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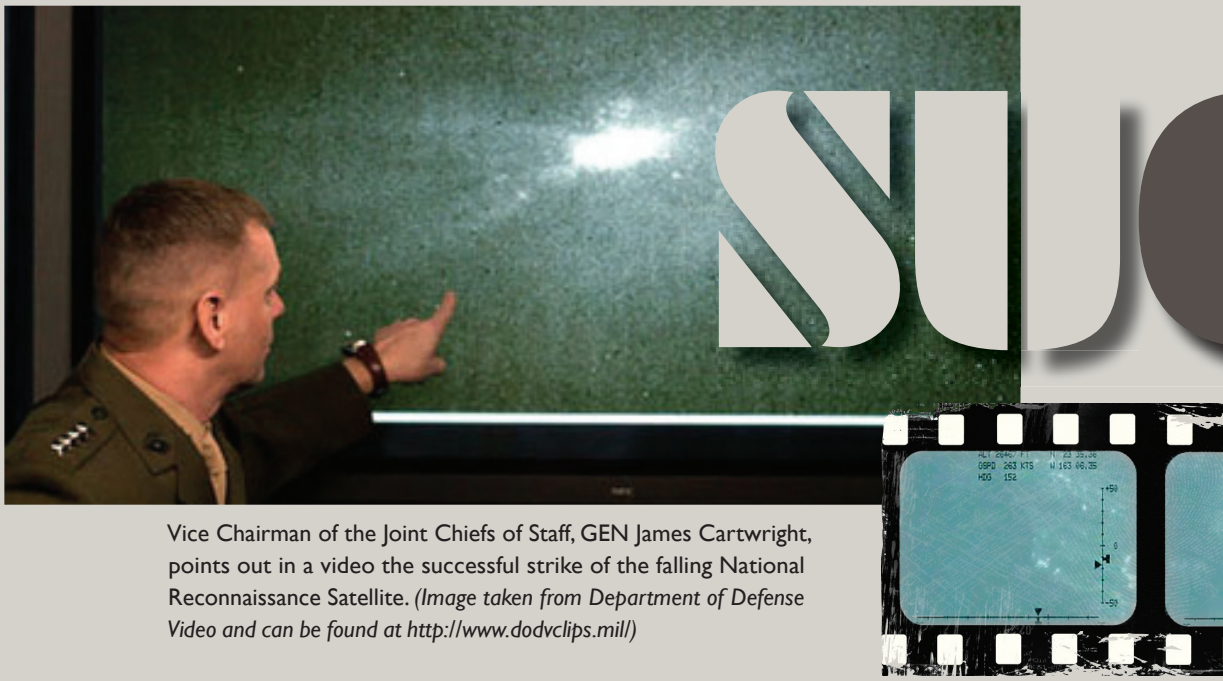


Vice Chairman of the Joint Chiefs of Staff, GEN James Cartwright, points out in a video the successful strike of the falling National Reconnaissance Satellite. *(Image taken from Department of Defense Video and can be found at http://www.dodvclips.mil/)*

GEN JAMES CARTWRIGHT: Let me give you just a couple of pieces, and then we'll run a video to give you a sense of what we saw last night.

At 10:26 (p.m. Pacific Standard Time), the Lake Erie launched a Standard Missile 3 from the Pacific. They were northwest of Hawaii. At 10:50, the Joint Space operations center out in Vandenberg confirmed the breakup of the satellite. The intercept occurred at 153 nautical [sic – statute] miles above the earth.

And what I'd like to do is run the video. We have two videos here. The first one is essentially the launch and the flyout. The second one is the intercept.

That's the launch. And this is the second video, and that's the satellite.

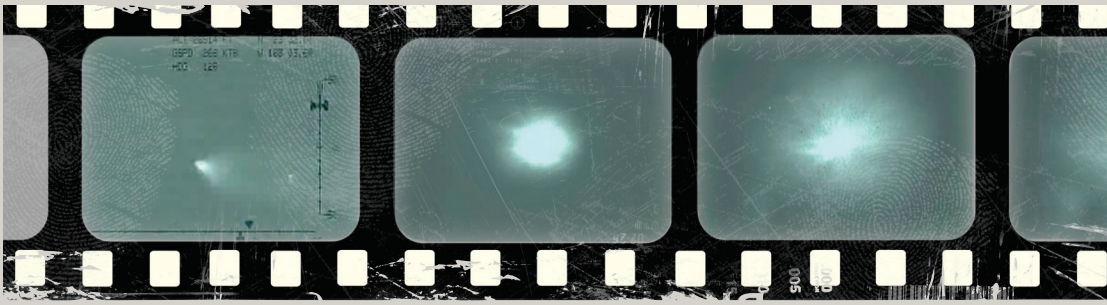
Q – Before or after?

CARTWRIGHT: Right at the hit.

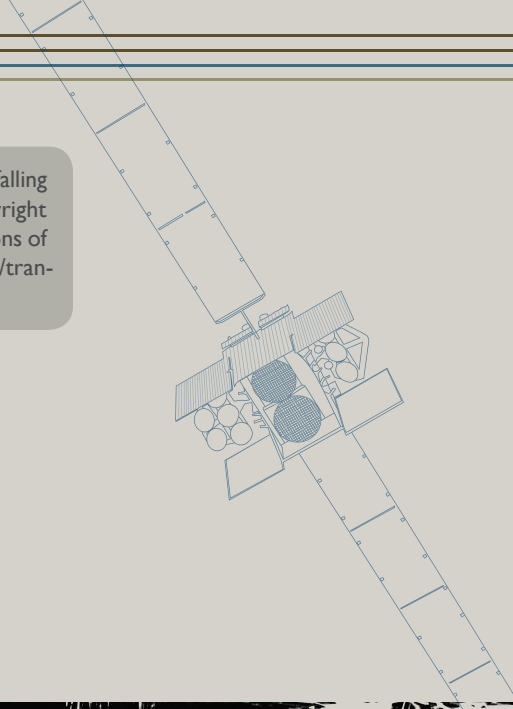
And so what you're seeing, you slow it down, what you'll see there is you'll see the intercept. You'll see the hit of a mass. There you go.

And what we're watching right now is this cloud that's forming right here, and I'll walk you through a little bit of what we think we're seeing there.

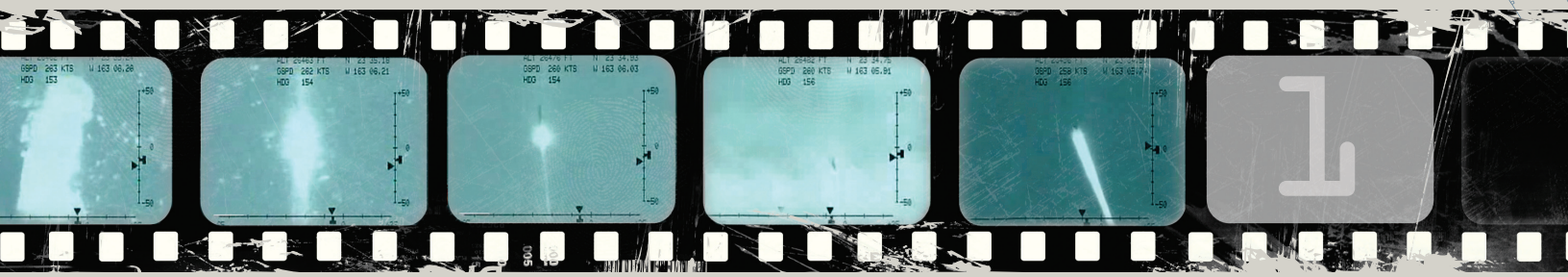
Our objective was to intercept the satellite, reduce the mass that might survive reentry, vector that mass as best we could into unpopulated areas, ideally the ocean, breach the hydrazine



EDITOR's NOTE: On Feb. 20, 2008, a U.S. Naval Ship launched a missile that successfully intercepted a falling U.S. reconnaissance satellite. The next morning Vice Chairman, Joint Chiefs of Staff, GEN James Cartwright presented videos of the event to the press and answered questions. The following pages include portions of the transcript from the briefing. You can find the briefing in its entirety at http://www.defenselink.mil/transcripts/transcript.aspx?transcriptid=4152.



CCESS!



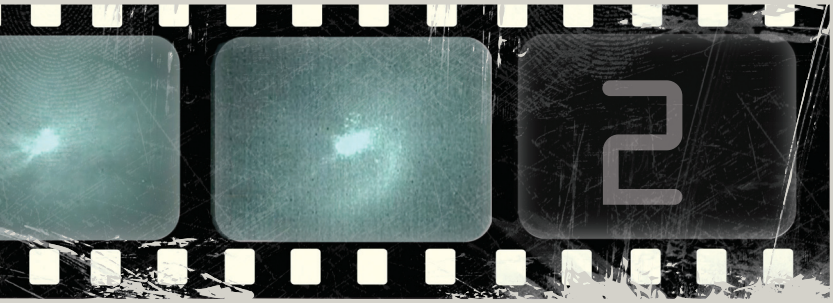
tank, so that we could vent the hydrazine off, the toxic fuel, and then have all of that done prior to impact.

The intercept occurred; you just saw that. We're very confident that we hit the satellite. We also have a high degree of confidence that we got the tank. We're still working our way through that. We will not be at a point where we are ready to say for sure.

But let me give you a sense of what we've got. We have a fireball, and given that there's no fuel, that would indicate that that's a hydrazine fire. We have a vapor cloud that formed. That, again, would be likely to be the hydrazine. We also have some spectral analysis from airborne platforms that indicate the presence of hydrazine after the intercept. So again, that would indicate to us that the hydrazine vented overboard in some quantity, and we're starting to see that in Space.

Any one of those as a stand-alone is not a smoking gun, so we're putting the pieces together. I would tell you that it's probably going to take us another 24 to 48 hours to get to a point where we are very comfortable with our analysis that we indeed breached the tank. The imagery that we have, the high-definition imagery that we have, indicates that we hit the spacecraft right in the area of the tank. So each of the pieces put together — we're pretty confident, but we're not standing there; I don't have a picture that shows you a tank.

What we have afterwards is a debris field. We're tracking that debris field. It is already starting to reenter. We're seeing reentries in the Atlantic and specific [sic — Pacific] right now, and we'll track that over the next 24 to 48 hours. It generally takes us about a day to two days to start to get a good sense of each piece of material that's up there. Thus far, we've seen nothing larger than a football, which tells us that we're in the right area. But again, it's not conclusive, because it's



going to take us more time to make sure that we've got all of the reporting in, we've been able to correlate the data.

Most of what we see in Space, we use radar to see. So when you use radar at that kind of distance, you may see an object that appears large, but it could be that it's reflective and not actually large in mass. And so we're trying to work our way through that. And after you see several passes, you'll see a change in angles, and then you'll be able to correlate the data and understand that you either have a large object or you have a small object that's just glinting. And so that's what we're trying to work our way through right now. As I said, we do have some reentries beginning. We expect that that will continue through the day today and into tomorrow.

All of the activity that we went through last night, we provided updates through the night to the State Department, so that they could keep their embassies informed. So that reporting has gone out. We are standing by for consequence management. We have seen nothing yet in the way of reporting or in the way of reentry that has survived to the Earth. Okay. We have reentry in the atmosphere, but we don't necessarily have anything hitting the Earth.

And so those are the key pieces of information that we have this morning. Obviously, as we went through the process last night — from the secretary taking his brief about eight hours prior to the shot — we — General Chilton from Strategic Command recommended to the secretary that we had a window, that all systems were go.

One of the things we watched was the weather. We had some indications yesterday that we might have high seas, but when we actually got the ship on station, the ship reported that the seas were about two to three feet, which was well within the limits. So we had a good weather window, but what we were facing is, there is a low moving into the area, that would be in the area for the next four or five days. So we decided that we would proceed last night. The secretary made that decision, and then we moved forward.

The United States Strategic Command out in Omaha, Neb., ran the intercept, commanded the forces. We had a great team from Space and Missile Defense Command out at Colorado Springs, Colo., that worked the terrestrial sensors, from the Joint Space Operation Center in Vandenberg, Calif., that worked that the Space sensors, and the Missile Defense Agency that worked all the telemetry, worked the test cards that we used to prepare for this, did all the modifications of the system.

So you can imagine at the point of intercept last night there were a few cheers from people who have spent many days working on this project.

I'm not at the point yet where we're ready to say we got that tank, but we have reduced the mass. There is substantially less than the amount that we forecast, the 2,800 pounds at reentry; substantially less is available out there; the pieces are substantially smaller. As I said, right now we're seeing nothing bigger than a football. So by all indications, we're on a positive path that this was a successful intercept.

Q – General, regarding the debris, do you have any estimate of how many pieces of debris were created? And also, are you — can you rule out that any potentially hazardous or harmful pieces would actually fall in populated areas over the next few days or so on?

CARTWRIGHT: We're looking at the count, but it will probably take us 24 to 48 hours to get that count right, because each radar we've got to correlate as it passes from one to the next; am I counting something twice, or did I miss something? And like I say, I think that will take us most of today, into tomorrow.

From the standpoint of can I rule out that hazardous material will fall to the Earth, not at this point, but that's why we have the team standing by ready to go out and respond to that. We've

NASA Administrator Michael Griffin, right, addressed the press during a Pentagon Briefing Feb. 14, 2008. Griffin was joined by Vice Chairman of the Joint Chiefs of Staff GEN James Cartwright, U.S. Marine Corps, and Assistant to the President and Deputy National Security Advisor Ambassador James Jeffrey (off to the left). The topic of the briefing was the U.S. government's plans to destroy an unresponsive U.S. reconnaissance satellite with an interceptor missile. The 5000 pound satellite would pose a possible risk to life if allowed to fall to Earth due to the large quantity of dangerous hydrazine rocket fuel onboard. *Department of Defense photo by R. D. Ward*

notified the embassies, taking all due diligence to try to make sure that we have made the notifications necessary and that we're prepared if we find any hazardous material.

Q – Have you got any requests from other countries to provide them with additional information about the debris issue?

CARTWRIGHT: Not at this time. I think the State cables are handling that nicely right now.

Q – General, are there any countries in particular that you have issued warnings to or advisories to that they might be particularly vulnerable if there is any debris falling at the moment?

CARTWRIGHT: No.

Q – General, you say no debris has hit the Earth, that you know of. Can you rule out that some might have at this point?

CARTWRIGHT: Cannot. Cannot. It could have been smaller, could have escaped the sensors. If that's the case, generally that's a good sign, because a large piece of debris that would have been significant, so to speak, would generally heat up and we would have seen it either by radar or by infrared. And we did not see anything survive the atmosphere in that case.

Q – I know you said that this isn't any sort of test of missile defense, but what does this successful hit say about missile defense or that capability that you have in that area?

CARTWRIGHT: The elements of missile defense that were used here were the sensors, and the netting together of the sensors. That was the key piece that we would take from the missile defense system. The missile itself is a standard missile in the Navy inventory; the ship is a standard ship in the Navy inventory. We added a lot of instrumentation. We made some modifications to the software to be able to go after a satellite.

You know, this is a one-time mod. It is — if you put this mod in, we can't use the ship or the missile for another function without taking the mods out. So it's not something that we would be entering into the service in some standard way. This is a one-time type of event. But the assistance that the Missile Defense Agency brought, their technical expertise in this area, was invaluable in helping us put together all of the pieces that were necessary to make this intercept.

Q – I know you said this is a one-time event, but given the amount of junk that's up in Space and the chance that something might — that this might happen again, is there a chance this might become a reoccurring mission for the Navy?

CARTWRIGHT: No. The issue here, again, was the hydrazine. The mass itself would not justify us shooting at it. We've had satellites reenter before. When we design the satellites, we design them to have the fuel and the capability to be vectored in a more precise way into the ocean where they won't harm someone. What we have here is a satellite that went on orbit and immediately went dead and would not respond to our commands. We don't have that happen. We have several fail-safes that we try to put in place to make sure it doesn't. It did. This is the only one that we know of that this has occurred on. And so we see this as a one-time event. We will go back with the National Reconnaissance Office and with U.S. Space Command and make sure in the design side was there anything we missed that might

"THIS WAS UNCHARTED TERRITORY. THE TECHNICAL DEGREE OF DIFFICULTY WAS SIGNIFICANT HERE."
— GEN James Cartwright

further reduce the opportunity of this occurring again from the design standpoint.

Q – One quickie, on the techie question. How fast was the Standard Missile 3 going? And then I had a follow-up.

CARTWRIGHT: (Chuckles.) I'd have to get you — let me get you that information. We have said that the combined velocity of the two is 22,000 miles per hour rough order of magnitude. Okay?

Q – Okay. A satellite question. Now that you've had a successful hit, the attention's going to turn to why the satellite failed.

CARTWRIGHT: Right.

Q – Can you give — and NRO is not that helpful. Can you tell me in layman's language, was this a design problem, a manufacturing problem or what, based on what you know to date?

CARTWRIGHT: And let me take — on that last point, based on what I know. Not being able to drive up to the satellite and look, we have had satellites over the years — I'm not going to guess on this particular one, but let me give you a sense. We have had satellites over the years fail, generally an electrical failure. Could be that the battery failed. Could explode and cause problems. Could be that it was hit by a piece of debris that we didn't track. Any of those are possible. So a smoking gun, so to speak, on exactly why is something that has alluded us to date just because we can't get any diagnostics to tell us what's going on, because it's not responding to — or didn't respond to us.

Q – One follow-up. Was this an operational imaging satellite that caused a gap in U.S. intelligence capabilities, or an experimental package out there that, while not a good thing it failed, it doesn't impact or degrade U.S. intelligence capabilities?

CARTWRIGHT: Well, again, this has been off-line for two years, so anything that would have potentially been of value from an experimental satellite was not here for the last two years. So the impact today, negligible. What I don't know, and what you need to talk to the NRO about, is what was the mission and what was it designed to do and what would its contribution be. And that's for them to decide.

Q – Can you — I mean, we're hearing that the tank took a direct hit with the missile. You showed us the vapor cloud and in the video. Can you give us a better sense of why it is that you can't be certain that the tank itself was breached at this time?

CARTWRIGHT: Sure. We're looking at preliminary data, and we have a bunch of techies that are trying to work their way through the data. They want something that they can really be absolutely sure of before they will come to that conclusion.

No one of the pieces of data that we have thus far is enough to be conclusive. We have a high degree of confidence, based on the imagery that we have and the destruction pattern, that the missile impacted the satellite in the area of the tank. We have the cloud that appears to be hydrazine. We have what appears to be the plume and the fire, all of which would lead us to that conclusion.

So we have a reasonable degree of confidence, but we're looking for some more refinement of the data, the ability to go through that. My sense is that we will probably work that through the next 24 hours before we're comfortable saying conclusively that we did or that there is still ambiguity that we're trying to work our way out of.

Q – Is the reasonable degree of confidence that it hit on the tank the video or photos from SM-3, and will you release those to us?

CARTWRIGHT: Well, the videos from the SM-3 are key in the analysis. They give us an idea of where we hit on the satellite body and put us in the area. But they — unto themselves, at 22,000 miles per hour, you're looking at frames — there are large gaps in between. And so we're trying to understand, to a level of confidence, that we actually hit where we thought we did, that when — where we hit would have caused a breach in that tank.

Q – Is a fireball caused by anything else?

CARTWRIGHT: Yes. Well, that's what we're trying to understand. Generally speaking, no. So we believe that that's a contributor. Was this fuel that could have been in a line, not in the tank? No, we're not sure, when the satellite failed, where all the — there are several degrees of ambiguity here that we're trying to work our way through. Was it big enough to say that it was the tank? What would it look like if it's frozen? We don't have a lot of experience with hydrazine blowing up in a frozen mass, and so we're trying to work our way through that – and that's some of the effort that has to go on today. I'm sorry

Q – General, are you confident that no sensitive equipment or intelligence could have survived this hit?

CARTWRIGHT: Our sense is that most of anything that would have been sensitive intelligence would be destroyed on the reentry, that the likelihood of that destruction would be increased by reducing the size of the fragments. Is it a hundred percent? No, but if it survives, it survives. I mean, that would not — as I've said before, that unto itself was not enough reason to go after this satellite with a missile. It's the hydrazine that we're focused on. If something falls to the Earth that is sensitive and classified, we have a process to try to recoup it, but it'll fall to Earth, and that'll be it.

Q – Let me follow up to some of the earlier questions. The vapor cloud, could — are there any other alternative reasons that it could have formed?

CARTWRIGHT: What we're trying to put together — when we put that together with the spectral analysis, that gives a better sense. The vapor cloud could be debris. It could be debris. But what we're seeing is the spectral analysis is showing that it appears to be that it's hydrazine. And so that's where the analysis is focusing in on, is, is that — when you correlate two different images, are we looking at the same point in Space? Have we got this about right, or are we looking at two different points and we're seeing hydrazine in one area and the cloud is just debris? And that's what we've got to correlate today. That's the analysis work that's going on.

And we're trying to pull all these pieces together

Marine GEN James Cartwright, Vice Chairman of the Joint Chiefs of Staff, informs Defense Secretary Robert M. Gates of the successful missile intercept from the Pentagon's National Military Command Center, Feb. 20, 2008. *Defense Department Photo by Air Force Tech. Sgt. Adam M. Stump*

and make sure that we're not stringing facts together erroneously, that what we're trying to do here is correlate them with some degree of confidence.

Q – And also you had talked about the — that if you did not need to use the other two missiles, that they would be — that the software that was used to — that was programmed then for the mission would be — (inaudible). When will that happen? When will they be —

CARTWRIGHT: Well, they'll return to port. They'll be downloaded. There was software associated with sensors, software associated with those weapons and the ship. That'll be taken out of the system.

There's also some wiring — test wiring that goes into this kind of a thing, to give us a better sense of what was going on. And that'll have to all be removed. So it'll take us a few — probably a couple of weeks to get all of that accomplished.

Q – Although you still have analysis to do to see just exactly how successful you were, you've got to feel pretty good about this, right? I mean, this was uncharted territory.

CARTWRIGHT: Yes. This was uncharted territory. The technical degree of difficulty was significant here. You know, it — you want to reach out to each one of those people that probably gave up their weekends and nights to get this done in 30 days and put it together, whether they were the Sailors on the ship, the technicians, the software programmers, STRATCOM's operations teams. I mean, all of those people, you want to reach out and just grab them by the hand and thank them for what they did.

You can imagine, at the point of intercept, there were a few cheers that went up in operation centers and on that ship, but with the understanding that we still have some work to do.

The consequence-management part of this, and making sure that we track that, is critical, because the intent here was to preserve human life. While the technicians are looking at what they did in their part and feeling very good about it, at the end of the day, what's important to us is what debris is out there that could fall, where is it going to fall, and if it falls in some area that's populated, getting to it and making sure nobody gets hurt.

Q – General, you were pretty confident of hitting the satellite. The trick was hitting the tank, I understand, and it appears very likely

that y'all did. Would you care to offer a percentage of probability of success of hitting the tank? Ninety percent, do you think, from the evidence you have now, or do you want to go into that?

CARTWRIGHT: From our position, you always want to hedge your bet, because there's no absolute certainty. But I would tell you, from watching and from participating, that we're in the very, very high — 80, 90 percent sure that the tank was breached. That's my opinion. We're going to try to validate that with assessment today. We are proceeding as if we didn't. In other words, we're posturing ourselves to go out and recover a hydrazine tank that maybe didn't get breached. And we'll hold those measures in place until we have a degree of certainty that the tank was breached and that the hydrazine was vented off.

Q – You had mentioned you can't rule out that hazardous debris could fall to Earth in a populated area. Can you give us a ballpark? Is that — you know, percentage-wise the chance that it might actually come in contact with humans?

CARTWRIGHT: No. And let me just kind of go to the statistics side of this. If you believe that in rough order of magnitude, there are 6 billion people on the Earth, most of the statistics would put each of them equidistant apart across the face of the Earth and say, now what's the chance that any one of them got hit. They would do it on a standard temperature day, no wind, et cetera. So the difficulty here in statistics is that you can make them say pretty much anything that you want, and they're not terribly revealing, particularly if you happen to be standing at the point of impact.

But what we try to do is put to that assessment what's the reasonable man approach here? One, it was clear to us that the hydrazine was unique in that it could expand beyond the area of a single mass hitting the Earth and affect people. I used the example of two football fields; again, standard day, a couple of knots of wind, dispersals, standard humidity, all of those things. What does that look like in a city? What does that look like in a forest? What does that look like in an open field? All of them very different, all very different.

But the intent here in looking at the analysis side of those statistics was — where we came to was that there was a reasonable chance that this hydrazine, if it fell in a populated area, would affect people. Would it affect them the same? Would they approach it? Would they walk away from it? I can't get inside of the head of a person. There's too many variables there.

So what we did was we said you have to treat this as if it's going to hurt someone, and if you can mitigate the threat, if we can reduce that opportunity, then you should take action if you have the opportunity. And that really was the driver for us.

So statistically, I can make them say almost anything we want. From an assessment standpoint, the hydrazine was unique here. That's what broke out — not the size of the mass, not the reentry, not the classified nature. It was the hydrazine that drove this. It's the only factor that we've seen that would justify doing something like this.

Q – (Off mike) — the debris from the impact is, can you give a high, low —

CARTWRIGHT: In the area of the satellite on orbit? I'm sorry, doing the wrong direction. On

"It is not a missile defense system. In other words, we had to modify it away from missile defense in order to do this, so the two don't correlate."

— GEN James Cartwright

orbit, we believe right now, one, that the size of the debris is smaller than we'd forecast it would have been?. I used the example of thus far, we haven't really catalogued anything bigger than a football. We've still got some looking to do. We may have missed something. It could have been masked, et cetera, but we're looking.

We are seeing reentry. We forecast that there would be a substantial amount of reentry on the first three revolutions or in about the first 48 hours we'd have a good percentage of it down. That seems to be holding true, but again, we've got to work our way through. And that's part of what's hard here, is something that was there on one revolution that's not there on the next. Did we miss it, or did it reenter? And so we're trying to work that cross-sensor, try to match radars to infrared, et cetera to put that together. So there's a lot of ambiguity right now, but the trends and the vectors are in a positive direction.

Q – One other reason that was speculated to be behind this was that essentially this was, for lack of a better term, "target practice," that the military wanted to basically present a new capability, another reason for missile defense, maybe send a message about our capabilities in Space. What do you say to those allegations?

CARTWRIGHT: I guess — two things. I mean, I'm certainly not in a position to tell people how to think. But this is not — this is a modified system. It is not a missile defense system. In other words, we had to modify it away from missile defense in order to do this, so the two don't correlate. Number two, on the idea that this was potentially an ASAT type of activity and we were trying to gain data for ASAT — remember that we did that in the 1980s. We really don't need to go back. We understand ASAT. This is — there's no reason to go back and reprove what we've already done.

From the standpoint of missile defense and some sort of justification that that would be a reason to go out and do this, the SM-3 has a great track record in missile defense. Again, this is not — I mean, it's a modified missile. It's not the same type of profile, so it doesn't correlate. Will I be able to convince everybody that that's the case? No, but at the end of the day, it would have been, in our judgment, irresponsible to try — to not try to remove some of this risk. And that's what drove us.

Q – I was going to ask him to put his STRATCOM hat on and look at — compare this hit with the difficulties of a ground-based interceptor type of hit. Missile defense true believers may use this and say, oh, geez, the system really works. But you know the difficulty of — can you just, one minute, how the — this is different than going after a, you know, four-foot warhead?

CARTWRIGHT: The key difference here is that this is not an aerodynamic body. The satellite can't fly in the atmosphere. A reentry vehicle can fly in the atmosphere. So if we launch from over here towards this direction, as soon as we launch, we can start to know about where this is going to land, because it's an arc. It's ballistic. This is not ballistic. The orbit is relatively predictable. But once you touch that atmosphere, this is not a pointy body that will fly through the air. It flips, it flops, it breaks apart. So that's substantially different than trying to aim at an aerodynamic body that has some consistent properties of flying through air mass. Okay. So — very different. Very different intercepts.

Q – It wasn't flying in the atmosphere, was it?

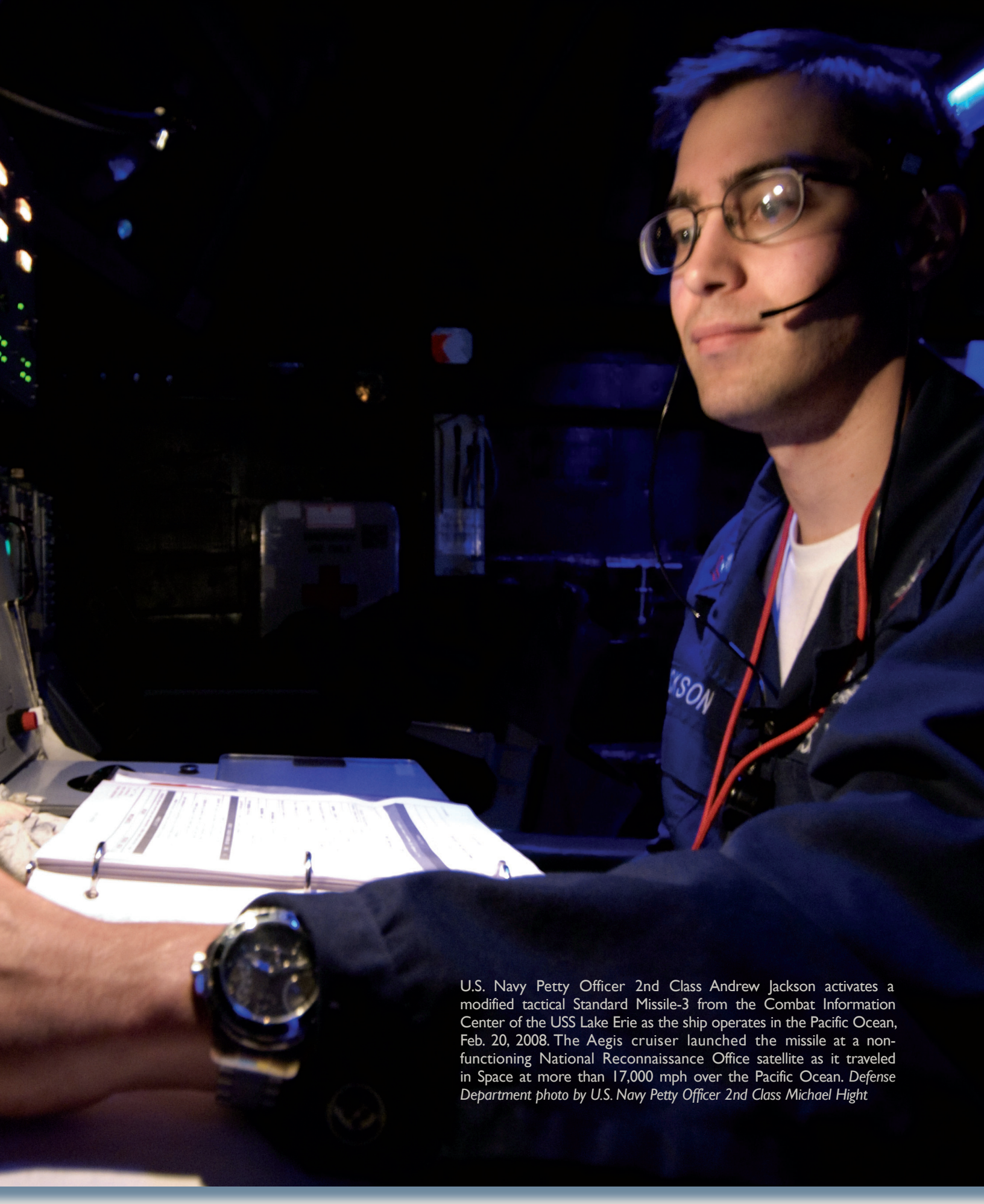
CARTWRIGHT: No. We're catching it up. So we've got the stability. But again, what you're dealing with in an orbit is a substantially different type of flight regime than an arcing body that is ballistic.

Q – Does the whole episode then add to the knowledge that could be used or applied to missile defense at all?

CARTWRIGHT: Other than netting the sensors together, which is what we use for missile defense, not really. I mean, it doesn't cross over.

Q – Can I just have a quick clarification? Is a second strike, a second shot, ruled out now? Do the ships stand down? You said you were going on the assumption, at the moment, that you haven't hit, even though you believe you did.

CARTWRIGHT: We believe that is really on the far edge of possibility. We're not proceeding as if we're going to take another shot. If we find something today that is very conclusive that the tank is still in Space, that it hasn't been ruptured, we may do an assessment. But I would tell you, the probability of another shot at the current time is very low.



U.S. Navy Petty Officer 2nd Class Andrew Jackson activates a modified tactical Standard Missile-3 from the Combat Information Center of the USS Lake Erie as the ship operates in the Pacific Ocean, Feb. 20, 2008. The Aegis cruiser launched the missile at a non-functioning National Reconnaissance Office satellite as it traveled in Space at more than 17,000 mph over the Pacific Ocean. *Defense Department photo by U.S. Navy Petty Officer 2nd Class Michael Hight*