Analyze That episode transcript

Choosing the right XRF for your application

This transcript has been lightly edited for clarity, readability, and length. The content reflects the original discussion and technical intent of the speakers.

Episode Description: Not all XRF applications are the same. In this episode, Thermo Fisher Scientific's John Margeson and Alloy Geek founder Nate Newberry continue the conversation from Episode 13, exploring how the right analyzer configuration, calibration, and operating mode can improve performance across alloy identification, precious metals, mining, and soil analysis. Learn how different XRF modes work, when to use them, and how proper setup and training can help you achieve faster, more reliable results.

Nate: Essentially what it does from understanding right is it's flipping the narrative on its head. So traditionally we just measure heavy elements first and then light elements second. And now we're going to write in the light elements right away so that we don't have to wait on extra time to do the analysis. Right? So, it's kind of cool.

It's a cool technology. It's very cool. But let's, let's transition away from metals. So, metals are a big part of sample prep and getting the right answer. But I think there's some mining we touched on earlier mining and soil modes and how those are used.

Think we should talk about that first at least next anyways in the lineup, because those are pretty big. There's a lot of people doing that and they're very different from metals modes, right?

John: Yes. Very much so. Right. So, I think you covered we're touching upon multiple different industries. You know, whether it's a scrap yard or a pawn shop, different uses, different markets. But the technology looking at metals are very similar. When we're talking about mining the soil and the mining modes we're referring to, they operate quite differently. Right. So, mining mode maybe you would use on a raw or, or when you're doing the actual mining exploration, you also might need to be analyzing soil, in which case our soil mode is assuming that you've taken loose soil and compacted it into a sample that we can detect, and that samples need to be contained into a very simple plastic container. But the analyzer is going to be assuming that plastic container is there, so that the algorithm is going to be accounting for that before you even actually take the sample. So, knowing, hey, if this is a solid rock or if this is soil that's been

compacted into something we can scan, you need to make sure that analyzers set up for the retina before you scan that.

Nate: So, there's a there's some assumptions here, right, with mining modes and soil modes that are kind of like behind the scenes. You hear those words and you're like, okay, what does that mean? It's just a mode. I'll just go. But so, for metals modes we're typically using fundamental parameters calibration. That's been the industry standard for a long time.

And for those of you that don't know what that is, it's just a robust algorithm or mathematical model that helps you great identify and get the chemistry result fast. But metals mode makes a different assumption. Behind the scenes metals mode say, hey, physics wise, the physics assumption. If you remember like physics from high school, that what we're shooting is 100% metal.

And if what we're shooting is not 100% metal, we're going to get the wrong answer because analyzer is going well, this should be 100%. So, if it's not 100% metal like or samples aren't, you're going to get the wrong answer. So, we transition to more, we transition to more robust and let's call them more complicated models, starting with the mining mode, which is an PH calibration for you guys.

That mode is great on things that are about the rule of thumb. And this isn't perfect, but the rule of thumb is 500 parts per million and above. The mining mode does a pretty good job, and anything less than that, sometimes there's a different model that's used in the soils mode called compton normalization that does a great job at reporting trace elements.

So, when you're looking at less than 500 parts per million, like, you know, hey, I'm looking for 30 parts per million lead in soil. Okay. Well Compton normalization does a great job with that. But each one of those modes, it kind of has pluses and minuses to it. The plus to the compton normalization is well with trace elements.

I'm like a soils background, like a silicon matrix is which is what a soil would be typically. But when you but when you get to higher concentrations the model breaks down. So that's where a mining mode does a lot better. So, if you have 17,000 parts per million silver in your ore you are going to want to use an PH calibration because it's going to give you an answer that's just closer.

And you might get a report out from your compton normalization or your soils mode that says, hey, the value is greater than 10,000 parts per million. It's like, okay, that's useful, but it's not the right result. Right? So, if we have an analyzer that has both, we can cover both the trace elements. And we can also cover the high concentrations of metals.

John: That's really well put. And trace elements are something I want to I want to hinge on for a second. Right. Because yeah, if you're doing a sort of mining exploration right

to the actual material you're looking for could be far in the ground, something you can't access with your handheld device immediately. But finding trace elements of what you're looking for, even trace elements that might indicate the material looking for is below.

Yeah, that can be impactful and help mining exploration, save on really millions of dollars of investment before they start the actual excavation. And one thing I want to get into with the trace elements is the number of scans. We talked about the speed in the advantages of handling XRF. Can we talk about how maybe a common mistake would be just not testing enough samples?

So sometimes, especially with mining samples, you can end up with like inhomogeneous non-homogeneous samples or regions of the world that are just naturally minerals different.

I think there's another thing I'd rather unpack here, which is that sample preparation and mining is probably more key than even just that. So, when you take your samples, how are you actually testing them?

And you touched on a sample cup earlier. I want to tell you a story that illustrates this pretty well, I think. So, we helped a few different minds get set up this year. One of those was a silver mine, and that mine was getting 200 parts per million reading on the rocks they were pulling out of their mine.

I actually see the rocks in one of the samples sitting over there. But what was happening? And then they would they would take these rocks and they would process them and refine the silver out of them. The refinery would say, you know, there's, you know, 1.5 to 2% silver in those rocks. That's a big difference from 200 parts per million. So, what we ended up having to do was that the samples, the silver was sort of bound into that rock, into that stone. So, pulverizing that stone into fine and dry, dry being key fine dry powder and then pushing that into a sample cup, which that's something we help a lot of people with sample cup and X-ray film. Now, there's a lot of debate about what x-ray film is the best. Personally, I think that if you're using a 4-to-6-micron range polypropylene film that's designed for use with XRF, you're going to get a pretty good answer. I mean, I think that's standard across the board. You can use you can get away with thicker films if you're looking at higher concentrations and things but if you want the best answer, you want the lowest amount of distortion and a 4-to-6-micron range. Yeah, it's thin, but you're going to get the best answer. So those fine particles and you modernize the sample as you pulverize your sample into a powder, it just gives you the right results and our results, instead of being 200 parts per million with XRF, which, you know, ended up being like 10 to 17,000 parts per million, which aligned very well with the assays they were getting from the lab with actual refined results.

So, sample prep matters a lot, and the mineralogy of what's going on is sort of complex. Geologists probably would laugh at me for saying that, but I know enough that I know

what I don't know. And sometimes just, you know, your basic sample prep is your best foot forward with getting good zip results, especially in mining.

John: That's awesome. And like I said, we could we could talk about this stuff for hours. But just look at the second time, I want to make sure we wrap up and kind of summarize the key points we touched upon.

We covered alot, but let's just kind of thinking back on it, knowing we covered knowing what analyzer to use.

No, not all handheld XRF analyzers are the same. Even within, you know, our Niton portfolio you can have different options that are going to make sense for different use cases. So, knowing the hardware but also knowing the software, knowing how you know what that analyzer has been calibrated for, does it match up the mode, the application that you need it for the sample prep.

I think that's the sample and the surface prep so widely important, right? So don't just take one scan on a, on a rusty piece of metal and assume that's the right answer. You need to know what you're looking at. Beware the aware of your environment. Be aware of your samples. I think that is like just like so, so wildly important.

Talk about some of the technique using some different accessories, using a test stand to make sure you're looking at what you want to look at, protecting your analyzer. So, if you're if you have a bucket of chips or turnings, you know, think about before you before you just jam the analyzer right in or think about how you clean or you want to maintain your analyzer.

Please don't put compressed air or Q-tips into the window. There's no need to do that.

Nate: And this device here we didn't touch on this is the wrist strap. Get your guys to wear your wrist strap. So, while some of what we talk about might seem obvious, there's a lot of people who, you know, get an extra put in their hand that may not know, but a wrist strap is going to prevent you from dropping the analyzer.

And the biggest ways people damage their XRF is actually by getting something in or breaking anything in the front of the device, which is where all the sensitive stuff is, or just dropping their device and not wearing their risk strap, but a wrist strap, just like you're, you know, you look at someone funny if they walked around with a naked phone or a phone with no phone case on it. In today's world, it's standard that we all protect their phones. Same truth for XRF, teach your guys to wear that wrist strap. I mean, some of these XRFs are pretty expensive. They do great things, but they're expensive tools that we use in our industry. So, protect them. And that risk strap is a really an expensive way to do it.

John: And especially when we talk about some rugged environments. Right. So, whether it's mining or scrap yards, you know, keeping that risk draft that we talked about

how accessories and test stands might help with operator safety. But the analyzer safety is also very important. Right. You know like as you mentioned these are these analyzers are investment.

We want to make sure users are getting the most out of their investment. And then I guess just to kind of finally wrap it up, I think the very first thing we talk about is training, right? So training is so wild, important, you know, no matter how much content in training you got, when you first got your analyzer, all the great content we put into our user guides that can be found online, more training can never hurt.

So that's why I'm really excited to have Nate here and make you offer trainings. Niton team. We offer trainings directly. We love to kind of just get more and more folks talking about and learning how to better use their analyzers. So, so please, if this this conversation has sparked even more questions, reach out to me. Reach out to Nate.

We want to hear from you guys. We want to help you with your application. And if it's an application we haven't talked about, that's even better because we are always interested in learning more about how these analyzers are being used.

Nate: And at Alloy Geek, if you want to have a call with us or call your local sales rep, talk to them about your application in detail. The more information you share with them, they're not going to be trying to just upsell you. They're going to be trying to figure out how to best help you with your application. If you need a different mode to test your samples, like if you're trying to do it, you can do, it used to be done, catalytic converter recycling, for example. You could do that testing with a soils mode and it used to be done that way. But now there's dedicated modes for that. So your local reps, you know they're going to be able to help guide you, get you the right. That is the right mode, that gives you the closest answer and set you up in a way that just pays it forward for years to come.

Because that test stand. One of the things we didn't talk about is sometimes when we test mining samples, we're testing for 60, 90, 100 and 20s and being able to run from a computer, clip your F into a test stand and just hit go and just work on something else while the XRFs collecting data is hugely beneficial, and a lot of people forget that, that there's a big value to your time too.

So, I, you know, at all like we're working on a couple of things. We have one class already that's available on demand for the Niton XL2 and Niton XL2 Plus series analyzers. It covers the basics. A lot of that same information can be found in the manual, but it's hard to get your team sometimes to sit there and read through a long manual.

So sometimes putting them through a class where they get a certificate at the end, at the end so that you're, you can say, hey, these guys were trained, they know how to safely use the device. They know how to properly use the device. They know the different modes to select the settings to dial in. That something we didn't talk about a lot

today was the different beam settings, but knowing when to use I call it the beam. John calls it the filters. It's essentially the same thing, but you have a heavy element beam and a light element beam, and sometimes a low, low beam or a different beam as well. But the two big ones are the heavy and the light element beam heavy element beams would be something like a single beam system, like a 100 series from the XL2 would have, and then something like the XL5 Plus might have 2 or 3 beams that cover different elements, and you can click on those beams, by the way, to see exactly what elements they're measuring in that area in each beam.

But that's a I think that's a conversation for another time. But training is so important. And making sure your team is trained and everybody's on the same page will also make sure your results are consistent.

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