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**INTO THE  
MISSILE AGE  
1956-1960**

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and a larger membership, which now included the chairmen of the Ballistic Missiles Scientific Advisory Committee and of the similarly named committee in the Office of Defense Mobilization (ODM) (soon to become the President's Science Advisory Committee). These changes seem to have satisfied the DSB members.<sup>137</sup>

Further action by the president followed soon after. On 7 November 1957, in his first talk to the nation after the two Sputniks, Eisenhower announced the creation of a position of special assistant for science and technology, to be filled by James R. Killian. The president added that he was directing Secretary McElroy to make certain that his executive in charge of missiles "is clothed with all the authority that the Secretary himself possesses in this field, so that no administrative or interservice block can occur." He and the secretary, he said, had agreed that any new missile or related program would in future, whenever practicable, "be put under a single manager and administered without regard to the separate services." This was the germ of what was to become the Advanced Research Projects Agency.<sup>138</sup>

In line with the president's instruction, McElroy on 15 November upgraded Holaday's position to director of guided missiles, with power to "direct all activities" relating to research, development, engineering, production, and procurement of missiles. This was stronger and more sweeping than the original directive to SAGM, which had authorized him merely to "assist in the direction and coordination" of missile activities and had not included production among his responsibilities. The director could also "require" information and reports from agencies of OSD and the military departments.<sup>139</sup>

In a press conference that day, McElroy explained that Holaday's authority now extended to missiles that were considered operational; these were still susceptible of improvement, and Holaday's assistance would be needed in this connection. He had "veto power" over the procurement of any missile to the extent that he wished to use such power "through the Secretary of Defense." Over budgeting and funding he had advisory authority only.<sup>140</sup>

When asked about Holaday's relationship with the service missile chiefs, McElroy gave a rather ambiguous reply that dwelt on the limitations of the director's power. He said:

Well, his authority stems from the authority of the Secretary of Defense. He is an Assistant to the Secretary of Defense. He is not an operating executive who directs individuals who are working on any of these missile programs. That's done in the services themselves. His authority goes through the missiles people in the services by a combination of his own unquestioned ability and his relationship to the Secretary of Defense as an Assistant to the Secretary of Defense.

Asked if Holaday had authority to cancel a contract for a missile, McElroy replied: "If he is not an operating man he can't cancel a contract nor write

Atlas  
 FBM (Polaris)  
 Satellite projects determined by the secretary of defense  
 to have objectives of "key political, psychological or  
 military import"  
 Antimissile missile weapons systems, including both active  
 defense and early warning  
 Thor/Jupiter  
 Titan  
 IGY scientific satellite program (Vanguard and Jupiter C)

McElroy discussed this list with the president on 21 January, and the next day the NSC noted that the president had formally approved it.<sup>161</sup>

Another action in January 1958 brought to a close the long period of fumbling uncertainty in the scientific satellite program and helped to restore some national prestige. On the night of 31 January 1958 ABMA, firing a modified four-stage Jupiter C rocket (Juno D) at the Air Force Missile Test Center, orbited a 31-pound satellite named Explorer I. President Eisenhower announced the achievement at 12:52 a.m. on 1 February. Another six weeks elapsed before Vanguard finally succeeded after two more failures.<sup>162</sup>

#### *The Advanced Research Projects Agency*

Eisenhower never tired of preaching the gospel of greater unity in defense organization. In the development of radically new technologies associated with missiles, he saw an example of a function requiring centralized control. The Soviet Sputnik and the accession of McElroy, two nearly simultaneous events, provided both a stimulus and an opportunity for introducing organizational changes. Missiles already far along the road to development might continue under individual services, but newer and more esoteric projects cutting across service lines seemed to call for other organizational arrangements.

On 11 October 1957, in one of his first conferences with his new secretary of defense, the president suggested the possibility of a "fourth service" to handle the "whole missile activity." McElroy suggested a Manhattan District project for the antimissile program, which the president had already cited as a possibility for the ICBM and IRBM programs. Eisenhower thought that the idea might be extended to the military reconnaissance satellite.<sup>163</sup>

In the end, however, the Manhattan model was rejected, probably as too sweeping. Instead, Eisenhower and McElroy opted for the "single manager" approach, already functioning successfully in connection with inter-service supply problems, with the managerial agency operating directly under OSD. The president, as already noted, announced this decision on 7 November. DoD General Counsel Robert Dechert rendered a legal opinion that, under the National Security Act as amended, the secretary had ample

authority to establish the proposed managerial agency, subject only to a requirement to notify Congress at the time he did so.<sup>164</sup>

McElroy intended that the new agency would have jurisdiction over new weapons that were "not anything like as far down the road as the missile program," such as the antimissile weapon and "perhaps some other very upstream types of weapons projects." It would develop new weapons to the point of operational capability, when they would be turned over to one of the services. It would not be a "Manhattan project." "There were things you could do in wartime to throw money into the Manhattan project that are quite different from the way this will be handled," he said.<sup>165</sup>

Some service spokesmen opposed the new agency. The most prominent, Air Force Secretary Douglas, considered it unnecessary and intrusive and believed that weapons systems, from their inception, should remain under the user service. Another argument, supported by the DSB, held that it would suffice to strengthen the authority of some existing official.<sup>166</sup>

McElroy and Quarles ignored these objections and moved ahead with their plans. Their draft directive for the "Special Projects Agency" was reviewed by the JCS, who did not object in principle but recommended some changes, including one to limit the agency's activities to antimissile weapons and satellites. McElroy rejected this view because, as his military assistant, General Randall, explained, he wished the new agency to be free to take on other projects if desired. It was also intended that the director of the agency would have authority to enter into contracts, although he would normally contract through the military departments.<sup>167</sup>

McElroy held up the formal establishment of the new organization, eventually named Advanced Research Projects Agency (ARPA), pending the appointment of a director, who could be expected to play a key role in setting its course.<sup>168</sup> Meanwhile, as already noted, McElroy included \$10 million for ARPA's initial operating expenses in the FY 1958 budget supplemental.

The House Armed Services Committee, investigating the missile program, also evidenced much interest in ARPA, and McElroy encountered questions on the subject when he appeared before the committee on 13-14 February. Some members doubted McElroy's authority to establish by executive action an "operating" agency with power to hold property. Assurances given the committee by General Counsel Dechert failed to convince the skeptics.<sup>169</sup>

This issue reached the floor of the House in connection with a bill to authorize construction of certain Air Force facilities in FY 1958, as part of the budget supplemental. The House adopted an amendment that expressly authorized the secretary to establish ARPA and allowed the agency to enter into production contracts. McElroy was willing to accept this provision provided it was so worded as to avoid any implication that the law was conferring an authority that did not exist. The Senate, however, deleted the House amendment as irrelevant to the rest of the bill. The conference committee retained its substance, but without mentioning

ARPA by name; the secretary "or his designee" was authorized to engage in advanced projects in the field of basic and applied research. In that form, the bill passed, with another provision added by the House authorizing not only military projects, but also "such advanced space projects as may be designated by the President"; this was intended to insure continuance of Vanguard. The president signed the bill on 12 February 1958.<sup>170</sup>

By that time McElroy had found a director for ARPA: Roy W. Johnson, a vice president of General Electric. His appointment was announced on 7 February 1958. The directive establishing ARPA, issued the same day, authorized it to direct or perform projects assigned to it by the secretary of defense, using existing facilities of DoD as far as practicable, although it could also acquire its own facilities. A few weeks later Herbert F. York, director of the Atomic Energy Commission's Livermore Laboratory in California and a member of the Ballistic Missiles Scientific Advisory Committee, became chief scientist of ARPA.<sup>171</sup>

The 1958 reorganization, already in prospect by January of that year, brought about significant changes in the administration of research and development within OSD. Pending the reorganization, the relationship between the newly established director of ARPA, the director of guided missiles, and the assistant secretary for research and engineering was regulated by an agreement worked out by these officials and approved by McElroy. Under its provisions, the assistant secretary (R&E) acted as a staff adviser responsible for recommendations concerning the soundness and feasibility of all research and engineering programs and their consonance with DoD policies. The DGM had specific responsibility for advice of similar scope concerning guided missiles, but he also held delegated line authority in his field. The director of ARPA was primarily a line official, responsible for planning and directing assigned projects. All three officials were enjoined to cooperate closely and to keep one another fully informed.<sup>172</sup>

From the beginning, it had been understood that ARPA would take over responsibility for development of antimissile defense and for military satellite projects. The first of these involved an area of rivalry between the Army and the Air Force, owing to the difficulty of distinguishing clearly between "point" and "area" defense. On 10 January 1958 Holaday informed McElroy that the Air Force had diverted some FY 1958 money to a full-fledged anti-missile project (known as Wizard), which overlapped the Army's work. Holaday recommended immediate action, without awaiting the organization of ARPA, to reaffirm the division of responsibilities prescribed earlier: the Air Force to limit its effort to long-range detection, the Army to develop the actual weapon. McElroy agreed. On 16 January he informed both service secretaries that the direction of the anti-ICBM program would eventually be assigned to ARPA, but in the meantime the two services were to continue their current lines of development.<sup>173</sup>

As its first responsibility, ARPA took over coordination of a national military satellite program. The Advisory Group on Special Capabilities, in response to Holaday's directive of 6 September 1957, reviewed the satellite

programs of the services and submitted recommendations on 15 January 1958. The first step, it said, should be development of vehicles to be launched by the boosters developed for IRBMs. A longer-term project would exploit the still more powerful ICBM rocket engines. Looking beyond military satellites to exploration of space (which it was assumed would become a national objective), the group noted that unmanned explorations of the moon, Venus, and Mars appeared to be within the capabilities of presently planned systems, and recommended that a lunar probe be part of the IRBM-based satellite program. For manned space exploration, the group made no recommendations, merely observing that the X-15 hypersonic aircraft, a rocket-powered vehicle under development by the Air Force and the Navy, provided a basis for development in this field.<sup>174</sup>

In response to a request from Holaday on 7 January 1958, the services submitted more specific recommendations for satellite programs. The Army on 10 January recommended a program that had been presented earlier to the advisory group, involving 16 satellite launchings between 1958 and 1960. Four days later the Army forwarded a long-range plan, beginning in January with the small satellite already scheduled for launch, followed by progressively larger and heavier satellites, then an unmanned moon landing in April 1959, manned landing and return in the spring of 1967, and a 500-man expedition to the moon by 1971.<sup>175</sup>

The Navy reply on 15 January set forth, as a minimum, the goal of developing satellites with a 1,500-pound payload, followed by manned space flight. This would require extensive research experience with smaller satellites; hence the Navy recommended continuing the Vanguard program with successively larger payloads, leading logically to the use of Titan or Atlas boosters to reach the 1,500-pound goal.<sup>176</sup>

The Air Force arrayed a smorgasbord of exotic projects, including the 117L satellite system, which could evolve into manned systems for orbiting the earth and the moon; the X-15, already described, and Dynasoar, a rocket-propelled supersonic glider, for manned space flight research; a nuclear-powered rocket and an ion-propulsion aircraft for actual space flight; and plans for lunar landings and probes of Mars and Venus.<sup>177</sup>

The Army and Navy made further proposals in sending Holaday their comments on the report of the Advisory Group on Special Capabilities, the conclusions of which they endorsed. Brucker, in lieu of the 16-vehicle program presented earlier to the group, now recommended 12 launchings during 1958 and 1959, building up to a capability by October 1959 of a launch rate of one per month which could be continued indefinitely; he also recommended approval of the Army's longer-range program. Gates recommended that the Navy take on the following specific tasks: continuation of Vanguard, expanded through combinations with Thor or Jupiter, a television satellite system under development; a satellite tracking plan, already under study by the Navy in response to a request by Holaday; and development of a hypersonic aircraft as a basis for a manned space vehicle, to be launched by a three-stage rocket using boosters from Titan and Polaris.<sup>178</sup>

Most of these ambitious proposals were clearly matters for long-term consideration. The principal exception, the Air Force 117L, gave promise in the near future of yielding a reconnaissance satellite. As early as February 1958 the Air Force planned one that would circle the earth three times, then eject a capsule containing photographs taken from aloft. McElroy and Quarles discussed this with Killian and Allen Dulles on 6 February, and the president approved it the next day with the understanding that it would come under the overall supervision of DoD and that CIA would control the intelligence aspects. On 24 February McElroy directed the Air Force to proceed with the project under the direction of ARPA.<sup>179</sup>

The director of ARPA set forth his proposed method of operation in memorandums to the service secretaries on 27 March. Initially, ARPA would not acquire or operate its own laboratories, though it might do so later. Some projects might be assigned directly to military departments; those not readily identifiable with a specific weapon system would be handled by ARPA through contracts with military activities or other governmental or private agencies. Johnson forwarded copies of orders that he had sent directly to service installations the same day. ABMA was instructed to prepare four satellite launchings between August 1958 and January 1959, with successively larger payloads, using Juno I or a more advanced version (Juno II). He directed the Air Force to develop three lunar probes to be launched as soon as possible, with a three-stage launch vehicle drawing on Thor, Vanguard, and a solid-propellant rocket to be determined later. The Naval Ordnance Test Station, Inyokern, California, was to develop a ground scanning system for use in lunar probes. On the same day, after the president had approved the projects, McElroy announced them publicly.<sup>180</sup>

ARPA was off to a fast start. The projects that it had set in motion would provide a basis for the program of the National Aeronautics and Space Administration and eventually, after years of patient and costly experimentation, for the nation's first moon landing in 1969.

#### *Further Acceleration of Effort*

The 1959 budget carried slightly more than \$3.8 billion in new obligational authority for procurement of missiles, exclusive of research and development and of the \$340 million requested for ARPA. However, the figures were not necessarily final; technological progress might lead to requests for more support of some programs, as McElroy told the House Appropriations Committee on 27 January 1958.<sup>181</sup>

Uncertainty about final budget goals stemmed not only from the state of weapons technology but also from the administration not having completed its examination of the Gaither panel recommendations. The NSC discussed these on 6 and 16 January. It directed DoD, in consultation with the White House, to report on the advisability of enlarging the Atlas and Titan programs beyond the 13 squadrons programmed and of hardening