Air and Radiation Docket and Information Center
Environmental Protection Agency
Mailcode: 6102T
1200 Pennsylvania Ave., NW.
Washington, DC 20460

RE: Docket ID No. EPA–HQ–OAR–2008–0708
Reciprocating Internal Combustion Engines Used For Emergency Demand Response

To Whom It May Concern:

The U.S. Department of Energy (DOE) provides the following comments regarding the emergency demand response (EDR) provisions of the "National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE NESHAP)," per the December 7, 2010, Federal Register Notice (75 FR 234, page 75937). Specifically, the U.S. Environmental Protection Agency (EPA), "…is requesting comment on our *[EPA's]* decision to amend the limitations on operation of emergency stationary engines to allow emergency engines to operate for up to 15 hours per year as part of an emergency demand response program." The DOE has at least two sites that are affected by this restriction in the RICE NESHAP. Based on discussions between the two sites and the DOE, we provide the following comments in support of increasing the current 15-hour operational restriction.

Background

For an electrical grid to function effectively, generation must closely equal demand. If generation is lower than demand, a "brownout" occurs, and the voltage drop can harm electronic equipment and electric motors. Brownouts can lead to a cascading failure of the electrical grid, causing a total blackout of all or part of an electrical grid by the loss of the utility-scale electrical generators. A single generator can be restarted from an isolated blackout by using electricity from other generators. For large-scale blackouts, generators must be restarted using "black start" generators, (other generators of smaller capacity that are used to restart larger generators, which are used to restart utility electrical generators). Restoring electrical power to the grid using the black start process takes several hours to several days and requires sections of the grid to be brought online individually, as generating capacity increases.

There are only two possible methods for avoiding a blackout: reduce demand or increase generation. In many urban areas, (e.g. Chicago, New England, California), current and historical peak electricity demand meets or exceeds total electricity generating capacity, especially during the afternoon and early evening hours of a hot summer. When instances of peak demand occur and generation capacity is exceeded, a brownout will occur as the electrical grid fails to provide enough electrical power, followed by a blackout, unless immediate measures are taken to increase generation or reduce demand.

Due to electricity utility de-regulation and the increased environmental requirements for electric utilities, there is less "excess" generating capacity for use during peak demand; only by decreasing demand can a utility avoid a blackout. Utilities utilize several options to avoid a total blackout: rolling blackouts, (parts of the grid are individually de-energized), voluntary load shedding programs, (utilities establish different rates to encourage companies to reduce load at certain times), and EDR, (utilities enter into agreements to obtain sufficient load reduction from customers by having the customers removed from the grid).

An emergency includes loss of electrical power. As defined in the RICE NESHAP, emergency RICE are, "used to produce power … when electric power from the local utility … is interrupted." EDR prevents an emergency (i.e. blackout) from occurring: by using EDR to reduce demand, existing electricity generation can meet demand during peak usage periods and avoid a brownout or blackout.

At least two DOE sites are affected by the EDR requirements of the RICE NESHAP: Argonne and Los Alamos National Laboratories. Both sites operate RICE for emergency electrical generation and participate in an EDR program.

Comment 1: The current limit of 15 hours for existing emergency stationary RICE with a site rating of less than or equal to 500 brake horsepower should be increased. Also, stationary RICE with a site rating greater than 500 brake horsepower should be allowed to participate in an EDR program.

The current limit of 15 hours provided by EPA is insufficient to allow EDR to effectively reduce the occurrence of brownouts / blackouts. The DOE recommends that EPA consider EDR as an emergency situation and regulate it as an emergency use, (i.e. unlimited use for the duration of the emergency). DOE suggests that Title 40 of the Code of Federal Regulations, Part 63, §63.6640(f)(1)(i) and (f)(2)(i) be modified to read,

> "There is no time limit on the use of emergency stationary RICE in emergency situations, including as part of a demand response program if the regional transmission organization or equivalent balancing authority and transmission operator has determined there are emergency conditions that could lead to a potential electrical blackout, such as unusually low frequency, equipment overload, capacity or energy deficiency, or unacceptable voltage level. The engine may not be operated for more than 30 minutes prior to the time when the emergency condition is expected to occur, and the engine operation must be terminated immediately after the facility is notified that the emergency condition is no longer imminent."

DOE recognizes that the EPA must consider the environmental effects of an unlimited EDR program versus the environmental effects from an EDR program with a limited number of hours. DOE provides the following comments in support of an unlimited EDR program:

1. EPA should require that facilities using emergency stationary RICE in an EDR program also be required to develop a site-wide EDR action plan that includes electricity demand reduction activities other than electricity generation.

   Argonne shuts down unnecessary equipment during an EDR event. An EDR program does not need to solely rely on participants having electricity generating capabilities to reduce demand; demand reduction can be achieved by shutting down unnecessary equipment and lighting. By requiring other demand reduction activities besides electricity generation from EDR participants, EPA will ensure that transmission operators do not view EDR participants as alternative sources of electrical power, as an EDR participant will not want to curtail its electricity usage for extended periods.

2. Emissions from large diesel emergency generators operated to prevent a blackout are lower than the emissions from all of the emergency generators operated after a blackout occurs.

   In the EDR program, large generators are operated at sites to lower demand to prevent a blackout. These generators emit lower amounts of pollutants per amount of power generated than small diesel generators. The following table compares emissions factors for large and small diesel engines from "AP 42, Fifth Edition Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources."

Pollutant	Small Diesel		Large Diesel		Emissions Reduction
NO_X	3.10E-02	lbs./hp-hr	2.40E-02	lbs./hp-hr	23%
CO	6.68E-03	lbs./hp-hr	5.50E-03	lbs./hp-hr	18%
SO_X	2.05E-03	lbs./hp-hr	4.00E-05	lbs./hp-hr	98%
PM_{10}	2.20E-03	lbs./hp-hr	7.00E-04	lbs./hp-hr	68%
TOC	2.47E-03	lbs./hp-hr	7.05E-04	lbs./hp-hr	71%
Benzene	9.33E-04	lbs./hp-hr	7.76E-04	lbs./hp-hr	17%
Toluene	4.09E-04	lbs./hp-hr	2.81E-04	lbs./hp-hr	31%
Xylenes	2.85E-04	lbs./hp-hr	1.93E-04	lbs./hp-hr	32%
Formaldehyde	1.18E-03	lbs./hp-hr	7.89E-05	lbs./hp-hr	93%
Acetaldehyde	7.67E-04	lbs./hp-hr	2.52E-05	lbs./hp-hr	97%
Acrolein	9.25E-05	lbs./hp-hr	7.88E-06	lbs./hp-hr	91%
Naphthalene	8.48E-05	lbs./hp-hr	1.30E-04	lbs./hp-hr	-53%
Average Emissions Reduction (weighted):					33%

   With the exception of Napthalene, large diesel engines emit less pollution than small diesel engines for the same amount of work performed. As a weighted average, large diesel engines emit 33% less pollution than small diesel engines, per amount of work performed.

To prevent a blackout, only EDR generators will be operating. During a blackout, the EDR generators will be operating in addition to numerous other generators, all providing emergency electrical power for the duration of the blackout. The air emissions from all of these generators operating during a blackout would be higher than air emissions of the few generators operating during an EDR event, as a larger number of generators are operated during a blackout and the length of a time for a blackout would exceed the length of time an EDR event would occur.

Since EPA is not providing for any emissions limits or control requirements on emergency generators, the only way to reduce emissions from emergency generators is to reduce operation. In the RICE NESHAP, the EPA allows for unlimited emergency operation of emergency generators. As an EDR program reduces the number of blackouts, there will be a corresponding reduction of emergency generator operation in all RICE NESHAP categories, including exempted emergency generators.

3. By providing an hourly operational limitation for EDR, EPA potentially will increase emissions from emergency stationary RICE participating in an EDR program.

   The generators used by the DOE sites in the EDR programs are otherwise classified as "emergency generators" under the RICE NESHAP. It is not economically feasible for the DOE to replace these "emergency generators" with generators subject to the RICE NESHAP non-emergency RICE emissions and control requirements for the sole purpose of participating in an EDR program. Rather, DOE sites would continue to categorize the generators as emergency stationary RICE and discontinue participation in the EDR program. Since operation of emergency stationary RICE is not limited by EPA in the RICE NESHAP, these generators would operate more often, as the number of blackout increases due to the lack of participation in an EDR program.

4. The use of small-scale alternative power sources will require a more robust grid that can adequately and quickly respond to demand.

   Alternative energy sources, especially wind and solar power, provide a variable power supply, subjecting the electrical grid to an increased potential for voltage drops and blackouts. EDR will be an important component ensuring that the electrical grid provides the constant and steady electrical power that U.S. citizens expect.

5. Blackouts cause environmental harm.
   During blackouts, air pollution control equipment, (e.g. electrostatic precipitator, wet scrubber), is shutdown due to the loss of electrical power. When power is restored, these units and the processes generating the air pollution must be restarted, causing a period of increased emissions. This condition is noted by the EPA in its startup, shutdown, and malfunction NESHAP requirements. A blackout causes the equipment to shutdown, (when power is lost), and malfunction. When power is restored, the emissions units will emit more during the startup period. Reducing the number of blackouts reduces the number of excess emissions events from the startup, shutdown, and malfunction of equipment during a blackout.

Also, several large scale chemical releases have occurred during power outages. In its paper titled, "Chemical Accidents from Electric Power Outages," the EPA Office of Solid Waste and Emergency Response detailed 240 chemical releases that occurred due to an electrical power interruption in 2000. Once again, the environmental impact of chemical releases due to power outages can be minimized by an effective EDR program. http://www.epa.gov/oem/docs/chem/power.pdf

6. Cost Analysis.
   As detailed previously, the costs of a blackout are quite high and include increased fuel consumption from emergency generators, increased municipal resources deployed to direct traffic and maintain order, and an increase in environmental response and cleanup due to chemical releases. These costs should be considered if EPA chooses a numerical operation limit for an EDR program. DOE believes these costs are sufficiently high enough that EDR should be classified as an emergency use of stationary RICE generators and not include an hourly operation limitation for EDR.

Comment 2: An EDR program should allow for electrical power to be provided to the electrical transmission grid.

The term "Emergency Demand Response" in the RICE NESHAP should be defined as, "An emergency demand response program means any program where load is reduced at the request of the regional transmission organization or equivalent balancing authority and transmission operator has determined there are emergency conditions that could lead to a potential electrical blackout, such as unusually low frequency, equipment overload, capacity or energy deficiency, or unacceptable voltage level. An emergency demand response program must include activities to reduce load within the facility for the duration of the emergency, which may include the use of emergency or non-emergency generators to provide power to the facility or to an electric grid. Stationary RICE used as part of an emergency demand response program are considered emergency RICE for the duration of the emergency."

Los Alamos National Laboratory provides power to the Los Alamos Power Pool via the electrical transmission grid in the event of electric generation deficiencies. These units are known as Special Purpose Approved Resources - Contingency Reserve (SPAR-CR) generators and are activated by the Los Alamos Power Pool system operators, although the generators are maintained and operated by the DOE. The electricity generated by these units is distributed over the Los Alamos electrical transmission grid, although some of the power does generated does return to the site. These RICE are classified currently as emergency generators by the New Mexico Bureau of Air Quality; DOE would discontinue operations of these engines if they were subject to the non-emergency RICE emissions and control requirements.

By restricting EDR to only providing power to the site, EPA will be removing the ability for a site to provide assistance to the surrounding communities that would be affected by an emergency power outage. Los Alamos provides emergency power to the electrical transmission grid only at the request of the local electricity utility, and the power provided does not directly benefit the site. The power provided to the grid reduces the operation of an unknown number of smaller backup generators and minimizes the detrimental and costly effects of a blackout to the community.

Comment 3: Financial consideration is given to DOE sites in the form of a direct payment or a credit for electricity generated, which should not invalidate these sources as emergency RICE.

Peak shaving is the use of on-site generators to provide electrical power to offset grid demand and should not be confused with EDR. Peak shaving is a load reduction measure instigated by the customer, with the express purpose of reducing electricity consumption during periods of high demand. EDR is instigated by the utility to reduce load and prevent a blackout from occurring.

Both DOE sites receive financial consideration for participating in their respective EDR programs; however, in both cases the emergency generators are operated at the request of the local transmission operator, not the facility. Argonne National Laboratory noted that there is a peak offset program offered by the local transmission authority; however, it chooses not to participate in that program.

Argonne National Laboratory is paid for its participation in the EDR program; however, those costs reimburse Argonne for the fuel consumed during performance testing, maintenance on the generators to ensure continued operations, and administrative costs for staff to operate the generators.

Los Alamos National Laboratory is given a credit for the energy produced in its EDR program, reducing the total amount paid by Los Alamos to the electricity utility. The DOE owns, operates, and maintains the generators used in the EDR, and pays for all fuel used by the generators. Personnel operating and maintaining the generators are contractors for the DOE. The EDR credit helps offset the costs of operating and maintaining the generators.

Conclusion

EDR should be recognized as an emergency, as generator operation in an EDR program prevents an emergency from occurring, (i.e. electrical power loss or blackout). By considering EDR use an emergency under the RICE NESHAP, the use of generators in an EDR program would be unlimited, per the decision by EPA not to include an hourly restriction in the RICE NESHAP on emergency generator use in emergencies. To reduce the likelihood of electricity utilities viewing EDR participants as alternative electricity generating sources, EPA should require that facilities participating in an EDR program institute electrical demand reduction activities besides electrical power generation.

EDR should not preclude generators from transmitting electricity to the distribution grid. Whether the electricity generated is transmitted to the distribution grid or used onsite, a blackout is prevented in both cases. This will also allow EDR participants to lend service to a municipality affected by a grid disruption.

Financial consideration should not be a factor discluding sites from participating in an EDR program. Although financial recompense could lead electric utilities to consider EDR participants as alternative electricity generating sources, the costs of generating electricity through the relatively modest EDR generators are still well above retail rates, as EDR participants must maintain the generators at a ready standby throughout the year.

Details of DOE Sites

Argonne National Laboratory:

Generator Capacity in EDR – 2.25 Megawatt | 3,017 horsepower over 3 generators
Maximum Operating Hours by Air Permit – 120 hours (per generator)
EDR Program Dates – June 1 – September 30 for grid emergencies

Notes:
Annual performance demonstrations are required for participation in the program.
Local distribution company offers 2 types of programs:

1. Curtailment Service Provider: 10 per year at 6 hours or 60 hours
2. Emergency Response Program: 10 per year for up to 8 hours 11AM -7PM or 80 hours

Argonne has removed itself from the electrical transmission grid and activated its EDR plan at the emergency request of the local transmission utility due to transformer failure.

Los Alamos National Laboratory:

Generator Capacity in EDR – 2.35 Megawatt (electrical) | 2.938 Megawatt (mechanical) over 2 generators
Maximum Operating Hours by Air Permit – unlimited
Highest Operating Hours – 80 hours/year for both generators
Average Operating Hours – 57 hours/year for both generators
EDR Program Dates – N/A; as needed for emergencies

Notes:
Generators are interlocked and activated remotely by commercial electric utility provider.
Each generator operates 18 hours/year for maintenance and performance testing.