The BurnsClean Review

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Did you know

A family of four burning waste in a drum in the garden produces more Dioxin than all 87 operating incinerators in Germany.[5][6][7]

More dioxin is produced by the use of antibacterial soap than is produced by modern incineration equipment[8].

Inside this issue:

Environmental Threats

I was born into a world shared with 2.8 billion others. Next year the human population will hit 7 billion.[1] This simple fact is the greatest single threat to the environment we face today

Humans have demonstrated the ability and desire to shape and change the things around us. We like to experiment and improve. Our instinctive curiosity is both an advantage and a curse. This is how we got computers, rayon, plastic containers, vaccines, cars, and flat screen TVs.

It is obvious that population growth threatens our collective future [2], but many people are working to limit the damage. This includes those trying to get rid of our massive amounts of waste.

Bio-waste used for the process of making mdf board. This application saved 7500 tonnes of CO_2 per year.

Unfortunately they have not done a good job promoting the advances made in the last decade.

Nuclear power once seemed to be the answer. But its potentially climate-changing technology is not accepted because of the danger and historical missteps. [3][4]

Incineration has been branded almost as dangerous, based on its early history of damage to the environment. But in the last ten years, incineration systems have been significantly improved.

Now BurnsClean has advanced even further, to make incineration - or more correctly - gasification, the safest, easiest and most cost effective method of destroying waste.

A new efficient gasification system

BurnsClean Inc announces the release of the SaniFlame 1000 gasification system. It features a number of industry firsts :

(i) removable hearth for safe and simple ash cleaning and loading between cycles.

(ii) Industrial duty combustion and controls system for reliable performance.

(iii) A unique thermal oxidizer design that improves on the industry standard of 2 seconds at regulated temperature, in order to maximize the thermal destruction of compounds like the dioxins and furans.

(iv) A regenerative cooler for rapid quenching of the off gas. The recovered waste energy can be returned to the system or used for heating water or producing steam.

Milestones: Solid Waste Management

6500 BCE
North America
5.3 lb waste/day

500 BCE Athens
1st Municipal dump
At least 1 mile from city limits

Bible New Testament
Valley of Gehenna (Sheol)
"Though I descend into Sheol, thou art there"

1388 CE England
Prohibition of waste in public waterways and ditches

1690 CE
Philadelphia USA
Paper made from recycled waste paper and rags

1400 CE
Paris France
Waste interferes with city defenses

1551 CE
Andreas Burnhardt Invents paper packaging

1810 CE
Peter Durand patents the Tin Can

1820 CE
London England
100% waste collected by dustmen is recycled by manual separation

1842 CE
England
Chadwick report linked disease to filthy living conditions

1869 CE
Hyatt Bros invent celluloid

1874 CE
Nottingham England
1st systematic incinerator

1885 CE
New York USA
1st Waste incinerator

1892 CE
Metal caps on beer bottles to prevent spoilage

1896 CE
USA
Waste reduction plants shut down due to noxious emissions (16)

The world has been wrestling with the problems posed by waste disposal for millennia.

In 1887 the prefect of Paris forced garbage cans on a reluctant public. "*This is government interference in the individuals right to throw his garbage in the street*".(12)

Intensive pig farming had been used as a method of dealing with fresh and cooked waste for centuries but this practice stopped in 1900 after an epidemic.

In the 1920's land-filling became a popular method of reclaiming swamp land. Much of present day New York is built on garbage.(13)

Incinerators were introduced at around this time and operated with little regard to public safety. These continued to operate until most were eventually shut down when the EPA came into being in 1971.(14)

Back in the 1960's the most popular method of municipal waste disposal was open burning and dumping.(15)

Federal legislation of 1965 enacted the first solid waste management laws and the per capita waste generation was about 3 lb/day. In 2010 we were at about 4.3 lb/day trending down.(16)

Garbage and health

There is a clear link between waste and the threat to general health.

Swine and Avian flu threats occur because of the proximity of people to animals and the potential for virus mutation. BSE which is neither viral or bacterial poses huge risks for us and can only be properly dealt with by completely destroying the pathogen concerned.(17)

Cholera, typhoid, dysentery, anthrax, hepatitis, polio, diarrhea, trachoma, various respiratory ailments and cancers are just a few of the diseases caused by exposure to waste.(18)

We also produce high risk materials and materials contaminated by biological waste such as bandages and tissue. Also in this group would be molds and fungi caused by insanitary materials, used tissues, etc.

The more people there are, the more waste is produced and the greater the problem.

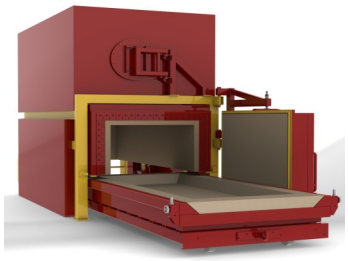
Dangerous materials

Oxygen is a dangerous material. When it was first produced in quantity in the neo-archean eon, (2.8—2.5 billion years ago) most of the life on Planet Earth was destroyed.(19) And yet we cannot live without it. Our immune system kills off body invaders with oxygen. We need it to survive, but too much is toxic.[20]

We also need micronutrients such as zn, cu, b, p, fe, mn, mo, cl, k & na to thrive. However, in excess concentrations some of these elements are toxic.(21)Zinc is a classic example. It is essential in our diets for normal growth and immunity. But too much zinc can make water acidic, leave soil unable to sustain plants, and cause pancreas, stomach and respiratory problems in humans.

It is therefore impossible to say that an element is toxic or not. This is also true for a variety of things we release into the environment.

The SaniFlame 1000



The New BurnsClean SaniFlame

This is a completely new design of equipment specifically engineered for small scale operation. It has all the advantages of a modern large scale incineration project in a package that is easy for operators with basic skills to operate cleanly and safely.

Modern remote monitoring methods verify performance of the system at any location with access to the internet. Service engineers can assist the operator in troubleshooting the system's operation without the need to visit the installation.

What sets this system above the competition is the modular approach to the design.

For certain materials such as SRM it is only necessary to operate the Primary and Secondary Chambers. However, for other materials, the system has a number of modular add-on items such as:

- Hot water/Steam generator
- Regenerative cooler
- Auto feeder
- Scrubber

"It is more dangerous to fry fish or beef in a skillet than to operate a modern incinerator"

Dioxin Myths and Facts

Dioxin has been labeled 'the most toxic chemical on earth'.
It consists of a range of compounds, some more deadly than others and is created by a variety of burning processes including forest fires, volcanoes, incineration. Also as a by-product of manufacturing, it travels through the food train into our bodies. Our food is laced with dioxin.

It is a known human carcinogen and impairs the reproductive system. One of its ingredients was used to make Agent Orange, the chemical that destroyed miles of jungle during the Vietnam War.

Myth:
Modern incinerators add to the environmental dioxin load. They cannot destroy the poly aromatic compounds of which dioxin is a single example, and only add to the pollution problems.

Facts:
The BurnsClean two-stage gasification system eliminates dioxins. First it destroys the waste, then it breaks down the harmful gases. Through precise control of the operating variables in the burn chambers, and passing the clean off-gases through its highly efficient rapid cooling system, dioxins and furans are prevented from forming again.

Greater concentrations of Dioxin are formed when Triclosan is broken down by microbial activity. Trilosan is the active ingredient in anti-bacterial soap.[8]

It is more dangerous to fry fish and fatty beef in an uncovered skillet where dioxin is concentrated in the PM2.5 particles in the frying fumes. There is a greater dioxin load from this source than from a modern incinerator.

In House Waste Management

How do you get rid of waste? Long ago waste was discarded in the gutter and the organic portion was consumed by pigs and other livestock.

This continued until 1954 in California and is still going on in some states today. The risk in this practice is the transmission of disease. In 2001 an outbreak of foot and mouth disease in the UK was caused by contaminated salami in animal feed.[9]

Backyard combustion of household waste in a barrel is also not uncommon. For 87 monitored industrial incinerators in Germany the Dioxin production level is 10 gm/year. In comparison, a single family using an oil drum will produce about 580 gm/year. [10]

Backyard composting produces dioxin at rates about 1000 times greater than a modern industrial incinerator. As the dioxin formed is due to microbial action, the environment seems to be able to cope.[11] But only a small percentage of our garbage is compostable.

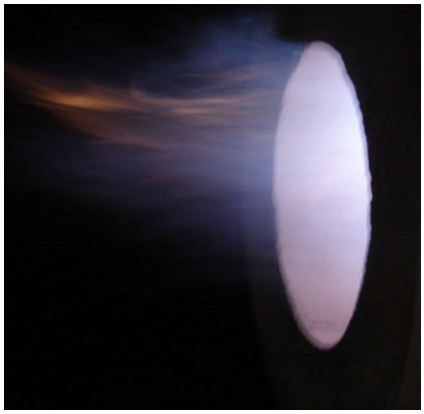
Typical backyard bonfire

How modern incinerators work

Incineration is simple. Materials placed inside a Primary Chamber are gently heated to gasify all volatile compounds. This stage is called pyrolysis.

All bio-waste materials pyrolyze. The result in the Primary Chamber is a rich hydrocarbon gas with a high potential energy and a small amount of residual ash which is completely sterilized.

The gas from the Primary Chamber must be further treated before it can be discharged to the environment. It passes though a turbulent mixing zone when entering the Oxidation Chamber causing the hot gas to recirculate. This increases the residence time and insures total destruction of the organics in the pyrolysis gas.



A typical gas burner flame

The Oxidation or Secondary Chamber operates at a higher temperature than the Primary Chamber to ensure that any toxic materials are destroyed and metallic elements present are oxidized.

In some cases the waste gas must be treated with a scrubber to reduce particulate and acid emissions.

The new BurnsClean system can also be fitted with a regenerative module to recover heat from the off- gas and prevent reformation of toxic chloro–organic compounds (dioxins and furans).

INNOVATION IN GASIFICATION

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BurnsClean Inc. is dedicated to the design and construct of high quality reliable gasification equipment custom made for specific problem waste streams.

Through continuous research & development, we work to deliver cost effective solutions for your specific waste disposal needs.

Please visit us at BurnsClean.com for further information.

The articles in this paper are an introduction to some of the great advances that have been made in incineration. In the coming Review papers we will choose subjects for a more in depth review of the scientific reference literature. We would value your input for future topics of interest. It is our aim to present the material in a readable plain English format, and the interested reader is referred to the web references below for further details.

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