Alaska Oil and Gas Association
121 W. Fireweed Lane, Suite 207
Anchorage, Alaska 99503
Phone: (907) 272-1481
www.aoga.org

Alaska Miners Association
3305 Arctic Blvd., Suite 105
Anchorage, Alaska 99503
Phone: (907) 563-9229
www.alaskaminers.org

May 20, 2011

The Honorable Lisa P. Jackson
Administrator
U.S. Environmental Protection Agency
Ariel Rios Building (Room 3000)
1200 Pennsylvania Ave., NW
Washington, DC 20004

Re: Petition for Reconsideration – Standards of Performance for New Sources and Emissions Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units – Docket No. EPA-HQ-OAR-2003-0119

Dear Ms. Jackson:

The Alaska Oil and Gas Association ("AOGA") and the Alaska Miners Association ("AMA") (jointly, "Petitioners") respectfully submit the attached Petition for Reconsideration of the U.S. Environmental Protection Agency's ("EPA") final rule titled "Standards of Performance for New Sources and Emissions Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units ("CISWI Rule"), specifically, the provisions for "small remote incinerators". *See* 76 Fed. Reg. 15704-90 (Mar. 21, 2011).

AOGA is a private non-profit trade association whose member companies account for the majority of oil and gas exploration, development, production, transportation, refining, and marketing activities in Alaska. AMA is a non-profit membership organization established in 1939 to represent the mining industry. AMA is composed of individual prospectors, geologists and engineers, vendors, small family miners, junior mining companies, and major mining companies. Petitioners, as well as other Alaska business interests, are directly and adversely impacted by the "small remote incinerator" provisions in the CISWI Rule.

Should any questions arise regarding the attached Petition, please to not hesitate to contact us with questions.

Sincerely,

Marilyn Crockett
Executive Director, AOGA

Steven C. Borell, P.E.
Executive Director, AMA

Attachment(s)

Cc: Gina McCarthy, Assistant Administrator
Richard Ossias, Associate General Counsel for the Air and Radiation Law Office
Charlene Spells
Toni Jones

The Alaska Oil & Gas Association ("AOGA") and the Alaska Miners Association ("AMA") (jointly, "Petitioners") petition the Environmental Protection Agency ("EPA") for reconsideration and amendment of the small remote incinerator ("SRI") standards contained in the Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units ("the CISWI Rule"), 76 Fed. Reg. 15704 (Mar. 21, 2011).

Alaska business interests including AOGA and ConocoPhillips submitted comments on the SRI provisions in the proposed CISWI rule. We appreciate the fact that EPA revised the SRI applicability criteria in the final rule in response to comments from Alaska stakeholders. Unfortunately, errors in the derivation of the emission standards render those standards unachievable by all or virtually all of the incinerators within the subcategory. Accordingly, for the reasons stated herein, we respectfully petition EPA to reconsider and revise the existing source and new source SRI emission standards.

Clean Air Act § 307(d)(7)(B) authorizes EPA to reconsider a rule where a petitioner demonstrates that it was impracticable to raise objections during the public comment period or if grounds for an objection arose after the close of the comment period, but within the time specified for judicial review. EPA has already determined that (1) the CISWI and Boiler MACT rules present "difficult technical issues," (2) certain issues arose after the public comment period closed or may have been impracticable to comment upon, and that (3) EPA may benefit from a more full evaluation of the relevant issues and data. National Emission Standards for Hazardous Air Pollutants, Notice of Reconsideration, 76 Fed. Reg. at 15267 (March 21, 2011).

On May 18, 2011, EPA published notice that the Agency has stayed the effective date of the CISWI Rule until the proceedings for judicial review of the CISWI and Boiler MACT rules are complete or EPA completes its reconsideration of the rules, whichever is earlier. 76 Fed. Reg. 28662 (May 18, 2011). In that notice EPA explained that the proposed reconsideration will "address issues on which the EPA believes further opportunity for public comment is appropriate . . ." EPA announced that it will issue a notice of proposed reconsideration of each rule that identifies the specific issue or issues raised in the petitions on which the Agency is granting reconsideration. *Id.* For the reasons set forth below, Petitioners request that EPA grant reconsideration of the SRI emission standards in Subparts CCCC and DDDD, and invite submittal of additional information on the issues summarized in this petition.

Petitioners submit that the emission standards and guidelines for SRIs demand revision for the following reasons::

- The SRI subcategory was established to address the unique operating and waste management conditions that prevail in rural Alaska, yet the existing source standards are unachievable in practice by all of the existing units in Alaska that fall within the scope of the subcategory;

- The SRI standards and guidelines fail to account for the range of wastes burned in SRI units and the fact that different waste materials exhibit profoundly different emissions characteristics;

- The SRI standards fail to adequately factor in cost and therefore impose a disproportionate burden on SRI units;

- The SRI standards in their current form will adversely impact wildlife in rural Alaska, including species listed as threatened under the Endangered Species Act. EPA violated Section 7 of the ESA by adopting the standards without first consulting with the U.S. Fish and Wildlife Service regarding adverse impacts on listed species, notably polar bears and spectacled eiders;

- EPA violated Section 129 by excluding from its maximum achievable control technology floor calculations for SRI emissions during startup and shutdown periods;

- EPA employed flawed data analysis and statistical protocols to derive the Subpart CCCC sulfur dioxide emission limit for new sources; and

- EPA neglected an opportunity to clarify the applicability of the CISWI Rule to incinerators located on marine vessels and outer continental shelf sources.

We look forward to working with the Agency to resolve these issues.

I. COMMERCIAL AND INDUSTRIAL INCINERATORS IN ALASKA

Many Alaska industry sectors, including mining, oil and gas production, electric power generation and fish processing, find it necessary to operate in remote areas of the state, far from paved highways, landfills and regional waste management facilities. Facilities located in northern Alaska face challenging transportation issues, including seasonal restrictions on the movement of vehicles and marine vessels, enormous distances from waste management facilities and prohibitions on road construction resulting from requirements to minimize impacts on wildlife, waterfowl, and the subsistence lifestyle practiced by the indigenous population. Facilities located in remote areas rely on small incinerators to manage solid waste, for reasons that include limited (if any) land disposal options in the vicinity, the high cost of transporting waste to alternative disposal sites, and the need to minimize wildlife interactions with industrial waste (and any related interactions with humans).

Incineration evolved as the preferred waste management practice in remote areas through close collaboration with the Alaska Department of Fish and Game and following studies funded by the U.S. Fish and Wildlife Service and conducted by the University of Alaska. The studies found that wildlife were not dispersing from North Slope oilfields during the winter months because they were attracted to food sources available to them in dumpsters and at the regional landfills.[1] In response, the Alaska Department of Natural Resources Division of Oil and Gas

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[1] Waste storage sites attract wildlife throughout rural Alaska, not just on the North Slope. Oil and gas production and mining operations on the west side of Cook Inlet and platforms in the (continued . . .)

now requires lessees of state lands to prepare plans of operations that include specified mitigation measures for fish and wildlife impacts. For a 2010 North Slope Areawide Oil and Gas Lease Sale DNR specified the following waste management mitigation measures:

> Proper disposal of garbage and putrescible waste is essential to minimize attraction of wildlife. The lessee must use the most appropriate and efficient method to achieve this goal. The primary method of garbage and putrescible waste is prompt, on-site incineration in compliance with state of Alaska air quality regulations. The secondary method of disposal is on-site frozen storage in animal proof containers with backhaul to an approved waste disposal facility.[2]

Throughout much of rural Alaska, there is no access to "an approved waste disposal facility." As a result, many industries in rural Alaska operate small incinerators.

The waste streams combusted in remote areas of Alaska include:

- Kitchen, domestic, and office waste;
- Oily waste (used sorbents or rags, mainly);
- Compressed sewage sludge (<10%); and
- Very small amounts of wastes generated by first aid clinics.

Kitchen, domestic, and office waste (i.e., municipal waste) represents the majority of wastes burned in these incinerators and such waste is burned in the SRIs almost as fast as it is generated to minimize the possibility of animal attraction. Other waste streams are fed into the municipal waste streams as they are collected.

(. . . continued)
Inlet have no road access to landfills or commercial waste management services. Admiralty Island, in southeast Alaska, hosts both mining operations and the highest brown bear population density in the world. The only waste management options available to these facilities are incineration, boat or barge removal, and/or air removal.

[2] Alaska DNR, North Slope Areawide 2010 Competitive Oil and Gas Lease Sale, Mitigation Measures and Lease Advisories, available at http://www.dog.dnr.state.ak.us/oil/products/publications/northslope/nsaw2010/NS2010%20mits%20adj.pdf. DNR required similar mitigation measures for a lease sale in Cook Inlet. *See* Mitigation Measures and Other Regulatory Requirements (Lessee Advisories) Cook Inlet 2010, http://www.dog.dnr.state.ak.us/oil/products/publications/cookinlet/ciaw2010/adj%20cI10%20Mits.pdf.

If the waste streams currently managed by Alaska's SRIs are not combusted as they are generated, a host of problems arise, including increased human and wildlife interactions. Facilities will need to be constructed to store the waste until such time as it could be hauled to a landfill, and such storage likely will attract animals. For facilities connected to landfills by road, waste storage facilities would need to accommodate just 2-3 days worth of waste generation. For facilities not connected by road to a landfill, waste accumulation facilities would need to be designed to accommodate a week of waste generation or more. The longer the storage period, the more likely human food waste will attract wildlife.

Transportation of the waste from facilities currently using small incinerator units would be costly. Moreover, transportation may be prohibited by weather conditions during certain seasons. Increased storage of waste at area landfills is another adverse consequence of decreased waste incineration that must be considered. Additional food waste storage at landfills will attract wildlife, one of the problems the state sought to avoid by promoting (and in some cases requiring) small remote waste incinerators.

II. THE SRI SUBCATEGORY

EPA promulgated the CISWI Rule pursuant to Sections 111 and 129 of the CAA. Those sections require EPA to establish new source performance standards ("NSPS") for new solid waste combustion units and Emission Guidelines for existing units. *See* 42 U.S.C. §§ 7411, 7429. Both the solid waste combustion NSPS and Emission Guidelines use a maximum achievable control technology ("MACT") approach, similar to that used under Section 112 of the CAA:

> Standards applicable to solid waste incineration units promulgated under section 111 and … section [129] shall reflect the maximum degree of reduction in emissions of air pollutants listed under section (a)(4) that the Administrator, <u>taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements,</u> determines is achievable for new or existing units in each category. The Administrator may distinguish among classes, types (including mass-burn, refuse derived fuel, modular and other types of units), and sizes of units within a category in establishing such standards. The degree of reduction in emissions that is deemed achievable for new units in a category shall not be less stringent than the emissions control that is achieved in practice by the best controlled similar unit, as determined by the Administrator. Emissions standards for existing units in a category may be less stringent than standards for new units in the same category but shall not be less stringent than the average emissions limitation achieved by the best performing 12 percent of units in the category.

42 U.S.C. § 7429(a)(2).

In the proposed CISWI Rule, EPA proposed to establish a "small remote incinerator" subcategory. 75 Fed. Reg. 31938 (June 4, 2010). EPA described the subcategory as follows:

> These are batch-operated units that combust less than one ton of waste per day and are farther than 50 miles driving distance to the closest MSW landfill. To the extent that these are located in Alaska, a major difference in these types of units is the inability to operate a wet scrubber in the northern climates and the lack of availability of wastewater handling and treatment utilities. We believe this would impact their ability to meet emission limits for pollutants controlled by wet scrubbers. In addition, because of the remote location, these units do not have lower-cost alternative waste disposal options (*i.e.,* landfills) nearby and emissions associated with transporting the solid waste could be significant.

Id. at 31951.

The proposed rule recognized the difficulties faced by SRIs in Alaska, with regard to available treatment technologies, transportation hurdles, and costs. EPA found that all existing units within the SRI subcategory would shut down if EPA set beyond-the-floor limits. 75 Fed. Reg. 31958. For this reason, and due to the limited availability of alternative disposal methods, EPA determined that it is not reasonable to go beyond-the-floor for the SRI subcategory. *Id.* EPA developed MACT floor limits for both new and existing units by ranking units based on average performance as determined from EPA's emissions database, selecting best performing units, pooling test run data for selected units, characterizing the data as normally or log-normally distributed, and calculating an upper limit, all on a pollutant-by-pollutant basis. 75 Fed. Reg. 31952. The database that EPA considered in deriving existing source emission limits for the SRI subcategory consists of 19 incinerators. 75 Fed. Reg. 31952-54. The proposed rule derived floor limits based on a statistical analysis of the top performing three units in the database, again on a pollutant-by-pollutant basis.

In response to comments from AOGA members, the final CISWI Rule revised the definition of small incinerator units to those units burning no more than 3 tons per day and more than 25 miles from a municipal landfill. 76 Fed. Reg. 15734. EPA restated the rationale for creating the SRI subcategory, noting that harsh environmental conditions preclude certain control technologies, and observing that closure of small incinerators would cause adverse environmental impacts, including increased interaction between people and wildlife attracted to stored waste. 76 Fed. Reg. 15734.

The MACT floor analysis for SRIs changed significantly between the proposed and final rules. The universe of SRIs shrank from 19 to 14 units, notwithstanding the expansion in the number of units qualifying for the subcategory. 76 Fed. Reg. 15724. As a result, EPA considered the performance of only the top two units (rather than three) in the category in deriving floor limits. *Id.* As a result of these and other changes, the emission standards for the SRI subcategory changed dramatically between proposal and the final rule. Most limits for existing units increased, but CO dropped from 78 to 20 ppmv, and the dioxin/furan limits in the final rule are much lower than in the proposal. Compare 75 Fed. Reg. 31953-54 with 76 Fed. Reg. 15725-26.

III. THE CISWI EMISSION STANDARDS FOR SRIS ARE UNLAWFUL AND UNATTAINABLE.

The SRI subcategory was established to address the unique operating conditions that prevail in rural Alaska. All of the sources in the MACT floor analysis for the SRI subcategory are Alaska incinerators, yet the existing source standards are unachievable in practice by any of those sources. EPA based the CISWI emission standards for SRIs on a MACT floor analysis that incorporated data from 10 of the 14 units that EPA identified within the SRI subcategory. Table 1 below[3] compares the test data from these ten units with the final CISWI emission standards for SRIs.

Table 1

Comparison of Final CISWI standards (Small Remote subcategory) to empirical data (test averages) for the units included in the Floor Analysis by pollutant (Excluding SSM conditions)

Pollutant	Final Existing CISWI Small Remote Standard	Coeur	XTO Energy	Teck Cominco Alaska, Inc - Red Dog Mine	Pioneer NR	Entech Alaska	Kuparuk Central Production (one unit)	UOCC Trading Bay	Hecla Greens Creek Juneau	Chugach Electric Beluga	Cook Inlet Pipeline - Drift River
Cadmium (mg/dscm)	0.61	1.255	0.094	0.167	0.011	0.054	0.044	0.530	0.122	0.232	0.091
Carbon Monoxide (ppmv)	20	12	14	17	19	28	40	111	169	205	219
Hydgrogen Chloride (ppmv)	220	118	--	126	81	--	78	100	76	45	28
Lead (mg/dscm)	2.7	0.63	0.47	6.39	0.61	0.09	1.16	0.77	0.45	2.15	0.39
Mercury (mg/dscm)	0.0057	0.0096	0.0096	0.0144	0.0011	0.0027	0.0021	0.0050	0.0018	0.0284	0.0012
Nitrogen Oxides (ppmv)	240	74	78	161	116	61	112	116	122	89	119
Particulate-filterable (mg/dscm)	230	84	--	195	189	497	181	85	118	107	150
Sulfur Dioxide (PPMV)	420	4.8	0.1	25.5	16.4	2.7	13.7	6.9	13.0	46.4	80.0
Dioxin Furan- Total (ng/dscm)	1,200	421	--	--	3,350	--	366	300	1,612	633	1,058
Dioxin Furan - TEQ (ng/dscm)	57	10	--	21	57	--	5	--	29	13	--

Complies with final standard

Does not comply with final standard

[3] Table 1 is a summary of source test data reported in Appendix B to a January 12, 2011 memo from Eastern Research Group to Toni Jones, entitled "CISWI Emission Limit Calculations for Existing and New Sources."

Table 1 shows that none of the SRI units included in EPA's floor analysis meet the emission standards for all pollutants, even when SSM conditions are excluded. This result contravenes the plain mandate of Section 129 that emission standards for existing units reflect the performance achieved by the best performing 12 percent of units in the category. 42 U.S.C. § 7429(a)(2).

A. The SRI emission standards fail to account for the range of wastes burned in SRIs and the fact that different waste materials exhibit profoundly different emissions characteristics.

Alaska's SRIs are essentially single (primary) chamber units that combust waste material together with natural gas, propane, or atomized diesel. The units may or may not have an afterburner that further combusts the plume emanating from the primary chamber. The only characteristics that distinguish SRI units in Alaska from each other are the presence or absence of an afterburner, and the mix of waste materials combusted.

Unlike other categories of sources subject to MACT standards, SRI feeds are highly variable. The emission rates from these units are a function of this highly variable feed. Although the existence of a secondary chamber, heat input, and device geometry may partially affect NOx, PM, and CO emissions, emission levels for the other six (of nine) pollutants regulated by the CISWI Rule are not affected by such controls. Those emissions are, instead, tied to the incinerator's waste feed.

Because waste feeds vary substantially among SRIs, and from time to time for any one SRI, the CISWI emission standards must account for the range of wastes burned. Test data from incinerators included in the floor analysis strongly suggest that the final guidelines for existing SRIs fail to account for variability in the emission rates from combustion of different waste materials. Appendix 1 to these comments depicts source test data from an incinerator at Kuparuk on the Alaska North Slope. The scale settings of the four graphs in Appendix 1 are logarithmic. Allowing for the compression caused by the logarithmic scale, these graphs are revealing. The spikes in CO emissions include spikes associated with startup. NOx emissions exceed the SRI limit when the incinerator is burning sewage sludge. Incineration is the only practical option for management of sewage sludge on the North Slope, because the harsh Alaskan climate does not allow for sewage lagoons or for disposal by dispersing sludge over the tundra, and removal by vehicle would be costly and burdensome.

The CISWI Rule's SRI standards are unlawful because they fail to consider (1) the range of wastes combusted in these incinerators, and (2) the fact that the different waste streams exhibit profoundly different emissions. The SRI limits in the CISWI Rule do not account for this variability. Rather, the test data developed and used by EPA was collected through a very limited Information Request, and thus provides a very limited "snapshot in time" of emissions at a particular unit, given the particular waste stream combusted at that time. For example, EPA's MACT floor analysis reports an average NOx concentration from Kuparuk of 112 ppmvd @ 7% O_2. That number may be a valid average, but the Subpart DDDD NOx limit for existing incinerators is a three run average based on test runs of at least 60 minutes. The Kuparuk incinerator and others may violate this limit when combusting sewage sludge, and perhaps other waste materials.

In deriving CISWI emission limits for SRIs, EPA did not consider a broad enough range of the waste streams combusted by these units. Our review of EPA's test data, and inquiries to the Agency since rule finalization, suggest that the Agency failed to consider the significant influence of the characteristics of an incinerator's waste feed on its emissions when deriving SRI standards. This flawed methodology resulted in overly stringent limits and contravenes the CAA's mandate that emission standards be achievable. 42 U.S.C. § 7429(a)(2).

AOGA and AMA request reconsideration of the SRI limits in the CISWI Rule, to enable EPA to develop a more inclusive emissions inventory that accounts for the different waste streams combusted in rural Alaska incineration units.

B. The SRI standards fail to adequately factor in cost and therefore impose a disproportionate burden on SRI units.

The CAA mandates that EPA consider cost when setting CISWI standards. *See* 42 U.S.C. § 7429(a)(2). EPA retained Eastern Research Group, Inc. ("ERG") to conduct compliance cost analyses for each of the subcategories regulated by the CISWI rule. *See* ERG Revised Compliance Cost Analyses for CISWI Units Memorandum (Jan. 12, 2011) ("ERG Costs Memorandum").

As will be discussed below, EPA's estimates of the cost of compliance for SRIs are low. Even when using the Agency's numbers, however, the CISWI Rule places a disproportionate compliance burden on SRI units. In the final rule, EPA estimates that more than half the units in the SRI subcategory will require afterburner upgrades, about two-thirds of the units will require activated carbon injection with fabric filters or fabric filters alone, and most will require a more robust materials segregation plan that removes chlorinated and non-ferrous metal components from the waste stream. 76 Fed. Reg. 15730. The cost of these upgrades will be spread over very few tons of emissions because SRIs are small and operate intermittently. Accordingly, the cost analyses conducted by ERG show a vastly higher compliance cost for SRIs than for other CISWI subcategories:

> The nationwide average cost effectiveness for all units to meet the emission limits was estimated to be $710/ton for liquid/gas-burning energy recovery units (ERUs), $61,700/ton for solids-burning ERUs, $58,400/ton for incinerators, $388,800/ton for small, remote units, and $1,100/ton for waste-burning kilns. Over all subcategories, the average cost effectiveness was estimated to be $6,400/ton.
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> *   *   *
>
> The nationwide average cost effectiveness for all units to choose the lowest cost option between complying using add-on controls and using an alternative disposal method was estimated as follows:

> $710/ton for liquid/gas-burning ERUs, $61,700/ton for solids-burning ERUs, $7,600/ton for incinerators, $234,800/ton for small, remote units, and $1,100/ton for waste-burning kilns. Over all subcategories, the average cost effectiveness was estimated to be $6,000/ton.

ERG Costs Memorandum at 10.[4]

Thus, using EPA's data, the lowest cost option for compliance for SRIs is $173,100/ton greater than the lowest cost option for the next most expensive subcategory (solids-burning energy recovery units), and $234,200/ton more than the average cost of compliance over all of the subcategories.

While Petitioners appreciate EPA's development of the SRI subcategory, we think it amiss that such a disproportionate compliance burden should fall to these smallest and lowest emitting of incinerator operators. Applying agency numbers, this burden is not only disproportionate in terms of cost, but is not commensurate with the emission reduction benefits that result from tightly controlling SRIs.

Moreover, EPA's compliance cost calculations obscure the magnitude of the problem, because the cost estimates for these incinerators are low. Despite the final rule's acknowledgment that Alaska SRIs face particular compliance challenges due to their unique geographic and climatic considerations, ERG's Costs Memorandum dismisses comments that SRI units in certain parts of Alaska require additional footprint for controls, which "may be costly to construct and permit," because no data was provided to show these additional footprint costs. ERG Costs Memorandum, at 3-4. The dismissal of such additional costs – despite agency acknowledgement of the related problem – suggests that the actual disparity between the costs of compliance for SRI units and units in other subcategories may be even greater than is represented in the ERG memorandum. *See also id*. at 9 ("Annual landfilling costs for small, remote units ranged from $433,000/yr to $24.6 million/yr.").

The Agency's own calculations show a glaring disparity between the compliance burden placed on SRIs and units in the other CISWI subcategories. Worse yet, EPA's compliance cost calculations are unrealistically low. The magnitude of the burden the rule imposes on SRI owners, together with the dearth of realistic waste management alternatives for these companies, compels reconsideration of the SRI emission standards.

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[4] The cost effectiveness of the final emission limits was calculated for each subcategory by dividing the total compliance cost (emission control, monitoring, testing, recordkeeping, and reporting) by the total emission reduction (HCl, CO, Pb, Cd, Hg, PCDD/PCDF, NOx, and SO2) needed to meet the emission limits. *Id.*

C. EPA violated the Endangered Species Act by adopting SRI standards without first consulting with the U.S. Fish and Wildlife Service regarding adverse impacts on listed species, notably polar bears and spectacled eiders.

EPA has an obligation under Section 7 of the Endangered Species Act ("ESA") to consult with the U.S. Fish and Wildlife Service ("the Service") before authorizing, funding or carrying out an action that "may affect" species listed as threatened or endangered under the ESA. *Id.* § 1536(a)(2); 50 C.F.R. § 402.14(a). The purpose of such consultation is to ensure that EPA's actions are not likely to jeopardize the continued existence of a listed species or destroy or adversely modify its critical habitat. 16 U.S.C. § 1536(a)(2). Consultation is concluded when the Service either concurs that the action is not likely to adversely affect listed species or issues a biological opinion and associated terms and conditions to minimize the impact of the action on listed species. *Id.*; 50 C.F.R. § 402.14.

EPA violated the ESA by adopting the SRI emission standards in the CISWI rule without first consulting with the Service under Section 7. As noted above, the SRI standards will impose very high compliance costs on affected units. Some facility owners will bear these costs because there is no realistic alternative, but others will shut down incinerators in favor of storing and periodically transporting waste to off-site permitted landfill facilities. It is therefore reasonably foreseeable that, in response to the rule, solid waste will be stored for a number of days and then transported by aircraft, boat or on ice roads during winter months. Harsh weather in the winter and fog conditions in the summer will delay these shipments at times. These logistical and seasonal constraints will result in periods where waste must be stored on site while awaiting transport. This anticipated change in waste management practices is the "indirect effect" of EPA's rule because it is "caused by" the rule and "later in time, but still … reasonably certain to occur." 50 C.F.R. § 402.02 (defining "effects of the action" to include indirect effects). As such, EPA must consider whether such foreseeable operational changes "may affect" ESA-listed species.[5]

Small incinerators were deployed in part to minimize wildlife interactions with food waste.[6] Stored waste is expected to attract bears, foxes, gulls, ravens and other species. The attraction of polar bears to these sites will not only alter their normal behavioral patterns but will also result in an increase in human-bear interactions that require deterrence activities including possible lethal take in defense of human life. In addition, the attraction of foxes, ravens and gulls will increase predation on many species including spectacled eider nests and broods, thus reversing years of progress in decreasing the number of food-conditioned animals and their corresponding adverse effect on species productivity.

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[5] To be clear, Petitioners are not contending that there is a causal relationship between emissions and effects on endangered species that would necessitate ESA consultation, but rather that the adoption of the SRI standards will cause indirect effects unrelated to air quality, namely the attraction of polar bears and eider predators to industrial and commercial operations that store waste.

[6] See studies cited at note 2, *supra*.

EPA's failure to consider these indirect effects violates Section 7 of the ESA. As a result, EPA must withdraw this portion of the rule or suspend its application until it completes consultation with the Service.

D. EPA violated Section 129 by excluding from its MACT floor calculations SRI emissions during startup and shutdown periods.

EPA's CISWI Rule replaces the startup, shutdown and malfunction ("SSM") period exemption found in the 2000 CISWI rule with a mandate that incinerators must meet CISWI standards at all times,[7] coupled with an affirmative defense that facility owners may assert to excuse exceedance of an emission limit resulting from a malfunction. 40 CFR 60.2685.

The key premise underlying EPA's decision to apply SRI emission limits during startup and shutdown is that SRI units should be able to meet the limits during those periods:

> We determined that CISWI units will be able to meet the emission limits during periods of startup because most units use natural gas or clean distillate oil to start the unit and add waste once the unit has reached combustion temperatures. Emissions from burning natural gas or distillate fuel oil would generally be significantly lower than from burning solid wastes. Emissions during periods of shutdown are also generally significantly lower than emissions during normal operations because the materials in the incinerator will be almost fully combusted before shutdown occurs.

75 Fed. Reg. 31964.

For some SRI units and pollutants, this assumption is incorrect. Periods of startup and shutdown are characterized by variable emissions rates. For the small incinerators used in rural Alaska, the period between initial waste charge and steady flame development is characterized by unstable emissions often exceeding SRI standards. Appendix 1 to these comments shows that during startup conditions CO emissions at one incinerator in the SRI subcategory greatly exceed the SRI CO limit. In addition, oxygen levels at startup can be very high and result in high emissions when a 7 percent oxygen correction factor is applied.

EPA made no attempt to incorporate startup or shutdown condition data into the MACT floor calculations for the SRI subcategory, nor did EPA establish startup or shutdown emission limits for the SRI subcategory.[8] The failure to accommodate startup or shutdown conditions in

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[7] 40 C.F.R. § 60.2105(a) ("You must be in compliance with the emission limitations of this subpart that apply to you at all times.").

[8] EPA has recognized the need for separate startup and shutdown standards – due to the variable emissions rate characterizing those periods – in its recent revisions to the Portland Cement MACT standards and NSPS. *See* Rulemaking dockets EPA-HQ-OAR-2007-0877 & EPA-HQ-OAR-2002-0051.

any way violates Section 129. Emission standards adopted under Sections 129 and 111 are technology-based standards. They must be achievable during all operating scenarios that a source will encounter during routine operations, including startup and shutdown.

As for malfunctions, EPA declares that "[i]t is reasonable to interpret section 129 as not requiring EPA to account for malfunctions in setting performance standards," and that "even if malfunctions were considered a distinct operating mode … it would be impracticable to take malfunctions into account in setting CAA section 129 standards for CISWI units." 76 Fed. Reg. 15738. EPA bases its finding of impracticability on the fact that "malfunctions" are "sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner …" *Id.* (quoting 40 C.F.R. § 60.2).

This conclusion may be realistic for some sectors of American industry. For SRI units in rural Alaska malfunctions are sudden and unpreventable, but they have a strong likelihood of recurrence. In upstream oil and gas operations, for example, the gas feed can be interrupted for any number of reasons. These energy sources are not like those found in towns with natural gas transmission lines supplying a steady flow of fuel. Processing facility upsets may cause the cessation of gas flow, even in the midst of incinerator combustion cycles. Such upsets can have potentially significant emissions results. In a recent source test, one Alaska company evaluated the CO emissions that would occur in the event of a gas supply interruption during the incinerator combustion process. The CO emissions increased by nearly two orders of magnitude to 3,357 ppmv (corrected to 7% oxygen).[9]

The affirmative defense established by EPA is not sufficient to address malfunctions under operating conditions like those that prevail in rural Alaska. A better approach would be to impose a work practice standard that requires prompt measures to mitigate any exceedance caused by a malfunction. It would be difficult to satisfy the criteria spelled out for assertion of the affirmative defense provided in 40 CFR 60.2685 in a region where the fuel supply is highly variable and harsh operating conditions cause a higher incidence of malfunctions than in the lower 48 states. A regulatory agency evaluating a forced shutdown or malfunction-related excess emission report – where the affirmative defense was asserted – could be forced to reject the defense and demand the implementation of expensive engineering solutions to prevent recurrence of environmentally insignificant malfunctions.

Because the assumptions underlying EPA's repeal of the SSM exemption are not viable for SRI units in Alaska, Petitioners ask that EPA reconsider elimination of the SSM exemption for SRI units. The omission from the SRI standards of any provisions to address operating conditions during startup and shutdown exposes operators to a risk of routine non-compliance. For this reason, we believe EPA should reconsider its failure to address foreseeable exceedances of the SRI standards during SSM periods.

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[9] *See* Appendix 1 to these comments.

E. EPA employed flawed data analysis and statistical protocols to derive the Subpart CCCC sulfur dioxide emission limit for new sources.

Subpart CCCC establishes a sulfur dioxide emission limit for new SRI units of 1.2 ppmvd.[10] 1.2 ppm is a very small emission rate from point sources that might be considered "in the noise" when evaluating emissions from most sources. Petitioners reviewed the mechanics of developing this standard and found the following deficiencies in its development:

- Use of zero and negative emission values in the raw data analyses and ranking of the units;
- Inconsistent operating conditions during the data collection not considered in comparing the data and ranking the results;
- Lack of documentation for the operating conditions needed to normalize the data for comparison of the data and ranking the results during at least some of (if not all) testing;
- Inappropriate comparison of the data for ranking with regards to variable sample collection periods during testing;
- Unknown variability in fuel and waste content among tests and, therefore, lack of consideration in ranking the results and establishing the limit;
- Deficiencies and flaws in the statistical analysis method used to derive the standard; and
- Failure to consider precision and accuracy limitations of the EPA reference methods, failure to derive detection limits for testing to consider in reported results and failure to consider inherent variability in analyzers allowed for in EPA reference method testing with regard to demonstrating compliance with the method.

No official guidance has been published to guide EPA in establishment of an emission standard based on "the emissions control that is achieved in practice by the best controlled similar unit." Therefore, we are left to assess the establishment of emission limits purely on the basis of sound statistical analysis. The above-cited deficiencies in the derivation of the new unit SO_2 standard led petitioners to conduct an alternative statistical analysis to compensate for the deficiencies. The alternative analysis generated a revised new unit SO_2 standard of between 100 and 130 ppm. The reasonableness of this range is doubtful given the quality of data available for setting a SO_2 limit; however, it highlights the magnitude of the concerns with how EPA derived the 1.2 ppm limit.

We believe that the data collected by EPA is insufficient to generate a technically valid new unit standard for SO_2. *See* Appendix 2 (containing detailed analyses and findings). Given that any incinerator has a finite life cycle and, for some small remote units, replacement with new units is almost mandatory, we believe EPA must get the new unit emission limits right. We also believe that it is appropriate, given the deficiencies in data used to set all of the emission limits for both the new and existing unit categories, for EPA to reevaluate its data, collect more

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[10] Table 8 to 40 CFR Part 60, Subpart CCCC.

data if necessary, and establish emission limits derived from a complete, comprehensible, and statistically sound data set.

F. EPA neglected an opportunity to clarify the applicability of the CISWI Rule to incinerators located on marine vessels and outer continental shelf sources.

EPA, without basis, allows for the application of the CISWI standards to sources located on marine vessels or on the outer continental shelf ("OCS"). A comment was submitted to EPA during the public comment period asking whether the CISWI rule applies to incinerators on vessels or on OCS sources. EPA responded:

> The applicability of part 60 standards to OCS sources and associated vessels is addressed in 40 C.F.R. 55.13(c). Owners or operators of OCS sources should consult their permitting authority to determine whether and to what extent this final rule applies to such sources. [11]

The response is inadequate for several reasons. First, this response does not address the question raised on EPA's intent for CISWI applicability for marine vessels operating incinerators in state waters or while docked in port. Vessels operating in state waters may or may not be related to an OCS source. There are numerous vessels (and types of vessels) equipped with incinerators operating in state waters and/or regularly docked in U.S. ports. The CISWI Rule must clarify its application to such vessels.

Second, there are no incinerators operating on OCS sources or marine vessels included in the MACT floor analysis. We can find no information in the docket showing that EPA contemplated incinerators on marine vessels or on OCS sources in the development of the MACT floor. We believe that, if emissions data were collected on units operating on OCS sources and/or marine vessels, the emissions testing results would be significantly different due to the differences in design of these units. Failure include such data therefore conflicts with the prescribed statutory process for establishing the MACT floor.

Third, the historical practice for incinerator designs on vessels and OCS sources is the IMO (MARPOL) requirements, which are completely different standards than those adopted by states for land based incinerator emissions. The waste burned on vessels may be very different than typically found in small land based incinerators so could emit significantly different emissions (quantify and/or qualitatively). Neither fact is addressed in the CISWI Rule.

Unless EPA collects data from incinerators utilized on vessels and/or OCS sources, we do not believe the MACT floor can be established to adequately consider these incinerators. Moreover, should this data be collected we suspect a separate subcategory will be warranted for SRIs employed on vessels and OCS sources because of the aforementioned variables. We believe it is imprudent for EPA to categorically defer applicability decisions for CISWI

[11] CISWI Response to Comments, at 358-359.

standards to regional offices. Rather, EPA's intent with regard to CISWI applicability to marine vessels and/or OCS sources should be clearly articulated in the CISWI rulemaking, thus providing criteria to be used by the regional offices and the opportunity for stakeholders to comment on such criteria. To defer CISWI applicability decisions without any explanation during the rulemaking process, not only increases the likelihood of inconsistency in application, but also the likelihood of speculation within regional offices on EPA's CISWI applicability criteria.

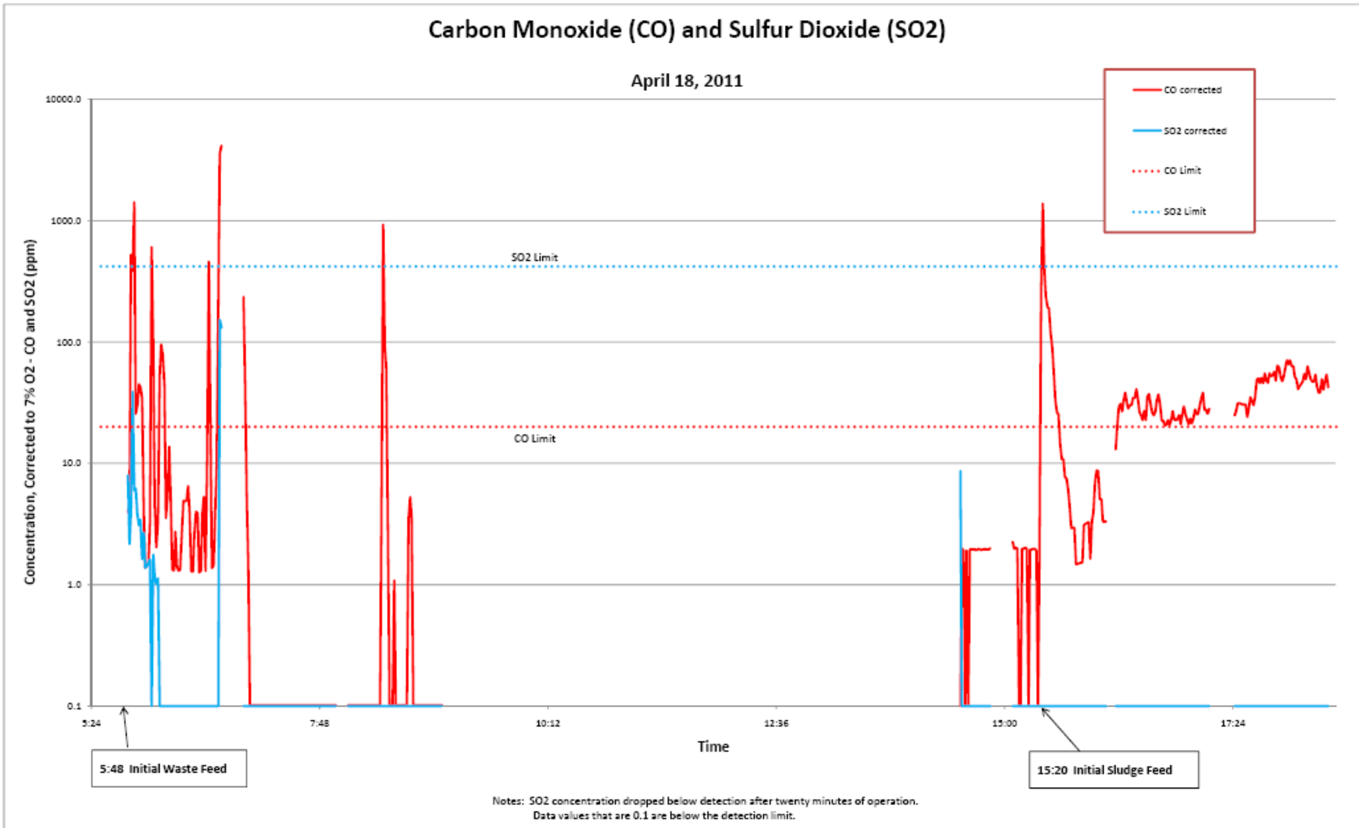
IV. REMEDY

It is premature to propose the precise form of the revisions that would make the SRI standards technologically feasible and economically attainable. Petitioners hope to engage with EPA on potential solutions that might include revision of specific emission limits, possible further subcategorization of the SRI subcategory, or an exemption for SRI units. In the course of the reconsideration proceedings, Petitioners will work with EPA to develop environmentally sustainable revisions to the SRI standards.

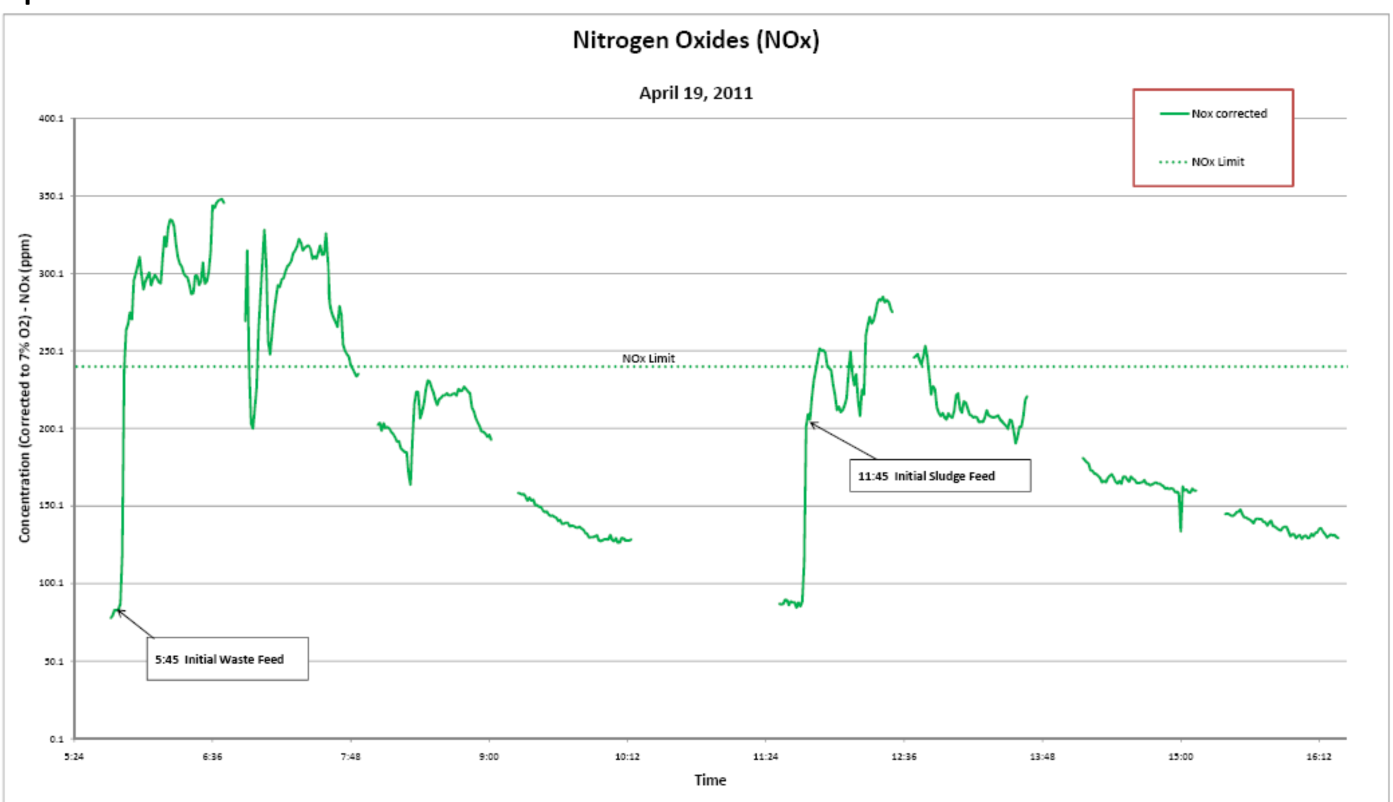
APPENDIX
1

Appendix 1

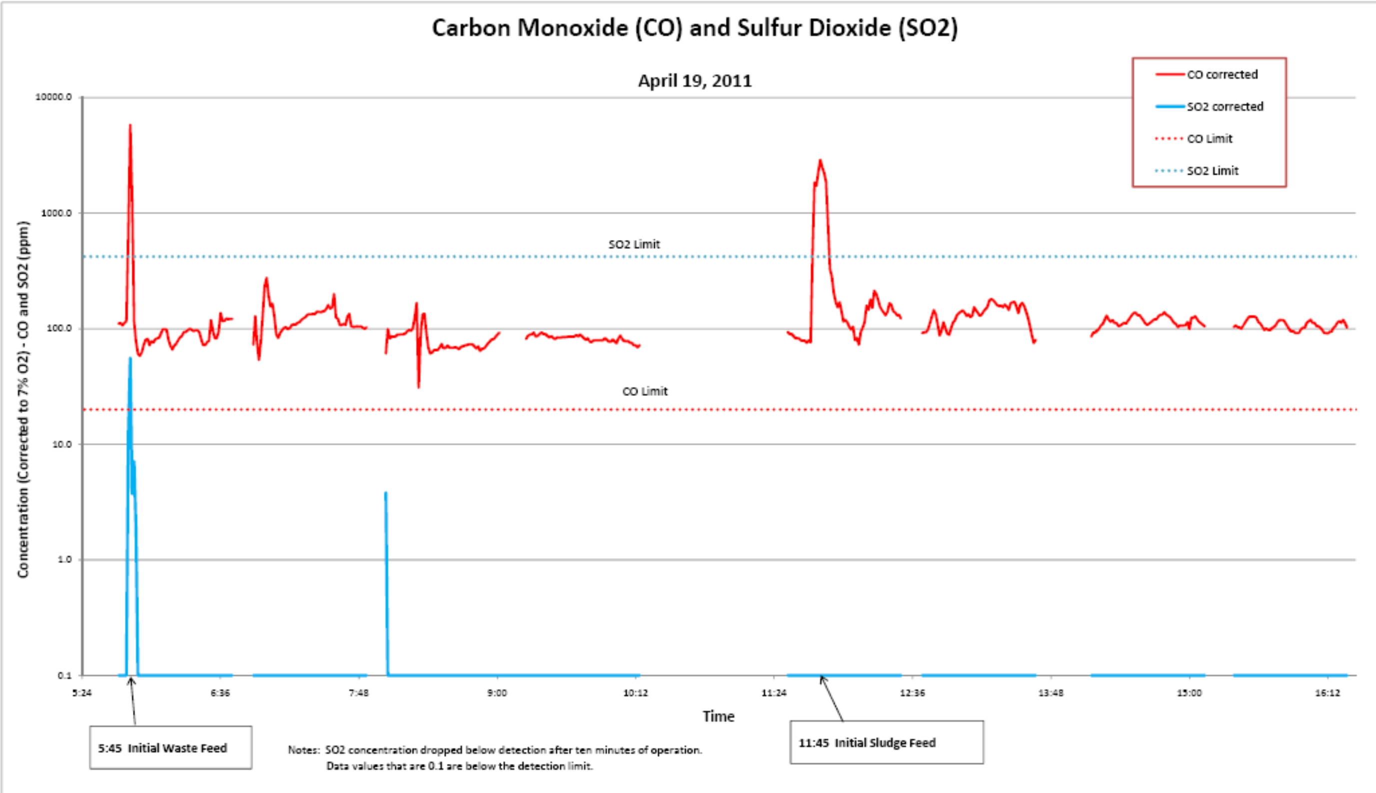
Graph 1



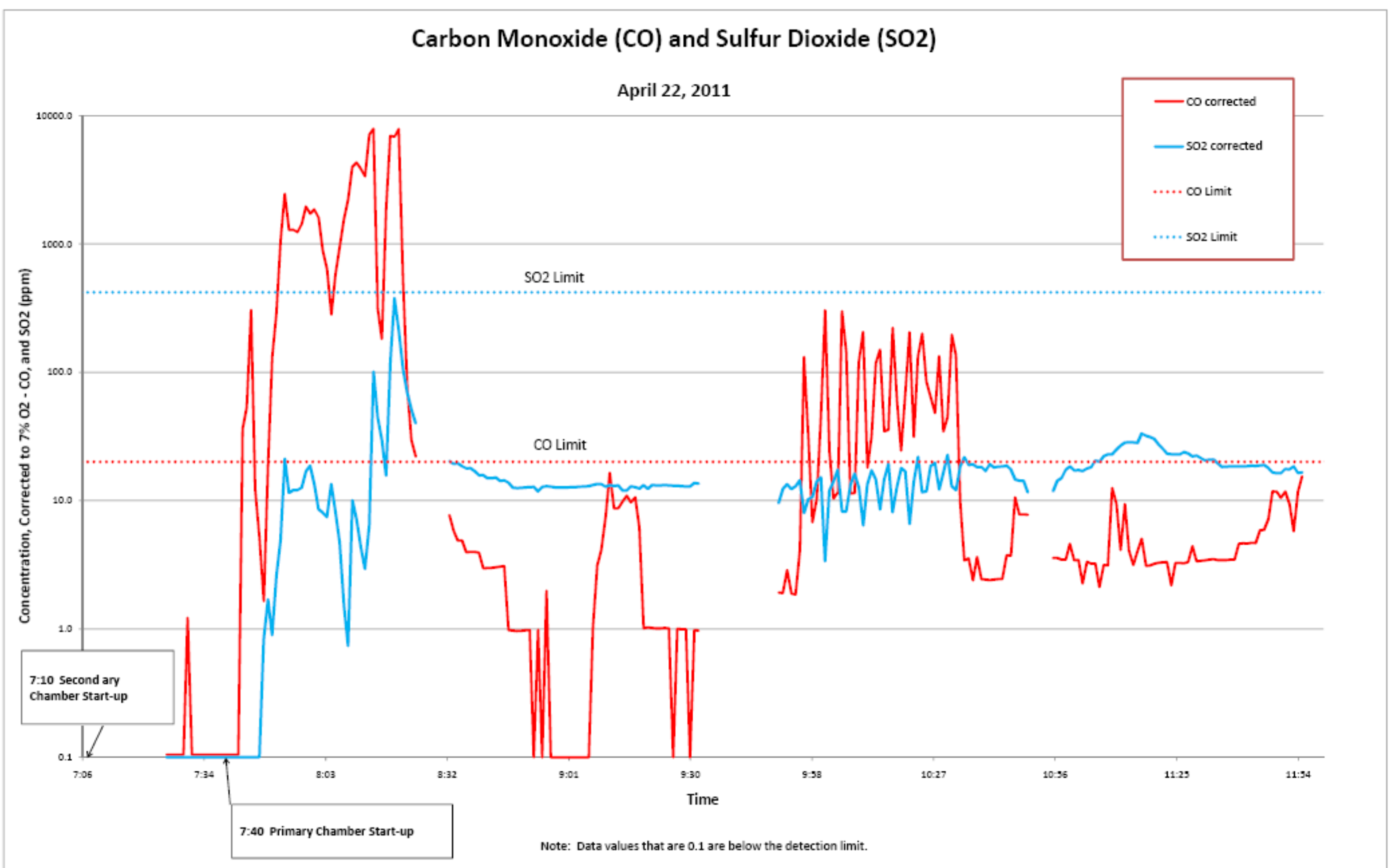
Graph 2



Graph 3



Graph 4



APPENDIX
2

<u>Appendix 2</u>

The New Small Remote Incinerator SO2 Emission Limit

The following discussion identifies concerns and deficiencies with the data used for the MACT floor calculation, computation method, and statistical analysis. Information reviewed included the MACT Floor Memo ("CISWI Emission Limit Calculations for Existing and New Sources", January 12, 2011) and associated appendices, final rule preamble Section V.B (Federal Register Vol. 76, No. 54, 15718), the final CISWI database, and some of the source test reports.

1. Use of Zero and/or Negative Reported Data in the Floor Analysis

The individual test data for each source is provided in the Final CISWI Database. Review of this data indicates negative and zero values were included in the average for three sources: AK XTO Energy, AK Coeur, and AK Hecla Greens Creek Juneau. These reported test results and calculated source average are shown in the Table below.

Small Remote Units in the final MACT database with zero and or negative results

Facility ID	Test ID	SO2 (ppmvd @ 7% O2)	Source Average
AKXTOEnergy	2	0	
AKXTOEnergy	1	0	
AKXTOEnergy	3	0.393767705	0.13
AKCoeur	4	0	
AKCoeur	5	0	
AKCoeur	6	14.3801508	4.79
AKHeclaGreensCreekJuneau	5	-3.159090909	
AKHeclaGreensCreekJuneau	4	12.46128769	
AKHeclaGreensCreekJuneau	6	29.62621282	12.98

Source: Final CISWI Database, Data: Emissions Tests.

Comments were submitted regarding the zero values as summarized in 76 FR 15727, Section 5:

> *Some commenters stated that EPA does not appear to have systematically screened the emissions data for cases where a detection limit should be applied, and has erroneously recorded zero values for emissions where those are reported in the original test reports.*

In EPA's response to comments the following comments were submitted regarding zero values incorporated into the MACT floor calculations as follows:

- EPA-HQ-OAR-2003-0119-1517.1, Excerpt 16
- EPA-HQ-OAR-2003-0119-1834.1, Excerpt 49
- EPA-HQ-OAR-2003-0119-1951.1, Excerpt 12
- EPA-HQ-OAR-2003-0119-1951.1, Excerpt 35
- EPA-HQ-OAR-2003-0119-1951.1, Excerpt 42
- EPA-HQ-OAR-2003-0119-1967.1, Excerpt 7
- EPA-HQ-OAR-2003-0119-1971.1, Excerpt 6
- EPA-HQ-OAR-2003-0119-2090.1, Excerpt 8
- EPA-HQ-OAR-2003-0119-2092.1, Excerpt 3
- EPA-HQ-OAR-2003-0119-2128.1, Excerpt 33

Although EPA responded to questions regarding treatment of non-detects, rationale for subcategories, and general MACT floor analysis, we could not find any response to the issue related to use of zero and negative values. Follow up e-mails with EPA's rule contact recently showed EPA was aware of the zero and negative values use in ranking the data and determining the best performer.

Unless EPA can provide justification for the zero and negative values as valid and representative data, we do not believe zero or negative data should be included in the MACT Floor analysis for determining the best-performer. Most importantly removal of this data triggers a material change on the ranking and determination of the best performer.

2. Selection of the Best-Performer

Based on a review of the MACT Floor Memo, the SO2 limit is derived by first identifying the best-performer of the sources that reported emissions. First, EPA calculates the 3-run test average values for each source within the subcategory. The sources are then ranked from lowest to highest based on the average of its tests. The average concentration for each unit in the small remote subcategory is provided in the table below.

Average SO2 Emissions by Facility ID

Facility ID	Average SO2 Concentration (ppmvd @ 7% O2)	EPA Rank
AKXTOEnergy	0.13	1
AKEntechAlaska	2.67	2
AKCoeur	4.79	3
AKUOCCTradingBay	6.91	4
AKHeclaGreensCreekJuneau	12.98	5
AKKuparukCentral Production	13.66	6
AKPioneerNR	16.37	7
AKTeckComincoAlaskaIncRedDogMine	25.52	8
AKChugachElectricBeluga	46.43	9
AKCookInletPipeline-DriftRiver	80.03	10

Source: MACT Floor Memo, Appendix B, Table B-7

Due to the issues outlined below, we believe the average reported emissions are not accurate and reliable for comparing the sources and establishing the ranking and best-performers in accordance with the preamble of the rule:

> "In assessing sources' performance, EPA may consider variability [] in identifying which performers are ''best'' ..."[1]

3. Inconsistent and Ambiguous Test Operating Conditions

SO2 emissions are highly dependent on the fuel and waste composition (particularly sulfur content) and operating conditions. EPA does not provide enough information in the database to determine if the tests conducted at each facility are consistent and, therefore, the results comparable. Furthermore, we suggest EPA should adjust each source's emissions accounting for variability in fuel, waste, operating conditions, and testing procedures prior to ranking the facilities. For example, test results from EPA's highest ranked source, AKCookInletPipeline-

[1] Federal Register, Vol. 76, No. 54 (March 21, 2011), p. 15723

DriftRiver, demonstrate high variability within the source with emissions ranging from 0.16 ppm (reported non-detect) to 195 ppm (a difference of 2 orders of magnitude between the minimum and maximum values). This is associated with a coefficient of variation of 1.07, assuming a normal distribution, indicating that the variability in individual test results is greater than the average concentration across all tests. No information or description is provided in the CISWI database or MACT floor analysis to explain this variability. From the documentation, we could not see any evidence that EPA accounted for this variability in identifying the best-performer. Applying EPA's method to compute variability (as described in Section II.B of the MACT Floor Memo, 99^{th} percent upper limit (UL)), this source has a calculated UL of 195.4 ppm based on either a normal or lognormal distribution. Further, the source identified as the second best-performer, AKEntechAlaska, has a calculated UL of 9,200 ppm based on a log-normal distribution. Further explanation of the UL calculation is provided in the "Calculation of the MACT Floor" section below. This indicates that if variability was accounted for, the ranking could change significantly.

4. Lack of Analysis and Consideration in Variability for Fuel and Waste between Units

The amount of SO2 emissions is primarily dependent on the sulfur content of the fuel (i.e., none of the small remote units tested utilize SO2 emissions control). There is thus a wide variation of SO2 emissions between sources and at an individual source simply due to variability in the fuel and/or waste. Very little fuel information is provided in the CISWI database, all sources providing SO2 emission data had "Municipal" listed as the fuel type.[2] Only three sources in the small remote subcategory provided fuel analysis with sulfur content data. However, the sulfur content was measured two to three years prior to the SO2 testing so does not necessarily represent the fuel burned during the test.[3]

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[2] CISWI 2011 Database for the Final Rule, "Data: EmissionsTest Fuel Data", February 21, 2011.

[3] CISWI 2011 Database for the Final Rule, "Data: FuelAnalysis", February 21, 2011.

MACT Database Reported Sulfur Content of Fuel (%)

Facility	AKHeclaGreens CreekJuneau[(b)]	AKKuparukCentral Production	AKUOCCTradingBay
EPA Rank[(a)]	5	6	4
Number of Samples	10	10	3
Minimum	0.00010	0.089	0.06
Maximum	0.00262	0.237	0.07
Average	0.00123	0.160	0.07
Standard Deviation	0.00079	0.054	0.01

(a) See Table 1 of this Appendix. Rank 1 refers to the facility identified as the best-performer by EPA.

(b) Adjusted to dry basis for comparison with the other facilities' data.

Even in the limited fuel data collected, there is still substantial variability of the sulfur content within each facility, but less than that summarized above for SO2 emissions (coefficients of variation range between .14 and 0.64). With most test runs conducted on the same day or within 1 day, it is likely the tests were completed on the same charge and, therefore, the same mix of fuel. We know this is the case with several of the sources. Therefore the data collected does not show variability due to fuel mix, waste content and sulfur content. EPA's methodology did not indicate any variability in fuel or waste was accounted for in ranking the sources.

5. Unknown Variability in the Test Operating Conditions

In addition to variations due to fuel and waste, SO2 emissions also vary during the burn cycle. EPA did not prescribe the operating conditions that should be tested. We believe the results do not reflect the full operating variability of the emissions from small remote incinerators over a burn cycle. Test data recently collected on four different incinerators shows SO2 emissions spiking at the beginning of a charge in three of four units tested. This is likely because the waste that burns first typically has the higher sulfur content (e.g. oily waste, gas H2S content, etc) and/or changes in burner configuration in the primary chamber. In these three tests SO2 emissions are highest in the beginning of the charge and can vary (based on minute readings) by ±1000% during the first hour of the burn cycle. We did not find any information in the CISWI database to indicate when the tests were started in the burn cycle, when the waste was added to the units, or general operating conditions (e.g., chamber temperature, hours of operation, fuel amount and composition). Without identifying the operating conditions, we cannot adequately determine what the reported emissions represent. Based on emissions profiles we obtained from four incinerators, it is likely that the sources EPA identified as the best-performers were starting the tests after the initial burn and/or for longer averaging periods and the worst-performers are reporting emissions from startup conditions (i.e. when waste is first introduced to the incinerator) and/or shorter averaging periods.

6. Inconsistent Test Run Length

We were not able to locate the averaging period (run length) of the individual test results in the database. However, we are aware that some reported emissions are based on a 1-hour average while others are based on a 4-hour average. The rule simply states the sample should be collected for a minimum duration of 1 hour per run.[4] The average concentration would change based on the averaging period selected where emissions are typically much lower given a longer averaging time. We believe EPA should use a consistent averaging period for accurate comparison between sources or account for variability due to potential differences in the averaging period in determining the best performer and setting the numerical limits.

7. Alternative Floor Analysis Method to quantify the unknown variables

We suggest EPA collect additional information to determine if the test data are comparable (same operation, fuel, and test procedures) between facilities and conduct additional statistical analysis to adequately account for variability of the data. This could be done through an analysis of variance (ANOVA) test that statistically compares the variability across all sources and identifies those that are different from others, if any. Those sources that are statistically the same can then be combined as one dataset in the calculation of the MACT Floor, as discussed below. This larger sample size enables use of the entire population, within the limits of the statistical method, when considering the MACT Floor.

8. Review of Test Report for the Identified Best-Performer

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[4] 40 CFR 60, Subpart CCCC, Table 1.

XTO Energy provided the test report the facility submitted to EPA.[5] The report stated the incinerator was charged with waste wood, cardboard and oily waste and no unit upsets or shut downs occurred during the test series. Based on discussions with XTO Energy we understand the unit ran from 7:00 am to 6:00 pm and burned 450 pounds of waste on 9/4/2009 (test runs 1 and 2) and 500 pounds of waste on 9/5/2009 (test run 3). The waste was a mixture of 25% MSW and 75% oily waste. The unit burned some waste for about 1 hour to get the incinerator warmed up. When the first test started on 9/4/2009 at 8:20 am, a new batch of waste was thrown in on top of already hot coals.[6] The second test was started later that same day (9/4/2009) at 1:41 pm. The third test was started at 7:40 am, 40 minutes after the incinerator began operation on 9/5/2009. Each test run length was approximately 4 hours and the reported SO2 concentration is an average of the entire duration of the test run. A summary of the test is provided in the following table.

Summary of XTO Energy Test Reported Results

Run	1	2	3
Test Date	9/4/2009	9/4/2009	9/5/2009
Run Start Time	8:20 am	1:41 pm	7:40 am
Run Finish Time	12:24 pm	5:45 pm	11:44 am
Concentration, ppm	0	0	0.3
Concentration at 7% O2, ppm	0	0	0.39
Fuel	400 lb/day	400 lb/day	500 lb/day

Review of the XTO Energy test report shows the first two runs were reported as zero due to high bias of the instruments relative to the measurement. Essentially, the values measured were within the range of instrument response with the zero calibration gas. We could not verify

[5] Ryan Tunseth, via email correspondence on April 27, 2011.

the calculations because the actual upscale gas calibration concentration (Cma) was not given in the report. Furthermore, the calculation equations were not provided in the report. We conclude the test followed all EPA procedures for a Method 6C test. However, EPA procedures are deficient for deriving a valid statistical analysis from the data for comparison in that they do not specify the operating conditions, calculation of the detection limit, or run length for the testing. This means EPA has not collected sufficient data to complete a MACT floor analysis.

9. Failure to consider Detection Limits in the Analysis

Including the zero and negative values requires use of a normal distribution, since natural logs cannot be calculated for these values. This is inconsistent with the prescribed approach wherein the log-normal distribution should be assumed unless normality is verified.[7] Use of zero and negative values in the calculations is not appropriate as these are not representative emission concentrations. Either detected values or detection limits should be used, and other values should be eliminated from the calculations. EPA should obtain the detection limit of the test or eliminate it from the calculations. It does not appear to us EPA required sources to collect or report the data needed to calculate the detection limit.

10. Review of Calculation Method

EPA concluded the UL computation is the appropriate statistical approach because the data are based on a completely defined population.[8] Assuming the dataset represents a complete population, the method is flawed if only a small subset of data is used in the UL calculation to make predictions about the entire population. Furthermore, as stated above, we suggest negative and zero values not be incorporated in the MACT floor calculations as these are not valid numbers.

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[7] MACT Floor Memo, Section II.B.

[8] MACT Floor Memo, Section II.C

One factor EPA should consider is that three samples are typically insufficient to have any statistical power in an analysis. We suggest the entire dataset be used because there were not enough samples from the "best" performer to make any conclusions regarding variability. We can't find any reference to sample size requirements in the Federal Register. When asked, EPA did not provide any justification for the small sample size.[9] This is a shortcoming that should be addressed in the rulemaking. For example, Gilbert[10] identifies a minimum of 4 samples to meet a 95% confidence level in estimating a mean given very small variance (the standard deviation is 1/10th of the mean). For more typical situations where the variability is higher, e.g. ½ of the mean, 97 samples would be required for a 95% confidence interval (i.e., correctly stating the mean is 95% likely to be less than a certain value). If being wrong 25% of the time is acceptable, only 16 samples are needed using this same variability. Therefore, variability is crucial in estimating a MACT floor because it defines the minimum number of samples necessary to meet various levels of acceptable error. In none of these circumstances are three samples enough.

EPA states, MACT floor calculations "may not use emission levels of the worst performers to estimate variability of the best performers without a demonstrated relationship between the two.''[11] The test data suggests there could be a relationship between the best and worst-performers in this case. We did not find any evidence to suggest EPA collected enough data on the best-performers over a full range of operations and fuels to determine variability of the best-performer. However, we suggest it is appropriate to use the entire dataset (best and worst-performers) to assess variability of the best-performer because they can be considered to come from a single population. That is, the best-performers and worst-performers are not statistically different, their variability is not different, and therefore, they have a demonstrated relationship.

As mentioned above the identified worst-performer, AKCookInletPipeline-DriftRiver, reports emissions ranging from 0.16 (reported non-detect) to 195 ppm. As such, the range of emissions reported for this worst performer encompasses the emissions reported for the best-performer.

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[9] Email from Toni Jones, EPA, on May 4, 2011.

[10] Gilbert, R.O. (1987). Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold, New York.

[11] 76 FR 15723.

Because the worst-performer demonstrated ability to produce emissions as low as the best-performer and emission are highly dependent on the fuel and start time of the test relative to start of the burn, we believe it is appropriate to assess variability using data from the entire dataset. This relationship can be further assessed using the ANOVA test described earlier.

11. Proposed Alternative Statistical Analysis Method Accounting for the Unknown Variables

The first step in our suggested approach is to compare the variability across different sources, including the best and worst performers, using the ANOVA test described earlier. The purpose of this step is to identify if some sources are significantly different from others. If so, the data from all sources cannot be combined in a statistical analysis. Otherwise, the data from different sources represent a single population (i.e., no significant difference between them) and can be combined to gain additional statistical power.

The variability of the different sources representing the single population are then combined with the associated arithmetic and/or lognormal means, to identify 95 and 99 percentiles, as well as 95UCL concentrations. The t-statistic test outlined by EPA should then be conducted on these sources as a single dataset. The resulting value would be the recommended MACT floor. For example, the resulting value is likely to be met 99 percent of the time if based on the 99^{th} percentile.

SLR completed a statistical comparison using SPSS software. The Kruskall-Wallis test, a non-parametric ANOVA test, was conducted using all SO2 data, to determine whether sources of SO2 differed significantly from each other (as determined by a p-value of 0.05 or lower). Across all 10 facilities, a significant difference was not observed (p-value of 0.066). A one-way ANOVA was also performed and returned a similar result (p-value of 0.169). The Kruskall-Wallis test was also run on the dataset with zeros and negative values removed, with a similar result (p-value of 0.30). A non-parametric t-test (the Mann-Whitney test) was then used to compare the best and worst performers (XTO Energy and Cook Inlet Pipeline, Drift River). This returned a “just barely” significant result (p-value of 0.048). However, when zeros were removed and this test was re-run, the result was not significant (p-value of 0.667), although this leaves only one value for XTO Energy.

Based on these results, the data across all sources are not statistically different and can be combined to calculate a 99UL. Excluding the zero and non-negative values results in a dataset of 33 results from small remote incinerators; the dataset is log-normally distributed based on the kurtosis and skewness test. The t-statistic is 2.44 and the log-transformed standard deviation is 1.99 for the 99UL calculation.

The facility identified as "AKEntechAlaska" is the best performing source when not considering any sources with zero or negative test results reported. Assuming log-normal distribution, the emission limit calculates to 100 ppmvd with variability defined by the entire dataset (excluding zero and negative values).

If EPA is able to provide adequate justification to include zero values, the average from the XTO Energy source (0.13 ppm) can be used in combination with the standard deviation and sample size for the whole dataset (with zeros and negative values). Using zero and negative values precludes the use of log-normal distribution even though normality is not proven using the kurtosis and skewness tests. The t-statistic is 2.43 and the standard deviation is 51 for the 99UL calculation. Using the same 99UL equation and rounding method the 99UL is 130 ppmvd.

Regardless of this alternative statistical analysis data will still need to be adjusted to address variability in the sampling duration and remove that data upon which adjustments cannot be made to normalize the data for comparison.

12. Demonstrating Compliance with the Final standard and Precision And Accuracy Concerns with EPA Reference Test Methods

The test method used for the performance testing, Method 6C, is a gas analyzer test method which does not have a listed detection limit. EPA describes the method detection limit (MDL) as the minimum concentration of a substance that can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero. The EPA method to determine method detection limit (MDL) involves testing at 1 to 5 times the expected MDL over several days, then doing a statistical analysis on the results. Details on the sample conditioning/condensing system configuration, the condenser outlet dew point, and analyzer response to interfering gases are needed to determine the MDL. Even then, the detection limit can only be estimated.

Based on our experience, we estimate an MDL of 1 ppm for the Teledyne API SO2 analyzer (the analyzer used in the XTO Energy test). However, the detection limit could be much higher due to known interferences from CO2, NO, and H2O vapor. For example, according to the spec sheet the Teledyne API's response to H2O is less than 0.1%. As such, the data could be significantly compromised because the conditioned stack gas generally contains about 10,000 ppm water vapor by volume. This suggests 10 ppm potential SO_2 interference (0.1% of 10,000 ppm = 10 ppm).

NDIR and pulsed flourescence SO_2 analyzers have some cross-interference problems (when used for stack testing). A UV-absorption type SO_2 analyzer has less interferences and might be used reliably down to 0.25 ppm or 0.5 ppm. Method 6C allows you to use any of these analyzers. Often overlooked method details such as the Method 6C interference check can become critical when the method must reliably measure below 1 ppm SO_2. In other words, the 1.2 ppm SO_2 emission standard is stretching the limits of what Method 6C can measure.