Sound Consumer Biosolids Article – Questions and Brief Responses

What are biosolids?

- Biosolids are the mostly organic material left after wastewater has been highly treated. Biosolids must meet strict quality standards for pollutant levels and treatment requirements for reducing pathogens and stabilization.
- Biosolids are not poop. They may have started out as poop, but through extensive treatment processes they are refined and become a good, stable, and valuable source of nutrients.
- Comparing biosolids to poop is like comparing gasoline to crude oil – gasoline starts out as crude oil, but through many steps of refining, it's changed into a useful, energy-rich product.

Why do we use biosolids?

- Washington law says that biosolids are a "valuable commodity" and that they should be beneficially used.
- Biosolids reuse is the ultimate in recycling. We're taking something that was considered a waste, treating it, and converting it to a valuable product that is used to benefit the environment.
- Biosolids are highly valued by many – especially farmers – because they contain all of the essential plant nutrients as well as vital organic matter which build productive soils and help plants grow bigger and better.

What are some benefits of recycling biosolids?

- Ecology strongly encourages the use of biosolids to "*build better soils.*"
- Applying biosolids has been shown to significantly improve plant growth and quality, increase the ability of sandy soils to hold water, improve drainage in heavy clay soils, and decrease both wind and water erosion.
- Biosolids use:
    - Provides all of the nutrients needed by plants.
    - Improves soil structure and tilth.
    - Adds organic matter to soils.
    - Sequesters carbon in soils.
    - Enhances soil moisture retention.
    - Reduces soil erosion.

- Improves plant growth.
- Enhances plant quality.
- Reduces the need for chemical fertilizers (which require enormous amounts of energy and resources to produce).
- Protects groundwaters and surface waters.

Where can biosolids be used?

- Biosolids can be used most places healthy plant growth is desired, including:
  - Lawns and gardens.
  - Parks and sports fields.
  - Farms.
  - Forests.
  - Reclamation sites such as surface mines and other drastically disturbed areas.
  - Only biosolids that are treated to meet the highest quality standards can be used on lawns, gardens, parks, and sports fields.

How much biosolids are produced in Washington and what happens to it?

- About 95,000 tons of biosolids are managed in Washington each year. Of that, about 80% are land applied, about 20% are incinerated, and a tiny amount is landfilled.
- About 76% of the applied biosolids go on agricultural sites (primarily east of the Cascades); about 11% are applied to forested sites (primarily west of the Cascades); and most of the remainder are sold for residential and commercial use.
- Overall, we estimate that biosolids are applied to less than 0.09% of agricultural land and less than 0.004% of the all land in Washington.

If biosolids were not land applied, where would they go?

- There really are just three things that can happen to biosolids at this time. They can be burned (incinerated); they can be landfilled; or they can be land applied (beneficially used). (See the timeline below to learn more about environmental and health considerations of incineration and landfilling.)
- As directed by state law, Ecology seeks to maximize beneficial use. But we also recognize that there is some risk associated with biosolids use. That's precisely why we have a regulatory program in place that restricts what can be done with biosolids and requires biosolids to be treated to meet strict quality standards.

- Here's a brief history of how "sludge" has been handled over time.
    - *Dumping into the streets.* This resulted in direct contact by people and other animals and untold illness.
    - *Discharging into rivers and other waterways.* Since these are the main drinking water sources for most people this resulted in illness and death from diseases such as typhoid.
    - *Dumping into oceans.* This resulted in contaminated fish and other sea life, "dead" zones, and inerts on beaches. Ocean dumping was banned by the Clean Water Act.
    - *Dumping into landfills.* This still occurs in many states. Landfill capacity is limited, so the more biosolids going into landfills, the less space there is for actual garbage. Landfilling is also expensive. Putting biosolids in landfills also enhances the creation of a very potent greenhouse gas, methane. It also results in the complete loss of nutrients and organic matter which otherwise could be returned to soils.
    - *Incineration.* This still occurs in Washington and many other states. Incineration results in air pollution, ash which mostly is disposed in special-purpose landfills, and the complete loss of nutrients and organic matter which otherwise could be returned to soils.
    - *Beneficial use.* This results in a return of nutrients and organic matter to soils, builds better and more productive soils, reduces the huge and negative environmental impacts of producing inorganic fertilizers, stores carbon in soils, reduces the costs of food production for farmers, and completes the "recycling circle."
- We create biosolids and have to do something with them. Given the above history, beneficial use offers a reasonable and responsible option.

What is Ecology's role in biosolids management?

- Ecology is the regulatory agency for biosolids management in Washington State. Ecology biosolids staff is responsible for writing the state biosolids rules and for permitting the nearly 380 biosolids facilities across the state.
- Six full-time Ecology employees regulate biosolids. There is at least one person in each of Ecology's four regions and headquarters.
- Ecology biosolids staff receives regular training in biosolids issues. Ecology biosolids staff holds advanced science-based degrees in environmental studies.
- Ecology also receives significant assistance in regulating biosolids from local health departments. So the actual resources overseeing biosolids management in the state are supplemented by local partnerships.
- Regulatory oversight includes regular site visits and inspections to ensure compliance as well as ongoing technical assistance to all facilities. Larger operations are inspected more frequently.
- Ecology staff closely evaluates reports and data submitted by the facilities and enters it into a database.

What is EPA's role in biosolids management?

- EPA is required to implement the federal biosolids program and upgrade regulations as new information based on research warrants changes.
- EPA doesn't have a large presence across much of the country, including in Washington. However, several people at EPA support the federal program.
- EPA has several people involved in research on biosolids-related issues. These people are mainly at EPA's Cincinnati-based research lab.

What kind of restrictions are imposed by biosolids permits?

- Management of biosolids is covered by permits issued by Ecology. The permits:
    - Limit application rates.
    - Impose buffers to water wells, surface waters, property lines, roadways and residential dwellings.
    - Require the protection of groundwater.
    - Restrict where and when biosolids can be applied.
    - Limit the concentration of pollutants.
    - Require removal of garbage.
    - Apply standards for storage.
    - Require transportation plans.
    - Define monitoring requirements.
    - Require monitoring and sampling plans.
    - Mandate the use of Ecology-accredited labs.
    - Specify treatment standards for pathogen reduction.
    - Specify treatment standards for stabilization.
    - Impose restrictions on site access.
    - Limit crop harvesting and use.

What's the difference between Class A and Class B biosolids?

- "Class A" or "Class B" biosolids products refers to the level of pathogen reduction that the product has undergone.
- Class B biosolids have been treated by a process designed to destroy at least 99% of the pathogen indicators.

- Class A biosolids have been treated by a process designed to destroy 100% of pathogens.
- There are few restrictions on the use of Class A biosolids, but there are many restrictions on how Class B biosolids can be used.

How are humans protected from consuming crops grown in biosolids?

- The state biosolids rule prescribes different crop harvesting restrictions based on whether the harvested part of the crop comes into contact with the biosolids and how long the biosolids were on the soil surface.
- The restrictions range from **30 days** for crops whose harvested parts do not come into contact with the biosolids (e.g.: wheat, cherries, corn), to **14 months** for above-ground crops whose harvested parts may contact the biosolids (e.g.: lettuce, cucumbers), all the way up to **38 months** for root crops (e.g.: beets, potatoes, onions).
- The result of the restrictions is that there is virtually no chance that crops whose harvested parts may come into contact with biosolids (e.g.: beets, potatoes, onions, lettuce, cucumbers) will be fertilized with Class B biosolids because the waiting period is just too long.
- Any type of crop can be grown in Class A biosolids because they contain no detectable pathogens.

What about metals in biosolids?

- Metals in biosolids come primarily from a combination of what we excrete, other things we flush down our toilets, leaching from our plumbing, stormwater that enters a treatment plant, and industrial sources.
    - Industrial sources are minimal because they are tightly controlled through pre-treatment programs at the plant/factory.
    - Leaching from plumbing has been reduced a lot over the years by controlling the pH of our drinking waters.
    - Stormwater can be a significant contributor because it contains contaminants washing off roadways, sidewalks, roofs, and other impervious surfaces. Stormwater also contains contaminants from burning and the resulting air deposition that lands on the impervious surfaces.
- There has been an enormous amount of research on metals in biosolids. The research has shown that metals do not move in soils.
- Most metals are tightly bound to the biosolids.
- The extensive risk assessment conducted for the federal biosolids rule set limits on concentrations of metals allowed in biosolids. The limits are extremely conservative.
- Biosolids applied in Washington rarely even come close to the maximum levels allowed for land application based on EPA's risk-based standards.

- Biosolids must be applied at the “agronomic rate”. The agronomic rate is tied to nitrogen which significantly limits loading rates. A common loading rate is 3-4 tons per acre. See the below photo which shows a 3-4 tons application rate; you’ll see it’s not much biosolids.

- By limiting biosolids application to the agronomic rate and by limiting the allowable pollutants in biosolids, it’s virtually impossible that metals in soils at biosolids application sites can accumulate to levels that pose any undue risk to even the most highly exposed individuals, much less to the general public.

Photo of Biosolids Applied at 3-4 tons/acre

What about pharmaceuticals, personal care products, and other chemical compounds in biosolids?

- Studies have shown that biosolids contain many different chemicals at low concentrations. This isn’t surprising since we buy, use and consume thousands of chemicals in our everyday lives.

- We refer to many of these chemicals as “trace organics” because they are carbon-based (i.e. “organic”) and because they are at low concentrations in biosolids (often at concentrations in parts per billion or parts per trillion).

- We are now able to detect these chemicals in minute concentrations due to advances in analytical technologies, whereas previously we weren’t aware they were present at all. This doesn’t mean they weren’t present in the past or that the concentrations pose a risk. It just means that we can now find them.

- Most of the trace organics found in biosolids are a result of our production and use of products containing chemicals. These products include shampoos, laundry detergents, plastics, hand sanitizers, toothpastes, clothing, soaps, furniture, medications, etc.

- These chemicals enter our sewage treatment systems because we use them so widely today.

- When any chemical enters a sewage system, there are primarily four things that can happen to it:

    - It can move through the system as-is and be discharged with the treated water.

- It can bind to the solids as-is and become part of the biosolids.
- It can volatilize into the air.
- It can be changed into other chemical compounds that follow one of the other three routes.

- If a chemical ends up in biosolids, we know something important (and positive) about it. We know that the chemical has properties which bind it to the solids (otherwise it would have remained with the liquids or volatilized). This tells us it's not readily water-soluble and, therefore, unlikely to leach after land application. In addition, the strictly controlled application of the biosolids to soils allows an opportunity for physical and chemical processes occurring within the soil environment to break the chemicals down into ones of lesser or no concern.

- Phthalates are a good example of a class of chemicals that can be found in biosolids. Phthalates are organic chemicals that are mainly used to make plastics flexible. Phthalates are truly ubiquitous in the environment because they are used in countless products and processes. Compared to many other trace organics in biosolids, phthalates are found in relatively high concentrations; research suggests the concentration of phthalates in biosolids to be about 10 – 50 parts per million (ppm). Not surprisingly, the current research on phthalates in biosolids suggests that the chemicals are bound to the biosolids (they don't move) and that they break down quickly in soils (half-lives of 20 to 25 days). Thus, we do not believe that phthalates in biosolids pose any real risk to human health or the environment.
    - For perspective, compare the estimated 10 – 50 ppm phthalates in biosolids with the estimated concentration in some other materials many of us use voluntarily on a daily basis.
        - Hair spray: 250 ppm.
        - Spray deodorant: 900 ppm.
        - Household dust: 1,000 ppm.
        - Fragrances: 12,000 ppm.
        - Nail polish: 40,000 ppm.
        - Some plastic products: 600,000 ppm.

- Most of us come in contact with many of the trace organics found in biosolids almost constantly in our everyday lives from other sources, particularly consumer products. Few of us ever come into contact with biosolids or crops grown in biosolids. So if there's any risk from these chemicals in biosolids, then the risk from our everyday activities will be much higher.

- The EPA, other federal agencies, and universities are conducting research on the potential risks of trace organics in biosolids. Given the information currently available, Ecology believes Washington's regulations adequately protect human health and the environment while still allowing for the beneficial use biosolids.