Group Report

- What 3 slides did you pick for your selected audience?

_____ _____ _____

- Which website format did you pick for your selected audience (circle one)?

A **B** **C** **D**

- Please present your reasons for your selections.

Audience

1. **Neighboring property owners** – Your utility has found an ideal biosolids land application site not far from your plant. There are neighboring property owners that have moved out of the city to enjoy a more rural environment. You are contacting them to let them know about the biosolids project.
2. **Regulators** – You are making a presentation to provide a regulator enough information for them to permit a site. This is a site in an area that has not previously received biosolids. The regulator has some familiarity with your program.
3. **Farmers** – You are meeting with farmers in an area that does not have a history of biosolids applications. Most farms grow agronomic crops such as cereal grains and wheat. Crops are irrigated. You are hoping that this area will embrace land application of biosolids as an alternative to synthetic fertilizers.

Audience

5. **County Council** – Your biosolids program is located in a small county where biosolids and septage have been land applied. The council is proposing a ban on land application based on concerns from a few citizens. You are preparing to speak to the council about the impacts of this ban,

6. **Environmental groups** – You are meeting with an environmental group who has expressed concerns over the land application of biosolids. The group prides itself on encouraging sustainable land development. They have never been to a wastewater treatment plant and have not previously thought about what happens when they flush.

Climate Change

1

Carbon	Nitrogen	Phosphorus
	Mg CO_2 Per dry ton	
1.3	.2	0.05

Emerging Contaminants

2

EE1	BPA ppb	TCC
300	4500	18000

Trace metals

3

Cadmium	Mercury	Lead
	ppm	
5.3	0.1	78

Fertilizer Value

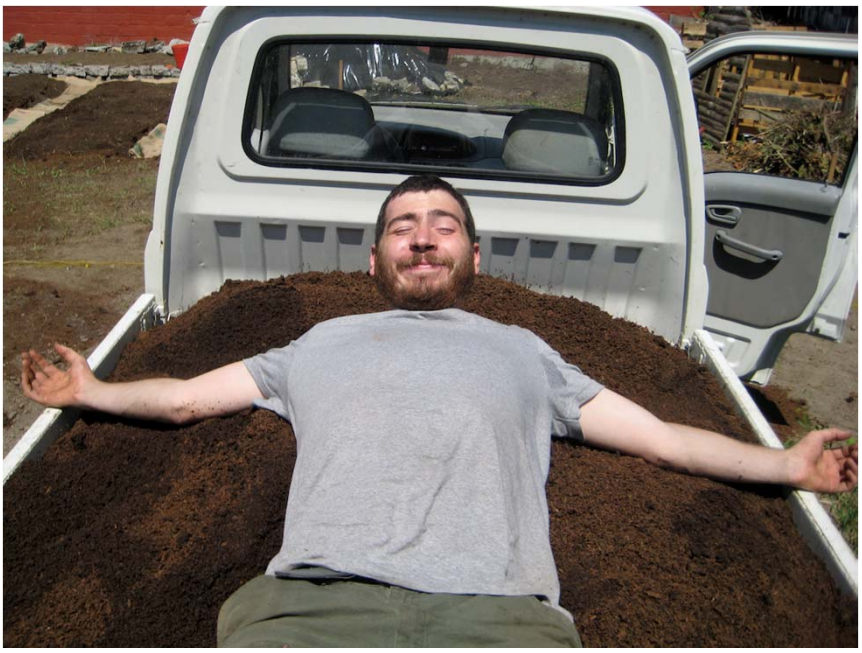
4

Nitrogen	Phosphorus	Potassium
	%	
5-7	1.5-3	0.1

Fertilizer Replacement Value

5

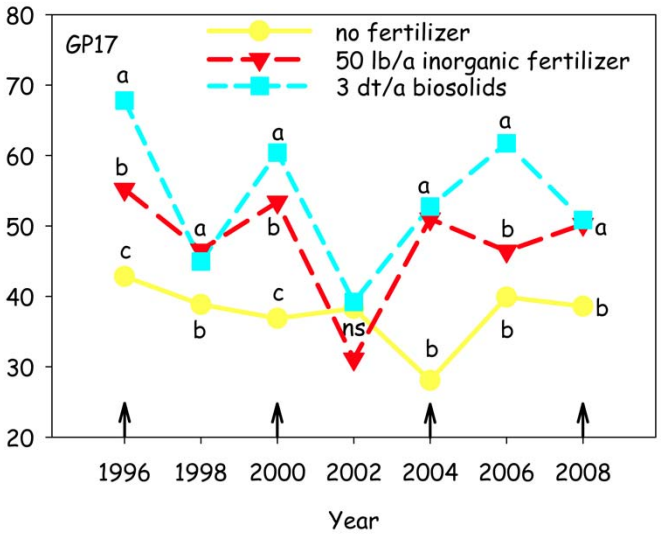
Nitrogen	Phosphorus	Potassium	Sulfur	TOTAL
		$/dry ton		
$19.95	$24.80	$3.90	$2.66	$51.31



6

Grain yield 1996-2008

7



City of Tacoma-TAGRO
Excellence in Biosolids Management Award Winner 8

EDCs Concentrations in Environmental Media 9

EDC	Surface Water (ng/L)	Wastewater Effluent (ng/L)	Sewage Sludge (µg/g)	Sediments (µg/g)	Manure Feedlot (ng/L)
Natural Estrogens					
Estrone (E1)	<0.1-17	0.1-19	0.00143 (Dewatered)	<0.04-2520	17-10500
17β-estradiol (E2)	<0.1-6.0	0.1-650	0.00057 (Dewatered)	0.9-2480	<20-211
Estriol (E3)	1.0-2.5	5.0-7.3	NA	0.5-1.5	<8-6290
Synthetic Estrogens					
Ethinylestradiol (EE2)	<0.1-5.1	0.1-8.9	0.00061 (Dewatered)	<50-500	NF*
Ethoxylates	<20-97600	320-1570	<0.5-250 (Dry weight)	<0.003-38	NF*
Estrogen Mimics					
Nonylphenol (NP)	<10-15000	18-770	5-1000 (Dry weight)	<0.003-154	NF*
Bisphenol A	0.5-250	4.8-258	NF*	NF*	NF*
Bis(2-ethylhexyl)phthalate	NF*	NF*	20-160	NF*	NF*
Diethylhexyl phthalate	NF*	NF*	10.5	NF*	NF*

*NF- Not found in literature

Mine tailing roots 10

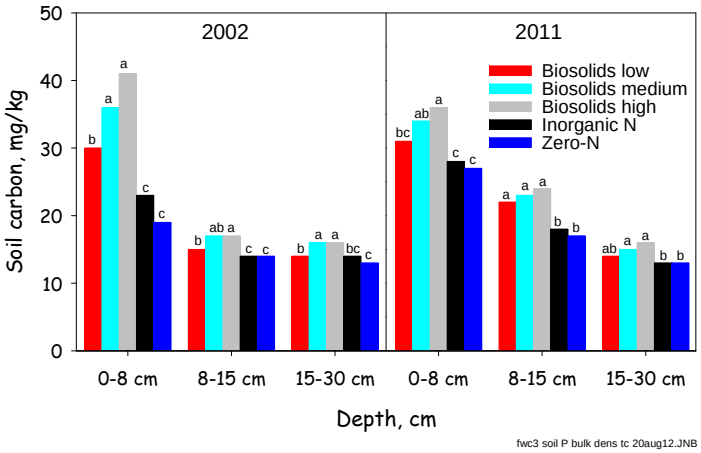
Figure 2. Comparison of tailings root contents after 13 years of reclamation with biosolids. The treatments B150 and B250 represent biosolid application rates of 150 and 250 dry Mg ha-1. Samples were obtained from the 0-15 cm soil layer.

11

13

Soil carbon was higher in biosolids treatments 9 years after the final biosolids applications.

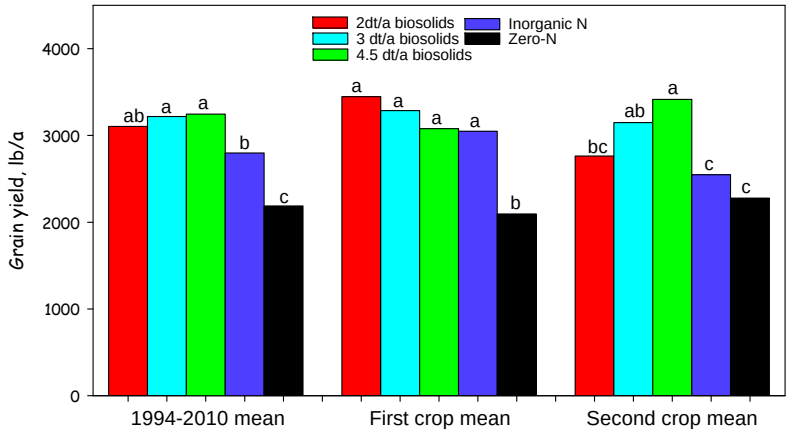
14



15

16

Yields averaged over the first crop and second crop following biosolids application



Sampling Block 2 (Intervale Farms Compost)-7-12-2011

GroCo™ typical lab results: quality

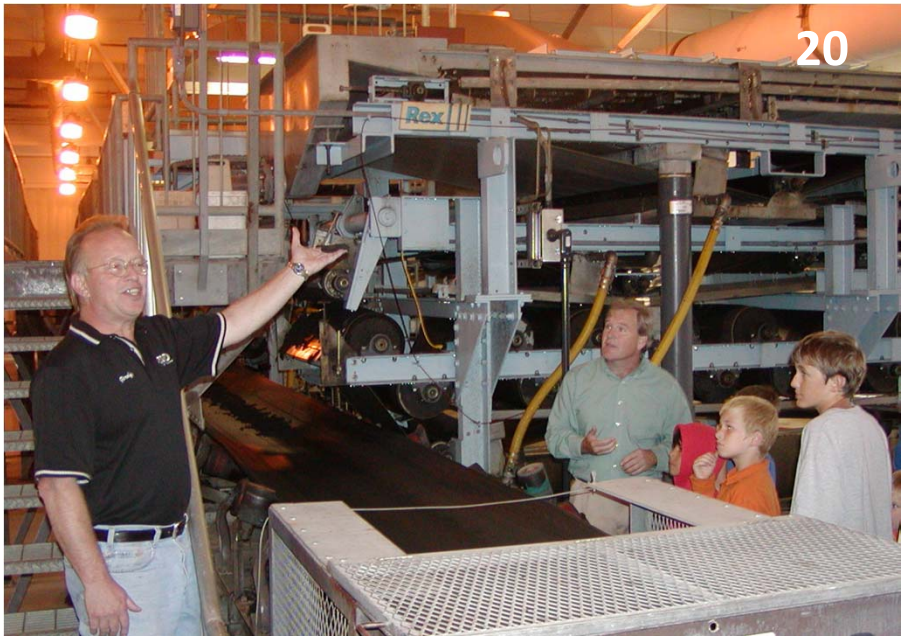
GroCo is made by composting Loop biosolids and sawdust from local mills together for more than one year. GroCo is tested to ensure quality and safety.

	GroCo compost	US Composting Council Seal of Testing Assurance Standard
Organic matter	85.60%	At least 40%
C/N ratio	35	
pH	6.8	6.0 - 8.0
Conductivity (EC)	4.4	
Stability	0.06 "very stable"	7.0 or below
Seedling emergence	100%	At least 80%
Seedling vigor	100%	At least 80%
Major nutrients		
Total nitrogen	1.24%	
Available nitrogen	0.24%	
Organic Nitrogen (slow-release)	1.00%	
Phosphorus (as P_2O_5)	2.04%	
Potassium (as K_2O)	0.19%	
Sulfur	0.33%	
Calcium	0.90%	
Magnesium	0.23%	
Micronutrients		
Iron	5917 parts per million (ppm)	
Manganese	263 ppm	
Boron	9 ppm	
Copper	136 ppm	
Zinc	304 ppm	
Particle Size	"fine"	
Percent passing 1"	100%	
Percent passing 5/8"	100%	
Percent passing 1/4"	96%	

results of ***safety*** *testing on other side*

GroCo™ COMPOST

19

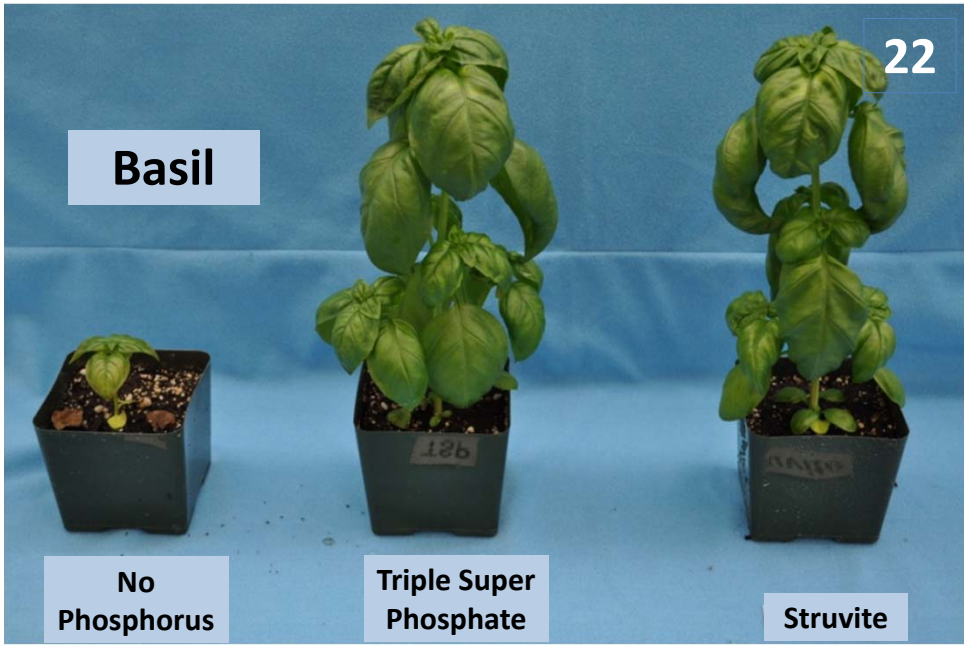


20

Pathways for Risk Assessment of Elements in Soils, and Highly Exposed Individuals-1.

21

Pathway	Highly Exposed Individual
1. Soil➔Plant➔**Human**	Farm markets; 2.5% of food
2. Soil➔Plant➔**Human**	Home gardens; 60% of garden foods for lifetime; **1000 t/ha**
3. Soil➔**Human**	200 mg/day soil/dust ingestion; **1000 t/ha**
4. Sol ➔Plant➔Animal➔**Human**	Farms; 45% home-grown meat; **1000 t/ha**
5. Soil➔Animal➔**Human**	Grazing ruminants; soil is 2.5% of annual diet; 45% home-grown meat.
6. Soil➔Plant➔**Animal**	100% of livestock feeds grown on soils; **1000 t/ha**
7. Soil➔**Animal**	Grazing ruminants; 2.5% soil in diet.



Four weeks after transplant.

Natural Selection Farms
Biosolids Application Worksheet

DATE: 8/3/2012 FIELD: T072927-3A Acres: 216

Mineralization Rate (%): 30 CROP: Hard Red Winter Wheat
Volatization Rate(%): 80

Crop N Requirement 98 lbs/acre of PAN

Clark County	Not Approved	2.1	DT / A	17.2	WT / A	46.0	Lbs. N / DT	3713	Total WT
Cowiche Sewer District	Not Approved	3.6	DT / A	#DIV/0!	WT / A	27.0	Lbs. N / DT	#DIV/0!	Total WT
Dallesport	Not Approved	2.8	DT / A	3.0	WT / A	35.4	Lbs. N / DT	643	Total WT
Ellensburg	Not Approved	2.8	DT / A	3.1	WT / A	34.7	Lbs. N / DT	679	Total WT
Grandview	Not Approved	2.7	DT / A	#DIV/0!	WT / A	35.7	Lbs. N / DT	#DIV/0!	Total WT
Granger	Not Approved	3.2	DT / A	#DIV/0!	WT / A	30.8	Lbs. N / DT	#DIV/0!	Total WT
Kennewick	Approved Rate:	5.3	DT / A	23.9	WT / A	18.7	Lbs. N / DT	5156	Total WT
King Co.--Brightwater	Not Approved	2.3	DT / A	12.2	WT / A	43.4	Lbs. N / DT	2639	Total WT
King Co.--Renton	Not Approved	2.4	DT / A	10.9	WT / A	40.5	Lbs. N / DT	2346	Total WT
King Co.--West Point	Not Approved	2.8	DT / A	10.3	WT / A	35.5	Lbs. N / DT	2215	Total WT
Lyle	Not Approved	3.7	DT / A	7.6	WT / A	26.2	Lbs. N / DT	1651	Total WT
Mabton	Not Approved	2.7	DT / A	#DIV/0!	WT / A	36.7	Lbs. N / DT	#DIV/0!	Total WT
Naches	Not Approved	2.8	DT / A	3.3	WT / A	35.1	Lbs. N / DT	717	Total WT
Prosser	Not Approved	3.8	DT / A	11.1	WT / A	26.1	Lbs. N / DT	2387	Total WT
Sunnyside	Not Approved	2.4	DT / A	#DIV/0!	WT / A	41.3	Lbs. N / DT	#DIV/0!	Total WT
Toppenish	Not Approved	2.0	DT / A	#DIV/0!	WT / A	48.6	Lbs. N / DT	#DIV/0!	Total WT
Wapato	Not Approved	3.8	DT / A	4.7	WT / A	26.0	Lbs. N / DT	1005	Total WT
Yakima	Not Approved	2.2	DT / A	11.3	WT / A	44.6	Lbs. N / DT	2432	Total WT
Ziliah	Not Approved	3.1	DT / A	20.5	WT / A	31.9	Lbs. N / DT	4422	Total WT
New			DT / A		WT / A		Lbs. N / DT	0	Total WT

Notes on Data

Clark County	Data from quarters 1 & 2 2012
Cowiche Sewer District	Data from 2011--6.4 % solids
Dallesport	Data from February 2012
Ellensburg	Data from September 2011
Grandview	Data is from 2011, percent solids estimated at 30%
Granger	Data is inadequate--must retest prior to land app. Need metal and nutrient data.
Kennewick	*Data from July 2012, Percent Solids @ 22%*
King Co.--Brightwater	Data from 2012-1st quarter
King Co.--Renton	Data from 2012-1st quarter
King Co.--West Point	Data from 2012-1st quarter
Lyle	Data is 2011
Mabton	Data is inadequate--must retest prior to land app. Need metal and nutrient data.
Naches	Data is from 2011
Prosser	Data is a composite from 2011--Dried sludge samples, not feed sludge or AHT
Sunnyside	Data from April 2011--4% solids, need to update before next application
Toppenish	Data is inadequate--must retest prior to land app. Need metal and nutrient data.
Wapato	Data is from February 2012
Yakima	Data is from January thru June 2012
Ziliah	Data is December 2011 sampling
New	

Agronomic Rate Approval 23

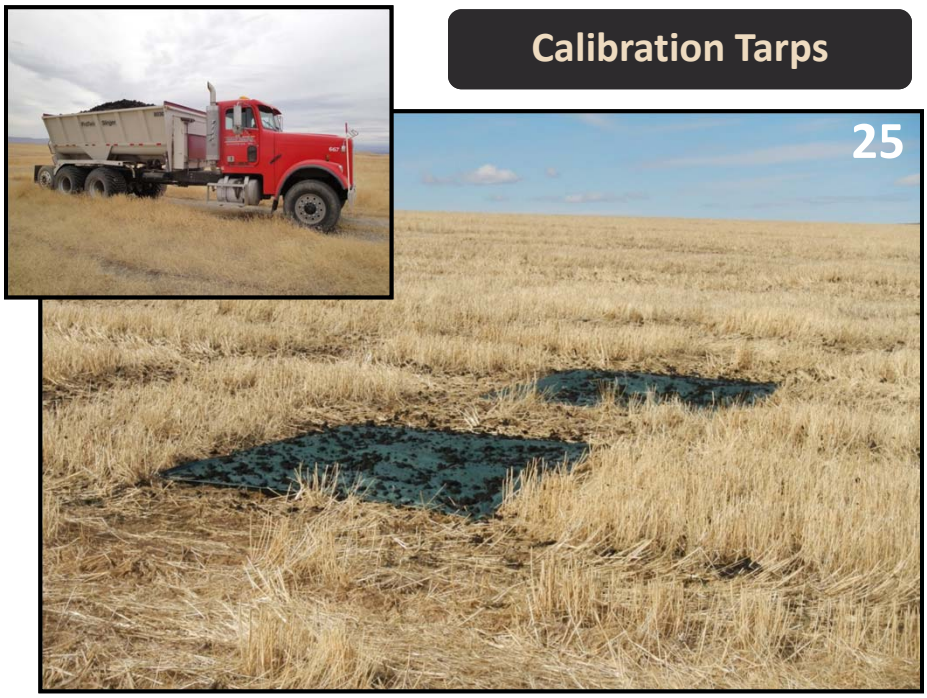
✓NSF sends the agronomic rate recommendation along with supporting information to our DOE regional coordinator.

✓ECY reviews rate, and provides approval or suggestions

✓Approval includes current list of approved municipalities along with the appropriate dry ton/acre rate for each municipality

24

Calibration Tarps



25

step 1. Determine the **square footage** of the project.

step 2. Determine the **depth in inches** you want.

step 3. **Multiply:** step 1. x step 2. x 0.0031 = cubic yards

One cubic yard covers:

324 square feet	1" deep
162 square feet	2" deep
108 square feet	3" deep
81 square feet	4" deep
65 square feet	5" deep
54 square feet	6" deep

26

How much GroCo?

Add it to your garden soil, containers, or indoor pots to get lush plant growth.

Annual flower and vegetable beds Add 1"-3" to the top of your garden soil and till it in 6-12" deep each spring.

Turf Add 1/2"-1" and rake evenly across the grass once a year.

Perennial shrubs and trees Add 1"-3" to the soil surface. As with any compost product or bark mulch, be sure to leave a 3" border around plant stems and trunks.

Indoor plants Sprinkle 1/2"-2" of compost on the surface of the soil.

How to use GroCo

Total Nitrogen	1.24%
Plant Available Nitrogen	0.24%
Organic Nitrogen (slow-release)	1.00%
Phosphorus (as P_2O_5)	2.04%
Potassium (as K_2O)	0.19%
Sulfur	0.33%
Calcium	0.90%
Magnesium	0.23%
pH	6.8
Organic matter	85.6%
C to N ratio	35

All values are reported on a dry weight basis.

Typical values of major nutrients found in GroCo compost

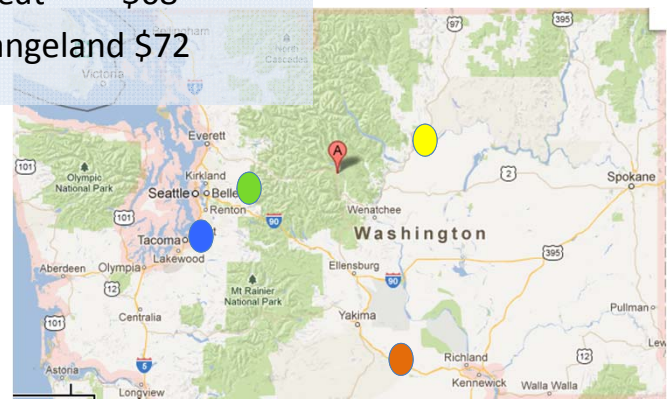
What's in GroCo?

Biosolids are produced by MUNICIPAL wastewater treatment plants

- Regulated under CWA
- Biosolids use/disposal costs burden of municipality
- Every day the biosolids program managers have to decide where to send the trucks
- About 10 trucks (@ 33 wet tons) per day per million people

King County, WA – cost per wet ton

- Compost facility $82
- Forest plantations $79
- Dryland wheat $68
- Hops and rangeland $72




BIOSOLIDS...
ich your soil, share the bounty!
27
What's Growing On?
TAGRO
GroCo


28
Application To Dryland Wheat
1.5 dt/acre

The basis for the agronomic rate calculation: Existing soil nutrient levels

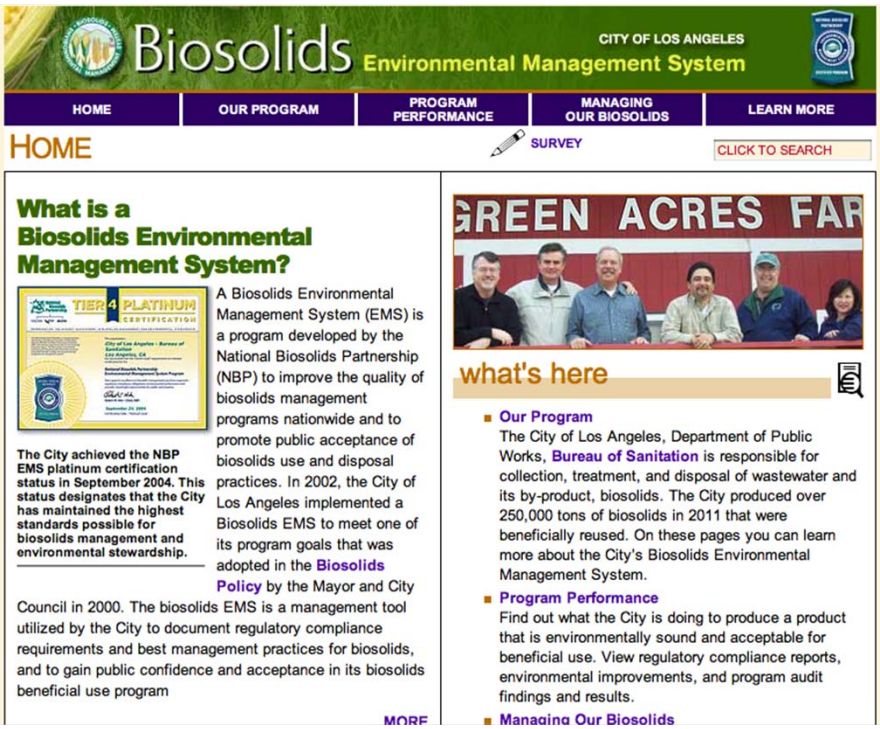
29

- ✓ 15-20 Soil Samples drawn at 1', 2', and 3' levels per field
- ✓ Store GPS coordinates of each sample site
- ✓ Newly permitted fields tested for metals
- ✓ Soil Samples are delivered to certified laboratory for analysis
- ✓ Analysis Report contains organic matter and soil residual nitrogen information

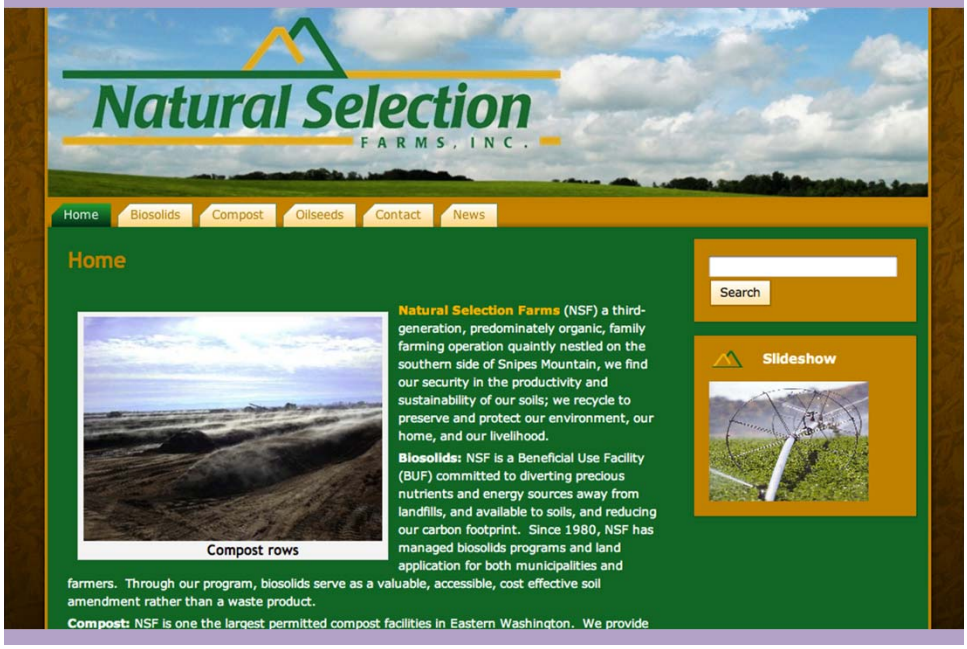
Additional selections

30. **Plant Tour**
31. **Farm Tour**
32. **Open House with Q&A**
33. **Public Meeting**
34. **Research Demonstration**

A


Biosolids
CITY OF LOS ANGELES
Environmental Management System
HOME
OUR PROGRAM
PROGRAM PERFORMANCE
MANAGING OUR BIOSOLIDS
LEARN MORE
HOME
SURVEY
CLICK TO SEARCH
What is a Biosolids Environmental Management System?
TIER 4 PLATINUM CERTIFICATION
The City achieved the NBP EMS platinum certification status in September 2004. This status designates that the City has maintained the highest standards possible for biosolids management and environmental stewardship.
A Biosolids Environmental Management System (EMS) is a program developed by the National Biosolids Partnership (NBP) to improve the quality of biosolids management programs nationwide and to promote public acceptance of biosolids use and disposal practices. In 2002, the City of Los Angeles implemented a Biosolids EMS to meet one of its program goals that was adopted in the Biosolids Policy by the Mayor and City Council in 2000. The biosolids EMS is a management tool utilized by the City to document regulatory compliance requirements and best management practices for biosolids, and to gain public confidence and acceptance in its biosolids beneficial use program
MORE
GREEN ACRES FAR
what's here
Our Program
The City of Los Angeles, Department of Public Works, Bureau of Sanitation is responsible for collection, treatment, and disposal of wastewater and its by-product, biosolids. The City produced over 250,000 tons of biosolids in 2011 that were beneficially reused. On these pages you can learn more about the City's Biosolids Environmental Management System.
Program Performance
Find out what the City is doing to produce a product that is environmentally sound and acceptable for beneficial use. View regulatory compliance reports, environmental improvements, and program audit findings and results.
Managing Our Biosolids

B


Natural Selection
FARMS, INC.
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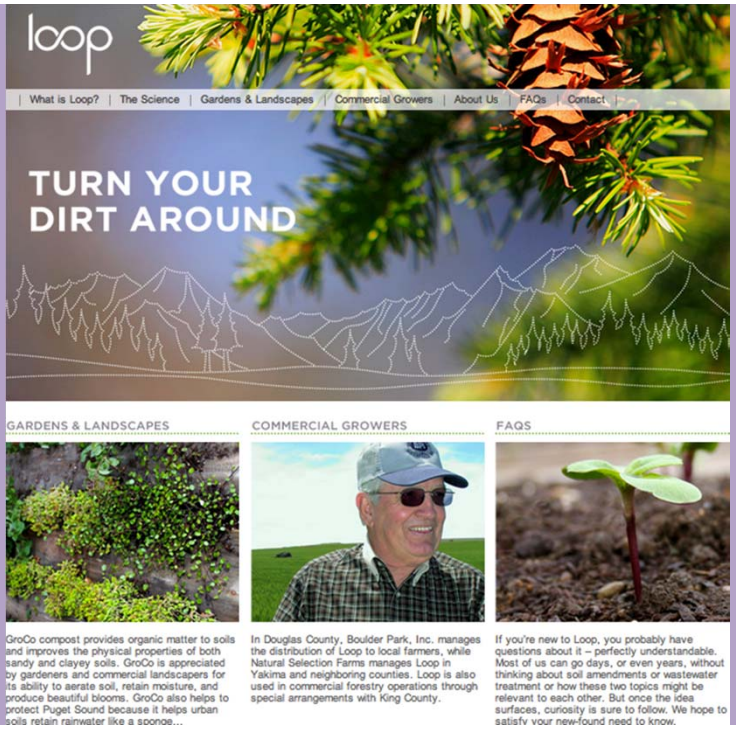
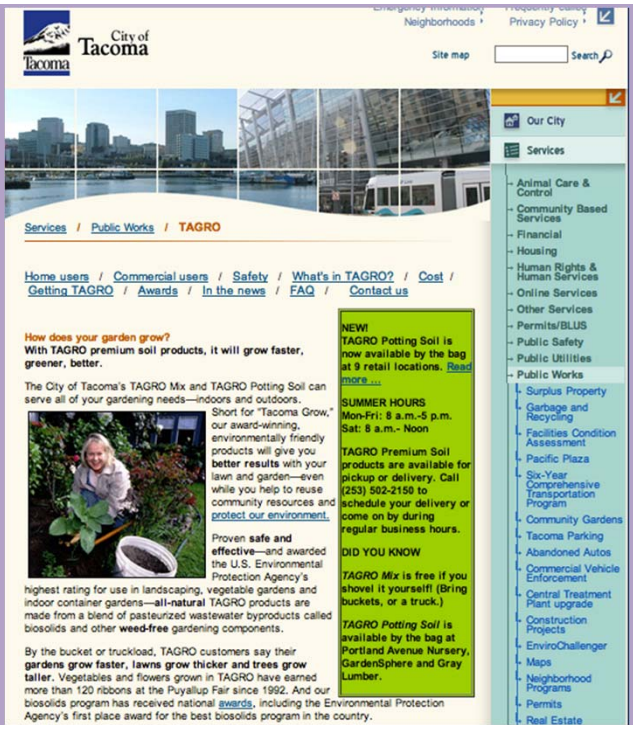
Natural Selection Farms (NSF) a third-generation, predominately organic, family farming operation quaintly nestled on the southern side of Snipes Mountain, we find our security in the productivity and sustainability of our soils; we recycle to preserve and protect our environment, our home, and our livelihood.
Biosolids: NSF is a Beneficial Use Facility (BUF) committed to diverting precious nutrients and energy sources away from landfills, and available to soils, and reducing our carbon footprint. Since 1980, NSF has managed biosolids programs and land application for both municipalities and farmers. Through our program, biosolids serve as a valuable, accessible, cost effective soil amendment rather than a waste product.
Compost: NSF is one the largest permitted compost facilities in Eastern Washington. We provide

C


loop
What is Loop? | The Science | Gardens & Landscapes | Commercial Growers | About Us | FAQs | Contact
TURN YOUR DIRT AROUND
GARDENS & LANDSCAPES
COMMERCIAL GROWERS
FAQS
GroCo compost provides organic matter to soils and improves the physical properties of both sandy and clayey soils. GroCo is appreciated by gardeners and commercial landscapers for its ability to aerate soil, retain moisture, and produce beautiful blooms. GroCo also helps to protect Puget Sound because it helps urban soils retain rainwater like a sponge...
In Douglas County, Boulder Park, Inc. manages the distribution of Loop to local farmers, while Natural Selection Farms manages Loop in Yakima and neighboring counties. Loop is also used in commercial forestry operations through special arrangements with King County.
If you're new to Loop, you probably have questions about it -- perfectly understandable. Most of us can go days, or even years, without thinking about soil amendments or wastewater treatment or how these two topics might be relevant to each other. But once the idea surfaces, curiosity is sure to follow. We hope to satisfy your new-found need to know.

D


City of Tacoma
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Site map
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Animal Care & Control
Community Based Services
Financial
Housing
Human Rights & Human Services
Online Services
Other Services
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Public Utilities
Public Works
Surplus Property
Garbage and Recycling
Facilities Condition Assessment
Pacific Plaza
Six-Year Comprehensive Transportation Program
Community Gardens
Tacoma Parking
Abandoned Autos
Commercial Vehicle Enforcement
Central Treatment Plant upgrade
Construction Projects
EnviroChallenger
Maps
Neighborhood Programs
Permits
Real Estate
Services / Public Works / TAGRO
Home users / Commercial users / Safety / What's in TAGRO? / Cost / Getting TAGRO / Awards / In the news / FAQ / Contact us
How does your garden grow?
With TAGRO premium soil products, it will grow faster, greener, better.
The City of Tacoma's TAGRO Mix and TAGRO Potting Soil can serve all of your gardening needs—indoors and outdoors.
Short for "Tacoma Grow," our award-winning, environmentally friendly products will give you better results with your lawn and garden—even while you help to reuse community resources and protect our environment.
Proven safe and effective—and awarded the U.S. Environmental Protection Agency's highest rating for use in landscaping, vegetable gardens and indoor container gardens—all-natural TAGRO products are made from a blend of pasteurized wastewater byproducts called biosolids and other weed-free gardening components.
By the bucket or truckload, TAGRO customers say their gardens grow faster, lawns grow thicker and trees grow taller. Vegetables and flowers grown in TAGRO have earned more than 120 ribbons at the Puyallup Fair since 1992. And our biosolids program has received national awards, including the Environmental Protection Agency's first place award for the best biosolids program in the country.
NEW!
TAGRO Potting Soil is now available by the bag at 9 retail locations. Read more ...
SUMMER HOURS
Mon-Fri: 8 a.m.-5 p.m.
Sat: 8 a.m.- Noon
TAGRO Premium Soil products are available for pickup or delivery. Call (253) 502-2150 to schedule your delivery or come on by during regular business hours.
DID YOU KNOW
TAGRO Mix is free if you shovel it yourself! (Bring buckets, or a truck.)
TAGRO Potting Soil is available by the bag at Portland Avenue Nursery, GardenSphere and Gray Lumber.