NATURAL RESOURCES DEFENSE COUNCIL

April 27, 2012

Administrator Lisa P. Jackson
Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

By email

Re: 1. Petition to Remove HFC-134a from the List of Acceptable Substitutes in household refrigerators and freezers and stand-alone retail food refrigerators and freezers under the Significant New Alternatives Policy Program.
2. Petition to restrict the sales of SNAP listed refrigerants to anyone other than certified technicians.
3. Petition for a standardized procedure to determine the speed of transition from obsolete high-GWP HFCs to next-generations alternatives and substitutes with superior Life-Cycle Climate Performance (LCCP).
4. Clarification of May 2010 Petition Regarding Aerosol Products.

Dear Administrator Jackson:

The Natural Resources Defense Council (NRDC), the Institute for Governance & Sustainability (IGSD), and the Environmental Investigation Agency – US (hereafter NRDC/IGSD/EIA) hereby petition the Environmental Protection Agency (EPA) to:

1) Remove HFC-134a from the list of acceptable substitutes for CFC-12 in household refrigerators and freezers and stand-alone retail food refrigerators and freezers maintained under EPA's Significant New Alternatives Policy (SNAP) program,

2) Restrict the sales of SNAP listed refrigerants to all except certified technicians with access to service tools required under existing EPA regulations, and

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> 3) Adopt a standardized procedure to determine the speed of transition from obsolete high-GWP HFCs to next-generations alternatives and substitutes.

NRDC/IGSD/EIA also hereby clarify the May 2010 Petition regarding aerosol products (see section 4 below).

Background and Introduction

On May 7, 2010 NRDC/IGSD/EIA petitioned EPA to remove HFC-134a from the list of acceptable substitutes for CFC-12 under the SNAP (Significant New Alternatives Policy) program for use in Motor Vehicle Air Conditioners (MVACs) and for other end-use categories where more benign alternatives are available. The MVAC end use under SNAP covers light-duty vehicles (e.g. passenger cars, pick-up trucks, minivans, and sport utility vehicles) as well as other types of vehicles (e.g., off-road construction, mining and agricultural equipment, heavy-duty trucks, airplanes, buses, and passenger trains).

On August 5, 2010, EPA replied seeking additional information before finding the petition complete and on November 16, 2010, NRDC responded to those questions.

On February 14, 2011, EPA responded:

> We are finding your May 7, 2010, petition complete for new passenger cars and light duty vehicles, as narrowed by your November 16, 2010 supplement, which petitions us to remove HFC-134a from the list of acceptable alternatives in *new* MVACs only.
>
> Consistent with 40 CFR 82.184(d)(5), EPA will initiate notice and comment rulemaking in response to your petition. EPA acknowledges the need to evaluate and take comment on many factors, including, but not limited to, the time frame for the introduction of newer alternatives into the automotive market, and potential lead time for automobile manufacturers to accommodate alternatives.

EPA has not, however, published a notice of proposal regarding MVAC use of HFC-134a. We do not address this delay here, but we reiterate the need for timely action on the MVAC matter and we intend to pursue such action separately.

The petitions elaborated in this letter are filed pursuant to Section 612(d) of the Clean Air Act and 40 C.F.R § 82.184(b)(3). Under section 612 of the Clean Air Act, EPA has the authority to evaluate alternatives to ozone-depleting substances (ODS) identified in section 602 and to publish a list of acceptable and unacceptable substitutes through the SNAP program. EPA also has the authority to revise this list on its own, or in response to a petition, to remove a substitute previously listed as acceptable.

1. Petition to Remove HFC-134a from the List of Acceptable Substitutes for CFC-12 in: Household Refrigerators and Freezers and Stand-Alone Retail Food Refrigerators and Freezers

CFC-12 is a Class I ozone-depleting chemical under section 602. EPA was required to identify acceptable substitutes for CFC-12 by considering their "atmospheric effects and related health and environmental impacts," the "general population risks from ambient exposure to compounds with direct toxicity to increased ground-level ozone," "flammability," and "cost and availability of the substitute."[1] In 1995, EPA determined HFC-134a and more than a dozen other refrigerants to be an acceptable substitute for CFC-12 in household refrigerators and freezers and stand-alone retail food refrigerators and freezers because HFC-134a has an ozone-depleting potential (ODP) of zero and a global warming potential (GWP) of 1300, as compared to CFC-12's ODP of 1 and GWP of 10,890.[2] On December 20, 2011, EPA listed "isobutane (R-600a) and R-441A as acceptable, subject to use conditions, as substitutes for chlorofluorocarbon (CFC)-12 and hydrochlorofluorocarbon (HCFC)-22 in household refrigerators, freezers, and combination refrigerators and freezers. This action also lists propane (R-290) as acceptable, subject to use conditions, as a substitute for CFC-12, HCFC-22, and R-502 in retail food refrigerators and freezers (stand-alone units only)."[3]

Isobutane and propane are hydrocarbons, and R-441A is a blend of hydrocarbons. The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 34-2010 "Designation and Safety Classification of Refrigerants" (ASHRAE, 2010) assigns a specific name and safety group classification to each refrigerant. Isobutane is R-600 (also commonly called HC-600) and propane is R-290 (also commonly called HC-290). The blend of four hydrocarbons is R-441A: ethane (3.1 percent by mass), propane (54.8 percent by mass), isobutane (6.0 percent by mass), and butane (36.1 percent by mass).

In the December 2011 EPA SNAP listing of acceptable low-GWP refrigerants for household refrigerators and freezers and stand-alone retail food refrigerators and freezers, EPA listed the relative GWPs as follows:

> The GWP of a greenhouse gas (GHG) quantifies its potential integrated climate forcing relative to carbon dioxide (CO2) over a specified time horizon. The 100-year integrated GWPs of isobutane, propane, and R–441A are estimated to be 8 (GE, 2008), 3 (Ben and Jerry's, 2008), and less than 5 (A.S. 11 Trust & Holdings, 2009), respectively, relative to a value of 1.0 for CO2. These are significantly lower than the 100-year integrated GWPs of the substances that they would be

[1] Significant New Alternatives Policy Program, Agency Review of SNAP Submissions, 40 C.F.R. § 82.180(a)(7)(i)-(ii) (2009).
[2] Protection of Stratospheric Ozone, 60 Fed. Reg. 31,092, 31,097 (June 13, 1995).
[3] Protection of Stratospheric Ozone: Listing of Substitutes for Ozone-Depleting Substances – Hydrocarbon Refrigerants, 76 Fed. Reg. 78,832 (Dec. 20, 2011).

> replacing: CFC–12 (GWP = 10,890); HCFC–22 (GWP = 1,810); and R–502 (GWP = 4,660) (WMO, 2011) and are significantly lower than those of other acceptable refrigerants in these end-uses (e.g., GWPs of HFC–134a, R– 404A, and R–410A are approximately 1,430, 3,920, and 2,090, respectively).[4]

It is also expected that energy efficiency will be equal or greater than equipment based on HFC-134a:[5]

> …energy efficiency of these refrigerants is likely to be comparable to or higher than that of ODS refrigerants and of HFC refrigerants sometimes used (e.g., HFC– 134a).
>
> In the 2010 Assessment Report of the Technology and Economic Assessment Panel, UNEP's Technology and Economic Assessment Panel (TEAP) discusses the energy efficiency of hydrocarbons compared to that of HFC– 134a: 'When GWP of HFC–134a is considered prohibitive in relation to HFC emissions (country regulation or company policy), hydrocarbon refrigerants (isobutane and propane, i.e. HC–600a and HC–290) or CO2 (R–744) are the current alternative solutions, presenting in most of the cases the same technical reliability and energy performance as HFC–134a. [p. 60]

EPA and the Department of Energy (DoE) can assure that energy efficiency of the new products will be higher than that of the obsolete high-GWP products by strengthening the appliance energy efficiency standard and the Energy Star qualification threshold. To achieve even higher energy efficiency and consumer savings, EPA and DoE could transition to a program where the most energy efficient appliance within each category (size and features) is annually designated as the "Top Runner" and every other appliance must equal or better that energy efficiency within two or three years. This approach uses the market to prove technical feasibility and rewards the companies offering the products most in the interest of consumers and society.

In light of the health and environmental goals of the SNAP program and the availability of hydrocarbon substitutes that present much lower risks to health and environment than those associated with already phaseout CFC-12 and currently allowed HFC-134a, NRDC and IGSD request that EPA remove HFC-134a and all other refrigerants with 100-yr GWP>150 from the acceptable substitutes list for household refrigerators and freezers and stand-alone retail food refrigerators and freezers. We recommend the 100-yr GWP threshold of 150 because this value allows hydrocarbons, carbon dioxide, HFC-1234yf, and HFC-152a and is also the maximum allowed by the European Commission (EC) F-gas Directive for motor vehicle air conditioning.

The environmental and legal justification for the petition to un-list HFC-134a in household refrigerators and freezers and stand-alone retail food refrigerators and freezers

[4] *Id.*
[5] *Id.*

is the same as presented by NRDC/IGSD/EIA in the petition EPA granted to un-list HFC-134a from motor vehicle AC.[6]

The Significant New Alternatives Policy program implements section 612 of the Clean Air Act. The SNAP program was created to assure the health and environmental safety of alternatives for ozone-depleting substances that were being phased out under Section 602 of the Act. The purpose of the SNAP program is "to allow a safe, smooth transition away from ozone-depleting compounds by identifying substitutes that offer lower overall risks to human health and the environment."[7] Section 602 of the Clean Air Act contains a list of Class I and Class II ozone-depleting substances which have been or are being phased out. Under the SNAP program EPA evaluates proposed substitutes to these ODS and classifies the substitutes as acceptable, acceptable subject to use limits or conditions, or unacceptable.[8] The SNAP approval process provides EPA an opportunity to review proposed alternatives before they enter the marketplace. SNAP determinations thus can drive commercial development towards substitutes that present a lower overall risk to human health and the environment.

Applicants for listing of potential substitute applications must provide certain information, including the name and description of the substitute, physical and chemical information, toxicity data, and health and safety studies.[9] In addition, applicants must include information concerning the ozone-depleting potential and global warming impacts of the substance, including "information on the GWP index and the indirect contributions to global warming caused by the production or use of the substitute."[10] EPA's acceptability determinations are comparative evaluations, where EPA looks not only at the proposed substitute in comparison to the relevant Class I or Class II substance listed in Section 602, but also in comparison to "other substitutes for the same end-use." As such, EPA must consider not only the original ODS but also the other listed substitutes for that substance. For example, in the context of household refrigerators and freezers and stand-alone retail food refrigerators and freezers, R-290, R-441A, and R-600 are SNAP listed substitutes for both CFC-12 and HFC-134a. In comparing these substitutes directly with each other, EPA then may "prohibit the use of those substitutes found, based on the same comparisons, to increase overall risks.[11] This progressively comparative analysis allows the SNAP program to continually promote new and less environmentally harmful substitutes as they are developed and listed.

EPA's criteria for risk comparison in the SNAP program support Title VI's goal of phasing out ODS from the marketplace in conjunction with the Montreal Protocol. EPA must explicitly analyze, among other things, "[a]tmospheric effects and related health and

[6] http://www.epa.gov/ozone/downloads/NRDC_petition_responses.pdf.
[7] Environmental Protection Agency, Significant New Alternatives Policy (SNAP) Program, http://www.epa.gov/ozone/snap/index.html (last visited Mar. 17, 2009).
[8] *Id.*
[9] Significant New Alternatives Policy Program, Information Required to be Submitted, 40 C.F.R. § 82.178 (2009).
[10] *Id.*
[11] Significant New Alternatives Policy Program, Purpose and Scope, 40 C.F.R. § 82.170 (2009).

environmental impacts. . .[and] [g]eneral population risks from ambient exposure to compounds with direct toxicity and to increased ground-level ozone."[12] In promulgating the initial SNAP rule in 1994, the agency noted that they had "followed several guiding principles in developing the SNAP program."[13] The rule outlines a comparative risk framework, where:

> The Agency's risk evaluation compares risks of substitutes to risks from continued use of ozone-depleting compounds as well as to risks associated with other substitutes. This evaluation considers effects due to ozone depletion as well as effects due to direct toxicity of substitutes.[14]

The proposed rule outlining the SNAP program elaborates on the climate-focused nature of this risk analysis, where the "'overall risk' characterization will consider such factors as: Toxicity and exposure -- both human health and ecological; chlorine loadings; ozone-depletion potential; global-warming potential; and flammability."[15]

In light of the comparative nature of the SNAP analysis and given that other acceptable substitutes are on the market or soon to be available, we request that EPA remove HFC-134a and all other refrigerants with 100-yr GWP >150 from the list of acceptable alternatives for household refrigerators and freezers and stand-alone retail food refrigerators and freezers, on a schedule that is based on the most rapid feasible introduction of one or more of the above-mentioned acceptable alternatives. Due to the comparative and progressive nature of the SNAP program, R-290, R-441A, and R-600 and other potential substitutes should be considered substitutes not only for CFC-12 (the initial ODS at issue) but also for alternatives already listed, including HFC-134a. In light of this, we request that EPA establish a schedule for rapidly phasing out the use of HFC-134a in household refrigerators and freezers and stand-alone retail food refrigerators and freezers.

EPA initially approved HFC-134a for use as an acceptable alternative in 1995. The initial approval stated that:

> HFC-134a does not contribute to ozone depletion. HFC-134a's GWP and atmospheric lifetime are close to those of other alternatives which have been determined to be acceptable for this end-use. However, HFC-134a's contribution to global warming could be significant in leaky end-uses such as household refrigerators and freezers and stand-alone retail food refrigerators and freezers. EPA has determined that the use of HFC-134a in these applications is acceptable because industry continues to develop technology to limit emissions. In addition,

[12] Significant New Alternatives Policy Program, Agency Review of SNAP Submissions, 40 C.F.R. § 82.180(a)(7)(i)-(ii) (2009).
[13] 59 Fed. Reg. at 13,046.
[14] *Id.*
[15] Protection of Stratospheric Ozone; Request for Data and Advanced Notice of Proposed Rulemaking, 57 Fed. Reg. 1984, 1985 (Jan. 16, 1992).

> the number of substitutes available for use in MVACS is currently limited. HFC-134a is not flammable and its toxicity is low.[16]

This analysis, though it may have been appropriate in 1995, does not hold true today, and highlights the necessity of phasing out HFC-134a. HFC-134a's GWP of 1300 is no longer close to that of other alternatives. For example, CO2 (R-744) has a 100 yr GWP of 1, propane (R-290) a 100 yr GWP of ~3, isobutane a 100 yr GWP of ~8 and R–441A a 100 yr GWP of <5.[17]

2. Petition to Restrict the Sales of SNAP Listed Refrigerants to Anyone Other than Certified Technicians

Under Section 609 of the Clean Air Act EPA prohibited the sale of small cans (less than 20 pounds) of CFC-12 to anyone other than an EPA-certified technician. This CFC-12 sales restriction 1) reduced the risk of cross-contaminating refrigerants and lubricants in order to maintaining the cooling capacity, efficiency, and reliability of refrigeration and air conditioning equipment; 2) encouraged the recovery and recycle of refrigerants by avoiding the cost of cleaning up contaminated refrigerants; and 3) discouraged owners of refrigeration and air conditioning equipment from undertaking ill-advised do-it-yourself recharge of leaking systems and significantly reduced the use and emissions of CFCs and CFC substitutes. At the same time, an government-industry partnership, co-chaired by EPA, developed a standard of purity for recycled CFC-12 from motor vehicles and a recycle test standard to certify that recycling machines could clean a standardized worst-case contaminated test sample of refrigerant to the agreed standard of purity. The combination of the ban on small cans and the commercialization of certified CFC-12 recycling equipment eliminated the largest single source of intentional ODS GHG emissions while increasing U.S. manufacturing jobs and profits and also increasing service industry employment. At that time EPA choose not to restrict the sales of HFC-134a in small cans.

EPA data indicate that about half of the HFC-134a sold today for MAC service is used by do-it-yourself car owners to service about 10% of vehicles needing service and that about half is sold for professional service of the other 90% of vehicles needing service. Therefore, if all vehicles were professionally serviced, total service emissions would be reduced by about 40-45%. Professional service is able to achieve this efficiency because those establishments have proper tools including refrigerant recovery equipment, sophisticated leak detectors, and service bulletins and instructions for each vehicle, including the proper charge size. Do-it-yourself vehicle owners (DIYers) rarely own or have access to any of these tools and most often merely recharge leaking systems without repair as frequently as necessary to maintain cooling, leading to higher total emissions. This DIY strategy has the appearance of immediate savings compared to professional service but often is more costly in the long run because improperly charged systems consume more gasoline and under-charged systems, and systems where oil has leaked out

[16] 60 Fed. Reg. at 31,097.
[17] See supra, notes 2, 4.

with refrigerant will wear out rapidly and require costly replacement of parts such as the compressor. Used vehicles with broken air conditioners are expensive to repair and have significantly lower resale value. Penny wise and pound foolish. Furthermore, DIY service of high-pressure MAC systems has a risk of injury if systems are improperly disassembled, if refrigerant charging hoses are attached to the wrong fitting, or if hands are in the way of cooling fans that start unexpectedly in response to thermostatic controls.

The EPA ban on sales of small cans of CFC-12 would have been more successful as a ban on all sales in portable containers, because some DIYers merely purchased 20-pound containers of refrigerant at large box stores and other discounters.

The same environmental and consumer protection justification for the ban on purchase of CFC-12 apply to the sales of HFC-134a, but as the global automobile industry transitions from HFC-134a to HFC-1234yf there is a compelling new reason to ban the sales of HFC-134a for all but professional service – to avoid the recharge of MAC systems designed for HFC-1234yf with lower cost HFC-134a. That risk did not exist during the transition from CFC-12 to HFC-134a because the phaseout of CFC-12 and the ban on small can sales kept the price of CFC-12 higher than the price of HFC-134a and the cost of refrigerant was a less significant portion of total repair cost than it will be in the future.

HFC-134a has a chemical production cost of about $8.00/kg and market price of about $12 to $18/kg when sold in small 500 gram cans typically purchased for DIY (price depending on sales promotions available at the time of purchase). HFC-1234yf has an expected chemical production cost of $40 to $50/kg which would be $60 to $90 per small 500 gram can at the current markup, and $28 to $34 per small can if only the actual price increase of the chemical were passed onto the customer. This price difference will be an incentive to switch back to HFC-134a the first time the vehicle is serviced, with a consequence of higher subsequent GHG emissions. The recharge with HFC-134a of vehicle designed and labeled for HFC-1234yf will increase the frequency of refrigerant contamination when these vehicles are later serviced. Cross contamination of refrigerants increases the cost of service because the mixed refrigerant must be removed from vehicles and from recovery/recycle equipment and either remanufactured or destroyed and high cost and inconvenience.

For these reasons, NRDC/IGSD/EIA petition EPA to restrict the sales of all refrigerants to certified technicians with access to service equipment required by EPA regulations.

3. Petition to Adopt a Standardized Transition from obsolete high-GWP HFCs to next-generation low-GWP substitutes and alternatives in refrigeration, stationary air conditioning, foam blowing agents, aerosol products, and all other applications.

In the next few years, EPA will face a growing challenge of un-listing obsolete high-GWP refrigerants, foam-blowing agents, solvents, aerosol products, fire protection chemicals, and other applications, as chemical and product manufacturing companies innovate to protect the climate and to satisfy increasing green market demand. NRDC/IGSD/EIA petition EPA to develop standard procedures that trigger the un-listing

of high-GWP chemical substances at a pace that reward pioneer and innovative companies and that gives all companies time to adjust their manufacturing processes.

For example, NRDC/IGSD/EIA have already petitioned EPA to delist HFC-134a aerosol "dust-off" type products, such as those used to blow debris off of computer keyboards and electronic circuit boards and to prohibit HFC-134a and HFC-152a in such products as silly strings, products to cool objects by fluorocarbon evaporation, and in any other aerosol product currently SNAP listed where safer alternatives exist.

EPA can create a standardized transition strategy based on the date when the first low-GWP product is marketed, the date when the low-GWP product achieves a specific market penetration, the agility of the sector to transform its manufacturing facilities, and other market indicators. In some cases, EPA will want to harmonize its transition schedule with the regulatory schedules of other jurisdictions and with the voluntary pledges of companies to avoid high-GWP refrigerants. The advantage of harmonized schedules is that American companies will be able to offer the same products in all markets with a level competitive playing field. Regulatory certainty lowers the risk of new investment and increases employment for a smooth transition. Prior notice of the transition schedule will allow companies to schedule product improvements (performance, energy efficiency, durability, and convenience) to take advantage of re-design and re-tooling and to reduce the combined cost of bringing the superior products to market.

In the case of the transition from HFC-134a to HFC-1234yf, NRDC and IGSD suggest that EPA un-list HFC-134a for new motor vehicles after January 1, 2017, which is the same schedule as the EC F-gas directive for new vehicles sold in Europe and also corresponds to the incentives under the joint rulemaking between EPA and NHTSA establishing fuel economy and emissions standards with credits for reducing MVAC leakage or adopting lower-GWP alternative refrigerants – credits that count towards compliance with EPA's greenhouse gas emission standards.[18] This five year transition is longer than the transition from CFC-12 to HFC-134a to account for additional time necessary supply adequate quantities of new refrigerant from manufacturing facilities that will be build from the ground up.

In the case of household refrigerators and freezers and stand-alone retail food refrigerators and freezers NRDC/IGSD/EIA suggest that EPA un-list HFC-134a for new products 24 months after the first low-GWP model is offered for sale within each appliance category. The transition from HFC-134a to low-GWP alternatives can be faster for refrigerators and freezers than for MACs because most refrigerator and freezer manufacturers are already producing and/or marketing these products in global markets. Thus the know-how, production equipment, and components are already readily available. In addition, most refrigerator and freezer component and product manufacturing facilities have long ago incorporated flexible machine tools and assembly lines that can rapidly fabricate the new mix of product. Furthermore, climate leadership

[18] *Supra*, note 17 at 207.

companies including supermarkets, green buildings, and restaurants are already pledged to phase-out use of high-GWP HFCs; creating large markets as soon as the first companies introduce low-GWP products satisfying energy efficiency and durability requirements.

Consider also that federal procurement guidelines and standards for vehicles, refrigerators, and freezers could specify low-GWP/high energy efficiency, when available, as a powerful incentive to rapid commercialization and market penetration. This would be complementary with the efforts of governments to speed technical innovation and product improvement in order to create jobs and reward entrepreneurs for creative solutions to environmental challenges.

4. Clarification of Previous May 2010 Petition Regarding Aerosol Products

In its letter of February 14, 2011, EPA asked whether the amended NRDC/IGSD/EIA petition intended to apply to uses exempt from the ban on nonessential products or only to specific applications mentioned in the November 16, 2010 response (i.e., "dust-off" products and propellant in "silly string").

The environmental purpose of our petition regarding aerosol products is to eliminate the unnecessary use and emissions of HFC-134a. Therefore we support a three-pronged approach:

> 1) Un-list HFC-134a for any aerosol products considered nonessential uses of Class I ODS (§82.66(a);
>
> 2) Un-list HFC-134a from any aerosol products that are exempt from the ban on nonessential products if lower-GWP propellant alternatives or not-in-kind product substitutes are technically and economically feasible;
>
> 3) Un-list HFC-134a from new products introduced after the CFC phase-out that would have used CFCs if available, but instead used HFC-134a.

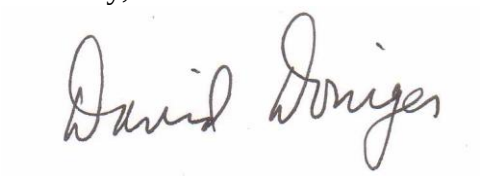
Conclusion

In conclusion, EPA should approve this petition to remove HFC-134a from the list of acceptable substitutes for new household refrigerators and freezers and stand-alone retail food refrigerators and freezers, approve this petition to restrict the retail sale of HFC-134a to certified technicians, and to approve the petition to adopt a standardized procedure to determine the speed of transition from obsolete high-GWP HFCs to next-generations alternatives and substitutes.

HFC-134a was approved at the inception of the SNAP program almost twenty years ago, but is now often the most damaging of the alternatives listed for particular end-uses, and to meet the statutory requirements of the SNAP program, EPA must now remove HFC-134a from the list of acceptable alternatives.

If you or your staff wish to discuss this petition, please contact me at ddoniger@nrdc.org or (202) 289-2403.

Sincerely,



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On behalf of:
Natural Resources Defense Council
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Environmental Investigation Agency – US