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ASSEMBLY OF WESTERN EUROPEAN UNION

TWENTY-SEVENTH ORDINARY SESSION
(Second Part)

# United States-European co-operation in advanced technology

REPORT
submitted on behalf of the
Committee on Scientific, Technological and Aerospace Questions
by Mr. Hill, Rapporteur

ASSEMBLY OF WESTERN EUROPEAN UNION
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**Document 889** **29th October 1981**

*United States-European co-operation in advanced technology*

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# REPORT[1]

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1. Adopted in Committee by 15 votes to 0 with 1 abstention.

2. *Members of the Committee:* Mr. Valleix (Chairman); MM. *Lenzer, Wilkinson* (Vice-Chairmen); MM. *Adriaensens, Amadei, Antoni,* Barthe, *Cornelissen,* Fiandrotti, *Forma,* Fortier (Alternate: *Bassinet*), Fourré, Garrett (Alternate: *Hill*), *Hawkins,* McGuire (Alternate: *Jessel*), Männing, *Prüssen, Spies von Büllesheim,* Topmann, *van Waterschoot, Worrell.*

N.B. *The names of those taking part in the vote are printed in italics.*

## *Draft Recommendation*

***on United States-European co-operation in advanced technology***

The Assembly,

Referring to its Recommendation 316 on United States-European co-operation and competition in advanced technology, adopted in June 1978, and the Council's reply dated 16th November 1978;

Considering that some useful progress has been made in the development of European-American links in the military sector of industry;

Regretting that its proposal in Recommendation 316 for a high-level European-United States special committee to promote European-United States co-operation in advanced technology projects had been ignored by the governments concerned, although such a special committee could have played an important rôle in the co-ordination of advanced technology;

Considering the growing need to co-operate for economic, financial, political and military reasons, and, *inter alia*, because of budgetary restraints, with a view to avoiding overlapping in research programmes and needless delays and wastage of necessarily scarce financial resources;

Considering the slow start and development of transatlantic technology transfer because of difficulties in overcoming differences in standards;

Aware of the serious problems between NASA and ESA due to respective priorities with regard to scientific programmes such as the joint international solar-polar mission;

Conscious of the present American administration's stated willingness to inject new life into American-European collaboration in many fields of high technology,

RECOMMENDS THAT THE COUNCIL

Invite member governments:

1. To study jointly how to bring military requirements into line with budgetary resources, for instance by the further joint development of new composite materials for military hardware, in order to halt the spiral of ever-increasing costs within military budgets, or by using an existing platform as was the case with the Boeing 707 and the Nimrod for AWACS or could be the Tornado for electronic jamming devices;

2. To study – in comparison with other systems – the various merits of the competing systems offered by the Lockheed/Dassault-Dornier Alpha-Jet trainer, the McDonnell Douglas/British Aerospace Hawk trainer and the Grumman-Beechcraft project for the jet flight training of American navy pilots (VTXTS programme);

3. To bear in mind the need for an up-to-date and as comprehensive as possible European military pilots' training system promoting harmonisation in the training systems and finally conclude that the best system should also be adopted generally in the European theatre;

4. To foster, within the framework of the International Energy Agency related to the OECD, where appropriate, a co-ordinated research and development programme, especially with regard to solar and wind energy which have to be funded by governments in order to avoid developments within national boundaries which fail to take account of developments in the same fields in other countries;

5. To invite the French Government to participate in the efforts in the International Energy Agency towards a collaborative and imaginative research and development programme;

6. To examine and use to good avail work carried out in the United States in its national wind energy programme;

7. To instruct their diplomatic missions in the United States to follow closely developments in respect of:

(*a*) the international solar-polar mission which should have priority for NASA funding as otherwise confidence would be lost in the future of American-European space collaboration ;

(*b*) the use of Spacelab components or elements for building and developing future space stations or platforms;

(*c*) the use of European remote-sensing satellite systems first for oceanic observation and later for land resources surveillance;

(*d*) the space telescope programme;

8. With regard to the law of the sea conference, to be wary of a split between the policies of Western European nations on the one hand and between the attitudes of Europe and the United States on the other hand, and to reconcile the need for developing countries to have access to ocean resources, with the essential requirement of guaranteed access to scarce minerals vital to NATO's ongoing defence programme.

## *Explanatory Memorandum*

*(submitted by Mr. Hill, Rapporteur)*

### *Introduction*

1. The Committee wishes to preface its report by expressing its sincere appreciation of the valuable assistance afforded by the United States Embassy in Paris, the State Department, NASA, and other authorities contributing to the arrangements which made the visit to the United States from 12th to 26th July 1981 a success. The Committee visited the State Department, the Departments of Defence and Energy, NASA and five aerospace industries, four on the west coast and one in New York[1].

2. In preparing for this visit the Committee studied a number of questions for use as guidelines in its discussions on research and development policy, the sea law, space activities and questions on nuclear energy as well as renewable resources of energy[2]. Moreover, the Committee believed it would be useful to discuss political aspects of NATO affairs so as to place the more technical discussions in the wider framework of overall East-West relations.

### I. *General*

3. In the framework of overall East-West relations of a political nature the Committee was briefed by Mr. H. Allen Holmes, Senior Deputy Assistant Secretary of State for European Affairs and former Counsellor at the United States Embassy in Paris. He pointed out that in order to enhance the security of the United States the new Reagan administration had decided to embark upon a major programme to improve the United States military capability. It wished to deny the Soviets any opportunity to conduct a foreign policy aimed at exploiting real or perceived American military weaknesses. Second, the administration considered Europe to be its principal partner and it would make a great effort to strengthen the Alliance relationship and bilateral relations with friendly European countries which shared the strategic interests of the United States.

4. Since the new administration had started its term of office two excellent NATO meetings had been held and there had been a number of bilateral contacts. The Secretary of State, Mr. Haig, and the Secretary of Defence, Mr. Weinberger, had a more realistic approach to the USSR-United States relationship and wanted to pursue co-ordinated foreign, defence and economic policies. This was the United States objective for the Ottawa summit meeting. At the same time they considered that America must again show that it was a reliable partner, consistent in its approach to international problems and balanced in its policies. For this reason the United States Government believed that the NATO defence budget should be increased by 3 % in real terms in both the conventional and nuclear areas. At the same time measures should be taken to promote talks on arms control and eventually disarmament. At the end of this year the foreign secretary would meet with his Soviet counterpart to start such talks with a view to achieving the lowest possible levels of armaments.

5. It should not be forgotten that since 1963 the United States theatre nuclear arms had not been modernised whereas the Soviets had deployed a new type of missile, the SS-20, with three warheads each, 220 of which were now stationed in Eastern Europe. At the same time the Soviet Union had not withdrawn its more than 1,000 SS-4 and SS-5 missiles. It was therefore rather ironic that the Soviet Government should now talk about a moratorium since this would place the United States at a disadvantage. The military balance in Europe should therefore be improved in the conventional as well as theatre nuclear fields and greater allied defence contributions were to be encouraged. At the same time the United States Government approved of the French initiative now being discussed in Madrid for a European conference on disarmament during which the human rights questions mentioned in the final act of the Helsinki conference should also be discussed.

6. Improved European security would also benefit the Alliance elsewhere in the world. If they felt confident of their security at home, Western European nations might be individually more willing to assist the United States in defending common interests outside the NATO area. For instance, in the Persian Gulf several NATO countries had quietly assembled a body of ships which might form a psychological defence barrier and avoid a disruption of traffic in the Strait of Hormuz, which was of course of great importance for the supply of oil for the United States and Western Europe.

7. An important difference in policy as compared to that of the former Carter adminis-

1. See the programme of the visit at Appendix I.
2. See Appendix II.

tration was that all questions were now being examined in terms of overall security and the approach was not compartmentalised as in the days of the Carter administration. Arms control discussions were thus linked to Soviet activities in Afghanistan, Iran, Poland, etc. At the same time the United States did not wish a confrontation with the USSR but sought an equilibrium and a balance of power. Neither wished the United States to have military superiority.

8. The growth in the United States defence budget would be 7 % in real terms and the government hoped that this increase in defence spending would be a signal to the USSR. At the same time the United States Government hoped that the European allies would continue to accept the 1979 goal of a 3 % increase in real defence spending. This was already being carried into effect in several countries and was of great political importance in order to avoid first and second class NATO nations.

9. Finally, on the question of the strength of the United States dollar, one should be aware that the high interest rates were a consequence of the monetary policy of the Reagan administration to reduce its deficit and to achieve a balance of payments. Only two years ago these goals were demanded by the European governments as then they considered the dollar too weak, preventing them from exporting their goods and services.

## II. *Space developments*

10. On Monday, 13th July, the Committee met in the State Department with Mr. James Malone, Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs. He gave a general outline of the policy of the Reagan administration in several areas such as space activities, research and development priorities, nuclear affairs and the law of the sea. In this chapter, your Rapporteur wishes to cover general research and development priorities and United States space activities. In following chapters he will deal with nuclear affairs, the law of the sea and aeronautical developments.

11. The new administration intended to rely increasingly on the private sector for its research and development policy. There was therefore a downward trend in research and development support which reflected the administration's overall intention to trim federal spending. So far there had been no comprehensive policy statement on federal research and development, but the general outlines were evident from the 1982 budget proposals. Some salient points included: (*a*) In basic research the United States Government clearly intended to maintain a strong base; emphasis would be on quality with some attempt to identify areas relevant to national security requirements. Overall basic research support would grow just enough to keep pace with inflation; in physical sciences, mathematics and engineering there would be modest real growth and a slight decline in biomedical sciences. (*b*) Research and development in defence areas would be increased significantly. (*c*) Support for social and behavioural research had been cut. (*d*) Priorities of programmes in applied research, development and demonstration had been reordered to reflect greater reliance on market forces, especially in civilian technology. (*e*) Tax incentives had been proposed to encourage greater research and development investment. (*f*) International co-operation in science and technology were very important for the new administration. Collaborative research and development were especially important as pressure on all national budgets was growing. This would be the answer for the rising costs of scientific and technological ventures in space, oceanographic research, fusion energy development, high energy physics and other fields such as natural resources and health.

12. The foreign policy implications of natural resources management were very significant. The western world had to use every opportunity to impress upon other parts of the world the seriousness of the global situation created by the demands of an expanding population on the resource base and the resulting threat to the environment. If the world was to alter the intensive consumption patterns of the past, which could not be sustained in future, it had to develop choices that did not lock countries into resource-intensive infrastructures.

13. Turning to the United States policy on space, Mr. Malone pointed out that the United States space programme was an extremely broad-based one, ranging from planetary exploration, as a means of contributing to man's knowledge of the universe, to direct, everyday applications in communications, navigation and crop forecasting. By their very nature space activities were international in scope and international co-operation had been an important part of the United States civil space programme from its conception.

14. Bilateral and multilateral projects with Europe, Canada and Japan had been very successful and both the United States Government and the United States Congress supported and expected such co-operation to continue. However, the current economic situation would have a great impact on national and international space programmes.

15. Broad international participation in the United States space programme meant a major restructuring of the NASA budget which necessarily affected international agreements too. The State Department had been working with NASA and representatives of ESA and of each Western European country to alleviate the first effects. Current budget restraints should not be misunderstood as lack of support for international co-operation. Mr. George A. Keyworth II, the Science Adviser Designate to the President, had stated that international co-operation was high on his list of priorities.

16. As far as the State Department's responsibilities were concerned, several trends would call for increased attention: (*a*) The planned growth of the shuttle programme would require the negotiation of new agreements for contingency landing sites and emergency rescues. (*b*) Remote sensing would become operational in the same way as satellite communications some years ago. Responsibility would pass from NASA to NOAA[1] and then to the private sector and thus the State Department would have an important rôle in arranging for foreign users to have access to data on a non-discriminatory and fair price basis. Regional meetings with developing countries as future users were planned for 1981 and 1982 to improve understanding of their needs as plans for future system designs were being drawn up. (*c*) As Landsat ground stations proliferated and other countries made increasing use of the shuttle, new and difficult questions of technology transfer and expert control would arise. In the past year stations had begun operations in Japan, India, Australia, Argentina and South Africa; existing stations were in Canada, Brazil, Italy and Sweden and future stations would be established in Thailand and mainland China. A number of other countries were considering joining the system as well. (*d*) A special effort was being made to promote co-operation in remote sensing with other countries. Meetings had been instituted with ESA, France, Canada and Japan in order to make the launch schedules, transit times and read-out procedures complementary and compatible. This would enable users to draw the maximum advantage from the different national programmes to the mutual benefit of all.

17. Of special importance to Europe was the international solar-polar mission. Two spacecraft, one developed by ESA and the other by NASA, would be launched together by the inertial upper stage (IUS) from the earth orbiting space shuttle into interplanetary trajectories towards Jupiter. The launch was planned to take place in February 1983. The mission would give scientists an insight into the solar system and especially a view on the sun itself. However, funding for the NASA satellite had been stopped by the Reagan administration. The State Department considered this mission an important scientific and international co-operative project. It was working closely with NASA, the budget office, the office of the President's science adviser, and ESA officials to do its utmost to meet the objectives set out in the United States understandings with ESA. No final decision had yet been made. One would have to wait until the newly-appointed NASA Administrator, Mr. Beggs, had had an opportunity to review the restructuring of the space science programme. The State Department hoped for a successful outcome, especially as ESA-NASA collaboration on Spacelab had been most encouraging. However, there could be no doubt that fiscal and budgetary policies would have an impact on future space programmes.

18. Other international space programmes were the solar maximum mission for which the United Kingdom and the Netherlands provided the instruments, the infrared astronomical satellite which involved NASA, the Netherlands and the United Kingdom for a planned launch in 1982, the Galileo Jupiter orbiter which was a co-operative project with the Federal Republic of Germany, and finally the space telescope which was a NASA-ESA projet. The most important collaborative project was Spacelab, of which two flight units were contracted by NASA.

19. On 14th July the Committee visited the NASA Headquarters in Washington where it was received by Dr. James Beggs, the newly-appointed Administrator, who underlined the need for ESA and NASA to continue their co-operative space projects. Collaboration was even more important since budgetary difficulties had arisen on both sides of the ocean. Nevertheless the American budget for fiscal year 1982 would still exceed $6.1 billion. Nearly half of this was to be spent on the shuttle, but even if space transportation system expenditure was completely excluded the NASA budget would still be more than seven times that of ESA.

20. Also on 14th July the Committee made an extremely interesting tour of the Goddard Space Flight Center where it was shown slides and films complementary to briefings at the NASA headquarters.

21. On the space transportation system a NASA representative pointed out that the flight of the space shuttle had been so successful that only minor repairs had to be made, especially with regard to the heat protecting tiles. The

1. National Oceanic and Atmospheric Administration.

damage at the launch site at Cape Canaveral was also minor and without much repair the same launching site could be used.

22. The breakdown of the usage of the shuttle system would be 28 % for flying scientific missions and 30 % for defence missions. The auxiliary rocket IUS (inertial upper stage) to be developed by Boeing was now at the testing stage and would become operational in 1983.

23. For foreign users NASA would only recover the operational costs and not the costs for the shuttle research and development.

24. The next shuttle launch would take place early in November 1981. The load planned for the second experimental orbital flight would be a selection of test instruments.

25. Four or five shuttles would be built in the coming decade. Each shuttle might be reused as many as 100 times. If the system was fully operational there might be some forty shuttle flights a year.

26. Beyond the currently planned and approved experiments the shuttle could carry into orbit modules for constructing large platforms in space.

27. It was NASA's intention to use the Spacelab facilities to conduct many experiments in such fields as medicine, metallurgy, astronomy and pharmaceuticals. Throughout its mission Spacelab remained attached to the shuttle and on return to earth it would be refitted for its next assignment. The Spacelab had been designed for reuse about fifty times and with a ten years' lifetime. There would be mixed cargo missions and also "dedicated" Spacelab missions in which the whole payload bay would be used for one special mission.

28. Spacelab's main elements were the pressurised laboratory, which afforded shirt-sleeve working conditions, and an instrument-carrying platform called the pallet that exposed materials and equipment directly to space. Each of these was segmented for mission flexibility; either could be flown alone or in more than half a dozen different combinations with the other. As many as five pallet segments could be flown at one time, each three metres long. They served as platforms for mounting instruments and could also provide electrical power and furnish connections for commanding experiments and acquiring data from them. Equipment and experiments could be serviced by astronauts in space suits. The laboratory module could accommodate three people regularly and a fourth for brief periods.

29. Spacelab missions would concentrate on intensive, relatively short investigations that complemented long-term observation programmes using free-flying satellites. Once the inertial upper stage had been built the shuttle could bring into geosynchronous or high-altitude orbits satellites of some 2,300 kilos.

30. One of the first assignments would be to place tracking and data relay satellites in geosynchronous orbit to handle communications between all elements of the space transportation system. Space operations in the past had depended mainly on ground stations and tracking ships for communications and there had been large blind spots in the coverage.

31. Two tracking and data relay satellites, one on the equator of Brazil and one over the Pacific Ocean, and a single ground station at White Sands, New Mexico, made it possible to track and communicate with the orbiter and most spacecraft for 85 % or 98 % of the time. There would therefore be very few out-of-touch periods. The tracking and data relay satellites would be supplemented by the remaining stations of the older global space tracking and data network and the NASA ground communications network would continue to link the tracking stations and control centres.

32. The space telescope would be launched in 1983. It was the most ambitious space astronomy project yet undertaken. Operating well above the optically obscuring effects of earth's atmosphere, the telescope would be able to detect objects fifty times more faint and seven times further away than those which could be seen by telescopes on earth. The solar array and photon detector assembly were being developed and manufactured by British Aerospace under contracts from the European Space Agency.

33. Launches of early shuttle missions, both civilian and military, were from Kennedy Space Center, Florida, out over the Atlantic Ocean to avoid flying over populated areas in the critical first minutes. This direction also gave space-bound vehicles extra velocity from the earth's eastward rotation. The payloads from here included all communications satellites and others for geosynchronous orbit. Missions requiring polar orbits, including many weather and earth survey satellites, were launched southward over the open Pacific from Vandenberg Air Force Base in California.

34. During its visit to Cape Kennedy the Committee was briefed on the first space shuttle, the Columbia, and watched it being serviced. The Committee also made a tour of the different launch sites, the first being used in 1950. It visited the launch sites for the Delta, Atlas-Centaur, Titan-Centaur, Saturn V and Skylab and also for the Mercury and Gemini, Apollo-Soyuz missions and the space shuttle itself.

35. At the Pentagon, the Committee was briefed on the military aspects of the American space programme[1]. For the Soviet Union as well as for the United States the space segment was becoming increasingly important for the deployment of military forces. Both countries had therefore launched a large number of military satellites for communications systems. As a general rule one could state that for every civil satellite, five military satellites were to be launched.

36. Apart from communications there were meteorological and surveillance satellites. Once the shuttle became fully operational the Defence Department would change from individual rocket launches to shuttle launches. On surveillance satellites it was noted that one of the reasons why the SALT II treaty was not well received in the Senate was that the Senators were not convinced that the treaty could be adequately verified by satellites alone.

37. In an international framework there was the NATO satellite communication system as well as the United Kingdom Skynet system. Military launches took place from Vandenberg Air Force Base as well as from Cape Kennedy.

38. The ESA Representative in Washington pointed out to the Committee that the Reagan administration was firmly committed to reduce both expenditure and the rôle of government in the affairs of the nation. One result would be that NASA's space science budget would be reduced, which had already led to the, one hoped provisional, cancellation of the United States spacecraft in the international solar-polar mission. It also had led to the cancellation of a proposed joint cometary mission which would take a spacecraft to within 1,000 kms of the Halley comet when it next approached the earth.

39. ESA considered the first mission especially as extremely important and on the United States side it had been selected only after the normal review of the claims of competing missions. Nevertheless, for one reason or another the international solar-polar mission had been in almost continuous trouble for the past three years. The final blow came on 18th February 1981 when NASA informed ESA that due to budget cuts they were cancelling the United States spacecraft. ESA had been trying to redress the situation and an acceptable compromise should emerge. Failing this, it would have to be concluded that the United States lacked the political will to find a solution.

40. The Reagan administration might also yield to growing pressure to hive off operational systems to the private sector, as was already the case for remote sensing.

41. On the other hand, its commitment to the shuttle, mainly because of its national security rôle, could be considered absolute.

42. On the establishment of permanent or semi-permanent space facilities a campaign was building up to persuade the administration to embark on the development of a space station or space platform. Here too military considerations might play a more important rôle than those of science or applications. If such stations or platforms were built ESA hoped that Spacelab components would be used as elements of the building block.

43. In the field of space science and applications there might be increased scope for co-operation as the United States would not be able to cover all fields. For instance, the ocean remote-sensing satellite had been cancelled and there were many in the United States who were hoping to have access to data acquired by ESA's ERS-1 remote-sensing satellite system for oceanic observation.

44. Finally, in areas where there was quite intense competition between European and American industries, for example in satellite communications, it had become clear that there were many areas such as data standards where co-operation was essential if only to remain competitive.

## III. *Energy questions*

45. In this chapter your Rapporteur wishes to make a distinction between nuclear affairs and the American interest in new and renewable energy resources.

### *Nuclear affairs*

46. The Reagan administration had not yet announced specific points of its new energy policy, but over the past six months an intensive review of United States policy had been conducted to develop the peaceful uses of nuclear energy and to prevent the spread of nuclear weapons.

47. A basic element of the new policy would be a total embargo on nuclear explosive material. The United States was deeply committed to preventing any increase in nuclear explosive capability and would pursue an active policy to that end. The government would seek to strengthen the global non-proliferation régime as embodied particularly in the non-proliferation treaty, the treaty of Tlatelolco and the safeguard system of the International Atomic

1. See also Document 883, Chapter II, Military aspects of space.

Energy Agency in Vienna. The government was also determined to restore United States credibility as a reliable nuclear supplier. At the same time it would work with other nuclear supplier nations and with nations sharing the American non-proliferation objectives to reduce the threat of nuclear proliferation. Distinctions would be made among nations based on the degree of proliferation risk which a particular country presented. The United States would place greater emphasis on nuclear power to meet its domestic energy needs.

48. When the new policy was announced all the abovementioned elements would be set forth in such a way that it would be clear that the United States would re-establish itself on the nuclear marketplace.

49. United States support for the International Atomic Energy Agency and its many programmes was directly related to the national security of the United States. The Agency monitored significant quantities of sensitive nuclear material, thereby reducing the risk of misuse of such material. The United States participated in the Agency's studies on international plutonium storage and spent fuel management which had a long-range impact on the nation's security by developing new methods and institutions to strengthen the non-proliferation régime.

50. The two-year study to evaluate the international nuclear fuel cycle was concluded in February 1980. Its purpose was to improve international understanding of the energy and non-proliferation implications of future decisions about the nuclear fuel cycle. Of particular concern were plans for energy independence through acquisition of reprocessing and enrichment facilities by an increasing number of countries and towards the commercial use of plutonium. Over sixty countries participated in the evaluation, which made a major contribution to clearing up the international nuclear atmosphere.

51. In the Capitol, where the Committee met with members of the Senate Subcommittee for Science, Technology and Space and the Committee for Science and Technology of the House of Representatives, it was pointed out that the nuclear energy policy was not a partisan issue. Both parties were in favour of commercial nuclear power and both parties were of the opinion that there was a need to restructure the government rôle, especially on questions of safety regulations. Of course there had to be an agency to assure that the safety regulations were applied and adhered to, but on the other hand the government rôle should be as limited as possible. As an example, the Federal Aviation Administration was quoted and the deregulation of airline communications. It was also pointed out that natural gas production had developed considerably since the Reagan administration abolished controls on gas drilling and prospecting.

52. If the United States were to aim for a second generation of fission-based reactors it should look towards high temperature gas-cooled systems which were far more economical than existing light-water reactors. Research on breeder reactors at the Clinch River facility had slowed down during the Carter administration although, because of Congress, it had never been stopped; this type of reactor might also be promoted by the new administration, which had earmarked $736.5 million for fiscal year 1982 against $485.5 million in the Carter 1981 budget.

*New and renewable sources of energy*

53. The Committee was briefed on this subject at the Department of Energy on Thursday, 16th July. It was pointed out that in the United States there were seventy light-water power reactors which supplied 11 % of United States electric power requirements but in some states it might be 50 % of the electric power. There were only two gas-cooled reactors in commercial operation and only a small research and development programme for this type of reactor. There were major obstacles to nuclear power expansion in the United States such as unknown factors in projected electricity demand, the financing of the utilities, long delays in licensing and many licensing uncertainties. Public acceptance and understanding of reactor safety and waste disposal were diminishing. Much ground had been lost after the Three-Mile Island accident and it was still not yet sure what the future of the power plant would be. This and the decline in United States oil production in the 1970s had fostered research for alternative sources of energy. Experimental technologies were being tested for extracting the enormous amount of oil trapped in shale rock and tar sands.

54. Since coal was plentiful in the United States there was the prospect of converting coal into so-called synthetic oil and gas. There were more than 6,000 mines employing more than 200,000 miners. About 80 % of the annual production was from some 1,200 mines each producing over 100,000 tons annually. Surface mines now produced more than half of the total output.

55. In addition to the United States commitments to new energy resources, major research efforts were being undertaken on renewable, continuously replenished, energy resources such as sunlight, wind, biomass, ocean and direct solar radiation. Although the use of renewable

energy sources was rising, it accounted for only a small fraction of national energy consumption at the present time.

56. The Federal budget for solar research and development was rising steadily and was more than $600 million for fiscal year 1981. For previous years it was $596 million in 1980 and $514 million in 1979. Whether these important sums would continue to increase under the new administration was considered dubious. The existence of the department itself was still an open question and it was not considered impossible that it would be converted into an energy research and development agency.

57. Until a new policy was formulated the department's goal was to reduce the nation's reliance on foreign sources of oil and to organise an orderly transition to alternative energy sources. In the period between the early 1980s and the early 1990s the transition from use of imported oil depended not only on increases in conservation but also on increased domestic gas and oil production, increased use of nuclear energy and coal and significant use of renewable energy systems. The main systems in this period would be based on solar thermal and photovoltaic technologies. Beyond the 1990s the emphasis was to be placed on oil from oil shale, coal-derived synthetic fuels, nuclear energy and renewable energy sources.

58. In order to promote these special solar technologies, tax credits were being provided to individuals and businesses. Other financial incentives were given by the Department of Housing and Urban Development to promote solar installations with home owners. Several solar technologies were currently considered cost-competitive in many areas of the United States, such as biomass energy systems, which would provide 2 % of the United States energy requirement each year. Biomass energy could be used to produce heat and power for residential, industrial and agricultural applications, to generate electricity and to produce liquid fuels for transportation.

59. Photovoltaic energy systems used solar cells assembled and connected in modular panels, mounted in arrays to convert sunlight directly into electricity. This method provided safe and reliable energy for a wide range of applications. It had started in the south-east of the United States and might be cost-competitive in 1985-86. By the year 2000 it could provide an annual generating capacity of approximately 50 gigawatts.

60. The wind energy conversion system was also technically proven and could become cost-competitive in 1985-86. The main problem was the development of an economical wind energy conversion system capable of providing up to thirty years of reliable and relatively maintenance-free service.

61. The solar heating and cooling of buildings used solar energy through an active solar system, a passive solar system, or a combination of both. The active system intercepted solar radiation and converted it into thermal energy. The passive system had a solar collection area, an absorber and a heat distribution method. The system was feasible only when it was built into new houses or buildings. It required the development of new materials and systems for building. In the United States it would be possible in the near future to have some 300,000 houses with a built-in solar system.

62. Agricultural and industrial process heat was another project of the Department of Energy's solar energy and development budget.

63. Agriculture and industry used about 40 % of the total energy consumed in the United States. The purpose of the programme was to develop and demonstrate solar components and technology that could supply significant amounts of heat energy for agricultural and industrial applications. The industrial process solar systems that supply heat are not presently cost-competitive with non-renewable heat resources. The agricultural process market is already fairly well defined and was in the process of being used experimentally, especially for grain drying, crop drying, food processing, etc.

64. The solar thermal power systems, the ocean systems programme and the satellite power system were still in an early research stage and it was questionable whether these systems would be utilised much before the year 2000.

65. The solar energy programme had led to a number of international co-operative actions and agreements. The most important were those with Saudi Arabia, Italy, Israel and Spain. In Spain a small solar power demonstration project for solar thermal generation would be established. Two engineering concepts in two 500 Kw solar plants would be tested. Agreements had been concluded with Sweden, Denmark, the Netherlands and the Federal Republic of Germany for experiments on certain parts of medium- and large-scale wind turbines. These agreements had been concluded in the framework of the International Energy Agency in Paris.

### IV. *Co-operation in weapon production*

66. At the Pentagon the Committee was briefed on some of the Department of Defence's science and technology problems. Its research

and development programme had a budget of $3.9 billion, just over half of which was spent in industry and the remainder in defence establishments. The main items were very high speed integrated circuits to achieve high precision manufacturing technology and high energy lasers to be built in weapons systems, which would lead to new and fundamentally different weapons systems than those which existed today. The purpose was to arrive at operational-directed energy weapons. Defence against chemical warfare, especially as a deterrent to the use of enemy chemical agents, was also a main budget item.

67. In order to avoid duplication of weapon developments in Europe and in the United States there should be a greater exchange of information much earlier than was now the practice. Research and development programmes should be better co-ordinated through agreements on joint requirements for new weapons systems such as the F-16, the AV-8B advanced Harrier and the family of air-to-air guided weapons, AMRAAM and ASRAAM. The United States had concluded eleven general memoranda of understanding with as many NATO countries in order to arrive at coproduction or dual production of the same types of weapons systems. It also promoted the concept of families of weapons systems.

68. In co-operation, political and economic cohesion should be strengthened through sharing technology and greater interoperability. The 3 % increase in real value of the defence budgets should leave room for joint ventures; restrictions because of preferences to buy national should be waived on a reciprocal basis; competition in the defence market of each NATO country should be facilitated and industrial consortia extending beyond national frontiers should be encouraged. This would also promote greater efficiency as it could eliminate duplication in research and development projects.

69. The United States had drawn up a list of seventeen first-rate high technology weapons systems with regard to air defence, artillery, air-to-air missiles, mines, night vision equipment, portable anti-tank weapons, advanced attack helicopters, etc. The Independent European Programme Group should also prepare such a list. A comparison between the two might improve efficiency in the Alliance development programme, satisfy the national aspirations of government and industries and create a favourable environment for procuring new weapons systems.

70. Within the NATO framework discussions should be held on difficult issues such as armed forces requirements, schedules, third country sales, management of programmes, conflicts through competition, budgetary aspects and technology transfer. Special attention should also be paid to proprietary restrictions, reciprocity in policies and procedures and setting up consortia for cost-effectiveness.

71. A major problem was also the reluctance of European countries to adopt families of weapons systems as the long industrial runs in the United States would always make production there cheaper. However, in modern weapons systems this handicap might be less important than it used to be. An example of an industrial consortium quoted was the ammunition consortium set up between the United States, the United Kingdom, Italy and the Netherlands to share a very large order for ammunition in order to redress low stocks of ammunition in Europe.

## V. *Law of the sea*

72. The fourth subject discussed by Mr. James Malone, Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs, was the law of the sea. Apart from being Assistant Secretary of State, Mr. Malone was also the President's special representative for the law of the sea conference.

73. As an introduction, your Rapporteur would mention that in the 1980 meetings of the third United Nations conference on the law of the sea the then United States Government negotiated widely-supported compromises on most of the major outstanding issues. The latest session concentrated on international machinery to regulate seabed mining, primarily for manganese nodules, and elaborated compromises on the basic questions of the voting system, composition and functions of the Council, the executive arm of the international seabed authority.

74. Addressing the House of Representatives' Subcommittee for Merchant Marine and Fisheries on 28th April 1981, Mr. Malone declared:

> "The draft convention creates a one-nation one-vote international organisation which is governed by an assembly and a thirty-six-member executive council. In the council, the Soviet Union and its allies have three guaranteed seats, but the United States must compete with its allies for any representation. The assembly is characterised as the 'supreme' organ and the specific policy decisions of the council must conform to the general policies of the assembly.
>
> The draft convention provides that, after fifteen years of production, the provisions of the treaty will be reviewed to deter-

mine whether it has fulfilled overriding policy considerations, such as protection of land-based producers, promotion of enterprise operations and equitable distribution of mining rights. If two-thirds of the states, parties to the treaty, wish to amend provisions concerning the system of exploitation, they may do so after five years of negotiation and after ratification by two-thirds of the states parties. If the United States were to disagree with duly ratified changes, it would be bound by them nevertheless, unless it exercised its option to denounce the entire treaty.

The draft convention imposes revenue-sharing obligations on seabed mining corporations which would significantly increase the costs of seabed mining.

The draft convention imposes an international revenue-sharing obligation on the production of hydrocarbons from the continental shelf beyond the 200-mile (322-km) limit. Developing countries that are net importers of hydrocarbons are exempt from the obligation.

The draft convention contains provisions concerning liberation movements, like the PLO (Palestine Liberation Organisation), and their eligibility to obtain a share of the revenues of the seabed authority.

The draft convention lacks any provisions for protecting investments made prior to entry into force of the convention."

75. When the Committee met with Mr. Malone on 13th July 1981, he stated that when the Reagan administration took office it was confronted with an informal draft convention on the law of the sea which was on the verge of being made final. It contained a number of provisions which raised concern as to whether this draft convention was consistent with the stated goals of the Reagan administration. In addition, many provisions of the draft convention had prompted substantial criticism from industry, Congress and the American public. The administration then decided that it was not in the American interest to proceed prematurely to complete negotiations on a treaty that might fail to further American interests and which, in its present form, would not be ratified by the Senate. The Geneva session of the law of the sea conference starting in early August 1981 would allow the United States Government to discuss its misgivings over the current text. It would not be prepared to submit a new text. The results of the discussions would be made part of the review process and various options would be presented to the President. As this process was bound to take time, negotiations were unlikely to be concluded at the end of 1981 and it would be difficult to forecast just when they would be completed, although the process would not be delayed unduly.

76. The question of deep-sea mining had been widely discussed and rightly so as it was of great importance. Polymetallic nodules were found on the floor of the ocean throughout many parts of the world. The Pacific Ocean was estimated to contain some 1.5 trillion tons of nodules, forming at the rate of 10 million tons per year. These nodules contained many different metals, the most important being nickel, copper, manganese and cobalt. All four were key materials for the United States defence industries in addition to their other important applications in the economy.

77. Your Rapporteur might mention in this connection the following[1]. Much of the world's production and reserves of a number of critical materials are located in Siberia and Southern Africa. These two areas contain 99 % of the world's manganese ore, 97 % of its vanadium, 96 % of its chrome, 87 % of its diamonds, 60 % of its vermiculite and 50 % of its fluorspar, iron ore, asbestos and uranium. Zaïre and Zambia now provide 65 % of the world's cobalt.

78. Mr. Malone pointed out that one of the most important questions to be resolved would be the competence of any supranational mining enterprise formed by the United Nations. The question of technology transfer, the problem of quantification, of competition between land-based mining and seabed mining, and the questions of national security involved in industrial mining technology. The new administration would continue to consult its European allies on law of the sea issues. Meetings were held in Europe for this purpose.

79. As the law of the sea conference was quite distinct from other areas, the United States Government was keeping in touch with the Government of the Soviet Union on law of the sea questions. There was a close relationship because of the communality of interests. The linkage of issues mentioned earlier did not apply for this subject. The administration would not propose any amendments to the informal draft convention at the meeting in Geneva. It would test the opinion of the other participating countries to see whether there was a genuine meeting of minds.

80. It was clear that deep-sea mining could become a most important source for strategic

1. See "The ailing defence industrial base: unready for crisis", 96th Congress, 2nd Session, Committee print No. 29.

materials and this question had therefore to be handled cautiously.

81. Both the administration and prospective seabed miners were concerned that the current provisions of the draft convention would not ensure free and continuous access over the longer term to the polymetallic nodules. One of the United States concerns was related to the complex of issues related to decision-making in the international seabed authority. Because of the voting system the United States, which was one of the world's leading countries in the development of seabed mining, might be out-voted by, for instance, the Eastern European countries.

82. Another difficult point was that access to critical raw materials could be blocked by the legal and technical commission to be set up under the convention.

83. Another point which was not acceptable to the United States concerned the transfer of technology provisions which could create substantial discrimination in favour of the international enterprise and developing countries to the detriment of industrialised countries.

84 As far as the future review conference was concerned, part of the treaty might possibly be altered by amendments ratified by two-thirds of the states parties and come into force for the United States in spite of American objections. This would raise a constitutional question which would certainly not be acceptable to the United States Senate.

85. Finally, the treaty might create a situation in which the international enterprise could use funds provided in part by the United States Government in order to halt mining activities by private American companies.

86. Until the law of the sea treaty came into force several provisional international arrangements had to be made. The Department of State had therefore initiated international negotiations to establish reciprocal interim arrangements co-ordinating regulation of deep seabed mining operations. They established ground rules by which participating countries would respect each other's deep seabed mining operations and require participating countries to apply effective measures for the protection of the marine environment. The participating countries included Belgium, France, the Federal Republic of Germany, Italy, Japan, the Netherlands and the United Kingdom.

## VI. *Activities of aircraft companies visited*

87. As mentioned in the introduction to this report, the Committee visited five private aircraft companies, four on the west coast and one on the east coast.

*General Dynamics Corporation*

88. At General Dynamics Corporation Convair Division in San Diego, California, the Committee was briefed on the general layout of the corporation, cruise missiles, gun developments, energy and space programmes.

89. General Dynamics has a work force of 84,000 divided into a number of divisions such as the Fort Worth Division where the F-16 is produced, the electronic division for automatic test equipment and high technology military electronics, the Convair Division in San Diego with a cruise-missile production capability, a marine division for electric boats and shipbuilding, and the domestic resources group covering mining interests. Computer and telecommunications activities also play an important rôle.

90. General Dynamics Convair Division was under navy contract to develop the Tomahawk cruise missile, a pilotless aircraft to be launched from submarines and surface ships. It had an attack capability against targets at sea and on land and could be launched from naval aircraft, submarines or surface ships. It could be equipped with nuclear or conventional warheads. The land attack version of the Tomahawk used an inertial and terrain contour-matching guidance system. This system controlled the missile on a preprogrammed flight path to the target. The Tomahawk had sufficient range to cover all theatre nuclear targets with an ample margin for survivable stand-off basing and defence avoidance routing.

91. The anti-ship version of the Tomahawk used a modified Harpoon missile guidance system. This system allowed the Tomahawk to be fired at an enemy warship at a low altitude to avoid detection. Initially the Tomahawk was to be launched from the torpedo tubes of attack submarines. For the new class of submarines, twelve vertical Tomahawk launch tubes were fitted in the forward part of the submarine. This installation would significantly increase the weapon load of the ships while maintaining their missions and capability.

92. The land-attack and anti-ship versions were scheduled to become operational in 1982. A variant of the Tomahawk was the medium-range air-to-surface missile which could be launched from attack and fighter aircraft. This missile could carry a variety of different sizes and types of tactical weapons.

93. General Dynamics was also producing in its Convair plant a new type of gun which might be used by Belgium, the Federal Republic of Germany, Italy and the United Kingdom. This type of gun was to be installed on ships and had a steel cover to protect it against aerial attack. The gun systems were of impor-

tance to all three armed services of the United States.

94. With regard to energy programmes General Dynamics was producing and installing large super-conducting magnet systems. These magnet systems might be used in nuclear or in conventional power plants and might greatly improve their efficiency.

95. In the space field it had built the Atlas launcher of which some eighty had been used to launch navigation, weather, earth observation and technology satellites. Combined with the Centaur it had been able to launch satellites for deep space missions.

96. The Centaur upper stage might also be used from the shuttle for deep-space missions from 1985 or 1986 onwards. The production line of these vehicles would continue well into the mid-1980s and even beyond.

97. In the field of satellites General Dynamics had built prototypes for large structures in space composed of several segments and had also produced a large number of different types of antenna.

98. General Dynamics' most important production line was for the F-16 programme[1]. More than 300 aircraft had been delivered to operational squadrons in the United States and in Europe. The all-weather capability of the F-16 had been significantly increased with the addition of radar-controlled missiles and the fire control components required to guide them. The new components would be installed in the aircraft scheduled for delivery at the beginning of 1984.

99. In 1981 the production rate would continue to increase with about 280 aircraft being scheduled for delivery against some 230 during 1980. Additional orders for F-16s had been received: 40 for the Egyptian air force and about 100 for the Netherlands air force; deliveries for most of the latter would start in the mid-1980s. General Dynamics had also received orders from Israel, South Korea, and options from Australia, Greece and Spain.

100. To broaden the base of the existing programme and improve its potential for long-term production, the aircraft was to be equipped with a General Electric J-79 jet engine. This engine was now being evaluated by the air forces of a number of countries.

101. Development was also under way for the F-16XL, a higher performance version of the F-16 which would incorporate very advanced aerodynamics and systems technologies. Its most distinguishing feature would be a new highly-swept, cranked-arrow wing which had been developed over the past five years. This would give the F-16XL a much shorter take-off and landing run, a greater weapon load and enhance its combat-readiness in air-to-air and air-to-ground missions.

102. In the electric boat division of General Dynamics, several problems which had caused delays in the delivery of the Trident and its SSN-688-class submarines and had now been overcome. Trident was the single most important defence programme under development in the free world today and would continue to be the most important weapons system of the United States strategic forces well into the twenty-first century. The new submarines would have a 50 % greater missile capacity and would be able to remain on station as mobile launching platforms for substantially longer periods than any submarine previously in service. General Dynamics had a backlog of eight Tridents and fifteen SSN-688-class attack submarines scheduled for delivery over the next five years. It was confident that these vessels would be delivered without fail in due course.

*Lockheed Corporation*

103. Like General Dynamics, Lockheed Corporation builds aircraft, especially military aircraft. It also has a large stake in space, building launchers, satellites and other spacecraft. It designs missiles and rockets, is a shipbuilder and has important divisions to deal with energy, earth and ocean resources and electronics, especially computers.

104. The Committee was briefed on the general activities of Lockheed which has some 90,000 employees. The most critical immediate challenge for the company was the L-1011 Tristar jetliner. It had had to reduce its production from twenty-five to eighteen aircraft per year although it still had 300 on order.

105. An important product for Lockheed was the Hercules cargo transport which had been launched in 1952 and of which more than 1,500 had been delivered in many different versions to some fifty countries. Production of this aircraft might continue into the mid-1980s.

106. The military version of the C-5 Galaxy, the world's biggest transport aircraft, was designed to transport tanks, tractors, trucks, helicopters, etc.

107. The C-141 Starlifter transport was specifically designed as a troop and cargo carrier. It was the main transporter for the United States air force and could fly combat-size forces to any area in the world. Development was under way to stretch the aircraft and increase its capacities.

1. See Document 883.

108. In the so-called "skunk" works at Burbank, Lockheed had built the strategic reconnaissance aircraft, the SR-71. It was the world's fastest and highest sustained flight aircraft. It flew at more than 26,000 metres and could survey 260,000 square kilometres of the earth's surface in one hour. The Titanium SR-71 had been developed for the United States air force strategic air command. It was a single-seat strike reconnaissance aircraft called " project stealth " as it was difficult to detect on any radar screen.

109. Another high-altitude strategic reconnaissance and special purpose aircraft was the U-2 which had been developed in 1954. Derivatives were still in use for the air force's tactical reconnaissance missions. A follow-up of this aircraft was the TR-1A now being built for strategic reconnaissance ; production had begun in 1980. A civilian version was being built for NASA for its earth resources survey programme.

110. In the space field Lockheed had built the Agena booster and satellite which was used normally as the upper stage of a two-stage launcher in combination with Atlas, Thor or Titan-IIIB. Agenas had served as boosters or satellites on more than 300 missions. The Lockheed missile and space company had manufactured special insulated tiles to protect the space shuttle ; it was building an experimental solar electric propulsion wing to fly aboard the space shuttle and it was building the space telescope which would be launched in 1983 and was considered the most ambitious space astronomy project yet undertaken.

111. Lockheed had also developed fleet ballistic missiles such as the Polaris A-1 with a range of 1,200 nautical miles, the Poseidon with a range of 2,500 nautical miles and now the Trident with a range of 4,000 nautical miles. The Trident missile had become operational in October 1979 and some twelve Poseidon submarines were being converted to take Trident missiles. Although the range of the Trident was substantially greater than that of the Poseidon it was the same size and could thus be used in existing Poseidon submarines. The Trident missile production was scheduled to continue well into the 1980s.

112. For the United States army, Lockheed was developing the Aquila, a remotely-piloted vehicle controlled from the ground. The unmanned aircraft carried laser devices and television cameras and could be employed to fly military surveillance, reconnaissance and target acquisition missions. They could also be used for border controls and monitoring pollution.

113. Lockheed had many other industrial activities such as building computerised air terminal information processing systems, aircraft servicing, maintenance, modification and support, many marine activities from the ocean surface to the very bottom of the sea, shipbuilding and engineering, and management services for many United States Government agencies.

114. In Greece it managed the design and construction of a major aircraft maintenance complex ; in Saudi Arabia it had developed a nationwide air traffic control system ; in West Germany it maintained communications and other electronic equipment for the United States army and a computerised weapon control system for the Federal German navy.

115. During its visit the Committee was especially briefed on the Lockheed Alpha-Jet/VTXTS and the P-3 Orion anti-submarine warfare aircraft.

116. Regarding the latter, it was pointed out that in 1958 Lockheed won a United States navy competition for an off-the-shelf anti-submarine warfare aircraft which flew for the first time in 1959. In the 1960s and 1970s updated versions of this aircraft were built for the United States navy, Australia and Japan. The present version in development would be the P-3 update III. Since June 1980, 537 of this aircraft had been delivered. The land-based P-3 Orion carried highly sensitive detection devices, a computerised analysis system and anti-submarine weapons. Apart from the United States navy it was used by Australia, Canada, Iran, Japan, the Netherlands, New Zealand, Norway and Spain. Under a foreign military sales agreement drawn up in January 1979 between the United States navy and the Netherlands, thirteen Orion patrol aircraft were to be delivered from 1981 onwards to 1984.

117. The Canadian version called the Aurora combined the engines and airframe of the Orion with the advanced electronic systems of the Viking. The first Aurora had been delivered in 1980 and all fourteen would be delivered by the end of 1981.

118. The anti-submarine warfare aircraft S-3A Viking had been introduced in the United States fleet in 1974 and was operating from aircraft carriers. The twin-engine Viking, as the land-based Orion, had been designed to counter the challenge posed by the new, quieter, faster and deeper-running submarines and missile-armed surface ships.

119. The Committee also had a special briefing on the United States navy trainer programme called the Lockheed Alpha-Jet/VTXTS, which was a new system for training carrier-based naval aviators. The United States navy had asked Lockheed and McDonnell Douglas to submit an overall system to train its recruits for navy pilots and aviators. Lockheed had there-

fore submitted a system which included academic courses, flight simulation courses and actual flight instruction. Lockheed had already provided comprehensive training programmes to support all Lockheed aircraft. In order to submit a complete programme it had concluded a collaboration arrangement with Logicon, a company which was specialised in training systems for the navy and the air force and would contribute to instructional systems development, performance measurement and training management systems development. Lockheed itself had important simulation expertise in training pilots of aircraft based on aircraft carriers. As trainer aircraft Lockheed had selected the Alpha-Jet produced by Dornier of Germany and Dassault of France. This aircraft was in use by the French as a trainer and by the Germans as a light attack aircraft. Six other countries had already bought it – Belgium, Ivory Coast, Morocco, Nigeria, Qatar and Togo – and Lockheed might produce it in the United States under licence. The aircraft could carry a pilot through basic and advanced training and even into weapons delivery operations. The old T-38 navy training aircraft would not have been able to do this. Moreover, it was obsolescent – too much time was required to train the pilots and its operating costs were rising. The integrated Lockheed system would develop highly-proficient carrier pilots, reduce their training time and the operating costs. The system would also measure student performances and would manage the simulators and computers necessary for instruction as well as management.

120. If the United States navy accepted the Lockheed proposals, the system could be fully operational in the mid-1980s. The Lockheed Alpha-Jet would undergo slight modifications in the meantime for carrier operations.

*McDonnell Douglas Corporation*

121. McDonnell Douglas has its head office in St. Louis, Missouri, employs a total of some 85,000 people and has a division at Long Beach, California, called the Douglas Aircraft Company. During its visit to the Long Beach factory, the Committee was briefed on civil and military production lines and space activities. It visited the DC-9 Super 80 which was being assembled there, the DC-10 assembly line and its military derivative the advanced tanker-cargo aircraft designated KC-10A. The production of this aircraft began in 1978 and its first operational flight took place in early 1981.

122. The main military McDonnell Douglas products were the F-4 Phantom, the F-15, of which, on 1st April 1980, some 530 had been delivered, and the F-18, of which some 1,400 would be delivered by the end of the 1980s. This was a single-seat fighter interceptor of which a carrier-based naval version also existed.

123. For its space activities it had built the Delta launcher of which some 160 had been ordered since the early 1970s. McDonnell Douglas was also involved in the design, development and production of most of the Spacelab hardware and the systems engineering for Spacelab operational capabilities.

124. McDonnell Douglas was building four prototypes of the Harrier, the AV-8B advanced Harrier. The Harrier was originally a British plane but it was now being modified by McDonnell Douglas to meet the United States navy and marine corps requirements. The operational date planned for the AV-8B was mid-1985 should production be approved by the United States Defence Department.

125. In the civil transport field a provisional agreement had been concluded with Fokker to study the manufacturing of the MDF-100, a new high technology commercial aircraft with a 130-150 seat capacity. If the agreement was finalised, both companies would build the plane in Europe for the European market and in the United States for the American market.

126. The Committee was given a special briefing on the McDonnell Douglas version for the navy undergraduate jet flight training system, VTXTS. McDonnell Douglas had associated itself with British Aerospace and Sperry Flight Systems to offer a comprehensive solution for the navy's training system. The McDonnell Douglas solution would feature either a new design aircraft from McDonnell Douglas or the existing Hawk jet from British Aerospace. The latter would be the principal subcontractor for the aircraft components and Sperry Systems would be the principal subcontractor for flight simulators. The partners had placed strong emphasis on developing a truly integrated training system; aircraft, simulators, academics, management system and support would mutually maintain and optimise the training tasks. The new pilot should be able to direct a high performance jet without an expensive training time. There would therefore be 26 % more use of flight simulators and 20 % less actual flying hours.

127. As far as the aircraft was concerned one alternative would be based on a new aircraft design by McDonnell Douglas, the D-7000. It would have a very economic fuel consumption and a better performance than existing planes. The other alternative would be the British Aerospace Hawk aircraft which would have many advantages but not all those of a new aircraft, but research and development costs would

be much lower and it would be available earlier. If chosen by the United States navy it would have to be modified for carrier operations and equipped with an updated cockpit produced in the United States. Some 180 Hawk aircraft existed already and it had marked up an enviable safety record in the RAF which used this plane for advanced jet training and weapons training. It had already been in service since 1976. The modifications necessary to make the Hawk meet United States navy requirements were relatively simple and, although they would not be cheap, associated costs were hundreds of millions of dollars less than the cost of developing a new aircraft.

128. The system could become operational in 1987 and the United States navy would need some 500 of them in the early 1990s.

*Boeing Company*

129. At the head office of the Boeing Company in Seattle, the Committee was briefed on the composition of the company which was divided into a number of subsidiaries for commercial aircraft, aerospace, military aircraft, helicopters, engineering and construction, computer services and marine systems. It had about 110,000 personnel and sales of some $9.4 billion.

130. 85 % of the company worked on civil aircraft, the 707, 727, 737, 747, 757 and 767. The latter had started leaving the factory in August 1981.

131. Military sales had approximated $1.5 billion per year. The military programme was concerned with improving the B-52, modernising its electronics for improved navigation and weapons delivery, and for carrying and launching cruise missiles.

132. The military subsidiary was also submitting a version of a new CX strategic military transport plane which had been requested by the air force and on which a decision would be taken in 1981. Another important element of military production was the KC-135A tanker transport plane for the United States air force which would be fitted with more powerful and fuel-efficient new engines, and finally the AWACS aircraft on which the Committee was given a special briefing.

133. Boeing Vertol (helicopter division) was producing Chinook helicopters for the United States army and was also marketing the Federal German MBB BO-105C helicopter. The Chinook helicopter was being used by some ten other nations. In its civilian version it served oil rigs in the North Sea.

134. In the space field Boeing had been selected by the United States air force to build the inertial upper stage (IUS) that would carry space shuttle payloads into higher orbit or into interplanetary trajectories. It was also building for NASA the solar electrical propulsion systems which would be used for certain payloads.

*Cruise missiles*

135. In the missile field Boeing Aerospace Company was building an air-launched cruise missile of which some 3,400 would be built during the 1980s. This missile was a small, unmanned, winged air-vehicle capable of sustained subsonic flight following launch from an airborne carrier aircraft. Boeing was in competition with General Dynamics, although it produced the better cruise missile. General Dynamics would also have its share in the order of the United States Defence Department with its Tomahawk cruise missile. The Boeing missile would fly at a speed of some 800 kms per hour and would be very hard to detect, its length being only 6.3 metres. It could fly as low as 10 metres above ground and could be launched from aircraft such as the B-52, the F-16 or the Tornado at a rate of one every five seconds. The B-52, for instance, could carry as many as twenty missiles. There would be a big world market for this type of missile during the next ten years. Boeing was spending up to $1 billion on this programme and three other companies together were also spending $1 billion. Its main targets would be airfields, tank units, command and control facilities and, for instance, stockpiles of ammunition. It would have nuclear as well as non-nuclear warheads.

136. It did not seem likely that certain types of aircraft could be replaced by cruise missiles. After the first three to seven days of hostilities, aircraft would have to take over as it would take a long time to prepare the missile tapes. An appropriate answer to cruise missiles hardly existed as they were extremely difficult to spot. However, every offensive weapon would one day find a counter-weapon.

137. Apart from this briefing on cruise missiles, the Boeing Company briefed the Committee on eight other special subjects; these were Roland, AWACS, energy programmes, Viking spacecraft, the Space Operations Centre, WASP, hydrofoils and the Boeing 757-767 technology.

*Roland*

138. Production of the United States army's Roland air defence missiles started in 1981, the programme having been initiated in

1975. Boeing Aerospace and Hughes Aircraft Company shared production responsibilities for the Roland system. They were under contract to build thirty-eight mobile fire units and 885 supersonic missiles.

139. The test firing of Roland missiles would take place at White Sands missile range, New Mexico. The first missiles would be delivered to the army in the summer of 1981 and the first fire unit delivery was scheduled for the autumn of 1981.

140. European procedures would be used as a guide for United States procedures; there would be an exchange of visits between United States and European test designers in order to assure interoperability. There was a steady exchange of industrial representatives between Europe and America. There had been a very extensive data package transfer and the European metric system and drawing practices had been adopted in the United States. Some United States Government requirements had even had to be modified to take full advantage of the technology transfer. This transfer from Europe to America meant overcoming difficulties as the United States Government was inexperienced in using converted foreign technology as it had very little experience in importing technology. The conclusion was however that technology import could work, that military requirements could be fulfilled at reduced development costs and that NATO could benefit economically and logistically by standardisation.

*AWACS*

141. The airborne warning and control system, officially designated the United States air force E-3A, was a United States-developed programme and meant a transfer of technology from the United States to Europe. The system was a mobile survivable high-capacity radar station and command and control centre in a Boeing 707 airframe. This airframe had been chosen to avoid the cost of developing a special aircraft. The system provided detection, tracking and identification of aircraft over great distances during all kinds of weather and over all kinds of terrain. A maritime version could also track ships at sea. At the same time, it could command and control the total air effort: strike, air superiority, support, airlift, reconnaissance and interdiction. In the event of a threat, the system could direct weapons in its own defence.

142. Its radar system would be extremely difficult to jam and the tracking and interception of airborne jammers was a built-in AWACS capability. The system was regularly updated, such as with a new data-display remoting system. The purpose of the system was to permit more effective use of existing weapons systems.

143. The first aircraft had been delivered to the United States air force in March 1977 and the last of the thirty-four aircraft would be delivered in 1984. The NATO programme had been started in 1979 and the first flight would take place in September 1981. For the NATO programme of eighteen aircraft, Boeing had concluded arrangements with Dornier for mechanical support equipment and with a number of German electronics firms for building software and data-processing components. In Europe, the United Kingdom had a similar compatible system, but built on eleven Nimrods.

*Energy programmes*

144. The Boeing energy and environment division was involved in uranium enrichment, nuclear power plants, electric power management, electromagnetic test facilities and also played a significant rôle in the effort to find efficient and economical ways to produce energy from the sun and the wind. The world's largest wind turbine had been completed and successfully operated at a site in Washington State. In June 1981, three wind turbines at this site were supplying enough electrical energy for about 2,000 homes in the area. The Department of Energy and NASA would evaluate the commercial feasibility of this project. The Federal wind energy programme had been started in 1973 and in 1977 Boeing was awarded a contract for the design, manufacture, construction, installation and testing of a 2.5 megawatt wind turbine system. The contract called for four machines, three of which would be located as one unit in the State of Washington; the fourth unit would be installed in Wyoming. The ultimate goal of the project was to demonstrate the feasibility of large wind machines and determine the cost for commercialisation. The first commercial customer was the San Francisco Electricity Company.

*Viking spacecraft*

145. The Viking was an unmanned scientific satellite which Boeing would build together with the Swedish Space Corporation, which would have management responsibility for the programme and would conduct orbital operations from the Swedish ground station at Kiruna. The experiments on board Viking would investigate interactions between hot and cold plasma along the auroral field lines. The mission would take eight months and would give an insight into aurora borealis phenomena

which would be of special interest for northern regions. Scientific groups in five countries – Canada, Denmark, France, Sweden and the United States – were interested in its results. Boeing Company was manufacturing, assembling and testing the spacecraft platform. The satellite would be launched in March 1984 and placed in an elliptical orbit.

*Space Operations Centre*

146. With the shuttle becoming operational in 1983, it would be of great interest to establish a permanent manned station in low orbit. From 1989, such a station could be used to service application satellites. NASA's Johnson Space Centre had started its studies on such a station in 1978 and concluded a contrat with Boeing for the operational design and assembling of the station. There would be two habitation modules, each for a four-man crew, a hangar for satellites and a 100 kilowatt solar array panel. Boeing would start the project by building first one habitation, one service and one logistic module. It would also build the instruments to bring the satellite out of space into the service module. The first station would weigh some 60,000 kilos and once the station was fully operational and complete it would weigh some 124,000 kilos. The life of the vehicle would be some ten years and the crew would be able to stay on the station ninety days at a stretch.

*WASP*

147. For the United States air force, Boeing was building a prototype of an anti-tank air-launched weapons system which would be able to operate in all weather conditions, at night and when confronted with the smoke and haze of the battlefield. Boeing was in competition with Hughes Aircraft for this battlefield missile system. It should be able to operate against second echelon armoured vehicles at a distance of 150 km. The WASP system was composed of missiles, pod launchers and carrier aircraft with equipment to monitor targets and launch the weapons. Each missile would be capable of autonomous acquisition and tracking and could be launched individually or massively. The pod launcher would contain twelve missiles which could be launched in a few seconds. The WASP system would be used primarily on the F-16, F-111 or the F-4, and could be fitted on the Mirage, Harrier, Tornado or Jaguar. The validation period before a definite contract could be concluded would be forty-two months. Four European contractors had been associated with the programme – British Aerospace, MBB, Dornier and Matra. They were, for instance, designing interphase equipment for European aircraft. The air force would select a single contractor for full-scale engineering development in 1983.

*Hydrofoils*

148. In its plant in Renton, the Committee visited the hydrofoils and jetfoils being built by Boeing marine systems. The hydrofoils used much technology of modern aircraft and missiles. Boeing had started its research with hydro-dynamic test systems in the early 1960s, and began building hydrofoil missile ships for the United States navy as well as for European navies in the 1970s. The Renton factory used an assembly line approach for cost-effectiveness and quality control. During 1980 the keels were laid for the last three of the five patrol hydrofoil missile ships on order from the United States navy. Final delivery would be in 1983. Italy and the United Kingdom had also ordered this type of missile ship – the latter for North Sea patrols round the oil rigs. They were capable of an average speed of some forty-three knots.

149. As the Soviets now appeared to be developing a force-projection naval capability, it did not seem very wise to combat this expansion with a plan for a similar type of naval force. This would hardly be economically feasible. A new concept for naval forces should therefore be considered and the hydrofoil could economically counter the expanded threat. With this type of ship it would be possible to achieve the destruction of critical strategic elements of the opposing naval force. This could be done with the fast and highly manœuvrable hydrofoils properly equipped with anti-aircraft and anti-ship missiles. They would ensure greater survivability because of their superior speed and manœuvrability, and more units could be used as the offensive capability could be packaged in a much smaller ocean-going ship.

150. For commercial passenger sea transport, Boeing had developed the jetfoil which had started service in 1975 and was now being built for many countries in both Europe and the Far East. The Committee visited one which was being prepared for Indonesia, but they were also in use in Hong Kong, Singapore, etc.

*Boeing 757-767*

151. The production of two new aircraft, the small-bodied 150-180 seater 757 and the 767 wide-bodied aircraft with 220-280 seats, started in 1979 and the first 767 left the factory in 1981. The 757 would probably be ready in early 1982. By the 1990s a market of more

than 1,000 was anticipated for each of the new aircraft, 1,500 for the 767 and 1,200 for the 757. Both would consume about one-third less fuel than the aircraft they were to replace.

152. The 767 had new aerodynamic engineering, new engines and a very modern computerised flight control system. Its range was 3,200 nautical miles, which could be extended to about 5,000 nautical miles. The smaller 757 would have a range of 2,500 miles, which could possibly be extended up to 3,000 miles.

153. Operational costs of aircraft used to be about 42 % labour, 37 % capital and 21 % fuel. Now fuel accounted for 65 %. Fuel saving of 30 % to 40 % would therefore be extremely important for energy-conscious airlines in the 1980s. Of the 767, 173 had already been ordered and options had been taken for another 138.

154. The 767 would be a direct competitor of the Airbus-310 which probably would be ready in February 1982. The Airbus also would be very energy efficient and would weigh some three tons less than the 767.

155. In order to close the gap between the 757 and the existing 737, Boeing was planning to build the 737-300 which would then be, with a lengthened fuselage, a 150-seater.

156. An advantage of the new 767 would be more cargo in the lower hold through a container system which would make it easy to bring an economical cargo service to small markets. The Committee saw mock-ups of both new aircraft.

*Grumman Corporation*

157. On 24th July 1981 the Committee visited the head office of Grumman Corporation at Bethpage, New York, where it was briefed on the corporation which was divided into five divisions: aerospace, allied industries, data systems, energy systems and Grumman International.

158. The corporation had existed for fifty years and employed some 27,000 people. It produced a variety of military, especially navy, aircraft such as the F-14, the E-2C Hawkeye, the A-6E Intruder, its derivative the EA-6B Prowler, and the new EF-111 which had been started for the United States air force in 1980.

159. The F-14 was the United States navy's first line air superiority fighter with a variable sweep wing and a speed over Mach 2. The F-14 was now in service with many naval squadrons. It had both dog-fight and air-defence rôles. Its primary weapon, the Phoenix missile, could reach a supersonic target at more than 185 km.

160. The A-6E all-weather attack aircraft, the Intruder, was the latest version of the navy and marine corps attack aircraft. It had good all-weather low-altitude manœuvrability both day and night.

161. The E-2C Hawkeye, which was the navy's latest airborne early-warning command and control aircraft, was designed for the air defence of the fleet. Secondary mission capabilities included surface surveillance, strike control, search and rescue, air traffic control and communications relay. It was packed with 4,500 kg of electronics and could monitor 20 million cubic kilometres of airspace and the ocean or land beneath it.

162. It had been purchased by Japan and Israel.

163. The EA-6B Prowler was an all-weather attack aircraft with an extensive electronic counter-measures system. This could jam the most advanced enemy radar, creating a safe corridor for attack aircraft or providing a task force defensive shield against air-to-surface or submarine-launched missiles.

164. The EF-111 was a conversion of the General Dynamics F-111 fighter-bomber. It would provide cover for air-to-ground operations along the forward lines and for the support of penetrating allied strike forces. Three basic models were foreseen and deliveries would start in 1981 up until 1985 for a total of forty-two aircraft. They would fly in combination with the E-2C Hawkeye.

165. During the discussions it was underlined that a great effort should be made to bring the military requirements into line with budgetary possibilities. This could be done only if the development costs of new aircraft were reduced by using new composite materials and developing more economic engines.

166. Grumman's activities in space were mainly concerned with the production of the wings for the space shuttle and the design and construction of a manned remote work station for NASA that would fit into the space shuttle's cargo bay to permit astronauts to service or repair vehicles in orbit and to assemble them in space. Grumman also had developed several concepts for space-based radar antennas ranging in size from 30 to 300 metres in diameter that would fold into the cargo bay of the space shuttle and could be unfurled in space.

167. Grumman's international relationships included activities with many companies and governments in Europe. It was especially interested in the Tornado which could provide a

powerful platform for an electronic jammer. It was very keen on collaborating in European-produced weapons systems and it would introduce and sponsor the Tornado into the United States. However, the European governments concerned with the Tornado needed to take a greater interest in this type of joint venture. They gave the impression that they did not have much faith in the capabilities of their own aircraft industries. European parliaments should pay special attention to this aspect of international co-operation.

# APPENDIX I

***Programme of the visit to the United States by the Committee on Scientific, Technological and Aerospace Questions***

***12th-24th July 1981***

*Sunday, 12th July*

| | |
|---|---|
| 6.10 p.m. | Arrival at National Airport, Washington, D.C.<br>Hotel: Holiday Inn<br>1501 Rhode Island Avenue, N.W.<br>Washington, D.C. 20005 |

*Monday, 13th July*

| | |
|---|---|
| 9.40 a.m. - 12.15 p.m. | Department of State<br>2201 C Street, N.W.<br>Washington, D.C. 20520<br>Address by Mr. H. Allen Holmes, Senior Deputy Assistant Secretary of State for European Affairs.<br>Address by Mr. James Malone, Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs. |
| 12.30 p.m. - 4.15 p.m. | Department of Defence<br>The Pentagon<br>Washington, D.C. 20301<br>Address by Dr. Richard DeLauer, Under Secretary of Defence for Research and Engineering.<br>Address by Mr. Frank Cevasco on co-operation in NATO.<br>Address by Colonel Conrad O. Forsythe on space applications in defence.<br>Address by Dr. George Wilburn on science and technology problems. |

*Tuesday, 14th July*

| | |
|---|---|
| 8.30 a.m. - 12.25 p.m. | NASA<br>400 Maryland Avenue, S.W.<br>Washington, D.C. 20546<br>Welcome by Dr. James Beggs, Designated Administrator, NASA.<br>Address by Mr. Leroy Day, Director Space Translation Systems Engineering and Integration.<br>Address by Dr. Stanley Weiss, Associate Administrator for Space Transportation Systems Operations.<br>Address by Mr. Jesse W. Moore, Director, Spacelab Flight Division, Office of Space Sciences.<br>Address by Dr. William Raney, Assistant Associate Administrator, Office of Space and Terrestrial Applications.<br>Address by Mr. Pederson, Director, International Affairs Division. |

| | |
|---|---|
| 12.30 p.m. - 4 p.m. | Goddard Space Flight Center<br>Greenbelt<br>Maryland 20771 |

*Wednesday, 15th July*

| | |
|---|---|
| 8 a.m. - 11 a.m. | Dirksen Senate Office Building<br>The Capitol<br>Washington, D.C. 20510 |

Working breakfast with the Senate Committee for Commerce, Science and Transportation and the House Committee on Science and Technology.

The following members were present:

Senator Harrison H. Schmitt (Republican, New Mexico);
Senator Ted Stevens (Republican, Alaska);
Mr. Don Fuqua (Democrat, Florida);
Mr. James H. Scheuer (Democrat, New York);
Mr. Larry Winn, Jr. (Republican, Kansas).

Members of staff:

Mr. Gerald J. Kovach, Senior Counsellor;
Miss Carol S. Lane;
Mr. Philip B. Yeagar, General Counsellor.

| | |
|---|---|
| 4 p.m. - 6 p.m. | European Space Agency<br>Suite 1404<br>955 L'Enfant Plaza North, S.W.<br>Washington, D.C. 20024 |

Address by Colonel Wilfred Mellors, Head of the Washington Office.

*Thursday, 16th July*

| | |
|---|---|
| 9 a.m. - 11.30 a.m. | Department of Energy<br>James Forrestal Building<br>1110 Independence Avenue, S.W.<br>Washington, D.C. 20585 |

Address by Dr. Joseph A. Leary, Director of Non-Proliferation and Environmental Affairs, Office of Nuclear Energy.

Address by Dr. Lloyd O. Herwig, Senior Scientific Adviser, Assistant Secretary, Office of Conservation and Renewable Energy.

| | |
|---|---|
| 6.15 p.m. | Leave Washington National Airport for Orlando. |
| 8.52 p.m. | Arrival at Orlando, Florida. |

Hotel: Harley Hotel
151 East Washington Street
Orlando, Florida

*Friday, 17th July*

| | |
|---|---|
| 9 a.m. - 3 p.m. | Kennedy Space Flight Center<br>Florida 32899 |

Welcome and briefing by Mr. Richard G. Smith, Director.

Address by Mr. Bob Gunnar on the space shuttle.

Address by Mr. George English on Spacelab.

*Saturday, 18th July*

| | |
|---|---|
| 4 p.m. | Leave Orlando Airport for San Diego. |
| 7.19 p.m. | Arrival at San Diego. |
| | Hotel: Sheraton Harbor Island Inn<br>1380 Harbor Island Drive<br>San Diego |

*Monday, 20th July*

| | |
|---|---|
| 9.20 a.m. - 2 p.m. | General Dynamics Corporation<br>Convair Division<br>P.O. Box 80847<br>San Diego, California 92138 |
| | Welcome and general address by Mr. G.E. Blackshaw, Vice-President Research and Engineering. |
| | Address by Mr. B.K. Beaver on cruise missile programmes and on the F-16. |
| | Address by Mr. M.P. Felix on missile and gun systems. |
| | Address by Mr. S.L. Ackerman on energy programmes. |
| | Address by Mr. R.C. White on space programmes. |
| | Address by Mr. A. Carrier on tactical weapons production by the Pomona Division of General Dynamics. |
| 2 p.m. | Leave for Los Angeles. |
| 4.11 p.m. | Arrival at Los Angeles. |
| | Hotel: Ramada Inn - Hollywood<br>1160 N. Vermont Avenue<br>Hollywood, California 90029 |

*Tuesday, 21st July*

| | |
|---|---|
| 8.15 a.m. - 11.30 a.m. | Lockheed California Company<br>2555 North Hollywood Way<br>Burbank, California 91520 |
| | Welcome by Mr. Horst Lux. |
| | Address by Mr. Bob Merino on the Lockheed Corporation. |
| | Address by M. Richard Fry on the United States navy trainer programme (Alpha-Jet). |
| | Address by Mr. Louis Caton on export programmes of the P-3 Orion anti-submarine warfare aircraft. |
| | Address by Mr. Andy Byrnes on commercial scientific and technology problems. |
| 12.30 p.m. - 4 p.m. | Douglas Aircraft Company Division of McDonnell Douglas Corporation<br>3855 Lakewood Boulevard<br>Long Beach, California 90846 |
| | Address by Mr. John L. Cooke on the McDonnell Douglas Corporation. |
| | Address by Mr. Bob Lowel on the McDonnell Douglas navy trainer programme. |
| | Address by Mr. McCahil on McDonnell Douglas military aircraft. |

| | |
|---|---|
| 5.30 p.m. | Leave for Seattle. |
| 7.48 p.m. | Arrival at Seattle Tacoma International Airport. |
| | Hotel: Sherwood Inn<br>400 North East 45th Street<br>Seattle, Washington |

*Wednesday, 22nd July*

| | |
|---|---|
| 8 a.m. - 4 p.m. | Boeing Aerospace Company<br>P.O. Box 3999<br>Seattle, Washington 98124 |
| | Welcome and address on the Boeing Company by Mr. D.E. Graves. |
| | Address by Mr. J. Monson on the American Roland programme. |
| | Address by Mr. T.C. Manning on AWACS. |
| | Address by Mr. G.E. Andrew on Boeing energy programmes. |
| | Address by Mr. B. Brentnall on the Viking programme. |
| | Address by Mr. M. Colsen on the space operations centre. |
| | Address by Mr. W.B. Adam on the WASP programme. |
| | Address by Mr. B. Mishel on hydrofoils. |
| | Address by Mr. R.E. Sancewich on the 757/767 technology. |

*Thursday, 23rd July*

| | |
|---|---|
| 8.15 a.m. | Leave Seattle Tacoma International Airport. |
| 4.10 p.m. | Arrival at New York John F. Kennedy International Airport. |
| | Hotel: Parker Meridien Hotel<br>119 W. 56th Street<br>New York |

*Friday, 24th July*

| | |
|---|---|
| 9.15 a.m. - 4 p.m. | Grumman Aerospace Company<br>1111 Stewart Avenue<br>Bethpage, N.Y. 11714 |
| | Welcome and address on the Grumman Aerospace Company by Mr. G. Skurla, President and Chairman of the Board. |
| | Address by Mr. M. Pelehach on military requirements versus budget realities. |
| | Address by Mr. M. Ciminera on advanced systems technology and current Grumman aircraft programmes. |
| | Address by Mr. D. Terry on future applications of Grumman products. |
| | Address by Mr. A. Kaplan on the E-2C Hawkeye, the airborne early warning command and control aircraft, built by Grumman. |
| | Address by Mr. F. Haise on space technology and space programmes. |
| | Address by Mr. R. Le Cann on international co-operative ventures. |

END OF VISIT

# APPENDIX II

## *List of questions put during the visit to the United States*

*Questions for the State Department*

*NATO affairs*

On 15th June 1981, Mr. Lawrence Eagleburger, Assistant Secretary of State for European Affairs, declared that NATO should avoid two classes of membership and that if the decisions taken in Rome in 1981 on the so-called "two-track" commitment were not kept, we would give the Soviets the impression that they had a veto over NATO decisions.

Could this point be explained further?

How will it be ensured that the interchange with allies covers the full spectrum of western security aspects and how will a new consensus on requirements for the Alliance be defined? Do we need new consultative mechanisms outside the NATO framework – either smaller like the group of Seven, or larger, including non-NATO countries such as Japan?

The most hotly debated question in the Alliance today is clearly the nuclear issue and the implementation of new steps in nuclear armament in Europe. Is there a divergence between United States and European objectives with regard to the "two-track" decision?

Should we all aim for a security policy of a global nature?

*Research and development policy*

How can the general political aims of the new administration be defined with regard to scientific and technological programmes in the civil and military fields?

What is the present budgetary trend and how will this change in the near future?

To which sectors will the federal government give priority in the 1980s?

In which fields is European collaboration particularly sought? Is an evolution in United States-European relations to be expected:

- in the aerospace field?
- in armaments programmes and arms sales abroad?
- on arms control arrangements?
- in the civil nuclear field?

Mr. Walter J. Stoessel, Under Secretary of State, called for stronger nuclear non-proliferation safeguards to lessen the kind of suspicion that was a factor in Israel's attack on the Iraqi nuclear facility on 7th June 1981. What stronger safeguard measures are possible?

*Sea law*

For the past fifteen years there have been discussions on the law of the sea. Could you explain the administration's new policy on the law of the sea conference which is scheduled to begin its new (tenth) session in Geneva on 3rd August?

Why did the administration decide to slow down the negotiating processes?

Is there a likelihood of the negotiations reaching a final conclusion in 1981 or 1982?

A successful treaty must be based on agreement between industrialised nations and the so-called "group of 77" developing countries.

What are the industrial reasons for deep-sea mining and how economically important are the mineral deposits on the seabed?

What should be the competence of any supranational mining company formed by the United Nations? How would technology transfer be carried out?

Can competition between land-based mining and seabed mining be quantified?

Which elements of national security are involved in industrial mining technology?

Can the draft convention on the law of the sea be modified within a reasonable time?

Addressing the House of Representatives' Subcommittee for Merchant Marine and Fisheries on 28th April 1981, Mr. James L. Malone, Assistant Secretary of State, declared:

> "The draft convention creates a one-nation one-vote international organisation which is governed by an assembly and a 36-member executive council. In the council, the Soviet Union and its allies have three guaranteed seats, but the US must compete with its allies for any representation. The assembly is characterised as the 'supreme' organ and the specific policy decisions of the council must conform to the general policies of the assembly.

The draft convention provides that, after 15 years of production, the provisions of the treaty will be reviewed to determine whether it has fulfilled overriding policy considerations, such as protection of land-based producers, promotion of enterprise operations and equitable distribution of mining rights. If two-thirds of the states, parties to the treaty, wish to amend provisions concerning the system of exploitation, they may do so after five years of negotiation and after ratification by two-thirds of the states parties. If the US were to disagree with duly ratified changes, it would be bound by them nevertheless, unless it exercised its option to denounce the entire treaty.

The draft convention imposes revenue-sharing obligations on seabed mining corporations which would significantly increase the costs of seabed mining.

The draft convention imposes an international revenue-sharing obligation on the production of hydrocarbons from the continental shelf beyond the 200-mile (322-km) limit. Developing countries that are net importers of hydrocarbons are exempt from the obligation.

The draft convention contains provisions concerning liberation movements, like the PLO (Palestine Liberation Organisation), and their eligibility to obtain a share of the revenues of the seabed authority.

The draft convention lacks any provisions for protecting investments made prior to entry into force of the convention."

*Questions for the Defence Department*

*Space activities*

One of the recommendations in Mr. Wilkinson's report on the future of European space activities was "To promote in a North Atlantic Alliance context the exploitation of European military communication and observation satellites and the investigation of the military implications of space technology." What is your opinion on this recommendation?

It has often been written that Soviet space activities with military potential far exceed United States programmes in this field. Do you share this opinion?

Will there be a future need for space-based defence against ballistic missiles, for interceptor satellite systems and for laser and beam weapon applications?

The main areas of interest are communications, navigation, early warning, surveillance and weather forecasting. What will be the repercussions of the space shuttle when it becomes operational in 1983?

*Questions for NASA*

What are your views on the International Solar-Polar Mission issue, the solution of which is of the greatest importance for future space co-operation between Europe and the United States?

What are the views of the United States Government and Congress on the future of space co-operation with Europe in the field of:

- space science?
- space applications: room or necessity for complementarity or exclusively competition?
- Space Transportation Systems (STS):
  - Where does the United States go now? (improvement of STS; development of retrievable carriers; development of a space operations centre) ?
  - What rôle could/should Europe play in this context, if at all?

How do the United States Government and Congress see the national United States space activities? Are they sufficiently ambitious? Can they stand further budgetary restrictions?

*Questions for the Department of Energy*

What is the new administration's policy regarding the United States Synthetic Fuels Corporation?

Pricewise, is methanol competitive with gasoline?

Will it be possible to organise a network of methanol service stations?

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