



Supplemental Memos Regarding Some of the Hazards Associated with Engine-Driven Generators, 2004–2014

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This analysis was prepared by the CPSC staff and it has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

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In June of 2015, CPSC published their annual report summarizing their finds regarding carbon monoxide (CO) fatalities associated with engine-driven tools emphasizing engine-driven generators¹. But, there are additional potentially fatal hazards associated with generators. Additionally, there are numerous non-fatal CO injuries associated with generators. Non-CO generator-related deaths and CO injuries are not part of the 2015 report.

This report provides a series of supplemental memos summarizing fatalities from non-CO hazards associated with generators and a memo providing estimates of diagnosed CO injuries associated with generators. Additionally, a memo is included which provides a more detailed look at fatal CO incidents in which a generator was used outdoors. These memos cover the time period from 2004 through 2014.

The incidents reported in these memos for the time period covered should not be considered a complete list of incidents associated with generator use. The memos are based on reported incidents that CPSC staff are aware of and have information contained within the CPSC databases. Additional reported incidents in this time period may come to light in the future.

¹ Hnatov, M. V. *Incidents, Deaths, and In-Depth Investigations Associated with Non-Fire Carbon Monoxide from Engine-Driven Generators and Other Engine-Driven Tools, 2004–2014*. U.S. Consumer Product Safety Commission. June 2015.

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Date: November 1, 2015

TO : Janet Buyer, Project Manager
Division of Combustion and Fire Sciences
Directorate for Engineering Sciences

THROUGH: Kathleen Stralka, Associate Executive Director
Directorate for Epidemiology

Stephen Hanway, Director
Division of Hazard Analysis

FROM: Matthew V. Hnatov, Mathematical Statistician
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SUBJECT: Electric Shock Deaths and Injuries Associated with Engine-Driven Generators in
2004 through 2014²

Non-fire, non-work-related, carbon monoxide poisoning is the primary hazard associated with engine-driven generators and has been linked to 703 deaths from 2004 through 2014 according to the most current CPSC counts³. But, carbon monoxide is not the only hazard associated with generators. Electrocutions and electrical shock injuries also present a significant hazard. This memorandum provides a summary of reported electrocutions and electrical shock injuries associated with engine-driven generators that occurred from 2004 through 2014. This memorandum includes incidents reported as of October 21, 2015. The incidents reported in this memo for the time period covered should not be considered a complete list of electrocution and electrical shock injuries associated with generators. The reported incidents are just those contained within the CPSC databases. Additional reported incidents in this time period may come to light as reporting continues.

Over the period from 2004 through 2014, CPSC has record of six reported non-work-related electrocutions and five reported electric shock injuries associated with generators. Table A.1 presents a summary of the fatal incidents and Table A.2 presents a summary of the non-fatal incidents. All six of the fatalities were males; all but one were over 35 years old. Two deaths occurred while attempting to set-up the generator, two while attempting to connect another product to the generator, one while attempting to start the generator, and, in the case of a fatality to a six year old boy, the circumstances are unknown.

For the non-fatal cases, two victims were female and three were male. In one incident, two males were injured. Two of the injuries occurred to teenagers (one female, one male). In two incidents, the victims were checking or doing maintenance on the generator – one of the incidents was the case with the two male victims, one injury occurred while attempting to set-up the generator, and in the case involving teenage girl, the circumstances are unknown, though it occurred in a school lab.

² This analysis was prepared by the CPSC staff, has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

³ Hnatov, M. V. *Incidents, Deaths, and In-Depth Investigations Associated with Non-Fire Carbon Monoxide from Engine-Driven Generators and Other Engine-Driven Tools, 2004-2014*. U.S. Consumer Product Safety Commission. June 2015.

Table A.1: Electrocutions Associated with Engine-Driven Generators, 2004-2014

Incident Date	Age	Gender	Incident Description	Activity	INDP	DTHS	IPII
1/27/2004	50	Male	BECAME UNRESPONSIVE WHILE ATTEMPTING TO HOOK UP A 110 VOLT GENERATOR - PROBABLE CONTACT WITH 110 VOLT HOUSEHOLD CURRENT COMPLICATING ATHEROSCLEROTIC CARDIOVASCULAR DISEASE - AUTOPSY YES.	Set-up / Installation		0418100773	
6/12/2004	59	Male	A MAN, AGE 59, WAS KILLED WHEN HE RECIEVED A POWERFUL ELECTRIC SHOCK WHILE USING A PORTABLE GENERATOR AT HIS HOME.	Start-up	040920HCC1015		N0470178A
8/30/2005	51	Male	WHILE CONNECTING A/C TO GENERATOR WAS ELECTROCUTED - ELECTROCUTION - AUTOPSY NO	Connecting product to generator	070124CCC3216	0522034283	
10/4/2005	36	Male	A MAN, AGE 36, WAS KILLED WHILE TRYING TO HOOK UP A HOME GENERATOR TO A SWAMP COOLER.	Connecting product to generator	051011CWE5006		F05A5004A
6/30/2009	6	Male	ELECTRICAL SHOCK FROM A GENERATOR - ELECTROCUTION - AUTOPSY YES.	Unknown		0901022811	
10/8/2011	40	Male	40 YOM DECEDENT WAS CONNECTING A GENERATOR ON A BOAT RAMP WHEN HE WAS ELECTROCUTED. ELECTROCUTION. AUTOPSY NO.	Set-up / Installation		1140027962	

Source records: In-Depth Investigation (INDP) File, the Injury or Potential Injury Incident (IPII) File, and the Death Certificate (DTHS) File.

Table A.2: Electric Shock Injuries Associated with Engine-Driven Generators, 2004-2013

Incident Date	Age	Gender	Incident Description	Activity	INDP	IPII	NEISS
4/23/2004	18	Female	ELECTROCUTION W/ GENERATOR, LOW VOLTAGE IN SCHOOL LAB DX: ELECTROCUTION W/ NO EFFECTS	Unknown			40450333
5/1/2007	17, 52	Male, Male	TWO MEN, AGES 17 AND 52, WERE SHOCKED AFTER THEY WENT TO CHECK ON THEIR GENERATOR. BOTH WERE HOSPITALIZED.	Maintenance	070606HCC2556	N0750012A	
8/30/2011	47	Female	47 YOF STANDING IN THE WATER TRYING TO CHANGE PLUG ON GENERATOR WHILE POWER WAS OUT & HAD A SHOCK ENTER LT THUMB & EXIT LT FOOT>>ELECTRIC SHOCK/BURN	Maintenance	110907HEP6804		110917743
12/4/2012	35	Male	35 Y/O MALE WAS INSTALLING A GENERATOR & WAS ELECTROCUTED WITH 240 VOLT DX ELECTROCUTION	Set-up / Installation			121215766

Source records: In-Depth Investigation (INDP) File, the Injury or Potential Injury Incident (IPII) File, and the National Electronic Injury Surveillance System (NEISS).

It should be noted that CPSC’s National Electronic Injury Surveillance System (NEISS) is a national probability sample of hospitals in the U.S. and its territories. Patient information is collected from each NEISS hospital for every emergency visit involving an injury associated with consumer products. From this sample, the total number of product-related injuries treated in hospital emergency rooms nationwide can be estimated. However, the observed NEISS counts were not sufficiently large to adequately calculate national injury estimates within acceptable confidence levels. The NEISS records presented in this report should be considered a limited anecdotal sample from the universe of all generator-related electrical shock emergency room visits nationwide, and is, therefore, a lower bound on the true number of generator-related shock injuries over the time period covered in this memo.

Date: November 3, 2015

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THROUGH : Kathleen Stralka, Associate Executive Director
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Stephen Hanway, Director
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FROM : Matthew V. Hnatov, Mathematical Statistician
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SUBJECT : Summary of NEISS Records Associated with Carbon Monoxide Exposure Cases
Related to Engine-Driven Generators in 2004 through 2014⁴

Non-fire, non-work-related, carbon monoxide (CO) poisoning is the primary hazard associated with engine-driven generators and has been linked to 751 deaths from 2004 through 2014 according to the most current CPSC counts⁵. Every year, many people are also treated at hospital emergency departments (ED) for non-fatal carbon monoxide exposure associated with the use of generators. This memorandum provides a summary of reported in CPSC's National Electronic Injury Surveillance System (NEISS). The NEISS database is a national probability sample of hospitals in the U.S. and its territories. Patient information is collected from each NEISS hospital for every emergency visit involving an injury associated with consumer products. From this sample, the total number of product-related injuries treated in hospital emergency departments nationwide can be estimated. However, the observed NEISS counts were not sufficiently large to adequately calculate national injury estimates within acceptable confidence levels. The NEISS records presented in this report should be considered a limited anecdotal sample from the universe of all generator-related carbon monoxide-related hospital emergency rooms visits nationwide, and is, therefore, a lower bound on the true number of generator-related carbon monoxide injuries from 2004 through 2014.

Over the period from 2004 through 2014, CPSC has 292 reported NEISS records of carbon monoxide-related ED visits associated with generators. It should be noted that many of the cases are coincident with other cases. Carbon monoxide events often affect multiple people concurrently. A carbon monoxide leak inside a house, for example, could affect everyone in the house to some extent. However, the NEISS records are based on the individual patient records and not on the inciting event so it is often unclear if cases are related to the same CO exposure event.

Table B.1 presents a summary of the disposition of the NEISS cases. In 70 percent of the case (204 of 292), were either treated and released or released without treatment. In these cases, no hospital admittance was deemed necessary. In 28 percent of the cases (81 of 292), patients were either treated and

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⁵ Hnatov, M. V. *Incidents, Deaths, and In-Depth Investigations Associated with Non-Fire Carbon Monoxide from Engine-Driven Generators and Other Engine-Driven Tools, 2004-2014*. U.S. Consumer Product Safety Commission. June 2015.

admitted for hospitalization, treated and transferred to another facility, or held for observation. In cases where patients were treated and transferred to another hospital (35 cases), it may be because the other hospital was better equipped to treat carbon monoxide poisoning. In nine of these cases, patients were known to have been transferred to a hospital and received treatment in a specialized hyperbaric chamber.

Table B.1: Disposition of NEISS Cases Diagnosed as Carbon Monoxide Poisoning or Carbon Monoxide Exposure Associated with Engine-Driven Generators, 2004-2014

Year	Treated and released, or examined and released without treatment	Treated and transferred to another hospital	Treated and admitted for hospitalization (within same facility)	Held for observation (includes admitted for observation)	Left without being seen/Left against medical advice	Fatality, including DOA, died in the ED	Total
2004	24	9	0	0	5	1	39
2005	17	0	4	0	0	0	21
2006	32	2	4	3	0	0	41
2007	12	3	7	6	0	0	28
2008	12	3	4	0	1	0	20
2009	26	7	2	1	0	0	36
2010	12	0	2	0	0	0	14
2011	18	2	4	1	0	0	25
2012	20	3	1	1	0	0	25
2013	6	5	3	1	0	0	15
2014	25	1	2	0	0	0	28
Total	204	35	33	13	6	1	292

Table B.2 presents a summary of diagnoses of the 292 cases. All of these cases were coded as either “Anoxia” or “Poisoning”. In the narrative description of the cases, more than half of the cases (51%, 149 cases) represented here were specifically diagnosed as “CO poisoning”. Another 33 percent were diagnosed as “CO exposure”.

Table B.2: Diagnosis of NEISS Carbon Monoxide Poisoning or Carbon Monoxide Exposure Cases Associated with Engine-Driven Generators, 2004-2014

Diagnosis	Total
CO Poisoning	149
CO Exposure	97
Anoxia	11
CO Inhalation	8
CO Intoxication	7
Unknown	7
CO Toxicity	3
Fume Inhalation	3
Toxic effects of CO Poisoning	2
Fumes Exposure	2
Acute Dizziness	1
Exposure to fumes	1
Found down	1
Total	292

Table B.3 presents a list of the most commonly identified symptoms given in the NEISS case narratives. In many of the cases, multiple symptoms were reported. But, in 29 percent of the cases (85), no symptoms were reported though the diagnosis was reported.

Table B.3: Most Common Symptoms Reported in NEISS Carbon Monoxide Poisoning or Carbon Monoxide Exposure Cases Associated with Engine-Driven Generators, 2004-2014

Common Symptoms	Total
Headache	73
Nausea Felt Sick	77
Dizzy / Confused Disorientation Lightheaded	70
Vomiting	34
Passed out Unconscious Unresponsive	18

Table B.4 presents a summary of the location of the generator associated with the CO poisoning event. The three most common locations identified were “Inside the home” (29%), “Inside the garage” (24%), and “In the basement” (19%). In ten percent of the reported cases, the generator was located outside. In half of the “Outside the home” scenarios, the narrative specifically cites the location being near a window, door, or air conditioner.

Table B.4: Location of Generator in Cases Reported in NEISS Carbon Monoxide Poisoning or Carbon Monoxide Exposure Cases Associated with Engine-Driven Generators, 2004-2014

Generator Location	Total
Inside the home	86
Inside the garage	70
In the basement	56
Outside the home	29
Other / Unknown	51
Total	292

Table B.5 presents a summary of the reasons why the patients went to the emergency room for treatment or to be checked out. In the majority of cases, the narratives provide little or no information on how the patients knew they needed to go to the emergency room or how they got there. However, in more than half of the cases where this information was available (47 of 93 cases, or 51%), the patient realized there was a problem and arranged to get to the emergency room.

Table B.5: Reason Victim Went to Emergency Room for NEISS Carbon Monoxide Poisoning or Carbon Monoxide Exposure Cases Associated with Engine-Driven Generators, 2004-2014

Reason	Total
Victim realized something was wrong and arranged to get to Emergency Room	47
Discovered in distress by family, friend or due to a welfare check	24
Carbon monoxide alarm sounded, arranged to get to Emergency Room	22
Unknown why or how taken to Emergency Room	199
Total	292

Tables B.6 and B.7 present a summary of the ages and genders of the ED patients, respectively.

Table B.6: Ages of Victims in Cases Reported in NEISS Carbon Monoxide Poisoning or Carbon Monoxide Exposure Cases Associated with Engine-Driven Generators, 2004-2014

Age Range (years)	Total
Under 5	27
5 - 14	58
15 - 24	41
25 - 44	73
45 - 64	64
65 and over	29
Total	292

Table B.7: Gender of Victims in Cases Reported in NEISS Carbon Monoxide Poisoning or Carbon Monoxide Exposure Cases Associated with Engine-Driven Generators, 2004-2014

Gender	Total
Female	143
Male	149
Total	292

The following pages presents a listing of the NEISS records of CO exposure cases related to generator usage along with the narrative record of the incident.

Date Treatment	Narrative	Age	Sex	IDI
8/14/2004	PT EXPOSED TO GASOLINE FUMES AT HOME FROM A GENERATOR DEVELOPED NAUSEA AND VOMITING CO EXPOSURE	19	Female	041001HEP9007
8/14/2004	PT HAD A GENERATOR RUNNING FELT WEAK AND NAUSEA CO POISONING COHGB 10.8	19	Female	051125HEP9010
8/14/2004	PT WAS IN A HOUSE WITH A GENERATOR RUNNING INHALED THE FUMES DEVELOPED NAUSEA AND VOMITING CO POISONING- COHGB 5.1	7	Female	
8/14/2004	PT IN A HOUSE WITH A GENERATOR GOING INHALED THE FUMES DEVELOPED NAUSEA AND VOMITING CO POISONING, COHGB 7.8	5	Female	
8/14/2004	PT IN A HOUSE WITH A GENERATOR RUNNING INHALED THE FUMES DEVELOPED HEADACHE AND NAUSEA AND VOMITING CO POISONING- COHGB- 20.1	38	Male	
8/14/2004	PT IN A HOUSE WITH A GENERATOR RUNNING DEVELOPED HEADACHE AND NAUSEA AND VOMITING CO POISONING- COHGB- 14.8	38	Female	041001HEP9001
8/14/2004	PT AT HOME INHALED THE FUMES FROM A RUNNING GENERATOR- RAN IN HOUSE FOR 24 HOURS- MOM WANTED CHECKED- POSSIBLE CO POISONING- DID NOT SEE MD	219	Male	051125HEP9008
8/14/2004	PT AT HOME INHALED THE FUMES FROM A RUNNING GENERATOR FOR 24 HOURS NAUSEA AND WEAKNESS- POSS CO POISONING- DID NOT SEE MD	14	Male	
8/14/2004	PT AT HOME INHALED FUMES FROM A RUNNING GENERATOR FOR 24 HOURS DEVELOPED NAUSEA AND VOMITING POSSIBLE CO POISONING- DID NOT SEE MD- NO COHGB	41	Female	041001HEP9004
8/14/2004	PT RUNNING HIS GENERATOR AT HOME INHALED THE FUMES AND GOT HEADACHE AND NAUSEA CO POISONING- DID NOT SEE MD- NO COHGB DONE	44	Male	
8/15/2004	PT EXPOSED TO FUMES FROM A GENERATOR RUNNING FOR TWO DAYS DEVELOPED SICKNESS NAUSEA AND VOMITING CO POISONING COHGB OF 12.9 TRANSFERRED	2	Female	
8/15/2004	PT EXPOSED TO FUMES FORM RUNNING GENERATOR OVER TWO DAYS DEVELOPED HEADACHE NAUSEA AND VOMITING CO POISONING COHGB 12.2 TRANSFERRED	3	Male	
8/15/2004	PT WAS EXPOSED TO FUMES FROM A GENERATOR OVER TWO DAYS DEVELOPED HEADACHE AND VOMITING CO POISONING COHGB 15.2 TRANSFERRED	6	Female	
8/15/2004	PT EXPOSED TO GENERATOR FUMES OVER TWO DAYS AT HOME DEVELOPED CONFUSION NAUSEA AND DYSPNEA- CO POISONING COHGB 19.5	35	Female	041001HEP9006
8/15/2004	PT WAS EXPOSED TO FUMES FROM A GENERATOR OVER TWO DAYS DEVELOPED DIZZINESS AND DYSPNEA CO POISONING COHGB- 16 TRANSFERRED	53	Male	051125HEP9005
8/15/2004	PT WAS EXPOSED TO FUMES FROM A GENERATOR RUNNING FOR TWO DAYS DEVELOPED HEADACHE AND NAUSEA CO POISONING COGHB 15.7 - TO HYPERBAROMETRICS	10	Female	

Date Treatment	Narrative	Age	Sex	IDI
8/16/2004	PT HAD A GENERATOR RUNNING IN A CLOSED GARAGE DEVELOPED DIZZINESS AND NAUSEA COHGB 11- CO POISONING	58	Female	041001HEP9005
8/16/2004	PT HAD A GENERATOR RUNNING IN AN ENCLOSED GARAGE AT HOME DEVELOPED NAUSEA AND HEADACHE COHGB OF 12- CO POISONING	52	Female	
8/16/2004	PT HAD A GENERATOR RUNNING IN HOUSE FOR 2 DAYS STRAIGHT DEVELOPED NAUSEA AND CONFUSION COHGB OF 11 CO POISONING	66	Female	041001HEP9003
8/16/2004	PT HAD A GENERATOR RUNNING IN HIS HOUSE FOR 48 HOURS DEVELOPED NAUSEA AND VOMITING COHGB 12.5 - CO POISONING	67	Male	051125HEP9006
8/16/2004	PT HAD A GENERATOR RUNNING IN THE BEDROOM WHERE SHE WAS SLEEPING DEVELOPED LIGHTHEADEDNESS AND NAUSEA COHGB 11.5 -CO POISONING	7	Female	041001HEP9002
8/16/2004	PT RUNNING A GAS POWERED GENERATOR AT HOME FOR 24 HOURS GOT LIGHTHEADED AND NAUSEA- CO POISONING	35	Male	041001HEP9008
8/17/2004	PT HAD A GENERATOR RUNNING IN HIS HOME FOR TWO DAYS DEVELOPED NAUSEA AND DYSPNEA HEADACHE COHGB OF 14.4 CO POISONING	72	Male	040901HEP9003
8/19/2004	PT IN A HOME WITH A GENERATOR RUNNING IN GARAGE, DEVELOPED NAUSEA, VOMITING HEADACHE, CO POISONING	9	Male	040901HEP9002
8/19/2004	PT AT HOME, GENERATOR RUNNING IN GARAGE, DEVELOPED HEADACHE, NAUSEA, VOMITING, CO POISONING	17	Female	040901HEP9001
8/19/2004	PT IN A HOUSE WHERE A GENERATOR WAS RUNNING DEVELOPED HEADACHE AND NAUSEA CARBON MONOXIDE POISONING	51	Female	040901HEP9004
8/20/2004	PT HAD GENERATOR RUNNING IN GARAGE AT HOME, DEVELOPED FLU LIKE SYMPTOMS AND HEADACHE , CO POISONING	28	Female	040902HEP9002
8/20/2004	PT HAD GENERATOR RUNNING IN GARAGE AT HOME X4 DAYS, DEVELOPED NAUSEA AND VOMITING, CO POISONING	5	Female	040902HEP9001
8/20/2004	PT HAD GENERATOR RUNNING AT HOME X4 DAYS, DEVELOPED CONFUSION, NAUSEA AND VOMITING, HEADACHE, CARBON MONOXIDE EXPOSURE	54	Female	040901HEP9010
10/4/2004	WORKING ON GAS POWERED GENERATOR IN GARAGE - CARBON MONOXIDE POISONING	16	Male	
10/4/2004	IN BEDROOM NEXT TO GARAGE WHERE THERE WAS A POWERED GENERATOR - CARBON MONOXIDE POISONING	16	Female	041015HEP9001
10/22/2004	WEAKNESS, DIFFICULTY BREATHING. HAS GAS POWERED GENERATOR UNDER HOUSE. DX: CARBON MONOXIDE POISONING.	63	Male	041112HEP9004
10/22/2004	WEAKNESS, DYSPNEA. HAS GAS POWERED GENERATOR UNDER HOUSE. DX: CARBON MONOXIDE POISONING.	65	Female	

Date Treatment	Narrative	Age	Sex	IDI
11/9/2004	ELECTRIC GENERATOR WAS RUNNING IN PT'S BASEMENT FOR 3-4 HR. DX: CO POISONING.	5	Male	041130HEP9004
11/9/2004	ELECTRIC GENERATOR WAS RUNNING IN PT'S BASEMENT FOR 3-4 HR. DX: CO POISONING.	4	Male	
12/2/2004	LIGHTHEADEDNESS FROM GENERATOR RUNNING - EXPOSURE TO FUMES	68	Female	041209HEP9006
12/23/2004	GENERATOR RUNNING IN BASEMENT OF HOUSE WHEN ELECTRICITY WAS OUT, PT NAP PING UPSTAIRS, VOMITING, CO 120 UPSTAIRS, CO 500 BASEMENT; CO EXPOSURE	2	Male	051123HEP9002
12/24/2004	PATIENT FOUND UNRESPONSIVE IN APARTMENT WITH CO LEVEL ABOVE 500, FAMILY RUNNING GENERATOR IN BASEMENT; CARDIAC ARREST, CO POISONING	3	Male	051123HEP9003
12/24/2004	PT WENT INTO NEIGHBOR'S HOUSE TO HELP WITH CO POISONING, HAD GENERATOR RUNNING IN BASEMENT, HEADACHE, NAUSEA, VOMITING; CO POISONING	34	Male	050215HEP9001
1/8/2005	ACUTE CO EXPOSURE.PT HAD A POWER OUTAGE AND PURCHASED A GENERATOR AND H AD IT GOING FOT 15 HOURS AND CO DETECTOR WENT OFF.	58	Male	050124HEP9002
1/8/2005	CHI,CO EXPOSURE.PT HAD A GENERATOR RUNNING FOR 15 HOURS AND PASSED OUT AND FELL OFF TOILET AND HIT HEAD.	59	Female	
1/21/2005	FUMES FROM A GENERATOR IN THE GARAGE ALL THROUGHOUT THE HOUSE DX FUMES EXPOSURE	11	Female	050128HEP9001
1/21/2005	FUMES FROM A GENERATOR IN THE GARAGE ALL THROUGHOUT THE HOUSE	5	Male	051125HEP9001
3/31/2005	PT IS BEING SEEN FOR CARBON MONOXIDE POISONING WHEN USING GENERATOR IN HOME	31	Male	050426HEP9001
7/11/2005	WAS IN HOME WIGHT EXHAUST FUMES FROM POWER GENERATOR BLOWING THROUGHT CRACK IN DOOR CARBON MONOXIDE POISONING	7	Male	050726HEP9002
7/11/2005	POWER GENERATOR EXHAUST BLOWING INTO HOUSE. FOR SEVERAL HOURS OVERNIGHT. CARBON MONOXIDE POISONING	11	Female	051125HEP9002
7/11/2005	EXPOSED TO CARBON MONOXIDE FROM GENERATOR BLOWING FUMES THROUGHT CRACK IN DOOR ALL NIGHT. CARBON MONOXIDE POISONING	4	Female	
8/15/2005	CARBON MONOXIDE POISONING-C/O HEADACHE AND LETHARGY AFTER USING AN ELECTRIC GENERATOR AT HOME LAST NIGHT.	54	Male	
10/24/2005	PT INHALED THE FUMES FROM A GENERATOR FOR A PROLONGED PERIOD OF TIME NAUSEA DIZZINESS CARBON MONOXIDE EXPOSURE	23	Male	051125HEP9004
10/25/2005	CARBON MONOXIDE POISONING-C/O DIZZINESS, NAUSEA, VOMITING WITH LIGHTHEA DEDNESS AFTER HUSBAND WAS RUNNING A GENERATOR IN BASEMENT.	29	Female	051123HEP9004
10/26/2005	PT WAS RUNNING A GENERATOR AT HOME NO POWER BECAME NAUSEA AND VOMITED CARBON MONOXIDE POISONING	82	Male	051125HEP9007

Date Treatment	Narrative	Age	Sex	IDI
10/30/2005	CARBON MONOXIDE POISONING AFTER GENERATOR RAN FOR 6 HOURS IN GARAGE - 4 OTHERS BEING SEEN FOR SAME	25	Male	
10/30/2005	PT IS BEING SEEN FOR CARBON MONOXIDE POISONING AFTER GENERATOR HAD BEEN RUNNING THE GARAGE FOR 6 HOURS. 4 OTHER PTS ARE BEING SEEN	22	Male	051123HEP9001
10/30/2005	CARBON MONOXIDE POISONING AFTER GENERATOR RAN FOR 6 HOURS IN THE GARAGE - 4 OTHER PEOPLE ARE BEING SEEN	68	Female	
10/30/2005	CARBON MONOXIDE POISONING AFTER GENERATOR RAN FOR 6 HOURS IN THE GARAGE - 4 OTHERS ARE BEING SEEN FOR SAME	25	Female	
10/30/2005	CARBON MONOXIDE POISONING AFTER GENERATOR RAN FOR 6 HOURS IN GARAGE - 4 OTHER PEOPLE ARE BEING SEEN	57	Male	051130HEP9006
10/30/2005	CARBON MONOXIDE POISOING WHEN GENERATOR WAS RUNNING I N GARAGE FOR 6 HOURS	4	Male	
11/28/2005	CO EXPOSURE FROM GENERATOR IN TENT	27	Female	
11/28/2005	CO EXPOSURE FROM GENERATOR HEATING HIS TENT	29	Male	060110HEP9001
12/5/2005	SLEEPING IN TENT WITH GENERATOR ON IN X MAS TREE LOT RESULTING IN CO POISONING	75	Male	060110HEP9002
3/5/2006	PT FOUND DOWN BY FAMILY AT HOME IN BED, UNKNOWN PILLS ON BED AND BEDSIDE, GENERATOR RUNNING IN BASEMENT DX: CARBON MONOXIDE POISONING, ALOC	48	Female	
4/26/2006	CARBON MONOXIDE-@ HOME-EXPOSURE TO GAS GENERATOR-COHB 36.1	24	Female	
4/26/2006	CARBON MONOXIDE-@ HOME-EXPOSURE TO GAS GENERATOR-COHB 35.2	52	Male	
4/26/2006	CARBON MONOXIDE-@ HOME-EXPOSURE TO GAS GENERATOR-COHB 25.3	21	Female	
4/26/2006	CARBON MONOXIDE-@ HOME-EXPOSURE TO GAS GENERATOR-COHB 27.8	30	Male	
6/3/2006	CHARGING GAS GENERATOR IN BASEMENT AND GOT CO POISONING- TRANSF TO HYPERBARIC CHAMBER AT MASS EYE AND EAR, THEN SUFFERED SEIZURE THERE	17	Female	
6/16/2006	USING NEW GENERATOR IN BASEMENT CO POISONING	44	Female	
6/28/2006	CARBON MONOXIDE POISONING DUE TO USING GENERATORS TO PUMP WATER FROM HIGH RAINFALL.	43	Male	
6/28/2006	CARBON MONOXIDE POISONING DUE TO USING GENERATORS TO PUMP WATER FROM HIGH RAINFALL.	14	Female	
6/28/2006	CARBON MONOXIDE POISONING DUE TO USING GENERATORS TO PUMP WATER FROM HIGH RAINFALL.	41	Female	
7/2/2006	EXPOSED TO GENERATOR AT CAMP/CARBON MONOXIDE POISONING	8	Male	
7/2/2006	EXPOSED TO GAS GENERATOR AT CAMP/CARBON MONOXIDE POISONING	36	Female	

Date Treatment	Narrative	Age	Sex	IDI
7/2/2006	EXPOSED TO GAS GENERATOR AT CAMP/CARBON MONOXIDE POISONING	7	Female	
7/2/2006	EXPOSED TO GAS GENERATOR AT CAMP/CARBON MONOXIDE POISONING	36	Male	
7/2/2006	EXPOSED TO GAS GENERATOR AT CAMP/CARBON MONOXIDE POISONING	14	Male	
7/2/2006	EXPOSED TO GAS GENERATOR AT CAMP/CARBON MONOXIDE POISONING	9	Female	
7/2/2006	EXPOSED TO GAS GENERATOR AT CAMP/CARBON MONOXIDE POISONING	7	Male	
7/2/2006	EXPOSED TO GAS GENERATOR AT CAMP/CARBON MONOXIDE POISONING	15	Male	
7/20/2006	CARBON MONOXIDE TOXICITY-C/O HEADACHE & WEAKNESS AFTER USING A GENERATOR AS A SOURCE OF ELECTRIC IN THE GARAGE.	64	Female	
7/20/2006	CARBON MONOXIDE POISONING-C/O LIGHTHEADEDNESS DE TO CO FROM GASOLINE GENERATOR USED IN THE GARAGE.	64	Male	
7/27/2006	BIB FATHER AFTER EXPOSURE TO FUMES FROM A GENERATOR IN THE GARAGE, VOMITTED ONCE " CO EXPOSURE"	214	Male	
7/27/2006	WOKE UP C FUMES IN THE HOUSE FROM GENERATOR LEFT ON ALL NIGHT IN THE GARAGE , C/O H/A " CO EXPOSURE"	3	Female	
7/27/2006	WOKE UP C FUMES IN THE HOUSE FROM A GENERATOR LEFT ON ALL NIGHT IN THE GARAGE, N&V " CO EXPOSURE"	35	Male	
7/27/2006	WOKE UP C FUMES IN THE HOUSE FROM A GENERATOR LEFT ON ALL NIGHT IN THE GARAGE, DIZZINESS " CO EXPOSURE"	7	Male	
7/27/2006	WOKE UP C FUMES IN THE HOUSE FROM GENERATOR LEFT ON ALL NIGHT IN THE GARAGE, SYNCOPED&FELL TWISTING FOOT " FX" +" SYNCOPE' +" CO EXPOSURE"	33	Female	
8/24/2006	PT C/O LIGHT HEADEDNESS, NAUSEA; PT EXPOSED TO GAS GENERATOR. D: CO EXPOSURE	30	Female	
8/24/2006	PT C/O NAUSEA; WAS EXPOSED TO CO FROM A GENERATOR. D: CO EXPOSURE	3	Male	
8/24/2006	PT WAS IN AN ENCLOSED AREA WITH A GAS GENERATOR X8 HOURS; CO EXPOSURE. D: CO EXPOSURE	11	Male	
8/24/2006	PT C/O LIGHT HEADEDNESS, HEADACHE AND DIFF BREATHING; WAS IN AN ENCLOSED AREA WITH A GAS GENERATOR X8 HOURS. D: CO EXPOSURE	9	Female	
8/24/2006	GENERATOR WAS IN THE GARAGE WHILE PEOPLE WERE SLEEPING. D: CO EXPOSURE	17	Female	
8/24/2006	PT C/O HEADACHE AND NAUSEA; PT WAS EXPOSED TO GENERATOR THAT WAS HOOKED UP IN THE GARAGE. D: CO EXPOSURE	13	Male	
8/24/2006	PT WAS EXPOSED TO CARBON, GAS GENERATOR WAS IN THE GARAGE. D: CO EXPOSURE	2	Male	
8/24/2006	PT WAS IN GARAGE WITH A GAS GENERATOR THAT WAS LEAKING, C/O HEADACHE AND NAUSEA. D: CO EXPOSURE	21	Male	
11/29/2006	PT WAS RUNNING GENERATOR IN GARAGE. DX: CO POISONING.	57	Male	

Date Treatment	Narrative	Age	Sex	IDI
11/29/2006	PT WAS RUNNING GENERATOR IN GARAGE. DX: CO POISONING.	57	Female	070206HEP9076
12/2/2006	CO POISONING-C/O DRUG MOUTH & NAUSEA AFTER BEING EXPOSED TO CO AT HOME AFTER USING A GENERATOR. LEVEL 17.9	67	Female	070206HEP9084
12/3/2006	CO INTOXICATION-DID NOT HAVE ELECTRIC SO HUSBAND USED A GENERATOR TOO C LOSE TO THE HOUSE. C/O NAUSEA, VOMITING AND GENERALIZED WEAKNESS.	51	Female	
12/3/2006	CO INTOXICATION-C/O NAUSEA & VOMITING AND HEADACHE AFTER A GENERATOR WA S USED TO CLOSE TO THE HOUSE.	11	Male	
12/3/2006	CO INTOXICATION-C/O NAUSEA, VOMITING AND HEADACHE.ALMOST PASSED OUT AFTER BEING EXPOSED TO CO DUE TO USE OF A GENERATOR.	57	Male	070206HEP9087
12/15/2006	PT WAS EXPOSED TO 3 HRS OF GENERATOR RUNNING IN BASEMENT. DX: CO POISONING ACUTE. COHB 17.0	3	Male	070206HEP9079
12/18/2006	PT WAS FOUND W/FACE AGAINST SPACE HEATER AND GENERATOR ON IN GARAGE W/ 4 OTHERS IN HOUSE DEAD. DX: FT BURN L HAND/CHEST, CO POIS. COHB 1.{DIED 32 DAYS LATER}	24	Male	070206HEP9080
2/15/2007	PT W/CO EXPOSURE W/GENERATOR RUNNING IN HOUSE X2 DAYS, CO LEVEL 15 AT ARRIVAL NOW DOWN TO 1, PARENTS W/HA, NAUSEA & VOMITING; CO POISONING	2	Female	080130HEP0801
2/24/2007	CO EXPOSURE-IN MOBILE HOME W/A GENERATOR-COHB 29.4	61	Male	
2/24/2007	CO POISONING-DEVELOPED NAUSEA & HEADACHE WHILE IN A MOBILE HOME W/A GENERATOR-COHB 19.0 INITIALLY-THEN 4 HRS LATER COHB WAS 2.3	39	Male	070227HEP6001
3/17/2007	CARBON MONOXIDE EXPOSURE - 83 YO MALE PRESENTS FROM HOME AFTER EXPOSURE TO CO - RPTS SON RAN GENERATOR IN BASEMENT AND DETECTORS WHEN OFF	83	Male	
3/17/2007	CARBON MONOXIDE EXPOSURE - 53 YO MALE PRESENTS AFTER CO EXPOSURE - WAS RUNNING GENERATOR IN BASEMENT DURING POWER OUTAGE & DETECTOR WENT OFF	53	Male	070325HEP6082
4/7/2007	CARBON MONOXIDE EXPOSURE.PT PUT A NEW GENERATOR IN BASEMENT AND NOW HAS N/V AND A HEADACHE.MONOXIDE LEVEL IS 22.8.	48	Male	070411HEP8920
4/17/2007	RUNNING A GENERATOR IN HIS BASEMENT ALL NIGHT CARBON MONOXIDE POISONING (31%) - FD ON SCENE	74	Male	070511HEP9055
7/7/2007	THE POWER WENT OUT SO A GENERATOR WAS BEING USED IN A HOUSE STARTED TO VOMIT COHGB OF 10.4 CO EXPOSURE	19	Female	
7/7/2007	PT IN HIS HOUSE WITH A GENERATOR GOING AFTER T5HE POQWER SHUT OFF DEVEL OPED DIZZINESS AND NAUSEA COHGB OF 6.4 CO EXPOSURE	16	Male	070710HEP7361
7/7/2007	PT IN A HOUSE WHERE A GENERATOR WAS BEING USED TO PROVIDE ELECTRICITY GOT SICK COHGB OF 8.6 CO POISONING	4	Male	070710HEP7364

Date Treatment	Narrative	Age	Sex	IDI
7/7/2007	PT IN THE HOUSE WHERE THE HOUSE LOST POWER A GENERATOR WAS MOVED IN AND PT GOT SICK COHGB OF 9.6 CO POISONING	221	Female	070710HEP7363
8/2/2007	PT EXPOSED TO CO FROM GENERATOR IN BASEMENT PT HAS A HEADACHE COHB 2.2 PT HELD FOR 4 HOURS O2 TREATMENT DX// TOXIC EXPOSURE CARBON MONOXIDE	7	Female	
8/2/2007	PT EXPOSED TO CO FROM GENERATOR IN BASEMENT COHB 2.2 PT HELD FOR 4 HOUR S OF O2 TREATMENT DX// TOXIC EXPOSURE CARBON MONOXIDE	223	Female	
8/2/2007	PT EXPOSED TO CO GENERATOR IN BASEMENT PT HAD CHEST PAIN COHB 13.2 PT T RANSF TO HYBERBARICS HOSPITAL DX// TOXIC EXPOSURE CARBON MONOXIDE	39	Female	
8/2/2007	PT EXPOSED TO CO GENERATOR IN BASEMENT COHB 6.2 PT HELD FOR 4 HOURS OF O2 TREATMENT DX// TOXIC EXPOSURE CARBON MONOXIDE	10	Male	
8/2/2007	PT GENERATOR IN BASEMENT FAMILY EXPOSED TO CO COHB 5.0 PT HELD IN ER FO R 4 HOURS O2 TREATMENT DX// TOXIC EXPOSURE CARBON MONOXIDE	11	Female	
8/2/2007	PT GENERATOR IN BASEMENT DUE TO NO ELECTRIC IN HOME 1 SON DEAD ON FLOOR 1 AMS PT HAS CO LEVEL 20.4 HEADACHE TRANS TO HYPERBARICS DX/ TOXIC EX	42	Male	
8/2/2007	PT AWOKEN BY PARENTS FOUND BROTHER DEAD CO FROM GAS GENERATOR IN BASEMENT PT COHB 25.1 TRANS TO HYPERBARICS HOSPITAL DX// TOXIC EXPOSURE CO	22	Male	070807HEP5207
8/10/2007	PT C/O FALLING ON STEPS AFTER EXPOSURE OF CARBON MONOXIDE POISONING FROM USING GENERATOR AT HOME FOR POWER	21	Male	070816HEP2081
11/29/2007	GENERATOR WAS POINTED TOWARDS THE HOUSE, NOW THE OCCUPANTS C/O HA&LETHA RGY, BIB MOM FOR EVA >> POSSIBLE CO EXPOSURE	205	Male	
11/30/2007	86 Y/O, M, RESIDENT IN NSG. HOME WITH FAULTY GENERATOR, ADMITTED, CARBON MONOXIDE POISONING, ABDOMINAL PAIN, RENAL MINSUFFICIENCY	86	Male	
11/30/2007	94 Y/O, F, RESIDENT IN NSG HOME WITH FAULTY GENERATOR, ADMITTED, CARBON MONOXIDE POISONING, RENAL INSUFFICIENCY, MYASTHENIA GRAVIS	94	Female	
11/30/2007	93 Y/O, F, RESIDENT IN NSG. HOME WITH FAULTY GENERATOR, ADMITTED, CO POISONING, SYNCOPE	93	Female	
11/30/2007	71 Y/O, M, RESIDENT IN NSG. HOME WITH FAULTY GENERATOR, CARBON MONOXIDE POISONING	71	Male	
11/30/2007	82 Y/O, F, RESIDENT IN NSG. HOME WITH FAULTY GENERATOR, ADMITTED, CARBON MONOXIDE POISONING	82	Female	
11/30/2007	82 Y/O,F,RESIDENT IN NSG,HOME WITH FAULTY GENERATOR, ADMITTED, CARBON MONOXIDE POISONING, ACUTE MUSCLE STRAIN	82	Female	

Date Treatment	Narrative	Age	Sex	IDI
11/30/2007	77 Y/O, M, NSG. HOME RESIDENT WITH FAULTY GENERATOR, CARBON MONOXIDE INTOXICATION	77	Male	
11/30/2007	95 Y/O, F, RESIDENT IN NSG. HOME WITH FAULTY GENERATOR,CARBON MONOXIDE POISONING	95	Female	
1/31/2008	PT HAD A GENERATOR RUNNING IN THE MIDDLE FO THE LIVING ROOM AND DEVELOPED SICKNESS AND COUGH PNEUMONIA RUDDY APPEARANCE	44	Female	
2/3/2008	CARBON MONOXIDE EXPOSURE-CO DETECTOR ALARMED-EXHAUST FROM GENERATOR-COH B 6.8-@ HOME	207	Male	
3/9/2008	PT WAS WORKINGW OUTDOOR GENERATOR IN BASEMENT AT HOME, FOUND UNCONSCIOUS DX: CARBON MONOXIDE POISONING	39	Male	
3/19/2008	INTOXICATED AND WORKING IN BASEMENT WITH GENERATOR AND CAR PARTS DEVELOPED CONFUSION,SYNCOPE,HEADACHE RESULTING IN CO POISONING	27	Male	
4/23/2008	CARBON MONOXIDE INHALATION-NO ELECTRICITY @ HOME-USING GENERATOR IN BASEMENT-FELT HEADACHE & DIZZY-COHB 32.2-SENT TO ANOTHER HOSP.	36	Female	
4/23/2008	CARBON MONOXIDE INHALATION-NO ELECTRICITY @ HOME-USING GENERATOR IN BASEMENT-FELT HEADACHE & DIZZY-COHB 37.1-SENT TO ANOTHER HOSPITAL	33	Male	
6/11/2008	PT BROUGHT TO HOSPITAL, UNRESPONSIVE FROM CO POISONING FROM RUNNING GENERATOR AT HOME	59	Female	080915HEP9001
6/27/2008	38 YOF LOST POWER, USING THE GENERATOR OUTSIDE AND DOOR WAS LEFT OPEN. CO DETECTOR WENT OFF, ABD CRAMPING, N/V AFTERWARDS, CO POISONING	38	Female	080911HEP9009
7/5/2008	PT WAS WORKING IN A FRIENDS SHED WITH A GENERATOR RUNNING FOR ELECTRICITY WAS FOUND UNRESPONSIVE CO POISONING COHGB OF 5.5	38	Male	080912HEP9001
8/28/2008	CARBON MONOXIDE EXPOSURE-UNRESPONSIVE IN HOUSE-HAD BEEN CUTTING UP A FURNACE WHILE USING A GASOLINE GENERATOR ENCLOSED UP IN A HOUSE-COHB 40.9	63	Male	080911HEP9008
10/27/2008	PT STARTED GAS GENERATOR AND WENT TO SLEEP AND AWOKE WITH DIZZINESS & LIGHTHEADEDNESS	30	Male	081029HEP2081
10/27/2008	PT SLEPT WITH GAS GENERATOR ON AND IS FEELING DIZZINESS	30	Female	
12/2/2008	PT HAD GENERATOR RUNNING IN BASEMENT AND NEIGHBOR'S CO DETECTOR WENT OFF	43	Male	081206HEP2081
12/2/2008	PT HAD GENERATOR RUNNING IN BASEMENT AND NEIGHBOR'S CO DETECTOR WENT OFF	47	Female	081206HEP2082
12/12/2008	PATIENT HURT WHEN BREATHING FUMES FROM RUNNING GENERATOR AT HOME. DX: CARBON MONOXIDE EXPOSURE/DIZZINESS/HA/NAUSEA	33	Female	081214HEP0003

Date Treatment	Narrative	Age	Sex	IDI
12/12/2008	PATIENT HURT WHEN EXPOSED TO CARBON MONOXIDE FROM RUNNING GENERATORS AT HOME. DX: CARBON MONOXIDE EXPOSURE TO GENERATOR FUMES/HA NAUSEA VOMIT	9	Female	
12/12/2008	PATIENT HURT, HAD CARBON MONOXIDE EXPOSURE FROM RUNNING GENERATOR AT HOME. DX: CARBON MONOXIDE EXPOSURE/NAUSEA VOMITTING HEADACHES. WEAK	12	Male	
12/12/2008	POWER WENT OUT AND GENERATOR WENT ON BUT DID NOT VENTILATE RESULTING IN CO POISONING, FAINTING WITH READING OF 19%	65	Female	081223HEP1361
12/15/2008	DOWNSTAIRS NEIGHBOR USING GENERATOR WHICH PRODUCED CARBON MONOXIDE WITH LEVEL OF 35	56	Female	081229HEP1361
12/21/2008	PT USING GENERATOR IN BASEMENT-PASSED OUT-CARBON MONOXIDE POISONING	15	Male	090126HEP8744
1/28/2009	PT WAS EXPOSED TO CO FROM GENERATOR IN GARAGE. DX: CO POISONING.	55	Male	
1/28/2009	PT WAS EXPOSED TO CO FROM GENERATOR IN GARAGE. DX: CO EXPOSURE, SEIZURE HX.	43	Female	
1/28/2009	PT WAS EXPOSED TO CARBON MONOXIDE FROM GENERATOR IN GARAGE. DX: CO EXPOSURE COHB 11.7.	16	Female	
1/28/2009	PT WAS EXPOSED TO CO FROM GENERATOR IN GARAGE. DX: CO POISONING.	21	Male	
1/28/2009	PT HAD CO EXPOSURE FROM GENERATOR IN GARAGE TO HEAT HOUSE. DX: MILD CO POISONING COHB 15.9.	20	Female	
1/31/2009	AT A PARTY WHERE INFLATABLES WERE BEING PUMPED WITH A GENERATOR. INHALED THE GAS FUMES. DX CO POISONING	9	Male	
2/21/2009	DX: GAS/ CARBON MONOXIDE EXPOSURE FROM GENERATOR IN HOUSE	23	Female	
2/21/2009	DX: GAS EXPOSURE/ CARBON MONOXIDE EXPOSURE FROM GENERATOR IN HOUSE FOR 2 HRS. DIZZY, SLEEPY, NAUSEA	6	Male	
3/28/2009	PT'S GENERATOR IN BASEMENT DID NOT HAVE A LOT OF AIR AND PT PASSED OUT FROM CO EXPOSURE	41	Female	
3/28/2009	GENERATOR WAS RUNNING FOR ABOUT 3 HOURS, PT EXPOSED TO CO	47	Male	
4/9/2009	PTS HOUSE FILLED WITH CO BY A POWER GENERATOR. DX CO POISONING	16	Male	
4/23/2009	PT WAS RUNNING A GENERATOR IN GARAGE DUE TO POWER OUTAGE. DX: ACUTE CO POISONING, COHB 21.1, ACUTE RENAL INSUFF.	33	Male	
5/8/2009	PT WAS EXPOSED TO CARBON MONOXIDE FROM A FAULTY GENERATOR	25	Female	
5/8/2009	PT WAS EXPOSED TO CARBON MONOXIDE FROM A FAULTY GENERATOR	28	Female	

Date Treatment	Narrative	Age	Sex	IDI
5/8/2009	PT WAS EXPOSED TO CARBON MONOXIDE FROM A FAULTY GENERATOR	62	Female	
5/8/2009	PT WAS EXPOSED TO CARBON MONOXIDE FROM A FAULTY GENERATOR	56	Male	
6/1/2009	PT WAS IN A HOUSE WHERE THEY WERE RUNNING A DIESEL GENERATOR/ POISONING	15	Male	
6/8/2009	PT LIVES IN ROW HOUSE. 6 DOORS DOWN GENERATOR WAS PRODUCING CO GAS. CO LEVELS MEASURED HIGH IN PTS HOUSE. DETECTOR WENT OFF. CO .8%. DX ANOXIA	15	Female	
6/19/2009	CO EXPOSURE-HAS A HEADACHE SINCE RUNNING A GAS GENERATOR IN THE GARAGE DURING A POWER OUTAGE-@ HOME-COHB 6.7	29	Female	
6/19/2009	CO EXPOSURE-HAS HEADACHE & VOMITING SINCE RUNNING A GAS GENERATOR IN THE GARAGE @ HOME DURING A POWER OUTAGE-COHB 16.2	31	Male	
8/14/2009	PT FOUND WEAK, ON FLOOR IN ROOM. CO DECT WENT OFF. GAS POWERED GENERATOR RUNNING BELOW ROOM. CO LEV-4.7%. TX FOR HYPERBARICS. DX ANOXIA	18	Female	
8/14/2009	PT AWOKE TO CO DETECTOR GOING OFF. GAS POWERED GENERATOR RUNNING BELOW HER ROOM. PT PASSED OUT. ART CO LEV- 5.7% TX FOR HYPERBARICS DX ANOXIA	14	Female	
10/16/2009	38 YO MALE. HAD ELEC SHUT OF TO HOME. RAN GENERATOR IN BASEMENT FOR 3 HOURS. PT NOW DIZZY, HEADACHE. CO LEVEL 500PPM. DX CO POISONING	38	Male	091104HEP5441
10/16/2009	PT HAS HEADACHE, DIZZINESS. ELEC SHUT OFF IN HOME. HAD GENERATOR IN BASEMENT ON FOR 3 HOURS. 500PPM. CO LEVEL 18.4. DX CO POISONING	9	Female	091104HEP5446
10/16/2009	PT HAS HEADACHE, NAUSEA, CHEST PAIN. ELEC SHUT OFF IN HOUSE. HAD GENERATOR RUNNING FOR 3 HOURS IN BASEMENT. 500PPM. CO LEV 14.9. DX CO POISONING	15	Female	091104HEP5442
10/16/2009	PT HAS HEADACHE, DIZZINESS. ELEC SHUT OFF IN HOME. HAD GENERATOR ON IN BASEMENT FOR 3 HOURS. 550 PPM. CO LEVEL 10.8. DX CO POISONING	6	Male	091104HEP5445
10/16/2009	PT HAS HEADACHE, NAUSEA. ELEC SHUT OFF IN HOUSE. HAD GENERATOR RUNNING FOR 3 HOURS IN BASEMENT. 500PPM. CO LEV 13.5. DX CO POISONING	18	Male	091104HEP5443
10/16/2009	41 YO FEMALE PT. ELEC SHUT OFF IN HOME. HAD A GENERATOR RUNNING FOR 3 HOURS. PT DIZZY, HEADACHE. 550PPM. CO LEVEL 21.8. DX CO POISONING	41	Female	091104HEP5444
10/20/2009	CARBON MONOXIDE EXPOSURE FROM A GENERATOR AT HOME	37	Female	091126HEP6641
10/27/2009	PT HAD POWER OUTAGE AT HOUSE. BROUGHT IN GENERATOR. HEADACHE FOR PAST FEW HOURS. UNK HOW LONG IN HOUSE. CO LEVEL 13.9. DX ANOXIA	18	Female	091113HEP5441

Date Treatment	Narrative	Age	Sex	IDI
10/27/2009	PT HAD POWER OUTAGE IN HOUSE. GENERATOR BEING RUN IN HOME. MOM BEGAN TO HAVE SYMPTOMS. LEFT HOUSE. PT W/ NO SYMP. CO LEVEL 7.0. DX ANOXIA	3	Female	091113HEP5442
10/30/2009	POWER WENT OUT AND GENERATOR WENT ON AT HOME AND SHE WAS FOUND BY BOYFRIEND UNRESPONSIVE WITH CO POISONING AND MED FLITE IN	43	Female	091117HEP1361
12/15/2009	PT WAS IN HOUSE WHERE GENERATOR WAS BEING USED FOR POWER. DX: CO EXPOSURE. COHB 7.31.	46	Female	091230HEP5761
12/15/2009	PT WAS IN HOUSE WHERE GENERATOR WAS RUNNING IN GARAGE. DX: CO POISONING. COHB 20.9	47	Male	
12/15/2009	PT WENT OUT TO GARAGE WHERE GENERATOR WAS RUNNING AND PASSED OUT. DX: CO INHALATION. COHB NS.	40	Male	
12/31/2009	53 YOM WORKING IN HOUSE W/ GENERATOR, PROPANE HEATER & KEROSENE HEATER RUNNING, DIZZY, LIGHT HEADED @ HOME DX;# CARBON MONOXIDE POISONING	53	Male	100106HEP4081
2/9/2010	PT DX TOXIC EFFECT OF CARBON MONOXIDE - 59 YR OLD BLACK FEMALE USED ELECTRIC GENERATOR INSIDE LIVING ROOM AFTER POWER FAILURE.	59	Female	100223HEP4401
3/17/2010	49 YOF HAD GENERATOR RUNNING AND WAS EMITTING CARBON MONOXIDE. C/O SCRATCHY THROAT. COHB =3.0. DX. FUME INHALATION.*	49	Female	100318HEP1401
3/17/2010	5 YOM THINKS NEIGHBORS GENERATOR THAT HAS BEEN RUNNING X 2DAYS MAY HAVE A CARBON MONOXIDE LEAK. COHB = 2.6. DX. FUME INHALATION.*	5	Male	
3/17/2010	5YOF WITH POSSIBLE CARBON MONOXIDE LEAK FROM NEIGHBORS GENERATOR. COHB = 2.8. DX. TOXIC EFFECT CARBON MONOXIDE.*	5	Female	
3/17/2010	53 YOM HAD A NEIGHBOR RUNNING A GENERATOR OUTSIDE BEDROOM X 2 DAYS. THINKS EXPOSED TO CARBON MONOXIDE. COHB = 2.3. DX .FUME INHALATION.*	53	Male	
4/30/2010	51 YR OLD MALE FOUND DOWN IN BASEMENT UNRESPONSIVE WITH GENERATOR RUNNING RESULTING IN CO POISONING	51	Male	100519HEP1361
9/24/2010	9 YR M CARBON MONOXIDE EXPOSURE WHEN GENERATOR ON AT HOME;DX ANOXIA	9	Male	100929HEP7524
11/7/2010	33 YOM GOT LIGHTEADED WHILE WORKING IN HIS GARAGE INTOXICATED BAC 142 WITH A GASOLINE GENERATOR RUNNING CO POISONING	33	Male	101110HEP7361
11/16/2010	4 YOF DAD STARTED GENERATOR IN GARAGE, PT ASLEEP, HARD TO WAKE UP DX: CARBON MONOXIDE POISONING	4	Female	101128HEP8722
12/1/2010	CO EXPOSURE/39YOM EXPOSED TO CO. BASEMENT HAD FLOODED AND HAD GENERATOR IN BASEMENT.	39	Male	101213HEP1281
12/1/2010	CO EXPOSURE/49YOF EXPOSED TO CO AFTER HAVING EQUIPMENT RUNNING IN THE HOUSE. RUNNING GAS GENERATOR IN BASEMENT TO PUMP OUT FLOODED BASEMENT.	49	Female	101213HEP1282

Date Treatment	Narrative	Age	Sex	IDI
12/6/2010	36 YOM WAS WORKING IN HIS GARAGE AT HOME AND HAD THE GENERATOR RUNNING TO PROVIDE HEAT NOW IS DIZZY AND NAUSEATED. DX: CARBON MONOXIDE POISON	36	Male	101219HEP2855
12/18/2010	47 Y MALE WORKING WITH GENERATOR AT HOME IN BASEMENT NOW WITH CARBON MONOXIDE POISONING	47	Male	101222HEP2081
12/18/2010	25 YO FEMALE WANT TO BE CHECKED FOR CO POISONING AFTER EXPOSURE W FATHER USING GENERATOR AT HOIME DX: CARBON MONOXIDE EXPOSURE	25	Female	101222HEP2082
1/7/2011	24 YOF WAS EXPOSED TO GAS FROM A GENERATOR FROM NEXT DOOR HOME	24	Female	110115HEP2081
1/22/2011	30 YOM CO TOXICITY USING A GENERATOR AT HOME HAD SYNCOPAL EPISODE PT TRANSFERED CO 13.3*	30	Male	110203HEP0961
5/2/2011	46 YOM SUSTAINED CARBON MONOXIDE POISONING FROM GAS GENERATOR IN HIS BOAT HOUSE. (CO = 50)	46	Male	110505HEP7121
7/6/2011	7 YOF LETHARGIC, CONFUSED, NAUSEA, HEADACHE AT HOME, DAD REALIZED GENERATOR IN GARAGE WAS LEFT ON; CO EXPOSURE	7	Female	110708HEP8213
7/11/2011	48 YOF POWER WENT OUT IN THE HOUSE RAN A GERERATOR CARBON MONOXIDE DETECTOR WENT OFF;CARBON MONOXIDE POISONING 2.5 CM	48	Female	
7/11/2011	15 YOM POWER WENT OUT IN THE HOUSE RAN A GENERATOR CARBON MONOXIDE DETECTOR WENT OFF HAS HEADACHE;CO POISONING CARBOXYHE M 2.4	15	Male	
7/11/2011	18 YOF POWER WENT OUT IN THE HOUSE RAN A GENERATOR WHEN THE CARBON MONOXIDE DETECTOR WENT OFF,HAS HEADACHE;CO POISONING 2.1 CARBOXNE	18	Female	110720HEP2721
8/29/2011	46 Y/O MALE WAS INHALING EXHAUST FROM A GENERATOR IN A POORLY VENTILATED ROOM DURING HURRICANE DX: ACUTE DIZZINESS	46	Male	110907HEP1681
9/26/2011	44 YOM CARBON MONOXIDE INHALATION - FROM A GENERATOR	44	Male	110930HEP6641
10/1/2011	19 YOM WAS EXPOSED TO CO FROM GENERATOR RUNNING IN GARAGE. DX: CARBON MONOXIDE POISONING.	19	Male	111025HEP9001
10/30/2011	72 YOM CO INTOXICATION RUNNING A GENERATOR AT HOME PT ADMITTED CARBOXY HEMOGLOBIN 16.6*	72	Male	111110HEP9001
10/30/2011	57YOF CO EXPOSURE IN HOUSE WHERE GENERATOR WAS BEING USED CARBOXYHEMOGLOBIN 5.9 *	57	Female	111110HEP9002
10/30/2011	65 YOF CO EXPOSURE IN HOME WHERE GENERATOR WAS RUNNING CARBOXYHEMOGLOBIN 10.7*	65	Female	111110HEP9003
10/30/2011	49 YR OLD FEMALE WITH CO POISONING AFTER TURNING ON GENERATOR WHEN POWER WENT OFF RESULTING IN HEADACHE ALSO	49	Female	111102HEP9001
10/31/2011	58 YOM CO INTOXICATION FOUND UNRESPONSIVE IN BED HAD PROPANE GENERATOR RUNNING IN BASEMENT AT HOME PT ADMITTED CARBXHGB 28.7*	58	Male	111111HEP9002

Date Treatment	Narrative	Age	Sex	IDI
10/31/2011	58 YOF CO INTOXICATION FOUND UNRESPONSIVE IN BED AT HOME HAD PROPANE GENERATOR RUNNING IN BASEMENT AT HOME PT ADMITTED CAROBXHGB 23.6*	58	Female	111111HEP9001
11/1/2011	40 YF IN A HOUSE WITH GENERATOR RUNNING IN THE BASEMENT C/O NAUSEA/VOMITING & DIZZINESS>>CO EXPO	40	Female	111109HEP9002
11/1/2011	11 YOM GENERATOR WAS RUNNING IN THE BASEMENT WHEN DEV. DIZZINESS, N&V >>CO EXPOSURE	11	Male	
11/2/2011	15 YOF STAYING @ FRIEND'S HOUSE WITH GENERATOR RUNNING IN BASEMENT NOW WITH H/A&NAUSEA>>CO EXPO	15	Female	111109HEP9004
11/2/2011	20 MOF LIVES IN 2ND FLOOR OF HOUSE WHERRE GENERATOR WAS RUNNING IN THE BASEMENT>>R/O CO EXPO	220	Female	111109HEP9005
11/2/2011	9 YR OLD FEMALE WITH GAS POWER GENERATOR IN BASEMENT CAUSED CO POISONING	9	Female	111109HEP9006
11/29/2011	CO POISONING.30 YOM WAS USING A PORTABLE GENERATOR AND HAD A HEADACHE AND NAUSEA.	30	Male	111230HEP9001
11/29/2011	CO POISONING.32 YOM USED A PORTABLE GENERATOR AND DEVELOPED A HEADACHE AND NAUSEA.	32	Male	111230HEP9002
11/29/2011	CO POISONING.33 YOM USED A PORABLE GENERATOR AND DEVELOPED A HEADACHE AND NAUSEA.	33	Male	111230HEP9003
11/29/2011	CO POSIONING.48 YOM USED A PORTABLE GENERATOR AND DEVELOPED A HEADACHE AND NAUSEA.	48	Male	
2/11/2012	14 YOF CARBON MONOXIDE EXPOSURE. FAMILY USING GENERATOR IN HOME TO KEEP WARM. DX: CARBON MONOXIDE INHALATION.	14	Female	
2/11/2012	7 YOF CARBON MONOXIDE EXPOSURE. FAMILY USING GENERATOR IN HOME TO KEEP WARM. DX: CARBON MONOXIDE INHALATION.	7	Female	120220HEP7913
2/11/2012	11 YOF CARBON MONOXIDE EXPOSURE. FAMILY USING GENERATOR IN HOME TO KEEP WARM. DX: CARBON MONOXIDE INHALATION.	11	Female	120220HEP7915
2/11/2012	4 YOF CARBON MONOXIDE EXPOSURE. FAMILY USING GENERATOR IN HOME TO KEEP WARM. DX: CARBON MONOXIDE INHALATION.	4	Female	120220HEP7914
3/8/2012	61 YOM STATES DRANK FEW BEERS FELL ASLEEP WOKE UP & WENT INTO RM W/GENERATOR IN IT & IT WAS FILLED W/FUMES ETOH 22 DX CARBON MONOXIDE POISON	61	Male	120608HEP7036
3/31/2012	4 YOM WAS IN HOME WHERE GENERATOR WAS BEING USED FOR SPACE HEATER. DX: CO POISONING. COHB 17.3.	4	Male	120417HEP5921
3/31/2012	44 YOF WAS IN HOUSE WHERE GENERATOR WAS BEING USED FOR SPACE HEATER. DX: CO POISONING. COHB 29.8.	44	Female	
4/30/2012	32 YOM COULD SMELL THE GENERATOR IN THE BASEMENT OF THE HOUSE HE RENTS AND WAS EXPOSED TO CARBON MONOXIDE	32	Male	120509HEP9001
4/30/2012	58 YOM WAS AT HOME AND HAD A GENERATOR FAILURE AND WAS EXPOSED TO CARBON MONOXIDE	58	Male	120509HEP9002

Date Treatment	Narrative	Age	Sex	IDI
6/30/2012	64 YOF WAS EXPOSED TO FUMES FROM GENERATOR RUNNING IN HOME CARBON MONOXIDE EXPOSURE	64	Female	120709HEP6503
6/30/2012	33 YOF WAS EXPOSED TO FUMES FROM GENERATOR AT HOME CARBON MONOXIDE EXPOSURE	33	Female	120708HEP6504
7/1/2012	8 YOF WOKE WITH DIZZINESS, VOMITING AT HOME, PARENTS HAD GENERATOR RUNNING IN BASEMENT X3 HRS, PT ON 1ST FLOOR W/DAD, CO LEVEL IN ED17;CO POISI	8	Female	
7/1/2012	4 YOF EXPOSED TO CO IN HOUSE WITH GENERATOR RUNNING IN BASEMENT W/O PROPER VENTILATION X3 HOURS, CO LEVEL 14 IN ED; CO EXPOSURE	4	Female	120802HEP8214
10/17/2012	5 YOF SLEPT IN A HOUSE WITH A GENERATOR RUNNING IN THE GARAGE AND AWOKE WITH A HEADACHE COHGB OF 1.3 CO POISONING	5	Female	
10/17/2012	48 YOF SLEPT IN A HOUSE WITH A GENERATOR RUNNING IN THE GARAGE AND AWOKE WITH SEVERE HEADACHE COHGB OF 21.7 CO TOXICITY	48	Female	
10/17/2012	23 YOF SLEPT IN A HOUSE WITH A GENERATOR RUNNING IN THE GARAGE AND AWOKE WITH A SEVERE HEADACHE COHGB 13.7 CO POISONING	23	Female	
10/30/2012	3 YO MALE SLEEPING IN A ROOM NEXT TO A GENERATOR. DX CO POISONING. LE VEL = 40.6	3	Male	
10/30/2012	76 YOM USING GENERATOR OUTSIDE HOUSE YET CO DETECTOR WENT OFF, MEASURED 5 550PPM, COUGH>>CO EXPO	76	Male	
10/30/2012	14 YOM IN A HOUSE WITH GENERATOR RUNNING OUTSIDE WHEN SUDDENLY CO DETECTOR WENT OFF FEELING DIZZY>>CO EXPO	14	Male	
10/30/2012	12 YOM IN A HOUSE WITH GENERATOR RUNNING OUTSIDE, CO DETECTOR WENT OFF C/O DIZZINESS>>CO EXPO	12	Male	
10/30/2012	42 YOM IN A HOUSE WITH GENERATOR RUNNING OUTSIDE THE HOUSE NEAR THE WINDOW WHEN CO DETECTOR WENT OFF, 500PPM CO LVL, C/O SOB>>CO EXPO	42	Male	
10/30/2012	72 YOF @ HOME WITH GERNATOR RUNNING WHEN CO DETECTOR WENT OFF READING 500 PPM, C/O H/A, NAUSEA&LH'D>>CO EXPO	72	Female	
11/1/2012	78 YOF WAS IN A HOME WITH CARBON MONOXIDE EXPOSURE FROM A GENERATOR	78	Female	
11/1/2012	59 YOM BODY ACHES&GEN. "NOT FEELING WELL" AFTER RUNNING THE GENERATOR NEAR GARAGE 3D AGO>>R/O CO POISONING	59	Male	
11/1/2012	53 YOF AWOKE WITH H/A, MALAISE 2D AGO AFTER RUNNING GAS GENERATOR NEAR GARAGE DOOR>>CO EXPO	53	Female	
1/16/2013	38 YOF TO ER FOR DIZZINESS/ LIGHTHEADEDNESS, HUSBAND STATES HE STARTED THEIR GENERATOR JUST OUTSIDE THEIR DOOR AND POSS CO POISON CHG 1.7 H	38	Female	

Date Treatment	Narrative	Age	Sex	IDI
1/25/2013	42 YOF C/O HEADACHE & SOB. USING A GENERATOR ON THEIR PORCH W/ FUMES COMING INTO THE HOUSE. DX CARBON MONOXIDE POISONING	42	Female	
2/9/2013	63 YR OLD MALE LEFT DOOR OPEN FROM GARAGE WITH GENERATOR ON AND FOUND UNRESPONSIVE IN BED WITH CO POISONING AND TRANSF TO HYPERBARIC CHAMBER	63	Male	
2/9/2013	73 YR OLD MALE IN GARAGE WITH GENERATOR RUNNING HAD CO EXPOSURE WITH AN MI	73	Male	
2/9/2013	25 YR OLD MALE HAD GENERATOR RUNNING IN GARAGE BECAME LIGHTHEADED AND HIT HEAD ON COUNTER WITH CO EXPOSURE	25	Male	
2/14/2013	51 YR OLD MALE RAN INDOOR GENERATOR IN HOUSE WITH CO EXPOSURE AND SENT TO HYPERBARIC CHAMBER	51	Male	
2/14/2013	47 YR OLD FEMALE EXPOSED TO INDDOR GENERATOR CAUSING CO EXPOSURE AT HOME	47	Female	
2/23/2013	18 YO WHITE MALE AT HOME USING A GASOLINE GENERATOR RUNNING DUE TO POWER NOT ON YET, DX CARBON MONOXIDE POISONING	18	Male	
3/8/2013	87 YR OLD MALE IN HIS SHED,LIT GAS GENERATOR WITH KEROSENE LAMP AND SUFFERED CO POISONING	87	Male	
5/13/2013	22 YO MALE WITH HEADACHE, BLURRY VISION AND DIZZINESS AFTER WORKING INSIDE A TRAILER WITH A GENERATOR RUNNING. DX CARBON MONOXIDE EXPOSURE B	22	Male	
5/24/2013	36 Y/O FEMALE WOKE UP WITH NAUSEA & WEAKNESS FAMILY USING GENERATOR IN BASEMENT TO HEAT HOME LEVEL 23.1 TRANS TO U OF P DX C/M POISONING	36	Female	
5/24/2013	12 Y/O FEMALE FAMILY USING GENERATOR IN BASEMENT FOR HEAT SMOKE IN HOUSE WOKE WEAK & VOMITTING LEVEL 31.3 DX CARBON MONOXIDE POISONING	12	Female	
5/24/2013	3 Y/O MALE FAIMLY WAS USING GENERATOR IN BASEMENT FOR HEAT SMOKE IN HOUSE LEVEL 26.7 TRANS TO U OF P X CARBON MONIXIDE POISONING	3	Male	
7/17/2013	34 YOF WAS EXPOSED TO CARBON MONOXIDE AT HOME WHEN A GENERATOR WAS RUNNING IN BASEMENT AND WINDOWS WERE CLOSED. DX ANOXIA	34	Female	
12/14/2013	CO POISONING 46 YOM WAS USING A GENERATOR AND BECAME LIGHT HEADED AND NAUSEA AND VOMITTING. CO LEVEL 25.	46	Male	
2/1/2014	7 YOM SLEEPING IN A CAMPER AT A CAMPSITE AND A GENERATOR WAS RUNNING RIGHT OUTSIDE THE WINDOW DEVELOPED NAUSEA AND HEADACHE POSSIBLE CO EXPOSURE	7	Male	
2/1/2014	8 YOF IN A CAMPER CAMPING AND A GENERATOR WAS RUNNING RIGHT OUTSIDE INHALED THE FUMES ALTERED MENTAL STATUS CO EXPOSURE	8	Female	
2/1/2014	9 YOF SLEEPING IN A CAMPER WITH A GENERATOR RUNNING RIGHT OUTSIDE THE WINDOW AT A CAMP SITE DEVELOPED NAUSEA HEADACHE CO EXPOSURE	9	Female	

Date Treatment	Narrative	Age	Sex	IDI
2/1/2014	15 YOF IN A CAMPER THAT HAD A GENERATOR RUNNING RIGHT OUTSIDE OF IT DEVELOPED NAUSEA POSSIBLE CO EXPOSURE	15	Female	
2/5/2014	47 YOF EXPOSURE TO CARBON MONOXIDE DUE TO FAULTY GENERATOR. DX ANOXIA	47	Female	
2/12/2014	57 YOF ILL AFTER EXPOSED TO CARBON MONOXIDE FROM A GENERATOR THAT WAS BEING USED IN A BASEMENT	57	Female	
2/12/2014	60 YOM EXPOSURE TO CARBON MONOXIDE WHEN USING A GENERATOR IN THE BASEMENT OF HOUSE	60	Male	
3/3/2014	22 YOM WITH HEADACHE AFTER WORKING ON AN RV WITH A DIESEL HEATER AND GENERATOR RUNNING. DX ACCIDENTAL CARBON MONOXIDE POISONING.LEVEL 16.1%	22	Male	
3/11/2014	7 YOM REPORTS EXPOSED TO CARBON MONOXIDE AT HOME, CONFIRMED BY FIRE DEPT PTA. SOURCE FROM GENERATOR AT HOME. DX. CARBON MONOXIDE EXPOSURE	7	Male	
3/11/2014	12 YOM PT WITH 3 DAYS HX EXPOSURE TO CARBON MONOXIDE FROM GENERATOR AT HOME, CONFIRMED BY FD. DX. CARBON EXPOSURE	12	Male	
3/11/2014	14 YOM PT REPORTS EXPOSED TO CARBON MONOXIDE AT HOME, CONFIRMED BY FD, SOURCE FROM GENERATOR AT HOME. DX. CARBON MONOXIDE EXPOSURE	14	Male	
3/11/2014	37 YOF PT REPORTS EXPOSED TO CARBON MONOXIDE AT HOME FROM GENERATOR. DX. CARBON MONOXIDE EXPOSURE.	37	Female	
3/11/2014	44 YOM CARBON MONOXIDE ALARM WENT OFF IN THE HOUSE APPROX 9 PM, FD CAME, PT REGISTERED A 6 ON THEIR METER, CO ALARM WENT OFF. DX. CO EXPOSURE	44	Male	
3/14/2014	54 YOM ANOXIA- CO EXPOSURE FROM GENERATOR	54	Male	
3/15/2014	14 YOM ANOXIA- CO EXPOSURE USING GENERATOR IN GARAGE	14	Male	
3/15/2014	50 YOF ANOXIA- CO EXPOSURE USING GENERATOR IN GARAGE	50	Female	
3/15/2014	52 YOM ANOXIA- CO EXPOSURE USING GENERATOR IN GARAGE	52	Male	
4/4/2014	70 YO WHITE MALE WITH AMS AT HOME WITH HEAT GENERATOR ON,UNRESPONSIVE DX CARBON MONOXIDE POISONING, AMS	70	Male	
5/8/2014	19 YR OLD FEMALE RUNNING GENERATOR IN GARAGE AND FOUND DOWN WITH CO ALARM GOING OFF AND MED FLITE INJ,UNK IF FIRE DEPT	19	Female	
8/3/2014	42 YOF EXPOSED TO FUMES FROM GENERATOR EXHAUST @THE BEACH NOW WITH DIZZINESS&NAUSEA, EMS MEASURED CO TO BE 9%>>CO POISONING	42	Female	
8/27/2014	9 YOM TO ER FOR POSS CO EXPOSURE, IN HOME WITH GENERATOR THAT WAS RUNNING FOR 5 HRS	9	Male	

Date Treatment	Narrative	Age	Sex	IDI
8/27/2014	27 YOF TO ER FOR CO EXPOSURE, WAS RUNNING A GENERATOR FOR 5 HRS AT HOME	27	Female	
9/9/2014	6 Y/O MALE STATES WAS SLEEPING IN HOUSE WITH ELEVATED CARBON MONOXIDE LEVEL GENERATOR RUNNING IN HOUSE HGB 10.8 DX CARBON MONOXIDE POISONING	6	Male	
9/9/2014	46 Y/O FEMALE EXPOSED TO CARBON MONOXIDE FROM A GENERATOR THAT WAS RUNNING IN HOUSE HGB LEVEL 24,8 DX CARBON MONOXIDE POISONING	46	Female	
9/9/2014	50 Y/O MALE WAS RUNNING A GENERATOR IN THE HOUSE WITH A FEW WINDOWS OPEN DEVELOPED HEADACHE CALLED 911 & OPENED HOUSE DX CARBON MONOXIDE POISON	50	Male	
9/30/2014	70 YOF HAD A GENERATOR RUNNING IN GARAGE AND BECAME SICK COHGB OF 1.5 ANOXIA CO EXPOSURE	70	Female	
10/2/2014	10 YOF IN HOUSE 30 MIN WITH GENERATOR RUNNING FOR LONG TIME, CARBON MONOXIDE EXPLOSIVE; DX ANOXIA FIRE DEPT ATTENDED	10	Female	
11/5/2014	32 YOM WAS IN HOUSE WITH GENERATOR RUNNING IN BASEMENT AND WAS FOUND UNCONSCIOUS. DX ANOXIA	32	Male	

Date: December 1, 2015

TO : Janet Buyer, Project Manager
Division of Combustion and Fire Sciences
Directorate for Engineering Sciences

THROUGH : Kathleen Stralka, Associate Executive Director
Directorate for Epidemiology

Stephen Hanway, Director
Division of Hazard Analysis

FROM : Matthew V. Hnatov, Mathematical Statistician
Division of Hazard Analysis

SUBJECT : NFIRS Injuries, Deaths, and Property Loss Estimates from the Use of Portable
Generators, 2004-2012*

Based on the latest available data provided by the U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) and the National Fire Protection Association's annual survey of fire losses, it is estimated that there were a total of 1000 fires (an annual average of about 100 fires) involving portable generators over the 2004-2012 time frame. Associated with these fires, it is estimated that there were a total of 110 injuries (an annual average of about 10) and \$55.9 million (an annual average of \$6.2 million) in property and content loss. Table C.1 shows the annual breakdown of the portable generator-related fire and associated losses over the nine-year time frame.

Table C.1
Annual Estimated Residential Structure Fire Losses Resulting
From Portable Generator Fires

	Fires	Injuries	Deaths	Property Loss (in millions)
2004	100	10	0	\$2.4
2005	100	40	0	\$11.0
2006	100	0	*	\$1.4
2007	100	10	*	\$4.1
2008	200	20	*	\$12.3
2009	100	20	*	\$4.1
2010	100	0	0	\$6.9
2011	100	10	0	\$6.2
2012	100	10	0	\$7.5
Total	1000	110	10	\$55.9
Mean	100	10	*	\$6.2

Source: NFIRS and NFPA, 2004 – 2012

Note: Calculations of Total and Mean were based on un-rounded numbers; hence, sum not equal to total.

* This analysis was prepared by the CPSC staff. It has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

The estimates pertain to unintentional, residential structure fires, resulting in civilian injuries. Fire estimates are rounded to the nearest 100, death and injury estimates rounded to the nearest 10, and property/content loss estimates are rounded to the nearest tenth of a million dollars. The rounded death estimates less than 10 but greater than zero are denoted by an asterisk (*) because they are not publishable.

DRAFT

Date: Nov 5, 2015

TO : Janet Buyer, Project Manager
Division of Combustion and Fire Sciences
Directorate for Engineering Sciences

THROUGH : Kathleen Stralka, Associate Executive Director
Directorate for Epidemiology

Stephen Hanway, Director
Division of Hazard Analysis

FROM : Matthew V. Hnatov, Mathematical Statistician
Division of Hazard Analysis

SUBJECT : Carbon Monoxide Deaths Associated with Engine-Driven Generators Located
Outdoors in 2004 through 2014⁶

Non-fire, non-work-related, carbon monoxide (CO) poisoning is the primary hazard associated with engine-driven generators and has been linked to 751 deaths from 2004 through 2014 according to the most current CPSC statistics⁷. More than 94 percent of the recorded CO deaths associated with generator use occur when the generator is located within an enclosed space such as a house, shed, or trailer. But, carbon monoxide fatalities have occurred in scenarios where the generator was located outdoors. This memorandum provides a summary of reported CO fatalities associated with engine-driven generators located outdoors that occurred from 2004 through 2014. Data records used in this memorandum were extracted from CPSC's most current report on CO fatalities from generators and other engine-driven tools⁸. The incidents reported in this memo for the time period covered should not be considered a complete list of deaths associated with outdoor generator use. The reported incidents are just those contained within the CPSC databases. Additional reported incidents in this time period may come to light as reporting continues. It should be noted that statistics presented in this memo cannot be gleaned from the annual generator CO report because the generator report's location statistics refer to the victim's location and this memo presents information on incidents where the generator was located outdoors and where CO entered a confined space (house, RV, camper, etc.) and at least one victim died.

Over the period from 2004 through 2014, CPSC has records of 44 reported non-work-related CO poisoning deaths associated with generators being used outdoors. These 44 fatalities occurred in 31 incidents with no more than two fatalities in any one incident. A brief summary of each of the incidents is provided in the appendix to this memorandum with the associated CPSC In-Depth Investigation (IDI) identifier.

Note that in four of these 31 incidents, another possible contributing source of CO was present and may have been operating at the time of the incident:

⁶ This analysis was prepared by the CPSC staff, has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

⁷ Hnatov, M. V. *Incidents, Deaths, and In-Depth Investigations Associated with Non-Fire Carbon Monoxide from Engine-Driven Generators and Other Engine-Driven Tools, 2004-2014*. U.S. Consumer Product Safety Commission. June 2015.

⁸ Ibid.

- An incident which occurred in a recreational vehicle (RV) used as a temporary residence where a small charcoal “smoker” type grill was apparently being used outside, between the RV and a pickup truck. (IDI: 051207HCC2153)
- An incident occurred in a small house where a propane cooker had previously been used that day to warm milk and possibly the room. The propane cooker was off upon the fire department’s arrival. (IDI: 070828HCC2764)
- An incident which occurred in a recreational vehicle (RV) used as a temporary residence where a portable propane camp stove had also been in use. The medical examiner believes that the gas powered generator had greater impact on the carbon monoxide exposure than the portable propane camp stove. (IDI: 060330HCC3422)
- An incident occurred in a motor home where a generator was found near the bumper of the motor home out of gas. A portable propane heater was found inside the home though it is unknown if it was in use at the time of the fatality. (IDI: 110223HCC2328)

Table D.1 presents a summary of the number of incidents and fatalities broken down by year. Notice that in 2005, there were more than double the number of recorded incidents and fatalities than any other year covered by this memorandum, with the exception of 2011. 2005 was notable as a year with an unusually high number of severe weather events in the United States including four Class 5 Hurricanes (Emily, Katrina, Rita and Wilma) and numerous winter ice storms in the southern and Midwestern United States. In 2011, one incident involved the death of five individuals (spectators) in an RV parked at a racing event.

Table D.1: Fatal Incidents and Fatalities from Carbon Monoxide Poisoning Associated the Outdoor Generator Usage by Year of Occurrence

Year	Incidents	Fatalities
2004	1	2
2005	9	12
2006	4	5
2007	3	3
2008	0	0
2009	3	4
2010	4	5
2011	3	8
2012	3	4
2013	1	1
2014	0	0
Total	31	44

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.

Tables D.2 through D.4 present demographic summaries of the CO fatalities categorized by age of the victim, gender of victim, and race/ethnicity of the victims, respectively.

Table D.2: Summary of Fatalities from Carbon Monoxide Poisoning Associated the Outdoor Generator Usage by Age of Victim, 2004-2014

Age Range	Fatalities
Under 5	0
5 to 14	1
15 to 24	8
25 to 44	18
45 to 64	10
Over 65	7
Total	44

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.

Table D.3: Summary of Fatalities from Carbon Monoxide Poisoning Associated the Outdoor Generator Usage by Gender of Victim, 2004-2014

Gender	Fatalities
Female	12
Male	32
Total	44

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.

Table D.4: Summary of Fatalities from Carbon Monoxide Poisoning Associated the Outdoor Generator Usage by Race/Ethnicity of Victim, 2004-2014

Race/Ethnicity*	Fatalities
Asian	1
Black/African American	6
Hispanic (any Race)	2
Native American	3
White	32
Total	44

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.

* Victims of Hispanic descent are included in the category “Hispanic (All races)” irrespective of race. All other Race/Ethnicity categories include only non-Hispanic victims. For example, the “White” category includes only non-Hispanic Whites, where all Hispanic Whites would be included in the “Hispanic (All races)” category.

Table D.5 presents a summary of the incidents and fatalities categorized by location of the incident. The table is separated into home and temporary locations. For the purposes of this report, a home location is defined as the established main residence of the victims whether it be a house, apartment, trailer, boat, or other structure used as the primary, everyday residence. A temporary location is a location being used away from the victim’s established main residence (such as a camper or cabin used on vacation or a hunting trip).

Fewer than half of the reported fatal outdoor generator incidents occurred at home locations - 39% (12 of 31). Though the number of reported fatal outdoor generator incidents is somewhat small, this percentage varies greatly from the percentages observed for all generator incidents, irrespective of generator location, where 84% of all fatal generator incidents occurred at home locations versus 16% at temporary locations⁹.

Table D.5: Summary of Fatalities from Carbon Monoxide Poisoning Associated the Outdoor Generator Usage by Location of the Incident and Associated Fatalities, 2004-2014

Victim Location	Incidents	Fatalities
Home Locations		
House	8	10
Apartment	1	2
Camper / Trailer	1	1
Mobile Home	1	1
Boat	1	1
Total - Home	12	15
Temporary Locations		
Camper / Trailer	9	13
Vehicle	2	2
Boat	1	1
Cabin	1	1
RV	6	12
Total - Temporary	19	29
Total – All Locations	31	44

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.

Table D.6 presents a summary of the incidents and fatalities at permanent, fixed-site houses at home locations, categorized by the size of the home. Note that all three of the non-house home locations (including the trailer home) were of unknown size. House sizes were obtained from CPSC investigation reports, when available, or from internet searches (primarily real estate information sites). Four of the six incidents where the house size was known occurred in houses smaller than 1,500 square feet. All but one of the six incidents where the house size was known occurred in houses smaller than 2,000 square feet.

⁹ Ibid., 18.

Table D.6: Summary of Fatal Incidents from Carbon Monoxide Poisoning Associated the Outdoor Generator Usage by House Size at Home Locations*, 2004-2014

House size (sq. ft.)	Incidents	Fatalities
Under 500	0	0
500-999	2	2
1,000-1,499	2	2
1,500-1,999	1	1
2,000-2,499	1	1
2,500-2,999	0	0
3,000 or larger	0	0
Unknown	2	4
Total	8	10

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.

* This table includes only the 8 incidents which occurred in fixed-site houses, detached or attached. Other home locations (apartments, campers, boats, and mobile homes) are not included here even though these were known to have been used as permanent homes.

Table D.7 presents a summary of the number of incidents categorized by the size (in Watts) of the generator involved. Note that one incident involved an automatic standby (stationary) generator rated at 7,000 Watts that was installed outside, directly next to a house under, what appears to be, a roof extension.

Table D.7: Summary of Generator Size (Watts) Involved in Fatal Carbon Monoxide Poisoning Incidents Associated with the Outdoor Generator Usage, 2004-2014

Wattage Rating (Watts)	Incidents
Under 2,000	1
2,000-3,499	4
3,500-4,999	3
5,000-6,499	6
6,500-7,999	1*
8,000 and larger	1
Unknown	15
Total	31

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.

* This incident involved an automatic standby (stationary) generator rated at 7,000 Watts.

**Appendix: Brief Summary of Fatal Incidents where the Generator was Located Outdoors,
2004-2014**

In-Depth Investigation	Incident Date	Number of Victims	Home / Temporary	Victim Location	Brief Incident Description
040209HWE5012	1/28/04	2	Home	House	A running gas powered electric generator being used on porch of residence. There was a PVC exhaust pipe that went from basement to the outside, near the generator. It is believed that the wind blew the generator exhaust into the house through that pipe.
051207HCC2153	6/27/05	2	Temporary	RV	A 55 yr. old male and a 40 yr. old female were staying in a 33-foot recreational vehicle on private property. A gas powered portable generator was positioned approx. a foot away from the RV. A rear bedroom window in the RV was open. The occupants died from carbon monoxide poisoning.
060908HCC3858	7/17/05	2	Temporary	Camper / Travel Trailer	Two male victims, ages 26 and 27, were discovered dead in a combination, pick-up truck/camper at a state rest area. The victims had pulled off the interstate to sleep at a rest area when a gas-powered generator started. Exhaust pipe of generator was facing toward the unsealed camper door.
051104HCC1082	10/27/05	1	Home	House	A family member purchased a generator to supply electricity to the home because Hurricane Wilma struck the Florida east coast the previous day. Two days later, after the family of 7 began using the generator, a 48 year old male expired overnight. It is believed that the generator was running outside the back of the residence with the sliding glass door open approximately 4 inches. The other six victims were treated at a hospital.
051206HNE0284	11/8/05	1	Temporary	Camper / Travel Trailer	A 57-year-old male was overcome by carbon monoxide from a generator that was chained to the bumper of a trailer. The victim had used it to supply power to the trailer. The generator exhaust fumes were being drawn into the trailer by a running trailer furnace.
070313HCC3301	11/27/05	1	Home	Camper / Travel Trailer	The Coroner's office indicated that the source of carbon monoxide was from a small gasoline powered generator located under the trailer.
060503HCC1509	12/12/05	1	Home	House	The victim had been running a gas powered portable generator directly outside an open garage door with the exhaust facing the interior of the garage was found on the floor of the garage of the one family residence.
070828HCC2764	12/16/05	1	Home	House	Carbon monoxide poisoning sickened three females (ages 25 years, 5 years, and 1 month) and likely led to the death of a 17 year old male. Electrical service was out due to an ice storm. A gas generator was running on the covered front porch of a small house near A/C unit. A portable propane outdoor cooker had also been in use inside the residence.
060330HCC3422	12/16/05	2	Temporary	RV	Two victims found dead in a motor home with a portable propane camp stove and a gas powered generator running. The large gas powered generator was observed outside the motor home and was apparently being used as a source of electricity. It is believed by the medical examiner that the gas powered generator had greater impact on the carbon monoxide exposure than the portable propane camp stove.
060124HCC1321	12/17/05	1	Home	House	A 49-year old male died from CO-poisoning while operating a portable, gas generator outside of an open, basement doorway. His residence lost electrical power during an ice storm. The victim was overcome by fumes that had seeped into the basement, traveled up the stairway and filled the living quarters.
060824HCC2770	1/1/06	1	Temporary	Camper / Travel Trailer	A 66-year-old male died from acute carbon monoxide poisoning while sleeping in an enclosed trailer at a campground with a gasoline-powered generator running outside the trailer. His 10-year-old granddaughter, who was also sleeping in the trailer at the time of the incident, suffered from CO poisoning, but survived. Investigators determined that exhaust from the generator, which was being used to power an electric space heater inside the trailer, entered the interior through a partially opened side door.
061016HCC3021	8/27/06	2	Temporary	Camper / Travel Trailer	A 62 year old male and his 7 year old granddaughter died of carbon monoxide poisoning when they went to sleep in a travel trailer with a generator running outside directly under the rear door to the travel trailer.
061107HCC3069	9/11/06	1	Temporary	Camper / Travel Trailer	Victim, a 42 year old male, was camping in his travel trailer at a remote camping site. He was found that evening at 9:00 pm unresponsive in the trailer by a neighboring camper who had not seen victim all day. The controls to the gas stove were found in the off position and the only other appliance that could have caused carbon monoxide was a gas generator that had been next to the trailer.

In-Depth Investigation	Incident Date	Number of Victims	Home / Temporary	Victim Location	Brief Incident Description
070807HCC1667	10/12/06	1	Temporary	Boat	A 43 year old male died and a 35 year old male was hospitalized from carbon monoxide poisoning caused by a small portable gas generator that was being used to run a window mounted air conditioning unit aboard a 42 foot commercial fishing boat. The generator was on deck but its exhaust side was pointed towards the cabin in the same area where the air conditioner took its supply air. This apparently caused the exhaust (CO) to be drawn through the air conditioning unit and into the cabin where the two victims were sleeping.
071005HCC1018	3/8/07	1	Temporary	RV	The 49 year old male decedent was found dead in his mobile home. There was a gas generator on the steps of his home attached to a propane heater inside the home. Cause of death: carbon monoxide poisoning.
080123HCC2376	5/12/07	1	Home	Mobile Home	A 31-year-old male died of carbon monoxide poisoning while using a generator to provide power to his mobile home. The victim placed the generator in a back attached shed which shared a common vent with the home.
071219HCC3255	12/12/07	1	Home	House	A 19-year-old woman died from co poisoning in a house that lost power during an ice storm. The residents placed a portable generator outside the open front door to supply temporary electricity to the house. They had the door open so they could supervise the generator and make sure nobody stole it from them.
090306HCC2428	2/4/09	2	Temporary	Camper / Travel Trailer	A 26-year-old female and a 27-year-old male died of carbon monoxide poisoning caused by fumes from a portable generator they were using outside a horse trailer converted to a camper. The exhaust pipe of the generator faced the back door of the camper and was level with a one inch gap where the back gate of the horse trailer was designed to open to let animals enter.
090227HCC3368	2/22/09	1	Temporary	Camper / Travel Trailer	The victim is a 19-year-old female who was at a campsite in a camper along with her foster parents, other family members, and friends. The victim was sleeping in the camper/motorhome with several other people. A poorly vented gas generator that was sitting on the rear bumper of the camper caused a build-up of carbon monoxide in the camper. The motor home was facing toward the east and the wind was coming from the east at approximately 10 to 15 knots.
110921HCC2977	7/4/2009	1	Temporary	Vehicle	A 33 year old male victim fell asleep in his pickup truck parked next to a running generator. The fumes seeped through a rusted hole located in the cab of the truck. The victim inhaled the fumes while sleeping. His brother found him unresponsive the next morning. The paramedics arrived on the scene and transported him to the local hospital where he was pronounced deceased due to carbon monoxide intoxication.
111109HCC3125	1/8/2010	1	Temporary	Vehicle	A 38 year-old male was found deceased inside of a small parked car. Outside, near the car was a small portable generator used to power an adjacent home. It is surmised that the victim sought shelter in the car from the elements. Someone from the home unknowingly started the generator with the victim in the nearby car. The victim was found deceased with a carbon monoxide saturation of 64% as well as amounts of several illegal drugs in his system.
100211HCC1321	1/10/2010	1	Home	Boat	A 60 year-old male died from carbon monoxide poisoning while aboard a sail boat he was using as his permanent residence. The victim used a portable generator to supply power to a space heater aboard the vessel as well as to supply power to the vessel itself. A flexible hose had been connected to the generator exhaust port and vented outside the vessel. However, the exhaust hose developed a leak and carbon monoxide vapors entered the sleeping area of the cabin.
100204HCC3322	1/22/10	1	Home	House	An 83-year-old man and his 76-year-old wife were found unconscious from carbon monoxide poisoning. The man later died in hospital. The couple was using a generator outside their home but due to deep snow carbon monoxide found its way to inside the home.
100415HCC3576	4/12/2010	2	Temporary	Camper / Travel Trailer	Two, 18-year-old men died from carbon monoxide poisoning while inside a camper on the bed of a pick-up truck. A gasoline-powered generator provided electricity to the camper. The generator was strapped on a cargo carrier at the back of the truck which placed it next to the camper's door. The generator's exhaust faced the camper. An extension cord was plugged into the generator at one end and into the exterior of the camper at the other end. Both victims were pronounced dead at the incident scene.
110223HCC2328	1/27/2011	1	Temporary	RV	A 40-year-old male was found unresponsive in his motor home. The victim died of carbon monoxide poisoning. A generator was found outside the home near the rear bumper. A portable propane heater was found inside the home. The co source resulting in the death could not be confirmed.

In-Depth Investigation	Incident Date	Number of Victims	Home / Temporary	Victim Location	Brief Incident Description
110912HNE1118	8/30/11	2	Home	House	An 82 year-old man and his 79 year-old wife both found deceased from carbon monoxide poisoning in their home after being discovered unresponsive by neighbors who hadn't seen them in several days. The home's power had been knocked out by tropical storm Irene several days prior and an automatic standby generator had been running since. Investigators believe the homeowner installed the unit too close to the home and immediately adjacent to a venting window for the crawlspace which ran under the entire house.
110919HNE1300	9/18/2011	5	Temporary	RV	Five adults one of which was a 27 yom died of carbon monoxide poisoning from a portable generator. The generator was positioned outside a recreation vehicle with the generator's muffler pointing towards a storage compartment on the rv. The storage compartment was not completely closed and the exhaust entered the rv through the compartment. The co saturation in the rv was 438 ppm. The co alarm did not have batteries installed.
121119HCC1206	11/1/12	2	Home	Apartment	Two 19 year-old females were killed in an apartment by prolonged exposure to carbon monoxide. The carbon monoxide came from a generator that was placed too close to their apartment window.
121120HNE1508	11/13/12	1	Temporary	Cabin	A 39-year-old male was sleeping in a hunting cabin with a generator operating outside near the air conditioning unit of the cabin. He was later found unresponsive by friends. The victim's cause of death was listed as carbon monoxide intoxication.
131121HCC3153	11/30/12	1	Temporary	Camper / Travel Trailer	Three victims (82yom - deceased, 58yom - hospitalized, and 54yom - no treatment) succumbed to carbon monoxide while using a camping trailer. A portable gasoline generator was found next to the trailer with the exhaust vented in the direction of an open access panel. A carbon monoxide detector was present in the trailer.
130827HCC1090	8/7/13	1	Temporary	RV	A 75 year-old man died and his 76 year-old wife made ill due to carbon monoxide (co) poisoning while they were sleeping in a borrowed motorhome. A portable gas generator that had also been borrowed was placed atop a cargo rack affixed to the rear of the motorhome, and was in close proximity to the motorhome's bedroom area. The husband and wife went to sleep during the evening and left the gas generator operating until it ran out of gas. The husband and wife were found unconscious the following morning by a neighbor. The wife was transported to a local hospital and has recovered. Her husband was declared deceased at the scene. There was no co alarm present.

Date: Nov. 3, 2015

TO : Janet Buyer, Project Manager
Division of Combustion and Fire Sciences
Directorate for Engineering Sciences

THROUGH : Kathleen Stralka, Associate Executive Director
Directorate for Epidemiology

Stephen Hanway, Director
Division of Hazard Analysis

FROM : Matthew V. Hnatov, Mathematical Statistician
Division of Hazard Analysis

SUBJECT : Fire-Related Incidents Associated with Engine-Driven Generators in 2004 through
2014¹⁰

This memorandum provides a summary of reported fire incidents associated with engine-driven generators from 2004 through 2014. The incidents reported in this memo for the time period covered should not be considered a complete list of fire incidents associated with generator use. The reported incidents are just those CPSC staff are aware of and have information contained within the CPSC databases. Additional reported incidents in this time period may come to light as reporting continues.

Over the period from 2004 through 2014, CPSC has records of 186 reported non-work-related fire incidents associated with generators. Table E.1 presents a summary of the number of incidents broken down by type of generator and year. Incidents involving portable generators comprise the vast majority (93%, 172 of 185) of reported fire incidents from 2004 to 2014.

¹⁰ This analysis was prepared by the CPSC staff, has not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

Table E.1: Reported Fire Incidents Associated with Generators by Type of Generator and Year of Occurrence, 2004-2014

Year	Portable generator	Fixed stand-by generator	Unknown generator type	Total
2004	11			11
2005	21	2		23
2006	20	1		21
2007	11	1		12
2008	22	2		24
2009	14			14
2010	13			13
2011	21			21
2012	16			16
2013	12	1		13
2014	11	4	2	17
Total	172	11	2	185

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.
 Source: U. S. Consumer Product Safety Commission, Directorate for Epidemiology, 2015.

Table E.2 presents a summary of reported fire incidents involving generators categorized by generator type and the incident type as described in the available incident reports. Descriptions of the incident are often limited, if present at all. Twenty-four percent of the incidents (45 of 185), the incident was described as simply the generator caught fire. In 18 percent of the incidents (34 of 185), no scenario was described (“unknown”), simply that a fire was caused by a generator. Many of the incident types may overlap, but there are insufficient available incident details in many cases to better characterize the scenarios. For example, the description “backfired” and “spark, fire” may, in some cases, be a “proximity fire” (a fire blamed on a generator being placed too close to a combustible material). But, “backfired” and “spark, fire” scenarios may have been a “leak, fire” or a “spark, vapor ignition” type incident.

The incidents described as occurring during refueling (“refilling, fuel”) constitute the second highest percentage of incidents where some descriptive information was available (excluding “Unknown” cases). Twenty-three percent of the incidents where a description was available (34 of 151) indicated that the fire broke out during the refueling process. This scenario usually involved refueling the generator while it was still running, but there were also incidents where the witnesses claimed that the generator was turned off prior to refueling. Proximity fires, fires where the heat from the generator or the generator exhaust caused nearby flammable material to ignite, constituted 18 percent (27 of 151) of known scenario incidents.

Table E.2: Reported Fire Incidents Associated with Generators by Type of Generator and Incident Type, 2004-2014

Incident Type	Portable generator	Fixed stand-by generator	Unknown generator type	Total
backfired	3			3
caught fire	44	1		45
electrical fire	9			9
explosion	7			7
leak, fire	11			11
proximity fire	23	4		27
refilling, fuel	34			34
spark, fire	7			7
spark, vapor ignition	5	1		6
battery explosion		2		2
unknown	29	3	2	34
Grand Total	172	11	2	185

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.
 Source: U. S. Consumer Product Safety Commission, Directorate for Epidemiology, 2015.

Tables E.3 presents a summary of deaths and injuries from the reported fire incidents involving generators categorized by generator type as described in the available incident reports. Again, some of the categories may overlap. For example, injuries reported as “Minor burns” may have been “Treated and Released” type injuries. Incidents where the scenario descriptions stated that the victims were “taken to the hospital” were included in the “Hospital Admission” category, though some of these may have been a “Treated and Release” injury. However, insufficient information was available to make a definitive determination. Note that the total number of victims is greater than the number of incidents because there were some multiple injury incidents – often which would be categorized into different categories. Incidents identified as “No First Aid or Medical Attention Received” were characterized as “No injury”. For summary purposes, generator fire incidents which did not involve an injury are counted as a singular “Victim Injury Severity” event, thus there were 135 such “No injury” events reported.

As can be seen in Table E.3, the only reported deaths and injuries occurred in fire incidents associated with portable, gasoline-fueled generators.

Table E.3: Reported Fire Incidents, Injuries, and Fatalities Associated with Generators by Type of Generator and Victim Injury Severity Type, 2004-2014

Victim Injury Severity	Portable generator	Fixed stand-by generator	Unknown generator type	Total*
Death	15 (14 [#])			15 (14 [#])
Hospital Admission	20 (18 [#])		1	21 (19 [#])
Emergency Department Treatment Received	3 (3)			3 (3)
Treated and Released	9 (8)			9 (8)
Minor burns	12 (6)			12 (6)
Level of care not known	2 (1)		1	3 (2)
Incident, No Injury	124 (124)	11		135 (135)
Grand Total	185 (172)	11	2	198 (185)

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.

Source: U. S. Consumer Product Safety Commission, Directorate for Epidemiology, 2015.

* Some incidents involved multiple victims. Each victim has been included in the table. The number of incidents appears in parentheses.

The count included two separate incidents which involved both a victim who died and a victim who was admitted into the hospital. These incidents are counted in both categories so the sum of the incidents will be two more than actually occurred as shown in the “Grand Totals” row of the table.

Table E.4 presents reported generator fire-related fatalities categorized by age of the victim. Sixty percent of the fatalities were 45 years old or older. Though the number of generator fire-related fatalities are much lower than those seen for carbon monoxide fatalities, the proportion of victims above the age of 24 are similar. Eighty percent of fire-related fatalities were above the age of 24 while 83 percent of the CO related fatalities were above the age of 24¹¹.

Table E.4: Summary of Fatalities from Generator Fire-Related Incidents by Age of Victim, 2004-2014

Age Range	Fatalities
Under 5	0
5 to 14	0
15 to 24	3
25 to 44	3
45 to 65	5
Over 65	4

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.

Source: U. S. Consumer Product Safety Commission, Directorate for Epidemiology, 2015.

¹¹ Incidents, Deaths, and In-Depth Investigations Associated with Non-Fire Carbon Monoxide from Engine-Driven Generators and Other Engine-Driven Tools, 2004–2014.

Table E.5 presents generator fire-related fatalities categorized by gender of the victim. Two-thirds of the fatalities were males. As with the ages of the generator fire-related fatalities, the proportion of male victims were similar to those seen with generator-related CO fatalities (73 percent¹²).

Table E.5: Summary of Fatalities from Generator Fire-Related Incidents by Gender of Victim, 2004-2014

Gender	Fatalities
Female	5
Male	10

Data collection is ongoing for 2013 and 2014. Counts may change in subsequent reports.
Source: U. S. Consumer Product Safety Commission, Directorate for Epidemiology, 2015.

¹² Ibid.

Date: October 6, 2015

TO : Gregory Rodgers
Directorate for Economic Analysis

THROUGH : Kathleen Stralka, M.S., Associate Executive Director
Directorate for Epidemiology

FROM : Stephen Hanway, M.S., Division Director
Hazard Analysis Division

SUBJECT : Injuries Associated with Generators Seen in Emergency Departments with Narratives
Indicative of CO Poisoning 2004-2012 for Injury Cost Modeling

I. Introduction

This memorandum gives results of a data search for carbon monoxide injuries associated with portable generators seen in emergency departments. The data source is the National Electronic Injury Surveillance System (NEISS), maintained by the U.S. Consumer Product Safety Commission (CPSC). Included here are incidents associated with victims seen in hospital emergency rooms from 2004 through 2012.

The purpose is to provide a basis for Injury Cost Modeling (see Zamula, 2007 or Miller and Bhattacharya, 2013) for these injuries. However, these should not be considered definitive estimates of carbon monoxide poisoning injuries. Physicians have noted difficulty in correctly diagnosing these injuries (e.g. Aniol, 1992). Carbon monoxide poisoning may mimic many conditions including alcohol or drug intoxication, psychiatric disorders, flulike illnesses, and others that can lead to misdiagnosis (ibid). Measurement of COHb levels in the blood can also be confounded based on the time lapsed and any breathing treatment administered which can lower counts prior to measurement. In the absence of an attempt to provide NEISS cases where carbon monoxide was diagnosed, however it would not be possible to compute non-fatal injury costs thus a potential underestimate was deemed more practical than assuming the injury costs would be zero.

II. Background

CPSC received an average of 63 reported non-fire carbon monoxide deaths per year from 2010-2012 associated with generators (see Hnatov, 2015). These often occur when the generator is operated in an enclosed space or is otherwise improperly ventilated. Multiple fatalities can result from a single incident. In fatal cases where such information can be known, it does not appear that the victims were aware that they were in danger which underscores why physicians may have trouble diagnosing such cases.

III. Injury Data

A. Methodology

NEISS is a probability sample of 96 U.S. hospitals having 24-hour emergency departments (EDs) and more than six beds. Coders in each hospital code consumer product-related data from the ED record and the data is then transmitted electronically to CPSC. Because NEISS is a probability sample, each case collected represents a number of cases (the case's *weight*) of the total estimate of injuries in the U.S. Different hospitals carry different weights, based on stratification by their annual number of emergency department visits (Kessler and Schroeder, 1999).

Staff searched the NEISS database for incidents between 2004 and 2012 involving generators (with a primary or secondary product code of 606) where the narrative description indicates carbon monoxide poisoning. This includes cases where the narrative says CO2 poisoning, with the presumption that a coding error was made. Not all of the cases included measures of COHb levels, nor were the observed levels always very high (some were in the 2% range).

Hazard Analysis staff used SAS[®] version 9 to compute estimates and the associated coefficients of variation for the number of injuries as well as the estimated number of injuries with particular characteristics such as age and gender. A coefficient of variation (C.V.) is the ratio of the standard error of the estimate (i.e. variability) to the estimate itself. This is generally expressed as a percent. A C.V. of 10% means the standard error of the estimate equals 0.1 times the estimate. Large C.V.'s alert the reader that the estimate has considerable variability. This is often due to a small sample size.¹³ Estimates and confidence intervals are not reported unless the number of cases is 20 or more, the estimate is greater than 1,200, and the C.V. is less than 33%.

B. Results

There were an estimated 8,703 injuries seen in emergency departments associated with generators with narratives indicative of carbon monoxide poisoning. Injuries were higher on average during the period from 2004-2008 which follows the pattern for reported deaths over these time periods. This coincided with severe weather events including Hurricane Katrina (see Hnatov, 2014).

Table F.1: Injuries Associated with Generators Seen in Emergency Departments with Narratives Indicative of Carbon Monoxide Poisoning 2004-2012, by Date

Product	Estimated Injuries	Annual Average	Coefficient of Variation	Sample Size	95% Confidence Interval
2004-2008	5,899	1,180	0.2620	149	2,870-8,928
2009-2012	2,805	701	0.2185	99	1,603 – 4,006
Total	8,703	1,741	0.1834	248	5,575 – 11,831

Source: U.S. Consumer Product Safety Commission National Electronic Injury Surveillance System and Children and Poisoning System, 2004-2012.

Rows may not sum to the total due to rounding.

¹³ For a more detailed discussion of measures of variation associated with NEISS estimates, see Kessler E and Schroeder T. *The NEISS Sample (Design and Implementation)*. U.S. Consumer Product Safety Commission. October 1999.

There were an estimated 5,458 injuries seen in emergency departments associated with generators with narratives indicative of carbon monoxide poisoning where the patient was treated and released. One NEISS case involved a three-year-old male who died after being found unresponsive in an apartment where a faulty generator was running in the basement. In twelve cases, the patient was held for observation. In six cases, the patient left without being seen. The remaining patients were hospitalized (see Table F.2).

Table F.2: Injuries Associated with Generators Seen in Emergency Departments with Narratives Indicative of Carbon Monoxide Poisoning 2004-2012, By Disposition

Product	Estimated Injuries	Coefficient of Variation	Sample Size	95% Confidence Interval
Treated and Released	5,458	0.1551	173	3,799 – 7,117
Hospitalized	*	*	56	*
Held for Observation	*	*	12	*
Left w/o Being Seen/ or Against Medical Advice	*	*	6	*
Fatality	*	*	1	*
Total	8,703	0.1834	248	5,575 – 11,831

Source: U.S. Consumer Product Safety Commission National Electronic Injury Surveillance System and Children and Poisoning System, 2004-2012.

*Indicates that the sample size was too small, the estimate too small, or the C.V. too large to be reported.

The age of the victims ranged from 5 months to 95 years. There were an estimated 2,649 injuries seen in emergency departments associated with generators with narratives indicative of carbon monoxide poisoning where the victim was under 18, 2,460 such injuries where the victim was aged 18 to 44, and 2,059 injuries where the victim was 45 to 64 (see Table F.3).

Table F.3: Injuries Associated with Generators Seen in Emergency Departments with Narratives Indicative of Carbon Monoxide Poisoning 2004-2012, By Age

Product	Estimated Injuries	Coefficient of Variation	Sample Size	95% Confidence Interval
< 18 years	2,649	0.2963	88	1,111 – 4,187
18 - 44	2,460	0.2095	84	1,450 – 3,470
45 - 64	2,059	0.2107	50	1,209– 2,909
65 years & over	*	*	26	*
Total	8,703	0.1834	248	5,575 – 11,831

Source: U.S. Consumer Product Safety Commission National Electronic Injury Surveillance System and Children and Poisoning System, 2004-2012.

*Indicates that the sample size was too small, the estimate too small, or the C.V. too large to be reported.

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