
Question 59: For a hydrofluoric acid (HF) alkylation unit, what instrumentation do you recommend for controlling HF acid levels throughout the unit?

LOWE (Pasadena Refining)

Generally speaking, the industry is moving more and more toward using nuclear devices for level of protection. At PRSI, we have a major project in place now where we're identifying crucial areas in our units and are installing nuclear devices in both of our alkylation units.

Through the recommendation of our licensor, we also have recently installed some external displacement level transmitters, which are really magnetic floats indicating the levels in different vessels. I think Tina has had some experience with that and talks about pluggage problems, but we haven't experienced that. However, the installations are relatively new.

Also, we still do have interface level sensors in our units, but they're not very reliable, which is one of the reasons why we are switching to the nuclear devices. So finally, we just suggest that you talk to your licensor. We're sure you are going to hear that they would recommend going to nuclear devices.

HAZLE (NPRA)

Tina.

DRUMHELLER (Frontier Refining)

We've tried a bunch of different level measurements. We've used different pressure cells and they failed due to corrosion. We've used magnetic floats and they had plugging problems, so proving them to be not too reliable. We've gone to nuclear in many services and they've proven, for us, to be the most robust and reliable method of level measurement. Some locations where we have the nuclear level measurement include the acid settler, the depropanizer overhead boot, and the acid stripper reboiler. In total, I think we actually have 14 nuclear level instruments in the alkylation units; so we use them extensively.

The benefits of that for us include decreased risk of personal exposure to HF when they're out there working on that stuff, more robust level indication during startup, and increased reliability. There are considerations you've got to keep in mind when you're using nuclear level measurement because they are susceptible to x-ray. If you're doing x-ray inspection out there in your plant, you're going to mess up

and you're not going to see the levels. We address this in operations with procedures. Essentially, we put those level control valves in manual when we're doing x-ray. This is for short periods of time. We use a lot of communication with our operators to prevent having operational problems in the alkylation.

We're also a small facility, so we have limited resources available to handle the regulatory requirements of nuclear instruments. Essentially, we have one guy that takes care of all that. So for us, we have to manage any problems that we have with those instruments and make sure that he's available. We haven't had a problem with that, but you do have to consider it when you're going to go to nuclear, and you must make sure you adhere to all the regulatory requirements.

HAZLE (NPRA)

Pedro.

FERNANDEZ (Jacobs Consultancy Group)

Our experience is the same as Tina and Ed had mentioned: that most refineries have either already installed, or are quickly installing nuclear devices, mainly in the acid settler and in the bottom of the acid regeneration column. We also checked with UOP about what other options they would have. They mention a differential pressure instrument with wafer-type seal and silicone-filled impulse lines for the main settler. We're not directly familiar with that type of instrumentation, so I would ask you to contact them or ask UOP to expand on that. For acid boots on overhead receivers, we have seen all kinds of instrumentation, including conventional displacement-type level instruments.

HAZLE (NPRA)

Those are the panel responses. Are there any questions on level management? Comments? That is also the question in the alkylation section. If anyone wants to backtrack, now would be a good time to do it. There is one over here.

DETRICK (UOP)

Kurt Detrick, UOP. To follow up on that question about the sulfur as when I mentioned the regenerator upsets, there is one more thing in our experience that may be significant also. It turns out that sulfur upsets can tend to upset the regenerator. So even though you get a sulfur upset in the feed and it doesn't look like you have a path for that sulfur to get to the alkylate, that path may be through the regenerator. The reason is that the sulfur oil you make that's going to the regenerator tends to be very light, and goes easily overhead in the regenerator. That's a link in that path that maybe is pretty important to consider.

HAZLE (NPRA)

Thank you. Other questions? Anything on alkylation?

UNIDENTIFIED SPEAKER

Yeah. I just had a question for the panel. Have they encountered any issues with mounting these nuclear devices onto the boots that are fairly long and not as wide, in terms of weight issues? These things are pretty heavy. Maybe UOP can answer.

HAZLE (NPRA)

Well, let's start with Tina. She says she's got 14. Any issues that you know of?

DRUMHELLER (Frontier Refining)

No. I don't know of any issues that we have.

HAZLE (NPRA)

Anyone else? Anyone from the floor? I'm sorry. Ed.

LOWE (Pasadena Refining)

I don't have direct experience because we're still in the beginning phases of installing these, but we were concerned about that, too. There are different types of devices that are not really heavy, and they are just strapped to the side of the vessels. They're not really heavy devices, so it's not really a concern to the people that we've talked to.

HAZLE (NPRA)

Okay. Other comments? Questions? We'll start the isomerization. Questions? Number 60: Pedro.

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