



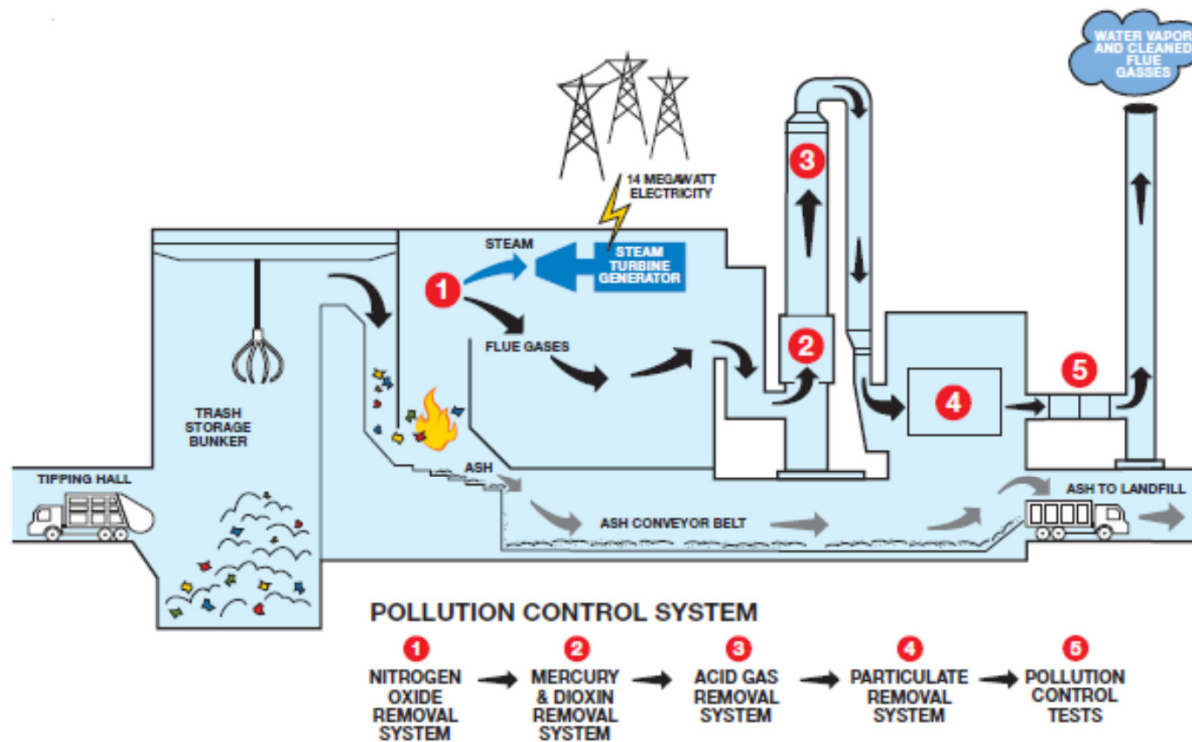
Pharmaceutical and Personal Care Product (PPCP) Test Burn Results

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Section Chief/Chemist

MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION

Protecting Maine's Air, Land and Water

Facility Overview:

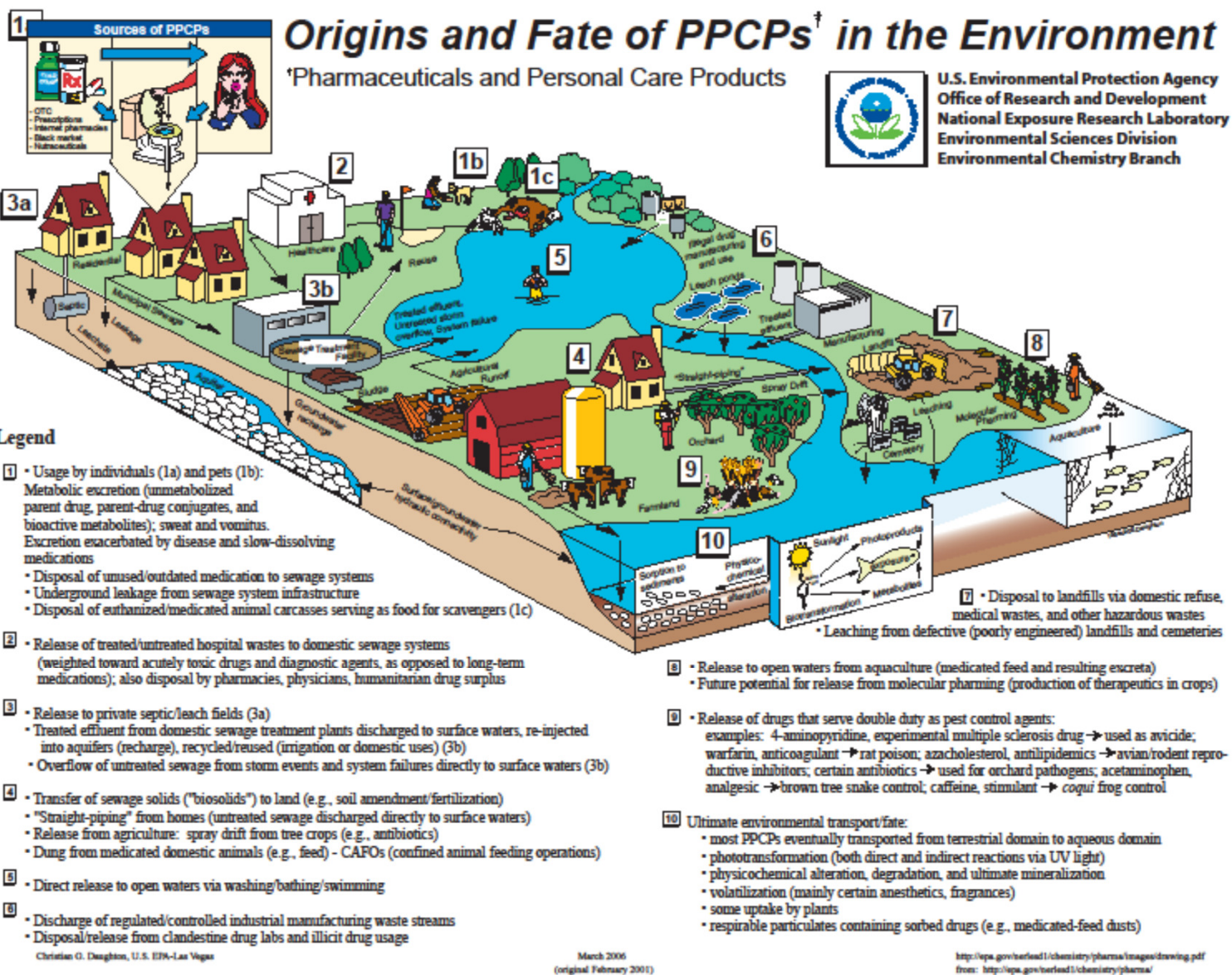


Waste-to-Energy

- 90% reduction of trash volume
- Power generation
- Pollution control

ecomaine
the future of regional waste systems
www.ecomaine.org







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- Partnership with DEA
 - Resident Agent in Charge, Mike Wardrop
 - Looking for permanent in State option
 - Coordination for Maine Law Enforcement Agencies
 - Public Safety Concerns
 - Uniform Rules of Disposal
 - Environmentally Safe Protocols
 - Best Available Technology

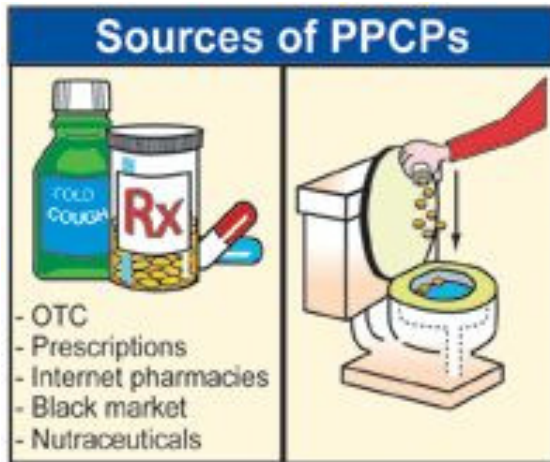




DEA Program

- Federal funding for household pharmaceutical collection events is ending.
- Transportation of household pharmaceuticals to Massachusetts municipal waste combustors incur financial and environmental cost for each trip.
- Maine DEA looking for affordable, long term solution to continuing Maine's take-back events.





Discarding unused drugs and personal care products down the toilet is a common but poor disposal method.
(<http://www.epa.gov/ppcp/basic2.html>)

National Drug Take Back

- National Drug Take Back Day #8 held on Saturday, April 26, 2014.. The statewide collection results reached another new bar: **27,040 pounds.**
- The **GRAND TOTAL** for all eight collections in Maine to date now stands at **133,660 pounds.**





Incineration Loads

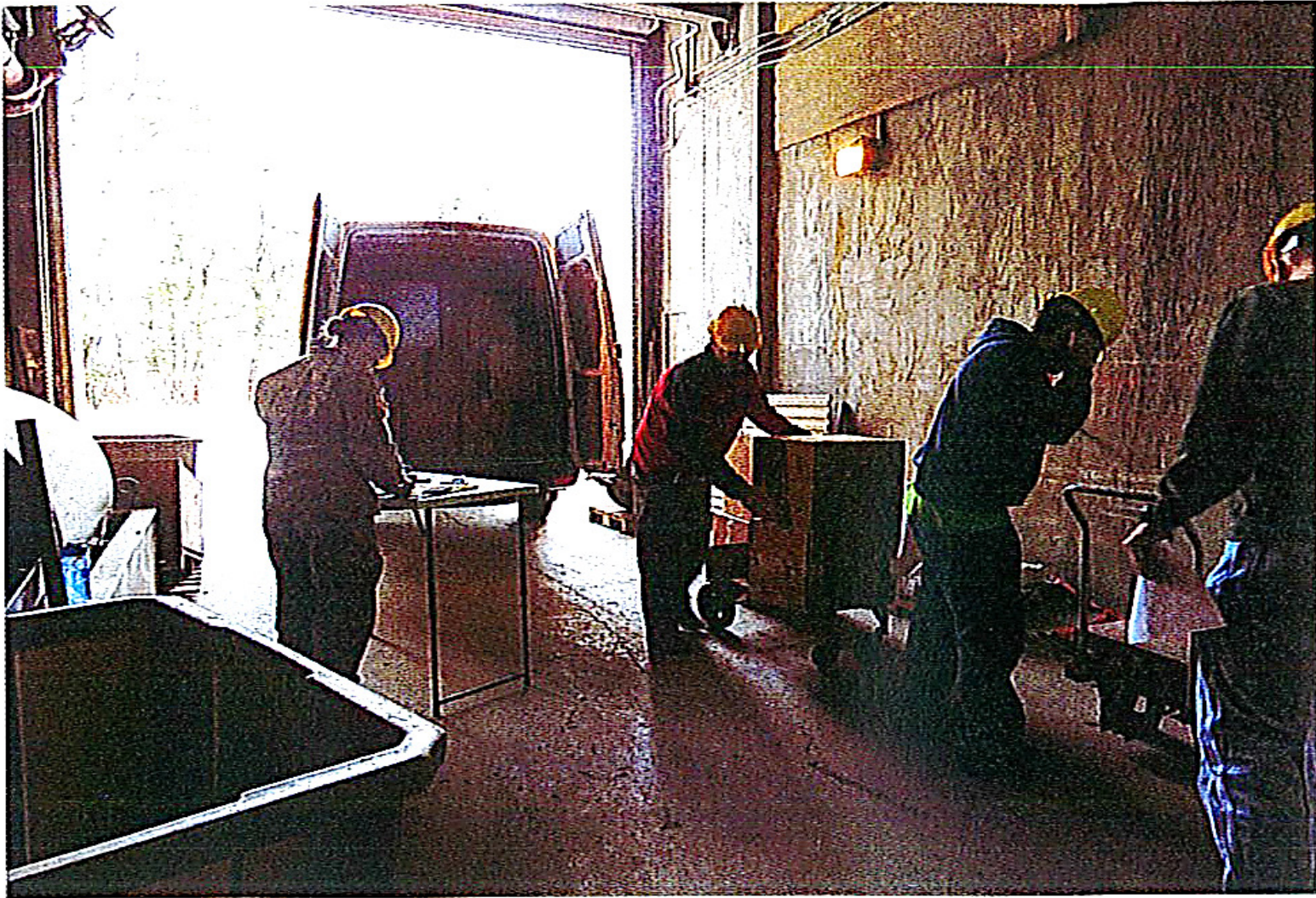
- 04/29/13 2,800 lbs. PPCPs

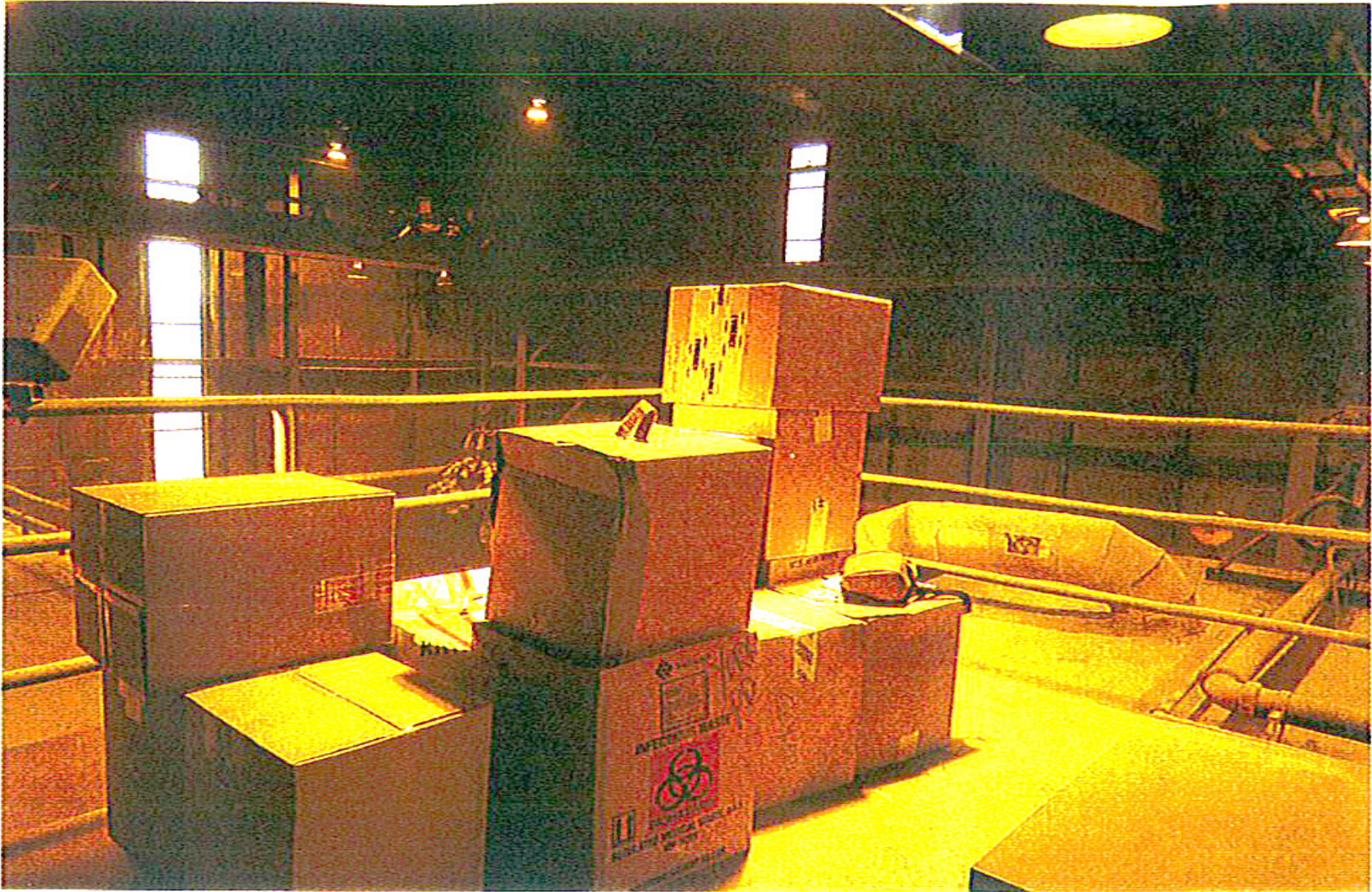
The load was broken into four hourly drops, 414 lbs., 407 lbs., 403 lbs., and a final drop of 1169 lbs. Metered in with continuous trash loading.

- 10/28/14 5,100 lbs. of PPCPs

PPCPs were dropped into the hopper over a 1 hr. period to maximize load for worst case scenario. Limited trash loaded during this time period.











AIR Testing Approach



Air Tox Environmental Company and the MEDEP analyzed the flue gas of ecomaine during typical operations when combusting ordinary municipal waste and when introducing the controlled substances into the combustion process. Air Tox Environmental used a standard stack testing method to obtain total Volatile Organic Compounds (VOCs) emission results and the Department measured the flue gas with a more sensitive method that analyzed for 52 specific VOCs and air toxics.







STACK TEST AIR ANALYSIS:

Air Tox Environmental performed an EPA Method 25 A utilizing two flame ionization detectors to measure total hydrocarbon concentrations ranging from 0.1 ppm to 10,000 ppm. This method is neither as sensitive nor as capable of speciation as the Department's approach to obtaining emissions data, but is appropriate to determine compliance with the VOCs emission limit the facility is subject to.





MEDEP TO-15 Air Analysis

MEDEP staff sampled the emissions and analyzed the collected samples through the EPA Test Method TO-15 which uses a gas chromatograph in conjunction with a mass spectrometer to obtain VOCs and air toxic levels in the gas samples at very low levels. The analytic method used by the Department analyzed the flue gas samples for 52 air toxic substances with a detection level of less than 10 parts per trillion.

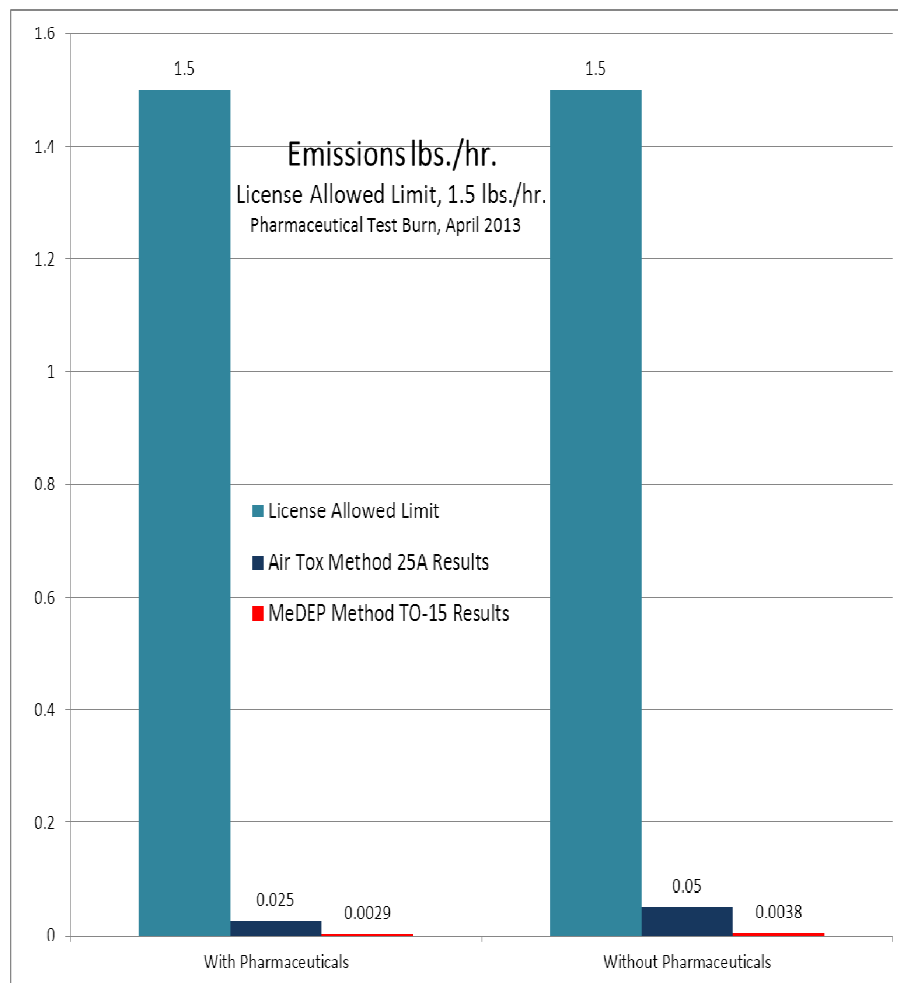


Method TO-15 Compounds (Total Measured Compounds)

1,1,1,2-Tetrachloroethane	Carbon Disulfide	Methyl Ethyl Ketone
1,1,1-Trichloroethane	Carbon Tetrachloride	Methyl Isobutyl Ketone
1,1,2,2-Tetrachloroethane	Chlorobenzene	Methyl Methacrylate
1,1,2-Trichloroethane	Chloroform	Methylene Chloride
1,1-Dichloroethene	cis-1,2-Dichloroethene	m-Xylene*
1,2,4-Trimethylbenzene	Dibromomethane	Naphthalene
1,2-Dichlorobenzene	Dichlorodifluoromethane	o-Xylene
1,3,5-Trimethylbenzene	Ethyl Chloride	Pentachloroethane
1,3-Butadiene	Ethyl Methacrylate	p-Xylene*
1,3-Dichlorobenzene	Ethylbenzene	Styrene
1,3-Dichloropropene	Ethylene Dibromide	Tetrachloroethylene
1,4-Dichlorobenzene	Ethylene Dichloride	Toluene
2-Hexanone	Ethylidene Dichloride	trans-1,2-Dichloroethene
Acrolein	Hexachlorobutadiene	Trichloroethylene
Acrylonitrile	Hexachloroethane	Trichlorofluoromethane
Benzene	Isopropylbenzene	Vinyl Chloride
Bromodichloromethane	Methyl Bromide	
Bromoform	Methyl Chloride	

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Air License Limit

The results of the Air Tox Environmental testing and the Department testing as compared to the license limit that ecomaine is subject to are presented in Figure 1.

As the results relate to the VOC limit, the ecomaine facility is well in compliance as shown by both the Air Tox Environmental results and the Department's results, whether combusting the controlled substances or without the controlled substances. The testing with the controlled substances actually resulted in lower emissions.





	ppm	lbs./hr.
Licensed Allowed Limit	6	1.5
With Pharmaceuticals 4/29/13 Air Tox Result	0.1	0.025
With Pharmaceuticals 4/29/13 MEDEP Result	0.01	0.0029
Without Pharmaceuticals 4/30/13 Air Tox Result	0.2	0.05
Without Pharmaceuticals 4/30/13 MEDEP Result	0.013	0.0038



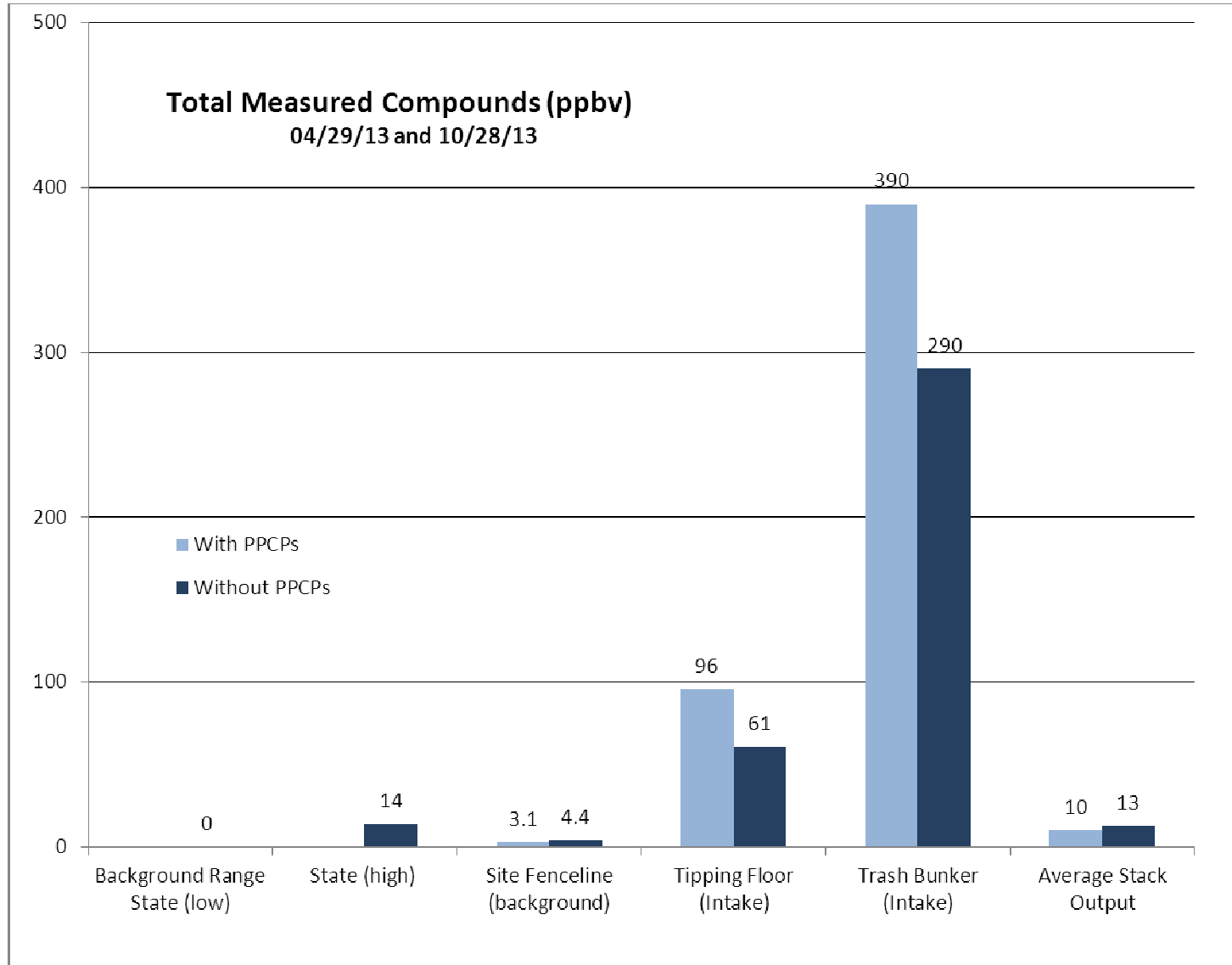


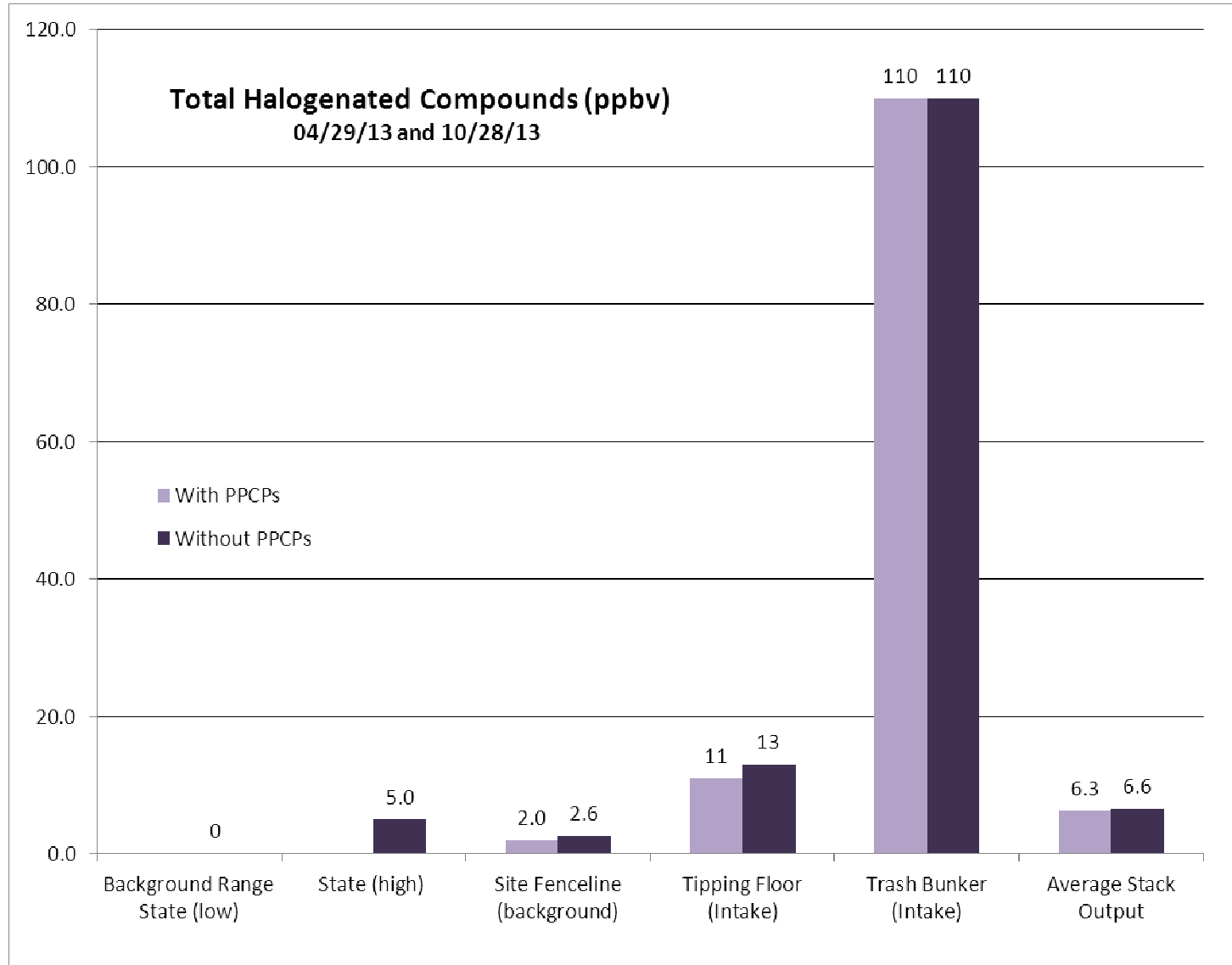
Sampling Locations

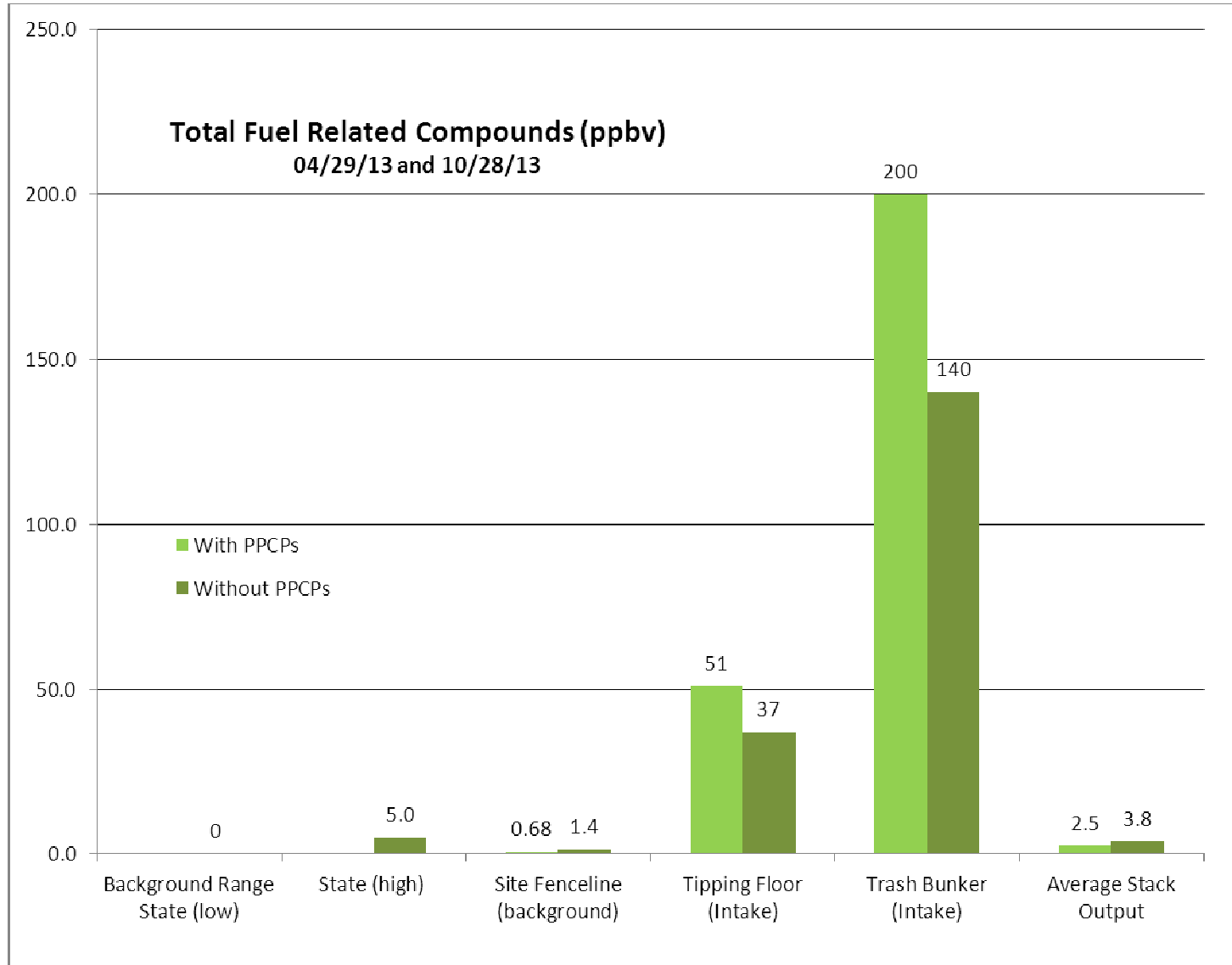
The Department also undertook sampling at the facility fence line, the tipping room floor and the trash bunker combustion air intake area.

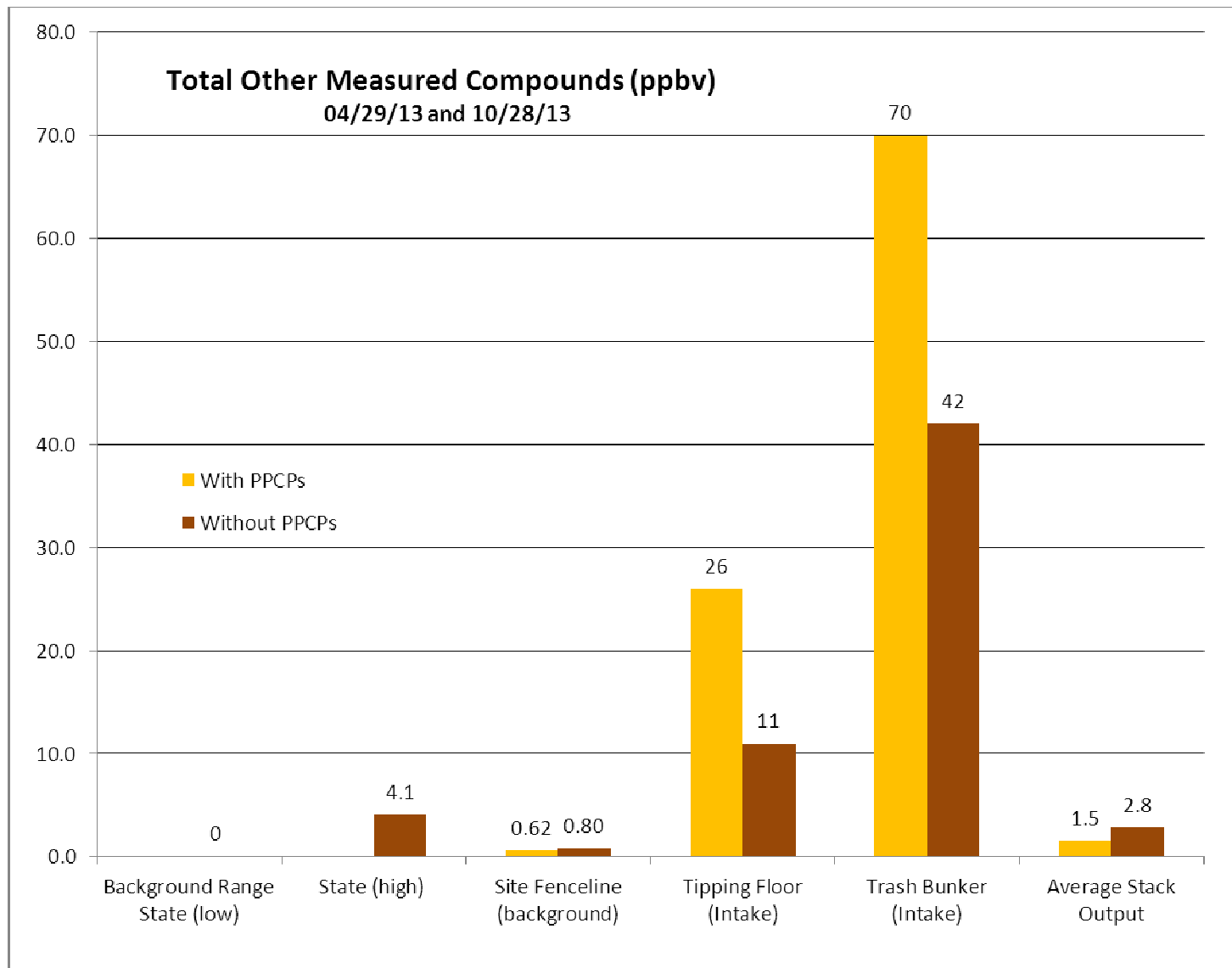


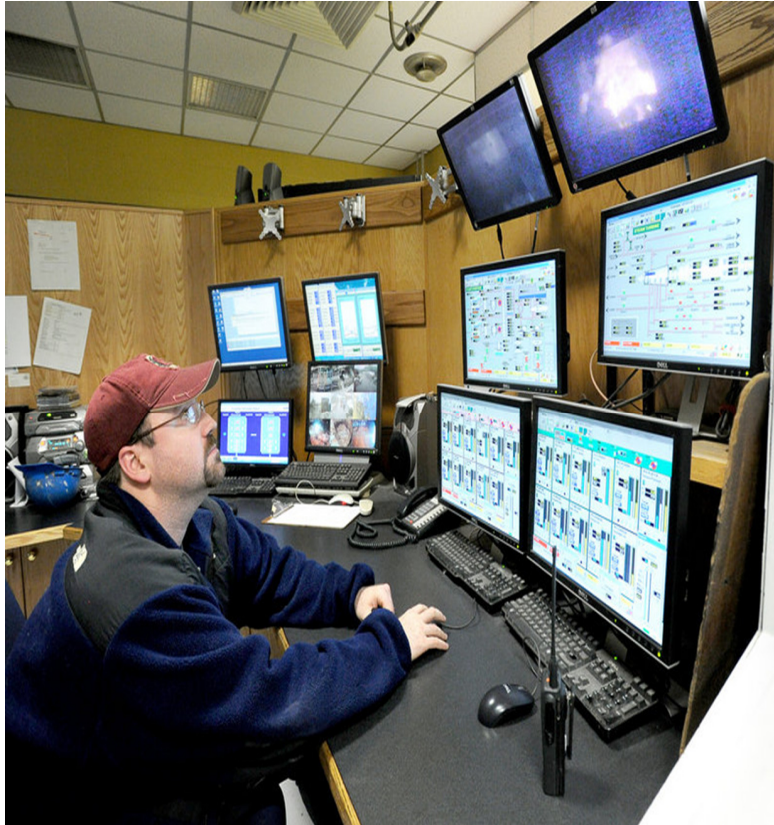












Air Results Conclusion

The results of the testing performed by Air Tox Environmental and the Department show that the emissions from the ecomaine facility, whether combusting controlled substances or not, result in very low levels of VOCs and air toxics. The stack exhaust shows levels of most compounds actually below what is routinely measured in the ambient air Statewide and within the Portland area.



ASH Sampling and Analysis Approach:



Ash samples were obtained from the boiler that combusted the PPCPs to determine the amount of residual PPCPs remaining after combustion. A “chain marker” was placed in the boiler with the PPCPs to ensure that the ash being sampled was that of the PPCP ash at the end process of the boiler combustion chamber. Once the chain marker appeared in the ash, samples were obtained. Based on the results of the samples obtained to that of pre-PPCP ash, it appears that the PPCP ash was correctly obtained and sampled. AXYS METHOD MLA-075 Rev 05, following USEPA guidelines was used for the ash analysis. A total of 173 indicator PPCPs were analyzed for.





Leachate Sample

A leachate sample was obtained from the ash landfill to determine the amount of residual PPCPs in background samples not associated with the test burn event.





173 indicator PPCPs

Acetaminophen	Oxytetracycline [OTC]	Valsartan
Azithromycin	Tetracycline [TC]	Verapamil
Caffeine	Bisphenol A	Diatrizoic acid
Carbadox	Furosemide	Iopamidol
Carbamazepine	Gemfibrozil	Citalopram
Cefotaxime	Glipizide	Tamoxifen
Ciprofloxacin	Glyburide	Cyclophosphamide
Clarithromycin	Hydrochlorothiazide	Venlafaxine
Clinafloxacin	2-Hydroxy-ibuprofen	Amsacrine
Cloxacillin	Ibuprofen	Azathioprine
Dehydronifedipine	Naproxen	Busulfan
Diphenhydramine	Triclocarban	Carmustine
Diltiazem	Triclosan	Chloramphenicol
Digoxin	Warfarin	Clotrimazole
Digoxigenin	Albuterol	Colchicine
Enrofloxacin	Amphetamine	Daunorubicin

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173 indicator PPCPs

Erythromycin-H2O	Atenolol	Doxorubicin
Flumequine	Atorvastatin	Drospirenone
Fluoxetine	Cimetidine	Etoposide
Lincomycin	Clonidine	Lomustine
Lomefloxacin	Codeine	Medroxyprogesterone Acetate
Miconazole	Cotinine	Metronidazole
Norfloxacin	Enalapril	Moxifloxacin
Norgestimate	Hydrocodone	Norethindrone
Ofloxacin	Metformin	Oxazepam
Ormetoprim	Oxycodone	Rosuvastatin
Oxacillin	Ranitidine	Teniposide
Oxolinic Acid	Triamterene	Zidovudine
Penicillin G	Alprazolam	Melphalan
Penicillin V	Amitriptyline	Androsterone
Roxithromycin	Amlodipine	Desogestrel
Sarafloxacin	Benzoyllecgonine	17 alpha-Estradiol
Sulfachloropyridazine	Benztropine	Estrone
Sulfadiazine	Betamethasone	Equilin
Sulfadimethoxine	Cocaine	Androstenedione
Sulfamerazine	DEET	17 alpha-Dihydroequilin
Sulfamethazine	Desmethyldiltiazem	17 beta-Estradiol
Sulfamethizole	Diazepam	Testosterone
Sulfamethoxazole	Fluocinonide	Equilenin
Sulfanilamide	Fluticasone propionate	Mestranol
Sulfathiazole	Hydrocortisone	Norethindrone
Thiabendazole	10-hydroxy-amitriptyline	17 alpha-Ethinyl-Estradiol

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173 indicator PPCPs

Trimethoprim	Meprobamate	Progesterone
Tylosin	Methylprednisolone	Norgestrel
Virginiamycin M1	Metoprolol	Estriol
1,7-Dimethylxanthine	Norfluoxetine	beta-Estradiol 3-benzoate
Anhydrochlortetracycline [ACTC]	Norverapamil	Coprostanol
Anhydrotetracycline [ATC]	Paroxetine	Epicoprostanol
Chlortetracycline [CTC]	Prednisolone	Cholesterol
Demeclocycline	Prednisone	Cholestanol
Doxycycline	Promethazine	Desmosterol
4-Epianhydrochlortetracycline [EACTC]	Propoxyphene	Ergosterol
4-Epianhydrotetracycline [EATC]	Propranolol	Campesterol
4-Epichlortetracycline [ECTC]	Sertraline	Stigmasterol
4-Epioxytetracycline [EOTC]	Simvastatin	beta-Sitosterol
4-Epitetracycline [ETC]	Theophylline	beta Stigmastanol
Isochlortetracycline [ICTC]	Trenbolone	
Minocycline	Trenbolone acetate	

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Natural and Synthetic Contributors

The list of PPCPs was divided into synthetic and naturally occurring categories, *with the exception of hormone related compounds*. The total analyses looked for both synthetic and naturally occurring PPCPs. Vegetable oils and food waste can skew the total PPCPs detected since small amounts of cholesterol were very high relative to the synthetic PPCPs.



i.e., One egg contains approximately 300,000 ug of cholesterol per yolk





Ash Sample Collection:

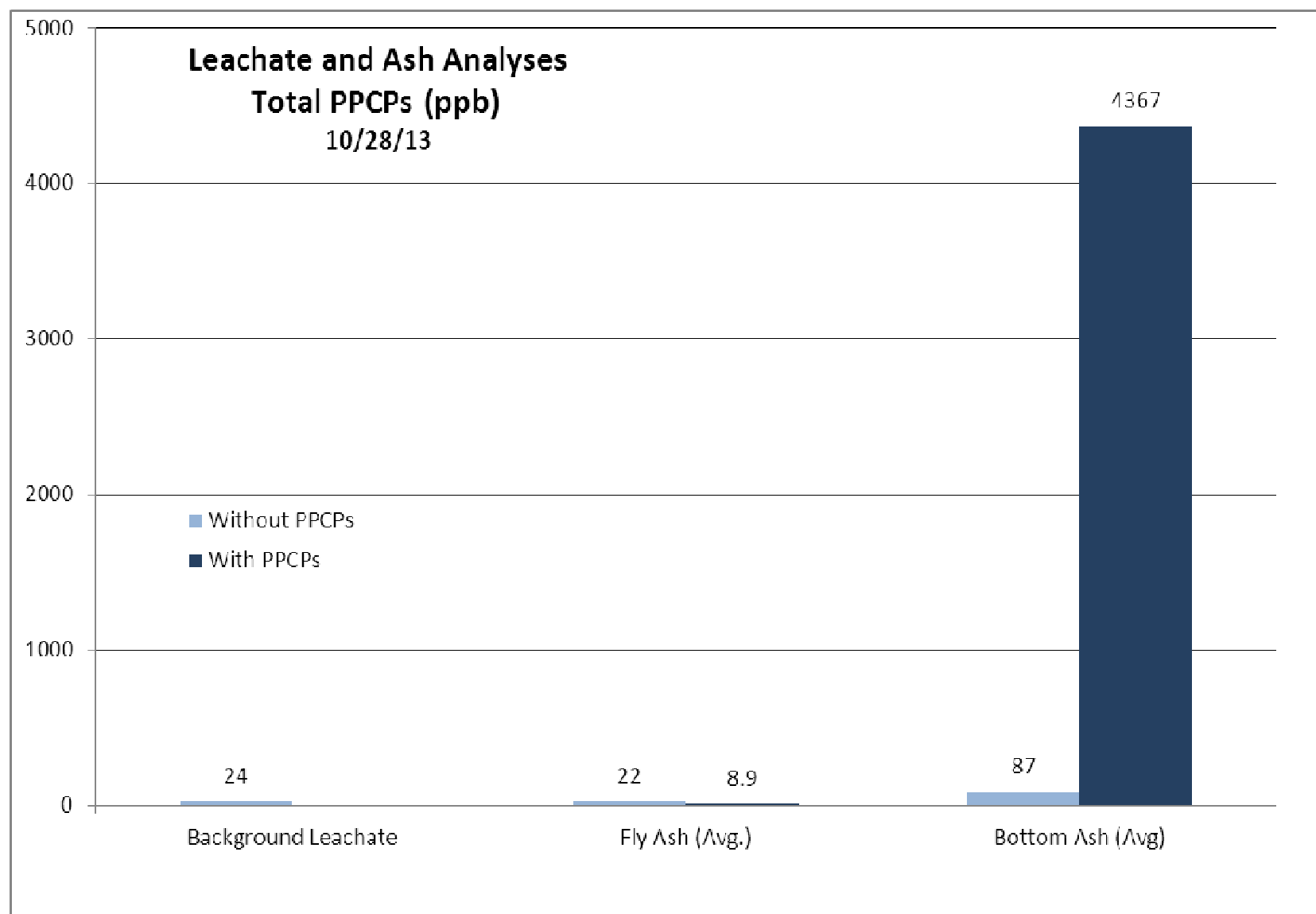
Ash samples were obtained from the boiler that combusted the PPCPs and from the Fly ash collection area to determine the amount of residual PPCPs remaining after combustion. Both Bottom Ash and Fly Ash composite samples were collected prior to the combustion of PPCPs to determine background residuals in the normal waste stream. Three additional bottom Ash and three Fly Ash samples were collected during the expected combustion interval.

Only A Snapshot!

While we have three rounds of stack testing data this is only a snapshot for the ash results. Our study needs to be followed up on and more data collected. The process has begun and while it answers some questions a lot still remain.

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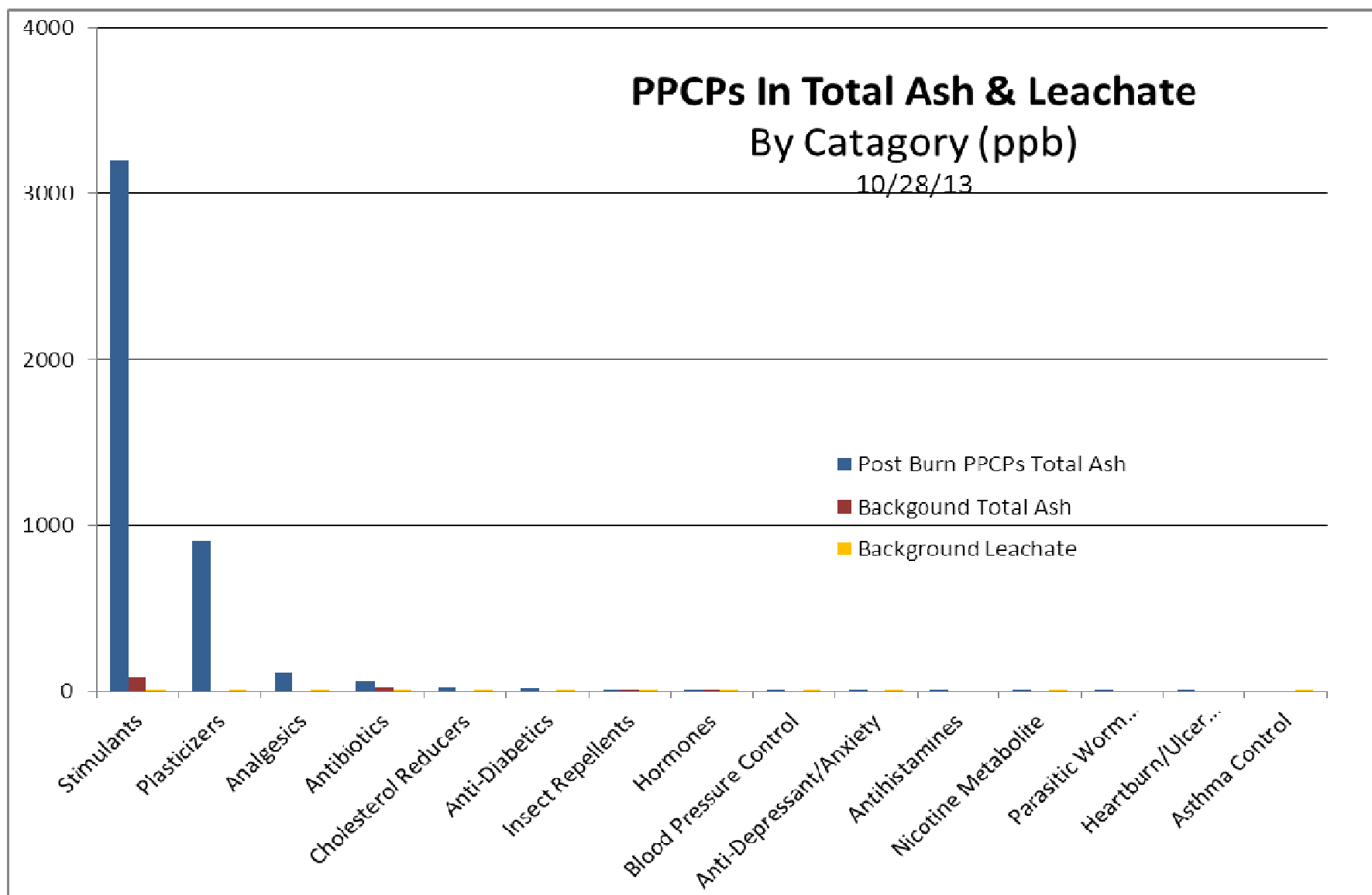


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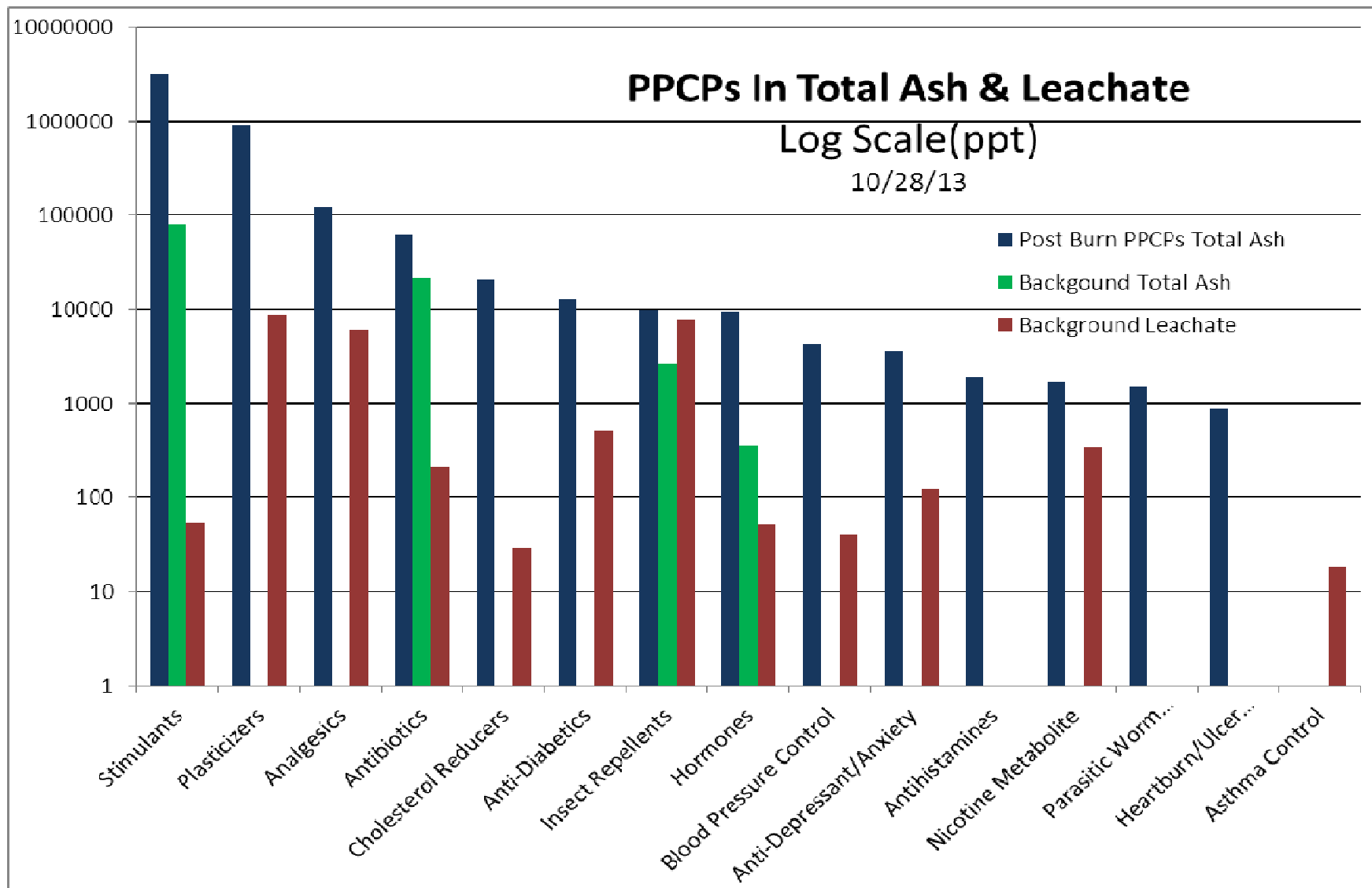
PPCPs In Total Ash & Leachate By Category (ppb)

10/28/13



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Ash QA/QC Summary

Fly Ash									
Summary:				Percent	Comments				
(173) Compounds analyzed									
(11) Compounds not quantifiable:				6.36%	Due to matrix interference the compounds did not pass minimum QA/QC..				
(7) Positive detections for at least one sample:				4.04%	Note; When a result was unavailable the MDL was used				
(4) Positive detections present in background ash.				2.31%	Attributed to routine burning not associated with burning event.				
(2) Positive detections only present in background ash.				1.16%	Attributed to routine burning not associated with burning event.				
(5) Positive detections in PPCP associated ash.				2.89%	Detections attributed to both routine burning and the burning of PPCPs.				
(3) Positive detections only in PPCP associated ash.				1.73%	Detections attributed to the burning of PPCPs only.				
Amount of post PPCP relative to background sample				39.70%	Observation, no difference between pre and post PPCP burn.				

Bottom Ash Summary									
Summary:	ng/g (ppb)			Percent	Comments				
(173) Compounds analyzed.									
(57) Background compounds not quantifiable:				32.9%	Due to matrix interference the compounds did not pass minimum QA/QC..				
(7) PPCP burn compounds not quantifiable:				4.0%	Due to matrix interference the compounds did not pass minimum QA/QC..				
(44) Positive detections for at least one sample:				25.4%	Note; When a result was unavailable the MDL was inserted as a positive value				
(17) Positive detections present in background ash.				9.8%	Attributed to routine burning not associated with burning event.				
(0) Positive detections only present in background ash.				0.0%	Attributed to routine burning not associated with burning event.				
(44) Positive detections in PPCP associated ash.				25.4%	Detections attributed to both routine burning and the burning of PPCPs.				
(27) Positive detections only in PPCP associated ash.				15.6%	Detections attributed to the burning of PPCPs only.				

COMPOUNDS (ppb)	Example Common Name	Properties, PPCPs - prescription, over the counter, and veterinary. Anthropogenic and Naturally occurring.	LEACHATE BKGRD	FLY ASH BKGRD	BOT ASH BKGRD
			(µg/L)	(µg/Kg)	(µg/Kg)
% Moisture	Water, H2O	solvent for hydrophilic compounds	100%	34.2%	17.1%
Acetaminophen	Tylenol	analgesic (pain), antipyretic (fever)	<	<	<
Caffeine	Caffeine	stimulant, mild analgesic	<	<	81.2
Carbamazepine	Tegretol	anticonvulsant and specific analgesic for trigeminal neuralgia (cranial nerve)	0.0511	<	<
Ciprofloxacin	Cipro	from group of fluoroquinolone antibiotics	<	<	<
Clarithromycin	Biaxin	semi-synthetic macrolide antibiotic (from spore forming bacteria)	0.0147	<	<
Diphenhydramine	Benadryl	antihistamine, sedative	<	<	<
Erythromycin-H2O	Eryc-H2O	dehydrated form, from macrolide group of antibiotics	0.0896	<	<
Lincomycin	Lincocin	antibiotic, member of the lincolnensis group of Streptomyces lincolnensis	0.0735	<	<
Lomefloxacin	Maxaquin	antibacterial, synthetic broad-spectrum antimicrobial	<	3.8	<
Norfloxacin	Noroxin	synthetic, broad-spectrum antibacterial	<	17.7	<
Norgestimate	Ortho-Cyclen	preventing pregnancy, treat acne, estrogen and progestin combination	<	<	<
Penicillin G	Penicillin G	Intravenous, natural penicillin antibiotic	0.015	<	<
Sulfathiazole	Sultrin	topical antibacterial cream preparation for intravaginal administration	0.0113	<	<
Thiabendazole	Mintezol	anthelmintic, (treatment parasitic worms)	<	<	<
Trimethoprim	Primisol	urinary tract antibiotic	0.00681	<	<
Bisphenol A	BPA	plasticizer	8.48	<	<



COMPOUNDS (ppb)	Example Common Name	Properties, PPCPs - prescription, over the counter, and veterinary. Anthropogenic and Naturally occurring.	LEACHATE BKGRD	FLY ASH BKGRD	BOT ASH BKGRD
			(µg/L)	(µg/Kg)	(µg/Kg)
Gemfibrozil	Lopid	cholesterol, triglycerides reducer	0.0285	<	<
2-Hydroxy- ibuprofen	2-H- ibuprofen	human metabolite of Ibuprofen	2.14	<	<
Ibuprofen	Advil, Motrin	anti-inflammatory, analgesic, antipyretic	3.95	<	<
Naproxen	Aleve	anti-inflammatory, analgesic, antipyretic	<	<	3.35
Albuterol	Proventil	asthma inhalation aerosol, selective beta 2-adrenergic bronchodilator	0.0179	<	<
Amphetamine	Adderall	stimulant, treatment of attention deficit hyperactivity disorder (ADHD)	0.0537	<	<
Atenolol	Tenormin	blood pressure beta-blocker	0.0359	<	<
Cotinine	Cotinine	metabolite of nicotine	0.000338	<	<
Hydrocodone	Vicodin	codeine/acetaminophen, narcotic analgesic, antipyretic	<	<	<
Metformin	Metformin	anti-diabetic	0.000501	<	<
Oxycodone	Oxycontin	narcotic analgesic, sedative	<	<	<
Ranitidine	Pepcid	H2-blocker, ulcers, heartburn	<	<	<
Amitriptyline	Elavil	tricyclic antidepressant	<	<	<
Benzoyllecgonine	Esterom	topical solution used for the relief of muscle pain, metabolite of cocaine	0.0315	<	<
Cocaine	Cocaine top	anesthetic, topical, temporarily numb mucous membranes	0.000981	<	<
DEET	DEET	insect repellent (present in all matrixes)	7.8	0.635	2.0
Diazepam	Valium	benzodiazepine anti-anxiety	<	<	<
Meprobamate	Equanil	anxiolytic drug, minor tranquilizer, anti-anxiety	0.0658	<	<
Metoprolol	Lopressor	blood pressure beta-blocker	0.109	<	<
Norverapamil	Norverapamil	high blood pressure, metabolite of Verapamil, calcium channel blocker	0.00437	<	<



COMPOUNDS (ppb)	Example Common Name	Properties, PPCPs - prescription, over the counter, and veterinary. Anthropogenic and Naturally occurring.	LEACHATE BKGRD	FLY ASH BKGRD	BOT ASH BKGRD
			(µg/L)	(µg/Kg)	(µg/Kg)
Gemfibrozil	Lopid	cholesterol, triglycerides reducer	0.0285	<	<
2-Hydroxy- ibuprofen	2-H- Ibuprofen	human metabolite of Ibuprofen	2.14	<	<
Ibuprofen	Advil, Motrin	anti-inflammatory, analgesic, antipyretic	3.95	<	<
Naproxen	Aleve	anti-inflammatory, analgesic, antipyretic	<	<	3.35
Albuterol	Proventil	asthma inhalation aerosol, selective beta 2-adrenergic bronchodilator	0.0179	<	<
Amphetamine	Adderall	stimulant, treatment of attention deficit hyperactivity disorder (ADHD)	0.0537	<	<
Atenolol	Tenormin	blood pressure beta-blocker	0.0359	<	<
Cotinine	Cotinine	metabolite of nicotine	0.000338	<	<
Hydrocodone	Vicodin	codeine/acetaminophen, narcotic analgesic, antipyretic	<	<	<
Metformin	Metformin	anti-diabetic	0.000501	<	<
Oxycodone	Oxycontin	narcotic analgesic, sedative	<	<	<
Ranitidine	Pepcid	H2-blocker, ulcers, heartburn	<	<	<
Amitriptyline	Elavil	tricyclic antidepressant	<	<	<
Benzoyllecgonine	Esterom	topical solution used for the relief of muscle pain, metabolite of cocaine	0.0315	<	<
Cocaine	Cocaine top	anesthetic, topical, temporarily numb mucous membranes	0.000981	<	<
DEET	DEET	insect repellent (present in all matrixes)	7.8	0.635	2.0
Diazepam	Valium	benzodiazepine anti-anxiety	<	<	<
Meprobamate	Equanil	anxiolytic drug, minor tranquilizer, anti-anxiety	0.0658	<	<
Metoprolol	Lopressor	blood pressure beta-blocker	0.109	<	<
Norverapamil	Norverapamil	high blood pressure, metabolite of Verapamil, calcium channel blocker	0.00437	<	<



COMPOUNDS Natural Plant and Fungus Sterols	Example Common Name	Properties Naturally occurring.	LEACHATE	FLY ASH	BOT ASH
			BKGRD	BKGRD	BKGRD
			(µg/L)	(µg/Kg)	(µg/Kg)
Ergosterol	Ergosterol	occurs in ergot, yeast; when irradiatded with UV light forms Vitamin D	<	<	<
Campesterol	Campesterin	cholesterol-lowering plant sterol	<	<	27.2
Stigmasterol	Stigmasterin	cholesterol-lowering plant sterol	0.518	<	40.9
beta-Sitosterol	Campesterol	plant sterol ester, treatment high cholesterol, enlarged prostate, etc.	1.18	<	185
beta Stigmastanol	Sitostanol	plant sterol ester, blocks cholesterol from entering the body.	<	<	19.7
Total Sum			1.7	0.0	447
COMPOUNDS Cholesterol Related	Example Common Name	Properties Biological Processes	LEACHATE	FLY ASH	BOT ASH
			BKGRD	BKGRD	BKGRD
			(µg/L)	(µg/Kg)	(µg/Kg)
Cholesterol	NA	structural component of animal cell membranes (present in all matrixes)	1.03	15900	482
Coprostanol	NA	biohydrogenation of cholesterol formed in gut of most higher animals	0.0698	<	263
Epicoprostanol	NA	biohydrogenation of cholesterol formed in gut of most higher animals	0.0349	<	7.7
Cholestanol	NA	cholesterol derivative found in human feces, eggs, and biological matter	0.0931	<	18
Desmosterol	NA	intermediate precursor of cholesterol	<	<	8.86
Total Sum			1.23	15900	780



COMPOUNDS	LEACHATE	FLY ASH	BOT ASH	FLY ASH	BOTTOM ASH
	BKGRD	BKGRD	BKGRD	AVERAGE	AVERAGE
(ppb)	(µg/L)	(µg/Kg)	(µg/Kg)	CONC (µg/Kg)	CONC (µg/Kg)
% Moisture	100%	34.2%	17.1%	31.7%	25.4%
Acetaminophen	<	<	<		89.5
Caffeine	<	<	81.2		3203
Carbamazepine	0.0511	<	<		
Ciprofloxacin	<	<	<		41.0
Clarithromycin	0.0147	<	<		
Diphenhydramine	<	<	<		1.33
Erythromycin-H2O	0.0896	<	<		
Lincomycin	0.0735	<	<		
Lomefloxacin	<	3.8	<		
Norfloxacin	<	17.7	<		
Norgestimate	<	<	<	2.8	
Penicillin G	0.015	<	<		
Sulfathiazole	0.0113	<	<		
Thiabendazole	<	<	<		1.46
Trimethoprim	0.00681	<	<		1.45
Bisphenol A	8.48	<	<		906



COMPOUNDS (ppb)	LEACHATE BKGRD (µg/L)	FLY ASH BKGRD (µg/Kg)	BOT ASH BKGRD (µg/Kg)	FLY ASH AVERAGE CONC (µg/Kg)	BOTTOM ASH AVERAGE CONC (µg/Kg)
Gemfibrozil	0.0285	<	<		21.2
2-Hydroxy-ibuprofen	2.14	<	<		
Ibuprofen	3.95	<	<		30.0
Naproxen	<	<	3.35		14.6
Albuterol	0.0179	<	<		
Amphetamine	0.0537	<	<		
Atenolol	0.0359	<	<		0.62
Cotinine	0.000338	<	<		1.67
Hydrocodone	<	<	<		1.65
Metformin	0.000501	<	<		12.7
Oxycodone	<	<	<		0.77
Ranitidine	<	<	<		0.87
Amitriptyline	<	<	<		0.53
Benzoyllecgonine	0.0315	<	<		
Cocaine	0.000981	<	<		
DEET	7.8	0.635	2.0	0.62	9.20
Diazepam	<	<	<		2.44
Meprobamate	0.0658	<	<		
Metoprolol	0.109	<	<		3.57
Norverapamil	0.00437	<	<		



COMPOUNDS (ppb)	LEACHATE BKGRD (µg/L)	FLY ASH BKGRD (µg/Kg)	BOT ASH BKGRD (µg/Kg)	FLY ASH AVERAGE CONC (µg/Kg)	BOTTOM ASH AVERAGE CONC (µg/Kg)
Promethazine	<	<	<		0.59
Propoxyphene	0.00376	<	<		0.30
Valsartan	0.24	<	<		
Verapamil	0.00982	<	<		
Citalopram	<	<	<		0.64
Moxifloxacin	<	<	<	4.8	15.3
Androsterone	<	<	<		0.41
Desogestrel	<	<	<	0.65	1.36
17 alpha-Estradiol	<	<	<		1.64
17 beta-Estradiol	<	<	0.35		0.47
Equilenin	<	<	0.275		1.34
Estriol	0.0512	<	<		0.55
Total Sum	23.3	22.1	87.2	8.93	4367
COMPOUNDS Natural Plant and Fungus Sterols	LEACHATE BKGRD (µg/L)	FLY ASH BKGRD (µg/Kg)	BOT ASH BKGRD (µg/Kg)	FLY ASH AVERAGE CONC (µg/Kg)	BOTTOM ASH AVERAGE CONC (µg/Kg)
Ergosterol	<	<	<		2044
Campesterol	<	<	27.2		562
Stigmasterol	0.518	<	40.9		1129
beta-Sitosterol	1.18	<	185		2557
beta Stigmastanol	<	<	19.7		249
Total Sum	1.7	0.0	447	0.00	6540
COMPOUNDS Cholesterol Related	LEACHATE BKGRD (µg/L)	FLY ASH BKGRD (µg/Kg)	BOT ASH BKGRD (µg/Kg)	FLY ASH AVERAGE CONC (µg/Kg)	BOTTOM ASH AVERAGE CONC (µg/Kg)
Cholesterol	1.03	15900	482	6317	3967.0
Coprostanol	0.0698	<	263		388.3
Epicoprostanol	0.0349	<	7.7		44.7
Cholestanol	0.0931	<	18		104
Desmosterol	<	<	8.86		47
Total Sum	1.23	15900	780	6317	4551



COMPOUNDS (μ/L) and (μg/Kg) (ppb)		TOTALASH Post-PPCPs FLY & BOTTOM CONC (μg/Kg)		TOTALASH Pre-PPCPs FLY & BOTTOM BACKGROUND CONC (μg/Kg)		LEACHATE BACKGROUND CONC (μ/L)
% Moisture		28.6%		25.7%		100%
Stimulants	1	3200	1	81	7	0.054
Plasticizers	2	910		<	1	8.5
Analgesics	3	120		<	3	6.1
Antibiotics	4	63	2	22	5	0.21
Cholesterol Reducers	5	21		<	9	0.029
Anti-Diabetics	6	13		<	11	0.00050
Insect Repellents	7	10	3	2.6	2	7.8
Hormones	8	9.3	4	0.35	8	0.051
Blood Pressure Control	9	4.2		<	4	0.40
Anti-Depressant/Anxiety	10	3.6		<	6	0.12
Antihistamines	11	1.9		<		<
Nicotine Metabolite	12	1.7		<	12	0.00034
Parasitic Worm Treatment	13	1.5		<		<
Heartburn/Ulcer Treatment	14	0.87		<		<
Asthma Control		<		<	10	0.018
Totals		4360		106		23



COMPOUNDS	TOTAL ASH Post-PPCPs	TOTAL ASH Pre-PPCPs	LEACHATE
Natural Plant	FLY & BOTTOM	FLY & BOTTOM BACKGROUND	BACKGROUND
and Fungus Sterols	CONC (µg/Kg)	CONC (µg/Kg)	CONC (µ/L)
Plant & Fungus Sterols	6500	270	1.7
COMPOUNDS	TOTAL ASH Post-PPCPs	TOTAL ASH Pre-PPCPs	LEACHATE
Cholesterol Related	FLY & BOTTOM	FLY & BOTTOM BACKGROUND	BACKGROUND
	CONC (µg/Kg)	CONC (µg/Kg)	CONC (µ/L)
Cholesterol(s)	11000	17000	1.2
Totals	17500	17270	2.9



COMPOUNDS (µ/L) and (µg/Kg) (ppb)	BOTTOM ASH BACKGROUND	BA-1 BOTTOM ASH	BA-2 BOTTOM ASH	BA-3 BOTTOM ASH	BOTTOM ASH BACKGROUND	SAMPLE BA-1	SAMPLE BA-2	SAMPLE BA-3	HIGHEST VALUES BOTTOM ASH
	CONC (µg/Kg)	CONC (µg/Kg)	CONC (µg/Kg)	CONC (µg/Kg)					CONC (µg/Kg)
Acetaminophen	<	29.5	118	121	ND	lowest	middle	highest	121
Caffeine	81.2	1510	4970	3130	lowest	middle	highest	middle	4970
Ciprofloxacin	<	18.7	18.7	85.7	ND	lowest	lowest	highest	85.7
Diphenhydramine	<	1.6	1.54	0.84	ND	highest	middle	lowest	1.6
Thiabendazole	<	1.57	1.4	1.4	ND	highest	lowest	lowest	1.57
Trimethoprim	<	1.4	1.4	1.56	ND	lowest	lowest	highest	1.56
Bisphenol A	<	722	1140	857	ND	lowest	highest	middle	1140
Gemfibrozil	<	18.9	24.6	20	ND	lowest	highest	middle	24.6
Ibuprofen	<	25.7	36.7	27.7	ND	lowest	highest	middle	36.7
Naproxen	3.35	20.5	10.3	13.1	lowest	highest	middle	middle	20.5
Atenolol	<	0.6	0.6	0.668	ND	lowest	lowest	highest	0.668
Cotinine	<	1.5	1.55	1.96	ND	lowest	middle	highest	1.96
Hydrocodone	<	1.5	1.5	1.94	ND	lowest	lowest	highest	1.94
Metformin	<	12.7	11	14.5	ND	middle	lowest	highest	14.5
Oxycodone	<	0.6	0.648	1.07	ND	lowest	middle	highest	1.07
Ranitidine	<	0.773	0.835	1.01	ND	lowest	middle	highest	1.01
Amitriptyline	<	0.69	0.622	0.28	ND	highest	middle	lowest	0.69
DEET	2.0	7.07	10.6	9.33	lowest	middle	highest	middle	10.6
Diazepam	<	4.49	1.95	0.876	ND	highest	middle	lowest	4.49
Metoprolol	<	2.65	5.05	3.0	ND	lowest	highest	middle	5.05
Promethazine	<	0.589	0.59	0.59	ND	highest	lowest	lowest	0.589
Propoxyphene	<	0.326	0.28	0.28	ND	highest	lowest	lowest	0.326
Citalopram	<	0.384	0.982	0.571	ND	lowest	highest	middle	0.982
Moxifloxacin	<	5.51	5.51	34.9	ND	lowest	middle	highest	34.9
Androstosterone	<	0.861	0.185	0.185	ND	highest	lowest	lowest	0.861
Desogestrel	<	0.55	0.428	3.1	ND	middle	lowest	highest	3.1
17 alpha-Estradiol	<	1.02	1.83	2.06	ND	lowest	middle	highest	2.06
17 beta-Estradiol	0.35	0.582	0.448	0.375	ND	highest	middle	lowest	0.582
Equilenin	0.275	1.43	1.3	1.3	lowest	highest	middle	middle	1.43
Estril	<	0.489	0.587	0.587	ND	lowest	middle	highest	0.489
Ergosterol	<	6100	22.5	8.56	ND	highest	middle	lowest	6100
Campesterol	27.2	553	586	546	lowest	middle	highest	middle	586
Stigmasterol	40.9	946	1230	1210	lowest	middle	highest	middle	1230
beta-Sitosterol	185	2630	2470	2570	lowest	highest	middle	middle	946
beta-Stigmastanol	19.7	325	245	178	lowest	highest	middle	middle	2630
Cholesterol	482	3800	4840	3260	lowest	middle	highest	middle	4840
Coprostanol	263	312	597	256	lowest	middle	highest	middle	597
Epicooprostanol	7.7	28.4	67.5	38.2	lowest	middle	highest	middle	67.5
Cholestanol	18	93.2	164	56.1	lowest	middle	highest	middle	164
Desmosterol	8.86	50.5	55.3	34.8	lowest	middle	highest	middle	55.3
Total	1140	17233	16646	12495	Average All Percent of Highest Detections				Total Highest (µg/Kg)
					0.0%	30.4%	54.4%	14.4%	23706



Value	Units	Assumptions/Comments
		If one detect then MDL used for non detects
		No PPCPs were subtracted from background concentrations
6486	µg/kg	Total PPCPs without Natural components (highest values)
23,706	µg/kg	Total hits, PPCPs and Natural Components (highest values)
24	mg/kg	Total hits, PPCPs and Natural Components
2400	mg/kg	Mass PPCPs detected times 100 (to account for poor recoveries)
2.4	g/kg	Mass PPCPs in grams/kilograms
0.0024	kg/kg	Mass of PPCPs in kilograms/kilogram
5106	lbs.	Weight PPCPs with Packaging (lbs.)
2316	kg	Weight PPCPs with Packaging (kg)
722	kg	Weight of PPCPs assuming 67 % packaging
43	dilution factor	110 Tons trash in 10 hr. maximum dilution period, (chain-hang-up?)
16.8	kg	Conservative weight of PPCPs using assumptions from above
0.01429	%	Percent of PPCPs remaining in ash
99.99	%	Percent destruction of PPCPs in Ash



Conclusion



The results of the testing performed by Air Tox Environmental and the Department show that the emissions from the ecomaine facility, whether combusting controlled substances or not, result in very low levels of VOCs and air toxics. The stack exhaust shows levels of most compounds actually below what is routinely measured in the ambient air in the Portland area.

The ash results indicate a greater than 99.9% destruction of PPCPs during the combustion process. The concentrations of PPCPs in the ash do not result in concentrations that would exceed the landfilled concentrations as a result of direct land disposal.





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