

bi♻️solids...



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North East Biosolids and Residuals Association

Cooperatively promoting the environmentally sound and public supported recycling of biosolids and other residuals.

February 2002, updated May 2005, Dec 2008

What happens to your sewage?

Have you ever visited a wastewater treatment facility?

What do they do?

Have you heard of biosolids?

Have you heard of sewage sludge?

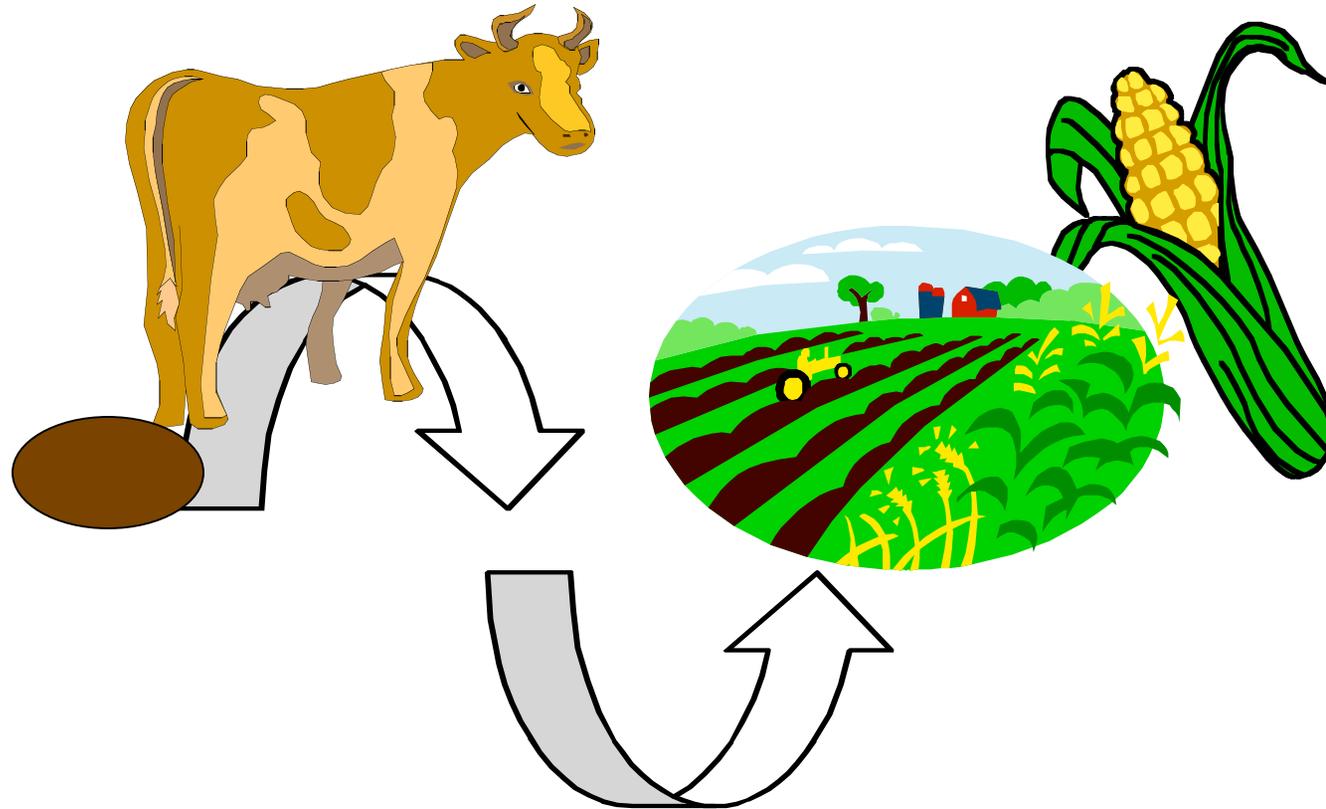
Have you lived on or near a farm?

**Have you seen animal manure spread on farm fields or
compost spread on gardens or lawns?**

Would you call this recycling?

IT IS RECYCLING....

Returning animal manures and composted food or other organic wastes to soils is recycling **NUTRIENTS & ORGANIC MATTER.**



BIOSOLIDS RECYCLING

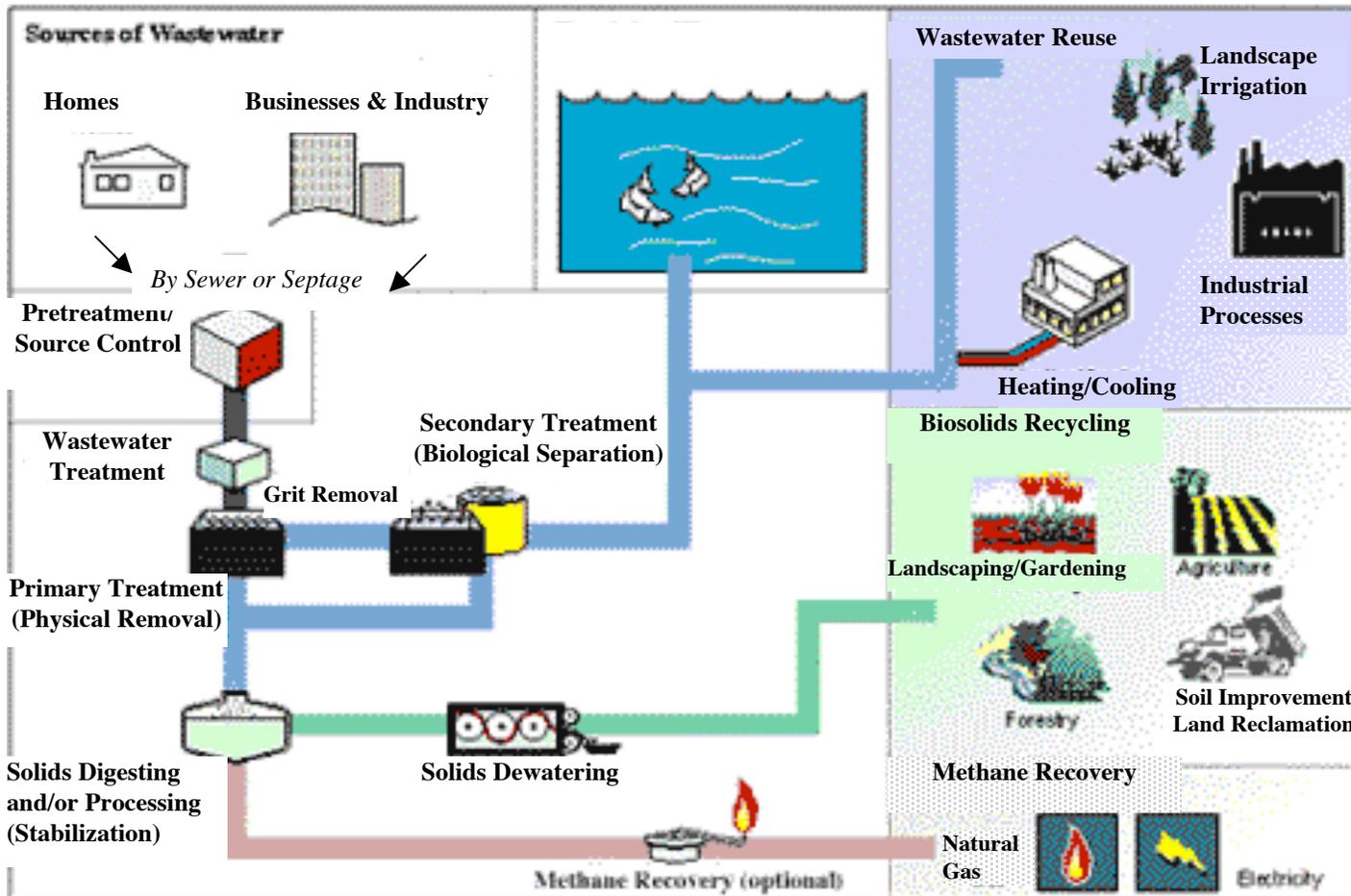
is

recycling nutrients and organic matter

from human uses

back to soils.

Typical Wastewater Treatment Process



Source: Northwest Biosolids Management Association

biosolid n. (1990): solid organic matter recovered from a sewage treatment process and used especially as fertilizer -- usually used in plural

--Merriam-Webster's Collegiate Dictionary, Tenth Edition

biosolids: plural noun: organic matter recycled from sewage, especially for use in agriculture

--New Oxford Dictionary of English, 1998





How are biosolids made in New England and Eastern Canada?

By treating wastewater, solids are removed. The solids are treated and tested to make biosolids.

At a typical New England
Waste Water Treatment Facility (WWTF),
wastewater (sewage), collected by a sewer system or
septic tank, enters the facility looking like this...



Windsor, Vermont WWTF.



...**primary treatment** is where solid particles settle out of the wastewater as it is held still in a large tank or **primary clarifier**...



...The cleaner water flows out of the top of the **primary clarifier**, over toothed weirs, and on to secondary treatment...



Windsor, Vermont



...The solids are removed from the bottom of the **clarifier** by gravity and a slowly-moving scraper...these solids are called **primary solids** or **primary sludge**...



(An empty primary clarifier, to show how it looks under the water)

...the wastewater goes on to **secondary treatment**...
Here the goal is to create an ideal environment for natural microscopic organisms to thrive and eat suspended and dissolved substances...



microorganisms

air is bubbled through the wastewater to help microorganisms thrive; pH and temperature are also controlled

Middlebury, Vermont



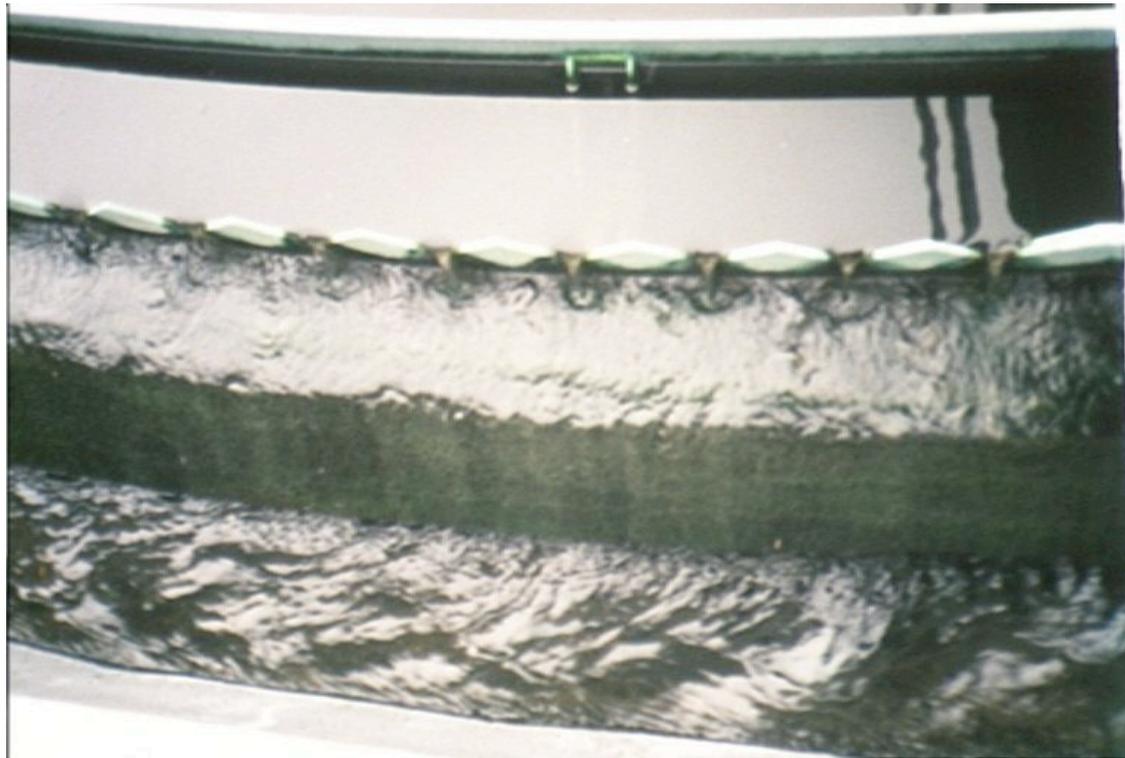
...Next, the wastewater goes into another tank--
the **secondary clarifier**--where more solids settle out
at the bottom of the tank ...these are **secondary solids**
or **secondary sludge**...



Windsor, Vermont



...The cleaned water, called **effluent**, flows out of the top of the **secondary clarifier** and on for final treatment (**tertiary treatment** and/or **disinfection**). It is then discharged to a river, the ocean, or groundwater.

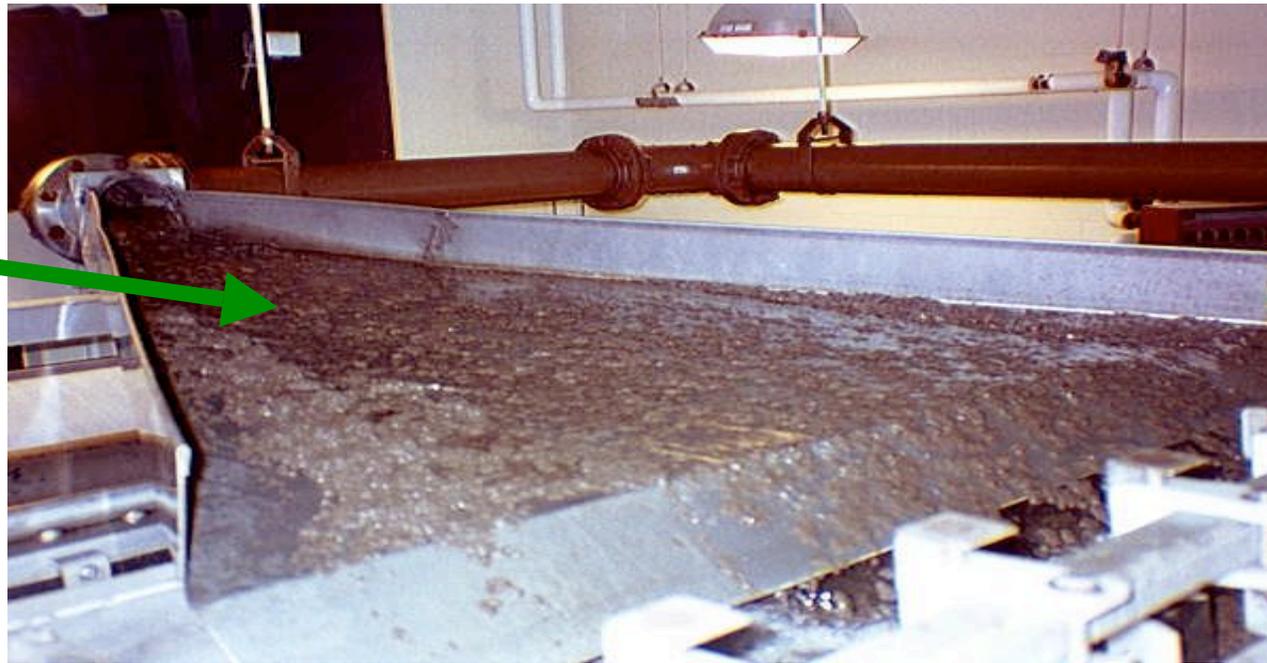


Effluent is continually tested to ensure it meets the health and safety requirements set by federal and state regulations.



Primary and secondary solids are often mixed together and pumped to **centrifuges, gravity thickeners, drying beds, and/or presses** that separate the solids from the water (that water is recycled back to the beginning of the WWTF process).

sewage
solids
before final
dewatering



Ogunquit, Maine

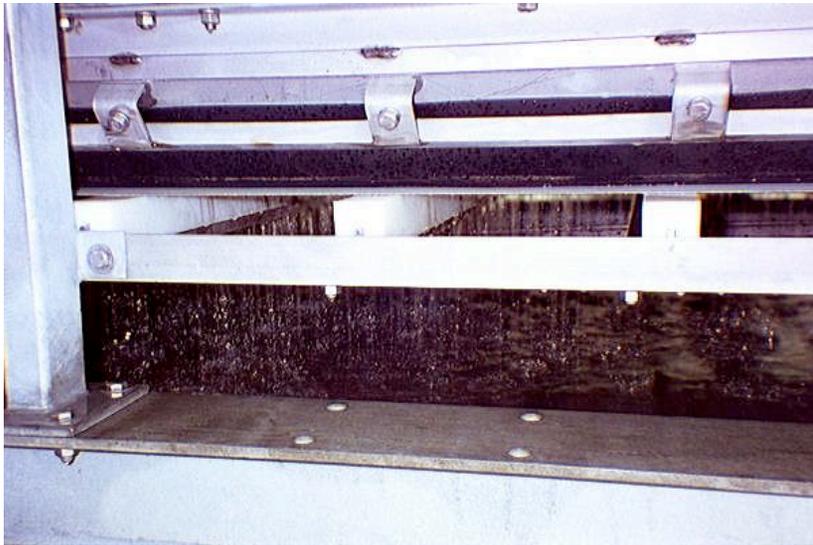


To kill **pathogens** (disease-causing germs), the solids are **anaerobically digested** (placed in sealed tanks with no air so that more micro-organisms further break down the solids) or **lime** is added to the liquid solids. This makes them **bulk Class B biosolids...**

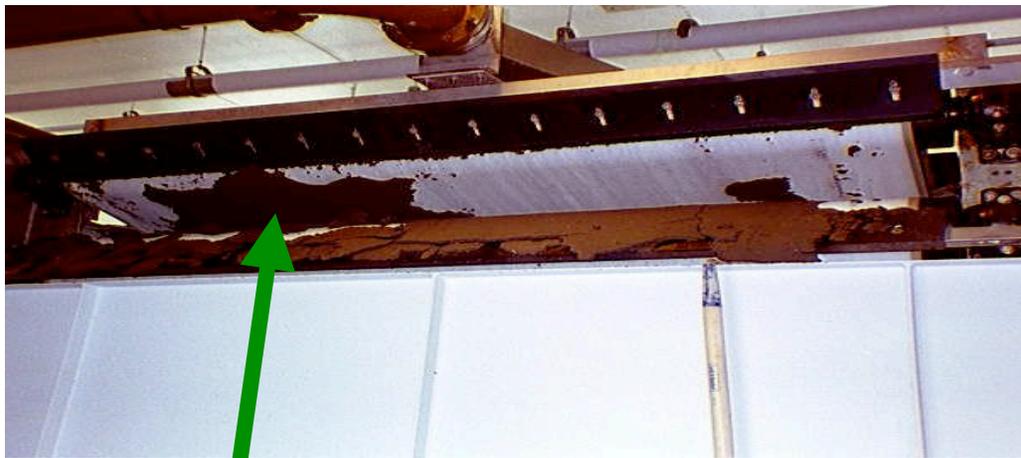
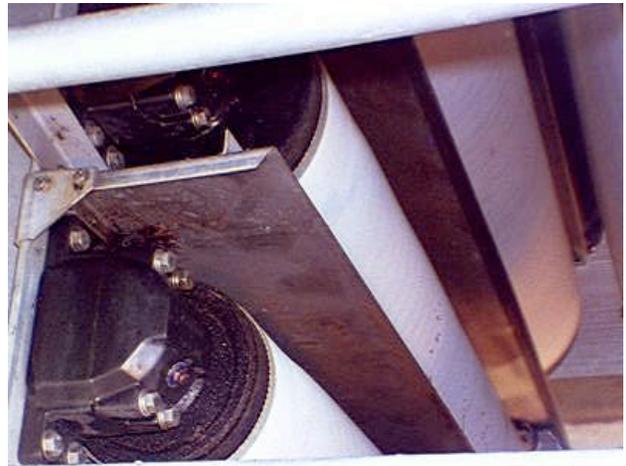


The Nashua, NH anaerobic digester makes bulk Class B biosolids and generates electricity from methane, reducing the amount and odor of biosolids, and saving ratepayers about \$750,000 a year in energy operating costs.

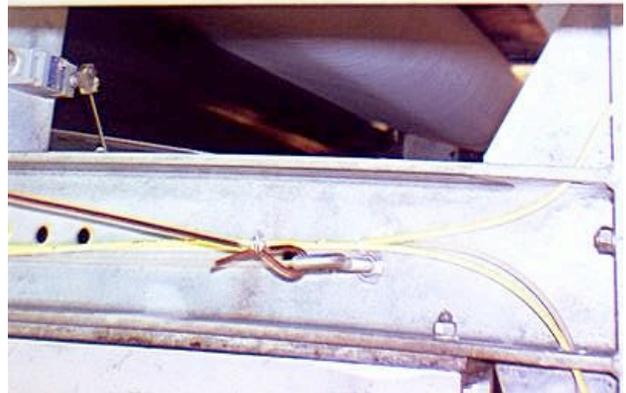




Ogunquit, ME filter press



biosolids



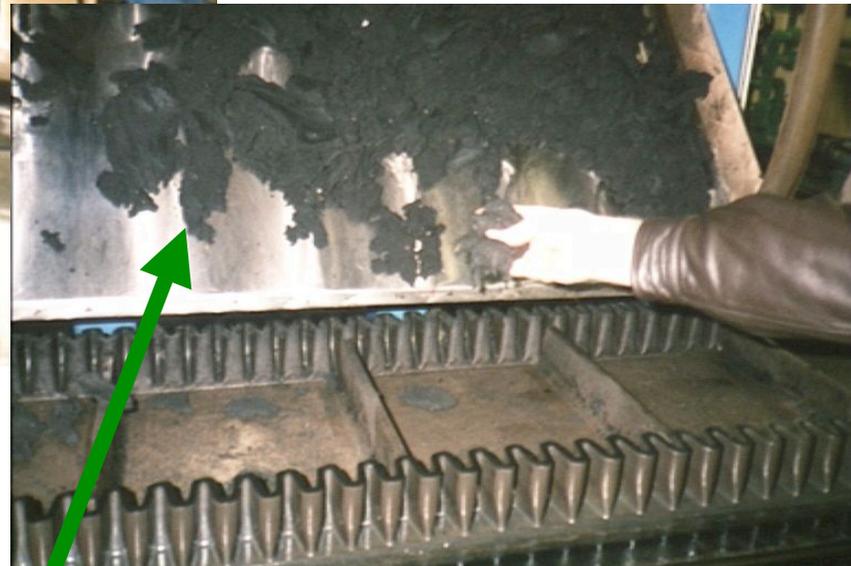
Middlebury, Vermont filter press



biosolids



Windsor, Vermont filter press

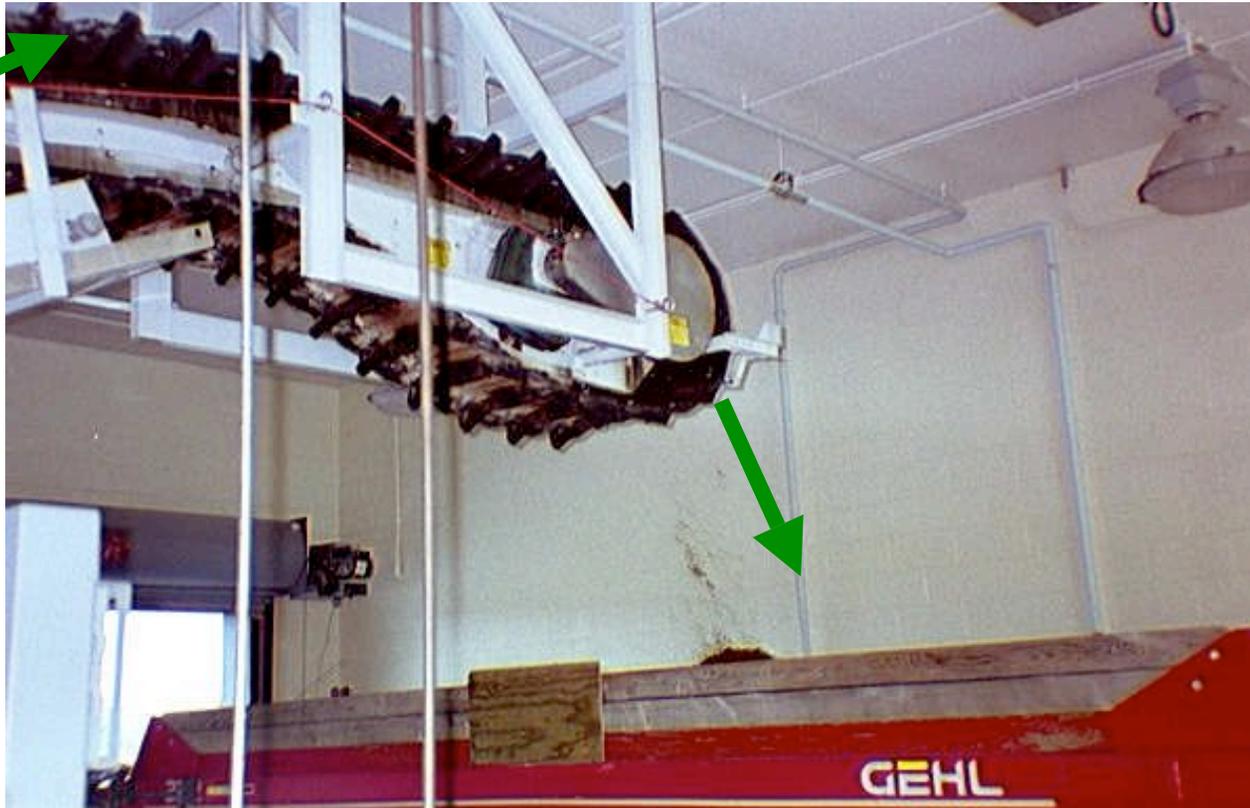


biosolids



...The **biosolids** are loaded into storage or a truck...
Samples of the biosolids are collected for testing for
trace metals and other potential contaminants, in
accordance with state and federal laws...

conveyor
belt



Ogunquit, Maine



...If a farm is going to use **bulk Class B biosolids**, the fields must be mapped, soils tested, set-backs determined, and areas unsuitable to receive biosolids flagged...a state permit is required too...



A flag marks the edge of the area that will receive biosolids.



...only after making sure the site is suitable and the biosolids meet all state and federal standards do the **bulk Class B biosolids** go on the land, in much the same way as animal manures are applied by farmers...

biosolids



Ogunquit, ME specialized biosolids land application truck



Bulk Class B biosolids are usually applied in the amount needed to supply enough nitrogen (N) to grow the crop without leaving excess nutrients that can cause water pollution. This is called the **agronomic rate**.

These Ogunquit biosolids will provide nutrients and organic matter to support the growth of grass for hay on this southern Maine farm field.





The darker green areas of these Maine **grass hay** fields have been fertilized with **bulk Class B biosolids**.





This central New Hampshire **grass hay** field produced more than twice as much hay after being fertilized with **bulk Class B biosolids** from the Franklin, NH WWTF.



Bulk Class B, lime-treated, Concord, NH biosolids are applied to local fields growing **feed corn** for dairy cows.





This
Richmond,
Vermont
feed corn
crop was
fertilized
with **bulk**
Class B
biosolids
from the
neighboring
WWTF.

a Maine farm where
biosolids is used to
grow **feed corn**



Some bulk Class B biosolids have been applied at the **agronomic rate** in forest management areas to provide nutrients for trees.



A northern Maine forest application site.



...land reclamation...

The organic matter and nutrients in **bulk Class B biosolids** helps on barren, disturbed land like **gravel pits** and **closed landfills**.

After careful mapping, soil testing, determining the proper mix, and permitting, **biosolids** and **short paper fiber** (paper mill wastewater residuals) and sand are mixed to create a **manufactured topsoil** that will provide nutrients and hold water for sustainable vegetative growth. This is a cost-efficient way of returning disturbed lands to productive use or protecting closed landfills while recycling part of a waste stream to which we all contribute.



a central
Maine
landfill
reclamation
project





a NH gravel pit 2 years later after reclamation



**manufactured topsoil develops
a sustainable soil ecosystem**



1 year after reclamation



...many New England & eastern Canadian facilities treat biosolids further...

facilities treat biosolids further...

These biosolids are considered **Class A** by U. S. federal and state standards and can be used anywhere.



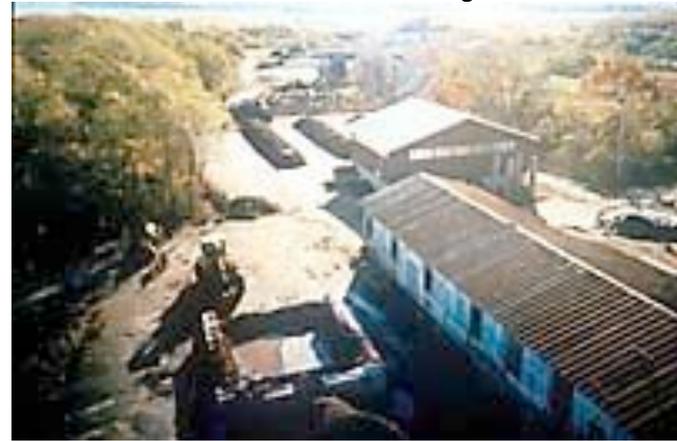
Holyoke, MA biosolids compost
(no longer produced)



...one further treatment is **composting biosolids**...
Composted Class A biosolids can be used anywhere...



Williamstown, MA



Ipswich, MA indoor composting

A Maine outdoor “windrow”
biosolids compost operation.



...on **golf courses**...



Billerica, MA biosolids
compost applied on a green.



Merrimack, NH biosolids
compost helps keep this central
MA golf course green.

...along **highways** ...



Biosolids compost
supports the
growth of
wildflowers along
a NH interstate
highway.



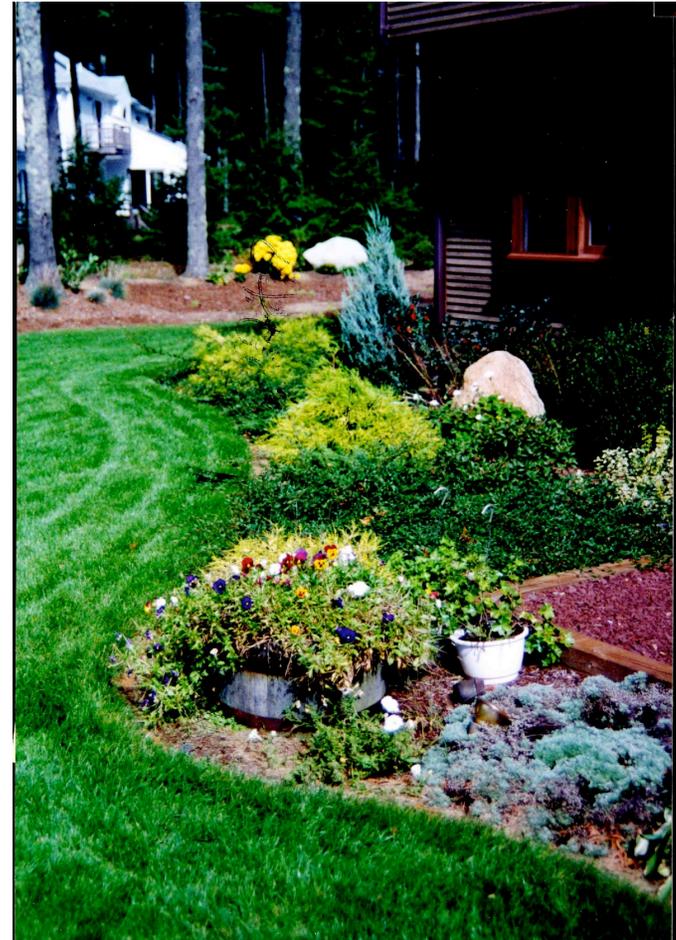
...for landscaping...



Billerica WWTf and biosolids compost facility.



The Great Lawn in New York's Central Park is growing on Merrimack, NH biosolids compost.



A central MA home lawn and garden.



...sports fields...



A university football field is topdressed with biosolids compost.

...and wetlands...

This constructed wetland along a NH highway has soil made with biosolids compost.



Maine's Colby College uses biosolids compost on sports turf.



Governor Angus King
of Maine applies
biosolids compost to
lawn of Governor's
mansion in Augusta,
May 22, 2001.



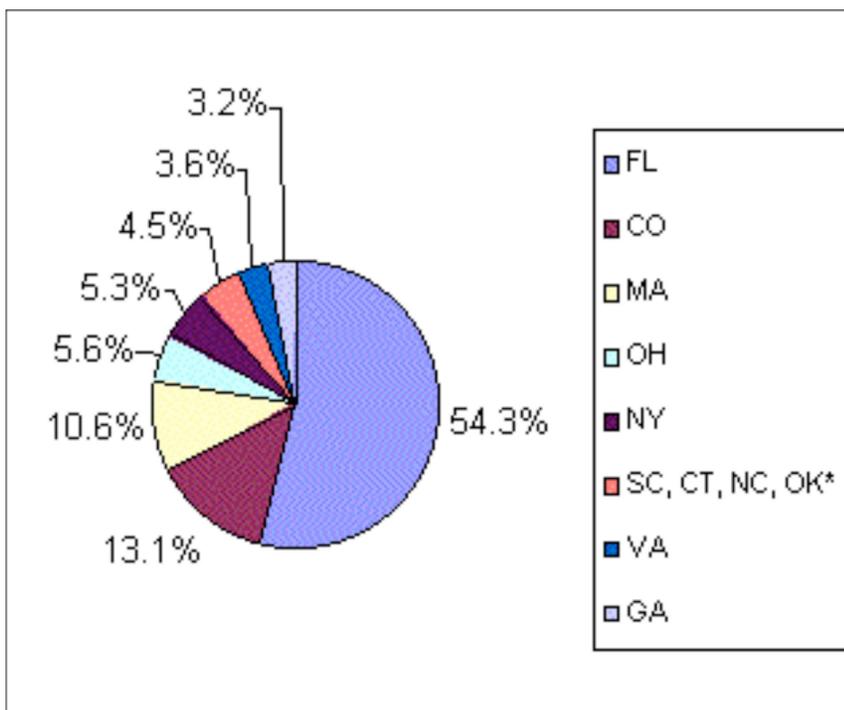


After:

The green strip of lawn, where the **biosolids compost** was applied, stands out 3 weeks later.

...and with **Boston biosolids**, they make **heat-dried pellets**--
Bay State Fertilizer...

States Using MWRA Fertilizer in 2000



Bay State Fertilizer is available in stores in the Boston area.



...and the New England Fertilizer Company ships it and Greater Lawrence **heat-dried pellet biosolids** to Florida to fertilize orange trees and to the Midwest and Colorado and...



Castle Island, South Boston

...some they have used right close to home...



The Esplanade along the Charles River is fertilized with Bay State Fertilizer.



From *Saving Soil: Biosolids Recycling in New England* (free download at www.nebiosolids.org):

New England Data (year 2000):

(this data is now outdated, but gives a general sense)

- ~ 600 publicly owned wastewater treatment facilities
- Approximately 434,000 dry tons of sewage sludge created & managed.
- 96,000 dry tons (22%) of regional sewage sludge recycled as biosolids fertilizer & soil amendment products.
- 18% treated to Class B standards; 82% treated to Class A standards.



State Biosolids Recycling Rates (2004 data*):

- ME – 79% (most is Class A material, including compost and advanced-alkaline-treated biosolids).
- VT – 70% (this is now much less, perhaps 25%, because Burlington area sewage sludge that used to go to Quebec for composting now goes to landfill).
- NH – 68% (land applied Class B and Class A compost).
- MA – 35% (almost all is Class A material including Boston’s MWRA heat dried “Bay State Fertilizer”).
- CT - 2% and RI - 7% (these states invested heavily in sewage sludge incinerators in the 1980s and, therefore, have always mostly used that disposal option).

*from NEBRA, 2007 - see “NEBRA Reports” at www.nebiosolids.org



Regional Savings (year 2000 data):

- 3.7 million lbs (estimated) nitrogen from 96,000 dry tons recycled biosolids.
- Equivalent chemical fertilizer nitrogen would have cost \$1.3 million.
- 96,000 dry tons of biosolids recycled would have required 350,000 cubic yards (est.) of landfill space – equivalent of 6 landfills each the size of a football field & 33 feet deep.
- Where sewage sludge is anaerobically digested (Boston, Greater Lawrence, Nashua, Essex Junction VT), energy is produced, offsetting energy use at the treatment plant.



But there are issues...

Sewage sludge and biosolids contain more than just human waste; they also contain...

- traces of “**heavy**” **metals**
- traces of many different **chemicals**
- **pathogens** (disease-causing micro-organisms)

Biosolids recycling has been extensively studied by scientists to determine the possible impacts of such contaminants. There are some uncertainties. Research continues. But...



...When trying to set **policy** on a complex matter like what to do with sewage sludge, it may help to look at what expert **scientific reviews** found.

In 1996, the nation's premier scientific body, the National Academy of Sciences, reviewed biosolids recycling and concluded:

“In summary, society produces large volumes of treated municipal wastewater and sewage sludge that must be either disposed of or reused. While no disposal or reuse option can guarantee complete safety, the use of these materials in the production of crops for human consumption, when practiced in accordance with existing federal guidelines and regulations, present negligible risk to the consumer, to crop production, and to the environment.”



A U. S. National Academy of Sciences 2002 review found:

“There is no documented scientific evidence that the Part 503 rule has failed to protect public health.”

It also found that the science behind biosolids recycling needs to be updated - which is happening.

The Part 503 regulations are the federal EPA rules governing the use and disposal of sewage sludge and biosolids.

All New England states and eastern Canadian provinces have stricter regulations than the Part 503.



So what happens to *your* organic waste ?

And what do you think of biosolids recycling?



Should biosolids recycling be a goal for a sustainable society?

We think so. The other options, landfilling and incineration, don't use the nutrients, organic matter, and energy in biosolids and are not considered sustainable.

Do the benefits of recycling biosolids to soils outweigh the risks?

We think so. Proper regulation and best management practices have minimized risks.

Can biosolids recycling programs be improved?

Yes - there is ongoing research and growing experience that leads to changes in best management practices.

What do you think? Your input is welcome!

You can learn more about this region's biosolids at
www.nebiosolids.org

Or contact your local wastewater treatment facility.

Your on-going public support of wastewater treatment and biosolids management helps these important environmental programs that protect water quality.

Thank you!

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Cooperatively promoting the environmentally sound and publicly supported recycling of bio solids and other residuals.

