This World of Ours #57: Don’t Throw It Away

[music playing]

Announcer: The following program is brought to you in living color on WKYC TV.

[music playing]

Announcer: In cooperation with the Cleveland Museum of Natural History, WKYC TV presents "This World of Ours", a program dealing with our past, present, and future. Here's your host, Tom Offutt.

Tom Offutt: Good morning. We're going to have a very interesting show today. I know you'll be interested in seeing it. But before we get to the show, I'd like to go on with our animal sounds. Now, last week, we had a sound that I'm sure many of you recognized. I haven't gotten the cards yet because this show is being taped just after you saw the other show. But let's listen to it and see if you can guess it now.

[animal sounds]

Tom: There he is, that's a rhinoceros. And he's just as big and mean as he sounds. He's so big that his horn even extends off the side of the screen there, as you see. The rhinoceros and the elephant and the other large mammals, a, like the hippopotamus that live in in Africa are very interesting relics of an age that is pretty much past other areas of the world. Well, this week, we've got another sound of another large animal you can tell-- here he is.

[animal sounds]

Tom: Okay, this particular fellow was a little bit scared and mad, at the time that this recording was made. And perhaps you haven't heard him sounding in this way. If you have an idea, guess as to what that is. Why send us a letter, write us a postcard to the Natural Science Museum 10600 or University Circle, Cleveland, Ohio.

Okay, and I really do enjoy getting your cards. And as I say, when we get the right answers I'll read them on the air for any of you that get them right.

But getting to our program today. There has been a lot of talk, more recriminations and agonizing over the pollution problem that is facing the whole United States. And we often hear people gnashing their teeth and worrying about it. But we very seldom find people that are doing something about it in a concrete way. And our guest today is a unique combination of a very concerned citizen, who also has a high degree of competence in engineering and is doing very practical and very interesting things in the area of making Cleveland a better place to live. I'd like you to meet Mr. Bert Raynes, who is vice president of Rand Development Corporation here in Cleveland. Bert?

Bert Raynes: Hi.

Tom: Glad you could be down here with us.

Bert: Thank you.

Tom: And you're vice president in charge of--

Bert: Applied Research.

Tom: Applied Research. And we're going1 to be talking about what that means today.

Bert: Well, I hope so. A little bit.

Tom: By the way, what did you think that sound was?

Bert: Well, I'm not sure, Tom. But I think if you put some bossa nova rhythm to it, you have a hit on your hands.

Tom: [laughter] Well, I think I think our guest-our viewers will be better than that. Bert, let's start at the beginning.

Bert: Okay.

Tom: You were presented with the problem, here of-of how to make the pollution abatement, more economical. And maybe you could just tell our viewers the story of how you approach this problem.

Bert: Well, basically, there are a lot of pollution problems and there are going to be a lot of pollution answers. There just have to be. This is just one of the many answers that I hope are going to help. In effect, we have accepted the challenge that conventional sewage treatment has a byproduct called "digested sewage sludge". When it's dried, it looks just like this material here. I don't know if we can see it. It looks like topsoil a little bit like dirt. As it is produced in a sewage treatment plant. It's produced as a slurry, in other words as a watery solid mixture in which the solids can vary anywhere from about 5 to 15%. That sort of thing.

Tom: Bert, this looks just like good, rich topsoil to me.

Bert: Yes. And it sort of looks like rich topsoil to me too. And has for a long time looked like good material for use in growing crops to a lot of people. To the sewage treatment plant operator, though, it's a headache. About half of sewage treatment plant costs revolve around the handling of this particular material in a sewage treatment plant. So to the sewage treatment plant operator, it looks like something he wants to get rid of. And it looks like something that costs him money. And so we tried to come up with an idea that would take advantage of the good parts, the good things about this kind of material, and take advantage of saving the taxpayers dollar a little bit. This material not only looks like good, well reasonably good, topsoil. It's called a soil conditioner but it has things like nitrogen, phosphorus and trace elements, and a host of things

that do help organic plants to grow.

It is available and people do use it in their gardens in some communities, including Cleveland. But it is only economic for the farmer, for someone who wants to use it in large quantity. And this material is produced in large quantity in a town. Sewage treatment numbers are huge. And it's very difficult to keep them in mind. Even if you're an engineer and get used to it. Each one of us uses 150 gallons of water a day and on the average and so forth. I have found an easy way of keeping this one straight. In a sewage treatment plant, for each person, about two tenths of a gallon of digested sludge is produced a day. Now two tenths of a gallon is a fifth. So, I am able to keep that particular number in mind without any difficulty.

Tom: So, you said that it is a problem and yet it is used as a commercially available product. Maybe we could mention where people can get this, if they want to.

Bert: In Cleveland you can get it at the Westerly sewage treatment plant in the outlying suburbs of most of the suburban sewage treatment plants.

Tom: It's free?

Bert: It's free for the haul. The farmer won't haul it because it just cost him too much to haul. It's a good material, but it's not a concentrated good material. It's not as concentrated in plant nutrients such as superphosphatet. So, our idea was to see what we could do about this problem from an engineering and economic standpoint. And it turned out that people have done a lot about it. All we have essentially done at Rand Development in this project is to take advantage of some techniques, some of which are very old. Some as much as 60 years old.

One, a sewage treatment, where this material is produced. Second is agriculture using manures and other fertilizers and things of that sort. And the third is, transport of an economical nature. Instead of going down with a truck and picking up this material in small loads, we're investigating the use of pipelines to transport this material away from the site of generation. Away from the city or the town. And instead of simply disposing of it and getting rid of it, as it is now generally done because the sewage treatment plant operator simply has to get it out of his hair. He incinerates it or cremates it, or whatever, to put it to use. It turns out that at distances away from large metropolitan towns, and these distances can be as high as hundreds of miles, there are areas that need reclamation assistance. Such areas as gravel pits, and strip mines, and areas that have been denuded of forestation by a fire, that sort of thing. Our idea simply is that you can take this material, it's very useful material, put it in a pipe, pump it out and use it. Put it to use 100, 10, 200 miles away, depending on the size of the town and how much you have available. If it's a small little town, you can put it in a tank truck. If it's a town the size of Cleveland with all its suburbs, you'd want a pipeline.

Tom: This sounds so practical. And is it economical?

Bert: Yes, we think it is. Our study show that we ought to be able to save up to 80% of that half of the sewage treatment process, if we pump even as far as, let's say, 100 miles for a city the size of half a million population, that sort of thing.

Tom: Bert. I think, before we go any further, we should tell our viewing audience that there's no-no objectionable aroma to this. It's just as if we did have some topsoil here on the table.

Bert: We're talking about digested sewage sludge, not raw material, not garbage, not trash—digested sewage treatment sludge.

Tom: What do you mean by digested? I think the viewers--

Bert: This has gone through all of the techniques that conventional sewage treatment plant procedures can give it. It has been aerated and settled and conditioned with chemicals and put in a heated tank and kept for up to 30 days so the bacteria can work on it. It is pretty inert at this stage.

Tom: When you talk about digested, you mean the bacteria?

Bert: Bacteria have digested the organic content, converted it into simpler compounds.

Tom: Uh-huh. Well, you brought down some slides showing how you at Rand development are using this and we can show a strip mine area here.

Bert: Okay. We're doing this work for the Federal Water Pollution Control administration. And I believe that slide shows us an aerial view of a mining operation here in Ohio giving you some idea of the kinds of lands that are available. This is an operation after the strip mine law had gone into effect. So it will probably be reclaimed satisfactorily. The next shot, I think, shows some land that has been used by some interest, some mining interest or other, perhaps 30 years ago.

Tom: Nothing's still growing there.

Bert: Nothing's growing and these are left on the taxpayer's docket. No one-no one wants to use it. It isn't being used beneficially for any purpose. I think the next slide shows an area this happens to be in West Virginia of how a coal strip mine, in this case, was left before reclamation. And then this shot here is just about an hour's drive away from Cleveland, showing land that was stripped 30 years ago. And you can see an acid pool and just a few trees have been able to survive on is extremely acid soil. It's for these extreme conditions that I think that digested sewage sludge has its greatest usefulness.

Tom: I think that those of us that have color television sets, recognize that reddish water certainly doesn't look

Bert: That's the mine water, very typical.

Tom: Very, very acid.

Bert: Well, that's over 30 years ago. This is an example of what happens when you try to make a forest grow again, in very acid soil. You stick a sealant in an open exposed area that's acidic and

they die mostly. Some areas can be reclaimed, and there are very good laws now, the laws are getting better anyway but not-not good as it could be

Tom: Right.

Bert: They are getting better. And there are very conscientious people trying. But in a very acid area there is difficulty. Now this is a shot showing digested sludge being taken out, in this case, in a tank truck just had a couple thousand gallons and showing you how it looks as it is being spread as it is produced before being dried as it is here in the--

Tom: Mm-hmm.

Bert: --in the studio. Just we took it out and poured it into an area which we made into a rectangle so that we know how many gallons we are using in our research. In the next view, where it shows that it can be used also by hydraulic spraying. This is the way they now seed the sides of superhighways and that sort of thing. But you see right in this material and spread it out.

Tom: I see, you can actually put grass seed in this tank with the sludge slurry.

Bert: Grass or trees, that's possible.

Tom: And spray it right on the side of a cut bank. And it will grow.

Bert: Yes.

Tom: As we'll see later.

Bert: Oh, I think we start here now a series of some of our experiments which started back, I think in 1965. We took an area and spread some sludge and then allowed it to dry. Which it does, by percolation and by evaporation. And the next slide, I believe, shows the typical cracking effect that you get as digested sludge dries.

Tom: I want everybody to look carefully at this slide because they'll be seeing this area taken from pretty much the same the same locality again. And you can see how-how completely, uh, denuded and sterile that that soil is. It's about as inhospitable an area for growing as you could as you could find.

Bert: Temperatures to 120 degrees sometimes on a summertime, right on the soil. It's just about like a macadam parking lot.

Tom: Yes.

Bert: And then in these cracks, grass seeds or tree seeds or legume seeds will find a hospitable environment. It's damp enough, there are plant nutrients and germination starts in the cracks in the drying and dried sludge. The next slide starts to show some growth. I can't see that too well myself, but I think that's in about just less than a month. So then the next slide I think shows

what happened after about three months where the sludge was applied. We did various things, various kinds of treatment. We added fertilizers, and we added different seeds. These two things in the foreground are the places where the tank truck pulled away.

Tom: Just the right--

Bert: And some sludge ran into the ruts.

Tom: I'll be damned.

Bert: About the tank truck and we got some pretty good growth there. And the next slide shows after three months. What happened on this strip mine which had not been reclaimed successfully before. This is in Ohio, and it's reasonably acid soil. You can see some tomato plants and some weeds and things in that soil.

Tom: Did you-did you actually put the tomato plant seeds in with the sludge?

Bert: No, tomato plants and squash and seeds of that sort could right through conventional sewage treatment and survive.

Tom: One of the few things that do.

Bert: It's still viable. Yes. One of the few things that are.

Tom: Did you put grass seed with this?

Bert: We put three grasses and one legume in this particular experiment. They all worked pretty well.

Tom: Mm-hmm.

Bert: And the next slide shows the next spring. Because it isn't enough just to show that you can grow something in this kind of material that's well-known. The question is, did you actually reclaim? Have you restored the usefulness of this barren soil? We did nothing further to these sites. We added neither seed nor sludge and we now go through the next season. This was in early spring. This is the flowering, the first flowering and going to seed. Tomato plants don't come back up again for some reason. But the birdsfoot trefoil took over. And this looks like rye grass that took over in about early summer and went to seed. And then there was one more crop winderal [?], going on by itself. We're building up topsoil restoring this particular terrain.

Tom: Is this actually going down into the soil and changing the composition of the soil?

Bert: Yes, we have some slides that we tried to take to show this. These were actually taken by the government people. It's just possible to see we just took a trial and stuck it in there and dug down in. And it's really difficult to tell but those roots have penetrated almost 24 inches into this acid spoil in this one year and a-and a half or so of growth. This is another shot trying to show

this root penetration. I think there's, well, it's our opinion certainly and it's also that of the federal people that reclamation was accomplished on this spot.

Tom: Bert, you mentioned federal people. And I think you mentioned briefly before that, you're doing this for the Department of the Interior?

Bert: Department of the Interior. Federal Water Pollution Control administration.

Tom: In Washington

Bert: Out of Washington. Yes.

Tom: And it's it's amazing to me that more of us haven't heard about this. You always hear about the problems and the horrors and everybody tries to lay blame. Now you're not interested in laying the blame in anybody's doors.

Bert: No.

Tom: --just solving the problem.

Bert: All we're trying to do is make available techniques that the politicians and the people that have to make the choice can make. That's an engineer's job as I see it. It's not our particular job [to make decisions]. That's my professional opinion—as a person, I worked very hard for conservation, as you know.

Tom: Yes.

Bert: But as a professional approach, we tried to make available to the civil engineering professional or the politician or the tax payer, an alternative to what he has now on the basis of either being more effective or being less expensive.

Tom: Mm-hmm.

Bert: We have three programs at Rand Development. Right now, the major ones are water pollution control and that's the aim in each case is to try to present another alternative for someone to use. This particular one, I think, is very fun though, because it seems to be useful and is gonna save money at the same time which is an ideal situation.

Tom: Sure.

Bert: --cake and eating it too type of thing.

Tom: Yes.

Bert: But not all that way.

Tom: You mentioned the engineering profession. You are a chemical engineer.

Bert: Yes.

Tom: Are there other efforts being made by other companies, in this direction and other members of your profession?

Bert: There's a lot of work going on now, especially in the last five years or so. And, as you say, not much of it is heard about. The federal Water Pollution Control Administration has great many, not only graduate student programs, but practical experimental and large-scale programs such as this going on. They're not the only ones. There are other people interested in water. One of our other sponsors is the coal industry. As a matter of fact, the Office of Coal Research is sponsoring one of our other projects down there at Rand Development. There is a great deal of work going on and it's going to be useful, it's going to be helpful. These things These things seem to run in cycles sometimes. It's the first time in many years that people have tried to find innovative answers to the water pollution problems.

Tom: Mm-hmm.

Bert: We have to find them.

Tom: We're always told that this is gonna cost a lot of money. Is this correct?

Bert: Cleaning up water and cleaning up your air and making your life more livable is going to cost money. The engineer should be trying to reduce the cost to the least amount of money that he can. That's what we're trying to do. But it's going to cost money, it's gonna cost someone money to keep our streams clean, our lakes clean.

Tom: I think--

Bert: I think it's worth it.

Tom: Sure. I think so too and I think it's very impressive to me to meet legislators and people from the state of Ohio who are working towards the governor's proposed $350 million bond issue, which will be directed towards pollution. Our viewers or their parents are going to have the opportunity to vote on this. And we certainly encourage ...

Bert: It's a lot of money. And if it's used wisely, it'll do a great deal of good.

Tom: Right, right. And it's not just Ohio that's doing this. Everywhere you go around this country. Every state is recognizing its obligation. It's not just an obligation, it's a dire necessity of doing something like this.

Tom: Bert, you mentioned two other projects that you were doing with the coal industries and, uh--

Bert: One's with the coal. We have a job for the Office of Coal Research. They represent the coal industry trying to develop new uses. And in effect, it's trying to develop a sewage treatment plant entirely different from this one. There would be no products such as this out of that particular one. Now, that's a brand-new concept. It's not biological at all. We don't use bacteria in that process at all. It's just going into pilot plant now. And so, it has a longer road to go before it gets into practice. Whereas this material is available daily, everywhere.

And we have a third project, which is quite a bit smaller, going on here in Cleveland. To try to just take out large and visible trash from sewer overflows. Cleveland, as most large cities, has overflow sewers. And when the rainfall comes, the sewers can't always handle what is given to them. They have to vent them to protect the system. This material gets vented, it's just diluted sewage goes directly into the streams, lakes, rivers. So we proposed a rather simple concept of just filtering out some of this material. And, of course, you can filter it, the question is, can we make this cheap enough so it can be operated without the need for people and that sort of thing?

Tom: Yeah.

Bert: That's located here in Cleveland. There's no end of problems in the water pollution control field, I'm afraid or in air pollution.

Tom: Yeah.

Bert: And there are more and more people seriously getting interested in it now including-including the executive community.

Tom: But Bert, these solutions that you're proposing are so practical and simple. They don't entail a lot of stuff or a new factory, or some high technological equipment. You don't use computers or do you?

Bert: No.

Tom: I think somebody said that what you're doing is obvious.

Bert: That's the highest praise, I think, a chemical engineer can ever get.

Tom: Right. But the fact that--

Bert: I thank that somebody.

Tom: [giggle] The fact that you're doing it, that it works, and that is economical. I think this is the key thing.

Bert: Well, this project will be going into an extended pilot plant study in Morgantown, West Virginia, We're building a four-and-a-half-mile pipeline. We just took bids on it this week, as a matter of fact. Should be starting building in a few weeks, I hope. And by the end of the year we'll be pumping through this line. There are some things to learn in order to make the process

more and more economical. I'm sure it's going to work, it's a question of cutting the costs as much as possible.

Tom: Mm-hmm.

Bert: And that's, I think, the name of the game for all engineers and people in this field.

Tom: Right. Could you tell us how this process of using coal works? Is it to be quicker, cheaper? Why are you working on this?

Bert: Well, it will be quicker in a way. But that's not the only reason. Again, it's the amount of cost. In effect, we're using coal as a big filter through which we filter sewage. And if everything works as we hope or as we can make it work to our will, we will try to borrow some coal from the public utility for a while, use it to treat sewage, and then return it to this public utility. In this case, the public utility could save little money on its coal cost and the taxpayer could save a little money on its sewage treatment cost.

So once again, economics comes in and should always come in to the picture when an engineer is talking professionally anyway. It also has some side effect benefits. The product that it produces, at least in the laboratory and on the small scale, seems to be superior to the water quality in certain respects. Then, the water, the sewage effluent you get from a conventional sewage treatment plant. For example, on detergent removal is exceptionally good. And it looks as though phosphate removal is good. And that's a big problem right now for Lake Erie and all the lakes and streams.

So, economics is there and our hope for a better product is there. A part of it, too, is just to indicate that there are alternative solutions to the old-fashioned solutions. Sewage treatment processes we have today were developed, and they're good ones, were developed about 60 years ago. Basically because the harbors and the rivers and the streams to quote the Presidential Committee report began to stink. Well, the rivers and the harbors are beginning to smell again, and something has to be done. So, there's a lot of people working on it and things have to be done.

Tom: Well, I'm glad that you are involved. I'm glad that there's a degree of competence that's being brought into this area. And I think that all of our viewers should be very grateful to you and to what you are doing at Rand Development.

Bert: Thank you Tom.

Tom: Corporation in this in-this area. They might also be interested within the next week, you're going to be hearing on the radio and on television about an organization that is called "Clean Air and Water", "Citizens for Clean air and Water. This is a very interesting concept that's taking place here in Cleveland. And I'm sure that everybody that looks at this program, willl be hearing about it. But may I just thank you, Bert for coming down here.

Bert: Thank you, Tom.

Tom: And telling us something. I don't think that 10 or 15 years ago that this would be a television subject.

[music playing]

Bert: Probably not.

Tom: Thanks a lot for being here Bert.

Bert: It's a really delicate one.

Tom: Right.

Bert: Thank you.

Tom: Thank you for being with us on This World of Ours.

[music playing]

Announcer: This program is a Public Affairs production of WKYC television in cooperation with the Cleveland Museum of Natural History.

[music playing]

[END]