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**The French Pacific Nuclear Test Center**

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**DIRECTORATE OF SCIENCE AND TECHNOLOGY**

Office of Scientific Intelligence

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# THE FRENCH PACIFIC NUCLEAR TEST CENTER

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## PROBLEM

To determine the schedule and objectives of French nuclear testing at their Pacific Test Center.

## CONCLUSIONS

1. Construction of the French Pacific Nuclear Test Center appears to be meeting a scheduled completion date of early 1966. Of the three major installations at the Center, the test site at Mururoa is probably in the most advanced stage of construction. The advance support base at Hao is still in an early construction phase, and extensive rear support facilities at Tahiti are in a continuing state of expansion.

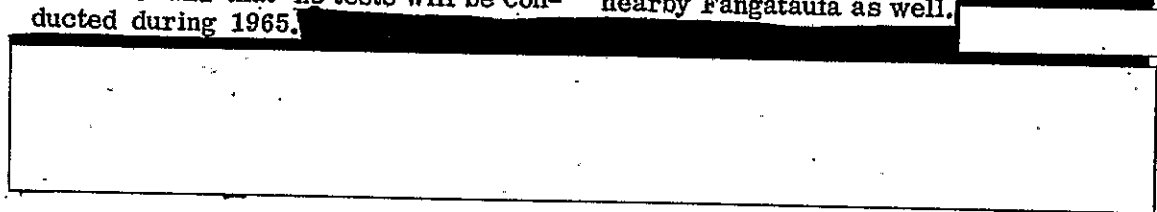
3. The 1966 test series probably will be directed toward further improvement of the Mirage IV weapon and development of a warhead for the land-based IRBM.



These tests probably will be balloon- and barge-mounted and take place over the Mururoa lagoon.

2. The first test series is scheduled to begin in mid-1966. All indications are that these tests will be conducted on schedule and that no tests will be conducted during 1965.

4. Other test series reportedly are scheduled for 1968-70 and also will be conducted at Mururoa and probably at nearby Fangataufa as well.



## SUMMARY

France intends to conduct atmospheric tests to develop and test the nuclear warheads for the *force de dissuasion*. The test

program now is primarily directed toward the development of thermonuclear warheads for use in a land-based missile

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system in the late 1960's and a submarine-launched missile system in the 1970's. Construction of a Pacific Test Center (*Centre d'Expérimentations du Pacifique-CEP*) was begun in 1963 so that test activity could be transferred to the Pacific before 1967 when French rights in the Sahara terminate. (France has conducted 14 nuclear tests in the Sahara and will probably continue these tests at least through 1965.)

The CEP includes a rear support base at Tahiti, a forward support base at Hao, and a test site at Mururoa. Weather and instrumentation stations and emergency airfields are being built on islands throughout French Polynesia. Facilities at the base at Tahiti are primarily for the military and are devoted to administration, logistics, and housing. Shipments of sensitive material, including instrumentation and the nuclear devices, are expected to be made to Hao, where a harbor and airfield are being built. The Mururoa site includes a support area and two test zones. Fangataufa, an atoll just south of Mururoa, will probably be used as a test site in later test series.

Construction of the center is a joint Atomic Energy Commission (*Commissariat à l'Energie Atomique-CEA*), military, and private enterprise venture. The CEA directs civilian contractors in construction

of technical facilities. During 1963, the initial reconnaissance and survey for the major CEP facilities were performed. In 1964 the logistics area at Mururoa was completed and the test area was begun. In early 1965, construction activity continued at Mururoa and was just beginning at Hao.

[redacted]

French Prime Minister Pompidou released a press statement in July 1964 that tests would probably begin in July 1966 following completion of construction in March 1966.

[redacted]

[redacted] These tests probably will be balloon- and barge-mounted, with possibly a tower shot or air drop test. Megaton (MT) tests can be expected in 1968-70.

The Operational Group for Nuclear Testing (*Groupement Opérationnel des Expérimentations Nucléaires-GEON*) is responsible for test operations. GEON, directing a large naval task force, undoubtedly will announce a restricted area several weeks before testing begins. Upon receiving favorable information from an extensive meteorological net, tests probably will be conducted at dawn of the appointed day.

## DISCUSSION

### FRENCH NUCLEAR TESTS

To date, France has conducted 14 nuclear tests, all in Algeria. The first four were atmospheric tests carried out at Reganne in 1960 and 1961.

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[redacted] In November 1961, France began underground testing at In Eker. (See table listing French nuclear tests in the Sahara.)

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Table

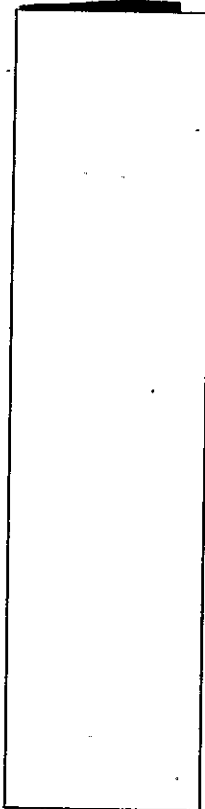
FRENCH NUCLEAR TESTS IN THE SAHARA

Atmospheric at Reganne

DATE

YIELD  
IN KT

13 Feb 60  
1 Apr 60  
27 Dec 60  
25 Apr 61



Underground at In Eker

7 Nov 61  
1 May 62  
18 Mar 63  
30 Mar 63  
20 Oct 63  
14 Feb 64  
15 Jun 64  
28 Nov 64  
27 Feb 65  
30 May 65

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[REDACTED]

high-yield devices.<sup>1</sup> The Evian Accords of March 1962, which called for the removal of French installations by July 1967, confirmed the need for a new site.

In mid-1962 following an investigation of possible sites in French territories, General Thiry, who heads the military authority responsible for operation of nuclear test sites, proposed to the Government that a Pacific testing center be constructed in the Tuamotu Archipelago. In April 1963, he announced plans for the Pacific Test Center (CEP), to become operational in 1966. The CEP includes a rear support base at Tahiti (149°30'W-17°35'S), an advance support base and technical center at Hao (141°00'W-18°15'S), and the test site at Mururoa (139°00'W-21°50'S). (See figures 2, 3, and 4.)

During 1964, French officials expressed satisfaction with the Mirage IV weapon and indicated that the development of a TN device now was the primary test objective, although improvement and miniaturization of fission devices would continue.

#### CEP INSTALLATIONS

Mururoa is an uninhabited atoll, chosen as the test site because of its remoteness and relatively large, accessible lagoon. The atoll is about 15 miles long and 6 miles wide. There is a broad natural break in the coral reef, which has been enlarged to permit the entrance of merchant ships. In addition to the extensive facilities to conduct each test, a logistic support base is being established at the eastern edge of the atoll including a 6,000-foot airstrip, several piers, and housing on land or aboard ships for some 2,000 test personnel. Fangataufa, a small enclosed atoll (about 25 miles to the south) and Mururoa make up the test site proper.<sup>2</sup> Fangataufa was designated as an observation post by General Thiry in 1963; however, it probably will be used as a test site at some point in the test

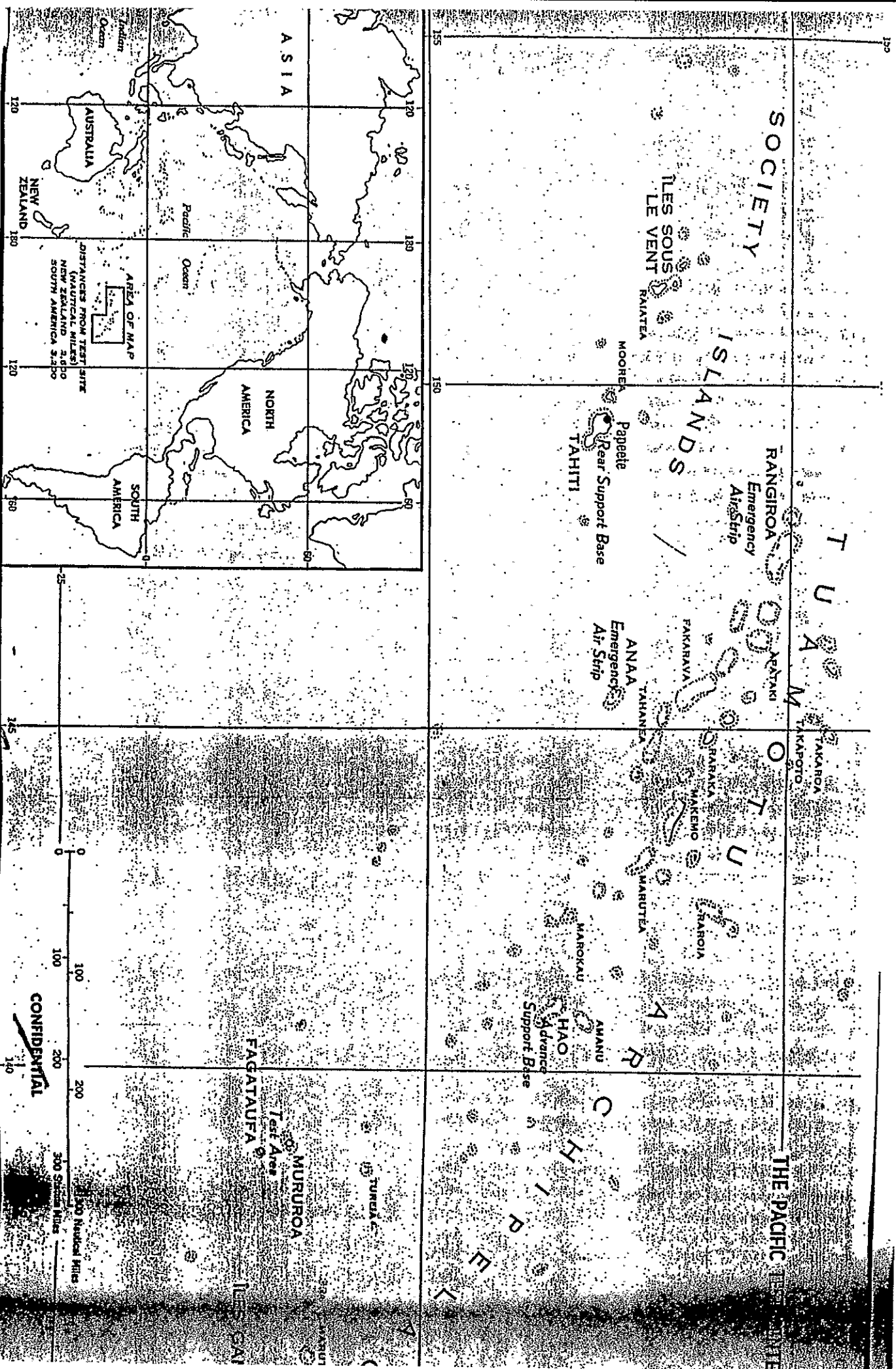
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The French reportedly are planning to continue testing in the Sahara at least through 1965 and probably until operations are transferred to the Pacific Test Center in 1966.

#### SELECTION OF THE PACIFIC TEST CENTER

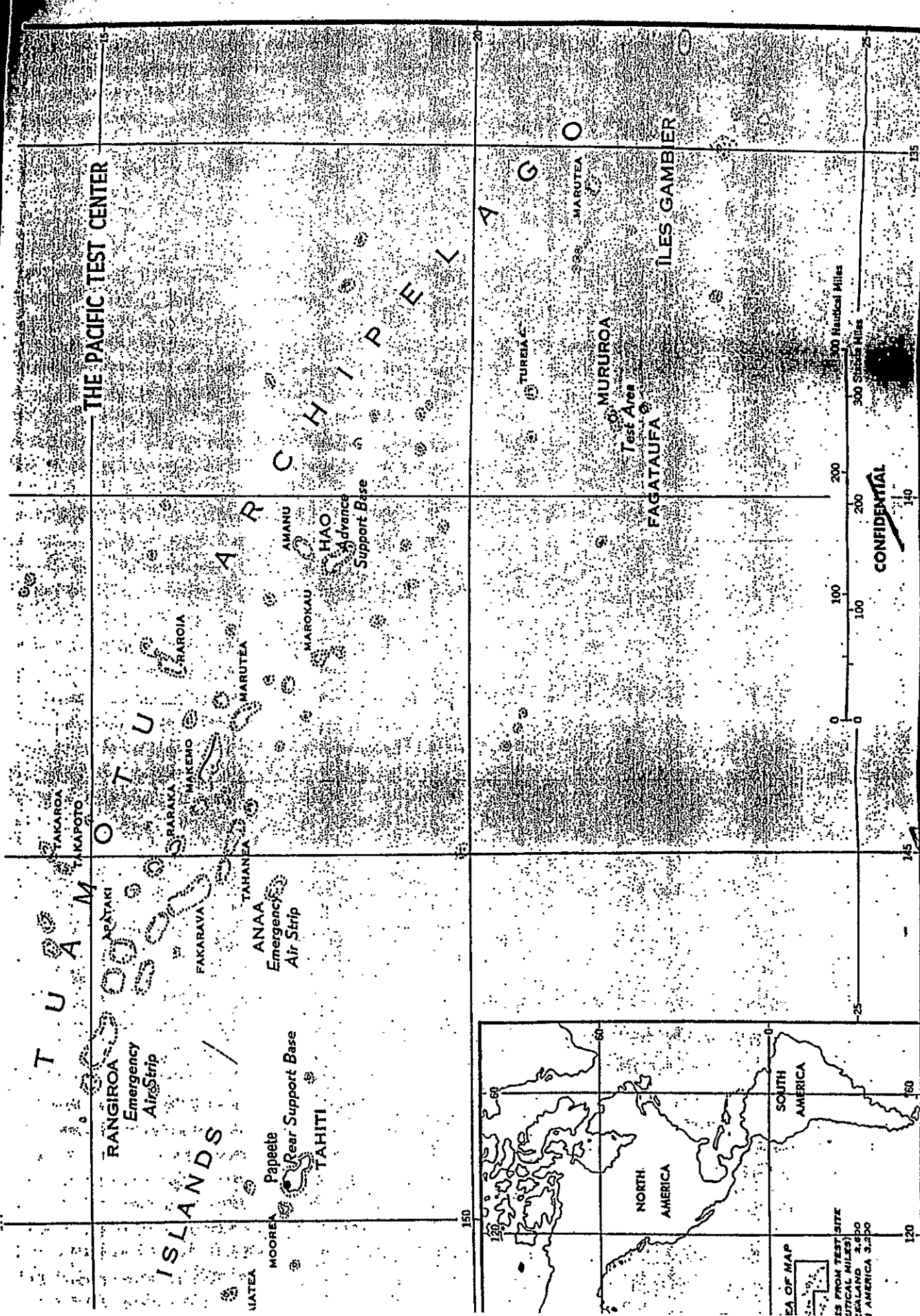
As early as 1961, because of the strained relations between France and Algeria, it was apparent that the Sahara would not continue to meet the requirements of the French nuclear testing program. A decision was made to seek a new site suitable for atmospheric testing of

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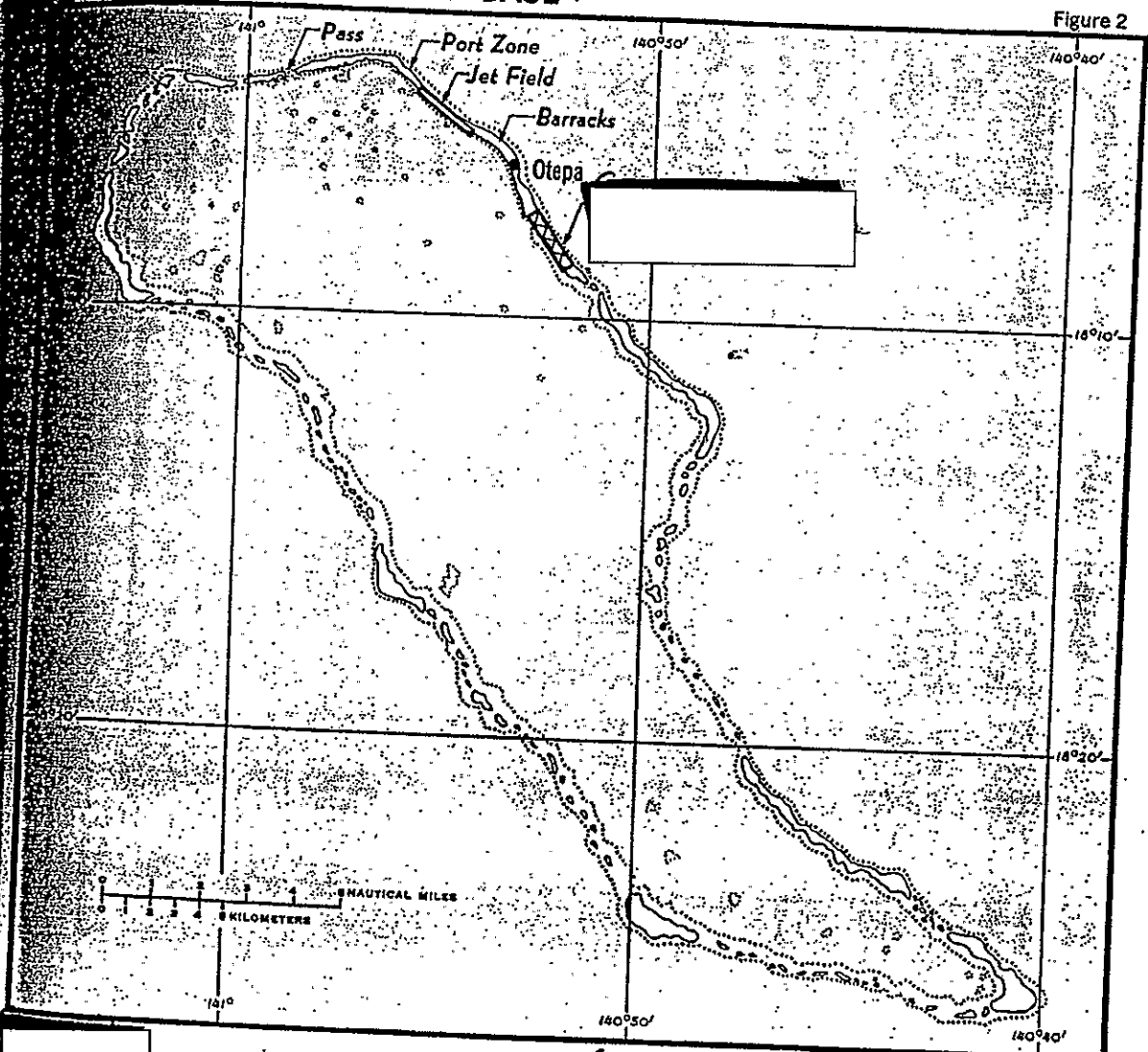
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ADVANCE SUPPORT BASE

Figure 2

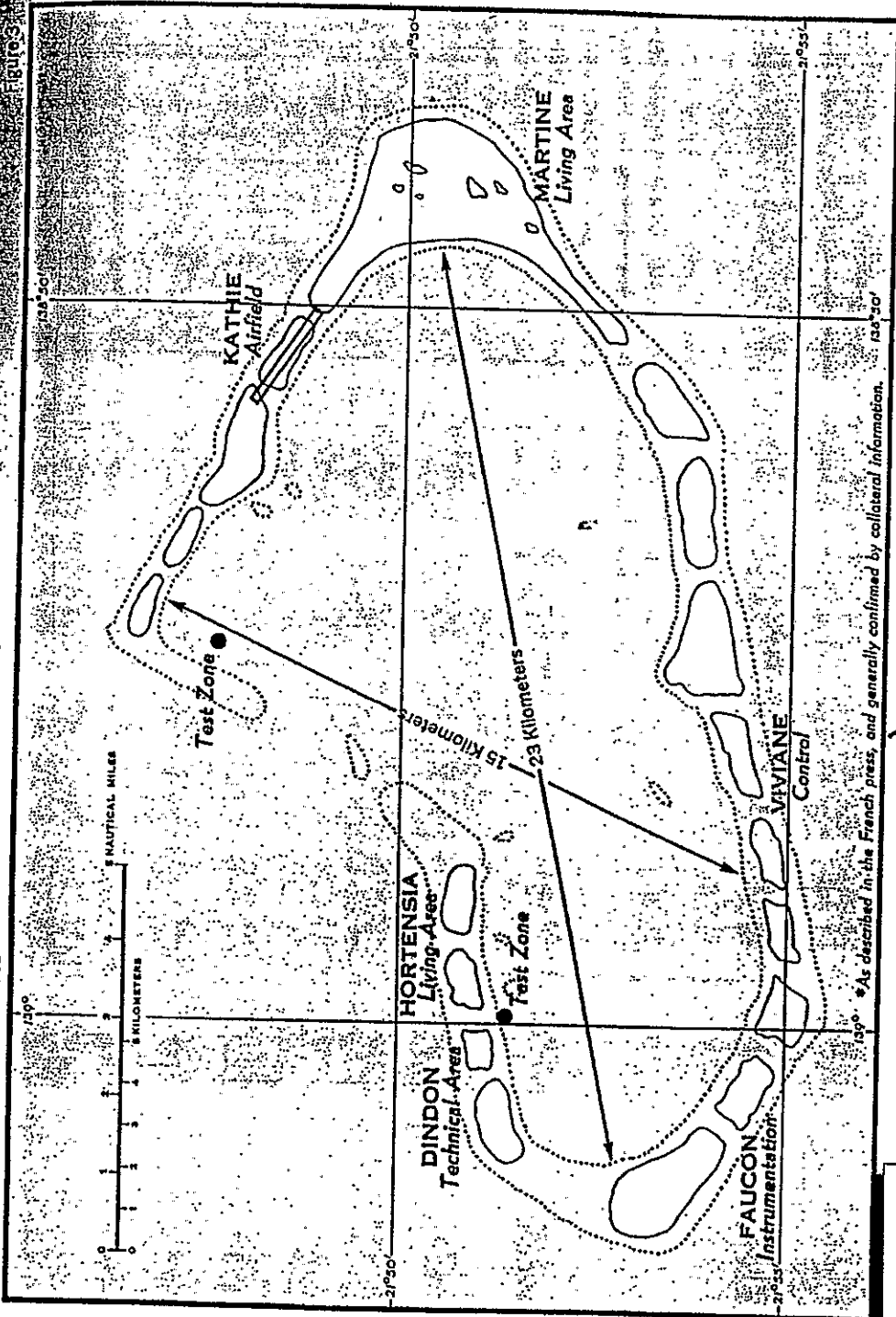


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# MURUROA: TEST SITE\*

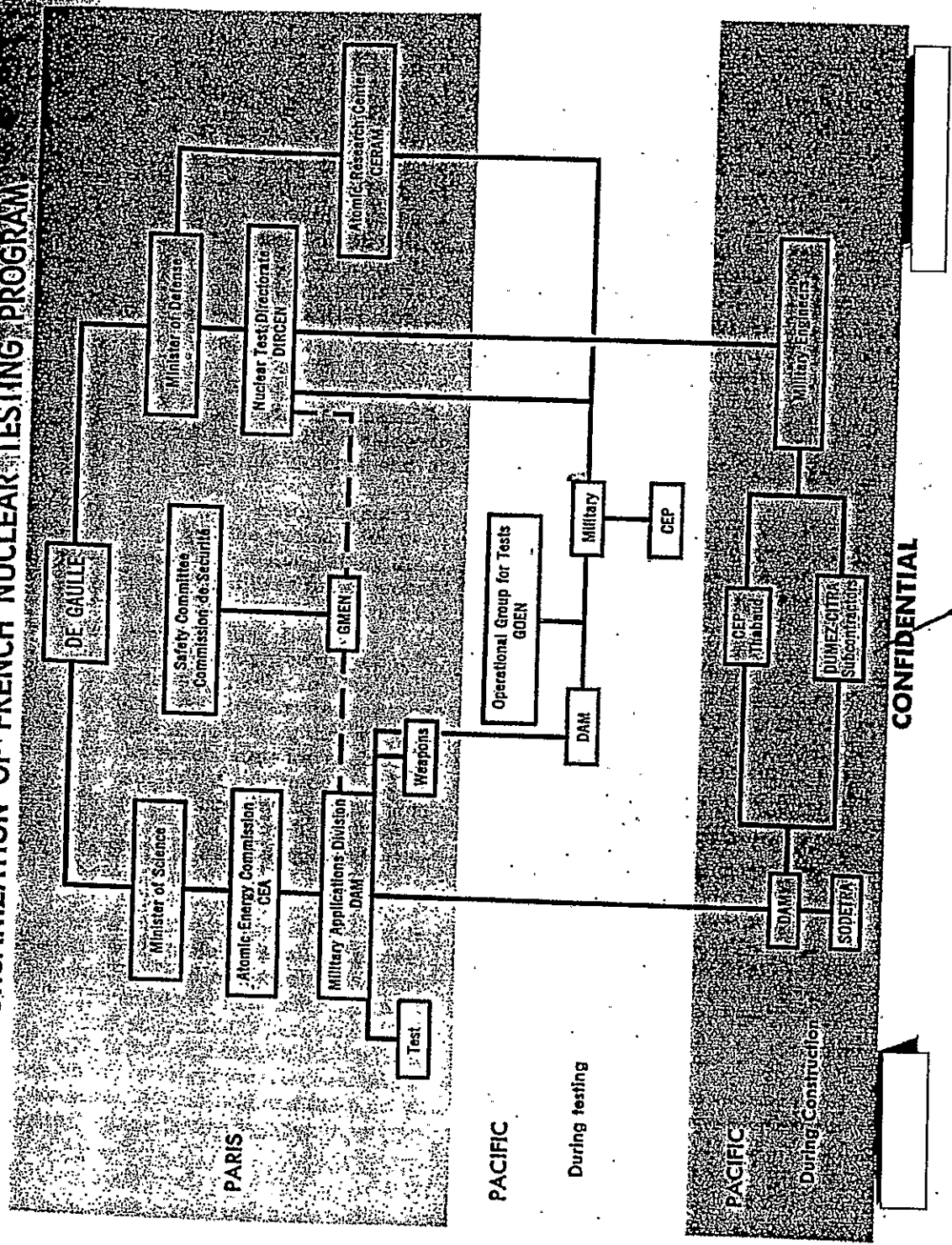
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\*As described in the French press, and generally confirmed by collateral information.

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**ORGANIZATION OF FRENCH NUCLEAR TESTING PROGRAM**



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program. High tests could be conducted at Fangataufa to avoid contamination of the extensive support facilities at Mururoa.

Mururoa and Fangataufa are the only atolls whose entire territory was ceded to the CEP. The nearest inhabited islands are Tureia, 80 miles to the north with a population of 80, and Vahanga in the Acteon group, 140 miles to the northeast. These atolls may be evacuated prior to testing.

Hao, 280 miles to the northwest of Mururoa, will serve as the advance support base.

sive improvement program, connect the CEP with France. Expanded petroleum storage facilities at Papeete will meet the French air and naval requirements during test operations.

#### SITE CONSTRUCTION

The CEP, which consists of military engineering units, CEA personnel, and private construction firms placed under the command of Admiral Thabaud,\* has undertaken construction of the site. The Directorate of Nuclear Centers (*Direction des Centres d'Expérimentation Nucléaire-DIRCEN*), established in January 1964 under the Ministry of Defense to support the nuclear testing activities, directs CEP operations from Paris. The establishment of DIRCEN apparently has diminished CEA's role in test construction and operations; however, CEA's Department of Military Applications (*Department des Applications Militaires-DAM*) directs construction of the technical facilities of the CEP. (See figure 4 for organization of the French nuclear testing program.)

Hao will serve as the land base of operations following the evacuation of the Mururoa atoll for each test. The entire northeast portion of the Hao atoll is being developed by the CEP. Land to the south of the native village of Otepa, population 300, has been acquired for the CEA technical center.<sup>3</sup>

Tahiti, the location of the CEP headquarters, will include administrative, communication, and meteorological centers.<sup>4</sup> In addition to construction of housing for some 2,000 personnel, the CEP will have warehouses, equipment repair shops, and technical laboratories. The existing jet airfield and the port at Papeete, which is undergoing an exten-

SODETRA, a private firm, was established to carry out the CEA construction

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in the Pacific. Army and navy engineers are responsible for the construction of military support facilities. A public work firm, *Dumez-Citra*, directed by SODETRA, and the military are doing most of the heavy construction connected with the CEP installations.

Construction of a test site on an island archipelago 1,000 miles long and halfway around the world has placed a tremendous logistic burden on France. Neither the French Navy nor the Air Force was equipped for such long-range support. Interisland air transport is provided by four Breguets (four-engine transports, first built in 1950). A seaplane, two Piper Aztecs, and several Alouette helicopters complete the CEP air unit.<sup>5</sup> Eight LSTs and LCTs transport supplies between the atolls and within the lagoons.

During the last stages of construction, two DC-8 aircraft and possibly several of the 12 KC-135s purchased for the *force de dissuasion* probably will be used in logistic support of the CEP. The ships required for the test operations may represent one quarter of the French Navy.

During 1963, the CEP engaged in a beachhead operation to establish the first temporary camps on the atolls. French foreign legionnaires established a tent camp outside Papeete and began construction of dock and warehouse facilities at Papeete and administrative and housing facilities at Arue, Taaone, and Mahina on Tahiti. Mahina and a 1,000-person housing complex at Taaone reportedly are scheduled for completion in early 1966.<sup>3 6</sup>

The main construction effort has been at Mururoa.

The logistic support area at the eastern end of Mururoa, which was essentially completed in 1964, includes housing, power, water, fuel storage, and communication facilities. France's Defense Minister Messemer and Science Minister Palewski toured the site in January 1964, followed by an inspection by Pompidou in July. Pompidou also inspected construction work at the western end of Mururoa. This area was apparently just beginning to be developed. By June 1965, a large instrumentation blockhouse was nearing completion in this area. Work on a similar blockhouse was just beginning at a second test area in the eastern portion

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Photographs of the two instrumentation blockhouses and a partially completed command post blockhouse were released to the press in June 1965.

All indications are that construction will continue until early 1966. Work on emergency airfields at Anaa and Rangiroa is underway and construction is continuing at Hao, Mururoa, and Tahiti. In March 1965, *Messageries Maritimes* added four modern merchant ships to the France-Tahiti run in anticipation of continued freight transportation for CEP construction.

CEP logistic facilities are not yet complete, and the jet airfield at Hao will not be completed until 1966.<sup>9</sup> The French are negotiating for delivery of two DC-8 transports in November and December of 1965. In March 1965, the first of four modified passenger ships to house personnel during peak construction and test periods arrived at Mururoa; three others were scheduled to arrive, one each in June, November, and early 1966. Following completion of construction, two or three months will probably be required for equipment installation. At this time, large quantities of coaxial must be laid. Housing at Tahiti for technical personnel to supervise equipment installation is expected to be completed in early 1966.

#### TEST SCHEDULES

The first test series is planned for mid-1966 and will include three or four tests at one month intervals.

The French test schedule called for use of the Sahara at least

through 1965.<sup>10-12</sup> During Pompidou's July 1964 visit to the Pacific, the press was informed that the CEP construction would be completed in March 1966 and that testing would probably begin in July 1966.<sup>13</sup>

Press and other reports have stated that test series will follow in 1968 and in 1970. However, testing in 1967 and 1969 cannot be excluded, particularly since the long-range test program is undoubtedly subject to change.

A more ambitious construction program could have readied the Pacific test site by 1964 or 1965. However, the French have encountered considerable difficulty and expense in maintaining their present schedule. In addition, by conducting tests at the rate of about three per year in the Sahara, they are acquiring considerable developmental data for use in the first test series in the Pacific.

If the French should so choose, a Mirage IV device could be set off in the Pacific in 1965 with a minimum of preparation and little technical benefit. However, such an operation is considered unlikely, since it would interfere with construction for the 1966 test series and would require an expensive naval operation to patrol the restricted area. Also, after a recent inspection of the Center, Messmer announced that no test will be conducted in 1965.

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French tests probably will be conducted just before dawn. All four of the French atmospheric tests at Reganne took place between 15 and 30 minutes before sunrise.

be included in the series, although there is insufficient evidence to confirm this possibility.

the tests usually will take place 20 minutes before dawn when optimum photographic conditions are obtained and the maximum number of daylight hours are available to track the nuclear cloud.<sup>16</sup>

#### PROGRAM OBJECTIVES AND RELATED PLANS

The French have reported their intention to conduct the nuclear tests necessary to develop an independent nuclear force. Parliamentary discussions of the military budget for 1966-70 made public French plans to develop the *force de dissuasion* in three stages: (i) the first generation force of Mirage IV bombers to become operational in 1964; (ii) an intermediate force of land-based IRBM's for deployment in 1968; and (iii) missile-carrying nuclear submarines to become operational in early 1970.

#### TYPES OF TESTS

There will probably be barge and balloon tests; the French have done considerable research on both of these test methods and can be expected to use them.

In 1963, the CEA sought to purchase a balloon system capable of supporting a 5,000-pound payload at an altitude of 3,000 feet. This is probably a good indication of the maximum detonation altitude for the first series. There are no indications of plans for high-altitude rocket-borne tests. Likewise there have been no indications that an operational test of the Mirage IV system is planned but, reportedly, the first test may be a barge test of the Mirage IV device.<sup>11</sup>

Because of the limited number of tests which the French will conduct, the test site will probably be extensively instrumented to obtain a maximum amount of information from each test. A tower shot may be included in the series since additional information can be obtained from this test method. An airdrop could also

The 1966 test series probably will be directed toward the development of a warhead for the land-based IRBM and an improved Mirage IV weapon. Later series in the 1968-70 period probably will include high-yield developmental tests of a megaton warhead for the submarine-launched missile system and tests of low-yield tactical weapons. High-yield tests may be conducted at Fangataufa to the south of the Mururoa test site.

#### WEATHER DATA

The location of populated islands necessitates that fallout be directed to the east or to the south. The prevailing upper-level winds are to the east and fallout will probably be carried toward

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South America. There is no single period of the year which appears to be strongly suited for testing from a meteorological standpoint; in fact, there is little seasonal weather variation in this region of the South Pacific. However, the months of July and August appear to have the least small and best chance of favorable high-level winds.

Observations at Mangareva, 200 miles southeast of Mururoa, provide the best available weather history of the area. Surface winds are generally weak and variable, with winds from the east predominating throughout the year. Winds continue to be weak and variable until the 20,000- to 40,000-foot level is reached. At these heights, winds are from the west. Easterlies that occur are weak and of short duration. Average speeds are typically 10 to 15 miles per hour. At 80,000 to 100,000 feet, winds are again variable. In the summer, these winds are primarily from the west with not infrequent light easterlies. From October to May, easterlies occur up to 100 percent of the time with velocities as high as 35 miles per hour.

#### TEST OPERATIONS

Test operations will be carried out by GOEN, the group responsible for testing, which will be established in the Pacific prior to testing.

The GOEN will be composed of civilian and military personnel provided through the Department of Military Applications of the CEA and the DIRCEN. DIRCEN officers have responsibility for the administrative and logistic portion of test operations, and DAM supervises the technical test activity, including test detonation and diagnostics. The Military Center for Atomic

Studies (*Centre d'Etude et de Recherche Atomique Militaire-CERAM*) is responsible for fallout prediction and monitoring during testing. Activities of the CEA and the military are coordinated by the Mixed Group for Nuclear Experiments in Paris. A safety commission is responsible for ensuring that adequate safety precautions are taken during tests.

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