Text Version for Biomass Program Manager Paul Bryan's Tour of the Thermochemical Conversion Section of the Biomass 2011 Interactive Exhibit Hall

[The video shows Biomass Program Manager Paul Bryan interviewing Jonathan Male of Pacific Northwest National Laboratory (PNNL).]

Jonathan Male: Also we have over here. We have a selection of feedstocks going towards a flour, which is what you would need for a pyrolysis or a liquefaction process. So this is like a quarter, this is more along the lines of going toward the flour.

[Jonathan hands Paul small bottles filled with various feedstock samples.]

Paul Bryan: So for the PNNL process, about which of these would you consider the right feedstock?

Jonathan Male: Well, we actually prefer the woods if we can get them, but particle size is a little large.

Paul Bryan: It would have to be a little smaller than that. How do they fit, some kind of auger, were you thinking, partial?

Jonathan Male: Right. Yes, fast auger, feeding.

Paul Bryan: Fast auger, Ok.

Jonathan Male: Let me turn that off.

[Jonathan switches off the pyrolysis demonstration unit.]

Paul Bryan: Yeah, good idea.

Jonathan Male: In case… we brush against that. What we are looking at here is…

Paul Bryan: I don't want to be pyrolyzed.

Jonathan Male: Ok, let's leave that one over there for now. Now, this is the pyrolysis oil, crude, coming out, one phase… it flows.

[Jonathan hands Paul small bottles filled with pyrolysis oil.]

Paul Bryan: Yeah, it's not that… not that viscous.

[Paul swirls around the pyrolysis oil, demonstrating its low viscosity.]

Jonathan Male: Right, and then, if one was to upgrade it, hydrotreat it, that's the 5%... oxygen remaining.

Paul Bryan: And this is just the conventional, refining type, hydrotreating catalyst?

Jonathan Male: Yes.

Paul Bryan: Molybdenum or…?

Jonathan Male: Yes, as sulfide catalyst. And then that is going to the 0.4%. And that is getting to perhaps your entry point into the refinery.

Paul Bryan: Oh yeah, certainly at 0.4%, I would think I could go straight into a refinery at some point.

Jonathan Male: Right. And then this is a different beast, this is the liquefaction product. If you tip that upside down, obviously that makes a biphasic… that doesn't flow, illustrating how more viscous the organic phase is.

Paul Bryan: Oh yeah, it flows very slowly.

Jonathan Male: See the bubbles; see it's creeping.

Paul Bryan: Oh yeah, yeah, that's like slime.

Jonathan Male: Indeed.

Paul Bryan: That's interesting. That's…

Jonathan Male: So it has a much higher energy density, carbon density, but it has viscosity issues, you better keep it warm.

Paul Bryan: But it… I mean… a comparably viscous crude material wouldn't flow like this, and it's interesting… the way it leaves the glass clean, is different from a petroleum fraction, or at least any petroleum fraction I've seen, of similar viscosity.

Jonathan Male: Right, and you would also have the aqueous phase, where you would still have carbon in there, which you wouldn't really need to recoup.

Paul Bryan: Right.

Jonathan Male: And then this is the work of Argonne, looking at different grades of steel, the accelerated corrosion… And you can see, if you are willing to pay for the higher chromium steel… But if you want to look at that one, you can still see some etching on that one…

[Jonathan hands Paul coupon samples of steel at various stages of corrosion.]

Paul Bryan: Yeah, how long has this been exposed?

[Paul picks up one of the samples and observes a relative lack of corrosion.]

Jonathan Male: Right there.

[Jonathan points to a label showing its exposure.]

Paul Bryan: 500 hours. I mean that's not too bad. Obviously, if you keep your maintenance records properly, you can tolerate some level of corrosion, you just have to maintain… before that happens!

[Paul picks up a much more corroded coupon sample.]

Jonathan Male: That's not really acceptable.

Paul Bryan: That is usually not acceptable in industrial practice. I mean, these kinds of things, if your furnace tube hangers do things like that, you tend to have problems with lots of people.

Jonathan Male: Right, and so, the other thing is, we have over here… catalysts from reforming. Because behind us, we have both the gasification process and pyrolysis.

[Jonathan shows Paul other laboratory samples and then points to posters which show diagrams of different conversion pathways.]