

BIOSOLIDS RECYCLING: Restore, Reclaim, Remediate

The program opens with shots of a family in a kitchen. We see bottles and cans landing in a recycling container. We then see a family member carrying the container to the corner. This dissolves to shots of a washing machine being loaded, a shower being turned on, someone washing dishes, and a close up of a hand flushing a toilet.

Narrator: Community based recycling programs are more popular than ever. Reducing the waste stream to already jammed landfills by recycling plastic, glass, metal, and paper just makes sense. It also makes environment awareness part of our daily routine.

Most people don't realize though, that the 200 gallons of wastewater a typical family of four generates every day can also be recycled.

Narrator: Once wastewater leaves a home, it's processed at treatment facilities where liquids are separated from solids, purified, and then safely returned to waterways.

The solids are also processed to illuminate any disease causing bacteria, viruses, and parasites. What remains is a nutrient rich natural fertilizer, known as biosolids.

For years, these biosolids were inefficiently landfilled, ocean dumped, or incinerated. But today, with restrictions tightening and costs for landfilling and ocean dumping rising, communities are realizing the benefits of biosolids recycling.

The animated title: "Biosolids Recycling: Restore, Reclaim, Remediate" appears. We then see shots of biosolids being used on farmland.

Narrator: Currently, agriculture is the number one outlet for biosolids. Through biosolids application, rich organic nutrients can be restored to overworked soils, thereby increasing crop yields.

Narrator: Restoring nutrients to agricultural lands seems the most logical application for biosolids, but alternative uses have been in use for years.

In the bituminous coal fields of north-central Pennsylvania, biosolids are used as a soil amendment to reclaim surface mines. After spent mines are backfilled and recontoured, biosolids are integrated into the soil. The soil is then reseeded as the final step of the reclamation program.

John Uzupis of Wheelabrator Water Technologies is introduced, and explains along with the narrator the process of using the biosolids on the mines as we see more images of the reclaimed mines.

John Uzupis: The field behind us is part of a mine site known as the Mountain top Mine. And the biosolids application started almost 5 years ago. Biosolids, compared to commercial fertilizer applications, have very similar germination times and initial establishment. The biosolids become much more impressive after the first year, when everything seems to come together and you get a bloom of growth.

Biosolids, by their organic nature are slow release. So the nutrients are available as the microbes digest or decompose the material, they make the nutrients available to plant growth so its sustained for significant periods of time.

A skyline shot of Philadelphia is followed with images of the city's biosolid recycling center as Bill Toffey, the city's Biosolid Utilization Manager is introduced.

Narrator: The biosolids are trucked to the mines from Philadelphia. The city's 72 acre Biosolid Recycling Center is one of the largest centralized biosolids processing facilities in the country, and has been recycling the wastewater generated by 2.3 million people into biosolids for over 20 years.

Bill Toffey: The Philadelphia Water Department made a commitment back in the mid '70s to the EPA and to the state agency that would end the practice of ocean disposal, and embrace land application of biosolids. One of our longest standing programs for recycling has been the program to use our product to reclaim bituminous strip mining lands in north-central Pennsylvania. Over the last nearly 20 years now, we've reclaimed about 4,000 acres of land using 700,000 tons of biosolids products.

More shots of mine reclamation are shown as the narrator and Bob Brobst, Biosolids Regional Coordinator for US EPA Region 8 talk about the potential for biosolid use.

Narrator: For surface mining reclamation, biosolid application is actually the preferred fertilizing program; a cost efficient, effective and eco-friendly means of restoring the land to productive wildlife habitat. But even with programs like this one-third of all biosolids processed nationwide still remain unused.

Bob Brobst: They municipalities are continuing to produce this product and most of them have established programs to either land apply. or use or dispose of this, but only 50% of the usable biosolids are actually land applied for beneficial purpose.

Shots of scientist working at the USDA Agricultural Research Service are shown as the narrator and Rufus Chaney, Chief Agronomist for that agency, explain new investigations into biosolids uses.

Narrator: Developing and implementing better ways to use this excess is crucial. For the last 30 years scientists at the USDA Agricultural Research Service in Beltsville Maryland have been experimenting with alternative uses for biosolids. With an eye towards hazardous waste sites, and in particular contaminated smelter and mining operations, these researchers believe that biosolids have real remediation potential.

Rufus Chaney: So it works good on coal mines. What does it do about zinc mine waste? I see it as a straightforward extrapolation of available knowledge applied to one of the toughest problems that the environmental agencies have: Of barren contaminated mine waste and smelter-polluted mountains that have been barren since 1950 or longer in some cases.

Narrator: Through a collaboration with US EPA's Environmental Response Team, the USDA has found a partner that if the technology proves itself could make a sizable dent in the surplus of municipal biosolids.

Harry Compton of the US EPA / ERT is introduced and along with the narrator, explains EPA's relationship with the USDA

Harry Compton: The biosolids, or composted biosolids technology, seem to be most appropriate for metals-contaminated sites. And specifically, we're encouraging their use at large area metal sites, where they're looking at literally hundreds of acres, or even square miles of contaminated mine land from base metals mining or smelting.

Narrator: Soil samples from EPA sites are shipped to the USDA's Environmental Chemistry Lab where they're blended with composted biosolids and other amendments like limestone.

As the narrator continues, animation illustrating how biosolids limit bio-availability is shown

Narrator: These tailor-made biosolids not only jump-start plant growth by increasing fertility, they also have the ability to fix or bind heavy metals, thereby reducing their phyto and bio-availability. Simply put, the contaminants are still present in the soil, but can't be absorbed by plants or animals. Even if they're ingested, they remain bound as part of a compound and are safely passed through the body.

Rufus Chaney and Harry Compton return to give additional details on biosolids' "fixing" abilities and how they are used in the field.

Harry Compton: The USDA folks basically give me a recipe of biosolids addition and lime addition and other amendments to give me the optimum conservative treatment for the kind of application we would perform.

A scenic shot of the mountains of Colorado dissolves into an image of a group of people working outside. We then see shots of barren lands damaged by mine tailings as the narrator continues.

Narrator: With the USDA's recommendations in hand, EPA and the state of Colorado recently teamed with the City of Denver to conduct field-scale testing along the floodplain of the Arkansas River. Mining in that region of Colorado, particularly around the town of Leadville, had been a boom to the region for over a century, but not without a cost to the region's pristine alpine environment. During seasonal flooding over the last 100 years, mine tailings were deposited along river's bank. The silt contained elevated levels of heavy metals which killed vegetation, escalated erosion, and stripped what little top soil remained.

Dr. Bernard Smith, a rancher from the area is introduced and gives some background info on the region. The narrator explains how biosolids are being used.

Dr. Bernard Smith: This material from the mills entered the Arkansas River and from there, it entered the irrigation ditches, and all of these metals from the mouth of California Gulch on south. This further killed a lot of the forage on the meadows, So a lot of waste material high in metal content came down all the streams.

Narrator: To try to get these soils healthy enough to support plant life again, 15 to 20 truckloads of biosolids are being hauled every day over the mountains from Denver Metro's wastewater treatment facility, which has the resources to process, custom blend, transport, and land apply biosolids.

Steve Frank, of Denver's Metro Wastewater Reclamation District is introduced and details his group's role in the remediation. Shots of their facility are also screened.

Steve Frank: We're actually a branch of local government here in the metropolitan Denver area. We serve some 55 local governmental entities, and we provide wastewater processing for those local governments. Metro Wastewater Reclamation District's biosolids are an excellent quality biosolids. We have an outstanding pretreatment program which prevents unwanted materials from getting here in the first place. We have an outstanding laboratory program for analyzing the biosolids, and we produce a material that far exceeds the EPA's requirements for what's called an EQ biosolid with respect to metals.

Narrator: Collaborating with biosolid specialists on site as well as in the lab has allowed researchers to experiment with different mixture ratios and application techniques on a larger scale.

Sally Brown: When you're going to a certain site, you have to look at the site, discuss and try to figure out what the problems are at a site that are limiting plant growth, and based on that come up with a specific amendment for each site that will try and address each of those problems. What you can do with the biosolids, is mix lime directly in, it's a very straightforward procedure. And just by turning it around a little bit with a loader, you can get a decent mix, and what you have when you add the biosolids and the lime together is the potential for the alkalinity that you're adding with the lime to move through the profile with the biosolid so that you can not only fix the acidity at the surface 6 or 10 inches, but hopefully you'll get down to 24 and even further.

Narrator: Analytical results of the pilot tests at Leadville indicate that the biosolids treated soils reduced the available metals, thereby reducing lethal toxicity to living organisms. What this means to the locals is that after almost 100 years, the land can finally be put back to productive use.

Dr. Bernard Smith: As these historic mine wastes are revegetated, the landowners hope to forage suitable for various types of livestock. We will have an area along the Upper Arkansas River that will support fish life, be a wonderful wildlife habitat, and be an enjoyable place for people to come and play.

Narrator: USDA and EPA are also collaborating at another metals site near Kellogg, Idaho. At the abandoned Bunker Hill smelter facility, airborne contaminants killed plants along the hillsides, leaving the soil susceptible to the forces of wind and rain. The erosion then stripped the steep slopes of nutrient laden topsoil and any hope of natural revegetation.

Sally Brown: When you have a site like this, you have problems associated with poor physical properties of a soil. That's basically a result of there being no more organic matter left in the soil.

Animation showing how biosolids deliver nutrients to poor soils is shown while Sally Brown explains.

Sally Brown: Biosolids are about 50% organic matter. So when you do a heavy biosolids application, you're rebuilding a lot of the organic matter in the A-horizon of the soil. Biosolids are basically your whole recommended nutrient table for plants. Nitrogen, phosphorus, some potassium, calcium, magnesium. There's a whole long list of elements that are essential for plant growth and biosolids basically have all of those elements.

The animation ends. Shots of scientists touring and taking samples at the site are shown as Sally Brown continues.

Sally Brown: There are two aspects of the biosolids project at Bunker Hill. We've treated uplands with biosolids, that's been in place for about 3 years, and we treated a wetland with a biosolids compost, and that's been in place for about 1 year.

And we've been real happy with the results we've seen so far. The biosolids on the uplands portion have maintained a really vigorous vegetative cover for the 3 years that they've been in place. What we used was biosolids in combination with wood ash on the hillsides. The wood ash is a locally available residual. It's very high in phosphorus and potassium and it's a very high calcium carbonate equivalent material. In addition, when you're mixing the biosolids and wood ash together, they get to be a very highly adhesive material, so they'll stick to the hillsides.

On the wetland, what's really nice is that now when you drive past the wetland, you hardly blink, because it looks like a wetland, like any of the wetlands in the area, whereas before it looked like it was filled with quicksand.

Shots from a public meeting in Leadville addressing biosolid application are shown as the narrator, Rufus Chaney, and Harry Compton talk about public acceptance and safety.

Narrator: Initially, public acceptance of biosolid recycling was somewhat skeptical. But initial fears of pathogens and naturally occurring heavy metals in biosolids are being replaced by enthusiasm.

Narrator: Inviting local representatives to visit application sites and biosolid processing plants has also been beneficial. Usually, once a community realizes the cost benefits as well as the advantages over traditional treatments, they're more willing to accept biosolids recycling as another "green" solution.

Harry Compton: Politically it's very cost-effective as well because most folks out there appreciate seeing a landscape of lush green and/or trees rather than cement or denuded landscape.

Steve Luftig, Director of EPA's Superfund program is introduced and talks about his agency's commitment to remediating with biosolids.

Steve Luftig: It's a very promising technology. It's inexpensive compared to other technologies and it takes two wastes, sludge and wastewater, mining waste, mixes them together and gets a positive result. And we're very hopeful that as we try it more and more and learn more and more about how to apply it, how to amend the soil, how to keep it in place, what plants will grow under what conditions, that we'll be very, very useful technology in the future.

Rufus Chaney of USDA appears for the last time and wraps the program up.

Rufus Chaney: This isn't a one-year or one-season fix, because we correct all the problems the soil had from the pollution. All the science says it's fixed persistently. The design makes it fixed persistently, and I'm confident from, again, the basic research side and the experience side that it's the persistent remediation that we've been seeking for these many years.

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