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DENSE PACK:

A CRITIQUE AND AN ALTERNATIVE

by

ADAM M. GARFINKLE

The Department of Defense, under direction from the White House, has labored long to find a basing mode for the MX missile that is both militarily rational and politically possible. On 22 November, President Reagan submitted his latest, if not necessarily final, recommendation to Capitol Hill on MX basing, urging adoption of the "Dense Pack" basing plan.[1] Although Dense Pack has been strongly supported in some quarters, the President can be assured that when the Ninety-Eighth Congress convenes in January to consider his proposal, he is going to have a fight on his hands. There are many, both in Congress and elsewhere, who remain unconvinced that Dense Pack is a feasible solution to the problem of MX basing.

Dense Pack would concentrate the deployment of 100 MX missiles, each with 10 warheads, within a small space (10-20 square miles), so that the survival of a large number of them would be insured by the "fratricide" of incoming warheads. Fratricide is the hypothetical technical phenomenon wherein the detonation of one nuclear warhead disrupts its immediate successors to the extent that an attacker cannot be assured of a successful military mission, no matter how many reentry vehicles he commits to battle, because he cannot predict how many units of an attacking force will detonate near their targets. The Administration is also said to have considered protecting that narrow corridor through which Soviet warheads would have to come with endoatmospheric Ballistic Missile Defense.[2]

There is no lack of irony in the Reagan Administration's having offered Dense Pack as the answer to the "window of vulnerability" problem—a phrase coined during the SALT II debate to refer to the Soviet Union's hypothetical ability to destroy nearly all US land-based forces in a first strike and still have enough forces in reserve to either deter or answer effectively an American retaliation. In the first place, the MX missile was originally designed to combine a counterforce capability with some degree of mobility, but Dense Pack would make MX just another big blockbuster; there would be nothing mobile about it. It is also ironic that Dense Pack would not be nearly as intrusive environmentally as the Multiple Protective Shelter plan of the Carter Administration, an Administration that, as a rule, was more sensitive to environmental issues than any of its predecessors and was certainly far more so than the current Administration.

Perhaps the most hurtful irony, however, is that an Administration that rode into office on a wave of pro-defense sentiment, buoyed by the Iranian hostage crisis and the Soviet aggression in Afghanistan, may have frittered away through irresolution and internal squabbles the strong consensus that might have enabled it to actually close the so-called window of vulnerability. First, as a result of some ill-considered remarks,[3] the significant political capital that had been expended to assure congressional consent to the MPS system was squandered before either the President or the Secretary of Defense had in mind a reasonable alternative. Second, the Defense Department was so slow in developing alternatives that it was forced finally to suggest the interim basing of 40 MX missiles

in unprotected fixed silos.[4] When this interim scheme quite properly evoked numerous objections, the Administration promised to rectify the plan by superhardening the silos while it searched for a final solution.[5] Then, a short time later, the Administration reversed itself on the interim basing plan, deciding that it was not cost-effective to superharden fixed silos for the MX.[6]

This irresolution provoked the criticism of many who were otherwise inclined to support the Administration, including Dr. William R. Van Cleave, who was a prominent member of President Reagan's post-election transition team, and members of the Committee on the Present Danger, whose former Executive Director, Eugene V. Rostow, was taken into the Administration as the head of the Arms Control and Disarmament Agency.[7] For his trouble, Van Cleave was fired from ACDA's General Commission on Arms Control and Disarmament.[8] The Administration also encountered unexpected problems with the Congress. One of its most stalwart congressional allies, Republican Senator John Tower of Texas, the Chairman of the Senate Armed Services Committee, joined in an effort to block funds for the MX in order to force the Administration to reach a decision on a basing mode—an issue that the Administration itself had deliberately portrayed as being of immediate and vital concern to American national security.[9] This congressional pressure was, by the way, the most proximate origin of Dense Pack.

It has also bothered many that while the Administration still refuses to ratify SALT II, the President has nevertheless declared his intention to stick by the terms of the treaty *as long as the Soviets do*. Aside from the logical problem involved in refusing to sanction formally a treaty that is nevertheless deemed worth observing, there is the matter of the 250 systems that the Soviets would have to dismantle *in order to be in compliance* with the treaty. If anyone thinks the Soviets will dismantle 250 systems while the United States refuses to ratify the treaty, they had better think again. Additionally on the question of SALT II, the Administration has repeatedly made the point that the treaty has fatal flaws, without ever providing the American people with a more detailed critique. This failure to be more specific is not because such a critique is not possible. It may, instead, simply be the result of Administration principals' not being able to agree on what they dislike most about the treaty. Whatever the reason, this lack of explicitness represents yet another failure of the executive branch to fulfill its educational role in the field of national security—and this during the tenure of the "great communicator."

Having been caught unprepared and irresolute in the case of MX basing has cast a pall over the Administration's mastery of other security-related issues. The image of inconstancy, for example, has fed suppositions that Dense Pack is primarily a negotiating chip for START, and that its choice throughout most of 1982 has had more to do anyway with the concern of the Air Force that "Big Bird" would divert funds from other, more intriguing, projects in aeronautics and avionics.[10] This sort of speculation is, of course, endemic to the politics of arms control, but such conjectures have seemingly acquired some credibility if only because little else seems fixed or sure in the Administration's strategic policies.

Similar signs of hesitancy and confusion have been evident in the Administration's public diplomacy. The belatedness of reaction to the nuclear angst in Western Europe and its subsequent spillover into the United States put the Administration on the defensive. The President's speeches of 18

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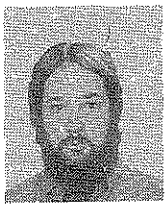

November 1981 on the intermediate nuclear force issue, and 9 May 1982 on START, both seemed pressed by the demands of public opinion and were, as a consequence, largely discounted as having been insincere.[11] This is unfortunate because, their imperfections notwithstanding, those speeches and the proposals they contained were *not* insincere. The failure of the Administration to order its policies on strategic affairs in a coherent fashion has also jeopardized somewhat its defense budget plans and, as a consequence, threatens its already modest bargaining leverage both in the Intermediate-Range Nuclear Force negotiations and in START.

Having blundered into a jam is no excuse, however, for trying to blunder out of one. While Dense Pack has certain advantages over other basing modes—Continuous Airborne Patrol, or Big Bird, for example—it would be by no means a perfect solution to the putative vulnerability of US counterforce-capable ICBMs to a Soviet first strike. It has many potentially serious flaws. Before giving it any further consideration as an MX basing mode—regardless of the immediate alternatives—the Administration and the Congress should carefully consider some of these problems.

DENSE PACK OR DUNCE PACK?

First, expert opinion is divided on whether "fratricide" is really the obstacle in fact that it is purported to be in theory. Fratricide is a technical supposition that is ultimately unprovable so long as atmospheric testing remains prohibited by the 1963 Test Ban Treaty. What can be learned from matched underground explosions is not insignificant, but neither is it sufficient. Of course, uncertainties of various sorts are often stabilizing characteristics within the mutual-hostage deterrence relationship because they make it impossible to blithely translate static indices of strategic power into operationally usable military force. Uncertainty about fratricide is stabilizing in this regard, however, only if the Soviets are swayed by its technical logic. Unfortunately, we do not know and probably cannot know for sure whether they are. We would thus be loading a judgmental uncertainty onto a technical uncertainty; the combination does not necessarily spell security.

Second, it may be possible for the Soviet Union to learn to concentrate enough throw-weight in one place simultaneously to render the fratricide problem irrelevant. To do so, of course, the Soviets would have to learn exquisite timing and master ballistic accuracies that are currently beyond the performance levels of their deployed weaponry. But weapon designers focus on such challenges, and weapon system lead times are such that today's operational hardware rarely reflects a nation's actual capability with regard to overcoming such technical problems. Would the Soviet task in overwhelming Dense Pack be greater than their task in overwhelming 200 MX missiles deployed in the Multiple Protective Shelter system? Would it be greater than their task in overwhelming 100 MX missiles deployed in a more limited MPS system, but protected with preferential Ballistic Missile Defense? The answers to such questions require highly sophisticated technical analysis, and this is not the place for it. One has to wonder, however, if such close comparative analyses have been made.

Third, it may be possible for the Soviet Union to conceive countermeasures to Dense Pack without having to achieve such refined timing and accuracy capabilities. The Dense Pack scenario calls for US ICBMs to be launched through the rubble after the detonation of Soviet warheads. At the very least, it might be possible for the Soviets to pin down the US retaliatory missiles for some time with graduated nuclear air bursts and the electromagnetic pulses they generate. The Soviets might also find a way to collapse the entire deployment area under the impact of a half dozen very large detonations. And, the Soviets might fix delayed fuses to their warheads, so that long after an initial attack, one nuclear warhead would detonate every few minutes in an irregular pattern (aptly enough, this countermeasure has been dubbed "popcorning"). As Strangelovian as

all of this may sound, it is not impossible. Besides, Strangelovian deployments naturally call forth Strangelovian responses.

Fourth, it may be possible to defeat the Dense Pack system without having to physically destroy MX missiles, by attacking US Command, Control, Communications, and Intelligence (C^3I) assets. The destruction of the C^3I system designed for MX, along with the possible destruction of US satellites entrusted with post-attack reconnaissance tasks, would render the assumed counterforce retaliatory capabilities of MX meaningless. We could not fire the missiles in a counterforce strike without the "connectivity" assured by C^3I; perhaps we could not fire them at all. Even if we could, only modest Soviet antisatellite capabilities could deny us the technical ability for post-attack target acquisition; we would not know what to shoot at. In all fairness, this is not a problem unique to the Dense Pack concept; it afflicts all would-be counterforce retaliatory systems. But if the concentration of missiles would suggest a concentration of C^3I assets as well, then these assets would become an even more inviting target than they already are.

Fifth, the concentration of US counterforce-capable ICBMs in such a small area might ease considerably Soviet intelligence tasks in information gathering, target acquisition, and post-attack reconnaissance. The concentration of MX in a small space could also increase the Soviet "footprint," which is jargon for the cumulative targets that can be attacked with a fixed number of weapons. The larger the footprint, the more cross-targetting is possible and the easier it is to adjust to missile launch failures, misses, and the intra-war retargetting of enemy assets. Putting so large a percentage of US counterforce-capable ICBMs in the same place, whether relatively far away from or near Soviet launch points, might simplify Soviet planning.

Sixth (and worse), the advantage to dispersing missiles far from one another is not only that it multiplies Soviet guidance and attack-coordination problems, but also that it reduces the possibility of a Soviet warhead missing its intended target and destroying another target by accident. With Dense Pack we take a Soviet shortcoming—inaccuracy—and make it much less important. Indeed, Dense Pack would *reward* the marginal inaccuracy of Soviet weapons.

Seventh, on a somewhat different level of analysis, Dense Pack might convince Soviet planners, especially in the midst of a serious international crisis, that a meaningful distinction could be drawn between counterforce and countervalue attacks on the United States. The Soviets might be so persuaded because it is possible to foresee very limited collateral damage to the degree that the target of attack is spatially limited. This point is important because the Soviets could justifiably have different expectations of a US response to a counterforce attack than to a countervalue attack. More specifically, Moscow might find it hard to believe that Washington would respond to a counterforce attack against MX with a countervalue retaliation. Such an expectation makes a counterforce attack just a bit more thinkable. The spatially limited target area provided by Dense Pack may be a marginal consideration, of course, because in a major damage-limiting attack against US forces the Soviet Union would also have to target Minuteman II and Minuteman III, as well as airfields capable of handling US manned bombers and other targets. But in a crisis, when the proclivity toward fuzzing the fine edges of deductive logic becomes pronounced, such marginal considerations can make all the difference. It is in the nature of crisis, after all, that people must take chances on the margins.

Indeed, it can be argued that the Soviets already make such a distinction between countervalue and counterforce attacks and that they see a real operational distinction between killing 10 million and 100 million Americans. This conclusion is implicit in much of the scenario-building that is used to suggest that the absence of US counterforce equity with the Soviet Union would lead to US surrender after a Soviet counterforce first strike. The argument is that an American President would balk for fear that American cities would be attacked if US forces

retaliated in a countervalue strike (probably the *only* option left to us given the vulnerabilities of our satellites and C³I systems).

The Soviets often go to great pains in both public and private forums, however, to deny that they entertain such distinctions. They disclaim altogether the possibility of fighting either limited or controlled nuclear wars (and the two, by the way, are not the same thing).[12] Are they dissimulating, or do they genuinely believe what they say? More to the point, are such sentiments held by those in the Soviet Union who have ultimate control of Soviet military forces? Unfortunately, these are questions without sure answers. It could be that these issues are contentious within the Soviet Union, as they are within the United States. By deploying Dense Pack, could we not be influencing this debate in a direction that we might one day regret? This question might be worth some thought.

Finally, another marginal consideration. We have had some bad luck with Titan missile silos as they have aged; more than one accident has reminded us that no machine retains its technical luster forever. Concentrating 100 missiles in a 10-20 square mile area, no matter how well protected against accident, invariably raises the risks of a spillover should there be a serious mishap in a silo. Worse, such accidents are most likely to occur just when one needs the silos most—while under attack.

DOCTRINE AND PRAXIS

I have raised three general objections to the Dense Pack basing mode for the MX missile: (1) the technical phenomenon upon which the concept is based is unproven, and its possible effectiveness is subject to countermeasures; (2) the concentration of US land-based counterforce ballistic systems may ease a variety of Soviet planning, evaluation, and intelligence tasks; and (3) the strict spatial limitations of Dense Pack might strengthen a Soviet conviction that a distinction between counterforce and countervalue strikes on the United States is strategically meaningful, particularly insofar as the Soviet expectation of US response is concerned.

Taken together, these difficulties make Dense Pack a dubious contribution to the development of capabilities to fight a controlled, protracted nuclear war. Dense Pack, that is, flies in the face of the Administration's own doctrinal urges.[13] Perhaps this is for the best; many reputable analysts decry any movement toward a merger of assured-destruction and warfighting concepts of deterrence for fear that such a merger would make war more thinkable and therefore more probable. It is more likely, however, that the effort to compose a rational balance between the assured-destruction and warfighting approaches to deterrence is both wise and technologically inescapable. The problem lies less with the evolution of the operational definition of deterrence than with Dense Pack as a method for achieving it.

Such arguments aside, there is a more serious and enduring problem here, and that is the dissociation of doctrine from capabilities. When PD-59 was unveiled during the Carter presidency, many critics despaired over the unwisdom of announcing a doctrine that one lacked the forces to implement.[14] Recent Defense Department statements on protracted nuclear war commit this same sin in spades.[15] Even granting, for the sake of argument, the intellectual validity of the warfighting approach to deterrence, there is no good purpose served by blowing forth such grotesque rhetoric in public, years before we can purchase the operational capability to implement such a doctrine. In the face of a rekindled and socially powerful anxiety about nuclear war—and Soviet advantages in most static indices of strategic power—this is surely jousting with neither shield nor lance.

What are the consequences of making doctrinal statements that cannot be enforced and suggesting basing modes for weapon systems that cannot, in their technics if not in their strategic logic, gird that doctrine with credibility? Aside from the Administration's making itself look foolish, we may find ourselves gazing through our "window of

vulnerability" at the worst of all possible worlds. We may end up with new first-strike-capable systems before we have a basing mode that can assure their survivability. The arguments for basing MX, as an "interim" solution, in unprotected fixed silos may very well return to haunt us, particularly if enough Senators and Congressmen appreciate the frailties of Dense Pack, note the haste with which it was flung upon them, and have been presented with no feasible alternative permanent basing mode. Fixed-silo basing of MX could turn from an interim solution into a permanent solution by default. If it did, the Soviet incentive to preempt in a crisis to destroy MX would be raised.

Meanwhile, the state of the art in command, control, and communications, though improving, is still such that we could not realistically contemplate the phased, staggered use of MX or Minuteman in a nuclear war even if they were based in a survivable mode.[16] Together, the heightened threat of losing MX missiles to a Soviet strike and the inability to employ them in any militarily rational way suggest two very unpleasant options: either a quick spasmodic countervalue retaliatory launch or an operational policy of launch-on-warning.[17] Both would likely touch off the worst possible consequences of a nuclear exchange—the destruction of American society.

This bleak prospect is not the fault of Dense Pack, to be sure. But the choice of Dense Pack as the basing method for MX might deepen the problem rather than solve it if that choice were then to lead to an endless extension of "interim" solutions. So what is to be done? Let us assume that the United States requires for security and crisis stability a *counterforce* retaliatory ICBM in a survivable basing mode. In other words, let us grant that countervalue overkill just isn't enough anymore, if it ever was, to deter an attack on the United States in an intense international crisis, when such an attack is most likely.[18] Let us also acknowledge that, practically, the MX missile is the most likely candidate to fulfill the mission of a land-based counterforce weapon.[19] (Indeed, the only other possibility is to reopen the Minuteman III production line and redesign the system to adapt it to new basing concepts, but this alternative seems politically remote.)

What is the fundamental requisite of a militarily sensible basing mode for MX? This requisite is obvious given the task assigned to the MX in current, post PD-59 US strategic doctrine: the system must be capable of riding out a major Soviet "damage-limiting" attack and still be able to inflict sufficient damage on the Soviet Union in a mixed counterforce/countervalue attack so that the Soviets could not hope to gain a military advantage by striking first. What is more, the system must be designed not only to accomplish this task technically but also to convince *Soviet* planners of its real capacity for foiling Soviet plans.

In addition, a basing mode should complicate, not simplify, Soviet targetting, coordination, and intelligence tasks. It should also be technically compatible with future C^3I advances that might allow the addition of options to current operational plans. And, ideally, its logic should be such that the most plausible Soviet responses not be ones that emphasize more and still larger fixed land-based ballistic systems. A final requirement is that the basing mode not make arms control agreements impossible. What, then, are the options?

WHERE TO PUT MX

It is worth pointing out, first of all, that the Multiple Protective Shelter system proposed by the Carter Administration to deploy 200 MX missiles, contrary to accepted wisdom in some quarters, did not meet the requirement of survivability. The Carter MPS plan was designed to exact such a ratio of offensive forces to targets (at least 23 to 1) that the Soviet Union would be unable to deliver offensive firepower sufficient to saturate, and thus defeat, the system. It was seen early on, however, that this scheme could not be justified solely on technical merit. True, it would have cost the Soviets more to produce additional reentry vehicles than it would have cost us to produce mostly empty concrete shelters, but the Soviets do

have the missile throw-weight and doctrinal proclivity to pay even a very high price to keep US ICBMs in jeopardy. The MPS plan would have generated a limited US victory in the battle of technical and financial one-upmanship, an ever-present shadow of the strategic competition, but it would hardly have solved the vulnerability problem, except perhaps temporarily.

The Carter Administration felt constrained, therefore, to justify the MPS system in a broader context, that being SALT II. Administration witnesses and others who supported SALT II argued repeatedly—and erroneously—that the MIRV ceilings and fractionation[20] limits in Article IV, paragraph 2, and in Article V, paragraphs 1 and 2, of the treaty would limit Soviet offensive potential to a level *below* that required to defeat MPS.[21] But what was conveniently forgotten was that the initial operational date for MX was not until 1986 under the best of conditions, and the SALT II Treaty was slated to expire in 1985![22] Thus, unless the fractionation limits on Soviet systems could be bought anew by US negotiators in SALT III, they would not prevent the Soviets from neutralizing MX even before it was fully deployed by, say, 1989. Given the balance of negotiating assets likely to obtain in SALT III, even as could be foreseen in 1979, it was not at all obvious that US negotiators would be able to persuade their Soviet counterparts to extend the fractionation limits and MIRVed launcher ceilings, except by trading other US assets such as Trident submarines or cruise missiles, systems not insignificant to us in their own right.

So, MPS was flawed. Various suggestions about basing MX at sea, either in shallow coastal submarines or on surface ships, have interested many but, on closer inspection, they have been found to introduce additional connectivity problems without offering any advantages in survivability.[23] Sea-based platforms also are more problematic than land-based when it comes to counterforce accuracy requirements. Suggestions to base MX in deep silos, superhardened to around 5000 psi, ran into imponderable technical obstacles. The Big Bird concept apparently preferred by Secretary Weinberger, involving revolutionary new aircraft in continuous flight in irregular patterns over the world's oceans, has one possible advantage: even failed Soviet attempts to target Big Bird would not result in nuclear explosions on American soil. But there appear to be serious connectivity problems with Big Bird, and, moreover, the entire concept relies on a new avionics technology that is unproven. Big Bird could also be targetted, and perhaps destroyed, with conventional ordnance, making the targetting of it a much less politically risky endeavor by most measures. Beyond that, there is the commonsense objection that what goes up sometimes has a disturbing tendency to come down at times and places human beings cannot choose. Finally, any attempt to eschew a land-based solution for MX is likely to undercut support among our friends in Western Europe to deploy the Pershing II and ground-launched cruise missiles agreed upon in December 1979.

Two other suggestions, which make a certain amount of military sense, are unfortunately either politically or financially impossible to implement at present. One is the scheme to deploy fewer—and even smaller—MX missiles in an MPS mode but with preferential Ballistic Missile Defense. The synergistic marriage of BMD and deceptive basing is affordable, and it would assure enough uncertainty about the number and location of US missiles to effectively foil Soviet attempts to defeat the system.[24] But this system would probably require abrogation or renegotiation of the ABM Treaty of 1972, and neither the Administration nor the Congress appears to be prone to seriously contemplate such a course.[25] Ultimately, the combination of deceptive basing, limited mobility, and active defense is likely to be the most effective method of insuring the survivability of land-based systems.

The other suggestion, to build a large number of mobile Small Intercontinental Ballistic Missiles (SICMs) that are not MIRVed, again makes a certain amount of military sense.[26] Because the ratio of US

warheads to launchers rises proportionately as MIRV fractionation increases (putting our eggs into fewer baskets), it becomes possible to destroy with a preemptive strike a large percentage of our raw strategic power by attacking a much smaller number of targets. The SICM idea reverses this proportionality to the point where the ratio of attacking warheads to targetted warheads is, at worst, one to one. With mobility introduced, the ratio required would jump to four or five to one.

But there are at least four practical problems with this notion of deploying a Small Intercontinental Ballistic Missile—sometimes called Midgetman. First, the military service bureaucracies are bound to strongly oppose abandoning MX, and they could argue that moving to a new missile would cause an unacceptable delay in solving our main problem. They could also protest to a budget-conscious Congress that it does not make much sense to throw away the money already spent on MX, around $5 billion, which is, after all, a considerable sum.[27]

Second, such a system, like any mobile system, might very well pose insurmountable obstacles for arms control verification. While the naive and unrealistic expectations of what SALT could accomplish have fallen victim to our experience with Soviet obduracy, there is still a genuine consensus, even within the Reagan Administration, that arms control can be worthwhile as a supplement to US national security policy, and that nothing should be done to make effective agreements impossible. Fully mobile systems are therefore still anathema.

Moreover, deploying a large number of SICMs also implies that for SALT—or START—to remain possible, a measure of strategic power other than launchers has to be found; otherwise, the United States would be well over any imaginable ceiling, and yet still not necessarily have anywhere near the same amount of deliverable megatonnage that the Soviet Union can load on its enormous SS-17s, SS-18s, and SS-19s. And it is by no means certain, of course, that US and Soviet negotiators would be able to arrive at a new measure.

The fourth problem is that, SALT or no SALT, it would cost much more to maintain essential equivalence by using non-MIRVed systems than MIRVed systems. Assuming that the USSR will not be easily convinced to give up its MIRVs, and noting the perennial difficulties of adequately funding defense in an age of economic irregularity, the SICM scheme might break the bank.[28]

ROUNDHOUSE

Is there any way out of this mess? Perhaps not. But at the risk of confusing further an already confused issue, I would forward an unrefined but perhaps interesting suggestion. What we need for the sake of stable deterrence and essential equivalence in the counterforce age is a way to make MX (and Minuteman III) nonprovocative, unambiguously survivable, and capable of counterforce retaliation all at the same time. We also need to preserve one last chance for effective arms control; therefore, fully mobile systems are out.

To accomplish the task of making MX nonprovocative, we need to invest, visibly and heavily, in a basing scheme that makes it clear that we intend MX as a second-strike, not a first-strike, weapon. In the mutual assessment game that lies at the heart of strategic interactions, one way to signal intent is to spend resources.[29] This is yet another reason why putting MX in unprotected fixed silos is bad; it is also why the nature of Soviet ICBM deployment is bad.

To insure survivability, we need more than just a favorable ratio of US launchers to Soviet reentry vehicles, lest we still run the risk of being forced into a launch-on-warning policy by dint of future Soviet deployments. For survivability's sake, we need limited mobility in an age of increasing missile accuracies. Ideally, we need to be able to move MX and Minuteman III ICBMs out of harm's way *without* having to fire them and *without* proliferating a large fixed number of aimpoints (as MPS would) that would only induce the Soviet Union to build still larger missiles and more warheads. But though we need to move the missiles, we need to do it in

such a way that the number of missiles can be counted by Soviet national technical means, this to insure the possibility of arms control verification. We can't, therefore, move them just anywhere. What sort of Rube Goldberg contrivance can satisfy all these requirements?

In Roanoke, Virginia, and elsewhere in the South, the Norfolk and Western Railroad Company used to operate what were known as roundhouses, circular buildings housing huge cantilevered rotating wooden platforms that could redirect a locomotive from one track onto any of dozens of others. Some of these roundhouses date from the turn of the century and still work tolerably well. Only a modest technical knowledge of strategic systems is enough to convince even a timid futurist that building such a platform for an ICBM is not beyond the realm of the possible. Let us call this, in proper defense community parlance, an Omnidirectional Dash Dispersal System, or Roundhouse, for short.

The idea in its simplest form is to build a basing mode, with an operational silo near the center, capable of moving one or more missiles—possibly by rail—fast and far enough away from accurate incoming reentry vehicles that a Soviet planner could have no surety of hitting them. It would probably be necessary for the missiles to travel under a protective shell. The potential number of new locations for the missile should approach infinity, so that the system could not be saturated or outwitted; the omnidirectional nature of the system would assure this. Also, it would be necessary to be able to reload the missile in a radiologically contaminated environment for firing in a counterforce mode within a reasonably brief period of time, certainly less than 10 hours, that being the approximate flight time of a cruise missile. The advantages of such a system over MPS are as follows: (1) omnidirectional dispersal potential would make it almost impossible to saturate the system because aimpoints would not be fixed; (2) except in a crisis, the missiles would not have to be moved, thus simplifying arms control verification and reducing costs; and (3) Soviet inability to saturate the system would remove pressure to consider launch-on-warning or launch-under-attack policies, which probably would have been necessary in the end to maintain the credibility of the MPS system.

The Roundhouse idea needs considerable refinement and work, to be sure. Together with cold-launch techniques[30] and preferential BMD, Roundhouse could perhaps be developed eventually into a militarily effective, environmentally acceptable, and affordable solution to our troubles. Moreover, only if the United States can make its land-based strategic forces unambiguously survivable—or as near to it as possible—will the Soviet Union be likely to consider negotiated reductions of its own counterforce ballistic land-based forces, for then they would be deprived of a plausible target set and would be rendered vulnerable themselves.

Having to take time to consider yet another deployment scheme for MX is regrettable, but it serves no good purpose to deploy MX in an ineffective, or worse, a provocative way. Roundhouse is, at least potentially, both militarily sensible and politically feasible. It might also conduce to meaningful arms control. The same cannot so easily be said for Dense Pack.

NOTES

1. Lou Cannon, "Reagan Urges MX 'Dense Pack' in Wyoming," *The Washington Post*, 23 November 1982, p. 1; and Richard Halloran, "Reagan Urges Congress to Weigh MX Missile Plan With Sympathy," *The New York Times*, 23 November 1982, p. 1.

2. Charles Corddry, "Reagan Approves MX Basing," *The Sun* (Baltimore), 19 May 1982, p. 1.

3. See, for example, "Environmentalist Action May Slow MX Basing," *Aviation Week and Space Technology*, 9 February 1981, p. 27.

4. This announcement was made in October 1981.

5. See "2 Weapons Facing Capitol Questions," *The New York Times*, 1 November 1981, p. 1.

6. See Tom Wicker, "A Switch For the MX," *The New York Times*, 19 February 1982, p. A31; Bernard Weinraub, "MX Deadline Raises Host of Questions," *The New York Times*, 16 May 1982, p. E3; and Steven R. Weisman, "Reagan Abandons Plan to Reinforce First 40 MX Silos," *The New York Times*, 12 February 1982, p. A1.

7. See "Is the Reagan Defense Program Adequate?" Committee on the Present Danger, Washington, D.C., 17 March 1982.

8. See Michael Getler, "Panel Says Ex-Member Reagan Fails to Bolster Defense," *The Washington Post*, 18 March 1982, p. A9.

9. Steven V. Roberts, "Senators Reject Plan for Placing MX Missiles in Silos," *The New York Times*, 3 December 1981, p. A1.

10. "Weinberger Reviving a Committee to Study MX Missile Cluster Plan," *The New York Times*, 26 May 1982, p. A6.

11. For one example, see Laurens Hogebrink, "The Arms Control Tricks of 1982," *Disarmament Campaign*, 19 March 1982, pp. 5-6.

12. At least hypothetically, it is possible for a nuclear war to be controlled without being ultimately limited and it is certainly possible for a nuclear war to be limited without being very well controlled.

13. See Richard Halloran, "Pentagon Draws Up First Strategy For Fighting a Long Nuclear War," *The New York Times*, 30 May 1982, p. 1.

14. See, for example, Colin S. Gray, "Presidential Directive 59: Flawed But Useful," *Parameters*, 11 (March 1981), 32.

15. Halloran, "Pentagon Draws Up First Strategy," p. 1.

16. See Gray; also see Desmond Ball, "Can Nuclear War Be Controlled?" Adelphi Paper, No. 169 (London: International Institute for Strategic Studies, Autumn 1981).

17. But some people are now *advocating* launch-on-warning postures. This is a sign of the times. See Blair Stewart, "Question for Strategic Modernization: Why 'Ride Out' A Soviet Attack?" *Strategic Review*, 10 (Spring 1982), 44-52.

18. See here Alexander M. Haig, Jr., "Judging SALT II," *Strategic Review*, 8 (Winter 1980), 11-17.

19. I am aware that some argue that MX is unnecessary because the Trident II program will give us a counterforce-capable system with roughly the same initial operational date in an inherently more survivable basing mode. But questions remain about the relative accuracies of ICBMs as against SLBMs, about submarine survivability, about connectivity problems with submarines, and about the greater dependency of SLBMs on exoatmospheric guidance systems that may be vulnerable to Soviet antisatellite warfare programs. Given a choice, I would prefer to have *both* sea-based and land-based counterforce-capable systems; fewer of each would then be required to cover a particular target set.

20. The term "fractionation" refers to the process of increasing the number of reentry vehicles carried by a missile (either MIRVing a missile that carries only one warhead or increasing the number of warheads on a missile that has already been MIRVed.

21. See, for example, the official statement of Ambassador Paul Warnke in US Congress, Senate, Committee on Foreign Relations, *The SALT II Treaty, Hearings*, 96th Congress (Washington: GPO, 1979), part II, p. 24.

22. The only Senators that bothered to make this important, elementary point were Senators Jackson, Tower, and Nunn. See US Congress, Senate, Committee on Armed Services, *Military Implications of the Treaty on the Limitation of Strategic Offensive Arms and Protocol Thereto (SALT II Treaty), Hearings*, 96th Congress (Washington: GPO, 1979), part II, pp. 511, 529, and 531.

23. For one description of a sea-based alternative, see John E. Draim, "More MX Missiles Out to Sea," *National Review*, 12 December 1980, pp. 1500-02.

24. See Raymond E. Starsman, "Ballistic Missile Defense and Deceptive Basing: A New Calculus for the Defense of ICBMs," National Defense University, Monograph 81-1, 1981.

25. Suggestions that such courage should be mustered are beginning to be heard more loudly. See, for example, Colin S. Gray, "A New Debate on Ballistic Missile Defense," *Survival*, 23 (March-April 1981), 60-71.

26. See Joseph Kruzel, "Scrap the MX and get on with a SICM," *The Christian Science Monitor*, 16 March 1982, p. 26.

27. See Lawrence J. Korb, "The FY 1981-1985 Defense Program: Issues and Trends," *AEI Foreign Policy and Defense Review*, 2 (July 1980), 18.

28. Cost is, in fact, the reason the SICM idea was rejected in the Defense Department. See "MX Basing: Key to Minimizing Risk of Nuclear War," *Defense Electronics* (November 1981), p. 79.

29. See Robert Jervis, *The Logic of Images in International Relations* (Princeton, N.J.: Princeton Univ. Press, 1969).

30. Cold-launch techniques would enable the MX to be launched from a theoretically infinite number of locations in the dispersal pattern rather than necessarily from the centrally located silo. Cold launch would not only considerably reduce the vulnerability of the system, which otherwise would be wholly dependent on the use of the operational silo, but it would further insure the ability to launch an MX counterstrike within 10 hours (if it were to take longer, the counterstrike could just as well be delivered by cruise missiles).