PART 3

SOME GLOBAL ISSUES OF IMPORTANCE FOR AUSTRALIA

CHAPTER 11

STRATEGIC DEFENCES AND THE ABM TREATY

Introduction

11.1 At its most basic level, stable deterrence is dependent on both superpowers being able to maintain long-range retaliatory nuclear forces that can survive the worst conceivable enemy attack and still cause massive destruction in the attacker's own country. The maintenance of a mutual hostage relationship, or a condition of mutual assured destruction (MAD), is central to the doctrine of minimum deterrence and remains an important factor - some would suggest the overwhelming factor - in the 'countervailing' theory of deterrence on which the current U.S. strategic doctrine and its Soviet counterpart are based (see Chapter 4). A condition of mutual vulnerability at the strategic level is stabilising because there is no guarantee that a military conflict between the superpowers would not get out of control and escalate to an all-out exchange. Faced with this prospect, the superpowers tend to operate very cautiously with each other, particularly in a crisis.

11.2 The condition of mutual vulnerability is enshrined in the 1972 ABM Treaty, and its 1974 Protocol. The ABM Treaty prohibits the deployment of ABM systems (or their components) for the defence of the whole territory of the United States and the Soviet Union or of an individual region except as expressly permitted. The original treaty limited ABM deployments to two areas in each country - one for the defence of the national capital and the other for the defence of an ICBM site - where no more than 100 ABM launchers and 100 ABM interceptor missiles may be deployed in each area. The 1974 Protocol reduced the permitted deployments to a single area.[1] The ABM Treaty underlies the SALT I and SALT II agreements which place a cap on the size of the strategic arsenals of the two superpowers and so place a quantitative restraint on the arms competition.

11.3 The stability that the situation of mutual vulnerability engenders would be reduced if one superpower only developed the capacity to protect itself against a nuclear attack, or the capability to attack and destroy the retaliatory forces of its opponent. Either of these actions would erode the assured destruction capability of the adversary and undermine mutual deterrence by creating the possibility of a successful first strike. Any unilateral deployment or component testing of extended defence against nuclear attack would also amount to a rejection of the ABM Treaty and the assumptions on which it is based. It would thus be tantamount to a rejection of the arms control process, and would have a significant impact on the arms competition and on the U.S.-Soviet relationship generally.

11.4 While neither superpower is currently able to completely threaten the assured destruction capability of its opponent, there are developments in hand which may threaten the continued viability of mutual deterrence in the longer term. For some time now both the United States and the Soviet Union have pursued the development of technologies for potential use in

ballistic missile defence. The most recent and controversial example of this is the United States Strategic Defense Initiative (SDI) which is a comprehensive research program designed to investigate the feasibility of effective defences against ballistic missile attack. The SDI program, together with its principal implications for strategic stability and arms control, are discussed in the following chapter.

11.5 An important rationale for the SDI program is the belief on the part of the United States that the Soviet Union maintains a considerable advantage in most areas of strategic defence. In an official U.S. publication Soviet Strategic Defense Programs, it claims, for example, that:

> Soviet efforts in most phases of strategic defense have long been far more extensive than those of the United States. The USSR has major passive defense programs, designed to protect important assets from attack. It also has extensive active defense systems to protect national territory, military forces, or key assets.[2]

11.6 Soviet 'active defences' are said to include air defence, ballistic missile defence 'based on current technologies', and research and development on advanced defences against ballistic missiles. The Americans claim that some of the recent Soviet developments are contravening the 1972 ABM Treaty and that the overall advances in Soviet strategic defences, coupled with continued advances in offensive weapons and technologies, pose a serious threat to U.S. security.

> Soviet offensive forces are designed to be able to limit severely U.S. and allied capability to retaliate against attack. Soviet defensive systems in turn are designed to prevent those retaliatory forces which did survive an attack from destroying Soviet targets.
>
> Given the long-term trend in Soviet offensive and defensive force developments, the United States must act ... to maintain security and stability both in the near term and in the future.[3]

11.7 The Soviet Union, on the other hand, whilst not denying its own defence research, does not accept that it has a significant lead in these areas and views recent U.S. developments in defence technologies, and in particular the establishment of the SDI program, as part of an American attempt to achieve military superiority over the Soviet Union, including the option of being able to deliver a first strike against Soviet strategic nuclear forces.

Air Defence

11.8 Official U.S. sources claim that the Soviet Union has deployed:

> ...numerous strategic air defence systems with excellent capabilities against aircraft flying at medium and high altitudes. They are now in the midst of a major program to improve their capabilities against aircraft and cruise missiles that fly at low altitudes. That effort includes partial integration of strategic and tactical air defenses, the upgrading of early warning and surveillance capabilities, the deployment of more efficient data transmission systems, and the development and initial deployment of new aircraft, associated air-to-air missiles, surface-to-air missiles, and airborne warning and control system (AWACS) aircraft.[4]

The Soviet Union is said to have nearly 12 000 SAM launchers at over 1 200 sites, 10 000 air defence radars and more than 1 200 interceptor aircraft dedicated to strategic defence. The Soviet surveillance and early warning systems now link into similar systems deployed by its Warsaw Pact allies. Its forces are being progressively modernised and extended, new interceptor aircraft - MiG-31 Foxhound, MiG-29 Fulcron and the Su-27 Flanker - are being deployed, and a range of new air-to-air and surface-to-air missiles developed. The same source asserts that the United States has only some 300 interceptor aircraft based in the U.S. dedicated to strategic defence, 118 strategic air defence warning radars, and no operational strategic surface-to-air missile launchers.[5] Unlike the United States, the Soviet Union does not publish details about its military forces or capabilities and so it is difficult to be certain about the accuracy of these claims, although overall, the numbers of Soviet missiles and other weapons systems quoted by official U.S. sources are generally consistent with those published by both SIPRI and the International Institute for Strategic Studies.

11.9 While these figures demonstrate a considerable difference between the strategic air defence capabilities of the two superpowers, this difference should be measured against the threat faced by each side. At present, the Soviet strategic bomber fleet comprises 143 aircraft capable of delivering less than 10 per cent of its total number of strategic warheads. The Soviet Union is reported to be developing a new strategic bomber, which would be similar to the American B-1 and may be deployed towards the end of the decade, and it is deploying a long-range, air-launched cruise missile. It could also use its medium-range Backfire bombers to attack the United States although it is generally thought that these aircraft would be used principally in support of regional operations.

11.10 The United States has some 240 long-range bombers capable of delivering around one third of its total number of strategic warheads. Nearly two thirds of the U.S. B-52 bombers are equipped with air-launched cruise missiles and this proportion is being increased. The United States is soon to begin production of its B-1B strategic bomber and it intends to deploy an Advanced Technology Bomber (or 'stealth' bomber) by the 1990s. In addition to these forces, the Soviet Union is confronted by medium-range and tactical nuclear and nuclear-capable aircraft located in Europe and China and on aircraft carriers located in the surrounding oceans and seas.

11.11 While the U.S. continental air defence system is not as complete as that of the Soviet Union, it is still reasonably extensive. It is made up of three interlocking radar and early warning systems which operate under the control of the North American Air Defense Command (NORAD) in Cheyenne Mountain, Colorado. These systems are:

a. Distant Early Warning (DEW) line consisting of a chain of more than thirty radar stations stretching across northern Alaska and Canada. The DEW line was established in the mid-1950s and is being replaced by modern microwave radars.

b. CADIN-Pinetree network of radar stations located just north of the United States-Canadian border. It was built at the same time as the DEW line and is jointly operated by the United States Air Force and Canada. The network is to be phased out once the other developments in strategic surveillance systems have been completed.

c. 414L System , currently comprising two over-the-horizon radars located in Maine and providing sector coverage to a range of 3 800 km. The United States is planning to deploy eight over-the-horizon radars for all-altitude surveillance of the eastern, western, and southern approaches to the continental United States.[6]

11.12 NORAD, supported by AWACS aircraft, also controls U.S. and Canadian interceptor forces which maintain a continuous ground alert at sites around the periphery of the 48 contiguous states, in Alaska, and in Canada. The interceptor squadrons in the United States are being equipped with F-15 and F-16 aircraft while the Canadians are upgrading their air defence forces with the F-18.

Ballistic Missile Defence (BMD)

11.13 The essential elements of any ballistic missile defence (BMD) system are target detection, tracking and

destruction systems. Both the United States and the Soviet Union deploy extensive ballistic missile early-warning and surveillance systems, utilising both ground and space-based technologies. At present only the Soviet Union has an operational anti-ballistic missile (ABM) weapons system. Both superpowers are spending considerable resources on research into all elements of BMD including new concepts to be employed in space-based ABM systems.

Soviet BMD

11.14 The Soviet Union uses satellites and ground-based radars to provide early warning of an American ballistic missile attack. The latter systems comprise over-the-horizon radars - which provide some 30 minutes warning - and a series of large phased-array radars located around the periphery of the Soviet Union. These radars can distinguish the size of a missile attack, confirm the initial warning given by satellite and over-the-horizon radar systems, and provide target tracking data in support of ABM forces. The ground-based radars are being modernised and upgraded to provide 360 degree coverage.

11.15 The anti-ballistic missile system currently deployed by the Soviet Union is permitted under the terms of the 1972 ABM Treaty. It is located around Moscow and is being upgraded. According to the U.S. publication, Soviet Strategic Defense Programs, when completed, the modernised ABM system will be:

> ...a two-layer defense composed of: silo-based, long-range, modified GALOSH interceptors; silo-based, high acceleration interceptors designed to engage targets within the atmosphere; associated engagement and guidance radars; and a new large radar at Pushkino designed to control ABM engagements. The silo-based launchers may be reloadable. The new system will have 100 ABM launchers permitted by the ABM Treaty and could be fully operational by 1987.[7]

11.16 The United States' concern over Soviet ABM capabilities appears to relate not so much to the existing deployments, which are generally allowed under various treaty provisions, but to the potential advantages these developments could provide in the future.

> The growing Soviet network of large phased-array ballistic missile detection and tracking radars...is of particular concern when linked with other Soviet ABM efforts. Such radars take years to construct; their existence might allow the Soviet Union to move rather quickly to construct a nationwide ABM defense if it chooses to do so. The Soviets are also developing components of a new ABM system which apparently are designed to allow

them to construct individual ABM sites in a matter of months, rather than the years that are required for more traditional ABM systems... We estimate that by using these components, the Soviets could undertake rapidly-paced ABM deployments to strengthen the defenses of Moscow and defend the targets in the western USSR and east of the Urals by the early 1990s.[8]

The same document concluded that:

Taken together, all of the Soviet Union's ABM and ABM-related activities are more significant - and more ominous - than any one considered individually. Cumulatively, they suggest that the USSR may be preparing an ABM defense of its national territory.[9]

11.17 The United States is also worried about Soviet research into advanced technologies that could be applied to ballistic missile defence. The research includes:

a. **Laser Weapons.** The Soviet Union has long engaged in research into laser technologies including lasers that have potential weapons applications. According to the Soviet Strategic Defense Programs the Soviet Union has progressed in some cases beyond technology research.

It already has ground-based lasers that could be used to interfere with U.S. satellites and could have prototype space-based antisatellites, laser weapons by the end of the decade. The Soviet could have prototypes for ground-based lasers for defence against ballistic missiles by the late 1980s, and could begin testing components for a large-scale deployment system in the early 1990s.[10]

b. **Directed energy weapons.** The Soviet Union has also engaged in research into directed energy weapons, such as particle beam and kinetic energy weapons, which could be deployed against satellites or ballistic missiles. Official U.S. sources claim that:

Long-range, space-based kinetic energy systems for defense against ballistic missiles probably could not be developed until the mid 1990s or even later. The USSR could, however, deploy in the near-term a short-range, space-based system useful for satellite or space station defence or for close-in attack by a manoeuvring satellite.[11]

c. **Antisatellite (ASAT) weapons.** As described shortly, the Soviet Union has an operational antisatellite system which enters into the same orbit as its target satellite and when it gets close enough, destroys the satellite by exploding a conventional warhead. At present, the Soviet ASAT does not pose a significant threat to U.S. satellite capabilities, nor would it be very effective in a BMD role.

United States BMD

11.18 The United States has very similar ballistic missile early warning and attack assessment systems to those of the Soviet Union. They include DSP early warning satellites, described in detail in Chapter 15, and a range of ground, air and sea-based radar systems.[12] These include:

a. **Pave Paws.** Phased array radar stations located in Massachusetts and California designed to detect and track SLBMs launched from the Pacific, Atlantic or the Gulf of Mexico;

b. **Ballistic Missile Early Warning System (BMEWS).** Phased array radar systems located in Alaska, Greenland and the United Kingdom. These are being upgraded with systems similar to Pave Paws;

c. **Perimeter Acquisition Radar Attack Characterization System (PARCS).** Radar station located in North Dakota designed to track multiple reentry vehicles and project their ranges, and impact points;

d. **FPS-85.** A converted space-tracking radar for ground-based coverage of SLBMs launched from the Gulf of Mexico or Caribbean regions;

e. **Cobra Series.** Ground and sea based radar systems used primarily for monitoring Soviet missile tests but they can equally be used to supplement early warning and attack assessment. They include Cobra Dane located in Alaska, and Cobra Judy which is a smaller floating version of Cobra Dane used on board Navy vessels; and

f. **Over-the-horizon radar.** One system is presently being tested in Maine.

11.19 The ground-based radars are being upgraded or expanded to eliminate any conceivable gaps in coverage or insufficient attack assessment processing.[13] The upgrading includes two additional Pave Paws radars, extra over-the-horizon radars, and

an extension to the range of PARCS. The various early warning systems operate under the centralised control of the North American Air Defence Command (NORAD) and provide data simultaneously to the other principal National Command Authority (NCA) centres - the National Military Command Centre (NMCC) in the Pentagon, the Alternate (NMCC) in Pennsylvania, and the Strategic Air Command (SAC) in Nebraska.

11.20 Like the Soviet Union, the United States has worked on anti-ballistic missile (ABM) since the early 1950s. In 1967, the then Secretary of Defense, Robert McNamara, announced a decision to deploy an 'area' defensive system designed to protect U.S. cities against Soviet missile attack. Codenamed 'Sentinel', the proposed system grew out of the U.S. Army's Nike-Zeus and Nike-X programs of the late 1950s and early 1960s. It was to be a 'layered' ABM defence, employing two types of nuclear-armed missiles: the long-range Spartan, which would intercept incoming warheads before they entered the atmosphere; and the Sprint, an interceptor which would destroy those warheads that successfully penetrated the first layer of defence. Several types of radar were to perform the tasks of identifying and tracking incoming warheads and guiding the interceptors to their targets.

11.21 The Sentinel decision raised controversy within the United States with critics arguing that the ABM system was technically very difficult to perfect and that it would be overwhelmed by increases in offensive forces. In addition, it was argued that the Sentinel - or the Soviet Galosh - system employed in large numbers would be destabilising since they undermined mutual assured destruction.

11.22 In light of the continued debate over ABM, the Nixon Administration re-oriented the Sentinel program from city-defence toward the defence of ICBM forces. This system, renamed 'Safeguard', continued to be subject to considerable controversy. It was further reduced in line with the provisions of the 1972 ABM Treaty and its 1974 Protocol which limited U.S. and Soviet ABM deployments to a single site consisting of no more than 100 launchers and 100 interceptors. The United States placed its ABM system around an ICBM base at Grand Forks, North Dakota. The system remained deployed until 1976 when it was closed down largely because it was felt at the time that its continued operation was not worth the cost. America's ABM research and development program subsequently declined but it did not stop.

11.23 According to the SIPRI Yearbook 1984, since the decommissioning of the Safeguard ABM system, the United States has continued its BMD research under two programs known as the Advanced Technology Program (ATP), which is concerned with the development of non-nuclear warheads and target acquisition technologies, and the Systems Technology Program (STP), which seeks to integrate the systems developed under the ATP and other programs into a workable BMD system. SIPRI reports that funding for these R&D programs for fiscal years 1982, 1983 and 1984 (requested) was just over $462 million, $519 million and $709 million respectively.[14] The United States has also maintained

considerable interest in high-energy lasers and directed energy weapons which could be used in BMD, although prior to 1983 funding for research in these areas remained relatively small. United States' BMD activities were given renewed impetus by President Reagan in March 1983 when he announced the Administration's Strategic Defense Initiative (SDI) research program which expanded and refocused the earlier BMD efforts into a single, integrated program for investigating the feasibility of effective defence against ballistic missile attack. Since that announcement, SDI has been the centre of continuing debate within the United States, among its allies and at the present bilateral talks at Geneva. It is discussed in detail in the following chapter.

The ABM Treaty and ABM Breakout

11.24 As described earlier the 1972 ABM Treaty and its 1974 Protocol limited each superpower to a single ABM complex that could be used to either protect the national capital or ICBM missile silos. The complex could contain a maximum of 100 interceptor missiles. The provisions of the agreements were tailored to prevent either country from deploying a full territorial defence or laying the groundwork for such a defence. To that end, they allow for the improvement of permitted ABMs only within well-defined limits and they place tight restrictions on the development of new types of ABM systems. The Treaty defines ABM systems purely in terms of interceptor missiles and radars and under Article V each party undertakes not to develop, test, or deploy ABM systems or components which are sea-based, air-based, space-based, or mobile land-based.

11.25 Article XIII of the Treaty established a Standing Consultative Commission to promote the objectives and implementation of the provisions of the agreement. This covered issues like exchange of information, questions relating to compliance and verification, consideration of strategic changes that would have a bearing on the Treaty and procedures for the consideration of amendments to the Treaty. The Treaty is of unlimited duration but subject to a right of withdrawal on six month's notice.

11.26 Since signing the 1972 ABM Treaty and its 1974 Protocol, successive United States' administrations have issued warnings that the Soviet Union was contravening the provisions of the agreements and pursuing developments that would enable it to deploy a nationwide defence against ballistic missile attack. The latest allegations were contained in the Reagan Administration's reports to Congress in 1983 and 1985 on Soviet non-compliance with arms control agreements (see Chapter 2). The principal allegations relating to the ABM Treaty were as follows:

a. that the deployment of a large phased-array radar at Krasnoyarsk in Central Siberia contravenes Article III of the ABM Treaty which requires that ABM radars be located within a

150-kilometer radius of the national capital; and Article VI which requires them to be located on the periphery of the country and oriented outwards;

b. that Soviet SA-10 and SA-X-12 surface-to-air missile (SAM) systems have the potential to intercept some types of strategic ballistic missiles and certain SAM radars have been tested in an ABM mode (both contravening Article VI of the Treaty); and

c. that the Soviet ABM-X-3 interceptor system may be able to be used in a mobile mode which would contravene Article V of the Treaty.

11.27 The Soviet Union has denied the allegations, claiming that the Krasnoyarsk radar is designed for space tracking rather than ballistic missile early warning and that the SAM radars were used for range-safety and instrumentation purposes which had nothing to do with ABM testing. It has also claimed that the United States has violated or is about to violate the ABM Treaty through:

a. its proposed SDI research program which is likely to require the testing of ABM-related components including advanced sensors and interceptors;

b. the planned testing of an Airborne Optical System (AOS), which would be used to track and identify reentry vehicles while they are still above the atmosphere, and the Space Surveillance and Tracking System (SSTS) used to provide target tracking and identification of missiles in the mid-course of their flight. Both these projects have been under development for several years and will continue to be pursued under SDI; and

c. the deployment of the Pave Paws and Cobra Dane large phased-array radar systems and the upgrading of BMEWS which together provide radar coverage of much of continental United States and therefore provide a base for ABM territorial defence that would contravene Article I of the Treaty.

Most of the allegations raised by both sides have been discussed in the Standing Consultative Commission but have not been resolved, as evidenced by the fact that they continue to be raised in analyses of treaty non-compliance.

Discussion and Committee Views

11.28 The closed nature of Soviet society and our subsequent reliance on Western intelligence sources for much of our information about Soviet military forces makes any detailed comparison of the strategic defences of the two superpowers very difficult. Nonetheless, it is possible to identify certain trends and draw a number of broad conclusions. Despite the primacy of offensive nuclear forces and capabilities, which was formally recognised by the signing of the SALT agreements and the 1972 ABM Treaty, both the United States and the Soviet Union are exhibiting an increasing interest in strategic defences. To date, this interest has been manifested in different ways and to different degrees. Overall, the Soviet Union has tended to pursue the development and utilisation of both 'active' and 'passive' defence measures far more than the United States. The Soviet Union has deployed extensive defences against possible air and ground attack either by United States strategic bombers or by combat forces located in Europe or China. It currently is the only nation to have an operational ABM system. Its preparations for civil defence are more advanced than is the case in the United States. It also appears to have a lead in research into certain advanced defence-related technologies such as laser and directed energy weapons. The United States has expressed concern that the Soviet lead in strategic defences, together with continuing developments in its offensive forces, provide the Soviet Union with a significant advantage which, if not corrected, could ultimately undermine strategic stability. It has sought to redress these perceived advantages through its strategic modernisation program and SDI. These are in turn viewed by the Soviet Union as part of an American attempt to gain strategic superiority.

11.29 While the differences between the strategic defences of the two superpowers are reasonably apparent, their import is less easy to judge. At least some of the differences can be explained in terms of the basic differences between the strategic doctrines and force structures of the two superpowers which stem from different geo-strategic circumstances and historical experiences. Because the Soviet Union is directly confronted by a range of potential adversary states, for example, it would seem reasonable to expect it to put a higher emphasis on defending itself against attack by aircraft and ground forces than the United States.

11.30 The situation is more complicated in the case of ballistic missile defences since both countries are vulnerable to attack and differences in capability, for whatever reason, are more serious because of the high stakes involved. The absence of effective defences against ballistic missile attack has been widely regarded in the West as an essential element in the preservation of strategic stability. This assessment has been based on the belief that where both superpowers are vulnerable to nuclear retaliation, each has little or no reason to use nuclear weapons pre-emptively. It has long been considered unstable for one superpower to be able to protect itself from nuclear retaliation since it could then also attack the other with relative impunity.

11.31 Both the United States and the Soviet Union are concerned that the other is moving toward developing an effective system of defences against ballistic missile attack. The Reagan Administration's concerns focus on the current Soviet upgrade of the permitted ABM site around Moscow, tests of new air-defence missiles which have potential ABM application, the deployment of large phased-array radars and continued research into new defence-related technologies. These developments are said to be placing the Soviet Union in a position where it could rapidly abandon the ABM Treaty and 'move rather quickly to construct a nationwide ABM system if it chooses to do so'.[15] If the Reagan Administration is correct in its assessment, the United States could indeed find itself at a serious disadvantage. The Soviet Union is probably in a position where it could deploy ballistic missile defences more quickly than the United States. A one-sided deployment of this kind, if effective, would serve to erode confidence in the U.S. nuclear deterrent and undermine the U.S. nuclear guarantee to its allies. On the basis of publicly available evidence, however, it would seem that the United States' concerns may be overstated. Some Soviet activities - such as the location of the Krasnoyarsk radar system - are clearly in violation of specific provisions of the Treaty. Other claimed violations are more contentious and may reflect ambiguities in the language of the Treaty or developments in technology as much as attempts to undermine the regime.

11.32 More importantly, an assessment of a Soviet capacity to abandon the ABM Treaty, or to be able to deploy a territorial defence against ballistic missiles, must take into account all aspects of its ABM or BMD facilities together with the United States' progress in developing counter-measures or its own missile defences. It is instructive to note that the proposed Treaty violations relate to only a small number of specific elements of a potential ABM system. In some other areas, the Soviet Union is probably on par with, or behind, the United States. It is unlikely, for example, that the Soviet Union would have made much progress to date in battle management technologies which form the heart of any territorial ABM system and require computer techniques which are well beyond even those currently used by the United States. Thus while recent Soviet ABM developments may shorten the length of time the Soviet Union would need to develop and deploy a comprehensive ABM system, the time is still likely to be sufficient for the United States to respond. Indeed given current deficiences in Soviet defensive technologies, U.S. technical capabilities, and the cost of a defensive arms race, the Soviet Union is likely to continue to pursue hedges against prospective developments in American defence-related technologies and new weapons systems. The major problem is that if the Soviet Union became convinced that the United States intended to abrogate the Treaty at some time in the future then it may begin to expand this hedge into a full-scale abandonment.

11.33 It is difficult to avoid the conclusion that the Reagan Administration's public concern over Soviet non-compliance may have as much to do with ensuring the

development of its own antimissile weapon technologies as with maintaining the ABM regime. This view is supported by the fact that the Reagan Administration appears to have done little in the SCC to resolve the verification and compliance difficulties that it continues to cite in public reports on Soviet non-compliance.

11.34 The compliance issue aside, it is reasonably clear that the ABM Treaty is under threat from the steady development by both superpowers of a range of technologies which threaten to circumvent the provisions of the present agreement. These developments can be divided into three broad categories:

a. **Antisatellite Weapons.** The technologies and components necessary to destroy satellites and ballistic missiles overlap. Because the ABM Treaty does not explicitly limit ASATs, many of the technologies required for ballistic missile defence could be tested and deployed under the guise of ASAT systems (this topic is discussed in more detail in Chapter 13);

b. **Anti-tactical ballistic missiles (ATBM).** Modern surface-to-air interceptor missiles used for air defence might also be effective against certain kinds of strategic missiles. The Soviet SA-10 and SA-X-12 SAMs provide examples of this problem;

c. **Large phased-array radars (LPARs).** LPARs provide early warning of missile or bomber attack, track satellites and other space objects and monitor missile tests. They are also an essential component of ABM systems providing initial warning of attack and battle-management support, distinguishing reentry vehicles from decoys and guiding interceptors to their targets. The 1972 ABM Treaty makes allowance for LPARs to be used in an early warning role. It also recognises that LPARs had to be restricted because of their importance to ABM. Because of their size and complexity, LPARs take years to construct and so represent the principal long lead-time item for any ABM system. Both sides are in the process of upgrading and expanding their phased-array radar systems and the Soviet Union has deployed one system which clearly contravenes the technical requirements of the ABM Treaty.

In view of the importance of maintaining the ABM Treaty and its underlying assumptions for at least the immediate future, consideration needs to be given to strengthening the provisions of the Treaty against the problems created by technical innovation in these areas. The most appropriate forum for such

action is the Standing Consultative Commission. It should be noted that in the event that both superpowers developed efficient defences against ballistic missile attack then not only would nuclear weapons become obsolete, so would the ABM Treaty. Under these conditions, it would be foolish to maintain the ABM Treaty and seek to ban nuclear defences.

Committee Considerations

11.35 The Committee considers that:

a. The continued observance of the provisions of the 1972 ABM Treaty is important for the maintenance of a system of stable deterrence based on mutual vulnerability of the two superpowers to a retaliatory nuclear attack.

b. Despite United States' concerns to the contrary the evidence available to the Committee does not support the view that the Soviet Union is actively seeking to abandon the ABM Treaty. Given current deficiencies in Soviet ABM defences, U.S. technical capabilities and the likely cost of a defensive arms race the Soviet Union stands to lose more by such an action than it would gain.

c. The Soviet Union is improving its ABM capabilities and it has specifically violated some of the provisions of the ABM Treaty. Further development of these capabilities will critically depend on United States' actions, particularly those relating to SDI.

d. The 1972 ABM Treaty is under threat from a range of Soviet and U.S. weapons development activities which circumvent, or threaten to circumvent the Treaty over the longer term. These include: antisatellite weapons, anti-tactical ballistic missiles and large phased-array radars.

e. The threats to the current ABM regime need to be rectified. The most appropriate way to avoid further erosion of the ABM Treaty is through negotiation at the Standing Consultative Commission (SCC) which was established under the terms of the Treaty to resolve compliance and implementation issues.

f. Should both superpowers develop the capacity to simultaneously deploy extensive and effective defences against ballistic missile attack then the underlying strategic assumptions of the ABM Treaty would no longer apply.

CHAPTER 11
ENDNOTES

1. See SIPRI Yearbook 1986, pp.579-80.
2. U.S. Department of Defense and Department of State, Soviet Strategic Defense Programs, October 1985, preface.
3. Soviet Strategic Defense Programs, preface.
4. Soviet Strategic Defense Programs, p.16.
5. Soviet Strategic Defense Programs, p.17.
6. Report of the Secretary of Defense Caspar W. Weinberger to the Congress on the FY 1985 Budget, FY 1986 Authorization Request and FY 1985-89 Defense Programs, February 1 1984, Washington, D.C., U.S. Government Printing Office, 1984, p.194.
7. Soviet Strategic Defense Programs, pp.8-9.
8. Soviet Strategic Defense Programs, p.12.
9. Soviet Strategic Defense Programs, p.12.
10. Soviet Strategic Defense Programs, p.13.
11. Soviet Strategic Defense Programs, p.16.
12. William M. Arkin and Richard Fieldhouse, 'Nuclear weapon command, control and communications', in SIPRI Yearbook 1984, pp.474-76.
13. Arkin and Fieldhouse, 'Nuclear weapon command, control and communications', p.474.
14. SIPRI Yearbook 1984, p.358.
15. Soviet Strategic Defense Programs, p.12.

CHAPTER 12

THE STRATEGIC DEFENSE INITIATIVE (SDI)

Introduction

12.1 The major problem with deterrence is that there is always a finite chance that it might fail. This concern has led to a search for alternative means of eliminating the risk of nuclear war between the superpowers without them having to threaten to destroy each other and, in the process, perhaps much of life on earth. One possible way out of the dilemma posed by the existence of nuclear weapons would be to move towards a purely defensive world in which offensive weapons and forces - nuclear and non-nuclear - would be largely replaced by non-nuclear defences. The advantages of such an approach are, first, that it would substantially reduce the immediacy of the threat posed by the current nuclear arsenals of the superpowers. Secondly, it could facilitate the achievement of total nuclear disarmament since reasonably effective defences could provide an effective hedge against one side cheating on any future nuclear abolition agreement.

12.2 The principal problem with the concept of non-nuclear defence is determining how it should be implemented. While the idea is fine in theory how could it be put into practice? President Reagan's Strategic Defense Initiative has been advanced as a means of doing precisely that; of transforming the current system of mutual vulnerability into one based on mutual invulnerability. While the notion of deploying defences against ballistic missiles has been raised and debated at various times during the history of the arms race, the President's proposal differs from earlier considerations in two important respects. First, it represents the first time a leader of one of the superpowers has unequivocally questioned the conventional wisdom that the strategic nuclear balance derives not from the capacity to defend against a nuclear attack but from the capacity to retaliate with a devastating blow. Secondly, SDI is unprecedented in its scope and technological optimism. The program is not a wholly new effort since it groups together a number of existing research and development programs. What is new is that these programs are now explicitly aimed toward a comprehensive defence against ballistic missiles and have been afforded the highest priority by the Reagan Administration.

12.3 Since President Reagan unveiled his proposal over three years ago, SDI has been the subject of widespread and impassioned debate over both its feasibility and desirability with opinion divided within the political, scientific and arms control communities in the United States, Europe and Australia. Increasingly, the debate has focused on the basic objective of the program itself. Should SDI seek to provide a comprehensive population defence against nuclear attack, or should it be used simply to strengthen deterrence? This Chapter outlines the SDI proposal and the various arguments that have been presented for and against it on technical, strategic and political grounds. It then discusses SDI in terms of:

a. whether or not SDI represents a feasible means of establishing a concept of a non-nuclear defence;

b. whether or not it can contribute to a system of stable deterrence; and

c. should Australia contribute to SDI research.

The Strategic Defense Initiative (SDI)

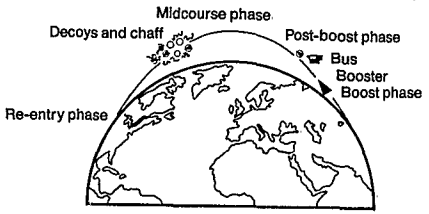
12.4 In a speech on 23 March 1983, President Reagan called upon the American scientific community, 'to turn their great talents to the cause of mankind and world peace: to give us the means of rendering... nuclear weapons impotent and obsolete'. In this and subsequent expositions the President sketched a picture of a future world in which security would be based on defensive capabilities rather than the threat of nuclear war. While acknowledging that nuclear deterrence had preserved peace and security for thirty years, he expressed the view that we could not continue to rely on it forever. In his view, only the development of the ability to 'intercept and destroy strategic missiles' would permit a shift in strategy from mutual assured destruction to mutual assured survival, and so 'free the world from the threat of nuclear war'. Following his 23 March address, the President ordered an intensive research and development effort with the 'ultimate goal of eliminating the threat posed by nuclear missiles'.

12.5 The Strategic Defense Initiative is a comprehensive research program that has been established to explore and demonstrate key technologies associated with concepts for defence against ballistic missiles. SDI does not involve the development or deployment of ballistic missile defences, rather it seeks to provide the technical knowledge required to support a decision on whether to develop and later deploy advanced defensive systems. In the event that the research yields positive results, the United States:

> ...will consult with our allies about the potential next steps. We would then consult and negotiate, as appropriate ... with the Soviet Union, pursuant to the terms of the ABM Treaty ...on how deterrence might be strengthened through the phased introduction of defensive systems into the force structures of both sides. This commitment does not mean that we would give the Soviets a veto over the outcome anymore than the Soviets have a veto over our current strategic and intermediate-range programs. Our commitment in this regard reflects our recognition that, if our research yields appropriate results, we should seek to move forward in a stable way.[1]

12.6 While the SDI program involves basic research, the research is organised towards developing a layered defensive system which would intercept and destroy ballistic missiles in

Figure 12.1 The phases of ballistic missile flight



Source: Union of Concerned Scientists, *The Fallacy of Star Wars*, Vintage Books, New York, 1984, p.55.

all phases of their flight paths (See Figure 12.1). In its original conception, the key to success was seen to be the first layer which would attempt to destroy Soviet missiles at the time or within minutes of launching. Boost-phase interception is critical because (1) the number of targets is much smaller than in later phases of the trajectory; (2) the booster rocket flame offers a strong infra-red signal that facilitates target identification and tracking; and (3) the booster rocket is more vulnerable than the re-entry vehicles it releases in the post-boost phase. Failure to significantly thin out an attack in the booster phase would present major problems to subsequent defences and could result in them being overwhelmed.

12.7 The SDI Office has identified for research a number of key functions and technologies associated with each layer of a potential ballistic missile defensive system and has grouped its research efforts into five program elements as follows:[2]

a. **Surveillance, acquisition, tracking and kill assessment.** This program involves research into sensing of information for initiation of the defence engagement and battle management and assessment of the status of forces during an engagement. Relevant technologies include radar and optical sensors, signal and data processing and laser imaging.

b. **Directed energy weapons.** This program provides for the 'development and demonstration' of technology required for boost and post-boost intercepts. The technologies include space-based lasers, ground-based lasers, particle beam weapons and nuclear-driven energy concepts.

c. **Kinetic energy weapons.** These would seek to make use of the very high velocity of a small mass to render a ballistic missile or its warhead ineffective. The technologies include hypervelocity launchers (ground, air and space-based).

d. **Systems concept and battle management.** This program is concerned with the command and control of ballistic missile defences and largely involves computer and communications technologies.

e. **Survivability and lethality.** This program examines the requisite technologies and concepts for enhancing system survivability against Soviet attack.

12.8 United States' official estimates are that the SDI will cost about $US26 billion over the period 1985 to 1989 which represents just under 2 per cent of the total U.S. defence budget and includes $1.4 billion (appropriated) in FY 1985; $3.7 billion requested in FY 1986; and $4.9 billion (estimated)

in FY 1987.[3] The SIPRI Yearbook 1986 reported that the U.S. Congress subsequently authorised only $2.75 billion for the program for FY 1986 and imposed the following requirements on the Reagan Administration:

> 1. No future decisions on deploying a strategic defence system can be made until the President certifies that the system would be survivable and cost-effective relative to offensive *counter-measures.*
>
> 2. The President must keep NATO nations informed 'to the maximum extent feasible and within national security guidelines...of the progress, *plans and potential proposals*' of the U.S. strategic defence program.
>
> 3. The Administration must submit a report with the FY 1987 budget request on the probable responses of potential *adversaries to a deployed* defence system including the deployment of offensive weapons not endangered by the SDI, such as cruise missiles and low-trajectory submarine missiles. This report will also analyse the potential impact of an adversary's anti-satellite (ASAT) capability on SDI, and the research and development cost estimates for SDI. An additional report, due with the FY 1989 request, should estimate costs for procurement and deployment of a strategic defence program.
>
> 4. The Secretary of Defense should report by 15 February 1986 on the feasibility and value of early applications of SDI in defending 'high value' U.S. and allied capabilities abroad, meaning airfields and prepositioned military equipment. This report should also evaluate the potential contributions of such defences to deterrence stability and examine the adequacy of the Army's anti-tactical missile program for allied defence.[4]

Congress also affirmed its support for the 1972 ABM Treaty and required that SDI funds should not be spent 'in a manner inconsistent' with the ABM Treaty and other arms control *agreements.*[5]

12.9 In justifying its decision to embark on the SDI research program, the Reagan Administration argued that the present system of deterrence is under threat from developments in Soviet *strategic offensive and defensive forces which,* 'if permitted to continue unchecked over the long term, will undermine the essential military balance and the mutuality of vulnerability on which deterrence theory has rested'.[6] The United States considers that the Soviet Union's improvements in its ballistic *missile forces are threatening* the survivability of

forces deployed to deter aggression and that advances in active and passive defences are providing the Soviet Union with 'a steadily increasing capability to counter U.S. retaliatory forces and those of our allies, especially if our forces were to be downgraded by a Soviet first strike'.[7] Added to these concerns is the belief that the Soviet Union has failed to comply with a number of arms control agreements and that it is interfering with National Technical Means of verification which threaten the integrity of the arms control process and reduce U.S. confidence *in assessing* the state of the strategic balance.

12.10 To meet these concerns the United States has embarked on a strategic modernisation program which would ensure deterrence in the near term. In light of the fragile nature of *deterrence, the United States is also examining* new deterrent options:

> ...over the long run, the trends set in motion by the pattern of Soviet activity, and the Soviets' persistence in that *pattern of activity, suggest* that continued long-term dependence on offensive forces may not provide a stable basis for deterrence. In fact, should these trends be permitted to continue and the Soviet investment in both offensive and defensive capability proceed unrestrained and unanswered, the resultant condition could destroy the theoretical and empirical foundation on which deterrence has rested for a generation.
>
> Therefore, we must now also take steps to provide future options for ensuring deterrence and stability over the long-term, and we must do so in a way that allows us both to negate the destabilising growth of Soviet offensive forces and to channel long-standing Soviet propensities for defences towards more stabilising and mutually beneficial ends. The Strategic Defence Initiative (SDI) is specifically aimed towards these goals. In the near term, the SDI program also responds directly to the ongoing and extensive Soviet anti-ballistic missile effort, including the existing Soviet deployments permitted under the ABM Treaty. The SDI research program provides a necessary and powerful deterrent to any near-term Soviet decision to expand rapidly its anti-ballistic missile capability beyond that contemplated by the ABM Treaty. This, in itself, is a critical task. However, the overriding, long-term importance of SDI is that it offers the possibility of reversing the dangerous military trends cited above by moving to a better, more stable basis for deterrence, and by providing new and compelling incentives to the Soviet Union for seriously negotiating reductions in existing *offensive nuclear arsenals.*[8]

12.11 To facilitate any future transition to a system of defensive deterrence, the United States is seeking to begin preliminary talks with the Soviet Union in Geneva aimed at achieving a 'radical reduction in the levels and the power of existing and planned offensive nuclear arms, as well as the stabilisation of the relationship between nuclear offensive and defensive arms, whether on earth or in space'. The United States has also stressed that it is not abandoning the policy of deterrence, nor is it seeking to establish military superiority. Strategic defences would be used to 'enhance', rather than replace deterrence.[9] This would be achieved by deploying a mixture (the composition to be determined) of defensive and offensive forces and capabilities.

Arguments For and Against SDI

12.12 The Soviet Union has been harshly critical of the program, seeking to make progress in the strategic and intermediate-range missile talks in Geneva dependent on concessions by the United States over SDI research. An official Soviet publication entitled Star Wars: Delusions and Dangers, claims that SDI is part of American efforts to secure 'decisive military superiority over the Soviet Union through outer space'. Weapons deployed under the program 'will be ready for use at short notice and will be almost instantly activated'. SDI would thus increase the risk of nuclear war. It will also accelerate the arms race.

> The U.S. plans of militarizing outer space, if carried out, will not enhance U.S. security or make the U.S. stronger. For the other side will not sit on its hands. It will produce appropriate weapons in reply, and there will be an escalation of the arms race in all fields.[10]

12.13 The Soviet Union rejects U.S. descriptions of SDI as a defensive system, saying it is offensive and designed to give the United States a first strike capability. According to this view, SDI components are

> ...ominous major elements of the U.S. war preparations envisaging the development of space strike weapons and a steep enhancement of the U.S. offensive nuclear capability. The purpose of these plans is to protect the United States by means of an anti-missile shield, while new strategic space-based weapons are to be simultaneously deployed, intended for destroying targets on Earth, on the seas, in the air, and in outer space.[11]

In support of this claim, the Soviet Union argued that weapons likely to be deployed in space as a result of the SDI program:

> ...may be used not only to knock out ballistic missiles after the latter are launched, but also to deliver a strike from outer space at earth, air, and sea targets...[and] to 'finish off' at launch those of its missiles that survive the nuclear first strike of the USA... The true purpose, of the strategic defense initiative is to obtain an opportunity for launching a nuclear attack with impunity, and for continuously harrassing the Soviet Union and other countries by means of nuclear blackmail.[12]

12.14 The Soviet objections appear to stem from a fear that the United States is determined to gain both defensive and offensive superiority; that a successful American defence would render obsolete the Soviet Union's considerable ICBM forces and therefore destabilise the strategic balance; and that the Soviet Union would have problems in matching the Americans in a prolonged and expensive arms race, particularly if it decided to continue to modernise and diversify its offensive forces. Recent press reports indicate that the Soviet Union may be prepared to move away from its initial hardline on SDI and accept that the United States could conduct laboratory research or research that cannot be observed and monitored. It would still seek to prohibit the testing and development of BMD technologies or systems and has called for a permanent ban on the use of force in outer space, from outer space against Earth and from Earth against space objects.

12.15 SDI has also attracted considerable criticism from within the United States, and from many private groups and individuals within allied countries, including Australia. Many submissions made to the Committee have raised objections to the U.S. proposals. The National Coordinating Committee of Scientists Against Nuclear Arms (SANA), for example, opposed SDI 'whether as a research program or implementation policy', arguing that the concept represents a 'grossly destabilising factor in weapon and counter-measure development'.[14] This view was repeated by the different state branches of SANA. The Tasmanian Branch stated that SDI would not work, it is ruinously expensive and 'even trying to make it work would only increase international instability'.[15] Similar views were put by the Medical Association for Prevention of War and the People for Nuclear Disarmament.[16]

12.16 Many of the criticisms of SDI made to the Committee cited the arguments developed by the United States' Union of Concerned Scientists (UCS) which includes scientists experienced in nuclear weapons and policy development. In a recent publication called The Fallacy of Star Wars[17] UCS argued that a completely impenetrable defensive shield is impossible to achieve, particularly in view of the large nuclear arsenals on both sides. It stated that the proposed defensive weapons of the SDI suffer from a combination of inherent technical limitations, intractable basing problems and susceptibility to Soviet counter-measures. For example, it is likely that a boost-phase

missile defence will need to operate from space. This could involve a system that is located in space on orbiting battle stations; or based on the ground, with mirrors in orbit to reflect its laser beams onto rising Soviet missiles; or 'popped-up' into space when a warning of a Soviet attack is received. The UCS considered that 'none of the three schemes appears workable', citing the enormous ranges involved, huge costs and impractical reaction times (short-range SLBMs and INF weapons take only seven to ten minutes to reach their targets and have unpredictable flight paths). The UCS further believed that all of the proposed defences 'are susceptible to counter-measures that are cheaper and better understood than the defences themselves'. These include an offensive nuclear build-up designed to saturate and overwhelm the U.S. defensive system; deployment of alternative delivery systems such as low-flying cruise missiles; shortening the boost phase of Soviet ICBMs; protection of booster rockets; and attacks on the defensive system itself. In a separate briefing paper UCS argued that even if individual weapons or technologies could be developed:

> ...fashioning them into a workable, deployable and survivable system would pose insurmountable difficulties. The system would be immensely more complex than existing weapons and could never be tested under realistic conditions. In addition, it would have to be fully automated, responding instantly upon warning of attack without presidential involvement, given the very short reaction time available for boost-phase interception. Yet the defence would have to work with near 100 per cent reliability. It would have almost no margin for error because even a minute 'leakage' rate would mean hundreds of nuclear explosions on US territory - and millions of fatalities - in the event of a large Soviet attack.[18]

12.17 Proponents of SDI accept many of the technical difficulties involved but argue that technical feasibility of defence against ballistic missiles can only be resolved by the kind of research envisaged under SDI, much of which is already being conducted by the Soviet Union. They consider that recent advances in physics, data processing and other fields offer sufficient justification to explore whether such technologies can be used in strategic defence.The SDI program will, it is said, take into account all possible developments in offensive technologies and sets very stringent criteria for any decision to move beyond the research phase. These were described to the Committee by Professor Harry Gelber as follows:

> Firstly, the methodologies developed must be cost effective at the margin. In other words, the cost exchange ratios must favour the defence. This is a crucial difference between the situation at the time of the ABM debates of 1969-70 and the present situation. At that time, at the beginning of the 1970s, the likelihood was that it would be easier and cheaper to enhance the offence than to enhance the defence and therefore the deployment of defences would at that time be likely to have produced a race to build more offensive weapons. The condition for the deployment of the SDI is, on the contrary, that it must be easier and cheaper to enhance the defence than the offence and there are serious hopes in Washington that that might be achievable. Secondly, the systems must be adequately survivable, including, of course, the space-based components. Thirdly, they must be robust and long lasting and there must be low maintenance requirements. Fourthly, they must be affordable - that is clearly an essentially political question but nevertheless a key one for obvious reasons. Finally, the development must shore up the ABM Treaty, an important point in the light of American convictions as to Soviet violations of their Treaty, and the systems must encourage and lead to a negotiated transition to deployment rather than a non-negotiated one.[19]

The first two basic criteria - cost-effectiveness and survivability - were first announced by Paul Nitze in a speech in Philadelphia in February 1985 and subsequently incorporated into the current Administration's policy as reflected in National Security Decision Directive 172.[20]

12.18 The proponents of SDI point to the increasing uncertainties associated with the existing system of deterrence, especially with the increasing accuracy and mobility of offensive systems on both sides, the diminishing possibilities of verification, and the possibility that new technologies such as laser communications may render submarines vulnerable to attack. They argue that in view of these developments, it is questionable whether the mix of technical and strategic developments of which SDI is a part would produce greater instability than if the SDI program was abandoned. As Professor Gelber submitted:

> On the question of what risks are posed by the approach to this new development, it is important to make the point that while, of course, there are risks which attend the development of an SDI, the real question is: Which way do the greatest risks lie in the development of SDI or in abstention from it? It is a balance of risks that we need to consider and my own judgement would be that for the time being at least, the risks of going the SDI route are less than the risks of not doing so.[21]

12.19 By contrast, other Committee witnesses commenting on SDI anticipated an overriding risk that it would stimulate a new round of the arms race, undermine strategic stability and threaten both the existing and possible future arms control regimes. These critics argued, for example, that the pursuit of SDI will lead to the demise of the 1972 ABM Treaty, and that it would undermine all past efforts to impose limits on offensive nuclear forces. They considered that the SDI program would create exactly what the ABM Treaty sought to ban: a national, multi-layered, anti-ballistic missile system for defence against incoming ballistic missiles. While accepting that some SDI research can initially be carried out within the terms of the Treaty, they considered that planned technology demonstrations would push the United States to the edge of compliance and so accelerate the process of erosion that is already threatening to undermine the Treaty. Moreover, by signalling to the Soviet Union its determination to undertake an expensive, long-term study into ABM feasibility, the United States is said to be risking a Soviet perception that the abrogation of the ABM Treaty is virtually inevitable which could in turn lead it to accelerate its own BMD program. The pursuit of space-based defences was seen to prejudice any chances of restraining the development of anti-satellite weapons, since such systems have inherent anti-satellite capabilities. It was thought that any defensive systems deployed as a result of the SDI program could pose problems for a number of other arms control treaties. SIPRI argued, for example, that the deployment in space of x-ray lasers, which would be powered by nuclear detonators, would violate both the 1963 Partial Test Ban Treaty and the 1967 Outer Space Treaty. The first treaty prohibits any nuclear explosions 'in the atmosphere beyond its limits, including outer space'. The second prohibits placing in orbit around the earth 'any objects carrying nuclear weapons or any other kinds of weapons of mass destruction', installing such weapons on celestial bodies, or stationing them in outer space 'in any other manner'.[22] It could be argued that x-ray lasers are not nuclear weapons even though they would be powered by a small nuclear explosion and so do not contravene the technical provisions of the 1967 Outer Space Treaty.

12.20 SDI critics further argued that the prospect of an improved American defence - whether real or perceived - would stimulate the most energetic responses by the Soviet Union to develop either counter-measures or its own defence capabilities. More importantly, some SDI critics also considered that the development of new defensive systems, taken together with continued advances in U.S. offensive forces, is likely to be perceived by the Soviet Union as posing an increased threat of an initial disarming nuclear strike. As former U.S. Secretary of Defense Robert S. McNamara and his colleagues argued in 1984:

> Our government, of course, does not intend a first strike, but we are building systems which do have what is called in our own jargon a prompt hard-target kill capability, and the primary purpose of these systems is to put Soviet missiles

> at risk of quick destruction. Soviet leaders are bound to see such weapons as a first-strike threat. This is precisely the view that our own planners take of Soviet missiles with a similar capability. When the President launches a defensive program openly aimed at making Soviet missiles 'impotent', while at the same time our own hard-target killers multiply, we cannot be surprised that a man like Andropov saw a threat 'to disarm the Soviet Union'.[23]

SDI opponents feared that the Soviet perception of a U.S. first strike capacity could lead to a Soviet pre-emptive strike in times of crisis, or the placement of Soviet forces on a higher alert status. Both these developments are seen to undermine stability and increase the risk of nuclear conflict.

12.21 In answer to these criticisms, the United States and the proponents of SDI have argued that no arms control treaty should be considered as sacrosanct and the assumptions underlying treaties signed in the 1970s may no longer hold or be as important in the 1980s. They further considered that arms control is concerned principally with reducing the risks of war and that overriding goal may or may not be served by a particular treaty regime. Thus, it may be in the interests of reducing the risk of nuclear war to renegotiate the ABM Treaty to cover systems that emerge from the various research programs that are being undertaken by the superpowers. New defence-related technologies may also be able to be used to protect the retaliatory nuclear forces of each side and so strengthen deterrence by preserving the logic of mutual assured destruction and thereby further reduce the risk of nuclear conflict.

12.22 The U.S. has also claimed that the ABM Treaty explicitly permits the kind of research envisaged under SDI, and that such research would be conducted within the ABM Treaty until the decision was required on whether or not to proceed to develop and deploy an operational anti-ballistic missile system. The United States admitted , however, that a decision to proceed:

> ...would almost certainly require modifications to the ABM Treaty. The ABM Treaty provides for possible amendments at any time and five year review sessions during which possible changes can also be discussed. Also, Article XV(2) provides a right to withdraw from the Treaty.[24]

The United States further argued that the Soviet Union is already 'hard at work on advanced technologies for BMD' and has active programs for upgrading its current ABM system. It is not seeking to develop a 'first-strike' capability and believes that the deployment of effective defences against ballistic missiles 'would be a powerful disincentive to anyone contemplating a nuclear first strike'.

12.23 The proponents have further suggested that SDI will not necessarily stimulate an arms race, particularly a fresh and destabilising build-up of offensive weapons. They argue that the Soviet Union's response to SDI will be influenced by a range of political, military and economic considerations, together with an assessment of the likely success and potential effectiveness of American SDI efforts and Russian competitiveness in defensive and offensive weaponry. These considerations could lead the Soviet Union to reduce its offensive forces. The principal problem here is to establish negotiating leverage: to convince the Soviet leadership that it will be seriously disadvantaged if the arms race were to escalate. In this context, economic factors may be at least as important as strategic ones. Professor Harry Redner submitted to the Committee that SDI:

> ...ought to be looked at not in military terms but in economic terms and that it is an extension of what you might call, the cold war into the economic area. Its real aim is to put pressure of this economic kind on the Soviet Union. It is based on the premise that America can bear such expenditure much, much easier than the Soviets can. From that point of view there is one merit in it and that is that it forces the Soviet Union to consider negotiating in a way which it might not have been prepared to consider negotiating or on things which it is clear the Soviet Union might not have been prepared to give up, such as its very, very strong land-based missile force, on which it prides itself so much. I do not think it would ever consider negotiating that unless something like this leverage were to be put on it. It is possible that, as a result of this kind of leverage or the threat of this kind of leverage, negotiations [may have occurred] with certain elements of both armed forces that might not have ensued otherwise.[25]

This position reflects a point of view allegedly held by some in the Reagan Administration that the Soviet Union does not have the economic capacity to match the United States in an unconstrained arms competition and that such a competition would ultimately return the United States to a position of superiority. Opponents of this view state that this kind of economic rationalism can be overstated. Past experience has shown that the Soviet Union is prepared to make considerable domestic economic sacrifices in order to maintain a position of parity with the United States, and it has ultimately been able to match most U.S. advances in technology. Furthermore, an unconstrained arms competition between the two superpowers could place as much pressure on the American political leadership as on the Russians. As there would be great dangers in a situation of a superpower armed with large numbers of nuclear weapons being forced into a position of imminent economic and political collapse, the U.S. would need to be careful not to press the Soviet Union into that position.

Allied Reaction to SDI

12.24 The United States has gone to considerable effort to elicit support for SDI among its allies and friends and has invited NATO members, as well as Australia, Japan and Israel, to indicate an interest in contributing to SDI research. Allied reaction to SDI has been mixed and generally cautious. The Department of Foreign Affairs reported to the Committee that:

> While harbouring reservations about its long term applications, the general approach of United States' European allies to SDI at present is: to maintain allied unity; to endorse the SDI research program as a necessary hedge against the Soviet Union's large ballistic missile defence research and development effort; but to emphasise the importance of maintaining the ABM Treaty and thus that any deployments of a ballistic missile defence would have to be subject to prior negotiations with the Soviet Union. In several allied countries, there is a concern not to leave the technical spin-off of the SDI research program exclusively to the United States. None of the allies have to date endorsed the desirability of <u>deploying</u> a system of ballistic missile defence.[26]

12.25 Despite some interest shown in sharing in SDI research activities there remain concerns among the European allies that SDI signifies a retreat into a 'Fortress America' mentality which would sacrifice important European interests for the sake of greater American security and that it could undermine both France and Britain's strategic deterrent. The United States has made it clear that 'no change in technology can or will alter our commitments to our allies'[27] in Europe and elsewhere and has offered to share the results of the SDI program with its NATO partners. The technical obstacles of defending Europe against Soviet tactical and intermediate-range nuclear missiles, however, are even more formidable than those confronting a defence of the United States and it is unlikely that Europe could hope to escape nuclear devastation in the event of war, even with highly effective defences in place.

12.26 The Australian Government does not endorse SDI nor does it propose to participate in SDI research.[28] While understanding the concerns that led the United States to undertake the research program, it considers that the SDI strategy is more likely to destabilise the international situation than is the system which it is designed to replace.[29] This position is taken on the grounds that the kind of defensive system envisaged under SDI requires a high level of technical perfection in concept and performance which is manifestly difficult, if not impossible, to achieve now and in the future. It would not provide defence against cruise missiles or bombers. The Government argues that it is inherently destabilising and would represent an increase in military spending. The United States has given Australia an assurance that the joint Australian-U.S. facilities were not and would not be involved in SDI research activities.

Discussion and Committee Views

12.27 In examining the feasibility and desirability of the Strategic Defense Initiative, it is important to be clear about the goals of the program. The President's original 'vision', described in his 1983 speech, was of a system of defence that would protect the populations and industrial centres of the entire United States and its allies from ballistic missile attack. The deployment of such defences would also allow the current system of nuclear deterrence to be replaced by a new strategy based on the defence of the United States and its interests, and would ultimately render 'ballistic missiles impotent and obsolete'.

12.28 This initial objective has since been divided into a number of separate phases. These were described by Lieutenant-General James Abrahamson, Director of the SDI Organisation, to the Defense Subcommittee of the United States House Appropriations Committee on 9 May 1984. They are briefly:[30]

> a. **A Research Phase:** covering the period of time from the President's 23 March 1983 speech to the early 1990s when 'a decision on whether to enter systems development could be made by the President and Congress'.
>
> b. **A Systems Development Phase:** covering the period of time beginning in the early 1990s when prototypes of actual defensive system components would be designed, built and tested.
>
> c. **A Transition Phase:** covering for the incremental and sequential deployment of defensive systems. 'It is our intention that each added increment, in conjunction with effective and survivable offensive systems, would increase deterrence and reduce the risk of nuclear war. During this period as the U.S. and Soviet Union deploy defenses against ballistic missiles that progressively reduce the value of such missiles, significant reductions in nuclear ballistic missiles would be negotiated and implemented'.
>
> d. **The Final Phase:** a period of time during which 'deployments of highly effective multi-phased defensive systems are completed' and 'ballistic missile forces levels reach their negotiated nadir'. This is the goal expressed in the President's 23 March 1983 speech. 'If similar technical progress in defense against other means of nuclear attack has been attained by this time, such defenses could also be incorporated'.

The early phases of the program would occur in parallel with the

continued modernisation of U.S. strategic forces as well as negotiations with the Soviet Union aimed at reducing the size of the nuclear arsenals of each superpower. During this time the fruits of SDI research would also be used primarily to explore ways in which the stability of the present systems of deterrence could be enhanced.

12.29 Thus the current descriptions of SDI research objectives now encompass two separate goals which need to be clearly and carefully distinguished. The first is the original aim of replacing the threat of retaliation as the basis of the U.S. nuclear deterrence strategy with a new strategy based on defence. The second is the more limited deployment of strategic defences in support of deterrence. These goals in turn reflect differences of opinion within the Reagan Administration over the role of SDI in shaping future U.S.-Soviet relations. The Administration's official view continues to maintain that it would be in the superpowers' mutual interest to move from an 'offence-dominated' to a 'defence-dominated' world. The two nations would negotiate a new arms control regime to facilitate this shift and they would be prepared to share defensive technologies. Certain Administration officials and some of its supporters express an alternative view which regards SDI as a new dimension in U.S.-Soviet competition and assigns it a key role in the reassertion of American supremacy. Strategic defences are seen as a lever to force the Soviet Union to submit to arms control on U.S. terms, and as a way of making deterrence more credible by removing the threat of assured destruction.

12.30 There is also some speculation over the continuation of the program in its present form. On the one hand, the President has expressed a strong personal commitment to the program which has afforded it a high priority in terms of defence expenditure. This, coupled with the fact that research in some areas of SDI is already well advanced and the growing stakes of defence contractors, provide the program with considerable inertia. On the other hand, while the program has been instrumental in bringing the Soviet Union back to the negotiating table, it could prove to be the major stumbling block to any subsequent progress in the talks. In addition, SDI, or more specifically defensive systems that may be deployed as a result of the program, are not looked on favourably by some United States allies. Nor does it necessarily have the full support of the U.S. defence establishment. As Arnold Kanter, a former Deputy Assistant Secretary for Politico-Military Affairs in the U.S. Department of State, has suggested recently, internal opposition to SDI is gathering and could well be sufficient to challenge the program at a later date.

> ... increasing political opposition to steadily mounting defense expenditures, concern in the armed services that requirements will be met by means of directing funds from programmes to which they assign higher priority, a lively debate about SDI's strategic and arms control implications, and the realization that this President will leave the

> White House before the programme with which he is so closely identified can become firmly entrenched, combine to offset the momentum which programmes like SDI typically acquire. Indeed, the continuing bureaucratic jockeying and the intensifying policy debate reflect in part the conviction of both the supporters and opponents of SDI that the future of the programme is neither settled nor secure.[31]

In view of this continued opposition and the mounting costs of SDI, it is possible that a new U.S. Administration will downgrade the priority of the program from its current favoured position. It may even be possible that SDI could still be used as a 'bargaining chip' in Geneva to achieve Soviet agreement for deep cuts in offensive weapons and a significant reaffirmation of the ABM Treaty. It is too early to make a firm judgement on this although present indications are that the United States will continue with the program in some form regardless of what occurs in Geneva. The Soviet Union, on the other hand, seems equally determined that SDI should not continue at least beyond fundamental research.

Non-Nuclear Defence

12.31 The principal rationale for the SDI program continues to be that it may provide a means of escaping from the dangers of a system of deterrence that is based either solely or ultimately on assured destruction. Before considering whether and how we could move to such a situation a prior question is whether it would be safer or more secure than the current one. A system based on the deployment by both sides of nearly impenetrable defences would be extremely sensitive to even small improvements in one country's ability to penetrate its adversary's defences . As Charles Glasser, research fellow at the John F. Kennedy School of Government at Harvard University, has argued:

> The country that first acquired even a small capability to penetrate the adversary's defense would have attained an important coercive advantage; it could threaten nuclear attack with impunity since effective retaliation would be impossible given the adversary's inability to penetrate its own defenses. Recognising that the adversary is likely to acquire a similar capability could create pressure to reap the benefits of the strategic advantage quickly.[32]

These improvements need not be in ballistic missile technology but could be in any of a range of conventional weapons systems which would have to be defended against. Lack of robustness in defensive systems would compel both sides to either try and defeat the adversary's defences or protect themselves against

such a contingency. It could result in both sides being presented with a series of 'windows of opportunity' which each might be tempted to exploit. This in turn would lead both sides to maintain significant offensive forces as a hedge against the possible inability to offset, with improved defences, the adversary's enhanced offence. Impenetrable or near impenetrable defences could increase the probability of conventional wars between the superpowers and so increase the possibility of nuclear war occurring by accident or miscalculation. They would also not provide protection against clandestinely delivered nuclear weapons.

12.32 Thus, a defence-dominated world is likely to be as complex as an offense-dominated one. It would be subjected to similar pressures and constraints which, under certain circumstances, could add to the risk of military conflict, and so will continue to require cooperation between the superpowers. Despite these problems, the concept of a system of international security based on non-nuclear defences has much to commend it. A world in which competing adversaries have only defensive weapons in place would be far preferable to the present system in which the security of both superpowers rests on the threat to annihilate millions of people throughout the world. It may also provide the only practicable means of achieving total nuclear disarmament. Given that non-nuclear defence is a worthy objective, is the current U.S. SDI proposal a viable and satisfactory means of achieving it? The answer to this question involves both an assessment of the technical feasibility of SDI and a consideration of the risks and costs of seeking to make a transition from an offense-oriented world to a defence-oriented one via the SDI route.

12.33 The arguments regarding the technical feasibility of SDI were outlined earlier in this Chapter. The Committee does obviously not have the expertise to comment on the feasibility of SDI. It notes that many prominent scientists claim it is impossible to achieve, whilst other scientists, some close to their respective governments, believe it has possibilities. While there are differences of opinion over matters of detail, there appears to be agreement that wholesale protection of the civilian populations of the two superpowers and their allies against the threat posed by current nuclear arsenals would require the deployment of an extensive system of defences, much of it located in outer space. The defensive system would need to work to near perfection the first time it was used and it would have to work against all kinds of strategic weapons, not only ballistic missiles. The development of a system to satisfy these exacting specifications would be enormously expensive and would require a range of technologies that are well beyond what has currently been developed or even designed. A more fundamental problem is that elements of the defensive system located in space will remain vulnerable to a range of active and passive counter-measures - some of which would result from the SDI program itself - which could be developed and deployed at a fraction of the cost of the defensive systems.

12.34 The Committee considers that these limitations alone make the prospect of a perfect or near perfect defence against current arsenals very unlikely. It is accepted that, in the future, new technologies could be developed which could render ballistic missiles 'impotent and obsolete'. But the major, and probably insurmountable, problem will still be to fashion this range of diverse technologies into a workable, deployable and survivable defensive system. While the prospect of developing effective defences against current arsenals is remote, it could be improved if the numbers and variety of nuclear weapons and delivery systems possessed by the United States and the Soviet Union were substantially reduced.

12.35 Even if the establishment of an effective defence against the current nuclear threat was considered to be possible is SDI the best means of achieving it? It is clear that the lead-time for many of the new technologies required to establish such a system are very long and that an overall system would probably not be available until well into the next century. For much of the period prior to its establishment, the potential benefits of strategic defences would remain distant and hypothetical whereas the dangers would be all too obvious and acute. Both sides would continue to take for granted the aggressive intentions of the other even where such an interpretation is not supported by fact. Faced with the prospect of an expansion of U.S. defensive capabilities, and the continued build-up of the United States' counterforce capabilities, the Soviet Union will remain fearful of an impending U.S. first strike and so will continue to improve its own defences as well as concentrate on strategies that will overcome the strategic defences of the United States. The most obvious approach in the short term is simply to increase its ballistic missile forces, even if this meant breaking out of SALT II. The Soviet Union is well-placed to do this at relatively little cost because of its higher missile throw-weights. Such a breakout would further increase American concerns and lead to an expansion of both its offensive and defensive systems, at enormous costs.

12.36 In the absence of negotiated restraint the continuation of the SDI program will stimulate a renewed arms race between the two superpowers which will involve both defensive and offensive systems and will extend into outer space. The extension of the arms competition in this way is likely given the nature and intensity of the political rivalry between the two nations, which will dictate that any significant change in the strategic forces of one side will lead to a corresponding change by the other. This is evidenced by the history of the arms race to date and was the major factor behind the United States' decision to embark on the SDI program in the first place. There is no doubt that the same logic that led to the American decision will apply to the Soviet Union; an American build-up of strategic defences, coupled with the continued deployment of new offensive forces will be seen as threatening and will lead to the development of new Soviet capabilities to counter them.

12.37 It has been argued that these problems can be overcome by the United States sharing with the Soviet Union the results of its SDI research and development. In that way neither power would obtain - in reality or in the mind of its adversary - a significant advantage that could be used to coerce its opponent. Despite American assurances, the Committee considers that is it highly unlikely that the United States would share the detail of its research endeavour with the Soviet Union. One reason for this is that it would mean exposing the flaws of a defensive system to an adversary that may be prepared to exploit them. Such a view was put by former U.S. Secretary of Defense Robert McNamara and his colleagues in a recent article in the journal Foreign Affairs in which they concluded:

> In the real world any defensive system will be an imperfect complex of technological and operational capabilities, full understanding of which would at once enable any adversary to improve his own methods of penetration. To share this kind of secret is to destroy its own effectiveness.[33]

12.38 The Committee is also concerned that the SDI research program may impede achievement in arms control. While it recognises the Reagan Administration's statement that SDI research will be carried out within the provisions of the 1972 ABM Treaty, it is clear that planned demonstrations of some of the technologies will move the United States into areas of contention with the provisions of the Treaty. More importantly, the strong political and economic commitments to confirming the feasibility of an effective national defence against ballistic missiles signals a clear intention on the part of the United States that it may break out of the Treaty at some stage in the future. Such a position seriously threatens the ABM regime and makes it more difficult for the United States to pursue the possibility of Soviet violations of the ABM Treaty, since America cannot simultaneously invoke the Treaty against the Soviet Union and pursue a goal that is clearly in conflict with it.

12.39 The pursuit of space-based missile defences under the SDI program is also likely to prevent the establishment of an anti-satellite regime, and could lead to a widespread loss of confidence in the U.S. Administration's commitment to future arms control negotiations. This may, in turn, lead other parties to abrogate their responsibilities under various multilateral agreements, in particular the Nuclear Non-Proliferation Treaty. Similar arguments of course apply to the Soviet Union. The Committee notes that the Soviet Union is pursuing research in a number of technologies, such as lasers and particle beam weapons, that could have an application in a SDI-type defensive system. At present, however, it seems more concerned with developing fixed land-based systems and terminal defences than a space-based defence against intercontinental ballistic missiles. The Committee is concerned over continuing Soviet developments in ballistic missile and air defences and their potential impact on the 1972 ABM Treaty and American perceptions of the strategic balance. The impact of these developments should not be exaggerated however. Despite some problems, they do not, at present, appear to constitute a clear abandonment from the ABM Treaty nor do they pose a serious threat to the United States' strategic forces.

Nevertheless, it would seem prudent for the United States to continue basic research into ballistic missile defence and related technologies as a hedge against a possible Soviet breakout at some time in the future. It should also examine ways of overcoming such defences. In contrast to SDI, this research should simply aim to allow the United States to deploy appropriate defences or counter-measures soon after a clear Soviet breakout. Such research can be conducted at a fraction of the cost of SDI and without the atmosphere of crisis commitment that characterises the present program and which contributes to the mutual suspicion between the two nations.

SDI and the maintenance of deterrence

12.40 Given that the prospect of developing a perfect or near perfect defence against ballistic missiles is low, can SDI play any valid role in strengthening the present strategy of deterrence?

12.41 The arguments for and against this are largely the same as those found in the ABM debate. The proponents of this view argue that ABM systems deployed as a result of the SDI program could be used to enhance the survivability of U.S. strategic forces - in particular ICBM forces - against an initial Soviet attack. The task of defending military assets is much easier than defending urban - industrial areas and these specialised defences could be less costly to produce and would not be susceptible in the same degree to offensive counter-measures. A limited ABM defence system utilising terminal defences would also be achievable with current technology. Limited, defensive systems could also be used to restrict damage occurring to the United States in the event that deterrence failed, or to provide protection against an attack by an accidental or unauthorised launch of a nuclear weapon by the Soviet Union or another nuclear weapon state.

12.42 Opponents of this view argue that ABM systems are enormously complicated, difficult to test and vulnerable to attack. They further consider that ABM is destabilising by contributing to an extension of the arms race and creating an illusion of safety which could lead to military adventurism. The development of an extensive ABM system would also undermine the present ABM treaty regime, it could lead to proliferation of nuclear weapons - either directly if the ABM system deployed nuclear warheads or indirectly because of countermeasures.

12.43 Thus any judgement on whether SDI should be used for the development and deployment of ABM or other defensive systems to enhance the present system of deterrence involves similar assessments of risks and costs as those applying in the case of attempting to move to a system of non-nuclear defence. On balance, the Committee considers that the limited deployment of space-based defences under the SDI program would tend to extend and emphasise the principal destabilising trends that characterise extended deterrence rather than reduce them. The Committee accepts that the current system of deterrence is under pressure from developments in technologies from both sides but

considers that it would be wiser to try and constrain them - initially through the strengthening of the ABM Treaty - than move to a position of unimpeded competition.

Conclusions

12.44 The Committee acknowledges that the present system of deterrence, as it is evolving, poses a number of practical and moral dilemmas to national command authorities as well as severe dangers to world survival should deterrence fail. There is an urgent need to redress these dangers but the Committee has serious doubts whether the results of the SDI program will provide a solution. In the Committee's view, the continued pursuit of SDI would not lead to a more stable system of deterrence nor would it result in the abolition of, or significant reductions in, nuclear weapons. Rather, SDI (or any similar Soviet program) is likely to set in motion a chain of events and reactions that would destabilise the current strategic balance, and undermine the limited progress that has been made in arms control to date. The Committee considers that this threat outweighs what it sees as a remote possibility that SDI will both produce a feasible and effective defence system and eliminate nuclear weapons.

12.45 This does not necessarily invalidate the concept of non-nuclear defence as originally articulated by President Reagan. What it shows is that such a system cannot easily be achieved while both sides possess large numbers of offensive weapons which continue to be improved and updated. The essential prerequisite of a defence-dominated future is political stability and major reductions in current nuclear arsenals. Any future transition to defensive deterrence will not be achieved by technical means alone. It requires the implementation of legal and political constraints to the continued existence and proliferation of nuclear weapons strengthened by the active intervention of science and technology. If the Reagan Administration wishes to establish a new international regime based on missile defences it should seek to address these two fundamental issues before rather than after or during the development of a system of ballistic missile defences. In this context, it should be prepared to defer further progress in the SDI program in return for similar assurances by the Soviet Union and progress in negotiations in Geneva on mutual reductions in offensive forces.

12.46 A significant prior reduction in offensive forces would have the added advantage of making the job of developing an effective defence much easier. If, for example, nuclear weapons were completely eliminated, space forces would then be required only to allay fears, diminish incentives for secret or open nuclear re-armament, and if necessary, contribute to the defeat of such a threat should it eventuate. Strategic forces capable of satisfying these requirements are not beyond the realm of technical possibility. Rather than the exotic space-based defensive forces envisaged under the SDI program, they would probably consist of a modest combination of early-warning and

surveillance satellites and small non-nuclear interceptors, either ground-launched or in orbit, which can use their own sensors to target onto a flying missile and destroy it by direct impact. Such forces would not by themselves remove all danger of breakdown of the non-nuclear regime, but they would powerfully strengthen the political and institutional structures on which the durability of the regime would depend.

Should Australia Contribute to SDI research?

12.47 At a meeting of NATO's Nuclear Planning Group in Luxembourg on 26 March 1985, U.S. Defense Secretary Caspar Weinberger formally invited allied governments to participate in the SDI research program. Letters of invitation to contribute were sent to the allied nations and a number of other nations not represented at Luxembourg. The letter asked each nation to respond within sixty days - this time limit was subsequently dropped - and to identify the sphere of research that they considered most promising for their participation in the program. As mentioned earlier, the reaction to the U.S. proposal has been cautious with considerable consultation taking place between the United States and its potential partners particularly the United Kingdom, the Federal Republic of Germany and Japan. The United Kingdom has formally agreed to participate in SDI research. France has said it will not participate but that French industry is free to do so. Other governments such as Denmark, Norway and Canada have declined to participate.

12.48 The Australian Government does not endorse SDI and it has declined to participate in SDI research since this would in effect amount to an endorsement of it. The Australian position has been criticised by Professor Gelber who argued that it would be in our strategic and economic interests to support the American initiative, particularly since 'in some respects Australia might be becoming less essential for the United States ... as and when some of the joint facilities in Australia become less important'.[34] This is because:

> ...in the first place a secure America is very much more in our interests, and very much more reliable as a partner for us, than an insecure America. If we want to benefit from extended deterrence, as we have done traditionally, it is in our interests to shore it up. Also the SDI might at some point, indeed, have direct applications in the defence of Australia ... there is also the point that some aspects of SDI will provide a heaven-sent opportunity to establish Australian capabilities at the cutting edge of some highly important technologies.[35]

Others believe that Australian participation in SDI research would enhance our indigenous research capabilities and provide important economic and employment benefits.

12.49 It is probably true that Australia could gain some research or technological benefits by participating in SDI. Whether these would have significant impact on the Australian economy as a whole is arguable, particularly as Australian organisations would be unlikely to receive major contracts from the SDI research program. Against this is the fact that Australia may have little control over what research is carried out here and, more importantly, participation in SDI research could be interpreted as a decision to support the eventual outcomes of such research. Once Australia becomes directly involved with the program, it would be difficult to alter or withdraw that involvement at a later date. On the other hand a complete and public rejection of Australian involvement - both on a government-to-government basis or through private enterprise - could affect relations between the two countries and would, at this stage at least, be difficult to effectively police although the United States has made it known that it would not pursue SDI research in countries where the government was not in favour of the program.

12.50 To overcome some of these problems, Australia could stipulate the conditions under which we would be prepared to participate in SDI research. These could be a restriction of research to areas where we already have a particular expertise or that correspond to Australia's own national security interests or that are not weapons-related. Whatever qualifications were made, Australia could still be portrayed as endorsing SDI and its potentially destabilising characteristics. Moreover, it would be very difficult at this stage to determine which research areas would ultimately form part of weapons systems and which would not.

12.51 Alternatively, Australia could continue to decline the invitation of the United States but leave it up to Australian companies, universities and individuals to decide whether they would participate in SDI related projects. Such an approach is unlikely to strain relations between the United States and Australia, and would keep our future options open without undermining our international image. It would lessen the economic and technological benefits to be obtained from SDI research, however, and the government would have little control over the research that was carried out. Furthermore, widespread participation by the non-government sector could, over time, lead to the establishment of substantial vested interests concerned to erode the government's policy of opposition to SDI.

12.52 The Committee considers that:

> a. Australia's support for, and participation in the SDI research program should be determined on the basis of the impact of the program on favourable arms control outcomes;
>
> b. the economic and technological benefits and spin-offs accruing to Australia from any participation in SDI research are likely to be small;

c. Australia's official position on SDI research should be consistent with its position on SDI generally. Any Australian Government participation in SDI research would effectively constitute support for the program and the eventual outcomes of such research. Until the strategic and political benefits of these outcomes can be shown to outweigh the risks and costs of pursuing them, Australia should decline to participate; and

d. Australia should emphasise the required preconditions for any safe transition from an offence-dominated world to a defence-dominated one, and seek to have these implemented before contributing to the development of the systems themselves. If these conditions were accepted and formally agreed by both superpowers then Australian participation in subsequent defence-related research could be justified.

CHAPTER TWELVE
ENDNOTES

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CHAPTER 13

VERIFICATION TECHNOLOGIES AND ANTI-SATELLITE (ASAT) WARFARE

Verification

Introduction: The Role and Importance of Verification

13.1 Arms control agreements help provide for balanced and stable deterrence by placing limits on the development and deployment of weapons systems or by contributing to more predictable and harmonious relations between the superpowers. Negotiated agreements can prevent an open-ended competition that may increase the likelihood of military confrontation or help stabilise or diffuse a crisis that is threatening to get out of hand. But arms control negotiations and treaties rely on more than trust. For a treaty to be negotiated successfully, the parties concerned must be convinced that they are able to verify their adversaries' compliance with the terms of the agreement. They must also be confident that any such violations or, more importantly, a break out from the treaty are detected in sufficient time not to prejudice national security.

13.2 In addition to ensuring that treaties are complied with, verification techniques and facilities serve a number of other useful purposes. They promote general caution on the part of adversaries. If Soviet and American military planners are convinced there is a reasonable chance that any violation of a treaty would be detected, they might act more cautiously since they would not want to encourage an opponent to increase its armaments or respond drastically in other areas. Confidence that the other party or parties have adhered to negotiated treaties provides a positive incentive for further negotiations. It can also prepare the ground for more extensive verification procedures in subsequent treaties. The monitoring of military capabilities and activities increases knowledge of an adversary and thereby lessens the prospects of the kind of misunderstandings that occurred in the 1950s and 1960s. Under certain circumstances, the verification system also provides a chance for a state to signal its intention to an adversary and so facilitates the handling of potential disputes before they become too serious. Verification techniques can thus contribute to the maintenance of stable deterrence.

13.3 Verification involves monitoring either objects, such as silos or missiles, or activities, such as troop movements, the development and deployment of weapons, or warhead tests. Agreements can be monitored directly, either by aerial or on-site inspection or observation, or indirectly through the examination of records. These checks can be carried out unilaterally, or by cooperation between the parties in accordance with agreed procedures and guidelines, or by a third party such as an international monitoring agency. Verification requires that each nation or group of nations has a reliable and objective means of

monitoring the capabilities or activities of the other side. Both the United States and the Soviet Union have, over the years, developed a range of systems for gathering such information from a distance. These systems are collectively referred to as 'National Technical Means of verification' or NTM. NTM are also used to spy on potential opponents. Military and political officials within the United States and the Soviet Union need to know as much as they can about the military capabilities and activities of adversary states in order to protect their national security.

13.4 Whatever means are used, verification systems must satisfy certain basic requirements. These were described to the Committee by the Adelaide Branch of SANA as follows:

> ... it must be technically feasible and practical. This may be determined by the provisions of the treaty rather than the technology available. For example, it is difficult, if not impossible, to count the number of warheads on a given ICBM. Nevertheless SALT II imposes limitations on these and proposes as a verification procedure that each ICBM of a given type shall be assumed to carry the maximum number that any version of that ICBM type has carried in testing.
>
> ... it must be capable of prompt detection of a violation ...
>
> ... it must have a degree of continuity. This is especially important where the means used are susceptible to jamming and camouflage.
>
> ... it must cause minimum interference with and impose minimum burdens on any aspect of life of the nations being monitored.
>
> ... it must be flexible enough to cope with technical changes in the arsenals being monitored. It should also be flexible enough to allow for updating of facilities in line with improved verification capabilities.
>
> ... it must be economically acceptable to each of the State parties.[1]

13.5 Verification is generally of greater importance to the United States than the Soviet Union because of the closed nature of Soviet society. Information on Soviet weapons systems and capabilities is much more difficult to obtain than its American equivalent. Soviet military budgets and its arms development and procurement process are not subject to the same public scrutiny as those in the West. The Soviet penchant for secrecy is well

known and it often views the requirement for verification either as an unwarranted intrusion by the West into internal Soviet affairs or as an arm of western intelligence agencies. Hence U.S. NTM are generally more extensive and more sophisticated than Soviet NTM. On the other hand, many of the basic requirements of verification, which are taken for granted in the West are perceived by the Soviet Union as a threat to internal Soviet political or military control and are thus difficult to accept. Furthermore, the Soviet Union tends to view verification as something it 'gives' to the United States and it therefore seeks recompense (see para 13.34).

Technologies for Monitoring the Testing, Production and Deployment of Weapons

13.6 Information about new weapons systems or technologies under development in the laboratory may be obtained from scientific or technical literature, through personal contact between researchers or via industrial or military intelligence channels. Information from these sources is more difficult to obtain than in later stages of the evolution of weapons systems, it is often sketchy and hard to corroborate. Once a weapon enters the testing and production stages, a wide range of remote techniques can be used to gain information about it. These include aerial and satellite photoreconnaisance, thermal detection and imaging, multispectral photography, various methods of recording electromagnetic emanations, and seismic detection in the case of weapons tests. Some of the verification technologies currently used by the United States, together with a brief summary of their properties, are shown in Table 13.1.

13.7 Ongoing activities and events that may produce visible permanent changes in the physical environment are most reliably detected by means of satellite photoreconnaissance, that is the periodic photographing of scenes by cameras or other electronic imaging systems carried on orbiting satellites or high flying aircraft. It has been reported that American reconnaissance satellites can detect an object on the ground of around 10 centimeters in length and that they can completely identify an object less than 1.5 metres across.[2]

13.8 The image of the ground scene can be recorded on photographic film which is ejected from the satellite in special capsules which re-enter the atmosphere and are snared in mid-air by special purpose aircraft. Alternatively the image can be converted into electronic signals which are transmitted directly, or via communications satellites, to ground stations for processing. The reconstituted images can be enhanced using fast computers and digital imaging processing techniques of the kind used by astronomers in examining the solar system and beyond.[3] These latter techniques provide for real-time monitoring of target areas with resolutions better than that obtainable by television. Both the United States and the Soviet Union have large-scale and sophisticated satellite-based photoreconnaissance capabilities which provides extensive coverage of the earth's surface [4] (see Table 13.2).

TABLE 13.1: TECHNICAL VERIFICATION SYSTEMS

Imaging reconnaissance satellites

KH-11: operates at 250-500 kilometers, with resolution of two to three meters. Two are in orbit at all times. Multispectral. Provides real-time data by a scanning mirror which projects the image onto an electronic plane.3,4

Big Bird: operates at 160-280 kilometers, with resolution of approximately 25 centimeters. Sends film to earth in a pod; for lower resolution, film is scanned with a television camera in the satellite.2,3

Close-Look: operates at 130-300 kilometers, with resolution of about 5-15 centimeters. Sends film back to earth.2,3

Space shuttle: uses multispectral infrared radiometer and cryogenic infrared radiance instrument. Department of Defense plans to use 25 of 72 shuttle flights scheduled through September 1987.

Landsat: operates at 800 kilometers, with resolution of 20-30 meters. Multispectral, using television-type transmission.

Electronic reconnaissance satellites

Rhyolite and chalet: operates in geosynchronous 36,000-kilometer orbit. Collects telemetric information about Soviet missiles during their flights. Aquacade to be used after 1985.4,5

Ferret: operates at 600 kilometers. Collects information about Soviet launches and radars.4,5

Radar and optical detectors

Seasat: operates at 800 kilometers, with resolution of 25 meters and two to five centimeter altimeter accuracy. Chirp radar.4,6

Cobra Dane and Cobra Judy: phased-array radars located, respectively, on land and on ships for detection of re-entry vehicles above 35 milometers. Other phased-array in Florida and Massachusetts can determine the size, shape and configuration of objects in space up to 5,000 kilometers distant.

Ballistic missile early warning system: radars in Alaska, Greenland and Britain for tracking missile tests.5

Altar: Can track 14 reentry vehicles up to 2,500 kilometers with an uncertainty of five meters in range, 250 microradians in angle and 0.1 meter per second velocity. Located on Kwajalein Atoll in the Pacific.5

Tradex: Can track six reentry vehicles at a distance of 1,400 kilometers with accuracy of three meters in range, 150 micro-radians in angle and 0.01 meters per second velocity.5

RC-137 (converted Boeing 707 airplane): air-based radars.

Over-the-horizon radar: not restricted in its range by the curvature of the earth.5

Recording automatic digital optical tracker: Long-focal-length (6.1 meters) telescopes that can discriminate among reentry vehicle types or ranges in excess of 3,000 kilometers.5

Fourier optics: Interferometric technique used to determine dilute gaseous impurities at a great distance.7

Nuclear explosion detection

Vela: satellites at 100,000 kilometers; gamma ray, x-ray, electro-magnetic pulse and infrared detectors. Early-warning detection of ICBM launchings and nuclear explosions above ground.8

Global positioning satellites: 18 located at 18,000 kilometers. Optical, electromagnetic pulse and x-ray sensors as well as navigational systems that give accurate positions of nuclear explosions.4

Seismic arrays: located in Montana, Norway and elsewhere in a world-wide network. Capable of detecting explosions as low as one or two kilotons in hard rock.9

In-country seismic sensors: tamper-proof instruments to be buried in an opponent's soil to send back seismic, acoustic and magnetic data by satellite.

Airplanes

U-2, SR-71: operates at maximum height of 28 kilometers, using cameras and other electronic surveillance.4

Airborne warning and control system (AWACS): operates at nine kilometers, with resolution of 0.5 meter. Comprehensive surveillance to a range of 370 kilometers. Can identify aircraft using radar wavelengths of about one to 30 centimeters.10

Submarine verification

Photographic reconnaissance satellites monitor Soviet shipyards to count submarines.

Sound surveillance system: passive system of hydrophones permanently fixed on the continental shelf of the United States and some allies. Can locate a Soviet submarine within a radius of about 100 kilometers.11

Surveillance towed array sensor system: about 18 arrays of hydrophones towed by slow-moving boats.11

Rapidly deployable sensor system: buoys with passive sensors that are deployed by aircraft, helicopters and ships.11

Seasat: radar and infrared data from the Seasat satellite can compute the oceans' background noise so that it can be partially removed from the data of passive and active detection systems.6,11

Laser photography: blue-green lasers positioned in satellites to obtain photographs of some aspects of the ocean.11

1. The characteristics in this table are taken from the sources indicated. There may be errors – even major ones – but that appears unavoidable because of the classification of the data.
2. G. Kaplan, "International Approaches to Peace-Keeping", IEEE Spectrum, 19 (Oct. 1982), p. 102.
3. B. Blair and G. Brewer in W. Potter, ed., Verification and SALT (Boulder, Colorado: Westview Press, 1980).
4. B. Jasani, Outer Space: A New Dimension of the Arms Race (London: Taylor and Francis, 1982).
5. F. Hussain, The Impact of Weapons Test Restrictions, Adelphi Papers, no. 6 (London: International Institute for Strategic Studies, 1981).
6. R. Cheney, J. Marsh and B. Beckley, "Global Mesoscale Variability from Collinear Tracks of SEASAT Altimeter Data," Journal of Geophysical Research, 88, no. C7(1983), p. 4,343.
7. G. Vanasse, ed., Spectrometric Techniques (New York: Academic Press, 1981).
8. S. Singer, "The Vela Satellite Program for Detection of High-Altitude Nuclear Detonations," Proceedings of IEEE, 53(1965), p. 1,935.
9. L. Sykes and J. Evernden, "The Verification of a Comprehensive Nuclear Test Ban," Scientific American, 247(Oct. 1982), p. 29; L. Sykes, J. Evernden and I. Cifuentes in D. Hafemeister and D. Schroeer, eds., Physics, Technology, and the Nuclear Arms Race (New York: American Institute of Physics, 1983).
10. R. Jansen, L. Graham, L. Porcello and E. Leith, "Side-Looking Airborne Radar," Scientific American, 237 (Oct. 1977), p. 84.
11. R. Aldridge, First Strike (Boston: South End, 1983).

Source: David Hafemeister, "Advances in verification technology", Bulletin of the Atomic Scientists January 1985, p. 39.

TABLE 13.2: U.S. AND SOVIET SATELLITES IN ORBIT

Orbit	Mission	United States 1983	United States 1989	Soviet Union 1983	Soviet Union 1989
Low					
100-500 kilometers	Photo reconnaissance	4	2	2	2
	Radar surveillance	-	-	2	2
	Electronic intelligence	6	-	-	-
	Manned	1	1	1	2
	Subtotal	11	3	5	6
Medium					
500-3,000 kilometers	Communication military	-	-	29	2
	Navigation	5	-	10	-
	Electronic intelligence	6	14	10	8
	Weather military	2	2	3	3
	Weather civil	2	2	1	1
	Remote sensing civil	1	1	1	2
	Subtotal	16	19	54	16
Semi-synchronous					
400 x 40,000 kilometers	Early warning	-	-	9	-
	Communication military	2	2	4	4
	Communication civil	-	-	8	-
	Subtotal	2	2	21	4
Semi-synchronous					
20,000 x 20,000 kilometers	Navigation	6	21	2	12
Synchronous					
36,000 x 36,000 kilometers	Early warning	3	3	-	3
	Electronic intelligence	4	4	-	-
	Communication military	20*	22*	-	12
	Communication civil	30**	65**	10	13
	Weather	2	2	-	1
	Subtotal	59	96	10	29
TOTAL		94	141	90	67

* Includes NATO satellites
** Includes INTELSAT satellites

Source: "Space Weapons", Bulletin of the Atomic Scientists, May 1984, Supplement, p. 145.

13.9 The information-gathering capabilities of photoreconnaissance satellites are limited by the fact that a visible-light system cannot function at night, and by the fact that visible, ultraviolet and infrared radiation cannot penetrate cloud cover. This problem is overcome by using a technique known as 'synthetic-aperture radar' or SAR in which a satellite illuminates the surface of the earth with radio waves and detects the reflections from the target. According to Hafemeister et al:

> The resolution of a SAR image is not as high as that of a comparable picture made with visible light ... It is good enough, however, to enable the U.S. to continue monitoring many activities in areas of the U.S.S.R. that are obscured by cloud or are in daylight for only a few hours a day.[5]

13.10 Information about missile launchings and tests is obtained using conventional radar systems to track missile flight paths or by monitoring the stream of information that is emitted by the missile during test flights. Both U.S. and Soviet ICBMs and SLBMs are flight tested throughout their life-cycles in order to monitor any changes in the accuracy and reliability that may result from prolonged operation and storage and to maintain confidence in initial estimates of system accuracy and reliability. Telemetry equipment installed aboard the missile monitors the performance of each sub-system throughout the flight, measuring the rate of fuel consumption, vibration, performance of the guidance system components, what temperature and pressure different parts of the missile are experiencing, and so on. This information - known collectively as telemetry - is broadcast to ground stations where it is collected and stored for analysis.

13.11 Telemetry is picked up by radars and electronic intelligence (ELINT) equipment located at ground stations and on board ships and aircraft. Some telemetry equipment can also be monitored by satellite. The United States uses two general classes of satellites for this purpose: low-flying 'ferret' satellites, and satellites stationed in geosynchronous orbit. The telemetric information can be encrypted in order to make it incomprehensible to an adversary. The unratified SALT II Treaty contains limits on telemetry encryption, but it only prohibits encryption that would inhibit verification of the treaty provisions. This provides for considerable ambiguity over what is and is not to be encrypted. As described in Chapter 2 of Part 1, the Soviet Union has encrypted the telemetry from some of its missile tests, leading to U.S. charges of Soviet non-compliance with SALT II.

13.12 These kinds of techniques and technologies enable the United States, and presumably the Soviet Union, to confidently detect missile tests when they occur and provide a great deal of information about the performance of the weapon. As noted by the SIPRI Yearbook 1984:

> ... as long as telemetry information can be intercepted and other monitoring techniques are not interfered with, it should be possible to acquire a considerable quantity of accurate information concerning the range, throw-weight and fuel consumption of the missile, the detailed performance of the guidance system during the boost phase, the technical characteristics of the MIRV bus, the number of RVs, and the ballistic coefficient and material composition of the RV shield. From this information, estimates of the reliability, accuracy and other technical characteristics of Soviet ICBMs are made. However, the uncertainty in this process will be substantially higher than the uncertainties in either country's estimates concerning its own ICBMs; if the Soviet Union continues its current practice of encoding large portions of the telemetry from its test flights, these uncertainties are likely to increase.[6]

The Monitoring of Nuclear Explosions

13.13 All nuclear weapons states explode nuclear warheads in order to test and develop their nuclear arsenals. The detection of atmospheric explosions is a relatively straightforward matter and is achieved by radiation and particle detectors contained on orbiting or geostationary satellites and through measurement of radioactive fallout. Following the signing of the Limited Test Ban Treaty by the United States, the Soviet Union and the United Kingdom in 1963, most nuclear tests are now conducted underground and as a result of the Threshold Test Ban Treaty and the Peaceful Nuclear Explosions Treaty which were signed in 1974 and 1976 respectively, are limited to a maximum yield of 150 kilotons.

13.14 Measures used to detect and monitor underground nuclear explosions include:

a. monitoring and analysis of the seismic waves generated by underground explosions;

b. atmospheric sampling for vented radioactive materials;

c. on-site inspections;

d. satellite observation to detect preparations for a test and earth subsidence after a test; and

e. intelligence channels including signals intelligence (SIGINT).

13.15 Of these methods, seismic monitoring is the most important. Underground explosions generate elastic waves that propagate both on and through the earth over very long distances (up to around 10 000km). The surface and sub-surface waves are made up of different types having different propagation and frequency characteristics. The amplitude or strength of all the propagated waves decreases over distance due to attenuation and geometric spreading. Consequently the strength of the wave measured at a particular point provides an indication of the strength of the original event and the distance between the source of the explosion and the point of measurement. Seismic waves can be detected with seismometers which are used to monitor earth tremors and disturbances. By using an array of these detection devices, the point of origin of the seismic waves can be determined.

Technical Problems Confronting Verification

13.16 Remote surveillance and verification techniques have advanced considerably in recent years, to the extent that very little of strategic significance can be done by one superpower without the other being aware of it. According to one author the last time the United States was surprised by a new Soviet program with any strategic significance was in 1957 with the launch of the Sputnik satellite.[7] Despite this steady improvement in verification technologies, a number of problems remain.

13.17 First, there are many capabilities - such as the number of warheads that are contained on a particular delivery vehicle, or the size of existing stockpiles of specific weapons - that cannot be monitored by remote means. As a result, successful arms control agreements will still need to rely on some degree of cooperation between the negotiating parties or on the development of agreed formulas, or 'counting rules' which take into account these uncertainties.

13.18 Counting rules were incorporated into the SALT II Treaty, and they have been given prominence in the United States' START proposals. The need for cooperation is also reflected in the problems currently confronting the negotiations over a Comprehensive Test Ban Treaty (see Chapter 14 for a detailed treatment of this issue). The basic problem here is that the waves yielded by nuclear explosions are similar to those of many other naturally occurring events such as earthquakes. Thus a major task is to discriminate the few events of interest from the many thousands of earthquakes occurring each year. The problem is compounded by the fact that it may be possible for the energy from a low-yield device to be effectively muffled by exploding the weapon in porous material (alluvium decoupling) or in a large underground cavity (cavity decoupling). Alternatively, the explosion could be detonated during a real or even simulated earthquake or similar event,

which would obscure the signal generated by the explosion. Scientists have developed ways of dealing with some of these possibilities, although evasion by decoupling remains a problem as Jack Evernden, a research geophysicist with the U.S. Geological Survey, has recently indicated:

> ... seismologists know of no certain way to distinguish the seismic waves of a several-ton tamped (placed in solid rock) explosion from those of a low-yield, fully decoupled nuclear explosion. Thus even the capability to detect and identify as an explosion the signal of a sub-kiloton decoupled explosion, one could not distinguish it from the plethora of small industrial explosions taking place frequently in the Soviet Union.[8]

Evernden concluded that detection of signals from low-yield decoupled explosions or explosions set off during an earthquake would require monitoring stations to be placed within the national boundaries of the two superpowers possibly supplemented by on-site inspections.

13.19 A second problem stems from the fact that verification is being made more difficult by the development of smaller and more mobile nuclear weapons which are being integrated into the conventional force structures of the superpowers and are often indistinguishable from non-nuclear weapons systems. Dr Julie Dahlitz, for example, argued that supervision of nuclear arms control (NAC) agreements have become substantially more difficult in the 1980s than in earlier decades when most of the present agreements and treaties were signed:

> The change is the outcome of vast technological advances in the field of nuclear weapons. As a result of better techniques and simplified methods, ... NAC among nuclear-weapon States has vastly increased in complexity, as designs and performance of weapons have undergone successive refinements. The trend continues while a substantial portion of the world's most able physical scientists is constantly engaged in further extending and perfecting the weapons.[9]

13.20 Similar arguments were presented to the Committee by Mr Andrew Mack, then Senior Research Fellow at the Strategic and Defence Studies Centre (SDSC) of the Australian National University. Mack suggested that new generation weapons presently under development by both sides such as the nuclear-armed Tomahawk cruise missile, United States anti-satellite devices and new American and Soviet land-based mobile missiles will be

increasingly difficult to verify once deployed because they are easy to hide and, in the case of the cruise missiles, indistinguishable from conventional types. Mack suggested that the only way to control these kinds of weapons is to prevent their testing:

> You can verify the testing but you cannot verify the deployment, and therefore, if you want to have an agreement on something which is unverifiable, you have to have an agreement to stop testing, and you make the assumption that they will not have to deploy something they have not tested.[10]

13.21 Similarly, Dr Desmond Ball, Director of the SDSC, also told the Committee that 'technological trends are going against the capabilities for National Technical Means of verification'. In Ball's view, the development by both sides of mobile ICBMs makes counting missiles, monitoring their deployment patterns and ensuring they do not exceed agreed numerical limits very difficult. More importantly, Ball suggests that the deployment of strategic cruise missiles will undermine existing arms control agreements because it will be:

> ... almost impossible to monitor their deployment by any National Technical Means of verification simply because they are too small and identical in shape, configuration and deployment patterns to conventional weapons.[11]

13.22 If the same level of verification is required then additional measures and techniques will have to be devised which may be unacceptable to one or both sides. Alternatively, weapons that are difficult to verify could be excluded from negotiations, but this would carry the risk that the resulting agreements may be incomplete or meaningless.

Verification and Arms Control

13.23 Technological change has substantially improved the ability to monitor an adversary and to verify his compliance with arms control agreements although, as just described, some problems remain. The introduction of new weapons technologies in particular means that existing methods of technical verification may need to be supplemented by various cooperative measures such as on-site inspections, agreed counting rules or exchanges of information. Even with these additional measures in place, it remains a fact that no significant arms control agreement can be perfectly verifiable. This may be due to the basic limitations of the measuring techniques or because the provisions to be monitored either have not or cannot be defined precisely enough.

Either way, there will always be risks involved in monitoring arms control agreements. The principal issue then is to decide how much risk is acceptable. This is more a political question than a technical one; and is largely determined by assumptions about the value of arms control and the motives and intentions of the other parties.

13.24 Those who strongly favour arms control argue that monitoring standards should not be so exacting as to foreclose agreement, since such agreements can deliver substantial benefits in terms of limiting the arms competition or channelling it in certain directions. These mutual benefits, together with the political costs of violating an internationally recognised agreement, are said to reduce any incentive to cheat. As a result, monitoring standards need only be adequate enough to detect significant levels of cheating and to detect it in time to take appropriate action. The need for adequate and flexible verification procedures characterised the United States' and Soviet Union's approach to arms control negotiations in the 1960s and 1970s, which led to a range of significant agreements including the Limited Test Ban Treaty, the 1972 ABM Treaty, and the SALT I and SALT II accords.

13.25 Those who are more sceptical of arms control, are concerned that agreements could limit the development of military capabilities which are needed to foil an adversary. They assume that the adversary is less interested in preserving agreements than in gaining an advantage and so can be expected to cheat on agreements unless there is a near certainty of being caught. As a result they require far more rigorous and effective methods of verification. According to one commentator,[12] this stronger approach to verification can take two forms:

> a. **A 'legalistic' approach.** Treaties are regarded essentially as legal contracts and all violations are considered to be serious regardless of their relative strategic significance. This view, typified by the opponents of SALT II, equalises all elements of a treaty. Consequently, the intelligence collection burden is much greater since the resolution of even relatively minor ambiguities can become important.
>
> b. **A metaphysical approach.** This approach 'is the most difficult of all to satisfy in terms of verification'. Its concerns go well beyond the letter of any specific agreement, insisting in effect that the parties conform to some unspoken behaviour code and interpreting actions as measures of intent or character. The approach can require very intrusive verification techniques and an 'implicit insistence on adherence to a "code of behaviour" to demonstrate good will, trustworthiness and so on, begs the question of whether both sides understand the rules of the game in the same way'.

13.26 The present U.S. Administration appears to take a stronger approach towards verification than has been the case in the past. Senior officials in the Reagan Administration have publicly complained about past Soviet behaviour of not abiding by earlier arms limitation agreements. The Reagan Administration has indicated that it may make 'proportionate responses' to offset Soviet violations, including an option not to continue to abide by the SALT II agreements. It has given notice that Soviet behaviour in arms control related matters will be interpreted as a measure of their intent in the international arena, and vice versa. And it has taken a much harder line on verification in the current negotiations in the Conference on Disarmament on chemical weapons, nuclear testing and anti-satellite weapons where it appears to be in favour of extending the scope and intrusiveness of verification certainly beyond the capabilities currently provided by NTM.

13.27 This view in turn reflects a more sceptical view of Soviet actions and intentions and of the sincerity of Soviet claims to comply with existing and prospective agreements. Some within the Reagan Administration consider that the Soviet Union has a specific policy of seeking to preserve treaty loopholes. They are also concerned that previous agreements such as SALT I and SALT II have enabled the Soviet Union to engage in practices which are not easily monitored and thus allow Moscow to exploit ambiguities in treaty provisions in ways that threaten to upset the strategic balance. They have also criticised the Standing Consultative Committee (SCC) which is the bilateral body in Geneva charged with handling compliance disputes arising out of the SALT agreements.

13.28 In assessing the Reagan Administration's current stand on verification and compliance some criticisms can arise. First, as noted in Chapter 2, its case against the Soviet Union may be overstated. Some of the alleged violations have already been dealt with by the SCC, others reflect differences over the meaning of certain treaty provisions, still others are largely unsubstantiated. The 'pattern' of serious and substantiated Soviet violations appears to reduce to three activities: the Krasnoyarsk radar, the encryption of some telemetry from Soviet missile tests, and the deployment of the SS-X-25 ICBM.

13.29 Secondly, even if the accusations were accurate, the Soviet Union is not alone in seeking to preserve certain interests through the arms control process or exploiting potential loopholes contained in existing agreements. The United States avoided imposing warhead limits during the SALT I negotiations in order to allow the MIRVing of its ballistic missiles. There is a broad consensus that the SDI research program when implemented will contravene the 1972 ABM Treaty or at least stretch the meaning of its provisions beyond reasonable limits. Other possible problem areas include the proposed Midgetman missile and the new phased-array radar systems being installed as part of an updated early warning and battle management system. Attempts by both superpowers to exploit treaty provisions simply underlines the fact that arms control

is just another element of competition to be used to protect the interests of the negotiating parties. Given the adversarial nature of their current relationship, a certain amount of cheating at the margins has to be expected and it is disingenuous of either side to expect otherwise.

13.30 Third, increased American emphasis on Soviet non-compliance has coincided with the development and advocacy of new national security policies and weapons programs. Past Soviet violations formed a major rationale for the United States rejecting a Soviet proposal to place a moratorium on underground nuclear testing. As Midgetman comes near to fruition, the charges that the SS-X-25 violates SALT II becomes progressively more certain. And the claims that the Soviet Union is developing a territorial defence against ballistic missile attacks - expressly forbidden by the ABM Treaty - have been stressed by those in favour of the SDI program.

13.31 Fourth, an uncompromising stand over verification and a continued emphasis of doubtful treaty breaches ultimately becomes counterproductive, takes the focus off genuine compliance problems and sours relations between the United States and the Soviet Union. It also devalues the arms control process. The stricter the verification requirements become, the more circumscribed will be the arms control measures that can be negotiated. Three results are possible, none of which are particularly useful from an arms control perspective.

a. No agreements since the verification standards would be too exacting and unacceptable to either or both sides;

b. partial agreements covering only those forces whose deployments could be monitored precisely. Such agreements may even prove to be counterproductive by maintaining forces that would have a destabilising effect in a crisis (MIRVed, static ICBMs for example); and

c. comprehensive but essentially unverifiable agreements which would probably increase tension as a result of mutual suspicion.

13.32 The past and present Soviet attitudes towards compliance can also be criticised. The Soviet Union has on a number of occasions been prepared to use verification issues for political purposes. While like the U.S. generally complying with the overall provisions of negotiated treaties, the Soviet Union has also exhibited a tendency to take advantage of ambiguities in, or grey areas surrounding, the agreements. It also appears not to take into account compliance considerations when planning its modernisation program. The Soviet practice of consistently authorising new missile programs that provide only marginal improvements over their predecessors but produce major

compliance headaches is a case in point. These practices do not amount to any signficant level of non-compliance overall, but they serve to erode the arms control process by raising questions about Soviet intentions, providing grounds for continuing charges of non-compliance.

13.33 Current Soviet attitudes towards verification, and arms control generally, are harder to deduce than in the case of the United States, largely because of the closed nature of Soviet society. The Soviet Union has always shown a reluctance to open its military establishments to inspection by outsiders, considering that on-site inspections in particular would be used by the West to gain intelligence about Soviet military capabilities. This attitude has relaxed somewhat in recent years as both sides have developed extensive satellite-based National Technical Means of verification and as the Soviet Union achieved strategic parity with the United States.

13.34 The Soviet Union now appears to favour the arms control process as a means of maintaining parity and restricting the process of technical improvement in order to alleviate what it perceives as an emerging threat to its land-based forces. Partly as a result of this it has accepted, in principle at least, some additional cooperative measures such as on-site inspections - to facilitate the verification of a comprehensive test-ban treaty, the destruction of chemical weapons and mutual and balanced force reductions in Europe - and the location of unmanned seismic monitoring devices within its homeland (see Chapter 14). Despite these advances, the Soviet Union does not have a totally open view of verification. As one author recently concluded:

> ... Soviet flexibility on verification and cooperative measures remain constrained by deep-seated sensitivities about espionage and protection of national security, broadly defined. The Kremlin has been forthcoming in the past on verification questions where there has been a specific reason to do so - such as to secure the benefits of a negotiated agreement - but only to the extent necessary to monitor specific provisions within that agreement. Greater openness is viewed not as an end in itself, but as tied to the object of negotiations. Nor will the Kremlin's negotiators be particularly philanthropic on verification issues. The United States needs intrusive verification provisions far more than does the Soviet Union. Soviet verification proposals invariably are inadequate at the outset of negotiations; they improve over time, but they may also be withdrawn. Attractive verification provisions will usually be offered by the Kremlin in the expectation of gain elsewhere in an agreement; they will be won by the West only in the course of hard bargaining.[13]

Similarly, it does not seem to favour any extension of the scope of verification to include, for example, an ability to monitor missile production or weapons inventories. Overall, the Soviet Union prefers to use National Technical Means as the primary method of verifying arms control agreements. Attempts to go beyond these are usually viewed as attempts by the West to gain unwarranted intelligence or as a smokescreen to mask disinterest in reaching agreements.

Committee Views

13.35 The different positions taken by the superpowers is likely to make it very difficult to find a verification formula that would be acceptable to both sides. Failure to agree on verification could increase political tensions between the superpowers, and limit the prospect and scope for arms control agreements in the future. Such an eventuality would be extremely unfortunate. In the absence of further, substantial agreements, the arms competition between the superpowers would escalate and lead to the further development of potentially destabilising capabilities and technologies. Neither superpower can afford an unrestricted arms competition. In the Committee's view, it is vitally important that confidence be restored in the arms control process and meaningful agreements be reached in a number of key areas.

13.36 The Committee considers that, at present, the arms control debate is being dictated by verification issues, rather than vice versa. The Committee considers that this relationship should be the other way around. It further considers that verification standards should be sufficient, or adequate, to prevent violations that would vitiate the basic purposes of an agreement, or threaten the strategic balance. The United States and the Soviet Union should show similar moderation in their approach to verification and should seek to improve the present climate for achieving arms control agreements by:

a. expressing public confidence in the existing arms control regime and avoiding actions that clearly violate current agreements. The United States should immediately ratify the SALT II Treaty as well as the Threshold Test Ban Treaty and the Treaty on Peaceful Nuclear Explosions. (Successive administrations have adhered to the above three Treaties). The Soviet Union should cease encrypting data on its ballistic missile tests and dismantle, or relocate, the Krasnoyarsk radar;

b. making greater use of the Standing Consultative Committee (SCC) to raise non-compliance issues, consider questions involving interference with technical means of verification, and develop additional means of increasing the viability of existing agreements, including possible changes to treaty provisions in order to eliminate or reduce ambiguities. All these functions fall within the legitimate jurisdiction of the SCC;

c. avoiding stipulating unnecessary verification requirements which foreclose any opportunities for the negotiation of agreements; and

d. developing additional cooperative measures which either overcome or lessen the importance of genuine verification difficulties.

13.37 The Committee accepts that these changes will only occur with the cooperation of the two sides. The SCC, or any other negotiating body, cannot be effective while the superpowers continue to question each other's intentions toward past agreements, and if they do not wish to maintain the viability of existing agreements. At present, the prospect of improvement in these areas appears poor and is hindered by the growing nexus between verification and the politics of the superpower competition. This nexus needs to be broken. This is best achieved by developing independent means of verification which can be used to separate real and genuine compliance concerns from those being used to support political positions or arguments.

13.38 To facilitate this process, the Committee considers that:

a. as a minimum, the SCC be maintained as a channel of discussion on verification and related matters between the superpowers;

b. a bipartisan, non-government agency be established to report on United States and Soviet compliance with arms control agreements (this could be a new agency operating under the control of the United Nations Secretary-General, a standing committee in the Conference on Disarmament, or an existing body such as the International Atomic Energy Agency); and

c. independent means of monitoring compliance with existing or prospective agreements be developed and possibly operated under international control. Some progress has already been made in this regard in the areas of seismic detection (see Chapter 14) and satellite surveillance. Consideration could be given to extending the present responsibilities and activities of the International Atomic Energy Agency to cover other areas such as chemical and biological weapons.

Australia's Role

13.39 The Australian Government has argued that verification is crucially important to successful arms control. For example, in the pamphlet, Uranium, the Joint Facilities, Disarmament and Peace, it is stated that:

> There will be no arms control between the superpowers unless each side is confident the other cannot cheat on that agreement. That is a fact of life. Both superpowers are deeply suspicious of each other. Both insist on effective monitoring and verification of any treaty on arms control into which they enter. To this point neither has been able to agree on full on-site inspection of arms control agreements ... The only way therefore in which those agreements can be verified is by what is termed National Technical Means of verification. It is highly unlikely that some major arms control agreements between the superpowers would have been concluded if there had been no Pine Gap or Nurrungar. If we were to *abolish Pine Gap and Nurrungar, we would be* seriously damaging the prospect of agreements on the limitations of nuclear arms between the superpowers. Once again we would have achieved exactly the opposite of what we would have set out to achieve.[14]

A similar view was expressed by the Prime Minister in his speech to Parliament on 6 June 1984. Mr Hawke stated that in the Government's view, 'adequate and effective provisions for verification is a crucial precondition for the progress in arms control negotiations'. Mr Hawke also described the role of the joint facilities in the verification process, arguing that removal of the facilities 'would damage the capacity of the United States for monitoring and verification, so striking a very serious blow at the prospect of arms control agreements between the superpowers'.

13.40 Verification concerns were also addressed in the Government's proposed program of work for the Conference on Disarmament's committee on a comprehensive test ban treaty. Under the program the issues to be considered were the central importance of verification of a CTB, the means for monitoring compliance, specific verification problems and their solutions, and the required procedures and mechanisms for monitoring compliance and considering issues of concern to the participating parties.

13.41 The Committee supports the view that verification is important for arms control. But the issue is rather more complex than that simple assertion, or the arguments that have been advanced by the Government. First, nations have, in the past,

entered into agreements which are not verifiable. The most important example of this is the 1972 Biological Warfare Convention. Secondly, the fact that activities can be adequately or even effectively monitored or verified does not necessarily mean they will be incorporated into an arms control agreement. As described earlier, negotiated agreements are part of the competition between the superpowers and so tend to reflect basic interests that may have little to do with the overall aims of arms control. Third, the so-called National Technical Means of verification are not separately constituted systems that have been developed exclusively for monitoring arms control agreements. As described in Chapter 15, verification is simply one of the functions of the worldwide surveillance and intelligence systems that are maintained by both superpowers. These systems contribute to a number of other functions - such as early warning, the collection of operational and strategic intelligence and command and control - some of which may be contrary to arms control objectives. Fourth, as described earlier, insistence on very strict verification and compliance provisions can serve to hinder or prevent progress in arms control and so act to throw the arms control baby out with the verification bath water.

13.42 The Committee is concerned by the lack of detailed public information on Australia's policy towards verification. The Government has stated that it is in favour of both 'adequate' and 'effective' means of verification without defining what it means by these terms. There is a suspicion that the Government may be using verification as a 'catch-all', or that it is simply supporting the United States' position without being fully aware of the implications of that position.

13.43 *In view of the importance officially attached to* verification, the Committee recommends that the Government release a detailed statement on Australia's verification policy including:

a. the basic aim of verification and its relation to arms control (whether monitoring standards should be 'adequate' or 'effective' as defined in this Chapter);

b. the minimum satisfactory, from Australia's point of view, for technical verification and compliance standards that apply for existing arms control agreements and those additional agreements favoured by Australia;

c. the current means of monitoring compliance and how these can be improved; and

d. details of Australia's present contributions to verifying compliance with existing arms control agreements.

13.44 The Committee considers that Australia should continue to contribute to the development of independent means of monitoring compliance with both bilateral and multilateral arms control treaties. It also should develop alternative means of overcoming or reducing the effects of compliance difficulties that arise from technical or other limitations.

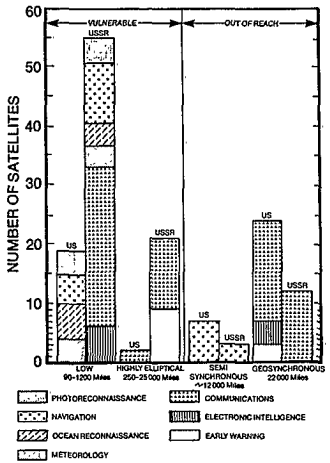
Anti-Satellite (ASAT) Warfare

Introduction

13.45 During the 1970s and 1980s, both the United States and the Soviet Union greatly increased their reliance on space to support their conventional and nuclear forces, to monitor their adversaries and to verify compliance with arms control agreements. Between 1958 and 1985, over 2 300 military satellites of various kinds were launched.[15] Both countries now maintain a sizeable number of satellites in orbit which perform a variety of functions (See Table 13.2). Most of the Soviet satellites are in relatively low orbits whereas U.S. satellites tend to occupy higher orbits. U.S. satellites are more sophisticated and generally longer-lived than their Soviet counterparts (which in turn must be launched more often to maintain the same capability). Soviet satellites are grouped together and tend to provide a back-up capability to dual land or sea-based facilities whereas the U.S. satellites tend to constitute their principal means of communications and information gathering. The increasing utilisation of space and the integration of satellites into the military systems of both sides is resulting in greater attention being paid to anti-satellite (ASAT) capabilities and systems. Because satellites amplify the effectiveness of the military forces they serve, they become exceptionally tempting targets as soon as hostilities are about to begin.

13.46 At present, both sides have only limited ASAT capabilities (these were described in Chapter 3). The Soviet system, which has been operational for some time, poses a threat only to low-level American space assets. It does not threaten satellites in geostationary orbit including those on which U.S. strategic forces would rely in wartime (See Figure 13.1). Furthermore the Soviet ASAT has not performed well in tests, it is cumbersome and can only be launched when a target passes over the area surrounding the launch facility. At present the United States does not have an operational ASAT system although one has been successfully tested and is planned to be deployed in 1987. If this system meets its specifications, it will be more capable than the Soviet system. Launched from an F-15 aircraft, the American Miniature Homing Vehicle (MHV) can be used to attack low-altitude satellites at almost any point in their orbit with relatively short flight time. The U.S. system will be capable of

Figure 13.1 Vulnerability and distribution of US and Soviet satellites



Source: Union of Concerned Scientists, *The Fallacy of Star Wars*, Vintage Books, New York, 1984, p.189.

attacking a wide range of Soviet military satellites, including all photographic and electronic intelligence satellites, the Radar Ocean Reconaissance Satellites (RORSATS) and the Salyut Space Station. A number of higher orbiting satellites will also be vulnerable because of their highly elliptical orbits which brings them close to earth over the Antarctic.[16]

13.47 Both sides are investing considerable effort in devising a range of protective measures to enhance the security and survivability of their satellites and are pursuing research into ASAT related technologies and weapons including ground or space-based lasers, high-energy particle beam weapons and associated command and control systems. In the absence of negotiated constraint, both the United States and the Soviet Union may develop more capable ASAT systems able to attack satellites in higher orbits.

13.48 A major reason for both sides developing and perfecting ASAT systems is to prevent the other from gaining a real or perceived advantage in this form of war-related technology. There is also the view that because satellites are becoming integral components of earth-based military systems - non-nuclear as well as nuclear - they represent legitimate targets. An additional incentive, at least for the Soviet Union, may be found in the nascent Chinese military space program.

Negotiations on Limiting ASAT Systems

13.49 There are no treaties banning the development or deployment of ASAT systems although the 1972 ABM Treaty, the 1963 Partial Test Ban Treaty and the 1967 Outer Space Treaty all place some limitations on what kind of systems could be deployed. Attempts to stop the spread of the arms race into outer space initially were made by the United States and the Soviet Union in bilateral negotiations in 1978 and 1979 but these talks ended in 1980 following the Soviet invasion of Afghanistan.

13.50 In 1981 the Soviet Union submitted to the United Nations a draft treaty banning the placement of any kind of weapon into orbit around the Earth. This was followed by a second draft, presented in August 1983, which banned the use of force in outer space and the testing or creation of new anti-satellite systems and required dismantling of existing systems. The treaty would rely on National Technical Means for verification, and consultation and cooperation would be through a consultative committee to be established under the treaty. The Reagan Administration has acted coolly towards both these proposals, stating to Congress that 'no arrangements or agreements beyond those already governing military activities in outer space have been found to date that are judged to be in the overall interest of the United States and its allies', and that it would not 'be productive to engage in formal international negotiations'.[17] The Administration nevertheless remains under Congressional pressure to resume negotiations with the Soviet Union.

13.51 Also in 1983, the United Nations General Assembly adopted overwhelmingly a resolution requesting the Conference on Disarmament 'to intensify its consideration of the question of prevention of an arms race in outer space' and 'to establish an ad hoc working group ... with a view to undertaking negotiations for the conclusion of an agreement'.[18] The CD has considered the issue of the prevention of an arms race in outer space in each subsequent year, with little progress. Initially, the main obstacle was in agreeing on a mandate for committee considerations. The Socialist and non-aligned countries insisted on undertaking negotiations for concluding an agreement to prevent an arms race in space, in line with the UNGA resolution. The United States remained opposed to any mandate which provided for negotiations of an agreement, emphasising the difficulties of obtaining comprehensive verification. It joined other Western countries, including Australia, in presenting a mandate which requested the Conference to identify, in the first instance, issues relevant to the prevention of an arms race in space. In 1985, agreement was reached on a mandate which required an Ad Hoc Committee to examine 'issues relevant to the prevention of an arms race in outer space, taking into account all existing agreements, existing proposals and future initiatives'.[19]

13.52 Among the issues important to the United States is its expressed determination to continue with its Strategic Defense Initiative research program which may eventually result in the deployment of a space-based ABM system. Such a system is likely to include an ASAT or potential ASAT capability. For these reasons and because ABM and ASAT issues are the subject of sensitive negotiations at the Geneva conference, it seems unlikely that the United States would be ready to participate in ASAT treaty negotiations for some time.

Implications of Anti-Satellite Systems

13.53 A number of submissions to the inquiry argued strongly that the continued development of ASAT capabilities would escalate the arms race, undermine the strategic balance, threaten the future of arms control and reduce the security of both the United States and the Soviet Union. The arguments include the views that:

a. ASATs pose a direct threat to an adversary's early-warning, intelligence and communications satellites and so in the event of nuclear conflict, would destroy the ability of the two sides to monitor each other or to control their own forces, thereby increasing the potential for further escalation. The early use of ASATs in a conventional conflict could also precipitate a nuclear exchange;

b. as a counterforce weapon, ASATs contribute to a 'first strike' capability and so undermine stability particularly during a crisis;

c. ASATs directly threaten National Technical Means of verification and so make future bilateral arms control agreements more difficult to achieve as well as signal a diminished interest in arms control and other confidence-building measures generally;

d. since ASATs incorporate technologies which derive from ABM systems and have potential ABM capabilities, continued ASAT development, testing and deployment would enable ABM development to occur under the guise of an ASAT program and threaten the 1972 ABM Treaty; and

e. further development of ASATs will lead to an arms race in outer space as both sides continue to test and deploy a range of anti-satellite measures and countermeasures, including space mines and lasers.

13.54 The Australian Government shares many of these concerns, and is 'encouraging the Conference on Disarmament to think through the longer term implications of recent developments relating to outer space before irreversible steps are taken, with a view to an agreement or agreements to avoid destabilising developments and dimensions of the arms race'.[20] According to the Department of Foreign Affairs 1986 publication Australia and Disarmament: steps in the right direction, the Government's attitude on preventing an extension of the arms race into outer space:

> has been conveyed in private diplomatic exchanges with the countries most directly concerned and has been expressed publicly on numerous occasions. It was also reflected in the vote by the Australian delegation at the 1984 and 1985 United Nations General Assemblies in support of resolutions sponsored jointly by Egypt and Sri Lanka.[21]

Committee Views

13.55 The Committee shares the United Nations' and Australian Government's concern over the prospects of continued and unrestrained development and deployment of ASAT weapons and capabilities. Such deployment could undermine stable deterrence, reduce escalation control in the event of conflict, and erode confidence in existing and future arms control agreements.

13.56. The Committee concludes that the security of both the United States and the Soviet Union would be enhanced far more by the ensured survival of their satellite systems than by an ability to destroy satellites and that it is important to begin negotiations on an agreement banning the further testing and deployment of all ASAT weapons as soon as possible. The Committee therefore recommends that:

a. Australia call for a ban on deployment of all existing ASAT systems and an immediate moratorium on the further testing, development and deployment of ASAT systems; and

b. the initial treaty negotiations could be restricted to prohibiting the testing and development of future ASAT systems.

Once agreed, the question of destruction of existing superpower ASATs should be considered and the treaty extended to all nations.

13.57 The Committee accepts that there may be some verification problems, particularly with respect to the destruction of ASATs and the overlapping functions of some civilian and military satellites. These may require special verification techniques to be developed. The Committee considers that on balance, the risks associated with potential non-compliance of the treaty are less than those of an unfettered competition in ASAT weapons and capabilities. In any case agreements to prevent further testing and deployment of ASAT weapons should not prevent either side from making its space assets robust against violations of such agreements.

13.58 In view of the increasing integration of U.S. and Soviet satellites into their military systems, the reluctance of the United States at this stage to negotiate an ASAT agreement, and the important role of satellites in the verification process, the Committee considers that there may be merit in establishing an independent means of verifying arms control agreements, for example through the establishment of an international satellite monitoring agency or use of non-military satellite systems such as INTELSAT or METEOSAT to perform such a role.

CHAPTER THIRTEEEN
ENDNOTES

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3. David Hafemeister, 'Advances in verification technology', Bulletin of the Atomic Scientists, January 1985, pp.35-40.

4. See Union of Concerned Scientists, The Fallacy of Star Wars, New York, Vintage Books, 1984, Chapter 10; and SIPRI Yearbook 1986, Chapter 7.

5. Hafemeister, et al, 'The Verification of Compliance with Arms-Control Agreements', p.42.

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16. See Richard L. Garwin and John Pike, 'History and current debate', Bulletin of the Atomic Scientists, Special supplement on space weapons, May 1984, pp.25-45; and Union of Concerned Scientists, The Fallacy of Star Wars, New York, Vintage Books, 1984, Chapter 10.

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CHAPTER 14

NUCLEAR TESTING AND THE COMPREHENSIVE TEST BAN (CTB)

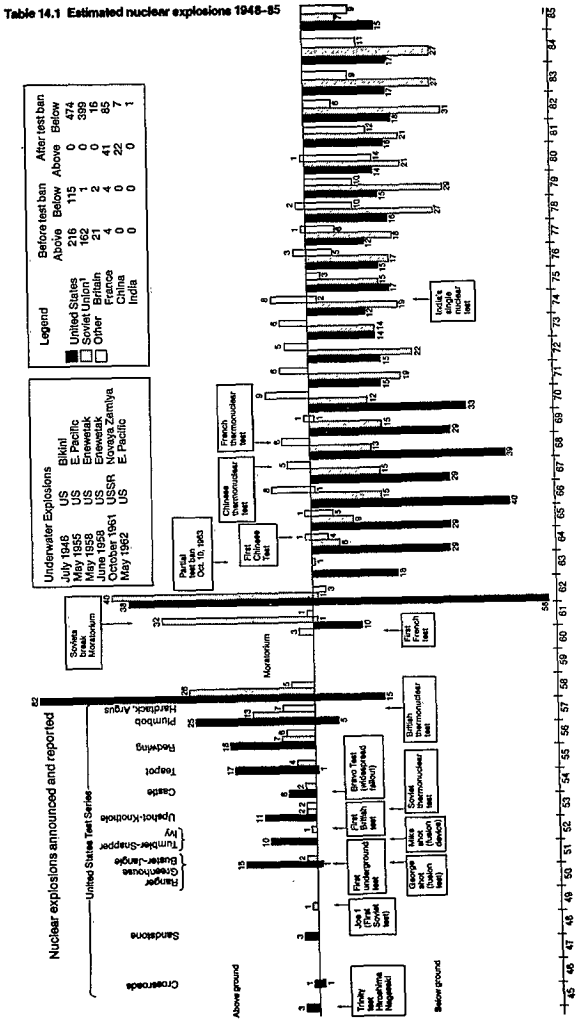
14.1 Since the first detonation of a nuclear weapon by the United States at New Mexico on 16 July 1945, there have been over 1 500 nuclear explosions. Around one third of these have occurred in the atmosphere, the remainder underground. Six nations have been responsible for the nuclear detonations - the United States, which has conducted about half of the total number of explosions (805 of a total of 1 570 known and presumed explosions as of 31 December 1985); the Soviet Union (562 explosions as of 31 December 1985); the United Kingdom (39); France (134); China (29) and India (1).[1]

14.2 The same period has witnessed continuing efforts on the part of the superpowers and others to negotiate to restrict and ultimately prevent the testing of nuclear weapons. The history of the negotiations to achieve a comprehensive test ban has been long and complicated. It clearly shows the range of constraints and obstacles that operate in the arms control field. These include both technical difficulties and political pressures which come from both inside and outside governments. These obstacles continue to operate and the prospects of a successfully negotiated treaty banning all nuclear tests in all environments still appears to be small.

The History of Nuclear Testing and Negotiations to Prevent It

14.3 The principal milestones in the history of nuclear testing are shown in Table 14.1. Between 1945 and 1949, the United States carried out a small number of tests of fission weapons at Bikini and Enewetak Atoll in the Marshall Islands. The explosion of the Soviet Union's first nuclear device in 1949 led the United States to increase its research into fusion weapons. It also began development of small-yield fission weapons for use on the tactical battlefield and opened a test site at Nevada, about 65 miles from Las Vegas. Over the next nine years, the United States carried out over 160 tests of both fission and fusion devices with yields ranging from sub-kiloton to the multi-megaton range. A number of these tests caused measurable radiation to fall on U.S. cities. Others contaminated inhabitants of a number of small islands in the vicinity of Bikini. The fallout from the 15 megaton Bravo test also landed on a Japanese fishing vessel, the Lucky Dragon, which had inadvertently crossed the path of Bravo's radioactive cloud. By the time the vessel arrived in Japan two weeks later the entire 23-man crew had fallen ill; one sailor later died. During this same period, the Soviet Union and the United Kingdom also carried out a number of nuclear tests, with radioactive rain falling on Japan as a consequence of one of the Soviet Union's thermonuclear tests.

Table 14.1 Estimated nuclear explosions 1948–85



1. The total for Soviet atmospheric tests includes 33 additional tests conducted in the period 1949–58, for which exact years are not publicly available.

Source: Based on table from *The Nuclear Almanac: confronting the atom in war and peace*, M.I.T., 1982, pp.304–5 with figures updated to reflect information from the *SIPRI Yearbook 1986*, pp.128–9.

14.4 These incidents and the general increase of radioactive elements in the atmosphere raised widespread public concern over the dangers of fallout and led to calls for the cessation of nuclear weapons tests. The first proposal for a complete ban on nuclear testing came from India's Prime Minister, Mr Jawaharlal Nehru, in an address to the United Nations in 1954. In 1955, the Soviet Union declared its preparedness to negotiate a test ban treaty as part of a package of general arms control and disarmament measures and, in 1957, proposed a two or three-year moratorium on nuclear testing, to be supervised by an international commission. In the spring of 1958, the Soviet Union unilaterally announced that it would suspend tests if the United States agreed to follow suit. This proposal followed an extensive series of its own nuclear tests.

14.5 The United States was initially reluctant to end testing as it was felt that the continued development of nuclear weapons was needed to counter the Soviet Union. By 1958, the Eisenhower Administration had moved away from this position and in response to the Soviet moratorium proposal, suggested that the Soviet Union participate in an examination of the technical requirements for verification of a nuclear test ban. The offer was accepted by Premier Khruschev on 9 May 1958.

14.6 The resulting Conference of Experts met in Geneva over July and August of 1958 and produced a report which concluded that it was technically feasible to set up an effective control system for the detection of violations of a possible agreement banning weapons tests. According to Desmond Ball, the report:

> ... claimed that nuclear explosions down to 1 kiloton in the atmosphere and 5 kilotons underground could be detected and identified with a system of 160-170 land-based and 10 sea-based control posts each manned by 30-40 people, and equipped with instruments to detect radioactive debris and seismic, hydroacoustic and radio signals. It was also provided that the international control organisation 'could' conduct on-site inspection of ambiguous or suspicious events.[2]

14.7 Based on this technical analysis, negotiations between the United States, the Soviet Union and the United Kingdom were initiated in Geneva on 31 October 1958 in an attempt to reach agreement on a test ban treaty. Around the same time, the three powers agreed to suspend nuclear tests as part of a voluntary moratorium on weapons testing. The test ban negotiations, formally known as the Geneva Conference on the Discontinuance of Nuclear Weapons Tests, continued until early 1962. Some progress towards a treaty was made, although considerable contention remained over the issues of verification and the nature of the control organisation. These differences were described by Greb and Heckrotte as follows:

> The United States and Britain envisaged an international organization, internationally staffed, with decisions made by majority vote. Most important, on-site inspections could be made whenever a questionable event occurred. From the Soviet perspective, such an organization could be manipulated by the West for intelligence purposes. Moscow thus sought a verification system under which the Soviets would in effect retain control of all operations on their own territory. For the West this simply spelled veto and self-inspection.[3]

14.8 At the same time, opposition to a test ban from within the Eisenhower Administration was gathering force. A number of officials argued that tests had to proceed in order to develop new strategic and tactical weapons including the neutron bomb. Doubt was also being raised over the capabilities of the verification and control systems to detect small explosions, especially those detonated in large underground cavities. Faced with these problems and pressures, the U.S. turned away from a total ban and began to favour either a ban on atmospheric tests or a threshold ban. In the spring of 1960, the U.S. delegation presented to the Geneva Conference a threshold treaty banning underground tests above a specified seismic magnitude, along with atmospheric tests. While both sides were prepared to compromise to achieve a treaty there remained significant differences over the issue of a voluntary moratorium on tests below the threshold level and the question of on-site inspections - the Soviets favoured three per year while the United States required 20 such inspections.

14.9 These difficulties were compounded by France's entry into the nuclear club on 13 May 1960, when it exploded its first nuclear device in Algeria, and by the U-2 spy plane incident. The Soviet Union, maintaining that continued testing by France could improve the nuclear capability of the Western alliance, announced on 30 August 1961 that it would resume testing. It was clear, however, that it had been preparing for a resumption of testing for some time. Starting the very next day, it conducted a comprehensive series of tests including the largest nuclear explosion ever carried out, equivalent to 58 megatons.

14.10 The United States was caught by surprise by the Soviet resumption. It had let its weapons laboratories run down and could not immediately respond. This situation did not last long and the United States resumed testing in September 1961 with a long series of underground detonations in Nevada followed by a series of atmospheric tests in the vicinity of Christmas and Johnston Islands in the Pacific.

14.11 On 4 March 1962, the U.S.-Soviet test ban negotiations entered a new forum, the Eighteen Nation Disarmament Conference (ENDC) which also served as a principal focus for international pressure for a test ban since nations other than the nuclear

weapons states were involved. The Conference initially considered a comprehensive test ban but, despite some further concessions by both superpowers, the earlier impasse over the number of on-site inspections continued to plague negotiations. While the Soviet Union refused to negotiate a comprehensive test ban, it eventually accepted a joint U.S.-UK proposal for a limited or partial treaty banning tests in the atmosphere, in outer space and under water.

The Limited Test Ban Treaty (LTBT)

14.12 The Limited Test Ban Treaty was signed on 5 August 1963, and entered into force on 10 October of the same year. By 1986, 115 states had become parties to the Treaty; two nuclear weapons states, China and France, are among those that have not signed. The LTBT was a significant benchmark in attempts to ban all nuclear weapons tests, and it met the concern that had fueled the initial public outcry - the fallout from atmospheric explosions. The LTBT also operated to restrict the spread of nuclear weapons to other states and served as a precedent for future arms control agreements.

14.13 While the LTBT sharply reduced atmospheric nuclear fallout, its effect on technical innovation in nuclear weaponry was minimal. Both the United States and the Soviet Union continued with extensive underground testing designed to improve and augment their nuclear arsenals. The signing of the LTBT also took international pressure off the superpowers and the period following 1963 saw them give priority within the ENCD (now the Committee on Disarmament) to the Nuclear Non-Proliferation Treaty (NPT) rather than on achieving a comprehensive test ban.

14.14 As a result, no further negotiations on limiting nuclear testing took place for over a decade until the signing of the Threshold Test Ban Treaty of 1974. This Treaty arose out of initial discussions between Soviet General Secretary Leonid Brezhnev and Secretary of State Henry Kissinger, and was signed at the July 1974 summit meeting between Brezhnev and President Nixon. The Treaty prohibited underground nuclear tests of more than 150 kilotons where verification was to be conducted using National Technical Means. While the impetus for the Threshold Treaty was largely political, it did contain a number of positive aspects. As Desmond Ball stated:

> Most particularly, the Soviet Union agreed to reveal the location of its nuclear test sites, to conduct tests at no other sites, and to supply to the United States information about the geological formations at each site to permit U.S. monitoring agencies to calibrate their equipment. The agreement to exchange data which would assist in the determination of explosion yields was 'the first agreed step in bilateral arms control going beyond National Technical Means'.

On the other hand:

> ... as Kissinger has also admitted, 'the arms control utility of a threshold test ban was marginal'. The limit of 150 kilotons 'was not set to conform with U.S. seismic monitoring capabilities but rather to allow completion of on-going weapons programs'. Moreover, about 90% of all U.S. and Soviet tests over the previous several years had been below the 150 kiloton limit permitted by the Treaty. Hence, the TTBT was widely perceived as 'spurious and a mockery of a test ban', doing no more than legitimizing continued testing by the superpowers.[4]

14.15 A separate agreement was reached on the troublesome issue of peaceful nuclear explosions. This was the so-called Peaceful Nuclear Explosions Treaty (PNET) which was signed on 28 May 1976. The PNET restricts the yield of individual explosions used for peaceful purposes to less than 150 kilotons, but permits salvo or group explosions in which the aggregate yield is less than 1.5 megatons and where the individual yields can be determined to be no greater than 150 kilotons. The Treaty and its associated protocol provide for extensive data exchange on all peaceful nuclear explosions and on-site inspection for group explosions. It thus incorporated two important concessions by the Soviet Union - first, the relinquishment of a long-held position that peaceful nuclear explosions should not be restricted like explosions at weapon test sites; and secondly, an agreement for on-site inspections. Critics of the PNET argued that the Treaty endorsed nuclear explosions for peaceful purposes and thus 'could prove an obstacle to a comprehensive ban and provide an excuse for potential proliferators to label weapons development as peaceful'. In addition, the on-site inspections were criticised 'because the circumstances were unlike those under a comprehensive ban and thus could prove to be a stumbling block in that context'.[5]

14.16 Neither the Threshold Treaty nor the Peaceful Explosion Treaty has been ratified by the U.S. Senate. Both countries continue to adhere informally to the treaties' restrictions, even though the verification provisions have not gone into effect. These provisions nonetheless did break important ground. As Greb and Heckrotte noted:

> Many of the on-site inspection procedures which negotiators painstakingly developed could carry over to a comprehensive ban and possibly could have parallel effect in other arms control treaties requiring on-site inspection. They represented, moreover, a significant evolution in Soviet thinking about cooperative and intrusive forms of verification.[6]

14.17 In 1975 the Soviet Union presented to the United Nations General Assembly a draft treaty calling for 'complete and general prohibition of nuclear weapons tests'. The draft treaty provided for the prohibition for unlimited duration of all nuclear weapons tests in all environments, although it allowed for peaceful nuclear explosions. Verification was to be by National Technical Means although in 1976 the Soviet Union modified this position to include the possibility of voluntary challenge inspections. This concept, which had been first introduced by Sweden in the 1960s, provides that if a seismic event occurs in country A and appears to country B to be ambiguous, country B may request permission to inspect the region surrounding the event. Country A then can either accept or reject the request. If rejected, country B could choose to withdraw from the Treaty.

14.18 By the beginning of 1977 the Carter Administration had assumed office determined to make significant progress in disarmament and arms control. Encouraged by the Soviet moves in the United Nations, the new administration sought to re-open discussions on a Comprehensive Test Ban. The Soviets agreed and a new round of negotiations between the United States, the Soviet Union and the United Kingdom began in Geneva in July 1977.

14.19 The Geneva talks continued from 1977 to 1980 and considerable progress was made in overcoming many of the basic obstacles and objections that had hindered earlier negotiations. The main points of agreement can be summarised as follows:

a. the treaty would prohibit any nuclear weapons test explosion in any environment and would be accompanied by a protocol establishing a moratorium on nuclear explosions for peaceful purposes. This latter undertaking followed a public announcement by Brezhnev on 2 November 1977 that the Soviet Union would accept such a moratorium for the duration of a comprehensive test ban, and it represented an important Soviet concession;

b. the treaty would establish a global network of seismic monitoring stations, including the possible location of a number of stations within the boundaries of each negotiating party, as well as an exchange of seismic data to assist verification. The United States had already developed and placed in operation in the U.S. and Canada high quality, automatic seismic stations that operate in conjunction with satellites and ground control stations. A group of British and Soviet scientists visited the U.S. prototype installations in July 1979; and

c. the treaty would need to include a provision for on-site inspections, in principle at least similar to the challenge or voluntary concept proposed by the Soviet Union in its draft UN proposal. This represented a concession by the United States which had roundly criticised the concept when it was first introduced by Sweden in the 1960s.

14.20 Despite these advances, the negotiations on a comprehensive test ban recessed in November 1980, some three weeks after President Reagan took office, and they have not been resumed. It was clear even before the 1980 election that the CTB was in trouble. Major objections to the treaty were being raised from within the U.S. national security establishment. In particular, the nuclear weapons laboratories, the Department of Energy and the Joint Chiefs of Staff began to express the view that without tests, confidence in the reliability of America's nuclear weapons stockpile would erode. In addition, it was argued that a CTB would result in the loss of technical expertise needed to develop or test new warheads and prevent the United States from modernising its nuclear forces.

14.21 These kinds of pressures forced the Carter Administration to change its position from a treaty of indefinite duration to a finite one of three years, with an option to resume tests after the accord lapsed. Meanwhile, Carter's principal arms control item, SALT II, also ran into troubles and delays and the priority given to reaching agreement on a CTB receded. The expectation of any immediate agreement being reached was further reduced by the worsening of U.S.-Soviet relations which followed in the wake of Soviet and Cuban intervention in the Horn of Africa, events in the Middle East and South America, and, most importantly, the Soviet occupation of Afghanistan.

14.22 Following the inauguration of the Reagan Administration on 20 January 1981, the position of the United States concerning a comprehensive test ban underwent a major change. Previously, the CTB had been a major goal of U.S. arms control policy subject only to adequate verification of compliance. Under the Reagan Administration, the achievement of a comprehensive test ban has become a long-term U.S. goal with greater priority being given to achieving deep cuts in levels of offensive weapons and to negotiating improved verification procedures which could make the TTBT and the PNET adequate for ratification. On 9 February 1982, the United States announced in the UN Committee on Disarmament:

> ... while a comprehensive ban on nuclear testing remains an element in the full range of long-term United States arms control objectives, we do not believe that, under present circumstances, a comprehensive test ban could help to reduce the threat of nuclear weapons or to maintain the stability of the nuclear balance.[7]

And Secretary of State George Shultz reported in a 1983 USIS publication, Security and Arms Control: The Search for a More Stable Peace, that:

> ... President Reagan has decided that the United States should seek verification improvements that would significantly enhance our ability to monitor Soviet compliance with the Threshold Test Ban and Peaceful Nuclear Explosions Treaties. To this end, we have informed the Soviet Union that we believe negotiation of such improvements would represent an important step toward ratifying the two treaties and building a solid foundation for further steps in the 30-year effort to limit nuclear testing.[8]

14.23 The Reagan Administration also began to raise the issue of Soviet non-compliance. In testimony before the U.S. House of Representatives Armed Services panel on 18 September 1985, Assistant Secretary of Defense for international security policy, Richard Perle, stated:

> ... we have not sent the Threshold Test Ban Treaty forward for ratification because we are unable to verify compliance with its terms and because there is substantial evidence that the Soviets are violating it testing at levels greater than 150 kilotons ... [Moreover] I have not the slightest doubt that the Soviets would cheerfully agree to a comprehensive ban on nuclear testing. But such an agreement would be adhered to unilaterally - by the United States - while the Soviet Union continued surreptitiously to test in a manner that we could not reliably detect.[9]

In addition to fears over Soviet cheating, other American arguments made against establishing a CTB at this stage included the claim that it would undermine deterrence by increasing doubts about the effectiveness of existing weapons, it would unduly disadvantage the United States by preventing modernisation of its nuclear forces, it would not be verifiable, and if there was a Soviet abandonment of the CTB, the U.S. would be unable to promptly resume nuclear testing, because American weapon designers, engineers, and testing personnel would have left the weapons program for other fields. These issues are considered in detail shortly.

14.24 The lower priority afforded the CTB by the United States was also reflected in President Reagan's decision, in July 1982, that it would not resume trilateral negotiations towards achieving a treaty. Instead, the United States agreed to the formation of a working group in the Conference on Disarmament in Geneva to 'discuss issues related to verification of and compliance with any future comprehensive test ban'.[10]

The Conference on Disarmament (CD)

14.25 The 40-nation Conference on Disarmament was created as the multilateral disarmament negotiating forum for the United Nations. It meets each year in Geneva for two terms of about three months each. The CD's agenda is decided by consensus where the conference normally establishes Ad Hoc Committees or Working Groups to consider each individual agenda item and related issues. The CD has had the comprehensive test ban high on its agenda throughout the 1980s, but to date progress has been hampered by difficulties over reaching an agreed mandate for any subsidiary Committee or Working Group investigating the CTB. These difficulties in turn stem from fundamental differences between the nuclear weapons states over the preferred contents of any proposed treaty.

14.26 Thus in 1984, despite the importance attached to a nuclear test ban by the majority of Members of the Conference, no work was carried out on this item in a subsidiary Committee or Working Group because of the failure to agree to a mandate. In the previous two years the task given to the CD Ad Hoc Working Group on a nuclear test ban was 'to discuss and define, through substantive examination, issues relating to verification and compliance with a view to making further progress towards a nuclear test ban'.[11] In the view of the Socialist Group of Nations and the Group of Neutral and Non-Aligned countries this mandate had been exhausted and a new mandate was required under which negotiations would commence on a nuclear test ban treaty. This view was in line with a 1983 UN General Assembly Resolution (38/62 dated 15 December 1983) which urged the CD to proceed 'promptly' to negotiations with a view to elaborating a multilateral treaty on the prohibition of nuclear weapon tests.

14.27 The extension of the mandate in this way was opposed by the United States which maintained that a considerable amount of work still remained to be done under the previous mandate. The Western nations, led by Australia, sought a compromise mandate which included the wording 'with a view to negotiation of a treaty on the subject', but this was unacceptable to the other two groups.[12]

14.28 Similar problems operated in 1985. The Department of Foreign Affairs Disarmament Newsletter of 24 October 1985 reported that the 1985 session of the CD:

> ... was yet again unable to agree on the establishment of a subsidiary body on a nuclear test ban. This was despite strenuous efforts on the part of the Australian delegation ... to promote the adoption of a mandate and program of work for such a body. Australia's goal was to ensure that, if the CD could not reach consensus on commencing negotiations on a comprehensive nuclear test ban treaty, it should commence substantive work on the issues of scope, verification and compliance 'with a view to the negotiation of a treaty'.[13]

14.29 In 1985 Soviet Premier Gorbachev announced that the Soviet Union would observe a moratorium on nuclear testing from 6 August 1985 to 1 January 1986 and indicated that the moratorium could be extended if the United States took similar action.[14] The United States rejected the Soviet proposal, noting that the Soviet Union had just completed an extensive series of tests. In an interview on 29 July 1985, Secretary of State George Shultz also stated that it was not in the U.S. interest to stop nuclear testing under the terms offered by the Russians. He considered that the experience of the 1961-63 moratorium indicated that the Soviet offer of a voluntary moratorium could not be taken seriously as they were likely to abandon it when it suited them. Rather it was more important to first resolve the verification difficulties associated with nuclear testing and to reduce the numbers of offensive weapons.

> ... the real point is not nuclear testing; it is the level of nuclear offensive weaponry and the power of that weaponry. And the proposals that we have made and what we're trying to achieve in Geneva ... to bring about radical reductions in offensive nuclear weaponry. And that's really the objective.[15]

14.30 In the six years 1978-1983 inclusive, the U.S. conducted 120 underground tests whilst the Soviet Union conducted 190. To facilitate progress in verification, the United States issued an invitation to the Soviet Union to observe and monitor a nuclear test at the Nevada test site. The U.S. invitation is not conditional on reciprocity and the Soviet Union was free to bring in whatever monitoring equipment it wished.

14.31 In 1976, the Conference on Disarmament established an Ad Hoc Group of Scientific Experts to Consider International Cooperative Measures to Detect and Identify Seismic Events. The Group comprises government-appointed experts from some 30 participating states as well as representatives of the World Meteorological Organisation, whose global communications network is was proposed to use.

14.32 The Group has met regularly and held its nineteenth session in March 1985. It has produced a number of reports dealing with technical, political and administrative aspects of establishing and operating an international seismic data exchange network and has established five study groups to address issues relevant to the proposed network.

14.33 The proposed global seismic system will comprise three principal elements:

> a. a network of more than 50 existing or planned seismic stations around the globe to collect data on all seismic activities;

> b. international exchange of these data over the World Meteorological Organisation's satellite-based Global Telecommunications System (WMO/GTS); and
>
> c. processing of the data at designated International Data Centres for the use of participating states.

14.34 In 1980-82 several member states of the Ad Hoc Group conducted a series of tests which 'demonstrated that the proposed system was potentially adequate for the rapid undistorted transmission of large volumes of ... data, at least in those areas involved in the trials'.[16] This was followed by further detailed trials in August 1983 and late 1984, using a wider range of participants and with the system operating under full load conditions. According to Dr Des Ball, the trials revealed:

> several weaknesses in the existing systems and procedures for exchanging data and analyses. For example, some parts of the Global Telecommunications System of the World Meteorological Organization (GTS/WMO), which was used to transfer the data from country to country and to the experimental international data centres, lacked sufficient capability to handle the data flow; there was inadequate coordination between the experimental international data centres; and some of the procedures for ensuring common data bases, reconciling initial event-lists, and extracting discrimination parameters from the records require improvement. However, these weaknesses should not be difficult to correct, and the GSETT did prove the feasibility of establishing an international data exchange regime for CTB verification.[17]

Australia's Role

14.35 In its submission to this inquiry, the Department of Foreign Affairs stated that 'one of Australia's primary objectives in contributing to curbing the nuclear arms race has been to promote a comprehensive nuclear test ban treaty (CTB) which would outlaw all nuclear testing by all states for all time'. The Department argued that the conclusion of a CTB:

> ... would help to put strong pressure on France to cease its testing program in the Pacific. A universally adhered-to treaty would also help inhibit the spread of nuclear weapons by making it impossible to test nuclear explosive devices. It would also help to prevent the development of new nuclear weapons and the improvement of existing nuclear weapons by the nuclear weapon states.[18]

In line with this policy, Australia has undertaken a range of initiatives designed to enhance the prospects of achieving a CTB.

14.36 At the diplomatic level, Australia has continued to press the CTB issue both in the United Nations and in the Conference on Disarmament, as well as in bilateral discussions with the nuclear weapons states themselves. In 1984, Australia and New Zealand jointly sponsored a resolution entitled 'The urgent need for a Comprehensive Nuclear Test Ban Treaty' before the United Nations 38th General Assembly. The resolution urged that the Conference on Disarmament establish, at the beginning of its 1985 session, an Ad Hoc Committee which would:

> ... resume immediately its substantive work relating to a comprehensive test ban, including the issue of scope as well as those of verification and compliance, with a view to negotiation of a treaty on the subject.

The resolution also called on the Conference to establish an international seismic monitoring network to:

> monitor nuclear explosions and to determine the capability of such a network for monitoring compliance with a Comprehensive Nuclear Test Ban Treaty as well as 'initiate detailed investigations of other measures required to monitor and verify compliance with such a treaty.

14.37 The resolution was carried by the United Nations General Assembly on 26 November 1984. There were no votes against the resolution; 109 countries voted in favour; and 26 abstained including the United States, the Soviet Union and France. According to Desmond Ball:

> Australia was primarily responsible for persuading the U.S. to abstain rather than vote against the resolution, and since abstention means that 'a country is willing to allow a resolution to be adopted', the Government regards this as a 'substantial achievement'.[19]

14.38 The UN resolution was part of an attempt to resolve the procedural problems which had prevented the Conference on Disarmament from considering the CTBT in its 1984 session. As described earlier, these problems stemmed from a failure on the part of the Conference to agree on a mandate: the Socialist and Neutral and Non-Aligned Groups in the Conference required immediate negotiations on a CTB treaty whereas some other members of the Conference, principally the United States, were opposed to negotiations.

14.39 In an attempt to overcome this deadlock Australia, as leader of the Western group of nations, tabled a compromise mandate, which sought further work on the problems of scope, verification and compliance 'with a view to the negotiation of a treaty'. It also tabled a program of work for the Ad Hoc Committee to follow. The rationale for this approach was described by Australia's Ambassador for Disarmament, Mr Richard Butler, in the following terms in a speech to the CD on 19 February 1985:

> Everyone in this room knows that the position of the Australian Government is that a CTB is urgently required. We would welcome a so-called immediate negotiating mandate but we know that, in a conference that works on the basis of consensus, such a formulation would not attract consensus at this time ... Our proposed draft mandate, while less than what we want as an individual country, nevertheless provides for practical work to be conducted by the Conference on the two vital issues - verification and compliance.[20]

14.40 Butler considered that the compromise mandate, together with a paper on the principles for the verification of a CTB, presented to the CD by Foreign Minister Hayden on 7 August 1984, and a number of other working papers presented by other Conference members would provide sufficient background to allow considerable progress to be made towards a CTB.

> Our proposal, our programme of work, the principles of verification tabled by the Australian Foreign Minister remain on the table, and they remain directed towards having an ad hoc committee on this subject established and getting started immediately on the practical work that is required to bring into existence a comprehensive test ban treaty.[21]

Butler rejected the suggestion raised in the CD that the approach taken by the Western Group towards the CTB comprised either delaying tactics or 'sabotage', and called on all parties to begin consideration of the Australian-sponsored mandate as soon as possible.

14.41 A similar position was taken by Mr Hayden in his 7 August 1984 speech to the CD - the first time an Australian Foreign Minister had ever addressed the Conference. Mr Hayden argued that while considerable progress had been made, more work needed to be done in the technical areas of verification and compliance before treaty provisions could even begin to be considered. He tabled a detailed working paper outlining a set of principles for the verification of a comprehensive nuclear test ban treaty, stating that:

> No amount of procedural debate will cause the technical questions involved in implementing such principles to disappear. Nor will it resolve them. The fact is that urgent practical work on such questions cannot possibly impede progress towards completion of a CTB. It is the only road towards a CTB.

Mr Hayden criticised the position taken by the Socialist and Neutral and Non-Aligned Groups, arguing that:

> ... to maintain a demand for 'immediate *negotiations*' constitutes a refusal to allow urgent practical work to be done. That refusal cannot be squared with the stated policy of those who are blocking this work. They say they want a test ban treaty. If so, then let us work together on that treaty under the best mandate available to a conference which works by consensus.[22]

14.42 As described earlier, Australia's efforts to date on the CD to move towards achieving a CTB have proved fruitless. In *evidence presented to the Committee on 13 May 1985*, the Department of Foreign Affairs stated:

> The Australian proposal for a mandate for the CD's ad hoc committee on a nuclear test ban has not secured general agreement in the Conference. (Neither have the competing proposals by the Socialist Group and the Group of 21 neutral/non-aligned countries). Although there has been a slow accretion of support for our draft among the Group of 21 (Sweden, Pakistan and Sri Lanka are among the most significant of the new supporters) nevertheless key non-aligned countries (Mexico, Argentina and India) continue to oppose it. Their opposition continues to be based on the fact that the mandate does not provide for immediate negotiations but rather consideration of the issues 'with a view to the negotiation of a treaty'. The Socialist Group also continues to oppose the draft. The United States continues to oppose a negotiating mandate.[23]

The Department further stated that the prospects for an immediate resolution of the procedural problems and establishment of a CTB remains poor.

> *Having spoken recently in the bilateral talks here* with both the Americans and the Soviets, our judgment is that in fact, no matter what either may say, we have an equal problem of equal resistance, for probably very similar reasons, ...

> in getting them to tackle a CTB with the priority that we think should be given to it. However, there is a very strong argument that no matter at what time in relation to other optimistic developments in the superpower arms control and disarmament negotiations, and no matter precisely when in a series of developments a CTB would be appropriate, it is going to be a very long and arduous negotiation.[24]

14.43 In the technical domain, Australia has been actively involved in the CD's Ad Hoc Group of Scientific Experts to *Consider International Cooperative Measures to Detect and* Identify Seismic Events. This participation has been as follows:

> a. membership of the Ad Hoc Group from its inception; and
>
> b. participation in all the seismic tests and trials to date, with provision of data from monitoring stations in Australia and from Mawson. An Australian representative, Mr Peter McGregor, *from the Bureau of Mineral Resources*, acted as the international coordinator of the 1984 Technical Test.

14.44 In addition, in August 1984, the Australian Government introduced a new program to create a facility, to be known as the National Seismological Monitoring Centre (NSMC), with two associated terms of reference:

> a. provision of an independent national capacity to monitor and provide information on underground nuclear explosions - a National Monitoring Service (NMS); and
>
> b. to serve as an International Data Centre (IDC) to assist in cooperative global monitoring of underground nuclear explosions.

The NSMC is to be located within the Bureau of Mineral Resources in Canberra. Its design 'was developed in close consultation with members of the GSE (Group of Scientific Experts), and in particular with experts from the Division of Applied Seismology of the Swedish National Defence Research Institute and the DARPA (Defense Advanced Research Projects Agency) Centre for Seismic Studies, both of which have operated national and international centres designed specifically for monitoring a CTB treaty'.[25]

14.45 *The NMS is to be based initially on the Joint* Geological and Geophysical Research Station (JGGRS) located at Alice Springs. It will subsequently be expanded to include monitoring facilities in Queensland, the Northern Territory, Western Australia and Mawson. It is expected 'that this network

will provide a very powerful monitoring capability with a threshold below 10 kilotons'.[26] The IDC would receive and store worldwide data associated with the global seismic monitoring system, process that data and distribute it over the Global Telecommunications System of the WMO. It is expected to be completed in 1987.

14.46 Altogether there are over 50 seismic stations currently in operation in Australia and New Zealand. The seismic stations to be included in the NSMC are capable of detecting underground explosions conducted by all nuclear weapon states, including the Russian test fields at East Kazakh, Novaya Semla and the Chinese Lop Nor site. While the establishment of the Australian monitoring network represents an important development in the move towards a CTB, considerable research is still required if optimum use is to be made of the system. In evidence presented to the Committee, the Adelaide group of SANA stated that there is still considerable uncertainty in the calibration of the seismic monitoring measurements largely because there has been very little information released on actual yields of tests that have been performed to date.

> The only yield data available ... is that from the Nevada tests, and only 30 to 50 of those have been released. What we need is knowledge of tests in other areas of the world. Of course, the magnitude of the seismic waves depends crucially on the local geology. Since all that has been done has been done in Nevada, we know about only what happens there.[27]

SANA recommended that Australia 'urge other nuclear states to release at least some test data'. It should also sponsor research into a number of problem areas, associated with seismic monitoring including seismic wave absorption between the test fields and monitoring stations, and various evasion techniques used to disguise or hide low-yield explosions.

14.47 SANA further suggested that Australia should push for the establishment of an international seismic monitoring network irrespective of whether a CTB is agreed or not.

> ... as we understand it, the present United Nations policy is that the idea of the experiment was simply to establish the feasibility of an international seismic monitoring network but nothing would actually be done about putting it into practice unless a comprehensive test ban was first negotiated and ratified. We feel that this is the wrong way to go about it ... it would make a lot more sense for the United Nations to go ahead with setting up such a network, monitor tests and be able to say: 'Look, we have measured these and these tests in the last week. We can do it - we have detected them'. From that position, it would be able to exert pressure more convincingly for a CTB ... [and] once a CTB went through, the mechanism for its verification would already be in place.[28]

Problems and Issues Surrounding the Test Ban Debate

14.48 Throughout its history, progress towards a comprehensive test ban has been hampered by a number of key problems and issues of both a technical and political nature. The issues have been raised by both sides although at present the major opposition to a CTBT is coming from the Reagan Administration. The principal American objections to a CTBT at this time were outlined to the U.S. House of Representatives Armed Services Committee on 18 October 1985 by Richard Perle, Assistant Secretary of Defense for International Security Policy, and his colleagues Richard Wagner, Assistant to the Secretary of Defense on Nuclear Weapons Programs, William Hoover, Assistant Secretary for Defense Programs in the Department of Energy and Ralph Alewine of the Defense Advanced Research Projects Agency.[29] These included:

> a. a CTB would undermine U.S. national security interests and would not serve the interests of arms control. At best it would only be an 'indirect, ineffective approach' to achieving reductions and the eventual elimination of U.S. and Soviet nuclear weapons. At worst, such a treaty would undermine security and raise doubts about the effectiveness of existing weapons;
>
> b. nuclear testing assures the credibility of the U.S. and allied nuclear deterrent, allows modernisation of that deterrent and maintains confidence in the safety, reliability and effectiveness of weapons in the nuclear stockpile;
>
> c. a ban on nuclear testing would have a greater effect on the United States because, on average, its warheads are older and it 'almost certainly' relies 'considerably more' than the Soviet Union on nuclear warhead design and development for achievement of its national security objectives;
>
> d. the United States would not be able to effectively verify Soviet compliance with such a ban 'because of the limitations in the capabilities of our National Technical Means';
>
> e. if there were a Soviet breakout from the CTBT, the United States would be unable to move 'promptly' to resume nuclear testing, because American weapon designers, engineers, and testing personnel would have left the weapons programs for other fields;

f. a nuclear test ban could encourage the proliferation of nuclear weapons since countries under the protection of U.S. nuclear guarantees may lose confidence in American nuclear capabilities and decide to acquire their own forces; and

g. a CTB would not result in the withering away of nuclear weapons. Rather, both sides would compensate for 'worst-case estimates of unreliability' by using weapons with higher yields and more warheads.

Verification of Compliance

14.49 The principal U.S. objection to a comprehensive test ban treaty concerns the ability to verify Soviet compliance with such an agreement. This in turn breaks down into two related issues: the technical feasibility of monitoring Soviet compliance, and the strong suspicion that the Soviet Union would seek to conduct tests in ways that might evade detection.

14.50 The second concern stems partly from the experience of the 1958-61 moratorium in which the Soviet Union deliberately exploited the voluntary ban on nuclear testing to plan an extensive series of tests 'designed to advance the relative states of Soviet weapons technology and knowledge of weapons effects compared to that of the United States'.[30] The United States has also argued that the Soviet Union has consistently violated the provisions of both the 1963 Limited Test Ban Treaty - by allowing radioactive material produced in underground tests to escape into the atmosphere - and the 1974 Threshold Test Ban Treaty - by detonating devices with yields in excess of 150 kilotons.

14.51 Ball states that the American allegations of Soviet non-compliance with both the LTBT and TTBT are subject to some speculation. In the first case, it is not certain 'whether the tests were conducted too close to the surface in order to reduce the costs of constructing deeper bore holes or because of the valuable data relating to air bursts which can be derived from near-surface tests'.[31] In the second case, Ball notes that U.S. intelligence agencies have concluded, on the basis of analyses of seismic signals, that the Soviet Union has frequently violated the TTBT and continues to do so despite formal American protests. However, a number of scientists outside the defence establishment have used advanced analytical and seismic measurement techniques to reevaluate the CIA's figures and they suggest that - intentionally or not - the Defense Department had misinterpreted the seismic data that led them to conclude that there had been Soviet violations.[32]

14.52 Similar differences of opinion exist over the extent to which a CTB can be adequately verified. Here the major issue concerns the minimum explosive yield that can be reliably detected and identified by current monitoring techniques. Ball

reports that again, U.S. establishment estimates tend to be more conservative than those made by independent scientists:

> On the one hand, Dr Donald Westerveld of the Los Alamos Scientific Laboratory has argued that it would be imprudent to assume that explosions less than about 30 kilotons could be adequately verified; and Dr Carl Romney, then the Director of the Geophysics Division of AFTAC, testified in 1971 that 'the level for unambiguous identification is about ... the equivalent of about a 20 kiloton yield in hard rock. On the other hand, Sykes and Evernden have argued that a monitoring system can be designed and deployed with current technology to reliably detect explosions down to 1 kiloton; George Rathjens, a former Deputy Director of DARPA, reportedly believes that detection is possible down to a level of 1.5 kilotons; and James Brune, Professor of Geophysics at the University of California, San Diego, testified in 1971 that discrimination between earthquakes and underground nuclear explosions is possible 'down to ... yields of about 2 kilotons in solid rock'. The Directors of the U.S. nuclear weapons laboratories have taken a more intermediate position. For example, in a joint letter to Congressman Henry J. Hyde of the House Foreign Affairs Committee dated 7 June 1985, Roger Batzel and Donald Kerr, respectively the Directors of the Lawrence Livermore and Los Alamos laboratories, stated that 'our ability to monitor a CTBT is currently insufficient to prevent the Soviets from carrying out occasional clandestine underground tests up to 10 kt'.[33]

14.53 In evidence to this Committee, SANA stated that:

> At the moment if we got cooperation with all the other countries to establish a seismic network, as was done temporarily for the purpose of the Geneva experiment last year, it would not be any problem to verify it, say, down to 30 kilotons. I do not think anyone would dispute that, although the problem is always at the threshold - you always have the question of 'Was that 29 or was it 31 kilotons?' ... It is certainly feasible to have a much lower threshold than we do at present, but urgent research is needed to get it down to the point where we could confidently prevent any useful testing of nuclear weapons. I think it would need to be lower than 30 kilotons.[34]

14.54 As noted earlier in this Chapter, there is a physical limit to being able to distinguish very low (sub-kiloton) yield nuclear explosions that are detonated in porous material or large underground cavities from a plethora of small industrial explosions taking place inside the country or from an even greater number of natural disturbances that occur annually throughout the world. Even the detection of explosions in the 1 to 5 kiloton range would probably require monitoring stations to be located inside the national boundaries of the participating countries.

14.55 The uncertainties and problems over detecting low-yield nuclear detonations continues to give rise to another important area of debate in the CTB: on-site inspections. The Soviet Union has always been suspicious of the concept of on-site inspections, believing them to be simply a means of gathering military intelligence. Despite this view, the Soviets have made limited concessions including agreement to establish a global network of seismic monitoring stations - including some stations in the Soviet Union - and agreement in principle to on-site inspections under certain circumstances. There remains a range of issues to be negotiated, however, including the frequency of such visits and the rights of visiting inspectors.

14.56 The arguments over on-site inspections are probably more to do with political than technical considerations since some scientists doubt whether such an inspection could resolve whether a low-yield explosion had taken place or not. Gerald Marsh, a physicist at the ITT Research Institute in Chicago, for example has argued that:

> For small nuclear weapon yields, the whole issue of on-site inspection may be a bit of a red herring. In his October 27, 1971 testimony before the Joint Committee on Atomic Energy, Stephen J. Lukasik stated that of all the on-site inspection techniques studied, only visual inspection and radio-chemical analysis appear useful. He also noted that sufficiently deep burial would preclude the detectability of surface effects (cratering) and prevent seepage of radioactive gas. Visually detectable evidence of site preparation - cables or drilling - could be hidden or camouflaged; in any case, such evidence would best be detected by satellite photoreconnaissance. Lukasik's technically sound testimony should have thoroughly demolished the technical validity of the U.S. position on on-site inspections, but it failed to have this impact ... If there were a suspected small-yield event, it is very doubtful that on-site inspection could resolve the issue.[35]

14.57 A further issue is whether very low-yield explosions would be of benefit in developing new weapon systems. A spokesman for SANA informed the Committee that:

> It is generally agreed that yields of the order of one or a few kilotons are not really useful. In fact there have been some explosions of around that magnitude and they are generally spoken of as duds. There are scaling problems. It is not at all clear that if you build a scaled-down version of a weapon you can scale it up and it is going to work the same way. I think if, on, say, even the current partial test ban treaty, there were a sufficiently low threshold, it would effectively prevent the development of major new weapon systems.[36]

Stockpile Reliability

14.58 A second major objection raised by opponents of a CTB concerns the question of stockpile reliability. Officials from U.S. nuclear weapons laboratories and the U.S. Department of Energy have long argued that without nuclear testing, confidence could not be maintained in the existing U.S. stockpile of nuclear weapons. This in turn would undermine deterrence and threaten the global strategic balance as 'asymmetries' in U.S. and Soviet weapons design would probably favour the Soviet stockpile in a CTB or low-yield threshold regime.

14.59 The issue of 'diagnostic' or 'proof' testing is controversial within the technical community. Desmond Ball noted that:

> According to testimony of Donald Kerr [before the U.S. Armed Services Committee in 1978], some several dozen different problems were discovered with various stockpiled weapons between 1945 and 1978, and while the great majority of those [were] resolved without resorting to tests to confirm the repairs there were 'greater than a dozen occasions when problems ... required tests for resolution'. On that basis, according to Kerr, it was likely that a problem would arise that would require proof testing 'every few years or so'.[37]

14.60 On the other hand, Ball notes that other technical experts in the United States, including former weapons laboratory officials, have argued that proof-testing is not necessary to maintain the reliability of the deterrent. They argue that proof-testing is one of the least often used methods in the U.S. program for checking and confirming continued weapons performance. The current approach is to individually test, and remanufacture where necessary, the separate components of a nuclear weapon other than the nuclear component. They consider that these practices, together with rigorous checks can provide reasonable reliability.

14.61 Another argument raised by CTB opponents is that the reliability of the United States' nuclear arsenal may 'degrade' at a greater rate than the stockpile of the Soviet Union. Two general reasons are given for this. First, the relatively greater sophistication of American weapons coupled with the possible need for future design changes could erode confidence in their reliability. As Hughes and Schneider have argued:

> The United States has emphasized technically sophisticated solutions to nuclear weapons design because U.S. missiles are of significantly less payload than their Soviet counterparts. Operating under severe volumetric and weight limitations, the U.S. nuclear weapons design establishment has been forced to adopt designs that have a smaller margin for degradation than would be the case if the United States could enjoy the same luxurious volumetric and weight limitations as the Soviet designers. Hence, if both sides complied fully under a CTB treaty, U.S. weapons would more likely suffer from environmental degradation than their Soviet counterparts.[38]

The second argument stems from the belief that the Soviet Union would be able to continue to conduct sufficient clandestine low-level tests to maintain its stockpile reliability while that of the United States would continue to deteriorate.

14.62 It should be noted that the question of unequal stockpile degradation may be a problem of the United States' own making. Desmond Ball has stated that:

> There is a very real question as to whether U.S. weapons were designed in such a way that continued diagnostic testing is actually a requirement. According to Dr Paul Brown, Assistant Associate Director for Arms Control at Lawrence Livermore, 'the designs that we put into the stockpile were done on the assumption that nuclear testing would continue'. If a CTB had been seriously considered by the laboratories, then it would be reasonable to expect that some design features would have been incorporated in the weapons so that dependable copies for the stockpile could be remanufactured following the achievement of a CTB. The fact that this has not been done, despite the knowledge that a CTB has been a goal of U.S. arms control policy for more than three and a half decades, suggests that the laboratories have been allowed by the Directors, whether deliberately or not, to effectively make agreement on a CTB much more difficult to achieve.[39]

14.63 A related argument is the concern that a CTB would lead to the dismantling of test facilities and a gradual erosion of technical expertise in the area as scientists, engineers and technicians go to other fields. With the experience of the 1958-61 moratorium firmly in mind, the United States fears that the Soviet Union, which is in a better position to maintain its facilities, could gain a significant advantage. The Department of Energy - which is responsible for nuclear weapons development - has argued that a CTB would only be acceptable if it was accompanied by strict and comprehensive safeguards to ensure the maintenance of design and test facilities and personnel. It also favours limiting the duration of the CTB.

14.64 While these arguments have some validity, it should be recognised that they could equally stem from self-interest on the part of the Department of Energy. David Morrison, a senior analyst at the Center for Defense Information in Washington D.C., reports that:

> The nuclear weapons complex managed by the Department of Energy is a far-flung archipelago... with 52 500 employees and $25.4 billion in assets. If nuclear weapons were traded on the stock exchange, Energy would rank ninth in the Fortune 500, after Standard Oil of Indiana. Energy enjoys a monopoly more absolute than that once held by American Telephone and Telegraph. Its only major competitor is the Ministry of Medium Machine Building, which turns out nuclear weapons for the Soviet military. But because its products are not as popular as they might be, the Department of Energy, like its predecessors the Atomic Energy Commission and the Energy Research and Development Administration, uses a hard sell to peddle its more-is-better philosophy of nuclear national security to presidents, the Congress, and the public.[40]

Morrison further reports that 'the Department is in the sixth year of a nine-year, $3.6 billion laboratory modernization effort' which is required to handle the planned expansion of the U.S. nuclear stockpile by up to 21 000 warheads over the next decade. The department is also involved in extensive research into so-called 'third-generation nuclear weapons'. These include enhanced radiation weapons, hydrogen bomb-boosted x-ray lasers for space-based missile defence, directed energy weapons and EMP weapons.[41]

Force Modernisation and Weapon Development

14.65 A further justification for continued nuclear testing is that it is necessary for force modernisation and the development of new generation weapon systems which would improve stability or reduce the consequences of nuclear war. This latter

rationale is often evidenced by reductions in the total megatonnage of the U.S. strategic arsenal, by the development of so-called 'clean' weapons such as the neutron bomb and by the proposed development, under the SDI research program, of defensive technologies.

14.66 With respect to global stability, the Reagan Administration asserts that its Strategic Modernization Program is essential to offset perceived Soviet advantages in nuclear and conventional forces and restore a credible deterrent posture. As noted earlier, a CTB at this time would prevent the development of new warheads required for this program and thus provide the Soviet Union with considerable military and political advantages.

14.67 Critics of this view argue that a strategic balance already exists between the superpowers and that the deployment of the new weapon system planned under the strategic modernization program will upset this balance rather than stabilise it. They further argue that the maintenance of a large cadre of weapons physicists and technicians together with continued testing will assuredly lead to the continued development of new, and invariably more destabilising, weapons which will be deployed for the simple reason that they can be developed.

Conclusions and Committee Views

Arguments For and Against a CTB

14.68 A principal argument in favour of a comprehensive test ban is that it would slow down the arms race between the United States and the Soviet Union, by preventing the further development and deployment of new weapons, some of which are extremely destabilising. Against this is the argument that continued testing could improve warhead safety and new nuclear weapons with more focused destructive effects will be safer because they will limit the devastation of a future war. While this can be true in isolation, the enhancement of warhead safety is only one objective of testing and the likely damage caused by a large-scale nuclear war will still be high. Moreover, the tendency towards greater diversity and miniaturisation of nuclear warheads and the integration of such weapons into the conventional force structures of the two superpowers, makes it more likely that any military conflict between them will escalate into all-out nuclear war.

14.69 It should be recognised that the prohibition of nuclear testing is not likely to stop the arms race. The techniques of developing and manufacturing nuclear warheads are well advanced. It seems probable that nuclear weapon states can maintain their nuclear stockpiles by non-nuclear testing and remanufacture of components which age, corrode or otherwise become unacceptable for use in the stockpile. More importantly, the principal future advances in the arms race are likely to be in the area of delivery systems rather than warheads.

14.70 Nevertheless, a CTB treaty would make more difficult the continued development of sophisticated weapons and place constraints on developing new warhead designs or on modifying existing ones. It would thus have an inhibiting effect on the arms competition between the superpowers but to gain maximum effect it would need to be supplemented by other measures, such as a flight test ban on certain delivery systems.

14.71 A further argument raised against a CTB is that it would undermine deterrence by reducing confidence in the reliability of the nuclear stockpile. The military could not be sure that its weapons would work thereby reducing the credibility of the nuclear deterrent. On the other hand, it has been suggested that a CTB would enhance crisis stability by reducing the incentive for either side to launch a pre-emptive or first strike. Such an attack requires absolute certainty that weapons will work as planned and completely destroy the retaliatory forces of the opponent. This level of confidence could not be sustained without continued nuclear testing.

14.72 The two major areas of contention in the test ban debate concern stockpile reliability and verification. These in turn involve both technical and political considerations where the latter are by far the most important. The arguments over stockpile reliability are subject to considerable, and in some respects self-serving, debate with experts divided over whether testing is necessary or not. At the technical level, the positions are straightforward. If dependable nuclear weapons can be manufactured without design changes and without further testing - as the proponents of the CTB suggest - then it is likely that the reliability of the U.S. nuclear stockpile can be assured under such a treaty. If the opponents of nuclear testing are correct and testing is required to maintain stockpile reliability then it would seem that the weapons laboratories have produced weapon designs that preclude the United States from signing a comprehensive treaty. Such a position seems incredible in view of the fact that a CTB has been a major policy goal of successive United States' administrations over the past twenty years. The conclusion that has to be drawn is that the United States - for a range of political and strategic reasons - is not interested in establishing a CTB at this time but is using technical arguments to justify its revised policy as well as to save face in the propaganda war with the Soviet Union.

14.73 Political considerations have also dominated the other major area of contention in the test ban debate: verification. Despite some problems, it seems clear that technical understanding of the seismological aspects of monitoring nuclear explosions is essentially complete and enables detection of such events down to significantly low yields. Furthermore, there is every indication that the required monitoring network could be established and maintained within parameters acceptable to the Soviet Union. Despite these developments, and an apparent willingness on the part of the Soviet Union to engage in immediate negotiations towards a CTB, the United States has

continued to use the verification issue to thwart progress towards such a treaty in the Conference on Disarmament. The United States position is, in effect, to insist on a degree of verification that precludes an agreement.

14.74 A further argument for seeking a CTB is that it would give credibility to the efforts of the nuclear weapon states to fulfil their pledges made under the 1968 Nuclear Non-Proliferation Treaty and so help prevent the spread of nuclear weapons to non-weapon states. Article VI of the NPT pledges its signatories 'to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date'. There is virtually universal agreement that the most effective measure that could be achieved at this time is a ban on all nuclear explosions. The 1985 NPT Review Conference, for example, stated in its final declaration that:

> the Conference ... stresses the important contribution that a treaty [banning all nuclear weapons tests] would make toward strengthening and extending the international barriers against the proliferation of nuclear weapons; it further stresses the adherence to such a treaty by all States would contribute substantially to the full achievement of the non-proliferation objective ... The Conference except for certain states [the United States and the United Kingdom] ... deeply regretted that a comprehensive multilateral Nuclear Test Ban Treaty banning all nuclear tests by all States in all environments for all time had not been concluded so far and, therefore, called on the nuclear weapon states party to the Treaty to resume trilateral negotiations in 1985 and called on all the nuclear weapon states to participate in the urgent negotiation and conclusion of such a Treaty as a matter of the highest priority in the Conference on Disarmament.[42]

14.75 For their part, the United States and the United Kingdom, 'while committed to the goal of an effectively verifiable comprehensive Nuclear Test Ban Treaty', considered 'deep and verifiable reductions in existing arsenals of nuclear weapons as the highest priority in the process of pursuing the objectives of Article VI'. On the other hand, the Soviet Union 'expressed readiness to proceed forthwith to negotiations, trilateral and multilateral, with the aim of conducting a comprehensive Nuclear Test Ban Treaty'.

14.76 Again the linkage between a CTB and the NPT is, to some extent, self-serving. While a CTB may serve to inhibit horizontal proliferation, it would not stop it. For one thing, a decision to acquire nuclear weapons is determined by politico-strategic considerations which are unlikely to be significantly influenced

by the presence or absence of a CTB. Neither France nor China, for example, are likely to sign a CTB while the superpowers maintain large-scale nuclear forces. In turn, if China refused to sign, it seems unlikely that India, concerned about China's nuclear capability and eager to achieve commensurate status with China in Asia, would adhere to a treaty. Similarly, it is unlikely that the principal 'threshold states' - Israel, South Africa, Pakistan, Iraq, Libya, Brazil and Argentina - would sign a CTB since it would limit their future security options and lessen their potential influence in their regions of interest. Moreover, countries can now develop a nuclear weapons capability without testing, because the techniques of manufacturing first-generation nuclear weapons are straightforward and widely known. Nevertheless, while the impact of a CTB on horizontal proliferation should not be overstated, nor should it be dismissed. A comprehensive agreement between the superpowers to prohibit all future testing would serve to bring pressure against additional countries contemplating entry into the nuclear weapons business and it would provide concrete evidence that the superpowers were willing to restrict their own nuclear development efforts and so enhance their credibility in urging others to accept restrictions.

Committee Views

14.77 The Committee considers that there is an urgent need for a Comprehensive Test Ban Treaty. Such a treaty, banning nuclear tests by all nations in all environments for all time, would have both technical and political benefits. Technically speaking, a CTB would inhibit the development of the weapons of the present nuclear weapons states, making it more difficult for them to develop nuclear warheads of new designs or utilizing new physical principles. A CTB would also make it hard for other nations to acquire a credible nuclear weapons capability: even those nations which developed nuclear weapons clandestinely could have only limited confidence that they would work as planned. This would in turn produce greater prudence on the part of these states in considering using a nuclear weapon against an adversary.

14.78 The political benefits of a CTB would be equally important. Such an agreement would demonstrate that the nuclear weapons states took seriously the pledge they made in the 1963 Partial Test Ban Treaty to achieve a comprehensive test ban, and in the 1968 Nuclear Non-Proliferation Treaty to move towards nuclear disarmament. Fulfilment of this latter pledge in particular is important if the non-nuclear weapons states are to be expected to abide by their commitment to forego acquiring nuclear weapons. A CTB would also enhance the acceptability and credibility of the NPT, which is the most important component of the non-proliferation regime.

14.79 A comprehensive test ban treaty may also contribute to improved superpower relations, provide greater trust and confidence in the arms control process, and be an important initial step in the long and difficult process of slowing,

stopping and reversing the arms race. Once it has been demonstrated that relatively decisive measures can be taken to stop one type of nuclear activity, other measures, such as a ban on missile flight testing or on the deployment of new delivery vehicles, can then be taken with greater confidence.

14.80 The Committee notes that there is some further work required on matters of technical detail with respect to verification before all parties are satisfied that a CTB could be effective. The principal issue concerns the ability to detect low-yield (5 to 10 kilotons) explosions especially those exploded during an earthquake or in physical circumstances that may avoid detection. The Soviet Union considers that existing verification techniques are sufficient to detect all nuclear explosions of military significance. The United States claims that present seismic thresholds are too high and that remote monitoring techniques need to be supplemented by other means, specifically on-site inspections. The Soviet Union accepts on-site inspections in principle and is prepared to negotiate provided it is part of formal treaty negotiations. For its part, the United States wants to resolve the technical issues surrounding verification before it begins to negotiate a treaty.

14.81 Expert opinion on the seismic threshold question is divided although a number of eminent scientists claim that seismic means can now be used to detect, locate and identify nuclear explosions down to a yield of one kiloton. There is recognition that some problems remain including uncertainties arising from inadequate calibration data and systemic bias due to geological differences in various regions in the world. The scientists claim, however, that with the cooperation of all parties, these problems and deficiencies could be rectified relatively quickly.

14.82 On balance, the Committee considers that these technical issues, while important, are not crucial to the commencement of negotiations on a comprehensive test ban treaty. This was shown by the results of the 1977-80 tripartite negotiations which recommended that even then a treaty could be established. The real problems are not technical but political where, at present, the major obstacle to any agreement on the cessation of tests is the attitude of the U.S. government, which has now decided to regard such a measure as a long-term goal of its policy rather than a high priority objective of arms control efforts, as most other countries do. This change in U.S. policy stems from national strategic and internal political considerations that appear to have very little to do with the cogency or otherwise of a nuclear test ban.

14.83 The Committee recognises and supports the Australian Government's actions in seeking to promote a comprehensive test ban. It considers that Australia should retain the establishment of such a treaty as a primary arms control objective and should continue its efforts in the United Nations General Assembly and the Conference on Disarmament to achieve it. In line with this

view, the Committee considers that Australia should attempt to influence the United States into affording the CTB a higher priority than is presently the case. It considers that such a treaty could be signed without undermining deterrence or preventing some degree of modernisation of America's current strategic arsenals. It is also important that the Soviet Union's apparent support for a CTB be tested. This is best achieved by commencing formal negotiations into a comprehensive test ban treaty.

14.84 The Committee considers that the current impasse in the Conference on Disarmament over the CTB requires a political solution, in addition to the further technical negotiations favoured by the Minister for Foreign Affairs and his Department. As a step toward the achievement of a CTB, one possible approach would be to seek to renegotiate the Threshold Test Ban Treaty and have it ratified by the United States Congress. At present the TTBT prohibits the carrying out of any underground nuclear weapon test having a yield exceeding 150 kilotons. This current threshold could be lowered to a level that effectively precludes the development of strategic nuclear weapons (say five kilotons). Article II of the TTBT provides that any party to the treaty may propose amendments to it and, if requested by one-third, or 37, of the 112 parties, the depository governments are required to convene a conference of the parties to consider the amendments. The revised treaty would be signed immediately but may allow the agreed threshold to be reached in a number of steps or over a period of time in order for detection and verification technologies to be perfected and inspection or challenge procedures to be agreed.[43]

14.85 The treaty could include provisions which restrict low-yield tests to a single site and it could forbid decoupled explosions. These provisions would not guarantee compliance but would greatly decrease the scope for dispute over technical matters. A low-threshold treaty would also reduce arguments over whether very small seismic disturbances arose from nuclear or non-nuclear explosions or from natural events. Finally the permitted level of testing would enable the parties to maintain the integrity of their laboratories.

14.86 The Committee recognises that a low-threshold treaty could impede progress towards a CTB and it would be subject to arguments over compliance around the threshold level. Nor could the treaty be formally amended without the agreement of all the major nuclear powers. Nonetheless, a conference to consider amendments to the 1963 Threshold Test Ban Treaty can be held without the approval of the nuclear powers, and such a conference could be used to exert considerable additional pressure on those states that are not inclined towards negotiating a comprehensive nuclear test ban.

14.87 At the technical level, the Committee considers that Australia should continue its work on the establishment of the National Seismological Monitoring Centre and the development of a National Monitoring Service as part of the UN-sponsored

international seismic data exchange network. The Committee considers that the network should be established regardless of whether or not there is progress towards a CTB. To facilitate this development, the Committee recommends that Australia sponsor further research into the existing problem areas associated with seismic monitoring and data exchange, and seek the release, by all nuclear weapon states, of information on past nuclear tests which could be used to calibrate the monitoring instruments.

14.88 Regardless of whether or not a CTB is established, the Committee considers that it is important that the United States ratify the 1974 Threshold Test Ban Treaty and the 1976 Peaceful Nuclear Explosion Treaty. These treaties include provisions for the exchange of data between the parties which would aid calibration and verification. It recommends that Australia should seek to influence the United States to ratify these treaties as a gesture of faith in further moves towards a CTB.

CHAPTER FOURTEEN
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PART 4

REGIONAL ISSUES

CHAPTER 15

THE JOINT UNITED STATES AUSTRALIAN DEFENCE FACILITIES

Introduction

15.1 The joint facilities are a clear reminder of Australia's role in the nuclear world and our relationship with the United States. They are a prime focus of anti-nuclear sentiment in Australia and have at times occupied a prominent place on the political agenda. Opponents of the joint facilities claim that they contribute to nuclear war-fighting doctrines and capabilities which are undermining stable deterrence and increasing the risk of nuclear war. They also claim that the facilities, and a number of other defence establishments in Australia, would be nuclear targets in the event of a military conflict between the superpowers. In their view, the latter possibility alone is sufficient justification to close down the facilities or to remove them from Australian soil. While the Government concedes that the presence of the facilities entails a risk of nuclear attack, they consider this risk to be very small and outweighed by the contributions the facilities make to overall global security through the maintenance of stable deterrence and verification of arms control agreements. They argue that closure of the facilities would undermine deterrence and would not protect us from the consequences of nuclear war.

15.2 This Chapter seeks to examine the primary reasons given by the Government for the continued retention of the joint defence facilities in Australia. It begins with a brief description of the known facilities and then considers their contributions to global deterrence and arms control. This is done under the following headings:

a. early warning of ballistic missile attack;

b. communications to submarine-based strategic deterrent forces;

c. satellite reconnaissance and intelligence gathering; and

d. the joint facilities and verification.

The discussion is detailed and highly technical in some areas. It aims to describe the characteristics and functions of the individual facilities, their part in the overall strategic systems that are maintained by the United States - including their importance to the operational survivability and effectiveness of the total system - and the technical and strategic developments which will affect their operation and use. The Committee considers that this level of understanding is essential for considering the higher-order strategic and political issues surrounding the joint facilities. These latter issues are addressed in the second half of the Chapter, which also considers the question of Australian sovereignty and access as well as future options that are available to us.

15.3 Making an objective assessment of the importance of the joint facilities is not as straightforward as the Government (and its critics) suggest. The installations differ enormously in terms of their functions and purposes, relative importance, and contribution to global and Australian security. It requires judgements on a range of complex questions and issues, including the efficacy of the present system of deterrence; the relative importance of the contribution made by the facilities to the maintenance of deterrence and arms control; the importance of the joint facilities to Australia's own security needs and interests including the maintenance of the defence capability of the Western alliance; and the impact of new technologies on the role of the facilities. Overall, the Committee finds that the joint defence facilities in Australia are concerned primarily with supporting global deterrence. They also make an important contribution to the verification of arms control agreements and this role is centred on the Joint Defence Space Research Facility at Pine Gap and has arisen because the technologies used for collecting operational intelligence can also be used for verification purposes. The contributions to global stability currently embrace support for both basic and extended deterrence where, in line with the evolution of American strategic nuclear doctrine, the emphasis is moving towards the latter. A further finding of the Chapter is that some of the facilities are becoming obsolete or redundant as a result of technological change and moves to increase the survivability of the United States' strategic communications, command and control (C^3) assets.

Some Preliminary Issues and Observations

15.4 Before examining the role and purposes of the joint facilities, there are a few issues and observations which should be kept in mind when considering the debate over the joint facilities. The first concerns information. At present, there is very little official information - much less discussion - on these questions; the assessment is not helped by the lack of information about the facilities themselves.

15.5 According to the pamphlet, Uranium, The Joint Facilities, Disarmament and Peace,[1] the general purpose and functions of the joint facilities are to provide information which contributes to:

> a. deterrence of nuclear war by enabling timely knowledge of developments that have military significance. (A specific example of this is the provision of early warning information received from space satellites about missile launches); and
>
> b. monitoring as part of verifying compliance with the provisions of arms control agreements. (For example, information is provided about the occurrence of nuclear explosions, which assists nuclear test ban monitoring and supports nuclear non-proliferation measures).

15.6 Further information on the facilities was provided by the Prime Minister, Mr Hawke, in a speech to Parliament on 6 June 1984.[2] In what he described as 'the most comprehensive public statement on the facilities yet made by an Australian Prime Minister or Minister', Mr Hawke stressed in his speech that the joint facilities are not military bases.

> There are no combat personnel or combat equipments there, no military stores or workshops, no plant or machinery or laboratories for research, development, production or maintenance of any weapons or combat systems of any type.[3]

He listed the functions performed at Nurrungar and Pine Gap as including the provision of early warning by receiving information from space satellites about missile launches, and the provision of information about the occurrence of nuclear explosions, but stated that 'disclosure of other technical functions of the classified facilities would involve damage to both U.S. and Australian interests and cannot be justified'. The facility at North West Cape was described as a communications relay station for ships and submarines of the United States Navy and the Royal Australian Navy which serves as a key element in the complex system of communications supporting the global balance.

15.7 Mr Hawke acknowledged that the lack of public information on the purposes of the facilities has not assisted public understanding of the vital issues involved, and has been partly responsible for some Australian groups and individuals calling for the closure of the joint defence facilities. In light of his statement, he asked those making such calls to consider very seriously the implications of their demands.

> As I have indicated, the removal of the joint facilities would hinder United States' efforts to maintain effective and stable deterrence and would damage the capacity of the United States for monitoring and verification, so striking a very serious blow at the prospect of arms control agreements between the superpowers. Such a development would dash the hopes of ordinary men and women around the world for peace and disarmament. Moreover, I draw particular attention to the early warning function mentioned in the statement I have just made, and to the significance of that function for the avoidance of nuclear war. In an uncertain and suspicious international climate, no action should be taken which would reduce stability or increase the risk of war through miscalculation.[4]

15.8 While such a statement is welcome, it added little to the information already available on the joint facilities, and more importantly, did not discuss the systemic or strategic

relevance of the facilities beyond some broad references to deterrence and stability. Much detailed technical information on the joint facilities is already available and on the public record in the United States. In evidence to the Committee, Dr Desmond Ball stated that 'extraordinary secrecy' continues to surround the joint facilities in Australia. Indeed, he claimed that there is more secrecy surrounding these installations than exists both with respect to other matters of defence in Australia, and the operations of similar installations in the United States. Dr Ball also suggested that the United States Congress knows more about the joint facilities than either Members of the Australian Parliament or the Australian public. Referring to the Prime Minister's June 1984 statement, Dr Ball stated that:

> The Prime Minister's statement with respect to Nurrungar and Pine Gap was to the effect that these are ground facilities for the control of satellites which provide timely information about Soviet military developments - the euphemism for signals intelligence - and early warning of Soviet missile launch. The statement did not go on to make a distinction about which of those facilities is involved in which. It did not go on to say anything about how a satellite involved in detecting missile launch operates, what the capabilities of that satellite are, what sorts of activities are detected by those satellites. The same month that the Prime Minister made that statement, several hundred pages on the so-called DSP - the Defence Support Program satellite, the early warning satellite that the Prime Minister had referred to - were made available to congressmen. They contained information about the funding of the DSP program; about the particular capabilities of the infra-red sensor on that satellite; about the overall architecture of the DSP system in terms of the satellites and the Australian ground station; the American ground station; a new backup simplified processing station; the contracting arrangements for that satellite program; the developments which are under way to enhance the capabilities of that satellite. Instead of just information to Congress that there is an early warning satellite controlled from Australia, which our Prime Minister has given, congressmen were given hundreds of pages of detailed briefing notes. They are available now if you write to the U.S. Government Printing Office, showing just what that satellite program is about ... The volume of information which is now officially released by the Department of Defense to the American Congress is really enormous. It is not a matter of people in any centre here or there going round having to dig that stuff out, it is material which it is taken for granted that congressmen and the American public have a right to know because there is nothing esoteric about this stuff any more.[5]

15.9 Another problem affecting assessment arises from the fact that the joint facilities, particularly those at North West Cape, Pine Gap and Nurrungar, have multiple roles and functions, relating to verification and the maintenance of deterrence. However a complication is that the United States uses the same technical facilities to satisfy different functional requirements. The same techniques that are used to verify arms control agreements, for example, are used to gather strategic intelligence which can be used for general military purposes and to provide early warning of a Soviet attack. The integration of National Technical Means of verification with strategic intelligence collection and early warning - both at the organisational and functional levels - may require judgements on the relative importance of different functions.

15.10 A further aspect affecting assessment of the importance of the joint facilities is that they are an integral part of a world-wide system of command and control which provides the United States' command authorities with the necessary information to make decisions on whether and how to use American combat forces or weapons systems, as well as the means of transmitting the decisions to subordinate commands in the form of military orders. The United States' strategic command, control and communications (C^3) system comprises the following three elements:

a. surveillance and intelligence gathering systems which provide intelligence on enemy forces or activities, early warning of enemy attacks, assessments of enemy actions or intentions and targeting and other information for use by friendly forces. The systems include radio listening posts, signals and electronic interception devices, spy satellites, radar systems, surveillance aircraft and underwater probes;

b. communications systems which convey the information obtained from the intelligence and surveillance systems to command centres, interconnect command centres, and transmit information and orders from command centres to military forces or weapons systems. A huge array of civilian and military communication media are used - covering every area of the electromagnetic spectrum - and are configured to provide maximum survivability and redundancy; and

c. command centres which receive and evaluate the incoming information, consider options, issue orders and command and control military forces and weapons systems.

15.11 The various elements of the strategic C^3 system are located throughout the world. They operate continuously and produce vast amounts of information which has to be collected, analysed and presented in standard formats for use by national decision-makers. The strategic forces of both sides have to remain prepared for war on a continuous basis, ready to respond instantly to an attack by an adversary at any time. They therefore require information and early warning very quickly. In addition, much greater control of strategic (and tactical) nuclear forces is required because of the horrendous consequences of nuclear war: neither side can afford to go to war either inadvertently or by accident. Consequently, their supporting C^3 systems are becoming highly automated and centralised. The integration of early warning and strategic weapons systems increases the importance of individual components to the operational efficiency of the whole system. It also means that the individual units, such as ground control or communications relay stations, cannot be divorced from the total system of which they are part.

Existing Joint United States - Australian Defence Facilities

15.12 On 21 August 1984, the then Minister for Defence, Mr Scholes, stated in Parliament that no defence-related facilities in Australia had been operated solely by a foreign power between 1978 and 1983.[6] He provided a list of six facilities which were operated jointly by Australia and a foreign power in those years (Table 15.1). The table did not include information relating to facilities in Australia which are operated primarily for scientific or for other civil purposes, e.g., the NASA facilities or the OMEGA facility. Mr Scholes stated that, while some of these facilities may from time to time provide information that is useful for Defence purposes, they are not operated by or for Australian or foreign military authorities; nor is it accurate to describe their basic purpose and functions as defence related.

15.13 The United States and Australia jointly maintain in Australia installations concerned with military communications, navigation, satellite tracking and control and various forms of intelligence collection. They can be divided into three broad groups as follows:

a. installations which are engaged primarily in scientific activities with relatively little defence relevance. These include NASA satellite tracking, communications and data acquisition stations;

b. installations engaged primarily in the collection, analysis and dissemination of intelligence. These include the facilities at Pine Gap and Nurrungar. The intelligence includes seismic data, photographic intelligence obtained from satellites and a wide range of signals intelligence; and

Table 15.1: Defence-related facilities in Australia jointly operated by Australia and a foreign power

Date	*Name of facility*	*Foreign power and co-operating agency*	*Foreign personnel including SOFA personnel*	*Australian personnel (See Note 2)*	*SOFA personnel*
1 July 1979-30 June 1980	Joint Project, Woomera	UK Ministry of Defence	22	102	Nil
1 July 1979-30 June 1983	Tranet, Smithfield	U.S. Defense Mapping Agency	1 (Since 1980) Average 365	2 RAN: varied 41-48 average 44	1 (Since 1980) Varied 340-424, average 365
	North West Cape Naval Communication Station	U.S. Navy		Civilian: varied 204-216, average 210	
	Joint Tropical Trials and Research Establishment (JTTRE)	UK Ministry of Defence	3	6	Nil
	Joint Defence Space Research Facility (JSDRF), Pine Gap	U.S. Department of Defense	Varied 220-249, average 236	Varied 218-245, average 233	Varied 115-120, average 118
	Joint Defence Space Communications Station (JDSCS), Nurrungar	U.S. Air Force	Varied 204-217, average 210	Varied 188-205, average 193	Varied 185-192, average 190

Notes: (1) This table does not include information relating to facilities in Australia which are operated primarily for scientific or for other civil purposes, e.g., the NASA facilities, the OMEGA navigation facility. *While some of these facilities may from time to time provide information that is useful for Defence* purposes, they are not operated by or for Australian or foreign military authorities; nor is it accurate to describe their basic purpose and functions as defence-related.

(2) These figures relate to Australian personnel employed by each facility, but do not include Australian Federal Police on security duty. The normal AFP contingent at each facility is:
North West Cape Naval Communication Station — 8
Joint Defence Space Research Facility — 15
Joint Defence Space Communications Station — 17.

Source: Australian Foreign Affairs Record, August 1984, p.833.

c. installations which can provide communications, navigation and other infrastructure support to United States military operations. These include the communications facility at North West Cape, the Omega navigation station and the TRANET navigation station.

15.14 The three most critical joint facilities in Australia are the naval communications station at North West Cape and the satellite ground control stations at Pine Gap and Nurrungar.

North West Cape

15.15 The naval communications station at North West Cape was established under the United States Naval Communications Station Agreement which entered into force on 28 June 1963. The station was commissioned as United States Naval Communication Station North West Cape on 16 September 1967 and was re-named the Naval Communication Station Harold E. Holt on 20 September 1968. Up to 1974 Australia's participation was predominantly in the provision of the site. The station was an American facility available for use by Australia's armed forces but over which we had no control. On 10 January 1974, the then Minister for Defence, Mr Barnard, and the United States Secretary of Defense, Dr Schlesinger, issued a joint communique which announced their agreement that the station would be operated as a joint facility. The communique also announced that the United States had agreed to keep Australia informed of strategic and operational developments of relevance to the station. They agreed further that Australian servicemen would participate in the management and operation of the facility. The original agreement was formally amended in an exchange of notes on 21 March 1974 which stated that the station would be operated jointly and limited the United States Navy occupation of the station to a 'national room'.

15.16 According to official sources the principal function of the base is to maintain reliable communications with ships and submarines of the United States' fleet serving in the Indian and Western Pacific Oceans, including the nuclear-powered ballistic missile submarines which comprise the United States strategic deterrent. The communications station also provides HF radio links to United States' facilities in Guam in the Marianas, Clark Air Force Base in the Philippines and to the Royal Australian Naval Communications Station in Canberra. These circuits are used to relay teletype and voice messages between respective headquarters and U.S. Navy and RAN ships at sea.

15.17 To carry out these functions, the facility has extensive VLF and HF antenna farms, high-powered transmitters and receivers, and communication centre facilities. All communications are encrypted. Since late 1967 the station has had access via a satellite ground station to the United States Defense Satellite Communications System (DSCS). It also has a receive-only terminal for the USN Fleet Satellite Communications (FLTSATCOM) System.

Pine Gap

15.18 The United States-Australian 'Joint Defence Space Research Facility' (JDSRF) commenced operations in 1970. The agreement came into force on 9 December 1966 for an initial period of 10 years. It was extended for a further ten years by an Exchange of Notes on 19 October 1977. After 19 October 1986, either government can request termination with one year's notice. Since its inception, the facility has undergone a number of significant upgrades and modifications. These included new computing and research equipment - most of which was supplied by specialised contractors in the United States - additional antennae, and office space.

15.19 The Pine Gap facility has a number of complex antenna systems housed in perspex radomes which are designed to protect the antennae against dust, wind and rain, and to hide some of the operational elements of the antennae from observation. It has HF communications to the American base at Clark Field in the Philippines, a communications link to the Australian Department of Defence in Canberra and two satellite ground stations (designated SLT-35 and SCT-B) which were installed in 1973 and 1980 respectively and connect into the U.S. DSCS. It has extensive computing facilities and is manned and operated by American and Australian personnel (there are presently some 230 U.S. personnel on the base).[7]

15.20 The functions carried out by Pine Gap are classified, but it is generally thought that its major role is to operate as a ground station for the signals intelligence (SIGINT) satellite program known as Rhyolite. The facility is also thought to be used as a receiving and control station for orbiting photographic reconnaissance and electronic intelligence (ELINT) satellites that are operated by the Central Intelligence Agency. The functions of these satellites are described in more detail below.

Nurrungar

15.21 The Joint Defence Space Communications Station (JDSCS), commonly known as Nurrungar, is located near Woomera about 500 km north-west of Adelaide. The station commenced operations in either 1970 or 1971.[8] According to Dr Ball, Nurrungar provides a real-time data link between the North American Air Defense Command (NORAD), the Strategic Air Command (SAC) and the National Military Command System on the one hand, and the satellite early-warning system on the other hand.

15.22 The station has two antennae systems contained within radomes, and a satellite ground station (AN/MSC-46) which was installed in 1974 and connects to the DSCS. It is also reported to have a direct communications link with the Department of Defence in Canberra as well as radio and cable links with the United States.

15.23 While Nurrungar operates under the control of the United States Air Force, Ball believes that there is CIA involvement at the base. The base also employs several hundred Australians. Recent budget estimates which were provided to the *Appropriations Committee of the United States' House of* Representatives, and declassified research and development summaries, indicate that Nurrungar is part of the United States Defense Support Program (DSP) or Program Code 647. The DSP is an on-going classified space program consisting of two ground control and readout stations located at Nurrungar and Colorado in the United States that receive data from early warning satellites, process the data and automatically present it to the U.S. National Command Authorities and military commanders for decision-making purposes. The DSP satellites are also thought to carry nuclear detonation detection equipment that can be used to monitor and gather specific data on Soviet, Chinese and French nuclear tests.

Other Facilities

15.24 Apart from these three major facilities, Ball considers that there are a number of other facilities in Australia which make some contribution to the United States strategic deterrent posture.[9] The most important of these are:

a. **Omega.** Located at Darriman in East Gippsland, Victoria, the Omega station is part of an all-weather, continuous, worldwide, VLF radio-navigation system for aircraft, surface ships and submarines; and

b. **Tranet.** Located at Smithfield, South Australia, the station receives signals from U.S. Navy Transit Navigation satellites and other satellites used to provide world-wide, all-weather navigational and geodetic information to surface ships and submarines. The Transit satellite network is to be replaced in the late 1980s by the Navstar Global Positioning System (GPS).

15.25 Some Australian peace groups have also raised concerns over the satellite ground station located at Watsonia, Victoria. The terminal is part of the U.S. DSCS and is said to provide communications between the Australian Defence Signals *Directorate (DSD) in Melbourne and the National Security Agency* (NSA), the CIA and the Naval Ocean Surveillance Information Centre (NOSIC) in the United States.

15.26 In evidence presented to the Committee, the Melbourne *Branch of People for Nuclear Disarmament claimed that the* communication facility is part of the U.S. Ocean Surveillance Information System (OSIS) which provides data on the position and activities of all naval vessels - surface ships and submarines - on a world-wide basis. It is also said to be an integral part of the targeting system for Tomahawk cruise missiles.[10]

15.27 Desmond Ball[11] supports the claim that Australia directly contributes to OSIS. He claims that the Defence Signals Directorate maintains a number of high frequency - direction finding (HF-DF) stations in Australia and its surrounding region. These stations monitor radio transmissions from naval vessels and airways and are able to use this information to track their movements. The information is sent to DSD headquarters in Melbourne for analysis and from there to the United States via the DSCS network.

The Joint Facilities and the Maintenance of Deterrence

15.28 As noted by the Prime Minister in his speech to Parliament on 6 June 1984, a major justification for retaining *the joint facilities in Australia is that they directly* contribute to international stability by helping to deter nuclear war. Removal of the facilities, or a substantial downgrading of their functions, would hinder United States' efforts to maintain effective and stable deterrence and so could increase the *risk of nuclear conflict.*

15.29 The joint facilities contribute to global stability in a number of ways. First, the signals monitoring and early warning functions of Pine Gap and Nurrungar make it impossible for the Soviet Union to launch a *surprise attack against* the United States without risking detection and subsequent retaliation against Soviet cities. These retaliatory forces include the submarine-launched ballistic missile (SLBM) forces that are located in the Pacific and Indian Oceans. These forces are virtually immune to a pre-emptive *Soviet strike and only a* relatively small number of submarines are needed to wreak 'unacceptable damage' on the Soviet Union in the event that it strikes first. By providing secure and reliable communications to the submerged FBM (Ballistic Missile-Equipped Nuclear-Powered Submarine) fleet, North West Cape is seen as providing a stabilising contribution to the global balance by enhancing basic deterrence.

15.30 The satellite surveillance and early warning systems which operate through Pine Gap and Nurrungar also contribute to overall stability by reducing uncertainty about the Soviet Union's strategic weapons programs and deployments, thereby reducing anxiety about its intentions and alleviating pressures on the part of the United States to maintain its forces at high alert status or to carry out a pre-emptive strike particularly during periods of tension or crisis.

Early Warning of Ballistic Missile Attack

15.31 Despite government reluctance to provide details on *the joint facilities at Pine Gap and Nurrungar, it is clear from* public sources that, at present, the Nurrungar facility plays a key role in providing early warning of a ballistic missile attack on the United States. In an article on nuclear weapon command, control and communications, the SIPRI Yearbook 1984, *for example, stated that:*

> The initial warning of land or sea-based missile attack on the United States would come from

> early-warning satellites. The current Satellite Early Warning System is the Defense Support Program (DSP), a set of three infra-red detection satellites in geosynchronous orbits, one above the western hemisphere directly over South America, a second over the central Pacific and a third over the Indian Ocean, all maintaining a constant watch on the Soviet Union, China and the oceans...
>
> When a missile launch occurs, the early-warning satellite senses the infra-red heat from the rocket plume and burning missile motor within a minute of lift-off. 'Mission Data' from the sensing satellite are transmitted to one of two large processing stations (in Colorado or Australia), to a 'simplified processing station' in Europe, and to some of six mobile ground terminals (MGTs) where they are processed. A computer library of representative launches is consulted to compare a typical launch with the features of each new launch. Characteristics of previous test flights or satellite launches are compared to determine if the launch is on a 'threat fan'.[12]

Processed data from the DSP satellites is transmitted via the U.S. DSCS to the four National Command Authority (NCA) command centres in the United States for further processing and review.

15.32 Early warning of missile attack is also provided by an extensive system of ground-based radars including the Ballistic Missile Early Warning System (BMEWS); PAVE PAWS; the Perimeter Acquisition Radar Characterization System (PARCS) and FPS-85 and FSS-7 radar systems. These radar systems also provide national decision-makers with a detailed description and assessment of the missile attack, including the cumulative number of individual warheads or 'raid size', the projected impact points and impact times, and the launch points of each originating missile. The DSP satellites, however, provide earlier warning of a missile launch than the ground-based radars and so give American command authorities more time to determine whether the launch is likely to be a threat and decide on appropriate response options. In addition, the combined use of satellites and radars helps to detect false alarms and so minimises the possibility of an inadvertent launch of U.S. retaliatory strike forces.

15.33 The importance assigned by the United States to its satellite early warning system is shown by the fact that it is upgrading the latest DSP satellites to enhance their performance and survivability. The SIPRI Yearbook 1984 reported that:

> Procurement of the satellites began in 1981, with $2.62 billion already spent on the DSP programme and approximately $2.1 billion planned during FYs 1984-88. Satellite-to-satellite laser crosslink, a second colour focal plane (which reduces laser jamming vulnerability), increased satellite autonomy without ground station command and control, and message rebroadcast will be incorporated into the new satellites. There has also been some speculation about plans to increase the number of operational satellites from three to five.[13]

15.34 SIPRI also reported that even though DSP is working extremely well, the United States plans to replace the satellites in the 1990s with a new generation designated Advanced Warning System (AWS). According to SIPRI, the desired features of the DSP replacement are:

> ... improved survivability, earlier detection and more accurate target identification, particularly of submarine-launched missiles. The current AWS R&D programme seeks to develop mosaic sensor arrays, lightweight optics, tunable spectral filters, passive/active thermal coolers and onboard data processing, all with smaller antennas. The satellites will provide data directly to the users, 'eliminating the need for vulnerable ground stations' and 'designed to operate reliably after an initial Soviet attack'.[14]

15.35 The American initiatives stem partly from concern about the build-up of the Soviet nuclear submarine fleet, which can fire SLBMs or nuclear-tipped cruise missiles at U.S. bomber bases and command centres with flight times ranging between four and fifteen minutes, and partly as a result of the higher priority being given to improving the survivability and reliability of U.S. strategic C^3 systems. In this second context, Defense Secretary Weinberger's Annual Report to Congress for Fiscal Year 1985 stated that:

> Strategic C^3 systems must be able to operate reliably under the extremely stressful conditions of a nuclear conflict. Unless we take steps to provide for the survivability of essential systems, they could easily be rendered ineffective through the direct or collateral effects of nuclear attacks, or by electronic jamming and other disruptive measures. The FY1985-89 program will improve our strategic C^3 systems - sensors, command centers, and communications - by upgrading and augmenting their capabilities, increasing their mobility, protecting essential equipment against nuclear effects, and providing alternate and redundant methods of communication.[15]

15.36 As part of providing for enhanced survivability and redundancy of essential systems, the United States is locating data processing capabilities on board its new early warning satellites. It is providing them with the capacity to communicate directly to other satellites or mobile ground stations and thereby bypass fixed and vulnerable ground stations such as Nurrungar. It is also developing a Simplified Processing Station (SPS) and a Mobile Ground Terminal (MGT) for use in the DSP. According to declassified Department of Defense research and development summaries provided to the Committee by Dr Ball, the SPS is a 'miniaturised, transportable, minimally-manned, lower-cost version of the current large, fixed, dedicated DSP ground stations'. It will provide a back-up capability to the current ground stations to enhance mission data survivability and increase the probability that data will be available to DSP users. The SPS will have a UHF communications link to airborne command posts which will provide an emergency method for the airborne user to obtain DSP data. It will also have the capability to monitor the housekeeping functions of the DSP satellites and command them as appropriate.

15.37 The MGT is a mobile receiving and re-transmission terminal which will be truck mounted so that it can be readily moved to new locations in order to complicate the enemy targeting capability. The MGT is to provide survivability to the ground processing of satellite data. The primary communications from the MGT to other command facilities is by satellite via the DSCS. The Annual Report to the Congress for Fiscal Year 1985 by Secretary of Defense Caspar Weinberger reports that the United States intends to deploy a total of six MGTs with operational testing and evaluation of the new system commencing from the end of FY 1985.

15.38 The planned improvements in U.S. early warning systems provide greater warning and protection for U.S. strategic forces and so enhance stability since these forces can be maintained on a lower level of alert and it is more difficult for the Soviet Union to launch an attack without detection and subsequent retaliation. However, the requirement that early warning and detection systems must be able to operate reliably under the extremely stressful conditions of a nuclear conflict seems to extend the potential use of these systems beyond the relatively straightforward requirements dictated by the doctrine of basic deterrence. United States' early warning systems are now required to continue to provide data to the American Command Authorities on Soviet missile launches occurring during a nuclear conflict. This development is consistent with United States' countervailing doctrine of deterrence which emphasises the development of a wide variety of 'counterforce' weapons and capabilities and seeks to demonstrate to the Soviet Union that it (the Soviet Union) would be denied 'victory' at whatever level of violence it chose to initiate (See Chapter 3). The efforts to improve survivability and system redundancy also suggest that the role and importance of the joint facility at Nurrungar is decreasing and that by the early 1990s the ground station will no longer be required, except perhaps as a back-up facility to more advanced systems.

Communications to submarine-based strategic deterrent

15.39 One of the functions of the joint facility at North West Cape is to provide very low frequency (VLF) communications between the U.S. Command Authority and its submarines on patrol in the Pacific Ocean, including its nuclear-powered ballistic missile carrying submarines. As argued by the Department of Defence, it thus contributes to deterrence by maintaining America's second or retaliatory strike capability:

> ... the primary role of the U.S.'s ballistic missile submarine fleet will continue to be a retaliatory one; that is, to deter the USSR from itself launching a first strike... If the U.S.'s ability to deter nuclear war by threatening retaliation from its submarine fleet is to be reliable, then it must have the ability to communicate reliably with its submarines. By assisting in this regard, North West Cape supports deterrence of nuclear war and supports Australia's as well as the U.S.'s interests.[16]

15.40 It should be noted that the VLF ground stations are not the only means of communicating with the U.S. submarine force. The SIPRI Yearbook 1984 shows that in addition to its world-wide network of ground-based relay stations, the United States maintains communications to its submarines via a fleet of Naval VLF/LF communications relay aircraft commonly known as TACAMO ('Take-Charge-and-Move-Out'). According to SIPRI:

> The TACAMO aeroplanes, continuously airborne in a 'random walk pattern' since 1974, retransmit communications received from ground stations, airborne command posts, ERCS and satellites (AFSATCOM and FLTSATCOM) to submarines on frequencies from VLF to UHF.[17]

SIPRI also reported that the TACAMO aircraft are soon to be replaced by a new aeroplane, designated the E-6A, which would be similar to its E-3A AWACS aircraft. Defense Secretary Weinberger reported, however, that while the 'TACAMO aircraft ... are our most survivable command link to ballistic missile submarines at sea ... the costs of the E-6A were too high'. Therefore, Weinberger continued, the U.S. has decided to reevaluate its alternatives for upgrading the TACAMO aircraft fleet. In addition to the E-6A, they are considering other aircraft, including a modified version of the EC-130. Weinberger also stated that:

> To increase operational flexibility and minimize the possibility of (submarine) detection, we are deploying a dual-site, extremely low frequency (ELF) communications system. The first site will

be housed at the existing test facility, in Wisconsin. The second site, to be located in northern Michigan, will operate in electrical synchronism with the Wisconsin site. The ELF system will provide a highly reliable and jam-resistant means of maintaining continuous contact with the submarine force. We are requesting funds in FY 1985 to construct the transmission system and produce the associated receivers.[18]

15.41 In addition to these primary means of communication, submarines can establish communications with the U.S. National Command Authority over a number of special purpose communication links:[19]

a. Gryphon: modulation compression and coding of VLF signals to shore-to-submarine communication;

b. Hudrus/Clarinet Omen: EHF secure submarine-to-shore report-back communications;

c. Clarinet Pilgrim: shore-to-submarine communications by superimposing information on the LF carrier wave transmitted by LORAN C stations world-wide;

d. HF radio stations at 24 locations world-wide, for simultaneous transmission of broadcasts with VLF/LF transmitters;

e. Circuit Mayflower: a special submarine-to-shore satellite communications system;

f. Clarinet Merlin: the emergency communications systems using AN/BRT-1 submarine-launched one-way transmissions (SLOT);

g. the Integrated Acoustic Communications System (IACS), using active sonars on surface ships; and

h. the Submarine Satellite Information Exchange System (SSIXS), a UHF satellite buoy which can be launched from a submarine at depth, providing rapid response via FLTSATCOM and GAPFILLER satellites to inquiries at a high data rate.

The United States is also experimenting with a number of new communications systems and techniques including blue-green lasers, acoustic systems, ELF satellites and airborne ELF systems.

15.42 Despite this increase in the means of communication, it is likely that the ground stations will continue to play an important role in the immediate future. According to Dr Ball, the joint facility at North West Cape is at present one of the most important communication links in the United States' global defence network and could not be easily replaced.

> It is the largest and most powerful of the three principal VLF stations in the U.S. world-wide submarine communication system - the other two are Jim Creek, Washington, which covers the Eastern and Northern Pacific, the Bering Sea, and part of the Arctic Ocean; and Cutler, Maine, which covers the North Atlantic, North Sea, Arctic regions, and the Mediterranean. Although the U.S. does have other VLF sites (e.g., Balboa, in the Panama Canal Zone; Hawaii; and Annapolis), coverage of the Western and Southern Pacific and the Indian Ocean would still be inadequate without a station in this region - and extensive engineering analysis indicated that a site in Western Australia would be most advantageous.

Moreover:

> there are no foreseeable technological developments likely to make North West Cape obsolete, at least before the Agreement comes up for re-negotiation in 1988. Satellite systems lack the power, capacity and reliability to be more than adjuncts, or give some degree of redundancy, to North West Cape; and the planned Seafarer communications link operates at extremely low frequencies (ELF), so that data delivery times will be very long by normal communications standards, and the system will be usable only for pre-coded transmissions; voice communication is impossible.[20]

15.43 Nonetheless, it is also clear that as in the case of early warning, the United States is seeking to enhance the survivability of its submarine communications systems by increasing the number and types of channels of communication and reducing its dependence on large and highly vulnerable ground stations. The increase in redundancy of submarine communications lessens the importance of any one link and so the importance of the relay station at North West Cape for maintaining communications to the U.S. SLBM fleet is likely to decrease in the future. In fact, given the probable deployment of the missile carrying submarines, it may provide communications to only a few submarines at any one time anyway and so probably plays a relatively minor role in providing a second-strike deterrent capability. Whether the ground station needs to be located at North West Cape is another matter again. Ball suggests that it could be located anywhere within a very large area of the South Pacific or Eastern Indian Ocean with no degradation in the effectiveness of the respective communication network.[21]

15.44 An issue raised in the submissions concerned the argument that, with the introduction of the Trident I submarine and Trident II SLBM, the primary role of the U.S. SLBM force would change from providing a second-strike capability to a counterforce or war-fighting capacity. This change could be perceived by the Soviet Union as constituting a potential first strike capability and so would increase the risk of nuclear conflict during a crisis. By providing communications to the Trident submarines, Australia would be contributing to this new role.

15.45 It is now generally accepted that the introduction of the Trident I nuclear submarine and the Trident II submarine-launched ballistic missile - which has a range of some 4 000 miles and a CEP in the order of 300 to 400 feet - will provide the United States SLBM force with a significant counterforce or hard-target-kill capability which could be used against a wide range of Soviet military targets including ICBM silos. Desmond Ball, for example, has argued that the SLBM has several important advantages in counterforce warfare. First, its decreased flight time considerably reduces the warning and reaction times that would be available to the Soviets. Secondly the inherent flexibility and invulnerability of SLBMs make them ideal weapons in any prolonged nuclear exchange or in engaging 'opportunity targets'. Third, the mobility of SLBMs greatly complicates the role and placement of anti-ballistic missile defences needed to counter them. Ball acknowledged however, that at present, the submarines' counterforce role is limited by important navigational and communications constraints:

> ... there are two very important qualifications to the SLBM's counterforce capabilities: the vulnerability of the submarine navigation system, and the problems of maintaining continuous dependable communications with the submerged FBM[Ballistic Missile-Equipped Nuclear-Powered Submarine] system ...
>
> Essentially these qualifications mean that the SLBM's counterforce capability is restricted to particular situations - to, for example, a first strike or an immediate follow-up strike where target information can be completely coordinated in advance and the follow-up modifications can at least be transmitted with reasonable speed.[22]

In this latter context, William Arkin has reported that each Trident submarine will carry sufficient data on board to be able to re-target rapidly either newly identified or undamaged targets with only minimal information required to be transmitted to the ship.[23]

15.46 A more general concern was whether the joint facility at North West Cape would be used to issue orders to U.S. naval vessels as part of an initial strike against the Soviet Union or in the event of nuclear conflict. The Government has acknowledged that North West Cape provides a communication link for U.S. ships

and submarines that are operating in the Western Pacific and Indian Ocean areas.[24] Desmond Ball has claimed that the United States uses the joint communication station at North West Cape to communicate to American attack or 'hunter-killer' submarines. The information is said to include data collected by an underwater sonar array (known as Project Flowerless) located off Christmas Island [25] and the HF-DF facilities located in Singapore, Malaysia, New Guinea and across Australia,[26] as well as a range of intelligence obtained from various sources.[27] The U.S. attack submarines are responsible for tracking Soviet ballistic missile submarines and destroying them in the event of war, and are considered by Ball to constitute an important counterforce capability which threatens the Soviet deterrent.

> American 'hunter-like' submarines are equipped with a variety of nuclear weapons - in particular, the Subroc nuclear anti-submarine missile (four to six per attack submarine), and the Mark 48 anti-submarine torpedo ASTOR (Anti-submarine Torpedo Ordnance Rocket). Insofar as these submarines are targeted on the Soviet FBM submarines, they represent a counterforce capability essentially similar to that of ICBMs targeted on their counterparts and have the same first strike implications, and by threatening the Soviet 'assured' second strike capability they are inimical to stable deterrence. This is particularly the case given the SALT limitations on numbers of FBM submarines. The United States currently has 64 'hunter-killer' submarines; as this number increases, and with the Soviets constrained to 62 FBM submarines, there must be increasing concern regarding the future viability of the Soviet deterrent.[28]

15.47 The United States ocean surveillance and anti-submarine warfare (ASW) capability is reported to be far superior to that of the Soviet Union, to the extent that the U.S. Navy is thought to be able to keep track of all Soviet submarines. It also appears to be intent on maintaining its present advantage in anti-submarine warfare and submarine technology. Defense Secretary Weinberger's Report to the Congress for Fiscal Year 1985 stated that the United States intends to deploy 100 'multi-mission' attack submarines and that a new attack submarine is under development which will carry more weapons than previous classes, will have improved sensor systems, and will be able to operate under the ice more effectively. The new submarines are scheduled to begin production in 1989. The Report also states that U.S. attack submarines will soon be armed with Tomahawk cruise missiles which will enable them to play an expanded role in anti-ship warfare missions as well as taking on the additional mission of projecting power ashore.[29]

15.48 The actual use of U.S. naval forces in the Pacific and Indian Oceans is guided by its strategic doctrine. Current U.S. maritime strategy seeks to exercise seapower across a spectrum of conflict situations covering normal peacetime circumstances,

periods of crisis, and various wartime scenarios. The basic requirements of U.S. and allied maritime forces under each of these situations was recently described by the U.S. Navy's Chief of Naval Operations Admiral James D. Watkins in a special issue of the journal Proceedings of the US Naval Institute.[30] According to Watkins, in peacetime, U.S. maritime forces emphasise forward deployments in order to 'maintain U.S. access on fair and reasonable terms to oil, other necessary resources, and markets, and deter and defend against attempts at physical denial of sea and air lines of communications critical to maintenance of the U.S. and allied economies'. Maritime forces are also said to play an important role in 'managing' crises since they can be readily deployed into crisis locations, are maintained at a high state of readiness, can be sustained at sea for long periods of time and 'bring a range of capabilities required for credible deterrence'. Watkins stated that the 'heart of our evolving Maritime Strategy is crisis response. If war with the Soviets ever comes, it will probably result from a crisis that escalates out of control. Our ability to contain and control crises is an important factor in our ability to prevent global conflict'. Watkins continued that:

> The peacetime and crisis response components of the Maritime Strategy are evolving, robust, and designed to foster a stable international setting. This is important for deterrence. Although deterrence is most often associated with strategic nuclear warfare, it is a much broader concept. To protect national interests, we must deter threats ranging from terrorism to nuclear war. This requires a credible peacetime and wartime capability at the level of conflict we seek to deter. Our national interest also requires an extended deterrent capability. Perhaps most importantly, protecting national interests while preventing war requires the ability to control escalation, and naval forces and our peacetime strategy are ideally suited for that purpose.
>
> If our peacetime presence and crisis response tasks are done well, deterrence is far less likely to fail. Deterrence can fail, however, and we must consider how the Navy would be used in a global war against the Soviets.

15.49 Should war break out the maritime strategy envisages three phases which were said to provide 'a broad outline of what we want to accomplish, not an attempt to predict an inherently unpredictable future'. The three phases are:

> Phase I: 'Deterrence or the Transition to war'. The goal of this phase remains deterrence. Through early, world-wide and decisive use of seapower, the U.S. would 'seek to win the crisis, to control escalation, and, by the global nature of our operations, to make clear our intentions to cede no area to the Soviets by default and to deny them the option to engage in hostilities on their terms'. The keys to success in this phase are seen to be 'speed and decisiveness in national decisionmaking'. The United States 'must be in a position to deter the Soviets' 'battle of the first salvo' or deal with that if it comes ... The need for forward movement is obvious. This is where the Soviet fleet will be and this is where we must be prepared to fight. Aggressive, forward movement of anti-submarine forces, both submarines and maritime patrol aircraft, will force Soviet submarines to retreat into defensive bastions to protect their ballistic missile submarines'.

> Phase II: 'Seizing the Initiative'. If war comes, the maritime strategy requires the U.S. and allied navies to 'seize the initiative as far forward as possible' and to 'defeat Soviet maritime strength in all its dimensions, including base support'. The history of war 'tells us that gaining the initiative is the key to destroying an opponent's forces'. Also it opens the way to press the Soviet Union 'to end the war on our terms - the new goal of our strategy once deterrence has failed'. A key component of this phase is antisubmarine warfare. 'It will be essential to conduct forward operations with attack submarines, as well as to establish barriers at key world chokepoints using maritime patrol aircraft, mines, attack submarines, or sonarbuoys, to prevent leakage of enemy forces to the open oceans'.
>
> Phase III: 'Carrying the Fight to the Enemy'. 'The tasks in this phase are similar to those of the earlier phases but must be more aggressively applied as we seek war termination on terms favourable to the United States and its allies. Our goal would be to complete the destruction of all the Soviet fleets which was begun in Phase II'. This would reduce 'the attractiveness of nuclear escalation by changing the nuclear balance in our favour'.

15.50 Watkin's article notes that the Soviet Union emphasises the combined deployment and use of nuclear and non-nuclear forces but argues that:

> [U.S.] maritime forces can influence that correlation, both by destroying Soviet ballistic missile submarines and by improving our own nuclear posture, around the periphery of the Soviet Union. Some argue that such steps will lead to immediate escalation, but escalation solely as a result of actions at sea seems improbable, given the Soviet land orientation. Escalation in response to maritime pressure serves no useful purpose for the Soviets since their reserve forces

> would be degraded and the United States' retaliatory posture would be enhanced. Neither we nor the Soviets can rule out the possibility that escalation will occur, but aggressive use of maritime power can make escalation a less attractive option to the Soviets with the passing of every day.
>
> The real issue, however, is not how the Maritime Strategy is influenced by nuclear weapons, but the reverse, how maritime power can alter the nuclear equation. As our maritime campaign progresses, and as the nuclear option becomes less attractive, prolonging the war also becomes unattractive, since the Soviets cannot decouple Europe from the United States and the risk of escalation is always present. Maritime forces thus provide strong pressure for war termination that can come from nowhere else.

He concludes that:

> Our strategy is not without risk. The strategy depends on early reaction to crisis and the political will to make difficult decisions early. It will require flexibility to meet the inevitable changes in Soviet strategy. To some, that aspect of the strategy which focuses on altering the nuclear balance may seem dangerous. But the risks exist for both sides: that is the nature of deterrence.[31]

Watkins further stresses the importance of the supporting command, control, communications and intelligence infrastructure to the success of the maritime strategy, noting that these different elements 'form the glue that binds this entire effort together'. This includes not only the communications of which North West Cape is part, but the various surveillance and intelligence collection networks which provide operational commanders with information on the location and movement of enemy forces, post attack assessments, and so on.

15.51 The foregoing illustrates that the naval communications station at North West Cape is an integral component of the United States' strategic deterrent and can be used to support either offensive or defensive operations. Along with the evolution of U.S. strategic doctrine, the principal purpose of the facility has been extended from supporting basic deterrence to also encompassing extended deterrence. If this current form of deterrence is considered to be dangerous and destabilising, as its opponents claim, then so are the installations that support it. If the adoption of 'counterforce' capabilities and doctrines contributes to increased stability by making the United States' deterrent posture more credible, then the facilities also contribute to this prospect.

Satellite Reconnaissance and Intelligence Gathering

15.52 Satellite reconnaissance and intelligence gathering techniques contribute to stable deterrence by reducing uncertainty over the superpowers' strategic weapons programs and by providing information on each others' force deployments and military activities. They also supplement early warning systems by providing advance notice that an attack may be in preparation. As Professor Redner put to the Committee:

> It is in our interest ... to spy on the Soviet Union. We do want to know what it is up to and what it is doing ... The situation the world was in before satellites ... when the U.S. had no information of what was going on in the Soviet Union, was much worse. In the late Eisenhower and the early Kennedy years there was crisis after crisis brought about by the fact that the U.S. did not have adequate information on the Soviet Union... On the whole, spying facilities are stabilising and useful, and I think both superpowers understand that.[32]

15.53 The Government has not provided details of how Australia contributes to the U.S. satellite reconnaissance and intelligence collection capabilities, but it would seem to be principally through the joint facility at Pine Gap which is a ground control station for the Rhyolite signals intelligence (SIGINT) satellites and may also be a receiving and control station for orbiting photographic and electronic intelligence (ELINT) satellites.

15.54 Desmond Ball has stated that the Rhyolite program 'is undoubtedly the most important U.S. secret satellite program with which Australia is involved'. He describes the program as consisting of a series of geostationary signals intelligence (SIGINT) satellites operated by the U.S. Central Intelligence Agency (CIA) under the direction of a super-secret intelligence satellite coordinating agency officially known as the National Reconnaissance Office (NRO).[33] Unlike earlier electronic intelligence (or ELINT) satellites, the Rhyolite satellites can be placed into relatively high geostationary orbits - outside the range of present Soviet ASATS -thus allowing continuous coverage of wide areas of interest and they can monitor a much wider range of electromagnetic emanations and communications. According to Ball:

> The frequencies covered by the Rhyolite satellites embrace four very significant categories of radio emanations: first, it includes telemetry data transmitted during Soviet ballistic missile tests, most of which are in the VHF and microwave bands; second, it includes most Soviet and Chinese radar emissions; third, the Rhyolite satellites have the capability for intercepting telephonic and radio microwave communications as well as VHF radio communications; and fourth, it includes satellite communications and data links.[34]

The uses of these signals embrace both intelligence collection and the verification of arms control agreements. While both types of uses are described here, this section deals only with the intelligence collection aspects; the detailed treatment of verification of arms control is contained in the following section.

15.55 Interception of telemetry from missile tests provides intelligence on matters like the number of warheads carried by a given missile, the range of the missile, the probable size of the warheads and the accuracy with which the warheads are guided at the point of release from the re-entry vehicle. According to Ball, this information is valuable to the United States both for the purposes of monitoring Soviet compliance with the SALT agreements as well as for making intelligence estimates of the development of Soviet missile capabilities.[35]

15.56 The monitoring of Soviet and Chinese radar systems allows the U.S. to map the location of and hence target their early-warning (EW) stations, air-defence systems, anti-ballistic missile (ABM) systems, air fields, air bases, satellite tracking and control stations, and ships at sea. The information collected by the Rhyolite satellites would also allow the U.S. to jam Soviet radar and radio transmitters in the event of war and enable U.S. bombers to evade the air defence systems en route to their primary targets.[36]

15.57 Radio and telephonic interception operates across the VHF, UHF and microwave frequency bands and so can cover all manner of military and civilian communications from the targeted country. While the amount of information received on even a daily basis would be astronomical, the potential intelligence benefits of this capability cannot be overstated. Paul Bracken has noted that:

> The application of computers to the task of collection and analysis of COMINT, satellite photographs, TELINT and SIGINT can advance the state of the art of warning and intelligence greatly, if used properly. In the past, the greatest warning breakthroughs have relied chiefly on communications intelligence and cryptography to analyze a tiny portion of an enemy's communications, generally high-level messages... Computer technology now makes it possible for intelligence to penetrate an enemy command organization on a system-wide basis, rather than just to insert a few probes into it here and there. The most important intelligence has typically come from proper interpretation of routine, low-level military activities... Correlated with other intelligence about the status of the Soviet Army and Air Force, such information could provide warning and insights about enemy intentions of a kind inconceivable in previous wars.[37]

15.58 Ball also considers that Pine Gap is used as a receiving and control station for orbiting photographic reconnaissance and electronic intelligence satellites operated by the National Reconnaissance Office. These satellites include the Big Bird and Keyhole or KH-11.

15.59 The Big Bird satellite is designed to perform both search-and-find and close-look photographic missions. It carries high-resolution cameras whose film is periodically ejected in re-entry canisters that land near Hawaii. In addition, Big Bird carries television equipment which can scan black-and-white, colour and multispectral photographs. These pictures allow observers to identify and count the number of Soviet silos or to monitor the movement of mobile SS-20 missiles. Its infra-red pictures can also be used to measure the thermal output of warm bodies in underground silos or buildings. The multispectral monitors can detect camouflage since they can distinguish between live vegetation and paint of the same colour.

15.60 Ball considers that both the Big Bird and Keyhole satellites are involved in signals intelligence (SIGINT) operations and that Big Bird carries VHF equipment to provide communications to SAC aircraft. Both satellite systems are said to provide a real-time, photographic and electronic surveillance capability in which the satellite can be directed by ground station monitors to scan or photograph areas of interest. The images are then converted to electronic signals and transmitted to the ground without significant loss of resolution.

15.61 The facility at Pine Gap performs an important role and some of the information cannot easily be collected by other means. This point was made by Andrew Mack who stated that:

> The eastern hemisphere spy satellite ground station needs to be able to beam its data - much of it extremely faint signals - down through 'electronically quiet space' so that the signals are not drowned out by extraneous electronic noise.
>
> Moreover, it is currently not possible to package the massive banks of 'state of the art' computers which process the spy satellite data at Pine Gap into mobile ground terminals.[38]

15.62 Furthermore, there is no question that U.S. satellite-based intelligence systems are able to gain considerable information on Soviet force deployments and activities and so would provide timely knowledge of developments that would have military significance. In his book The Command and Control of Nuclear Forces, Paul Bracken cited a number of instances of the United States tapping into Soviet early warning and command systems and concluded that:

> The ability to eavesdrop on highly secret communications about the Soviet nuclear control system could be exploited to great advantage for

> warning of attack. It might constitute the ultimate early warning information, if integrated with American nuclear forces. Not only might it tell of impending attack but it could also detail the characteristics of the oncoming attack.[39]

In this context, Pine Gap plays a stabilising role in the relationship between the superpowers. The same information however is invaluable for developing military options and plans and for engaging in a prolonged nuclear exchange where damage needs to be constantly monitored and assessed and new targets located and destroyed. This again illustrates that military capabilities can be used for both offensive and defensive purposes.

The Joint Facilities and Arms Control

15.63 The second major reason given in favour of retaining the joint facilities is that they contribute to verification of existing arms control agreements and are essential for any future agreements.

> There will be no arms control agreement between the superpowers unless each side is reasonably confident the other cannot cheat on that agreement. That is a fact of life. Both superpowers are deeply suspicious of each other. Both insist on effective monitoring and verification of any treaty on arms control into which they enter. To this point neither has been able to agree on full on-site inspection of arms control agreements between them. The only way therefore in which those agreements can be verified is by what is termed National Technical Means of Verification. It is highly unlikely that some major arms control agreements between the superpowers would have been concluded if there had been no Pine Gap or Nurrungar. If we were to abolish Pine Gap and Nurrungar, we would be seriously damaging the prospect of agreements on the limitations of nuclear arms between the superpowers. Once again we would have achieved exactly the opposite of what we would have set out to achieve.[40]

15.64 The Government has not provided specific details on how the joint facilities fulfil their verification functions and so it is difficult to assess the validity of its stated position. A number of observations can be made however. First, it is clear that the facility at North West Cape does not contribute to the verification of arms control treaties. In the words of the Prime Minister:

> ... the joint defence facility at North West Cape ... is a communications relay station for ships

> and submarines of the United States Navy and the Royal Australian Navy and serves as a key element in a complex system of communications supporting the global balance.[41]

15.65 The primary joint facilities used for verification are Pine Gap and Nurrungar. From the information provided by Dr Ball and others, it seems likely that these two facilities contribute to arms control agreements in at least the following ways:

a. **SALT I and SALT II.** Through direct observation of Soviet ICBM sites using photoreconnaissance satellites such as Big Bird and Keyhole which can be controlled by Pine Gap; through the collection of signals intelligence (SIGINT) and communications intelligence (COMINT), especially telemetry from Soviet missile tests, by the Rhyolite satellite.

b. **1974 Anti-Ballistic Missile Treaty.** The Rhyolite satellites controlled by Pine Gap can monitor radar emissions from around Soviet ABM sites.

c. **1963 Partial Test Ban Treaty and the 1968 Nuclear Non-Proliferation Treaty.** The DCP satellites which are controlled by Nurrungar carry equipment which can monitor nuclear detonations in the atmosphere or in outer space. Both the photoreconnaissance satellites and the signals intelligence satellites are also capable of providing information on preparations for nuclear testing.

The same satellite systems would be expected to play a role in monitoring any subsequent treaties such as those that might arise from the present START or INF negotiations or from the establishment of a comprehensive test ban treaty (CTB).

15.66 Although both Pine Gap and Nurrungar contribute to the monitoring of certain arms control agreements, there is evidence to suggest that, in some respects, the facilities are not as crucial to verification as the Government has suggested. Moreover, the verification role of the joint facilities is likely to decrease in the future with the introduction of advanced surveillance and communication technologies.

15.67 The primary example of this is the DSP satellite which is controlled by the joint facility at Nurrungar. At present the DSP satellites carry sensor equipment which enables them to detect nuclear detonations in space and in the atmosphere. This capability supplements the so-called 'Vela' satellites which were first launched in 1963 and are the primary means of monitoring the Partial Test Ban Treaty. According to Andrew Mack,

the DSP satellites carry more advanced nuclear detonation sensors than those on the Vela satellites but they lack global coverage. This:

> ... limits their ability to monitor compliance with both the NPT and the Partial Test Ban Treaty. In theory it would be possible for atmospheric tests to be conducted in a number of areas in high latitudes without detection by the DSP satellites.[42]

15.68 Partly to overcome this problem, and because the Vela satellites are reaching their end of life, the United States is deploying a new satellite-based detection system known as the Integrated Operational Nuclear Detonation System (IONDS). According to Paul Bracken, IONDS:

> ... consists of visible-light sensors that detect a nuclear explosion's flash. The sensors will be placed aboard the Navstar Global Position System Satellites. Eighteen of these navigation satellites will be placed in deep space, meaning that in theory they cannot be quickly destroyed by Soviet antisatellite weapons. They would give information on the number, yield, and location of above-ground nuclear explosions worldwide.[43]

U.S. Defense Secretary Weinberger's Report to Congress for Fiscal Year 1985 stated that the new nuclear detection system (NDS) will be able to provide virtually instantaneous information on the scale and location of above-ground nuclear explosions in any part of the world. They will contribute to nuclear test ban monitoring in peacetime and would provide damage and strike assessment information to U.S. command posts in the event of a nuclear attack. The FY 1985 program includes installation and integration of the NDS sensors into the GPS host satellites of the Navstar Global Position System. The GPS system will become fully operational in the late 1980s.[44]

15.69 Thus the nuclear detonation facilities deployed on the DSP satellites have always played a supplementary role in monitoring the test ban treaties and certainly would not appear to be crucial for continuing verification. In this respect, the closure of Nurrungar would not erode confidence or the ability to monitor the PTBT or the NPT in the future. Nor is it a crucial consideration in the 1974 Threshold Test Ban Treaty, the 1976 Peaceful Nuclear Explosions Treaty or any forthcoming Comprehensive Test Ban Treaty since all these involve monitoring of underground explosions which is done principally by seismic means.

15.70 A more likely use for the nuclear detection equipment located on the DSP satellites is to monitor nuclear explosions in order to provide the U.S. National Command Authorities with an

assessment of the damage that has occurred as a result of an initial attack by either side, plus targeting options in an on-going war. Again, however, this role is likely to be superseded with the full deployment of IONDS. According to SIPRI:

> IONDS will upgrade the attack assessment capability, but only after nuclear detonations, providing a real-time assessment of nuclear explosions anywhere in the world. Scheduled to replace the older satellite-borne NUDETS sensors, IONDS is being developed to give the NCA instant information on the locations of nuclear detonations and, according to the Defense Department, 'for estimation of strike damage and indirect assessment of residual capability'. IONDS consists of a set of sensors developed by Sandia Laboratories which will be deployed on the 18 satellites of the NAVSTAR global positioning system. The system will be used for 'damage assessment' both in the United States and abroad, reporting the locations, yields and heights of bursts of nuclear detonations, including 'hard target damage assessment'. Forty small mobile read-out terminals will be widely deployed (including on airborne and mobile command centres) to allow retargeting and assessments of nuclear strikes. The full set of IONDS sensors will be deployed by 1986, providing world-wide coverage.[45]

15.71 Andrew Mack[46] considers that despite the deployment of IONDS, there are several possible reasons why the United States may decide to continue to deploy nuclear detection equipment on DSP or other satellites at least in the near term. First, DSP coverage will fill in the gaps until the GPS-based IONDS system is fully operational; second, to maintain extra redundancy in the post-attack assessment regime; third, because the DSP satellites operate at higher altitudes than Navstar, they may be less vulnerable to Soviet Anti-Satellite (ASAT) attack and to the effects of Electromagnetic Pulse (EMP); and fourth, to enable detection of nuclear detonations in space. Mack notes that 'with the exception of the last one, none of these possible reasons for continuing to mount NUDETS/IONDS detectors on DSP satellites relates to arms control verification. They are related to warfighting functions'.

15.72 Similar considerations apply in the case of some of the functions of the satellites that are controlled by the ground station at Pine Gap. The Rhyolite satellite, for example, contributes to the verification of Soviet compliance with the SALT agreements by being able to intercept telemetry from Soviet missile tests. The United States, however, uses a number of other National Technical Means to achieve this objective. These include air, sea and ground based radar systems such as Cobra Ball, Cobra Dane, Cobra Shoe and Cobra Judy. These radar systems can be deployed to monitor most phases of the missile tests and so

probably constitute the principal means of verification. This view is supported by Desmond Ball who has suggested that the interception of telemetry would amount to only a very small proportion of the operations of Pine Gap and the Rhyolite satellites. According to Ball, less than 24 hours a year - or less than 0.3 per cent of Pine Gap's time - is spent on telemetry interception. Moreover:

> ... the Rhyolite program was conceived and the satellites designed some five years before the SALT negotiations began and before the idea of monitoring any agreement by 'National Technical Means of verification' had even been conceived. The Rhyolite programme was designed for the collection of strategic intelligence, and appreciation of its value for arms control was essentially an after-thought.[47]

15.73 The Rhyolite satellites in conjunction with ground-based ELINT stations are also the principal means of verifying compliance with the provisions of the 1972 ABM Treaty, and, according to Ball, have provided the grounds for recent U.S. allegations of non-compliance by the Soviet Union (see Chapter 2). It is also clear however that the ability to monitor and map ABM and air defence systems can facilitate operational planning. The Strategic Air Command (SAC) can use this information to improve the effectiveness and survivability of its strategic bombers and long-range cruise missile operations or to develop a range of active and passive means of countering Soviet air defences including pre-emptive strikes, evasion techniques, and electronic counter-measures. The ability to monitor telephonic and radio communications can also provide military commanders with an advantage during wartime.

15.74 These dual uses also apply to satellite photoreconnaissance. It is undoubtedly an important means of verifying treaties. The satellite monitoring capabilities were crucial to the success of the SALT II negotiations and will continue to play a vital role in any future agreements seeking to limit the number of ballistic missiles or other delivery systems. But they also serve a number of other functions, especially the provision of operational intelligence in both peace and war. Ball cites for example:

> ... Big Bird satellites were used by the U.S. to monitor the Indian nuclear test of 18 May 1974, the Turkish invasion of Cyprus of 20-22 July 1974, and the preparations for the aborted South African nuclear test of August 1977; in October 1973 a Big Bird monitored the outbreak of the Yom Kippur War in the Middle East, and intelligence from this satellite may have been passed to the Israelis and used in their successful break through the Egyptian lines in the Sinai. Photographs obtained from Big Bird satellites were reportedly also used by the U.S. during its involvement in Vietnam to pin-point targets for bombing Cambodia.[48]

15.75 Should nuclear war occur, Ball has stated that:

> ... slow-motion counterforce exchanges as envisaged in current American strategic policy are necessarily dependent on continuous real-time monitoring of Soviet missile silos and bomber bases, and command and control centres. Data on impact points, destruction levels, capability degradations and adversary reactions must be immediately available to the decision-makers.[49]

Australian sovereignty and access

15.76 Some critics of the joint facilities claim that some of the functions carried out through the joint facilities jeopardise Australian sovereignty because Australian governments do not have sufficient control over their operations nor are they fully consulted about them. One allegation that has been cited in support of these criticisms include the belief that SIGINT facilities at Pine Gap have been used to monitor Australian domestic communications.

15.77 Another allegation is the claimed use of the North West Cape facility in late 1972 during the U.S. operation to mine the Vietnamese port of Haiphong and the station's 'red alert' during the 1973 Arab-Israeli war. Another incident involving North West Cape occurred in May 1978, when it was revealed that the U.S. planned to upgrade the satellite ground terminal at North West Cape is alleged to have and that the Minister for Defence had not been informed.[50] The last instance involved an allegation published in the National Times on 29 March 1985 that the United States Government had, with the compliance of the Australian Government, repositioned a DSP satellite controlled through Pine Gap so that it could spy on Greece and other Mediterranean countries.

15.78 For its part, the Australian Government is satisfied that Australia's sovereignty is adequately protected. In his statement on 6 June 1984, the Prime Minister said that new arrangements had been agreed with the United States to ensure that the Australian Government would be able to make timely judgements about the significance for national interest of developments involving North West Cape. He further stated that all the facilities:

> ... are jointly managed and operated by the Australian and American governments. All functions and activities require, and have, the full knowledge and concurrence of the Australian Government. We monitor this and we are satisfied that the operations of the facilities in no way derogate from Australian sovereignty.[51]

In the pamphlet Uranium, the Joint Facilities, Disarmament and Peace, Foreign Minister Hayden further stated that:

> The presence of the joint facilities does not derogate from Australian sovereignty. Contrary to speculation which appears from time to time in the media, the information produced by Nurrungar and Pine Gap is fully available to Australia. Properly qualified Australian government personnel participate in all areas of activity at these facilities. Australia is therefore able to ensure that nothing takes place in those facilities which is contrary to Australian government policy.[52]

On the question of the alleged incident with Greece, the Minister for Defence, Mr Beazley gave an overall assurance that 'nothing happens at [the joint] facilities about which this Government is unaware' but he did not directly confirm or deny reports that the DSP satellite controlled through Pine Gap was being used to spy on Greece.[53]

15.79 The key issue in ensuring Australian control over the facilities concerns access to the installations and their operations. Desmond Ball has argued that such access needs to be considered at three levels: the appropriate degree of Australian access to the installations themselves; the nature of Australian representation in Washington; and the possibility of direct access to the various U.S. satellites controlled or monitored from ground stations in Australia.[54]

15.80 The Committee has been assured on a number of occasions that Australia has sufficient access to the installations. An officer from the Department of Defence informed the Committee during the present inquiry that the Department has access to all the information from the joint facilities.[55] On a previous occasion, during its inquiry into the ANZUS Alliance, the Committee was told that:

> those who have access to the information about the role and the functions of the Joint Defence Facilities, both Australian and American, are fully aware of the nature of the work at the facility and how the facility is operated. Those at the site, Australian and American, whose responsibilities so require, have equal right of access to all parts of the facility, to its activities and to all results of the research, excepting only national communications rooms where cipher communications are kept private.
>
> The principle of full knowledge and concurrence underlies our participation in those joint facilities. The exception which the Minister (for Defence) stated in 1977 was only the national communications rooms, one Australian and one American, where cipher communications are kept private. The physical layout of the site and the interdependence of the staff are such that the scope of a program being undertaken is clear to those working there. We have an Australian Defence representative who participates in the daily decision-making concerned with program activities. He has complete access at any time to all operations. There is no way in which systematic deception, or activities detrimental to Australian interests, could go undetected. Programs are actively monitored both at the site (Pine Gap) and in the Department of Defence in Canberra.[56]

15.81 Desmond Ball, on the other hand, while acknowledging that Australian access has improved considerably in recent years, claims that it remains limited in certain important respects.

> At North West Cape, Australians are excluded from the U.S. National Communications Room, which obviously severely constrains any Australian ability to ensure that the station will not be used to send orders for a first strike nuclear attack nor to initiate a limited strike.
>
> At both Pine Gap and Nurrungar there are also national U.S. cypher and communication rooms to which Australians are not admitted. More importantly, however, Australians are also excluded from one of the most critical sections of the Control and Computer Building at Pine Gap. This building has three principal sections: (i) the Station-Keeping Section, which is responsible for keeping the satellites at geostationary altitude from drifting out of orbit and for correctly aligning them towards areas of interest; (ii) the Signals Processing Office (SPO); and (iii) the Signals Analysis Section. The Signals Analysis Section (SAS) is staffed only by CIA and NSA analysts; it includes no U.S. contractor personnel and no Australian citizens. Many of the personnel in this Section are linguists who monitor the voice intercepts. Former staff at Pine Gap have claimed that much of the material analysed in this Section is never passed on to the Australian officers - this included, for example, voice intercepts obtained from China and Vietnam during the period of the last Labor Government. It is imperative that there be Australian personnel working in this Section, not only to ensure that all SIGINT of interest to Australia is passed on, but also because while there remains a Section which is inaccessible to Australians there can be no confidence that domestic Australian transmissions are not being intercepted and routed through this Section.[57]

15.82 Ball also considers that the current arrangements between Washington and Canberra concerning Australian involvement in the joint facilities and the provision of information about U.S. activities that may affect the facilities or Australia's interests are inadequate.

> ... they relate much more specifically only to North West Cape. They do not provide for equivalent and full access in the case of Nurrungar and Pine Gap. It is true that we do have liaison officers at the Central Intelligence Agency but we do not have anyone specifically tasked with liaison on the particular intelligence which is collected at Pine Gap. In particular the management authority concerned with Pine Gap, the National Reconnaissance Office, is an area where I believe we should have someone with definite liaison responsibilities.[58]

15.83 Elsewhere, Ball claims that these issues were raised in talks between the Prime Minister and President Reagan and Defense Secretary Weinberger and again at the annual meeting of the ANZUS Council in 1983, in both cases with little success.

> The most the U.S. would accept was an amendment to the 1974 agreement on North West Cape to the effect that the U.S. will liaise with a nominated officer of the Australian Defence Staff in the Washington Embassy, who will inform Canberra 'of any change in the status of military preparedness or alterations which take place' with respect to the North West Cape station.[59]

15.84 Ball accepts that the arrangements covering access to North West Cape and probably Nurrungar are reasonably good. He considers that this is not the case with Pine Gap and recommends that Australia continue to pursue full and high level access both at the facility itself and in Washington. In the latter case:

> The appropriate machinery that is required there has to be beyond liaison arrangements with the CIA. The critical area where the first analysis of that material is done is the Foreign Missile and Astronautics Center which involves more than just the CIA. It involves the National Reconnaissance Office and the National Security Agency. That is really where the difficulty comes in, because getting some sort of accreditation to those agencies other than the normal routine accreditation which we have with NSA through DSD is a major difficulty. I am not sure whether the Americans would even come at that. Because it is a difficulty, though, does not seem to me to be a

> reason why we should be stepping away from it. I think it is of supreme importance that we be assured that we do see what comes down through that facility. The appropriate person has to be someone with technical knowledge dealing very much with some of the most complex and intricate technical operations to assure us that material is not being diverted from the satellite directly to another satellite back to the United States or in some way coming down to the ground and being diverted away from areas where we could see it.[60]

15.85 Ball also considers that Australia should have access to all material collected by the satellites controlled by Pine Gap and Nurrungar whether or not it actually passes through the ground stations.

> ... if the United States has gone to the trouble of putting a backward facing dish on some of their intelligence gathering satellites and sending material back directly to the United States rather than coming down through Australia at least in my mind that would provide even more of a reason for wanting to know why they were doing that, and more of a reason why I would want to see that material. We say that we are a joint operator of the ground station which is controlling the operations of that satellite, in terms of station keeping, its focus on areas of interest, and, therefore, everything that that satellite is picking up is something which we are entitled to see. None of that should be in some way filtered off and sent back without us having an opportunity to see it. That is, in my terms, one of the elements of a joint operation.[61]

Discussion and Committee Views

15.86 In its assessment of the role and importance of the joint defence facilities, the Committee has sought to examine in detail the primary reasons given by the Government for their retention: that is, the role of the joint facilities in maintaining stable deterrence and their contribution to verification and arms control. As described earlier, the subject is both highly complex and controversial. The installations differ enormously in terms of their functions and purposes, relative importance and implications for global and Australian security. Distilling these issues is a difficult task which has not been helped by the lack of official information or comment on the detailed purposes and functions of the facilities, particularly Pine Gap and Nurrungar.

15.87 The Committee acknowledges that over recent years an increasing amount of information on the facilities has been made publicly available, but it is aware that because of intelligence restrictions the information provided is still insufficient for members of this Committee, or the general public, to derive a fully informed and authoritative view on their role or contribution to global security. As a general principle, the Committee considers that the Australian public should be told as much as possible about the purposes and functions of the joint facilities as is compatible with genuine considerations of Australian security requirements. The information provided should be sufficient to justify the Government's case for the retention of the facilities in Australia and it should, as a minimum, cover what is available on the public record in the United States. The information should address the following aspects:

a. the technical characteristics and general functions and purposes of the individual facilities. What are they made up of and what do they do?

b. the way in which the individual facilities fit into the overall strategic systems that are maintained by the United States. What are the facilities connected to, how important are they to the continued operational survivability of the system and what alternatives exist? And

c. the broader strategic and defence-policy context within which the facilities and their parent systems operate. How are the American strategic forces structured, and what are the principal purposes of the weapons and other systems of which the joint facilities are part?

15.88 Consideration of the joint facilities can take place at three levels: technical, strategic (or defence) and political. The preceding discussion has concentrated largely on technical issues, in particular the functions performed by the various facilities: what they are, their importance, whether they can be carried out by other means, and so on. The Committee feels that a detailed understanding of the technical nature of the United States' command and control network and its individual components is essential for considering the higher-order strategic and political issues surrounding the joint facilities.

Technical Considerations

15.89 The technical descriptions contained in this Report rely on information drawn from the public record, including the writings of Dr Desmond Ball, Head of the Strategic Studies and Defence Centre in Canberra and an eminent authority in this field. It is recognised that Dr Ball does not have complete access to official information on the joint facilities and

therefore his information may be incomplete or out of date in certain respects. With this caveat in mind a number of observations and conclusions can be made with respect to the functions and purposes of each of the facilities.

a. **North West Cape.** The facility at North West Cape plays no role in the verification of arms control agreements and so should be judged solely in terms of its contribution to maintaining deterrence. It is clear that it supports extended deterrence by providing communications to submarines and surface ships of the United States and allied navies including U.S. attack submarines on patrol in the Indian and Pacific Oceans. North West Cape also appears to play a role in maintaining basic deterrence through the provision of communications to SLBM submarines. The importance of these roles seems to be decreasing with the introduction of alternative means of communication between U.S. command authorities and its SSBN fleet.

   Given that the joint facility at North West Cape is a communications relay station, and the allegedly restricted access to the U.S. cypher office located at the facility, it seems unlikely that Australian personnel located at North West Cape could directly monitor orders being relayed through it.

b. **Nurrungar.** The Joint Defence Space Communications Station at Nurrungar forms part of the U.S. satellite-based Defense Support Program (DSP). The DSP satellites and associated ground control stations provide early warning to the United States of Soviet ballistic missile launches as part of an initial attack on the United States, thus contributing to basic deterrence. The DSP satellites also carry nuclear detection (NUDETS) equipment which can be used to monitor above-ground nuclear explosions. This function could be used to verify arms control agreements although the DSP satellites are not essential for this purpose.

   The importance of Nurrungar's contribution to America's early warning and assessment capabilities is decreasing with the deployment by the United States of new technologies and systems designed to improve the survivability and redundancy of its strategic C^3 systems. If these developments continue on schedule, it would seem that over the coming decade the Nurrungar ground station will no longer be

required except perhaps as a back-up facility to systems which involve extended counterforce and nuclear war-fighting capabilities.

c. Pine Gap. The Joint Defence Space Research Facility at Pine Gap is part of the United States' satellite intelligence monitoring network which collects a range of information on the military activities and forces of the Soviet Union or other targeted nations. The information can be used for a variety of purposes: to monitor compliance with arms control treaties; to provide early warning of a potential adversary's actions or intentions; for operational planning purposes; or to monitor existing operations - either conventional or nuclear. The actual use of the information gathered and the relative importance of these uses is very difficult to determine without access to official U.S. doctrines and policy. It would seem reasonable to assume, however, that the U.S. Rhyolite Program and other satellite intelligence systems would have been developed to collect intelligence and to facilitate U.S. operational planning and control, as well as a means of verifying arms control agreements.

d. Other Facilities. There are a number of other facilities located throughout Australia which make some contribution to the United States strategic posture. These include the Omega navigation station in Victoria (which is by its nature useful to any and all shipping and aircraft in the area), the Tranet satellite earth station in South Australia and the satellite ground station at Watsonia which is part of the U.S. DSCS network and links the Australian Defence Signals Directorate in Melbourne to the National Security Agency, the CIA and the Naval Ocean Surveillance Information Centre (NOSIC) in the United States. Very little is known about the functions of this last station except that it probably relays information on ship and aircraft movement which is collected by DSD high frequency-direction finding (HF-DF) stations located in Australia and its surrounding region. Such information would be used by the U.S. Command Authorities for operational intelligence purposes.

15.90 Overall, it appears that the defence facilities in Australia are concerned primarily with supporting global deterrence and that verification of arms control agreements is a secondary, albeit important role which has arisen because the technologies used to satisfy both functions are the same. The former point is evidenced by the fact that the naval

communications station at North West Cape does not contribute at all to the verification of arms control agreements; above-ground nuclear explosions can be adequately detected without the DSP satellite that is controlled through the ground station at Nurrungar; and while the SIGINT and photoreconnaissance facilities operating through Pine Gap are important national technical means of verification, they are also used to collect operational intelligence that can be used for war-planning and war-fighting (both conventional and nuclear). In addition, it can also be reasonably assumed that a number of other facilities located in Australia are used, albeit in some cases indirectly, by United States strategic forces to maintain deterrence.

15.91 On the basis of the information considered, it would also seem that, from a technical point of view, some of the defence facilities are more important than others. The most important facility is the space research centre at Pine Gap. The functions carried out here relate to intelligence collection in Australia's own area of interest, they are highly complex and they require very powerful computer processing facilities. It is unlikely that the functions performed by Pine Gap could be easily transferred to another ground station or location, nor are they likely to be duplicated by on-board processors being placed on new generation satellites. The naval communications relay station at North West Cape plays an important role in maintaining deterrence and the space communications station at Nurrungar and the Tranet facility at Smithfield have both provided important contributions in the past. However within the coming decade each may become redundant as a result of developments in satellite technology and improvements in and diversification of the United States' strategic C^3 system.

Strategic and Political Considerations

15.92 The key issue here is whether the contributions being made by the joint facilities are making nuclear war more or less likely than in the past. Are they enhancing or destabilising deterrence? Given that the Government concedes that at least some of the facilities could be targeted by the Soviet Union in the event of a nuclear war between the superpowers, a related issue is whether the risk to Australia of maintaining the targeted facilities is worth taking.

15.93 The Government considers that the risk of being attacked with nuclear weapons is small and that it is more than outweighed by the contribution the facilities make to global stability through verification of arms control agreements and the maintenance of deterrence. It further argues that the closure or removal of the joint facilities would actually undermine deterrence and so increase the risk of military conflict between the superpowers, thereby endangering Australia's security. It points out that Australia could not avoid the consequences of a major nuclear war. Under these conditions, it claims that it makes sense to host the facilities and so reduce the probability of such a war occurring.

15.94 The arguments used by the Government to support its case tend to emphasise the contribution that the joint facilities make to enhancing basic deterrence, crisis stability and verification of arms control agreements over other U.S. nuclear policy objectives. The earlier technical discussion clearly shows that the joint facilities contribute to both basic and extended deterrence with the emphasis gradually shifting to the latter. This should not be surprising since the facilities form an integral part of the U.S. nuclear posture and so will reflect overall changes in its strategic forces and capabilities. As described in Chapter 3, the United States now follows the 'countervailing' form of deterrence. Under this approach, emphasis is given to the development of counterforce capabilities, and the United States' threatened response to Soviet actions is thought to be made more credible by preparing targeting and contingency plans for a variety of possible military conflicts between the superpowers; plans which are designed to deny the Soviet Union the possibility of victory at whatever level of aggression it chooses to initiate and to minimise or preclude unwanted collateral damage in the event of war. These changes are in turn reflected in the changing role and functions of the joint facilities. Early warning systems are being expanded to provide post-attack and damage assessment capabilities; warning and intelligence systems are collecting information needed for operational planning and control, and they are being made more durable in order to be able to continue to operate in a hostile nuclear environment; and the joint facility at North West Cape now provides communications to surface shipping and attack submarines as well as SLBM forces.

15.95 The United States claims that the emphasis on 'counterforce' and 'warfighting' doctrines and capabilities makes deterrence more credible and therefore reduces the risk of military conflict between the superpowers. Critics of the 'countervailing' form of deterrence argue that the proliferation of weapons and the increasing emphasis by both sides on offensive doctrines and military capabilities increases the chances of nuclear conflict, particularly in a crisis, makes such a conflict harder to control, and increases the chances of escalation to all-out nuclear war. This view appears to be shared by the Government. In the 1984 publication Uranium, The Joint Facilities, Disarmament and Peace, the Foreign Minister Mr Hayden gave support to a system of nuclear deterrence in which each superpower would retain invulnerable strategic nuclear forces capable of destroying the other side in the event of a nuclear attack. He further considered that the development of nuclear war-fighting doctrines and capabilities is dangerous since to 'prepare to fight a limited nuclear war, or to prepare to fight and win a war, is in fact to make nuclear war more thinkable and therefore more possible'.[62]

15.96 While the facilities may be making an increasing contribution to extended deterrence, it remains the case that Pine Gap and Nurrungar in particular continue to operate in support of basic deterrence - primarily through their intelligence collection and early warning functions - and that Pine Gap provides the United States with an important National Technical Means of verifying Soviet compliance with existing or

projected arms control agreements. Many of the facilities also provide a number of functions - navigation and radio relay for example - which are used by Australia's own defence forces to support our national security posture. The question of whether the contributions made by the joint facilities are stabilising or destabilising, or whether the facilities should be removed or retained, depends on an assessment of the relative merits of basic and extended deterrence and the significance of the contribution that the facilities make to each or both of these strategies.

Future Options

15.97 **Closure or removal of the facilities.** A small number of submissions to the inquiry considered that any direct involvement of the joint facilities in U.S.' war-fighting' strategies represents sufficient grounds for their closure or removal from Australia. They considered that, contrary to government opinion, such a move would not undermine deterrence since most of the functions of the bases are either duplicated or being duplicated by other systems. In their view, closure of the joint facilities, in particular, would signal Australia's concern over its continuing collaboration with nuclear war-fighting doctrines and capabilities because they are seen as highly destabilising. They also claim that it would minimise the risk of being directly attacked by nuclear weapons.

15.98 The Committee does not support this option for a number of reasons. It may be true from a purely technical point of view that a number of the facilities in Australia or their functions may in the short term be duplicated elsewhere and so their closure would not seriously erode current or projected American C^3I capabilities. However, the facilities are now and probably for many years to come will be, of sufficient strategic significance to the United States that their removal from Australia or closure would be strongly opposed. The United States would also be concerned over the security implications of the removal of the facilities as well as the political ramifications of such a move for other areas of the globe. Closure would only detract from the United States and have no impact at all on Soviet capabilities and doctrines. The fact that some of the installations need to be located in Australia if their role is to be fully effective is likely to add to American resistance to their closure.

15.99 Closure of the facilities would mean the end of ANZUS and halt the benefits that we currently derive from our present alliance relationship. It would also have a detrimental effect on the coherence of the Western alliance to the benefit of the Soviet Union, providing both a potential military advantage and propaganda opportunities as well as an invitation to increase its presence in the Pacific and Indian Oceans. It could thus have a significant destabilising effect on our region, with potentially serious consequences for Australia's own security, as well as reduce the regional influence that Australia currently enjoys through its close security ties with the United States.

15.100 A decision to close down the facilities would not be supported by the Australian population at large. The Australian electorate sees the hosting of the facilities as a legitimate and necessary commitment arising from the ANZUS alliance and our continued support for the Western Alliance. It also seems to be part of our contribution to gain continuing American protection. As Andrew Mack has noted, this support is very strong.

> The Australian electorate is extraordinarily conservative on defence issues. Support for ANZUS has increased from 68 to 73 per cent in the last year. Most Australians want conscription brought back and defence expenditure increased. They support U.S. nuclear ship visits and the use of Darwin as a staging post.
>
> The most recent polls on the presence of U.S. defence facilities - in 1981 - showed that 60 per cent supported their presence compared with only 22 per cent who were opposed.[63]

15.101 A further problem is that closure of the facilities at Pine Gap and Nurrungar would reduce the United States' overall ability to monitor arms control agreements or receive early warning of Soviet actions that may threaten Western security. While verification is currently only part of the functions carried out via Pine Gap, its importance could increase significantly if the United States reversed its present policies and sought to negotiate a number of arms control agreements.

15.102 The Committee notes that some of the facilities, notably the space communications station at Nurrungar, are slowly becoming redundant as a result of technological change and as the United States deploys additional C^3I assets. It is thus possible that at some time in the future some of these facilities could be either closed down or converted to another role without any detriment to the United States' deterrent posture. The Committee also recognises that the use of the facilities are determined by broader strategic considerations which are beyond Australia's control.

15.103 **'Decoupling' or conversion of the facilities.** A number of submissions accepted the continued presence of the facilities in Australia, for the time being, and sought ways of minimising what were seen to be the objectionable functions of the facilities whilst preserving or enhancing their verification and stabilising roles. Among the suggestions made were:

a. the Australian Government prohibit any modification or upgrading of the facilities which would enhance U.S. 'warfighting' capabilities;

b. the facilities, or at least their intelligence gathering and verification functions, be 'disconnected' from the U.S. nuclear weapons systems and placed under independent control, either:

   (i) an Arms Control and Disarmament Agency established by the Australian Government; or

   (ii) an appropriate United Nations agency such as the proposed International Satellite Monitoring Agency (ISMA); and

c. conversion of the facilities for exclusive Australian use either to facilitate our existing defence capabilities or in a non-military role (one suggestion, for example, was to convert the radio transmitters at North West Cape for use by Radio Australia).

15.104 The Committee does not support these proposals as they would be subject to the same constraints that operate against closure of the facilities. Given the political and strategic importance that it attaches to the facilities, the United States would not allow them, or even some of their functions, to be placed under exclusively Australian, much less international control. Any attempt to move in this direction would therefore be opposed by the United States and could lead to the dissolution of ANZUS and the withdrawal of American support from the region. In any event, the verification functions of the facilities could not be separated from the deterrence capabilities as the same technologies are used for NTM as are required for the planning and support of U.S. combat operations. As described in Chapter 13, the Committee nonetheless supports the concept of establishing independent means of verifying superpower compliance with existing and proposed arms control agreements since this would lessen the chances of using the verification issue for political or propaganda purposes.

15.105 **Continued operation of the facilities.** Some submissions accepted that the United States would not allow significant changes to be made to the facilities but argued that:

a. the Australian Government insist that it be fully apprised by the United States of the operational details of the facilities and of those technical and strategic developments that are likely to affect the roles, functions and operational procedures of the facilities; and

b. the Australian Government exert greater operational control over the facilities and have complete access to all information that is either passed through the facilities or is collected by the systems they support.

15.106 The Committee supports the continued presence of the joint facilities in Australia. It considers that the Australian Government be fully apprised of the operational details of each of the facilities and the technical and strategic devlopments that would affect their role and functions. As a matter of principle, the Committee considers that Australia should have sufficient control over all military facilities located on its soil to ensure Australia knows about and can prevent any use of the facilities that are inimical to Australia's own interests. Such control should involve as a minimum:

a. participation in management decisions affecting the structure and operation of the facilities;

b. access for Australian personnel to all areas within the facilities; and

c. availability of all information passing through the facilities, or collected by them, to appropriately cleared Australian personnel located in Australia.

15.107 A key issue here is the question of access. The Committee notes that there is a difference of opinion between the Australian Government and the evidence presented in 1984 by Dr Desmond Ball, Head of Strategic Studies Centre at the A.N.U., over whether the present access provisions are sufficient to guarantee Australian sovereignty and control of the joint facilities. The Government claims that present access is sufficient to protect our interests. Ball claims that Australians continue to be excluded from key cypher and communications rooms at all the joint facilities as well as the Signals Analysis Section at Pine Gap. If this is true, it would seriously constrain Australia's ability to monitor certain messages passing through the facilities, or information that is collected by them. The Committee has not been able to independently verify whether Ball's claims are true.

15.108 The Committee notes that the role of the Joint Defence Space Communications Station at Nurrungar may decrease significantly in the next decade as the United States deploys alternative means of providing early warning of Soviet missile launches. If no longer required, consideration should be given to an alternative use from that time for the facility which directly assists Australia's defence posture. Conversion to this use could be negotiated in return for the continued presence of the other joint facilities. There may be value, for example, in converting the ground station for use in an Australian satellite-based system which would be used in conjunction with over-the-horizon radar and airborne early warning aircraft (AWACS) to provide surveillance of Australia's area of interest. The Committee *recommends that a feasibility study be conducted on this or* similar eventual Australian use of the Nurrungar facility.

Should the joint defence facilities be used as bargaining chips to achieve Australian political or economic objectives?

15.109 The recent decision by the United States' Government to subsidise American wheat sales to the Soviet Union and China, despite the significant impact this would have on the Australian economy, raised the issue of whether the facilities could or should be used to exert pressure on the United States to prevent it from carrying out actions that would be detrimental to Australian interests.[64]

15.110 The arguments in favour of using the facilities to exert political leverage include the view that Australia is entitled to use any means available to protect its own national interests; that Australia's continued support of the Western alliance depends on its ability to maintain existing levels of defence expenditure; and that the United States cannot ask us to contribute to an alliance to withstand the Soviet Union while at the same time enacting policies which support the Soviet Union at the expense of its traditional allies. Some have expressed a view that Australia has a right to demand an 'economic rent' for the facilities as a means of recouping at least some of the foreign exchange losses inflicted as a result of the current U.S. trade policies.

15.111 The principal arguments against the proposition that the facilities should be used for political leverage are the same as those described earlier against closure or decoupling of the joint facilities. Attempts to use the facilities as 'bargaining chips' would undermine Australia's security, threaten the tangible military and intelligence benefits currently received through the U.S.-Australian alliance relationship, and erode the ability to verify arms control agreements.

15.112 The Committee does not support the use of the joint defence facilities as bargaining chips to advance trade or other economics interests. Such an approach may be seen to be politically expedient, but would be counterproductive since it would threaten Australia's current relationship with the United States and place in jeopardy the defence and national security benefits that we currently derive from them. A nation's national security interests cannot be equated with relatively short term trade problems. *The Committee further considers that the United* States should not be required to pay an 'economic rent' for locating the facilities in Australia. The facilities operate under the joint control of the two governments and therefore provide benefits to both sides as well as the Western alliance generally.