in Field**
Agricultural Sciences	15	1	15.0	33.3%
Biology & Biochemistry	264	9	29.3	13.4%
Chemistry	113	2	56.5	7.4%
Clinical Medicine	555	13	42.7	22.0%
Computer Science	37	2	18.5	100.0%
Environment/Ecology	1,460	47	31.1	30.9%
Multidisciplinary	764	7	109.1	63.6%
Pharmacology & Toxicology	1,923	40	48.1	37.0%
Plant & Animal Science	551	21	26.2	36.8%
Social Sciences, general	16	2	8.0	100.0%
	Total = 5,698	**Total = 144**	**39.6**	**27.8%**

Table 3. Number of Highly Cited EDCs Papers by Field (top 1%)

***ESI* Field**	**No. of Citations**	**No. of Papers**	**Average Cites/Paper**	**% of EPA Papers in Field**
Computer Science	18	1	18.0	50.0%
Environment/Ecology	365	5	73.0	3.3%
Multidisciplinary	698	5	139.6	45.4%
Pharmacology & Toxicology	470	3	156.7	2.8%
	Total = 1,551	**Total = 14**	**110.8**	**2.7%**

Table 4. Highly Cited EDCs Papers in the Field of Computer Science (top 1%)

No. of Cites	First Author	Paper
18	Ouyang M	Gaussian mixture clustering and imputation of microarray data. *Bioinformatics* 2004;20(6):917-923.

Table 5. Highly Cited EDCs Papers in the Field of Environment/Ecology (top 1%)

No. of Cites	First Author	Paper
169	Crisp TM	Environmental endocrine disruption: an effects assessment and analysis. *Environmental Health Perspectives* 1998;106(Suppl 1):11-56.
102	Ankley GT	Description and evaluation of a short-term reproduction test with the fathead minnow (Pimephales promelas). *Environmental Toxicology and Chemistry* 2001;20(6):1276-1290.
17	Mills LJ	Review of evidence: are endocrine-disrupting chemicals in the aquatic environment impacting fish populations? *Science of the Total Environment* 2005;343(1-3):1-34.
71	Swan SH	Decrease in anogenital distance among male infants with prenatal phthalate exposure. *Environmental Health Perspectives* 2005;113(8):1056-1061.
6	LeBlanc GA	Crustacean endocrine toxicology: a review. *Ecotoxicology* 2007;16(1):61-81.

Table 6. Highly Cited EDCs Papers in the Field of Multidisciplinary (top 1%)

No. of Cites	First Author	Paper
106	Das SK	Estrogenic responses in estrogen receptor-alpha deficient mice reveal a distinct estrogen signaling pathway. *Proceedings of the National Academy of Sciences of the United States of America* 1997;94(24): 12786-12791.
124	Hawkins MB	Identification of a third distinct estrogen receptor and reclassification of estrogen receptors in teleosts. *Proceedings of the National Academy of Sciences of the United States of America* 2000;97(20): 10751-10756.
181	Zhu Y	Identification, classification, and partial characterization of genes in humans and other vertebrates homologous to a fish membrane progestin receptor. *Proceedings of the National Academy of Sciences of the United States of America* 2003;100(5):2237-2242.

No. of Cites	First Author	Paper
182	Zhu Y	Cloning, expression, and characterization of a membrane progestin receptor and evidence it is an intermediary in meiotic maturation of fish oocytes. *Proceedings of the National Academy of Sciences of the United States of America* 2003;100(5):2231-2236.
105	Anway MD	Epigenetic transgenerational actions of endocrine disruptors and mate fertility. *Science* 2005;308(5727):1466-1469.

Table 7. Highly Cited EDCs Papers in the Field of Pharmacology & Toxicology (top 1%)

No. of Cites	First Author	Paper
144	Parks LG	The plasticizer diethylhexyl phthalate induces malformations by decreasing fetal testosterone synthesis during sexual differentiation in the male rat. *Toxicological Sciences* 2000;58(2):339-349.
155	Gray LE	Perinatal exposure to the phthalates DEHP, BBP, and DINP, but not DEP, DMP, or DOTP, alters sexual differentiation of the male rat. *Toxicological Sciences* 2000;58(2):350-365.
171	Laws SC	Estrogenic activity of octylphenol, nonylphenol, bisphenol A and methoxychlor in rats. *Toxicological Sciences* 2000;54(1):154-167.

Table 8. Very Highly Cited EDCs Papers (top 0.1%)

ESI Field	No. of Cites	First Author	Paper
Environment/ Ecology	71	Swan SH	Decrease in anogenital distance among male infants with prenatal phthalate exposure. *Environmental Health Perspectives* 2005;113(8):1056-1061.
Multidisciplinary	181	Zhu Y	Identification, classification, and partial characterization of genes in humans and other vertebrates homologous to a fish membrane progestin receptor. *Proceedings of the National Academy of Sciences of the United States of America* 2003;100(5):2237-2242.
	182	Zhu Y	Cloning, expression, and characterization of a membrane progestin receptor and evidence it is an intermediary in meiotic maturation of fish oocytes. *Proceedings of the National Academy of Sciences of the United States of America* 2003;100(5):2231-2236.
	105	Anway MD	Epigenetic transgenerational actions of endocrine disruptors and mate fertility. *Science* 2005;308(5727):1466-1469.

Table 9. Extremely Highly Cited EDCs Paper in the Field of Multidisciplinary (top 0.01%)

No. of Cites	First Author	Paper
181	Zhu Y	Identification, classification, and partial characterization of genes in humans and other vertebrates homologous to a fish membrane progestin receptor. *Proceedings of the National Academy of Sciences of the United States of America* 2003;100(5):2237-2242.
182	Zhu Y	Cloning, expression, and characterization of a membrane progestin receptor and evidence it is an intermediary in meiotic maturation of fish oocytes. *Proceedings of the National Academy of Sciences of the United States of America* 2003;100(5):2231-2236.
105	Anway MD	Epigenetic transgenerational actions of endocrine disruptors and mate fertility. *Science* 2005;308(5727):1466-1469.

Ratio of Actual Cites to Expected Citation Rates

The expected citation rate is the average number of cites that a paper published in the same journal in the same year and of the same document type (article, review, editorial, etc.) has received from the year of publication to the present. Using the *ESI* average citation rates for papers published by field as the benchmark, in 11 of the 15 fields in which the EPA EDCs papers were published, the ratio of actual to expected cites is greater than 1, indicating that the EDCs papers are more highly cited than the average papers in those fields (see Table 10). For all 15 fields combined, the ratio of total number of cites to the total number of expected cites (8,997 to 4,582.3) is 2.0, indicating that the EDCs papers are more highly cited than the average paper.

Table 10. Ratio of Actual Cites to Expected Cites for EDCs Papers by Field

ESI Field	Total Cites	Expected Cite Rate	Ratio
Agricultural Sciences	18	8.1	2.2
Biology & Biochemistry	961	853.0	1.1
Chemistry	247	189.1	1.3
Clinical Medicine	1,124	685.9	1.6
Computer Science	37	5.8	6.4
Engineering	2	6.0	0.3
Environment/Ecology	2,284	1,023.3	2.2
Geosciences	3	2.2	1.4
Microbiology	1	4.7	0.2
Molecular Biology & Genetics	32	65.9	0.5

ESI Field	Total Cites	Expected Cite Rate	Ratio
Multidisciplinary	776	40.6	19.1
Neuroscience & Behavior	213	354.7	0.6
Pharmacology & Toxicology	2,552	1,002.5	2.5
Plant & Animal Science	731	336.3	2.2
Social Sciences, general	16	4.2	3.8
TOTAL	**8,997**	**4,582.3**	**2.0**

***JCR* Benchmarks**

Impact Factor. The *JCR* Impact Factor is a well known metric in citation analysis. It is a measure of the frequency with which the "average article" in a journal has been cited in a particular year. The Impact Factor helps evaluate a journal's relative importance, especially when compared to others in the same field. The Impact Factor is calculated by dividing the number of citations in the current year to articles published in the 2 previous years by the total number of articles published in the 2 previous years.

Table 11 indicates the number of EDCs papers published in the top 10% of journals, based on the *JCR* Impact Factor. Two hundred thirteen (213) of 519 papers were published in the top 10% of journals, representing 41.0% of EPA's EDCs papers. This indicates that nearly one-half of the EDCs papers are published in the highest quality journals as determined by the *JCR* Impact Factor, which is 4.1 times higher than the expected percentage.

Table 11. EDCs Papers in Top 10% of Journals by *JCR* Impact Factor

EPA EDCs Papers in that Journal	Journal	Impact Factor (IF)	*JCR* IF Rank
1	New England Journal of Medicine	51.296	2
1	Science	30.028	9
7	Proceedings of the National Academy of Sciences of the United States of America	9.643	116
1	Development	7.764	165
1	Cancer Research	7.656	172
1	Human Reproduction Update	6.793	202
1	Nucleic Acids Research	6.317	222
31	Environmental Health Perspectives	5.861	255
1	Journal of Clinical Endocrinology and Metabolism	5.799	261

EPA EDCs Papers in that Journal	Journal	Impact Factor (IF)	*JCR* IF Rank
4	Analytical Chemistry	5.646	276
1	American Journal of Epidemiology	5.241	308
12	Endocrinology	5.236	310
1	Journal of Medicinal Chemistry	5.115	328
2	Bioinformatics	4.894	358
1	Molecular Ecology	4.825	374
8	Toxicology and Applied Pharmacology	4.722	397
1	Cancer	4.582	413
3	Epidemiology	4.339	452
1	Hippocampus	4.232	478
18	Environmental Science & Technology	4.040	518
1	Physiological Genomics	3.789	593
3	Hormones and Behavior	3.789	593
11	Critical Reviews in Toxicology	3.707	623
74	Toxicological Sciences	3.598	662
1	Journal of Chromatography A	3.554	678
1	Applied and Environmental Microbiology	3.532	682
19	Biology of Reproduction	3.498	694
1	Neuroscience	3.427	721
1	Evolution & Development	3.293	770
1	Fertility and Sterility	3.277	777
3	Chemical Research in Toxicology	3.162	818
Total = 213			

Immediacy Index. The *JCR* Immediacy Index is a measure of how quickly the *average article* in a journal is cited. It indicates how often articles published in a journal are cited within the year they are published. The Immediacy Index is calculated by dividing the number of citations to articles published in a given year by the number of articles published in that year.

Table 12 indicates the number of EDCs papers published in the top 10% of journals, based on the *JCR* Immediacy Index. Two hundred twenty-eight (228) of the 519 papers appear in the top 10% of

journals, representing 43.9% of the EDCs papers. This indicates that nearly one-half of the EDCs papers are published in the highest quality journals as determined by the *JCR* Immediacy Index, which is 4.4 times higher than the expected percentage.

Table 12. EDCs Papers in Top 10% of Journals by *JCR* Immediacy Index

EPA EDCs Papers in that Journal	Journal	Immediacy Index (II)	*JCR* II Rank
1	New England Journal of Medicine	12.743	2
1	Science	5.555	16
2	ILAR Journal	1.783	121
7	Proceedings of the National Academy of Sciences of the United States of America	1.758	126
1	Nucleic Acids Research	1.744	131
1	Development	1.579	157
3	Epidemiology	1.437	187
1	Cancer Research	1.220	246
1	Evolution & Development	1.120	287
12	Endocrinology	1.102	298
1	American Journal of Epidemiology	1.091	306
1	Hippocampus	1.081	309
1	Human Reproduction Update	1.069	317
1	Journal of Clinical Endocrinology and Metabolism	1.046	333
31	Environmental Health Perspectives	0.994	373
1	Environmental Science and Pollution Research	0.982	376
3	International Journal of Andrology	0.974	379
11	Critical Reviews in Toxicology	0.880	442
1	Journal of Medicinal Chemistry	0.859	461
3	Hormones and Behavior	0.856	466
1	American Zoologist	0.842	480
4	Integrative and Comparative Biology	0.842	480
4	Analytical Chemistry	0.795	524
19	Biology of Reproduction	0.736	593
74	Toxicological Sciences	0.734	597

EPA EDCs Papers in that Journal	Journal	Immediacy Index (II)	*JCR* II Rank
1	Journal of Experimental Biology	0.719	621
1	Cancer	0.713	629
2	Bioinformatics	0.712	631
1	Molecular Ecology	0.666	700
3	Chemical Research in Toxicology	0.663	703
18	Environmental Science & Technology	0.646	729
1	Reproduction Fertility and Development	0.641	739
1	Applied and Environmental Microbiology	0.634	751
1	Physiological Genomics	0.616	777
1	Fertility and Sterility	0.612	788
1	Neuroscience	0.611	790
3	Pure and Applied Chemistry	0.586	840
8	Environmental Research	0.583	844
Total = 228			

Hot Papers

ESI establishes citation thresholds for hot papers, which are selected from the highly cited papers in different fields, but the time frame for citing and cited papers is much shorter—papers must be cited within 2 years of publication and the citations must occur in a 2-month time period. Papers are assigned to 2-month periods and thresholds are set for each period and field to select 0.1% of papers. There were no hot papers identified for the current 2-month period (i.e., March-April 2007), but there were a number of hot papers identified from previous periods.

Using the hot paper thresholds established by *ESI* as a benchmark, 4 hot papers, representing 0.8% of the EDCs papers, were identified in two fields— Environment/Ecology and Multidisciplinary. The number of EDCs hot papers is 8 times higher than expected. The hot papers are listed in Table 13.

Table 13. Hot Papers Identified Using *ESI* Thresholds

Field	*ESI* Hot Papers Threshold	No. of Cites in 2-Month Period	Paper
Environment/ Ecology	3	3 cites in December 2003	Schreinemachers DM. Birth malformations and other perinatal outcomes in four US wheat-producing states. *Environmental Health Perspectives* 2003;111(9):1259-1264.
	4	12 cites in February-March 2006	Swan SH, et al. Decrease in anogenital distance among male infants with prenatal phthalate exposure. *Environmental Health Perspectives* 2005;113(8):1056-1061.
	5	6 cites in February 2007	LeBlanc GA. Crustacean endocrine toxicology: a review. *Ecotoxicology* 2007;16(1):61-81.
Multidisciplinary	9	15 cites in May-June 2006	Anway MD, et al. Epigenetic transgenerational actions of endocrine disruptors and mate fertility. *Science* 2005;308(5727):1466-1469.

Author Self-Citation

Self-citations are journal article references to articles from that same author (i.e., the first author). Because higher author self-citation rates can inflate the number of citations, the author self-citation rate was calculated for the EDCs papers. Of the 8,997 total cites, 418 are author self-cites—a 4.6% author self-citation rate. Garfield and Sher[3] found that authors working in research-based disciplines tend to cite themselves on the average of 20% of the time. MacRoberts and MacRoberts[4] claim that approximately 10% to 30% of all the citations listed fall into the category of author self-citation. Kovacic and Misak[5] recently reported a 20% author self-citation rate for medical literature. Therefore, the 4.6% self-cite rate for the EDCs papers is well below the range for author self-citation.

Highly Cited Researchers

A search of Thomson's *ISIHighlyCited.com* revealed that 17 (1.6%) of the 1,096 authors of the EDCs papers are highly cited researchers. *ISIHighlyCited.com* is a database of the world's most influential researchers who have made key contributions to science and technology during the period from 1981 to 1999. The highly cited researchers identified during this analysis of the EDCs publications are presented in Table 14.

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[3] Garfield E, Sher IH. New factors in the evaluation of scientific literature through citation indexing. *American Documentation* 1963;18(July):195-210.

[4] MacRoberts MH, MacRoberts BR. Problems of citation analysis: a critical review. *Journal of the American Society of Information Science* 1989;40(5):342-349.

[5] Kavaci N, Misak A. Author self-citation in medical literature. *Canadian Medical Association Journal* 2004;170(13):1929-1930.

Table 14. Highly Cited Researchers Authoring EDCs Publications

Highly Cited Researcher	Affiliation	*ESI* Field
Andersen, Melvin E.	CIIT Centers for Health Research	Pharmacology
Ankley, Gerald	U.S. Environmental Protection Agency	Environment/Ecology
Birnbaum, Linda S.	U.S. Environmental Protection Agency	Pharmacology
Boobis, Alan R.	Imperial College London	Pharmacology
Brown, Sandra	Winrock International	Environment/Ecology
Burger, Joanna	Rutgers University	Environment/Ecology
German, J. Bruce	University of California-Davis	Agricultural Sciences
Giesy, John P.	University of Saskatchewan	Environment/Ecology
Guillette, Louis J.	University of Florida	Environment/Ecology
Jobling, Susan	University of Brunel	Environment/Ecology
McLachlan, John A.	Tulane University	Environment/Ecology
Needham, Larry L.	National Center for Environmental Health	Environment/Ecology
Pace, Michael L.	Institute of Ecosystem Studies	Plant & Animal Science
Rao, P. Suresh Chandra	Purdue University	Environment/Ecology
Sih, Andrew	University of California–Davis	Environment/Ecology
Suidan, Makram T.	University of Cincinnati	Environment/Ecology
Sumpter, John P.	Brunel University	Environment/Ecology
Total = 17		

Patents

No patents have been issued or patent applications filed by investigators from 1997 to 2007 for research that was conducted under EPA's EDCs research program.

This bibliometric analysis was prepared by
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in Gaithersburg, Maryland
under EPA Contract No. EP-C-05-015