

DID IVINS MOVE THE REFRIGERATOR? NEW COLD FACTS CAST FURTHER DOUBT ON AMERITHRAX CONCLUSIONS

The top-notch Frontline/ProPublica/McClatchy group that has been continuing to investigate the anthrax attacks of 2001 and the subsequent Amerithrax investigation by the FBI posted some photos on Monday that they obtained through FOIA requests. They are here. Mouse over the first photo and then you can click through the slideshow. The most important photo is the one of the lyophilizer. The FBI is claiming Bruce Ivins used this to dry the spores used in the attacks. That is not two pieces of equipment in the photo; here's a clearer shot of what looks like the same model available on the used market. The thing is huge! The problem is that it is NOT in Ivins' "hot suite", so using it in its place would have put spores all over the place in area where at least some of the personnel probably weren't vaccinated (and thus would have died). This would have been an obvious contamination event Ivins could not have hidden. Technically, the lyophilizer is "mobile", but as you can see, it's the size of a refrigerator and it would have been obviously missing if Ivins wheeled it into the hot suite. Also, it uses 220V (see the wiring that obviously was put in so the lyophilizer could be used in this spot), so Ivins might not have had an outlet available in the hot lab. Also notice the piece of paper on the top part; that's most likely a sign-up sheet to reserve it since this thing is used for drying down large amounts of liquid and these runs take a number of hours. You can bet if Ivins had signed into the log during the critical period we would know about

it. There is only one sheet there, though, so the sheet from the appropriate time period might not have survived until the time USAMRIID was being looked at carefully.

Here is the photo of the lyophilizer, slightly enlarged from the PBS website:



The caption supplied by the Frontline/ProPublica/McClatchy team reads:

The lyophilizer, or freeze dryer, which the FBI says Ivins could have used to make the attack anthrax. Stored outside of the secure BSL-3 hot suite, the lyophilizer was a central focus of the investigation; however, the FBI was never able to definitively link it to the attack anthrax, and some of Ivins' colleagues are skeptical that he would have risked drying anthrax outside of the secure suite.

The FBI's claim that this lyophilizer was used by Ivins came about in a very embarrassing way for the Department of Justice. DOJ had submitted a document in the wrongful death suit filed by the widow of Robert Stevens, who was the first fatality in the attacks. The initial filing stated flatly that Bruce Ivins did not have access to the equipment needed to dry the anthrax spores used in the attacks. After the FBI went ballistic over that filing, a judge allowed DOJ to submit an amended document (see page 3) where DOJ referred to the "refrigerator sized" lyophilizer in the BSL-2 containment area, where DOJ also noted that no work with live anthrax was carried out.

For those of you who want more details on the science behind the reasoning that Ivins could not have used this lyophilizer in this spot to dry the spores used in the attack, keep reading after the jump.

The image posted by the Frontline/ProPublica/McClatchy group is not sharp enough to enable identifying information on the lyophilizer to be read, but I believe that what we are seeing is virtually identical to this used lyophilizer I found for sale on an internet listing. The lyophilizer being offered for sale is described as a "Virtis 25EL Freeze Dryer with Virtis Unitop1000L Shelf Freez". Although the lyophilizer looks like two pieces of equipment stacked on top of one another, it takes both pieces to make a functional laboratory device. The lower section is called the condenser and is the "25EL Freeze Dryer" portion. Some of the technical specifications for this portion of the device can be found here, where clicking on the "25EL" information shows that this piece of equipment can weigh between 280 and 495 pounds and requires a 220V power supply.

But note that the top half of the machine at the specifications link above differs from that in the FBI's photo from USAMRIID. That is because lyophilizers can be configured in many different

ways. See, for example, some of the many different manifolds that can be found as the top portion on some lyophilizers. The manifolds on the webpage at that link are more in line with what I expected to see as the top part of any lyophilizer that Ivins would have used to dry anthrax spores while working outside his containment lab.

Note especially that with some of these manifolds, scientists purchase portable torches that can be used to seal glass ampules in which material has been dried. These ampules would be dangling off the multi-port manifolds. This can be done while the ampules containing the dried powder are still under vacuum, thus cutting down on the amount of powder that would be released outside the instrument once the vacuum is released. Similarly, some of the manifolds have the ability to put stoppers into vials while the material remains under vacuum.

The unit at USAMRIID, however, appears to be a shelf dryer on the top half, where the material to be dried is placed into open pans that slide into the unit on shelves prior to drying. It is possible that the USAMRIID unit may only accept two shelves as opposed to the five shelf setup in the used unit I found on the internet listing, but it's hard to conclude that the USAMRIID device is anything other than a shelf dryer based on the overall shape of the top portion of the lyophilizer when compared to the known shelf dryer. It is very hard to imagine how anthrax spores could be dried in a shelf dryer and then removed from the dryer without a lot of spores being released into the room in which the lyophilizer is located.

Note especially that the lyophilizer is not in Ivins' "hot lab" which was maintained at Biological Safety Level 3 (BSL-3, see this CDC discussion (pdf) of the various biosafety levels for laboratories) but is in an area maintained at BSL-2. Procedures at USAMRIID required that all work with live anthrax be carried out at BSL-3, so it is likely that at least some of the

personnel who could have come into contact with the lyophilizer did not routinely handle live anthrax and thus were not vaccinated. That means that Ivins would have had to be extremely diligent in decontaminating both the lyophilizer and the surrounding area to prevent an anthrax outbreak among his coworkers or visitors to the BSL-2 area.

It is routinely acknowledged that lyophilizers are at risk of spreading the material that has been dried in them. This guidance document (pdf) prepared for researchers at Columbia University has this to say about use of lyophilizers for infectious material:

Lyophilizers produce a dry solid that is very easily dispersed. They should be fitted with a HEPA filter or vented to a BSC when used for drying suspensions of infectious material. Disinfect chamber surfaces and any materiel collected in the vapor trap. Ampoules should be opened only in a BSC; place a disinfectant-moistened pad over the scored line when opening the ampoule.

It is undoubtedly this general knowledge that lyophilizers produce easily dispersed solids, combined with the fact that this particular lyophilizer is a shelf dryer rather than one on which ampules can be sealed (even though the Columbia document even refers to powder being dispersed from systems where ampules can be sealed), that led the workers at USAMRIID to doubt the FBI claim that this particular lyophilizer could have been used to produce the attack material.

It is possible that the lyophilizer pictured at USAMRIID has been connected to a HEPA filter as suggested in the Columbia document. Just to the left of the lyophilizer, above the hanging lab clothing, it is possible that the grey metal object about a foot tall on top of the black metal frame could be part of a HEPA air filtration unit. It is unlikely that this is a

HEPA filter attached to a typical biological safety cabinet (BSC in the Columbia excerpt), as such cabinets are built so that workers sit in front of them in chairs that can roll up to the front edge of the cabinet. Note that the black metal frame here has a bar at floor level, so a chair could not be rolled up into working position. However, the shiny object on the top of the shelf dryer could well be a bit of aftermarket ductwork connecting the lyophilizer to a HEPA unit.

If the lyophilizer is connected to a HEPA unit, then that means it would have been impossible for Ivins to wheel the unit into his BSL-3 lab area. That means, in turn, that Ivins would have had to thoroughly decontaminate both the condenser chamber area and the shelf dryer area of the lyophilizer after use. More importantly, some anthrax spores would have been trapped in the HEPA filter unit. These units are changed out every few years and it is possible spores would have survived on the HEPA unit, only to infect the poor worker who removed the old filter. Remember that this is in a BSL-2 area, so there would have been a presumption of no live anthrax, increasing the chance of infecting someone long after the anthrax was dried.

Another indication that if the lyophilizer were contaminated coworkers would have been at risk can be seen in the surroundings of the unit in its normal spot. What appear to be lab coats or other lab clothing are hanging to the left, there is a small trash can to the right and a box of supplies, most likely sterile disposable pipettes, from the look of the packages, sits on the "table top" extending from the condenser unit next to the shelf dryer.

One more thing stands out in looking at the photo of the lyophilizer at USAMRIID. Note that there is a single sheet of paper on the right side of the shelf dryer. Although this could have instructions for those less familiar with the operation of the lyophilizer, I think it is more likely to be a sign-up sheet for reserving

use of the lyophilizer. When used with the large volumes of liquid that this particular lyophilizer is built to dry, each use of the device would be expected to require several hours. Scientists who share equipment like this use sign-up sheets as a matter of courtesy to let others know when they intend to monopolize the device for a long period. You can bet that if the FBI had a copy of a sign-up sheet on which Ivins reserved use of the lyophilizer during the time they accuse him of preparing the attack, that would have been used as a virtual "smoking gun". However, the fact that only one sheet appears to be attached might also suggest that old logs were not kept, and so there might not have been records going back to the time at which the attack spores would have been prepared once the FBI got to the point of investigating USAMRIID.

At any rate, the bottom line is that this photo of the lyophilizer the FBI wants us to believe Bruce Ivins used defies all scientific sense. Although it is large enough (unlike the "speed-vac" they note as being present in his BSL-3 area) to handle the volume of liquid that would have been needed to be dried to produce the attack spores, it is configured in a way that would have virtually guaranteed that highly infectious spores would have been spread in a work area where live anthrax is not handled. As such, this contamination likely would have caused an anthrax outbreak in unvaccinated coworkers or visitors. Alternatively, if the device remained portable, it also defies logic that no workers would have recalled the lyophilizer being missing for the extended period Ivins would have needed to dry down the spores and then decontaminate the device after using it in his very small BSL-3 space.