

HEALTH IMPACTS
of
Ash-for-Trash agreement

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Health Q1 – Chemicals & Routes of Exposure

1) What chemicals in OCRRRA's ash pose risks to human health?

How might Cortland County residents be exposed to these chemicals?

Chemicals of concern: metals

Element	Health Risks
Arsenic	probable human carcinogen
Beryllium	probable human carcinogen; inflammation of lungs, skin
Cadmium	probable carcinogen; diarrhea, kidney damage
Chromium	hexavalent form is carcinogenic
Lead	decreased intelligence, stunted growth, fetal death; possible carcinogen
Mercury	neurotoxin: interferes with brain function
Vanadium	Nausea, mild diarrhea, and stomach cramps (@ high exposure)
Zinc	an essential nutrient; but high levels are toxic

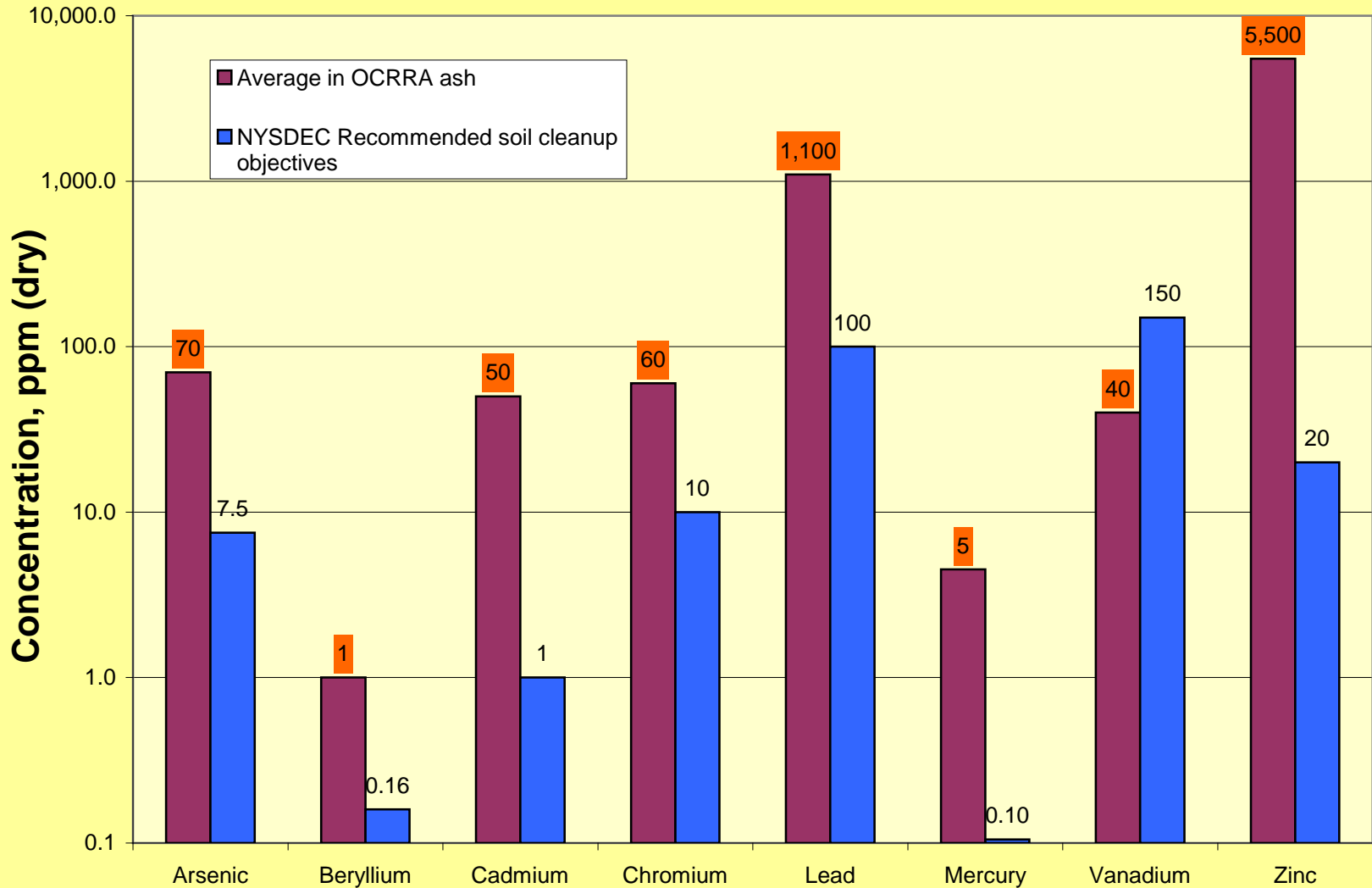
Metals in Onondaga County incinerator ash

Element	Average concentration, ppm (mg/kg), dry wt.	Amount in 90,000 tons wet ash, lb*
Arsenic	70	10,080
Beryllium	1	140
Cadmium	50	7,200
Chromium	60	8,600
Lead	1,100	158,000
Mercury	5	650
Vanadium	40	5,760
Zinc	5,500	792,000

Based on bi-annual testing by Onondaga County Dept of Health, 2008-2014

* Solids content estimated to be 21%, based on 2014 analyses by Life Science Laboratories

Metals in ash compared to NYS soil cleanup objectives



Organic chemicals #1

1. PAHs (polynuclear aromatic hydrocarbons)
 - Formed during combustion
 - 19 types listed by USEPA
 - 13 are cancer-causing

Organic chemicals #2

2. PCBs (polychlorinated biphenyls)

- Legacy industrial chemicals – found in electronics, caulk, transformers, ink
- cancer-causing
- Suspected neurotoxins
- reproductive damage and birth defects

Organic chemicals #3

3. Polychlorinated dioxins & furans (PCDDs, PCDFs)

- A mixture of >100 types, with wide range of toxicities
- Formed during incineration/combustion
- 2,3,7,8-TCDD = “dioxin”

Health effects of dioxins

Acute:

- hair loss, swelling of the face, and moderate to severe chloracne

Chronic:

- Cancer [“known human carcinogen”]
- reproductive damage and birth defects
- endocrine disruption
- interferes with immune system

How can one be exposed to these chemicals?

- Trucking ash from Syracuse to landfill in McGraw
 - Spillage during transport to landfill
 - Handling at the landfill
 - Dirty truck on return trip
 - accidents

How can one be exposed to these chemicals?

- At the landfill
 - Runoff surface water
 - Leachate >> aquifer
 - Contamination of Tioughnioga R.
 - Dry ash >> airborne dust
 - Flooding >> carries ash offsite
- Treatment plant
 - Leachate >> sewage sludge and/or Tioughnioga R.

Health Q2 – Dioxin

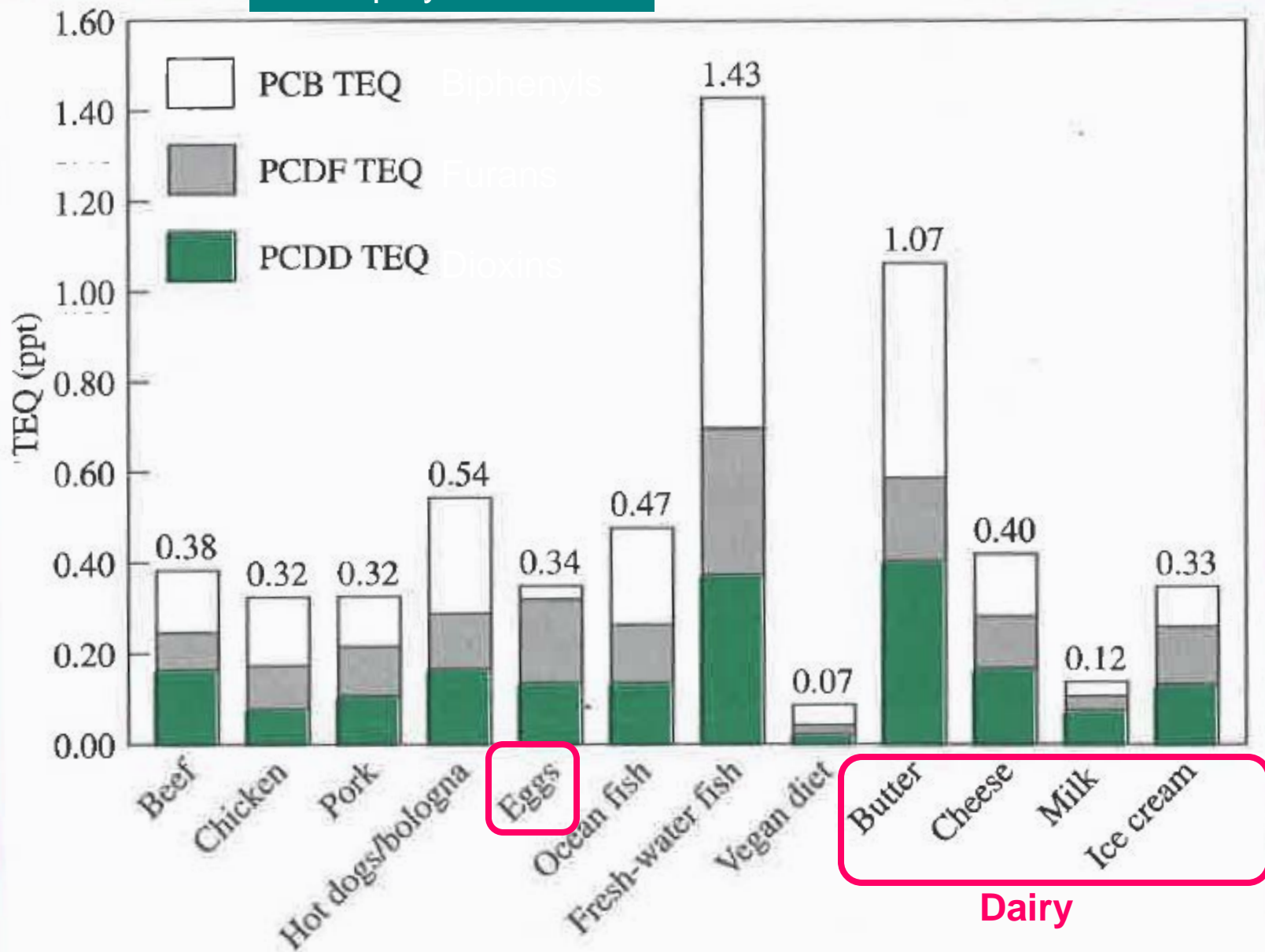
2) Discuss the potential health risks of dioxin to Cortland County residents and acceptable levels of dioxin.

Current science on dioxins

It is now believed that incineration and combustion processes are the most significant sources of chlorinated dibenzodioxins to the environment
(Zook and Rappe 1994)

90% of exposure is through consumption of food

PC = "polychlorinated"



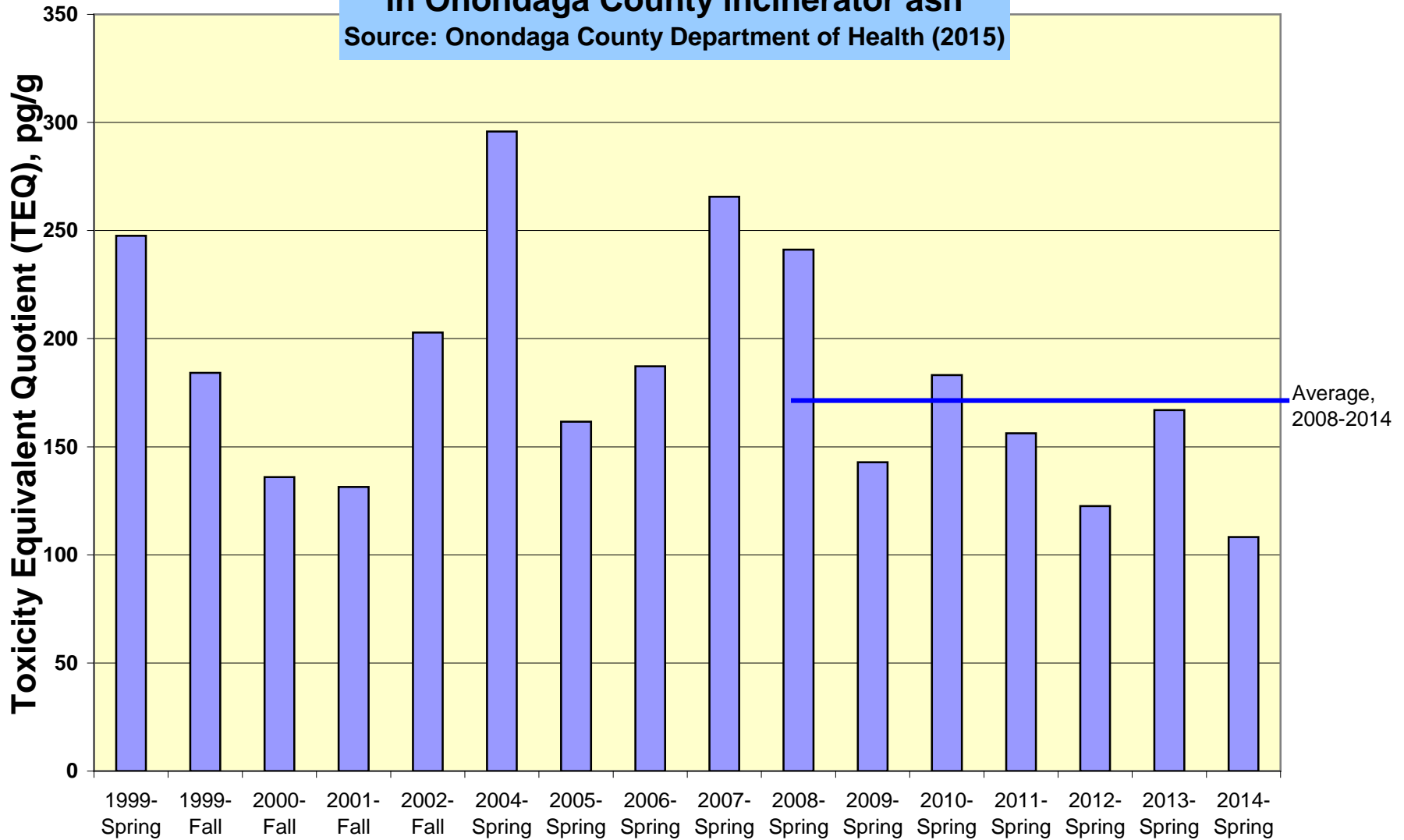
Source: Shecter, A., et al. (1997), "Levels of Dioxins, Dibenzofurans, PCB and DDE congeners in Pooled Food Samples Collected in 1995 at Supermarkets Across the United States," *Chemosphere* 34: 1437+

A case of acute exposure to dioxin...

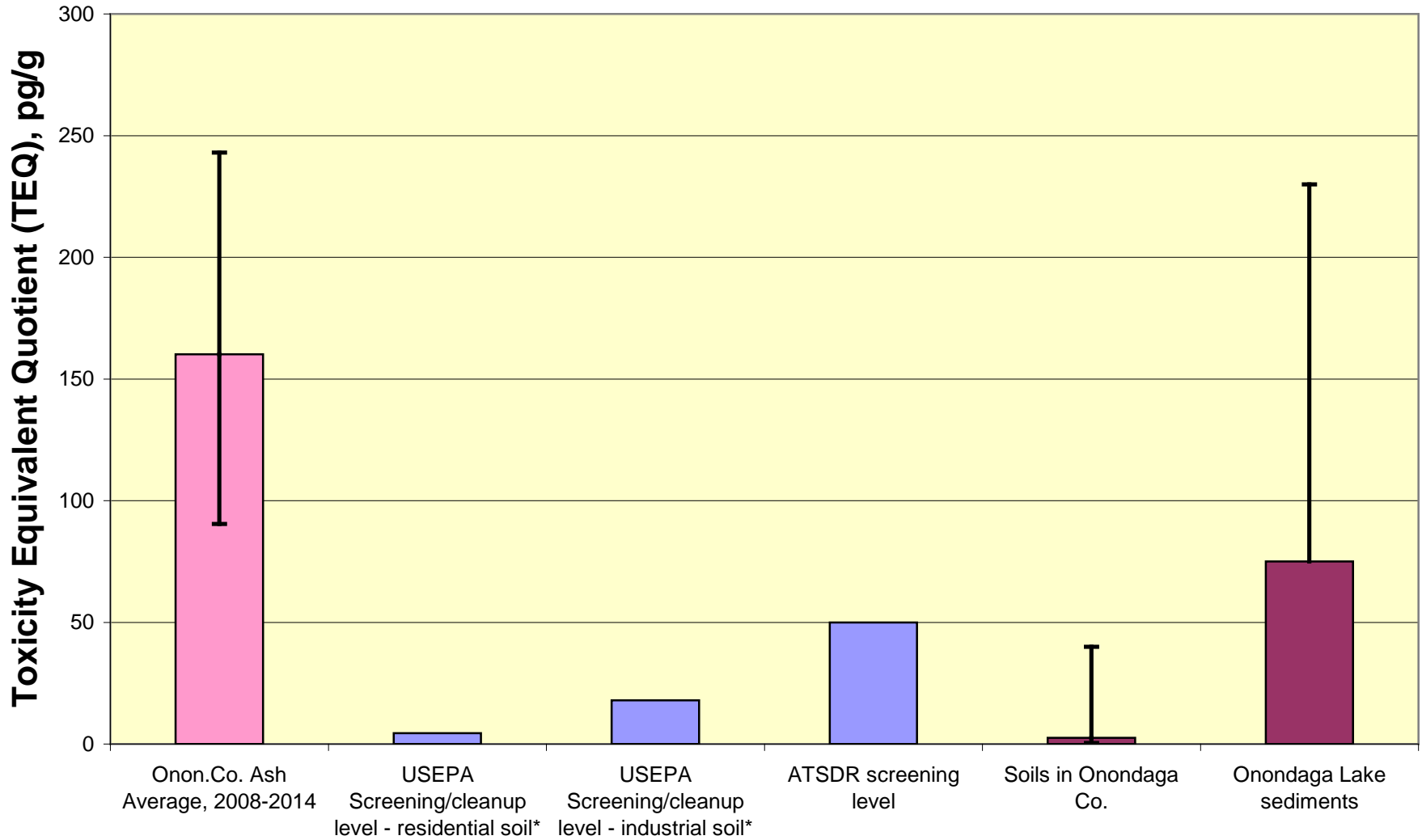


Former Ukrainian President Viktor Yushchenko before and after he was poisoned with dioxin. (AP photos)

**Polychlorinated Dioxins and Furans
in Onondaga County incinerator ash**
Source: Onondaga County Department of Health (2015)



Dioxins and furans in ash, soil & cleanup levels



Health Q3 – Current Science

3) Is current testing adequate to protect public health?

Discuss the scientific evidence supporting safety or health risks of ash.

The original health risk assessment for the incinerator was conducted more than 25 years ago (published in 1988), and the EPA's notice on ash testing under RCRA (federal law governing solid waste disposal) was published 20 years ago (1995). Discuss how new scientific knowledge has been addressed to safeguard public health.

Is incinerator ash hazardous?

Ash defined “**hazardous**” under
Resource Conservation & Recovery
Act if it fails the
Toxicity Characteristic
Leaching Procedure (TCLP)

TCLP test is designed to simulate a landfill. It tests *only leachability*

TCLP ignores other routes of exposure:

inhalation, ingestion, accumulation
in animals

Parameters tested for leaching

EPA HW No.	Contaminant	CAS	Category
D004	Arsenic	7440-38-2	Metals
D005	Barium	7440-39-3	Metals
D006	Cadmium	7440-43-9	Metals
D007	Chromium	7440-47-3	Metals
D008	Lead	7439-92-1	Metals
D009	Mercury	7439-97-6	Metals
D010	Selenium	7782-49-2	Metals
D011	Silver	7440-22-4	Metals
D012	Endrin	72-20-8	Pesticides
D013	Lindane	58-89-9	Pesticides
D014	Methoxychlor	72-43-5	Pesticides
D015	Toxaphene	8001-35-2	Pesticides
D016	2,4-D	94-75-7	Herbicides
D017	2,4,5-TP (Silvex)	93-72-1	Herbicides
D018	Benzene	71-43-2	Volatiles
D019	Carbon tetrachloride	56-23-5	Volatiles
D020	Chlordane	57-74-9	Pesticides
D021	Chlorobenzene	108-90-7	Volatiles
D022	Chloroform	67-66-3	Volatiles
D023	o-Cresol	95-48-7	Semi-Volatiles
D024	m-Cresol	108-39-4	Semi-Volatiles
D025	p-Cresol	106-44-5	Semi-Volatiles
D026	Cresol	1319-77-3	Semi-Volatiles
D027	1,4-Dichlorobenzene	106-46-7	Volatiles
D028	1,2-Dichloroethane	107-06-2	Volatiles
D029	1,1-Dichloroethylene	75-35-4	Volatiles

D030	2,4-Dinitrotoluene	121-14-2	Semi-Volatiles
D031	Heptachlor (and its epoxide)	76-44-8	Pesticides
D032	Hexachlorobenzene	118-74-1	Semi-Volatiles
D033	Hexachlorobutadiene	87-68-3	Semi-Volatiles
D034	Hexachloroethane	67-72-1	Semi-Volatiles
D035	Methyl ethyl ketone	78-93-3	Volatiles
D036	Nitrobenzene	98-95-3	Semi-Volatiles
D037	Pentachlorophenol	87-86-5	Semi-Volatiles
D038	Pyridine	110-86-1	Semi-Volatiles
D039	Tetrachloroethene	127-18-4	Volatiles
D040	Trichloroethene	79-01-6	Volatiles
D041	2,4,5-Trichlorophenol	95-95-4	Semi-Volatiles
D042	2,4,6-Trichlorophenol	88-06-2	Semi-Volatiles
D043	Vinyl chloride	75-01-4	Volatiles

Only 40 chemicals are regulated.
Other USEPA contaminant lists have
>200 chemicals

Dioxins, PCBs, PAHs are ignored

Health Q4 – Catastrophic Events

4) Discuss the health risks posed by catastrophic events such as contamination of land surface and waterways by truck accident or flooding at the landfill.

What is the worst-case scenario?

Truck accident

- Spills up to 10 tons of ash
- Metals are up to 275x DEC soil clean-up levels
- Dioxins are about 10x USEPA cleanup levels
- Can contaminate nearby streams
- Creates slippery road surface