

Gary L. Hoe, PE  
LtCol, USAF (ret)

White-haired former nuclear warrior

### **Scientists for Accurate Radiation Information (SARI)**

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During the Cold War, the US made some 69,000 nuclear weapons and the Soviets made about 73,000. We dropped two in combat, tested about 1300 more, and of the remainder all but about 5000 of ours have been retired and dismantled. Same for the Russians and their former Soviet Socialist Republics. I don't know about the others in the Nuclear Club, but I believe China has maybe a thousand, several hundred each for England and France, maybe a hundred or so for India, Pakistan, and North Korea, and who knows about Israel and everyone else. And then, you must consider whether the above countries have the means to deliver those weapons to an adversary - they are not a threat if they are stuck in a bunker.

So, whatever the basis was for fearing worldwide devastation and a nuclear winter, and for the setting of the Union of Concerned Scientists' Doomsday Clock to a minute or two before midnight, there must be a substantially smaller basis for such fear today. There just are not enough weapons to ruin the planet - never were, actually. That such fear still exists is a sad commentary on the abysmal technical education of recent decades, the lack of critical thinking, and the need for the purveyors of fear to keep us afraid so that their donations keep coming in. As to the actual effects: During the first years of the Cold War, guidance systems were poor, there was no GPS or satellite reconnaissance, delivery systems were slow, and weapon numbers were few. Targets were mostly cities and military bases, because they were large and immobile. As with the two warshots over Japan, the early weapons were intended to detonate well above ground so as to severely damage the largest portion of those soft targets. At those altitudes, the only fallout would have been the mass of the bombs themselves.

Later, as the Allies and the USSR learned how to harden their equipment and to put ICBMs in silos, many of the war plans included digging up each other's silos and bunkers and command centers. This would have greatly increased local fallout and particulate dispersal in the air, which is what caused the new fear about nuclear winter following a full Mutual Assured Destruction exchange. (Tongue firmly in cheek, I have suggested we go back to controlled surface detonations in selected locations so as to counter global warming.)

Also, the weapons became smaller and lower in yield as they became more numerous and as guidance improved. Making a huge planet-buster Tsar Bomba may be an interesting footnote in history, but it has no effect if it is too heavy to deliver over a long range. After all, once you have converted your weapon and its target into plasma, of what use is the next megaton? Fireball growth and soft-target damage versus yield is quite non-linear.

Then, President Ronald Reagan stated we would pursue the Strategic Defense Initiative (Star Wars), effectively telling the USSR that (1) you can't dig up enough of our weapons to stop our retaliatory reply, and (2) we will shoot yours down if you try anyway, and (3) the debris will fall on you, not us. On top of that, he commissioned the LGM-118 Peacekeeper ICBM, which took only 150 seconds from launch to deployment of the first of ten warheads off the post-boost vehicle, and each warhead would land with a 100-meter Circular Error Probable. That is about a

quarter of the flight time and several times the accuracy of previous ICBMs, which made it exceptionally hard to find and target before the warheads were on their way. The Trident D-5 SLBM was almost as effective. The USSR went bankrupt trying to counter that, and folded on Christmas Eve in 1991. It was over 30 years ago that we won the Cold War.

The various strategic arms reduction treaties came about because, after the Cold War, we found the Russians were as scared of us as we were of them. Nuclear deterrence only works if both sides are rational. So now, the only irrational actors with nukes are North Korea, maybe Pakistan with India, and the Iranian wanna-be types. None of them offers a worldwide threat. Until recently.

I must reluctantly, and with some serious concern, dump the present boss of Russia into the irrational bucket. That's a problem with dangerous egomaniacs on steroids. I don't know whether his threat to use nukes is valid or not, nor where they would be employed, nor in what quantity, nor whether his military command structure would actually follow through with such an order if it came. Nor do I have any insight as to what NATO might do in return.

I wish I knew more about the nuclear command and control structure of Russia and the former USSR. I do know ours, and from the President to the officer with the "football" to the National Command Authorities to the nuclear-armed wing and fleet commanders to the men and women in the launch capsules, there are rational, sane, psychologically evaluated, trained as a trusted crew, intelligent, reasoning people. Rational and sane people who can and will refuse and countermand an order if it is illegal, illogical, and without corroborating basis. Please believe me on that. I bet my life on it for several years, and still do.

But I do know, if the order is valid and corroborated, and our weapons are released - they will work. I guarantee it. And I know what they would do, and what they cannot. Evaluating that was my job for several years at the Nevada Test Site, and I was good at it.

But I would rather everyone in power was sane and rational, and that nuclear weapons were all in museums, as the last Peacekeeper ICBM is, here in Albuquerque. As a docent, I go outside at the National Museum of Nuclear Science and History and pat her side every now and then, glad she never flew in anger. A couple summers ago, a dove made her nest in the fourth stage – the symbol of peace raising babies in the instrument of war. I take comfort in that.

