Over the past year, National Institute has conducted a series of interviews with key national security experts on a variety of contemporary defense and national security topics. In this issue of National Institute's *Journal of Policy & Strategy*, we present two interviews: one with Lieutenant General Henry "Trey" Obering III (USAF, Ret.), former Director of the Missile Defense Agency; and another with Vice Admiral Robert Monroe (USN, Ret.), former Director of the Defense Nuclear Agency. Both interviews were conducted by David Trachtenberg, Vice President of the National Institute for Public Policy. Lt. Gen. Obering discusses the evolution of missile threats to the United States and what the United States should do to improve its capability to defend against them—including the role that space can play in facilitating effective missile defenses. VADM Monroe addresses the need for the Department of Defense to regain expertise in understanding nuclear weapons effects, especially when U.S. adversaries and strategic competitors are expanding and improving their own nuclear weapons capabilities.

These interviews provide insightful context on some of the critical national security issues of our time. In today's highly dynamic international security environment, they add important perspective to the contemporary debate on the threats to U.S. national security and what actions the United States should take to address these challenges.

An Interview with Vice Admiral Robert R. Monroe (USN, Ret.)

An Interview with Vice Admiral Robert R. Monroe (USN, Ret.), former Director of the Defense Nuclear Agency and former Director of Navy Research, Development, Test and Evaluation (RDT&E). ADM Monroe looks at the history of the U.S. nuclear weapons enterprise and implications of the decline in nuclear weapons expertise.

Q. As a former Director of the Defense Nuclear Agency (DNA) – which subsequently became the Defense Special Weapons Agency (DSWA) and the Defense Threat Reduction Agency (DTRA) – do you believe the United States retains the technical talent necessary to ensure a modern, credible, and effective deterrent?

A. Absolutely not.

Background

When the Manhattan Engineer District was founded in 1939 to create nuclear weapons for the United States, its leader, General Groves, and his scientists understood that they would need two principal types of scientists to manage and sustain the development. These were: Nuclear Weapon Design experts (primarily civilian); and Nuclear Weapon Effects experts (primarily military). Cadres of these individuals were formed, worked together, and brought the project to success in 1945.

In 1947, the wartime Manhattan Project was terminated and two new organizations were formed from its staff to continue the program. Scientific research, design, and production personnel became the Atomic Energy Commission (AEC); and nuclear weapon effects and operations personnel became the Armed Forces Special Weapons Project (AFSWP) in the Department of Defense (DOD). The greatest early need was to produce numbers of nuclear weapons rapidly. The AEC subsequently evolved into the Energy Research and Development Administration (ERDA) and then the Department of Energy (DOE).

Focusing now on DOD, AFSWP controlled all DOD nuclear weapons activities for twelve years. It had custody of all DOD nuclear weapons, and did all of DOD's nuclear testing, while training the Air Force, Army, and Navy in nuclear weapons' maintenance and operations. It grew to be a huge, powerful organization.

In 1958, the Services took over the weapons, and AFSWP transitioned into a much smaller Defense Atomic Support Agency (DASA). Numbers of weapons produced became less important than advances in nuclear weapon design and effects, and in 1971, DASA became the Defense Nuclear Agency (DNA). More and more scientists were needed, and nuclear weapon effects blossomed. DNA became recognized informally as the "National Laboratory for Nuclear Weapon Effects."

Nuclear Weapon Effects

The term "nuclear weapon effects" was used several times in the above paragraph. It is necessary to know exactly what it means, and why it's so important. When a nuclear weapon detonates, an enormous amount of energy is released in a microsecond, producing blast, thermal, and radiation effects. This energy released can be shaped to be most efficient in destroying the particular type of target against which it was launched. The types and amounts of energy can be varied. Nuclear weapon effects is the military science of measuring detonation effects in detail and creating optimum weapons.

DOE tests and DOD tests are vastly different in purpose, form, and in data-recovery, so each Department conducts their own test program in Nevada; however, all planning and data recovery are fully shared.

A final comment on nuclear weapon effects: The Cold War was the world's first nuclear war. It lasted 47 years, and for most of it each state was threatening the other with nuclear weapons. We won it because we bested them in science. We had more and better scientists, and DOE and DOD bested the USSR in testing and in analyzing test results and creating better future test concepts. This DOE and DOD testing provided the scientific results that allowed our leaders and warriors to shape winning national nuclear policy, nuclear deterrence, nuclear strategy, and nuclear tactics. We conducted about a thousand tests during the Cold War. No one could ever have dreamed that this Cold War could end with total victory for

one side, total defeat for the other, without a single nuclear weapon having been detonated in anger. But we did it.

After the Cold War

Once the USSR had collapsed and the Warsaw Pact nations were freed, no major international threats were immediately apparent. Peace was declared, including a peace dividend. Defense budgets were reduced, nuclear weapons budgets were reduced even more.

The scope and nature of the nuclear reductions were, of course, a vast overreaction. They amounted to a total U.S. nuclear weapons freeze. Within five years, two rogue states—North Korea and Iran—were clearly on their way to nuclear weapons capabilities and they should have immediately been stopped by conventional U.S. military force. But our leaders chose handwringing instead. China was already well into an immense, decades-long strategic military revolution, cloaked in secrecy. Within ten years, Russia had collected its nuclear weapons from its former USSR republics and was starting a frightening new nuclear arsenal. The U.S. nuclear dismantlement continued, decade after decade.

Here are some of the early U.S. nuclear cutbacks that were imposed by the President and the Congress, through laws, regulations, Nuclear Posture Reviews, etc.

- All U.S. underground testing of nuclear weapons was prohibited;
- All "tactical" nuclear weapons were withdrawn from our military;
- Advanced research on nuclear weapons was not allowed;
- Design of low-yield nuclear weapons was forbidden;
- Design and production of new nuclear weapons was outlawed;
- The United States has had no significant pit production capability for 33 years;
- Nuclear infrastructure spending was not funded;
- The nuclear test site in Nevada has been allowed to totally deteriorate.

Possibly the most damaging nuclear setback the United States has accepted is that in our testing prohibition we have followed a zero-yield test policy for three decades, while Russia and probably China conduct highly effective low-yield tests and North Korea accepts no limits.

DOD's "De-nuclearization"

DOD has been so "de-nuclearized" over the past 29 years that the Department lacks the essential, widespread, fundamental grounding in the military science of nuclear weapon effects. The nation is ill-prepared for the possibility of nuclear war of any type.

This challenge does *not* refer to the abilities of our Air Force and Navy to operate and maintain our strategic Triad in the superb manner that led to our Cold War victory. Those capabilities are still first-rate, as has been DOD's immense drive to replace the three delivery systems simultaneously.

The issue *does* apply to DOD's capability—as the "warrior class" of the nation—to first deter war, but if necessary, fight and win on a nuclear battlefield. Every American expects the U.S. Defense Department to be superior to the rest of the world in this.

After the eight nuclear cutbacks listed above were completed, the final de-nuclearization of DOD was accomplished in two hammer-blows, a decade apart. One was a single act, the other an extended drain.

In 1997 DNA and three other DOD organizations were combined into the Defense Threat Reduction Agency (DTRA). DTRA adopted an entirely new charter, which did not include most of DNA's functions; and almost none of its nuclear weapon effects scientific work. DTRA has continued to evolve *away* from DNA's functions for over twenty years. *DNA essentially vanished overnight*. The vital military science of nuclear weapon effects disappeared from DOD.

In 2009, President Obama announced that henceforth one of America's principal goals would be the creation of "a world without nuclear weapons." This did not result from a national debate, nor even a major study…just an announcement. The President also announced that to achieve this goal worldwide the United States would immediately commence a continuing series of actions to reduce America's roles, missions, capabilities, and numbers of nuclear weapons. He continued these eliminations and reductions for eight years.

The most notable document which implemented Obama's policy is the *Nuclear Posture Review* (NPR) of 2010. It greatly reduced the role of America's nuclear weapons; established purposes for which nuclear weapons may not be used (a statement the United States should *never* make); prohibited nuclear weapons testing; prohibited improving the capability of any weapons; prohibited the design and production of new nuclear weapons; and many more restrictions.

For the next eight years, the President's program of "actions" to remove every aspect and element of nuclear weapons from DOD--except the strategic deterrent Triad--was highly effective. ***Nothing remained. No scientific foundation was left.***

DNA's Leadership and Management

You asked whether the United States retains the technical talent for an effective deterrent? I will answer—negatively—in some detail by describing what DNA did in helping to win the Cold War. Almost none of that is being done now.

- DNA, headed by a military three-star, who reported directly to the Secretary of Defense and Chairman of the Joint Chiefs of Staff (JCS), maintained supervisory control and oversight over all of DOD's nuclear weapons activities. DNA was manned by the top 1,500 of DOD's nuclear weapon effects leaders. You should consider that virtually NONE of the below listed activities exist in DOD today.

- DNA, working with the services, built a cadre of hundreds of DOD nuclear weapons specialists, military and civilian, with advanced degrees in nuclear weapon effects, nuclear physics, and nuclear engineering, who spent their entire careers advancing every aspect of DOD's scientific nuclear weapons capability. Uniformed nuclear weapons sub-specialists, who followed line careers but had extensive nuclear weapons education and experience, swelled these ranks to thousands.

- DNA oversaw the staffing of every necessary element of DOD with these nuclear weapons specialists and sub-specialists. These included the Office of the Secretary of Defense (OSD), JCS, Army, Navy, and Air Force secretariats, Service Chief staffs, the National Nuclear Security Administration (NNSA) and the weapons labs, Defense agencies, laboratories, war colleges, Joint and Unified Commands, NATO, and right on down to individual artillery batteries, ships, and aircraft squadrons holding nuclear weapons.

- These distributed nuclear specialists and sub-specialists created and maintained, throughout DOD, the essential professional expertise in nuclear weapons. This served many necessary purposes, including: (1) it provided instant expert nuclear weapons advice to commanders at every level; (2) it provided competent education and training in nuclear weapons to all key personnel in the commands; and (3) it provided an efficient communications network between DNA and all DOD elements with nuclear weapons for reporting problems, taking action on them, asking questions, providing answers, issuing alerts or instructions, etc.

- DNA, working with the Services, oversaw the career development of these nuclear weapons specialists and sub-specialists by rotating them through billets in the above commands.

- DNA mobilized a family of scientific laboratories specializing in nuclear weapon effects. DNA itself was the "national laboratory for nuclear weapons effects" (paralleling the Los Alamos and Livermore roles as national laboratories for nuclear weapons design). DNA's Field Command, which conducted underground nuclear weapon effects tests at the Nevada Test Site, was a major sub-command. Harry Diamond Lab (Army), Air Force Weapons Lab, and Naval Research Lab focused heavily on nuclear weapons science. The Armed Forces Radiobiology Research

Institute (AFRRI), a sub-command of DNA, investigated biological response to high-level ionizing radiation exposure.

- DNA provided the expertise to ensure the "hardness" and survivability of all U.S. weapons and sensors (tanks, ships, aircraft, missiles, silos, satellites, etc.) to the effects of nuclear weapons. They did this by continually advancing the essential military science of nuclear weapon effects. It was accomplished primarily through underground nuclear tests, but also through nuclear weapons effects simulators, kiloton-level high-explosive tests, barium releases in the Van Allen belt, etc. Each new weapons system or sensor (conventional or nuclear) is born with its own, unique set of vulnerabilities to nuclear weapon effects, and these can only be discovered and corrected through underground nuclear testing.

- The above paragraphs speak of defensive aspects of nuclear weapons effects. The offensive aspects are equally important. Every possible target for our strategic and tactical nuclear weapons (silos, submarines, air bases, troops, armor, artillery, ships, deeply buried command centers or WMD storage sites, reactors, energy facilities, manufacturing sites, transportation centers, satellites, re-entry vehicles, etc.) is most vulnerable to those nuclear weapons with a particular energy output (x-rays, gammas, neutrons, blast, thermal, etc.) Yield, height-of-burst, and delivery tactics also must be optimized for each target. This is one of the most important *military* aspects of nuclear weapons, and one which DNA led, in extremely close coordination with the Services and the weapons labs. Since the U.S. can stockpile only a limited number of nuke designs, the business of trade-offs is extremely demanding.

- As should be obvious from the two above paragraphs, DOD's underground nuclear testing—DNA's central role—is of paramount importance in determining the effectiveness of all U.S. nuclear weapons. DNA operated its own test site in Nevada, located at Rainier Mesa. For most tests, DNA used tunnels with horizontal-line-of-site runs from the working point. Designing and executing a DNA nuclear test was a 2- or 3-year proposition, costing tens of millions of dollars, with no margin for error anywhere.

- For most of DNA's more general nuclear weapon effects work, the Agency contracted for each specific tasking with highly qualified U.S. contractors. During the 1960s and 1970s, DNA was responsible for increasing the number of these specialized industrial firms from about ten to almost 100.

- Essential to DNA's remarkable role in winning the Cold War was its superb advisory board, "SAGE" (Scientific Advisory Group on Effects"). With notable elder statesmen in nuclear weapon effects like Albert Wohlstetter, Joe Braddock, Bill Graham, Bill Ogle,

Chuck McDonald, and Al and Dick Latter, SAGE kept DNA focused on the serious real-world scientific challenges that had to be overcome if America was to prevail.

- In meeting their high-level responsibilities for the security, safety, and survivability of all DOD nuclear weapons, the Secretary of Defense relied on DNA to exercise supervisory control over all DOD nuclear weapons. For example, DNA conducted regular searching inspections of Army, Navy, and Air Force nuclear weapons units, to ensure that uniform standards were used and that high levels of proficiency were maintained.

- With tens of thousands of DOD nuclear weapons spread worldwide, many in constant motion, and some being transferred between organizations daily, DNA had the immense and vital responsibility for maintaining minute-by-minute accounting for every DOD nuclear weapon.

Importantly, DOD and DOE must function as one if America is to have a superior nuclear weapons capability. DNA accomplished this in hundreds of ways daily. At present, DOD is only partially in the nuclear weapons business.

How DOD Can Recover

The thirteen bullets above describe nuclear weapons responsibilities of DOD, most of which are no longer being carried out. Clearly an immense task lies ahead.

We won the Cold War by outperforming the USSR at the new military science of nuclear weapons effects. What we must do is re-introduce nuclear weapons effects into every necessary elements of DOD.

America faces rapidly advancing nuclear threats from peers, other nuclear nations, and irresponsible and belligerent rogue states. Nine nations today have large nuclear arsenals, and most are increasing and improving them. Russia is aggressively crossing borders, making nuclear threats, (including world war), developing frightening new nuclear weapons, using hypersonics to shorten our nuclear warning times, and is threatening world war. China, now a global power, appears to be vastly increasing its ICBM arsenal, is threatening nuclear attacks on nation after nation, is building an ocean-spanning Navy, and is cloaking armaments in secrecy. India and Pakistan are in a nuclear arms race, while fighting over borders and issuing nuclear threats. Israel is preparing to defend itself. North Korea, now with a growing nuclear arsenal, must be taken seriously, and Iran is moving closer and closer to nuclear weapons.

Nuclear weapons are not going away—ever. DOD simply *must* regain its nuclear weapons professionalism and eminence. I believe it can only be done by effectively re-establishing DNA, including a 3-star military Director and the same solid reporting lines from the Director

to the Secretary of Defense and Chairman of the Joint Chiefs of Staff, etc. Nuclear weapons involve so many military activities that one military leader must have this overall responsibility—as was the case during the Manhattan Project and subsequently during 47 years of Cold War.

Since few of DNA's activities have been performed in DOD for over two decades, the military officers and civilians chosen to lead DNA will have to depend mightily on Cold War DNA scientists, and on scientists in DNA's former contractor base. But most all surviving individuals are in retirement; and in a few years all will be gone. Fast action is necessary. Deferring decision on re-establishing DNA is not an option. I urge responsible decision-makers to seek the advice and counsel of Cold War nuclear weapons leaders and scientists on this issue.

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An Interview with Lieutenant General Henry A. "Trey" Obering III (USAF, Ret.)

Lieutenant General Henry A. "Trey" Obering III (USAF, Ret.), Executive Vice President of Booz Allen Hamilton and former Director of the Missile Defense Agency (MDA). Lt. Gen. Obering looks at U.S. missile defense policy in light of recent changes in the strategic environment and advances in defensive technology.

Q. As a former Director of the Missile Defense Agency, do you believe the current U.S. missile defense program is sufficient to defend the nation against evolving ballistic, cruise, and hypersonic missile defense threats? Why or why not?

A. The U.S. missile defense system, which we began deploying over seventeen years ago when I was the Director of MDA, is certainly capable of defending the United States from the current threats from North Korea or Iran. However, as these threats continue to evolve and as we face a resurgent Russia and a very aggressive China, we must make dramatic improvements to the system.

For example, we need to provide global birth-to-death tracking and discrimination to maximize interceptor effectiveness and kill assessment against both ballistic and maneuvering threats including hypersonic missiles; this would enhance both homeland and regional defenses. This can only be done from space and MDA's Hypersonic and Ballistic Tracking Space Sensor (HBTSS) program is a first start to achieve this.

We need the ability to intercept warheads in complex threat suites including advanced countermeasures and decoys, and have the ability to kill multiple objects or warheads from

a single missile. Again, the Next Generation Interceptor (NGI) program begins to address this needed capability.

We need the ability to handle substantial raid sizes from rogue nations, and to handle enough of a raid by peers or near-peers to ensure an overwhelming strategic response. This demands that we develop and deploy a robust space-based kill capability to include a boost/ascent phase intercept/kill capability.

Finally, we need to fully integrate our offensive and defensive capabilities to take advantage of the precision of the defense and the responsiveness of the offense.

Q. Every U.S. administration, on a bipartisan basis, has acknowledged that U.S. missile defenses are directed against rogue states like North Korea and are not intended to defend against near-peer threats like Russia and China. For example, the Trump Administration's 2019 Missile Defense Review noted that current U.S. policy "relies on deterrence to protect against large and technically sophisticated Russian and Chinese intercontinental ballistic missile threats to the U.S. homeland." In light of the extensive nuclear buildup by both Russia and China, do you believe this policy should continue or should the United States seek to defend against all types of missile threats from wherever the source, including Russia and China?

A. I believe that we should now adjust our strategy to address the evolving threats and the 2016 and 2017 NDAAs began to lay the foundation for this. These statutes describe developing "an effective, robust layered missile defense..." and "architectures for a hypersonic defense capability" as well as providing "a plan for developing one or more programs of record for a space based ballistic missile intercept layer..."

When you put these in the context of our overall national security strategy, you can draw the conclusion that we need to develop both the capability and capacity to defend against any and all missile threats from North Korea and Iran.

And that we must have the capability to defend against any missile threat presented by Russia and China while building the necessary capacity to ensure continued deterrence when combined with our offensive forces.

In other words, we must continue to develop a qualitative and quantitative defense against rogue nations, and a qualitative defense combined with our existing and planned offensive capabilities to deter peers and near-peers, and to win if deterrence fails.

So, we need to develop next generation capabilities that will form the foundation for our missile defense strategy well into the future.

Q. Some missile defense proponents argue for improved space-based sensors but not space-based interceptors or other types of space-based "shooters," such as directed energy systems. What role can and should space play in a layered U.S. missile defense program and how would a space-based defense contribute to both deterrence and defense?

A. I feel very strongly that the United States must move aggressively into space with precision tracking and discrimination capabilities as well as a space-based kill capability which could initially be kinetic and transition to directed energy weapons as they become available.

Such a robust space-based capability could provide not only boost/ascent phase defense capability, but also a much more robust midcourse intercept capability against large raids and more advanced threat suites typical of Russia and China.

For example, the current technology represented by nanosatellites, peer to peer networks, artificial intelligence and the rapidly emerging commercial launch industry could allow the United States to deploy a very cost effective and operationally effective constellation of space-based sensors and interceptors. MDA recently deployed two such nanosatellites in their CubeSat Networked Communications Experiment (CNCE) to explore such a capability.

This type of missile defense capability would cause a dramatic increase in the uncertainty of the success of an enemy attack and therefore, strengthen our strategic deterrence.

It would also improve the effectiveness of our terrestrially based defenses by providing global birth-to-death precision tracking. This would allow us to take full advantage of the maximum range of our interceptors which often can outfly the range of their organic radars. This would significantly increase their defended area coverage.

Q. How has the technology of missile defense changed since the U.S. withdrawal from the Anti-Ballistic Missile (ABM) Treaty in 2002? Are there defensive technology improvements that the United States should be pursuing but is not?

A. The technology of missile defense has improved significantly since 2002. We have made great strides in our sensor capabilities, our hit-to-kill technology, our discrimination techniques, our manufacturing processes, our systems reliabilities and much more.

One particular area in which we've made good progress, but we find ourselves funding-limited instead of technology-limited is that of directed energy weapons. The Airborne Laser (ABL) shot down both liquid and solid rockets back in 2010 but it was a heavy, chemically based laser which was needed to achieve a megawatt power level required for lethality.

Today, dramatic progress has been made in much lighter and more compact combined fiber and hybrid pumped diode laser technology. But we could go so much faster with a focused and well-funded directed energy program.

Q. How do you address arguments that a more robust missile defense of the homeland would be destabilizing, provocative, and fuel an "arms race"?

A. I believe history holds the answers to those types of criticisms. For example, in 2006 when the North Koreans were building their Taepo-Dong 2 multi-stage, long range rocket, they were being very evasive about its capabilities and whether it was an ICBM or space launch rocket. They also did not abide by the international norms of airspace and sea lane closures for safety.

Several former senior U.S. officials were calling on President Bush to pre-emptively strike the launch site. In the end, President Bush relied on our missile defense capabilities to defend any threatened U.S. territory. I believe a preemptive strike would have been much more provocative.

Similarly, in Israel, the Iron Dome system has been able to protect hundreds, if not thousands, of lives from rocket attacks. Without this capability, the Israelis have said they would have to use much more aggressive air and ground attacks to stop the rocket launches which would cost more lives for the Palestinians as well.

Many critics have also said that building missile defenses is expensive and that aggressors can just build more offensive missiles. Let's look at the tragedy of 9/11. According to the Institute for the Analysis of Global Security, if you count the value of lives lost, the property damages, the lost production of goods and services, the impacts to the nation's stock market and impact on corporate profits, etc. the price tag approaches $2 trillion…and remember that this attack was not with a weapon of mass destruction such as an ICBM. Compare that to the total cost of all missile defenses developed and built since the program's inception in 1983 which is below $250 billion.

Missile defense capabilities provide senior leaders with more options for responding to aggression and buys critical decision time which they would not otherwise have.

Q. Some analysts and commentators have called for the United States to negotiate additional limitations on missile defense in order to encourage reductions by Russia and China in their offensive nuclear forces. Do you believe missile defense should be "on the table" in any future arms control negotiations?

I do not believe that missile defenses should be "on the table" for future arms control negotiations. Again, let's look at history when the Anti-Ballistic Missile Treaty of 1972 was signed between the United States and the Soviet Union. At that time only about 7-8 countries

had ballistic missile technology including several allies of the U.S. When the U.S. abrogated that arms control treaty in 2002, the number of countries had grown to over 30 with many unfriendly to the United States. In addition, the United States found itself facing ballistic missile threats from countries such as Iran, North Korea and China that were not signatories to the ABM Treaty.

Missile defenses can protect against an accidental launch, can allow leaders more decision time to potentially de-escalate a crisis and they can make the success of a first strike by an enemy more uncertain. They can also be used to protect an offensive retaliatory capability, which again strengthens strategic deterrence.

President Reagan resisted strong pressure to put missile defenses "on the table" in his 1986 arms control talks with the Soviets at Reykjavik, Iceland. History has shown that this not only paved the way for the protection missile defenses provide today but was a significant factor in the demise of the Soviet empire.