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A handwritten signature in cursive script that reads "Robert Storer".

Robert Storer  
Chief, Records and Declassification Division

Attachments:

1. MDR request
2. OSD response letter
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If you have any questions, contact Ms. Luz Ortiz by e-mail at [Records.Declassification@whs.mil](mailto:Records.Declassification@whs.mil) or by phone at 571-372-0478.

Sincerely,

Robert Storer  
Chief, Records and Declassification Division

- Enclosures:
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# Nuclear Proliferation and Iran: Net Assessment (A Case Study) (U)

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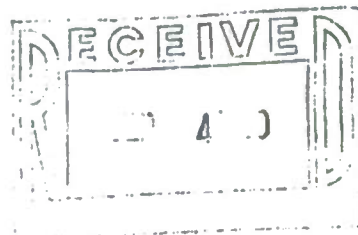
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# NUCLEAR PROLIFERATION AND IRAN: NET ASSESSMENT (A CASE STUDY) (U)

By: WILLIAM H. DAUGHERTY  
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Prepared for:

DEFENSE INTELLIGENCE AGENCY  
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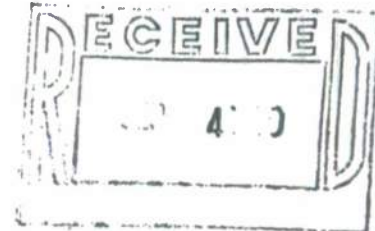
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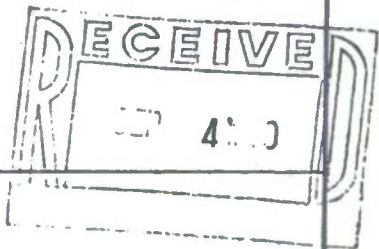
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ABSTRACT

This volume provides a net assessment of factors bearing on Iranian nuclear proliferation based upon the methodology presented in Monitoring Nuclear Proliferation, SRI SSC-TN-4802-1.

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FOREWORD

Nuclear proliferation is one of the most crucial problems confronting mankind. U. S. policy remains strongly opposed to the further proliferation of nuclear explosives. The problem of proliferation is aggravated by the worldwide expanding participation in nuclear power programs that enhance the potential for proliferation by significantly reducing the technological obstacles to acquiring nuclear weapons. Therefore, it is important to assess the trends of possible further proliferation and develop a methodology that would facilitate the early identification of the technical, political, military, and economic indicators of an Nth country's intention to acquire a nuclear weapon capability.

The acquisition of a nuclear weapons capability as a suitable instrument of national policy is the culmination of a political, military, technical, and economic process. Thus, an interdisciplinary approach to the evaluation of a trend relative to proliferation is indicated. The methodology developed during this study is based upon a functional approach that resulted from analysis of the political, military, economic, and technical factors and considerations that have an impact upon the phenomenon of proliferation.

This research is presented in three reports: Monitoring Nuclear Proliferation (SSC-TN-4802-1), presents the methodology that has been developed to both monitor and conduct net assessments of a country's proliferation status; Nuclear Proliferation and Iran: Net Assessment (A Case Study) (SSC-TN-4802-2), presents an illustration of the methodology using Iran as an example; and Nuclear Proliferation and Spain: Net Assessment (SSC-TN-4802-3), provides a country proliferation study of Spain. This report presents the net assessment of Iran.

This study was undertaken by the Strategic Studies Center of SRI with the assistance of the Engineering Systems Division of SRI for the Defense

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Intelligence Agency. The project was under the general supervision of Richard B. Foster, Director, SSC. ~~Clarence M. Davenport, Jr., was the~~ project leader. M. Mark Earle served as a principal investigator with Clarence Davenport. Other members of the project team included Warren W. Berning, William Daugherty, James E. Dornan, Kenneth H. Jacobson, Harold W. Rood, and Anna R. Rhodes-Vivour.

Richard B. Foster, Director  
Strategic Studies Center

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I (U) INTRODUCTION (U)

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A. Nature of the Problem

Proliferation--the acquisition of a nuclear weapon capability by additional countries--is regarded by most as being counterproductive to international peace and security. There is no doubt that the further spread of nuclear weapons will have a substantial impact upon the structure of world politics. Knowledge concerning the status of Nth countries in regard to acquiring a nuclear weapons capability is relevant to the development of U.S. policies and options in several areas, which include assistance and activities in international nuclear power programs as well as providing security assurances to nonnuclear nations.

Political, military, economic, and technical factors and considerations have an impact upon the rationale for proliferating or abstaining from proliferation as well as the mode followed by an Nth country should it elect to acquire a nuclear weapons capability. Accurate understanding and assessment of the factors bearing upon proliferation and the integration of those factors are essential in reaching an accurate determination of an Nth country's proliferation status. Thus, enhancing comprehension of the phenomenon of proliferation and the development and refinement of a systematic manner of categorizing, gathering, and evaluating information concerning the relevant political, military, economic, and technical factors facilitates monitoring the proliferation status of Nth countries.

B. Objective

The purpose of this study was to conduct a net assessment of the incentives vs disincentives to acquire a nuclear weapons capability as perceived by Iran. The report is also a "case study", in that it is an illustrative application of a methodology developed for DIA to monitor a country's proliferation status.

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## C. Organization of Report

Chapter I summarizes the methodology. Chapter III presents a "proliferation overview" of Iran. The net assessment is presented in three chapters: IV. Evaluation of Technical Capability; V. Evaluation of Motivational Trends; and, VI. Net Assessment Conclusions. Chapter VII concludes the report with the identification of additional intelligence needs in light of the Iranian assessment.

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II (U) METHODOLOGY (U)

A. General

The methodology developed for monitoring the proliferation status of an Nth country and conducting a net assessment of the interaction of incentives vs. disincentives for acquiring a nuclear capability, is discussed in "Monitoring Nuclear Proliferation," SRI, SSC-TN-4802-1 (SECRET). This chapter summarizes the methodology.

The methodology consists of two broad phases. The first requires collection and categorization of specified information. The second involves evaluation of that information. The two phases are not mutually exclusive, but are distinguished on the basis of their primary orientation. Some evaluation occurs concurrently with the collection of information and additional information is obtained during the evaluation phase. The phases are also cyclic, in that the intelligence needs identified at the end of the net assessment provide the basis for gathering additional information to fill data gaps or resolve ambiguities. Figure II-1 summarizes the major elements of the methodology.

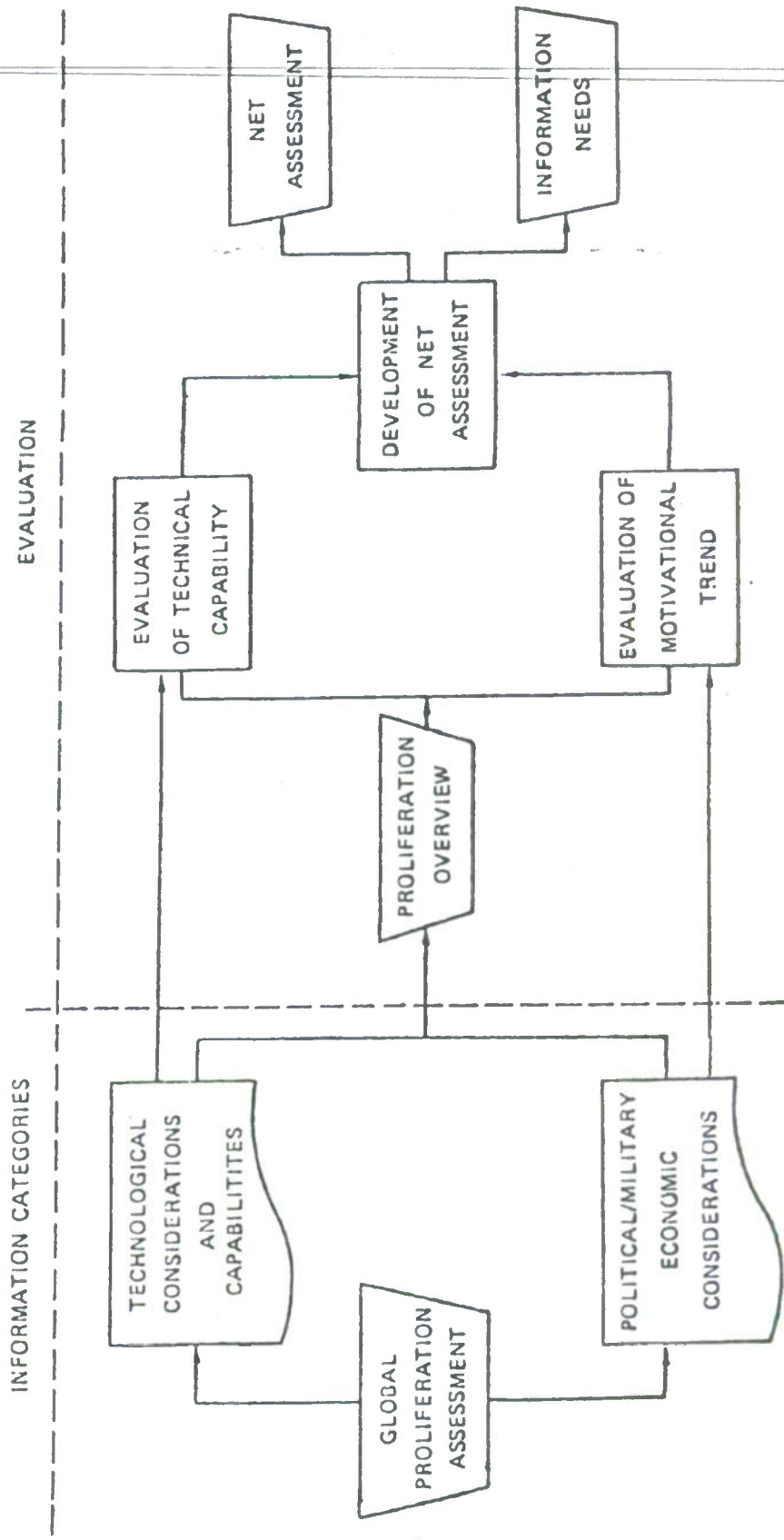
B. Information Needs and Data Structuring

The objective of formulating information categories is to establish a functional filing system to organize data so that it can readily be factored and integrated in the evaluation process. The major information categories were derived from a functional perspective of proliferation phenomena. The technical information categories are keyed to basic requirements for establishing a nuclear weapons program and are listed in Table II-1a.

The political, military and economic categories are based upon factors essential to determining the motivational trend of a country toward or away from nuclear proliferation. These are listed in Table II-1b.

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FIGURE II-1  
METHODOLOGY FOR EXAMINATION OF Nth COUNTRY'S PROLIFERATION STATUS



II-2

TABLE II-1a

TECHNICAL INFORMATION CATEGORIES

1. Scientific and Technology Base
2. National Nuclear Industry
3. Fissile Materials
4. Weapons Design, Development and Fabrication
5. Weapons Production
6. Delivery Systems

TABLE II-1b

POLITICAL/MILITARY/ECONOMIC CONSIDERATIONS:  
MAJOR INFORMATION CATEGORIES

1. Threat
2. Perception of the Reliability of Security Guarantees
3. Perceived Political Utility of Nuclear Weapons
4. Perceived Military Utility of Nuclear Weapons
5. Position on Nuclear Arms Control Measures
6. Attitudes Toward Possible Superpower and Other International Reactions
7. Domestic Political Factors
8. Economic Factors

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The foregoing major or what is referred to in the monitoring systems as level I information categories are too broad or general to focus upon specific data requirements so subcategories are utilized. The concept of levels is developed from the perspective of what information would assist the analysis (the scope) and what specific data (the amount of detail) is involved in fulfilling the broader information requirements. The desire for specific information is tempered by the realization that the analyst would probably like to have more information than he can get. However, need and relevancy -- not anticipation of the difficulty of obtaining the information -- is the primary consideration in the initial formulations of data requirements.

The delineation of specific data requirements is accomplished by asking specific questions. Using interrogations in this manner serves as an alternative to developing exhaustive lists.

An example of the subcategories which have been developed through level 3 for the technical information categories and an example of specific data requirements in the interrogatory format is provided in Table II-2. An example of the nontechnical information subcategories is given in Table II-3.

C. Country Study: Part I -- Proliferation Overview

As previously indicated, the country proliferation study which is a product of this methodology consists of two parts, a proliferation overview and a net assessment. The information categories relevant to monitoring proliferation as developed for DIA are comprehensive and lengthy. To facilitate gathering and focusing upon the most pertinent data for a specific Nth country, conducting a preliminary study or proliferation overview is needed. Thus, the primary purpose of the proliferation overview is to establish the specific framework for conducting the proliferation assessment. It provides a bridge between the general phenomena of proliferation and those considerations that are especially relevant to a specific Nth country.

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## TABLE II-2

### DATA REQUIREMENTS

LEVEL 1 CATEGORY: Science and Technology Base

LEVEL 2 SUBCATEGORY: 1.1 International Cooperation in Nuclear  
and Power Research

LEVEL 3 SUBCATEGORY: 1.1.5 Scientific Training Exchanges

#### DATA REQUIREMENTS: (Partial Listing)

- What nations are involved? What scientific disciplines are involved, and what is the direction of technology flow?
- What type of program has been set up? What is the scope and duration, and are objectives and thruputs being met?
- What is the expertise of the foreign faculty? Are there special faculty members and facilities?
- Is a cadre being formed and in what areas? Where do students come from and what is their distinction?
- Is there evidence of elite linkages and training?

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TABLE II-3

DATA REQUIREMENTS

LEVEL 1 CATEGORY: 2. Security Guarantees

LEVEL 2 SUBCATEGORY: 2.3 Domestic Attitudes Toward  
Security Guarantees

DATA REQUIREMENTS: - (Partial Listing)

- What are the attitudes toward such guarantees held by various elites, most notably the military and scientific elites?
- What is the view of the legal opposition?
- What are the positions of the various media (government-controlled and free)?

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D. Country Study: Part II-A -- Evaluation of Technical Capabilities

The evaluation of the technical capability, which is Part IIa of the country proliferation study, is shown schematically in Figure II-2; it is based upon data from the technical information files organized by the major categories given in Table II-1a, and the findings of the proliferation overview. The major elements of the technical evaluation are: 1) projections of the nuclear industry; 2) the identification of possible paths to proliferation, and; 3) projections of weapons programs.

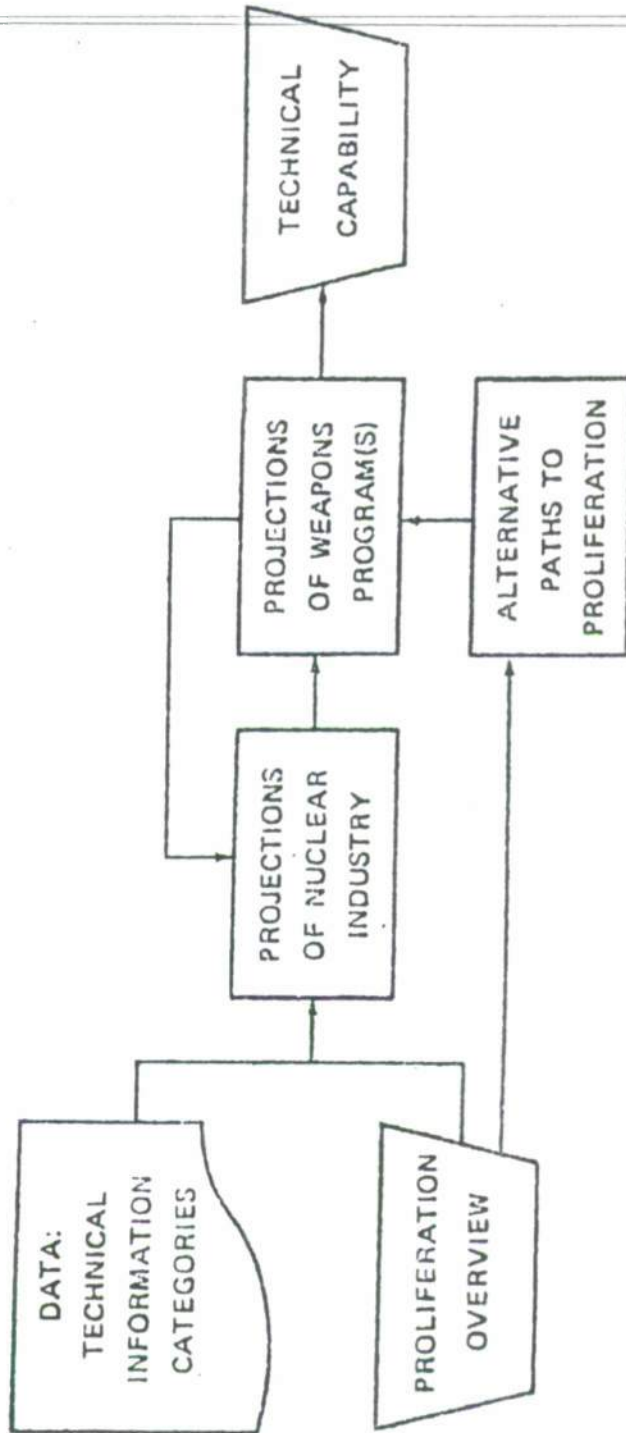
What one would like to obtain through examining and projecting the nuclear power industry of an Nth country are insights into the questions: 1) What technical capabilities to acquire a nuclear weapons capability are attained through this industry? and 2) Does the development of this industry appear to be designed to support proliferation?

On the basis of considerations pertaining to the country's nuclear energy program, time, and resource allocation, four alternative paths or modes of acquiring nuclear weapons have been postulated:

- Hedge Option Path -- The Hedge Option Path is possibly the most popular path for projecting the clandestine acquisition of a nuclear weapons capability. It is based on the fact that most of the essential elements of a nuclear weapons program can be acquired either through, or in conjunction with, a nuclear power program.
- Minimal Time Path -- The distinguishing characteristic of this mode is the expediency attached to the program. Expediency associated with the Minimal Time Path may be reflected by the adoption of specific time-saving steps.
- Minimal Resource Path -- For countries having a high utility in small, rather than large stockpiles of fission weapons, an attractive path is one based on diversion of fissile material from R&D reactors or from existing power reactors. In these instances, fabrication would probably be accomplished in laboratory-type industrial facilities.
- Minimal Technical Constraint Path -- In those instances in which technical capabilities are not considered to be a limiting factor

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FIGURE II-2  
EVALUATION OF TECHNICAL CAPABILITY



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to acquiring nuclear weapons, one variant which might be identified is referred to as the ~~Minimal Technical Constraint Path~~. Under this mode, political, military and economic factors and considerations will be the prime determinants of the country's decision regarding proliferation.

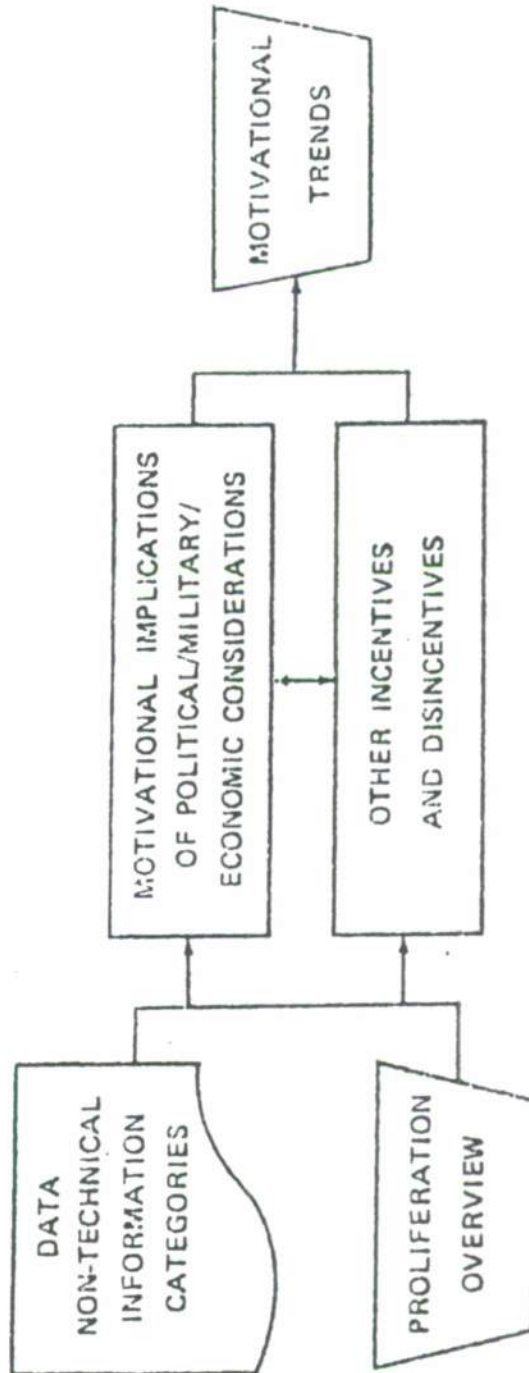
Following the assessment of the national power industry and the selection of alternative technical development paths based on the interaction of the technical analysts and nontechnical analysts regarding objectives for a nuclear weapons program, specific weapons programs are projected. Without established civilian programs, these projections are of a general nature and related to the identification of the possible lead times involved in the deployment of a limited number of weapons. For the technically-advanced countries more detailed flow charts can be constructed and greater attention paid to the relationships between nuclear warheads and alternative delivery systems.

E. Country Study: Part II-B -- Evaluation of Motivational Trend

The evaluation of motivational trends of a country is conducted using the major information categories of the proliferation data base. Given that proliferation is viewed as a dynamic interaction of incentives and disincentives as perceived by a particular country, the political, military and economic considerations are assessed in terms of their incentive implications. The second component of the evaluation of motivational trends involves the identification of "less obvious" incentives and disincentives. This imposes a requirement to probe all aspects in the development of an issue and to avoid, to the extent possible, conclusions based on "nonsurprise free" analyses. It also provides a means to focus on factors and considerations which might cause an alteration in the future of a then-current motivational trend. The major elements of the evaluation of motivational trends are presented in Figure II-3.

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Figure II-3  
EVALUATION OF MOTIVATIONAL TRENDS



## F. Country Study: Part II-C -- Development of the Net Assessment

Developing the net assessment involves the integration of the technical and nontechnical analyses and evaluations. It seeks to determine an Nth country's overall status concerning acquiring a nuclear weapons capability from both motivational and technical perspectives. An analysis is made of pronouncements and declaratory positions as compared with the apparent operative policy, such as the type and quantities of nuclear facilities that have been contracted for or acquired, whether the NPT has been signed and ratified, and the changing perception of the NPT and other arms control measures by the country's elites.

In view of the dynamic nature of the proliferation phenomenon the following time-frames are defined for use:

| <u>Time Period</u> | <u>Years</u> |
|--------------------|--------------|
| Current Status     | Now          |
| Near-Term          | 3-5          |
| Mid-Term           | 5-10         |
| Long-Term          | 10-20        |

The following analytical tasks are performed in conducting the net assessment:

- Integrate the technical and nontechnical factors to portray the trend in incentives vs. disincentives within the evolving framework of changes in technical capability.
- Identify major uncertainties in the analysis. These are key factors that bear on the validity of the major conclusions presented. They may be a particular interpretation of a technical matter or a data gap.
- Identify near-term critical issues. These are the key factors if the country follows the path set forth as likely in the evolution through the near- and mid-term to the long-term.

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Since an Nth country's position on proliferation is considered to be dynamic, the proposed methodology makes provisions for possible shifts in that position. The technical and nontechnical analyses are reviewed to identify the factors and circumstances that might make fundamental changes in the nature of the interaction of incentives and disincentives. The analyst is thus provided an opportunity to explore and make accommodations for possible shifts in the current assessment.

G. Country Study: Part II-D -- Identification of Additional Intelligence Needs

Gaps or ambiguities in data or other kinds of problems will probably become known during the course of developing the evaluation of the technical capability, the evaluation of the motivational trend, and the net assessment. Some of the needed additional information can be obtained while the country proliferation study is in progress. In instances where the information is not readily obtainable through the open literature or intelligence sources, it will be necessary to generate specific intelligence requirements. Those specific intelligence requirements should be keyed to the technical political, military and economic information categories and data requirements developed to monitor proliferation. This procedure ensures feedback and reinforces the analysts need to systematically organize data pertaining to a country's proliferation status.

H. Coordination of Technical/Nontechnical Factors During Evaluation

The consideration and evaluation of political, military, and economic factors as well as technical factors are essential for accurately monitoring the status and trend of an Nth country concerning proliferation. In addition to considering those factors within the nontechnical and technical areas it is also necessary to consider the interrelationships between these two areas. Accordingly, under the proposed methodology integration of interdisciplinary factors occurs during the development of the proliferation over-

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view, via coordination during the evaluation of the technical capability and motivational trends and in the development of the net assessment.

During the evaluations of the technical capability and motivational trends coordination and interdisciplinary consideration of technical and nontechnical factors is accomplished by the technical and nontechnical analysts performing the following tasks on a joint basis:

- Analyze the consistency of national objectives with energy program development objectives.
- Analyze the interaction of international political-economic factors with the national nuclear power program with special emphasis on identifying trade-offs and vulnerabilities.
- Analyze the interaction of domestic political-economic factors with the national nuclear power program.
- Examine the implication of military strategy and force requirements for possible nuclear warhead programs.
- Explore the alternative paths to proliferation to be assessed in the study on the basis of preliminary technical and non-technical considerations.

I. Report Format

To facilitate comparability between country studies, standard formats have been developed for every major section of the study. The Iranian Net Assessment has been prepared using those formats.

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III (U) COUNTRY OVERVIEW (U)

A. Purpose of the Overview

The purpose of this phase of the analysis is to establish a framework for conducting the proliferation assessment. Since it is an assumption of the monitoring method that there is no generic Nth country, it is important to establish a bridge between the global phenomenon of nuclear proliferation and the country specific considerations that make Iran a unique subject of study. The overview is also a means whereby technical and non-technical evaluations can be focused at the onset in considering prospects for Iranian proliferation.

B. Organization

The overview introduces some country specific factors bearing upon an Iranian decision to exercise the nuclear option. Non-technical factors are: (1) the general character of the society, which indicates the general availability of critical skills; (2) internal political dynamics, which identifies the principal sources of political power; (3) political decision making, which indicates how political choices are generally made; (4) the strategic setting, which is a capsule summary of the country's overall security position, and; (5) the economy, which suggests the country's current level of development and probably rate of growth.

Technical factors include: (1) national power and energy objectives; (2) the current status of the nuclear industry; (3) an assessment of the country's scientific and technical base, and; (4) the extent of the country's cooperative ventures with other states.

The overview concludes with a discussion of special considerations relating to proliferation in the Iranian context and the identification of

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key implications for conducting an assessment of the likelihood of Iranian proliferation.

Since this report represents an illustrative application of the monitoring method to a selected country, there is a brief italicized section following the conclusion which identifies any special problems encountered in preparing such an overview.

C. Character of the Society

Iran is a country of about 3/4 million, nearly two-thirds of whom belong to the dominant Persian ethnic group. The country is undergoing vast social change due to the rapid infusion of oil revenues and a full-scale national modernization effort. The essentially rural and feudally organized society of the 1950s is breaking down. About 45 percent of the Iranian population is now urban, and a migration from the countryside to the cities of the north and east continues unabated, despite government efforts to stabilize the rural population.

A low level of literacy and a shortage of critical skills are two obstacles to rapid industrialization. The 1966 census showed some 70 percent of the population to be illiterate, but an expanded program of rural education may have reduced this number to 55 percent. Despite the modernizing and secularizing influences attendant to the rise of a money economy, religion remains a powerful influence in Iran. Over 95 percent of the population is Muslim (about 90 percent belonging to the Shia sect of Islam).

A 1972 International Labor Organization report estimated that some 10 percent of the population accounted for 40 percent of household expenditures, while the lowest 30 percent of the population spends only 8 percent of the total. Much of this disparity reflects a gap between rural and urban living standards, yet it also helps to explain the government's recent concern about the great concentrations of wealth being amassed by a few industrial and trading families. The governments seeks to accelerate the entry of rural

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dwellers into the modern income stream and thus provide a mass market for the products of domestic industry.

D. Internal Political Dynamics

Although nominally limited by the constitution of 1906 and later amendments, the Shah is in fact an absolute monarch who is the principal architect of public policy. The major props of the monarch are a state service bureaucracy that is judged to be extremely capable at the upper levels, a powerful military establishment, and the Savab, a formidable state security and intelligence network.

The Iranian parliament exercises no independent political power, and the press carefully reflects official views. A single mobilization party (National Resurgence) was created in 1975. Similar to other single parties of the Middle East and North Africa, it is designed to: (1) serve as a two way channel of communication between the government and the people, and; (2) instill a limited sense of public participation in the process of national development.

There is little organized political opposition. The religious leadership is frequently critical of the country's growing secularization. Some students (many of whom are being educated for non-existent jobs) chafe against authoritarian features of the Iranian system and occasionally demonstrate. The underground is small, and its terrorist attacks on resident Americans and Iranian officials are intended more as symbols of continuing protest than as serious attempts to overthrow the Shah.

E. Political Decision Making

Political decision making is highly centralized, and the Shah himself exercises close personal control over the major lines of foreign and domestic policy. The country's most powerful interest groups, the state bureaucracy, the military, and the secret police are closely aligned with the monarch.

In this respect Iran differs from other single party states in that

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there are rarely tensions among competing bureaucratic interests. As an absolute monarch, the Shah exercises more political power than do the leading figures in various Arab socialist regimes or the kings of Jordan, Morocco, and Saudi Arabia.

F. Strategic Setting

Iran shares a common border with the Soviet Union, and has long been a so-called "forward defense" country within the U.S. security system. Relations have been normalized between Tehran and Moscow, but the Shah entertains no illusions as to the fundamental Soviet attitude toward his regime. Iran looks to the United States to deter any threat of direct Soviet aggression, and is presently expanding and modernizing its own armed forces to maintain security in the Persian Gulf and stabilize the adjacent Middle Eastern and South Asian regions.

Within the Gulf, Iran has negotiated a detente with its longtime regional rival, Baathist Iraq. The Shah is determined to maintain security in the Gulf through which so much of the world's oil flows, and has an interest in preserving traditional rulers along the Gulf's Arabian littoral. Iran continues to supply Israel with oil, but out of deference to its Arab OPEC partners, it also supports U.N. Resolution 242, which calls for Israeli withdrawal from occupied Arab territories and a resolution of Palestinian grievances. Throughout the Middle East, Iran is steadily improving its ties to moderate and conservative Arab regimes.

Iran foresees a larger security role for itself in the northwest quadrant of the Indian Ocean in the decade ahead, and--at the present writing--is attempting to stabilize the Indian Ocean's western approaches, particularly at the mouth of the Red Sea.

Tehran also seeks to support Pakistan against the external threat of Soviet and Indian pressure, and counter the internal threat posed to both Iran and Pakistan by Soviet support for Baluchi dissidents. There are about 1.4 million Baluchis on both sides of the Pakistani-Iranian border, who represent a potential separatist threat to both countries.

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G. The Economy

The Iranian economy stands halfway toward economic development. It boasts a modern nationally-controlled petroleum company and the beginnings of import-replacing industrial structure. For the decade ahead, the country will continue to depend on petroleum and gas exports, and the pace of development will be tied to worldwide demand for oil.

The rapid infusion of oil revenues (\$20 billion in 1974 alone) has caused problems as well as offering abundant promise. Bottlenecks developed at the Gulf ports, which were simply not adequate to handle the stream of imports. Inflation climbed to an estimated 30 percent rate in 1975, as wages skyrocketed along with the cost of imports. On top of all this, economic recovery was slowed in the West, and this caused an unanticipated slump in Iranian oil sales, which necessitated heavy borrowing in international markets. In recent months, Iran has negotiated several barter arrangements by which aircraft and other military equipment are to be purchased directly for oil. In this way, Tehran hopes to reduce the outflow of foreign exchange and avoid additional borrowing.

In spite of these difficulties, the national leadership remains totally committed to accelerated industrialization. Already Iran is ranked (along with Brazil, Mexico, and others) among those in the takeoff stage of development. Its Gross Domestic Product, estimated at \$48 billion in 1974-75, is the largest of all OPEC members and--unlike its Arab neighbors--it has a domestic market with enormous growth potential.

H. Power and Energy

A key element to Iran's future is energy. As a petroleum supplier to the world, particularly to the industrialized nations, Iran is accumulating the capital required for domestic expansion and social programs and for investments abroad which will enhance the country's international economic leverage. Known domestic energy resources include an excess of oil and gas and a modest supply of coal and hydroelectric power.

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An energy policy has been articulated at the highest level through the ~~Shah and the Parliament. It calls for a broad-based national commitment to~~ using the different sources of energy in a way which exploits each efficiently and conserves known reserves. The current Fifth Plan (1973-1978) calls for development of each of the fuels. Focusing on electrical power, nearly \$4.5 billion has been allocated for capital investment in this industry alone, for it is recognized that electrical power is a major precondition to industrial growth and hence the realization of national goals.

The basic strategy is to expand the power generation and distribution capability initially with fossil fuels. When possible, (considering a national capability to fund and technically support the growth) the transition to nuclear power systems is planned. While each fuel will have a share of the power generation market, the nuclear share is projected to grow so that by 1992 over half of the base load electrical generation will be nuclear.

Table III-1

## SHARE OF BASE LOAD GENERATION BY MINISTRY OF ENERGY<sup>1</sup>

|                        | Year  |       |       |       |        |        |
|------------------------|-------|-------|-------|-------|--------|--------|
|                        | 1974  | 1977  | 1982  | 1987  | 1992   | 1997   |
| Nuclear                | 0%    | 0%    | 24%   | 46%   | 59%    | 64%    |
| Fossil Steam Oil & Gas | 100   | 100   | 75    | 48    | 37     | 34     |
| Fossil Steam Coal      | ---   | ---   | 1     | 6     | 4      | 2      |
| Gross Generation (GWH) |       |       |       |       |        |        |
| Base Load              | 6540  | 9890  | 40800 | 75400 | 127000 | 197000 |
| Total                  | 11200 | 20200 | 50900 | 95500 | 159000 | 254000 |

<sup>1</sup> Fifth Plan Base Case

Source: SRI and Iranian Ministry of Energy

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## I. Status of Nuclear Industry

The current Atomic Energy Organization was created in 1974 as an autonomous public institution with the tasks of constructing nuclear power plants and water desalination facilities, producing raw materials for the nuclear industry, and coordinating and supervising all nuclear energy related affairs. Predecessor organizations have not had this broad a charter and appear to have been oriented toward the academic and research side of the atoms for peace program.

The present organization places management of the nuclear energy program in a centralized structure reporting to the national government at the cabinet level. National policy and plans relating to nuclear science and technology, in turn, are formulated at a cabinet level Atomic Energy Council and can flow directly to the Atomic Energy Organization.

A major effort has been undertaken with the Fifth Plan to develop a nuclear power industry, but it requires outside managerial and scientific support. This support takes the form of "turn key" projects contracted with nuclear export countries. Current appraisals of domestic industry suggest that in general Iran is dependent on imported expertise. While domestic industrial output is increasing, emphasis remains on increasing basic industry and to a lesser extent consumer oriented industry. There is no existing "high technology" industry and domestic nuclear industry has not developed.

French and German concerns are under contract to furnish the Iranian Ministry of Energy with four light water reactors, a total of 42,000 MW(e), between 1980 and 1983. The Ministry has also conducted reconnaissance for domestic uranium fuels, purchased (on a turn key basis) a nuclear power research center from France, generated a number of exchange agreements with other nations, (notably Great Britain and the United States) and investigated purchase of fuel cycle facilities. These steps, notwithstanding, the Iranian nuclear industry is in a very early stage of development and is highly dependent on foreign support.

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## J. Scientific and Technical Base

If measured in terms of scientific or technical accomplishments, Iran does not exhibit a strong scientific and technical base. There are no significant programs in the nuclear disciplines presently underway. Technical lead for the commercial venture rests with the foreign contractor. The single 1000 KW Triga MK II research reactor at the University of Tehran was purchased from the United States and is operated at the Institute of Nuclear Science and Technology.

Iranian institutions of higher learning have historically tended to focus on non-technical fields, with students typically going abroad to pursue technical studies. While steps have been taken to reverse this practice through the establishment of training centers in Iran and by arrangements with universities and government laboratories abroad, the problem will continue to exist and output will fail to keep up with the increased demand for shortages of engineers and scientific personnel. Critical industrial skills will continue to be scarce for many years. This problem is aggravated by inadequate secondary and technical schools. Present plans give priority to a reduction of the national illiteracy rate and the improvement of technical training.

All is not negative. Training programs, programs of study abroad, and other methods are producing positive results. Managerial capacity appears to be growing. Numbers of middle and upper management levels in major industries, e.g., oil refining or Air Iran, are Iranian. The depth of qualified personnel however is thin and will remain so as industrial requirements continue to grow. This observation does not rule out the possibility that one might assemble a scientific and technical elite group at any given time if the circumstances required. It does, however, imply that assembly of such a group might be observable and would impose personnel shortages in other important economic sectors.

## K. International Cooperation

Iran is a member of IAEA and is signatory to the NPT.

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Scientific interchanges have been established with the IAEA, and several university exchanges have been arranged for students to work in the United States and Great Britain. Harwell provides nuclear consultants to the Tehran nuclear research center, and is training a number of Iranian graduate students in England. France has agreed to set up and have operating a nuclear research center in Iran by 1980.

Agreements of a commercial nature have involved contracts or letters of intent for four nuclear power reactors with French and German firms. Although no letters of intent have been signed, negotiations with U.S. suppliers have been conducted for upwards of 8000 MW(e) of reactors.

Australia is likely to be the major supplier of future uranium needs. Agreements appear to have been concluded for Australia to supply 1000 to 1500 tons a year starting in 1980 to meet natural uranium input requirements for the 23,000 MW(e) requirement of the Fifth Plan (base case). South Africa can also be considered a potential supplier of uranium. Iran has purchased a 10 percent interest in EURODIF and a 25 percent interest in CORDIF.

L. Special Considerations Relating to Proliferation

In monitoring Iran's status as a nuclear threshold power, one must keep in mind that Tehran's nuclear power program is in its earliest stages. The government seeks to create a scientific and technical base while simultaneously undertaking an ambitious power plant installation effort. The program is almost totally dependent upon outside assistance for resource development and complete power reactor systems.

The authoritarian character of the Iranian political system, the centralization of decision making, and the Shah's forthrightness when discussing the nuclear option tend to simplify the task of monitoring a change in national nuclear policy. Unlike other countries being monitored, there are no semi-autonomous interest groups contending for political power; the government is the only major domestic force to consider. It drafts the national development

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plans with a minimum of parliamentary debate, assigns priorities, and allocates resources. Nuclear power must compete for scarce qualified personnel and funds with other major development programs (infrastructure, heavy and intermediate industry, agriculture, defense, education, and social welfare). A sudden shift of scientific and engineering talent to nuclear power development would probably be easy to detect given the large number of resident foreign experts in the country.

The strategic setting--the volatile Middle East in the vortex of the East-West rivalry--is such that military threats could develop rapidly (or be perceived to develop rapidly by national leadership). Increased tensions in any of the three areas of Iranian national interests--the Persian Gulf, the conflict zone of the Middle East, and the Indian Ocean--could cause an overnight reassessment of defense needs, and might lead to a decision to exercise the nuclear option.

One final special consideration relevant to monitoring change in Iranian nuclear policy is the special advantage Tehran enjoys in its relations with high-technology countries. As a major supplier of crude petroleum, a major importer of industrial goods, and a major investor in leading market economics, Iran has significant leverage to exert over several exporters of nuclear reactors and technology; the leverage could easily be employed in a crisis, particularly in view of the weakness of current IAEA nuclear safeguards.

The foregoing discussion suggests certain country-specific implications for assessing Iranian proliferation potential:

- Critical attention should be focused on official government pronouncements relating to changes in the strategic setting, the priority accorded the nuclear power industry, and new nuclear cooperation arrangements. Emphasis on government

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~~initiatives~~ is warranted because of the authoritarian structure and centralized decision making that are characteristic of the Iranian political system.

- For the same reasons, the potential influence of interest groups or political factions is less in Iran than in many nuclear threshold countries.
- The potential for "symbiotic nuclear relationships" involving Iran and technologically advanced countries in joint nuclear development arrangements is very great. This is because: (1) the Iranian nuclear power program is not advanced, and (2) Tehran exerts considerable economic leverage over its high technology trading partners and other regional powers which are farther along the path of nuclear development.

COMMENTARY.

*No particular difficulties were encountered in preparing the country overview of Iran. The country is in the limelight of Middle Eastern and international politics; its foreign policy goals and nuclear power objectives are well known. The nature of its internal political dynamics and political decision making process in comparison with many other countries is unambiguous. The nuclear power industry is in its infancy, thus the dependence on external assistance to achieve mid-term electric power objectives are clearly evident.*

*The major subdivisions of the overview, strategic setting, the economy, energy and power, etc, appear from the experience of the Iranian analysis to be the appropriate ones to establish the framework for examining the motivational trends and assessing technical capability. A tendency was noted in the first few drafts to include material in the overview, however, that properly belongs in the evaluation of motivation and technical considerations. One of the ways in which this problem can*

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IV. ~~(S)~~ EVALUATION OF TECHNICAL CAPABILITY (U)

A. Purpose

It was established in the overview that Iran has an ambitious program for development of a domestic nuclear industry by relying upon outside assistance from nuclear industry nations. In the evaluation of the technical capability of Iran the analysis will investigate the factors which characterize the development of the national nuclear power industry and specifically investigate the possibility that development of this industry may be designed to support proliferation. The technical conditions relating to such a course of action will also be developed.

The ambiguity of nuclear energy with respect to a potential for both power and weapons production requires careful scrutiny. The purpose of this section is to project the growth of nuclear industry and to project a hypothetical weapons program so that the technical capability for each may be understood. Of interest to the investigation are Iranian economic goals and energy needs, strengths and vulnerabilities of the nuclear program, and possible feasible paths of proliferation.

B. Organization

The technical evaluation section is organized into two major parts. In the first, the nuclear industry is projected to a planning horizon of the year 2000. After that, industry's goals and programs are rationalized, and a weapons program is postulated. For Iran, two such possible military programs have been postulated based, in one case, on an orderly growth to the domestic industry to the development of a hedge option for proliferation at some future date. In the other case, it is hypothesized that a military nuclear capability may be required at sometime in the future but that no major commitment of wealth, and technical reserves would be made. This path to

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proliferation is termed the minimum resources path. Capabilities and ~~limitations of each of the postulated programs are developed and tentative~~ conclusions for each are drawn. Coordination with the nontechnical part of the evaluation is maintained and results are integrated during the net assessment.

C. Nuclear Power Program

1. General

Iran is endowed with large reserves of oil and gas as well as a modest potential for hydroelectric and a modest supply of coal. The problem for Iranian planners is one of proper allocation and efficient use rather than a chronic shortage of energy, as is the case of many developing and industrial nations. The issue is clear, although Iran is the world's fourth largest producer (second in OPEC), at the current production rates, Iran's proven oil reserves may not last more than 30 years.<sup>1</sup> At that time, Iran must have adequate alternatives available.

To insure that there is continuity in energy supply for domestic usage into the future, yet to insure maximum benefit from the exploitation of petroleum resources, Iran has a national energy program that includes development of alternate sources of energy to oil and gas. Petroleum is the cornerstone of the energy program outlined in the Fifth Development Plan (1973-1978). Production and refining are to be expanded to meet expanded domestic demand and to maximize value added on export. Substitution of natural gas for middle distillates and conservation of both oil and gas are important to efficient and optimum development. Increased domestic exploration and participation in a broad range of exploration, development and distribution abroad are intended to maintain Iran's share of the energy market in the long run. A pricing policy for petroleum products is structured to maximize the return on exports by pricing commensurate with the cost to

<sup>1</sup> Jahangir Amuzegur, Energy Policies of the World: Iran, (Newark, Delaware: University of Delaware, College of Marine Studies, 1975).

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consumers of alternate sources of energy with allowances for inflation and  
currency devaluation.<sup>1</sup>

The national policy of allocating the different sources of energy to meet efficient and conservative uses suggests that petroleum will ultimately satisfy chemical inputs and special transportation needs, that gas and other nonfossil fuels will be used for space heat and air conditioning and that an electric economy based on natural gas, nuclear, and, to a lesser extent, coal will be the long term steady state condition of the future. The present energy policy, enunciated by the Shah and enacted by the parliament in theory is designed to make Iran self-sufficient and to fulfill future needs of an industrialized Iran.

2. Institutional Arrangements

a. Energy Ministry and Governmental Infrastructure

At the ministerial level, the Minister of Energy has the responsibility for the overall national energy program. Central planning for the production, pricing, and consumption of energy from all sources in Iran is coordinated through this Ministry. Moreover, because of the developing nature of the country the growth of factors of the energy production and distribution system, the training of personnel, and the stimulation of information and exchange and cooperation arrangements in the field of energy with foreign countries and institutions are important functions that fall within the responsibilities of this Ministry.

One of the key operating agencies for the Ministry of Energy is the Atomic Energy Organization (AEO). This organization is an autonomous public installation created by an Act of Parliament in 1974. Its principal objectives are:

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<sup>1</sup> Ibid.

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- Construction of new power plants and water desalination facilities.
- Produce raw materials needed for the nuclear industries.
- Coordinate and supervise all nuclear energy-related affairs.

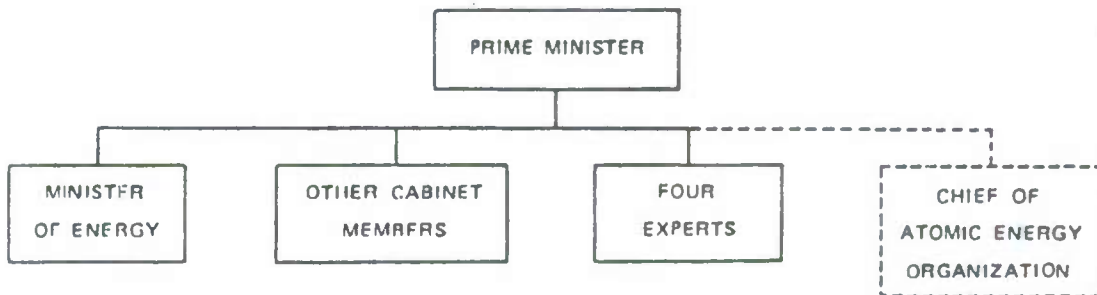
The AEO appears to have an expanded scope from its predecessor, the Iranian Atomic Energy Commission which was created to direct and coordinate nuclear research principally centered on medicine, agriculture and sea water desalination. The AEO is the major operating activity for Iran in the field of nuclear energy, and is expected to expand and develop the domestic level of nuclear science and technology and to investigate and plan for its use in support of national objectives. Typical of many developing nations, early nuclear programmatic emphasis is on resource development, but unlike most developing nations, Iran also has a major program for reactor commissioning.

An Atomic Energy Council (AEC) provides national policies and plans relating to the field. This includes safety and environmental protection as well as international cooperation in the field of atomic energy. As the highest national policy formulating body, its membership includes the Prime Minister and Minister of Energy plus other members of the Cabinet and four selected specialists. Executive policies and oversight of the management of the AEO are vested in the Atomic Energy Committee, of which the Minister of Energy is chairman and the Minister of Economic Affairs and Finance and Minister of State Budget and Plans are members. The Chief of the AEO, who manages the daily operations of the organization, is secretary to each of the foregoing groups and like all other members is appointed by Imperial decree. The relationship of members of these two governmental bodies is shown in Figure 1.<sup>1</sup>

<sup>1</sup> Ibid.

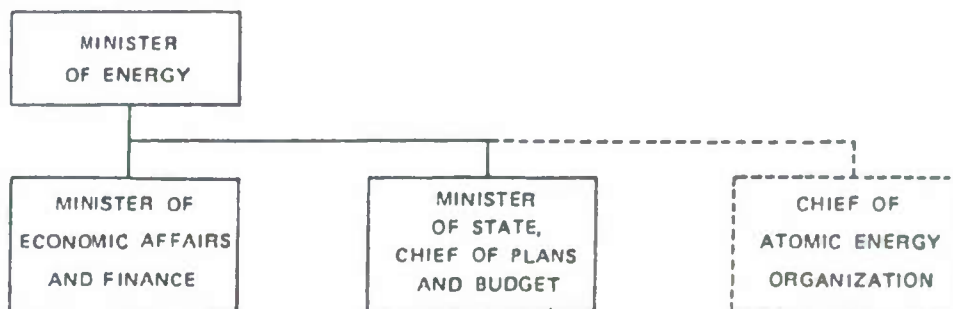
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ATOMIC ENERGY COUNCIL



†SETS NATIONAL POLICIES AND PLANS RELATING TO NUCLEAR SCIENCE AND TECHNOLOGY; APPOINTED BY THE SHAH

ATOMIC ENERGY COMMITTEE †



†MAKES EXECUTIVE POLICY AND SUPERVISES THE MANAGEMENT OF ATOMIC ENERGY ORGANIZATION; APPOINTED BY THE SHAH

FIGURE 1. (U) IRANIAN INSTITUTIONAL ARRANGEMENTS (U)

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From the foregoing we observe that the formulation of policies and plans and their supervision and oversight is done at the Cabinet level by persons responsible to the Prime Minister and the Shah. The important issues relating to the national energy plan, fuel strategies and funding for development can be developed at the highest Cabinet levels and implemented directly within the AEO. The same officials have similar control over the national Iranian Oil Company and over the generation and transmission of electrical power in the public sector.

b. Ownership of the Power Industry

By 1965, the electric generating power segment was largely nationalized to consolidate the private and municipal plants into large scale generating and distribution facilities. The entire public capacity has been brought under a single administration responsible for generation and transmission. Eleven regional electric companies are responsible for retail distribution. The market segment that remains in private hands is becoming comparatively small and is associated primarily with industrial applications. Nuclear power plants will be in the government utility.

3. Demand for Electricity<sup>1</sup>

Historically, in the Fourth Plan (1968-1972), the demand for electrical power increased at an average annual rate of over 18 percent. With the Fifth Plan, growth of demand, as measured by increased consumption, remains at the 18 percent rate peaking in the 1982 projections at 20 percent and thereafter declining to an annual rate of 9 percent to 10 percent by the year 1997 (Table 1).

<sup>1</sup> Information contained in this section is based on proprietary information from the unclassified unpublished report: Fourth Interim Report to the Ministry of Energy, SRI/Yekom Consultants, (Project work performed between 4 May and 4 August 1976 in Tehran.

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TABLE 1

PROJECTIONS OF ELECTRICAL ENERGY FOR IRAN

Demand for Electrical Power (Millions of KWH)

|                                  | Year |       |       |       |       |       |        |        |
|----------------------------------|------|-------|-------|-------|-------|-------|--------|--------|
|                                  | 1970 | 1972  | 1974  | 1977  | 1982  | 1987  | 1992   | 1997   |
| Ministry of Energy (Grid)        | 3472 | 5723  | 9152  | 16790 | 42791 | 79248 | 132348 | 212152 |
| Private and Industrial (Nongrid) | 2501 | 2688  | 2845  | 2492  | 5533  | 5885  | 6635   | 6959   |
| Total                            | 5973 | 8411  | 11997 | 19282 | 48323 | 85133 | 139073 | 219111 |
| Annual Growth Rate               |      | 18.6% | 18.1% | 17.1% | 20.2% | 12.0% | 10.3%  | 9.5%   |
| Doubling Time (Years)            |      | 4.1   | 4.2   | 4.4   | 3.8   | 6.1   | 7.1    | 7.6    |

Source:

Jahangir Amuzegur, Energy Policies of the World: Iran, (Newark, Delaware: University of Delaware, College of Marine Studies, 1975).

Unpublished Report. Fourth Interim Report to the Ministry of Energy, SRI/Yekom Consultants, (Project work performed between 4 May and 4 August 1976 in Tehran.

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Consumption, however, does not tell the entire story because ~~unsatisfied demand for electrical power in Iran exists principally in the~~ nonindustrial sector of the economy. Government pricing policy for electrical power has been to stimulate demand through low prices at retail level. In a sensitivity analysis of electrical demand to economic factors, high <sup>1</sup> economic growth in Iran could drive the 1977 demand for electrical energy up by 35 percent, while a low economic growth could result in a demand less than 60 percent of that projected by the Fifth Plan. High world energy prices, on the other hand, would place pressures on the Iranian economy and result in a demand equivalent to only 85 percent of the planned level.

#### 4. Supply of Electrical Power

##### a. Fuel Shares

Iran is a country with a surplus of inexpensive fossile fuels. Natural gas is a prime candidate fuel that can meet virtually all domestic electrical generation needs as well as space and process heat for the mid term. Petroleum refining in the country can also produce a sizeable quantity of heavy fuel oil for boiler operations, however, as more advanced refining plants are built in Iran, the practice of cracking the hydrocarbons to more marketable products will undoubtedly occur. Domestic fuels also include a potential for coal and hydroelectric but in limited use in certain areas. Natural gas stands out as the principal mid to long term fuel for electric generation.

There are no identified commercial deposits of uranium at present in Iran, although geological surveys suggest that reserves will eventually be discovered. In the short term, therefore, nuclear fuels will have to be imported, however, in the short to mid term, there does not seem to be strong economic reason for developing nuclear fuels as an alternative

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<sup>1</sup> Economic growth projected in the Fifth Plan averages 9.9 percent annual growth over the 23 year period from 1974 through 1997. The high growth rate is 11 percent, the low growth rate is 8.5 percent. Private conversations between James Eysell and William Daugherty.

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to fossil fuels. By the year 2000, nuclear fuel may be a viable alternative, particularly if petroleum resources are drawn down.

b. Installed Capacity

As late as 1940, the total installed capacity in Iran was only approximately 50 MW.<sup>1</sup> The Fourth Plan saw a growth from 1560 MW to 3335 MW with two thirds of this in the government-owned segment controlled by the Ministry of Energy. Table 2 shows the projections of installed generation capacity to the year 1997 for both a base case of the Fifth Plan and an alternative case for moderate nuclear growth. The base case is an ambitious plan which would see over 60 percent of the base load capacity eventually nuclear. This plan is an upward revision to the original Fifth Plan resulting from the 1974 rise in the world price of oil. Since these early plans were made, there has been additional cause for reconsideration. Inflation has acted to partially offset the gains; expansion of the domestic gas reserves and projections of a surplus of natural gas will provide an alternative fuel. There have been a number of other technical and managerial factors which bear on the practical issues associated with the dramatic growth of this segment of the power industry.

A program of moderate nuclear growth, shown in Table 2, will nevertheless provide for a significant nuclear fraction by 1997 with 24 percent of base load capacity. There is a growing realization by foreign observers that a more moderate development of the nuclear power segment will of necessity occur.

c. Electrical Distribution System

Iran is presently taking a number of small isolated systems with generating capacities relatively close to the load centers and by

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<sup>1</sup> Jahangir Amuzegur, op. cit.

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TABLE 2

## INSTALLED GENERATION CAPACITY

MW(e)

|  | Year |      |       |       |       |       |
|--|------|------|-------|-------|-------|-------|
|  | 1974 | 1977 | 1982  | 1987  | 1992  | 1997  |
| Total Capacity                               | 3215 | 6203 | 16114 | 23186 | 36392 | 55134 |
| Baseload Capacity                            | 1587 | 2052 | 11186 | 15486 | 24886 | 37487 |
| Nuclear                                      |      |      |       |       |       |       |
| Base Case                                    |      |      | 3300  | 6600  | 15000 | 24600 |
| Percent Total Capacity/<br>Baseload Capacity |      |      | 30/20 | 43/28 | 60/41 | 66/45 |
| Moderate Growth Case                         |      |      | 3300  | 4200  | 6600  | 9000  |
| Percent Total Capacity/<br>Baseload Capacity |      |      | 30/20 | 27/18 | 17/12 | 24/16 |

Source:

Unpublished Report. Fourth Interim Report to the Ministry of Energy, SRI/Yekom Consultants, (Project work performed between 4 May and 4 August 1976 in Tehran. Proprietary information. Private conversation between James Eysell and William Daugherty.

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amalgamation and expansion integrating a single power system.<sup>1</sup> Such a system will permit use of large generating facilities serving the needs of the entire system; however, plants frequently will be relatively remote from load centers.

Forced by a shortage of coolant water to locate in remote Persian Gulf<sup>2</sup> areas, transmission capital costs and operating power losses will be high. Another source of coolant water might be the Caspian Sea but it is a logistically difficult area in which to construct large nuclear reactors, and moreover, water use is a politically sensitive issue with respect to the USSR.

## 5. Nuclear Power

### a. Power Plants

In 1974, Iran signed letters of intent for four pressurized water reactors, two 1200 MW(e) units from the German firm KWU and two 900 MW(e) from the French firm FRAMATOME.<sup>3</sup> Site selection for the two KWU supplied reactors has been made at Bushihr on the Persian Gulf. The first of these units is programmed for completion in 1980, the second in 1981. The FRAMATOME reactors are programmed for completion in 1982 and 1983. Many of the details of these installations are not known. Construction, however, will be on a turn key basis by the reactor vendor. Iran has also conducted negotiations

<sup>1</sup> Fourth Interim Report, op. cit.

<sup>2</sup> Persian Gulf facilities using sea water avoid the use of scarce river flow saving it for agricultural purposes, however, as an area of high seismic activity, construction costs may be expected to be greater. "Iran Has A Construction Shipping List Worth \$42 Billion", ENR, 26 June 1975, p. 18. This is the principal area of location of natural gas and petroleum reserves.

<sup>3</sup> "Order for Units from European Vendors", Nuclear News, January 1975, p. 56.

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with U.S. firms for procurement of an additional 8000 MW(e),<sup>1</sup> however, no letters of intent have been signed to date. Iranian nuclear power plants ordered to date are shown in Table 3 and are consistent with the projections of base case electrical generation capacity through the year 1982. Known orders total 4200 MW(e). This is consistent with the moderate growth case through the year 1987. The size and type of these reactors are consistent with the plan.

The early stages of the Iranian program prevents any accurate estimate of the eventual progress the nuclear reactor program will have. The Iranian energy program is more a statement of objectives and has not been fully founded on the ability of the country to absorb the technology and to fund the ambitious nuclear program.<sup>2</sup> Few studies have been made to evaluate the real costs of nuclear energy against the locally available alternative fuels. The high cost of nuclear construction and the availability of alternative fuels suggests that a more modest reactor installation program will evolve.

b. Fuel Cycle

Exploration for uranium resources is being conducted. Both broad area surveillance and drilling in selected geological formations is under way.<sup>3</sup> Iran is placing emphasis that this reconnaissance should lead to the identification of an adequate domestic supply of uranium. Notwithstanding their efforts, forward contracts based on needs for fuel to satisfy the base case projections for 24,600 MW(e) of installed capacity in 1997

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<sup>1</sup> "News Wires Jumps Gun on Iranian Reactor Deal", Nuclear News, Vol. 18, No. 5, April 1975, p. 78.

<sup>2</sup> "Nuclear Energy", The Financial Times, June 21, 1976, p. 21.

<sup>3</sup> Fifth Interim Report to the Ministry of Energy, SRI/Yekom Consultants, Proprietary Information.

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TABLE 3

SCHEDULED NUCLEAR POWER INSTALLATIONS

| <u>Number</u> | <u>Name</u> | <u>Completion</u> | <u>MW(e)/MW(T)</u> | <u>Type</u> | <u>Vendor</u>    |
|---------------|-------------|-------------------|--------------------|-------------|------------------|
| 3341RP        | Iran 1      | 1980              | 1200/3765          | PWR         | Kraft Work Union |
| 4031RP        | Iran 2      | 1981              | 1200/3765          | PWR         | Kraft Work Union |
| 4531RP        | Iran 3      | 1982              | 900/---            | PWR         | FRAMATOME        |
| 4821RP        | Iran 4      | 1983              | 900/---            | PWR         | FRAMATOME        |

Source:

"Power Reactors 1976", Nuclear Engineering International, April 1976.

"Orders for Units from European Vendors", Nuclear News, January 1975, p. 56.

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have been negotiated with Australian firms.<sup>1</sup> The Union of South Africa may also be considered a potential supplier of uranium either in a natural form or possibly as enriched fuel to meet needs of light water reactors.<sup>2</sup> Iran has expressed an interest in financially supporting the development of South Africa's enrichment facilities.

Enriched uranium for LWR requirements can come from other sources. Iran holds 15 percent of the equity of Eurodif, the joint diffusion enrichment plant in Europe. Ten percent of this output is obliged to Iran. Iran has purchased 25 percent of COREDIF, a French enrichment enterprise.<sup>3</sup> While these are oblique references which no longer may be valid because of recent changes in attitude of nuclear exporting nations, they do tend to fortify the notion that Iran desires to eventually have a self-sufficient fuel cycle.

Similarly, it is too early to suggest that a domestic fuel fabrication plant is necessary and will be built. Reactor vendors usually provide the initial fuel load and some specified refueling support. There have, however, been some investigations with German firms to suggest that Iran is interested in fuel fabrication in Germany. In the event domestic reserves are located and developed for commercial purposes, there could be greater interest in this operation. Much the same may be said for reprocessing of fuel elements. Negotiations with France were carried on for the purchase of a reprocessing plant. Recent policy changes suggest that France, as well as other nations, is reexamining the export policy for this type of technology.

Projections of demand for fuel cycle services have been made on both the base case and the modified nuclear growth case, as shown in Table 4.

<sup>1</sup> "Negotiations with Australia on Uranium", Nuclear Engineering International, Vol. 21, No. 248, September 1976, p. 12.

<sup>2</sup> "Confirm Negotiations for Uranium Supply", Nuclear News, December 1975, p. 61.

<sup>3</sup> Fifth Interim Report, op. cit.

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TABLE 4

## REFUELING REQUIREMENTS AND PLUTONIUM PRODUCTION IN SELECTED YEARS <sup>1</sup>

|   | <u>1982</u> | <u>1987</u> | <u>1992</u> | <u>1997</u> |
|---|-------------|-------------|-------------|-------------|
| Base Case Gross Generation (GWH)<br>from nuclear <sup>2</sup> | 9,987       | 34,689      | 74,634      | 125,092     |
| Fuel (te) <sup>3</sup>  | 41          | 141         | 303         | 508         |
| Pu Content <sup>4</sup> (Kgn)                                 | 270         | 940         | 2,022       | 3,390       |
| <hr/>   |             |             |             |             |
| Moderate nuclear growth case (GWH)                            | 9,987       | 22,075      | 34,689      | 47,304      |
| Fuel (te)   | 41          | 90          | 141         | 192         |
| Pu content (Kgm)<br>in spent fuel                             | 270         | 598         | 940         | 1,282       |

<sup>1</sup> Contains proprietary information obtained from Fourth and Fifth Interim Reports.

<sup>2</sup> Assumes all reactors are PWR and perform similar to the KWU facility at Biblis or FRAMATOME facility at Fessheim. Burn up is approximately 31,000 MWD/Te.

<sup>3</sup> At  $4.06 \cdot 10^{-3}$  te/GWH

<sup>4</sup> At  $2.71 \cdot 10^{-2}$  Kg Pu/GWH

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Requirements are shown for fabricated fuel for refueling of light water reactors. In addition, each reactor requires an initial fuel inventory of approximately 85 te per 1000 MW(c). An economically acceptable unit size for a fuel fabrication plant would have an annual output of approximately 400 te, although smaller facilities may be justified and built. Without a domestic uranium source and enriching in country, fuel fabrication in Iran would offer very little savings in cost of electricity or in international balance of payments. If the base case nuclear development plan is followed, there could be some justification for domestic fuel fabrication in the 1990s. Similarly, fuel reprocessing in Iran will offer no economies of scale until the turn of the century, or unless there is a marked increase in the value of uranium fuel, or use of metal oxide fuels can otherwise demonstrate a clear economic advance. It appears that Iran would do well to participate in joint fuel cycle service arrangements.

Figure 2 summarizes the state of the fuel cycle in Iran.

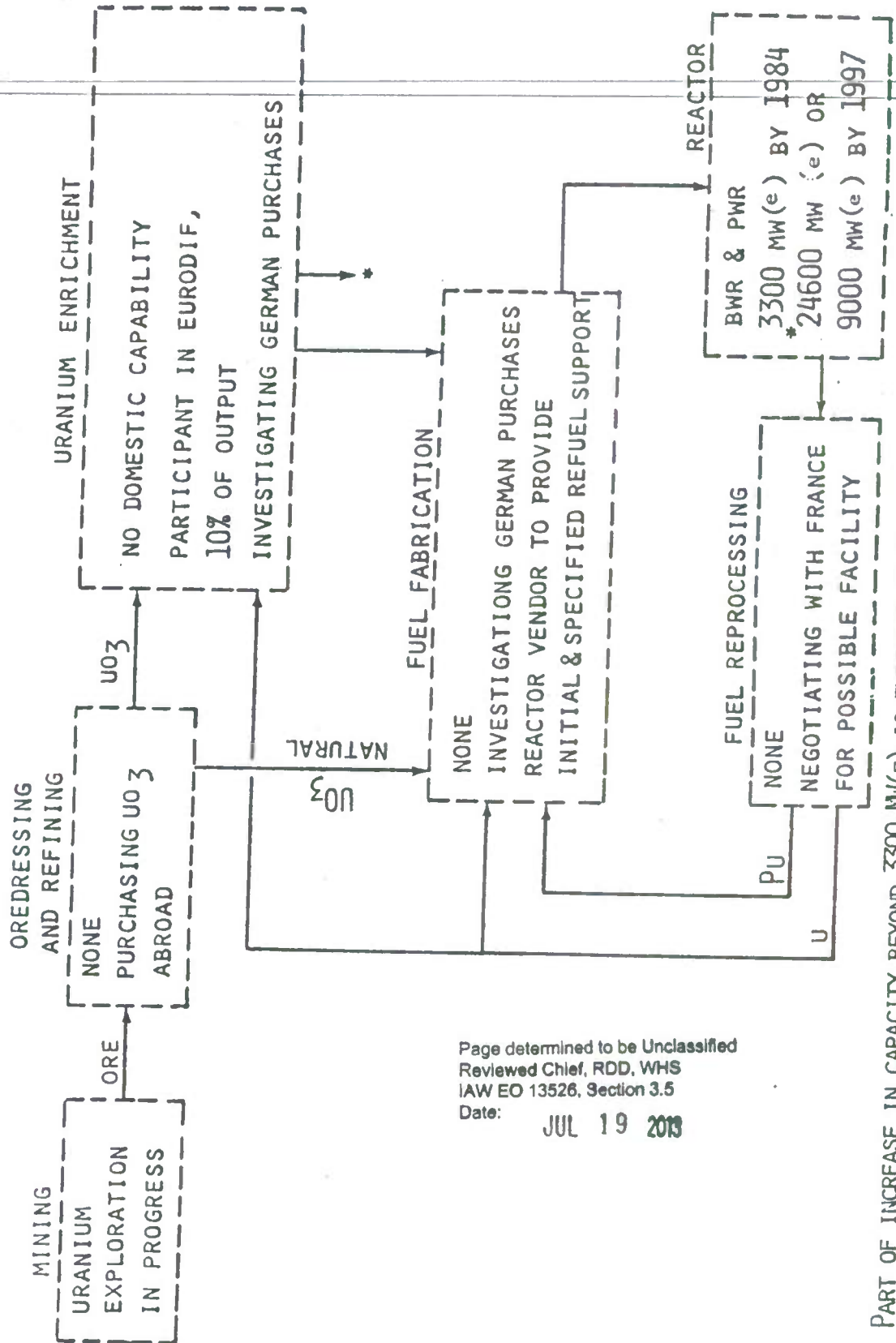
### C. Management and Industrial Trends

Iran has a central planning and budgeting activity at the national government level and a nationalized electric power generation and transmission firm. At this time, the country is relying extensively upon foreign support in development of nuclear power resources. Reactors are being purchased on a turn key basis and extensive reliance on foreign nuclear exporting countries is evident. Iran's power industry is increasing its scientific and technology base through the use of domestic and overseas training programs. Cooperation has been extended by several countries in order to train personnel. A single low power research reactor is in the country at this time; however, the nuclear research center, being organized with French assistance, may include a larger research reactor. There have been indications that a large high flux material test reactor has been considered in the past for sale to Iran.<sup>1</sup>

<sup>1</sup> Nuclear News, July 1976, p. 59.

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FIGURE 2  
(U) SUMMARY OF IRANIAN NUCLEAR POWER PROGRAM IN RELATION TO THE FUEL CYCLE (U)



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\* PART OF INCREASE IN CAPACITY BEYOND 3300 MW(e) IS EXPECTED TO BE IN FORM OF BWRs FROM THE U.S.

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D. ~~Capability~~ Capability of Nuclear Power Program to Support Proliferation<sup>1</sup> (U)

(U) Iran's energy program in many respects is more a statement of philosophy than real accomplishments. The nuclear power program is largely in its infancy, having evolved to its present form and scope as recently as 1974. It is possible, however, to see plans for a nuclear power program that will have at least four large power plants installed early in the 1980s and at least 9,000 MW(e) by the end of the century. A number of factors suggest that the original planned capacity of 24,600 MW(e) installed by 1997 is too ambitious. A general consensus is that the present four reactors and other expansions to the electrical generation and distribution systems are all that Iran can manage for the next five years. Events accompanying the nuclear program include an expansion of the atomic energy organization as personnel become available and scope of activities expands.

(U) Iran's desire for self-sufficiency, particularly in its nuclear fuel cycle, at this time may not be realizable. It is clear that high level consideration has been given to insure that the nuclear power program shall go forward supported by adequate planning. It is not clear that Iran's heavy nuclear commitment is economically sound and that Iran can afford the capital investment or has the technical personnel to support it. It is not clear that nuclear export countries will deliver the resources needed for a self-sufficient cycle. Moreover, it is not clearly in the best interests of European industrial powers that Iran develop a complete nuclear industrial sector. Because a relatively nuclear independent Iran would be less susceptible should the occasion arise to apply pressure to obtain fossil fuels from Iran.

(U) For the near term, many resources will have to be supplied from abroad and nuclear services may be best performed by Iran's industrial trading partners. For the near term, there does not appear to be a compelling requirement for

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<sup>1</sup> (U) Conclusions in this section are classified CONFIDENTIAL although they are drawn from unclassified sources.

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(U)

Iran to develop a self-sufficient fuel cycle; plans for offshore support appear to be adequate.

1. ~~(C)~~ Current Estimate (U)

~~(C)~~ Observations based on actions and events in Iran at the present time indicate that Iran is in a mode of developing human and material resources, a characteristic of an early phase of development of a nuclear program. Additionally, however, Iran is accelerating the growth by contracting with foreign suppliers for power reactors and a research center. It is clear, however, that Iran cannot build today a weapon from assets currently available to its nuclear power program. Furthermore, firm commitments to date do not suggest Iran is following an overt proliferation path.

2. ~~(C)~~ Future Estimates (U)

~~(C)~~ Because of the ambiguous nature of nuclear energy research and nuclear generating facilities and the current early state of its development, many actions taken in Iran at this time could be considered as increasing the potential for developing a weapon. The character of nuclear growth in the mid term, as it will be evidenced by the date and quantity for the next order for reactors, will provide an excellent indication of the scope and timing of the power program. Departure from LWR, for example, to use of HWRs should be viewed with skepticism. Possible discovery and subsequent commercial operation of a domestic uranium mine could set the stage for some efforts to expand fuel cycle operations; prior to that time any efforts beyond a laboratory scale should be carefully examined for its economic rationale. It is entirely possible if the desire for self-sufficiency is attained that Iran's nuclear power program will be able to support future proliferation. However, because of the current infantile state of development, it is difficult to project these events with any certainty.

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E. ~~(S)~~ Proliferation Capabilities and Shortfalls by Alternative Paths<sup>1</sup> (U)

1. ~~(C)~~ Program Objectives (U)

OSD 3.3(b)(2)(G)

~~(C)~~ In developing hypothetical programs of weapons development in Iran, the motivational aspects suggest that the most likely requirements will be for a modest air deliverable strike force that could be used in defensive or retaliatory operations

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It is not clear at what time such a weapon stockpile may be useful to the furtherance of national policies.

DIA 3.3(b)(2)(G)

2. ~~(C)~~ Alternative Paths (U)

~~(C)~~ The above rather modest requirements are ambitious objectives when considering the fact that Iran is starting from almost zero technical and resource base. Of the four models of paths to proliferation outlined in Section II, hedge option, minimum time, minimum resource, and minimum constraint, two preliminary paths are to be examined.

~~(S)~~ Iran may choose to expand its nuclear power program in an orderly fashion, meeting a representative share of new electrical demands with additional nuclear power reactors. As the program develops, Iran may take steps to insure that the power program provides the necessary resources to eventually underwrite attainment of a weapon program. This is the Hedge Option Path and may be either a continuous or accidental one, but one might observe it would comprise a fortuitous set of decisions that would bring the nation along the path to eventual proliferation. The Hedge Option Path is considered a promising model of Iranian proliferation.

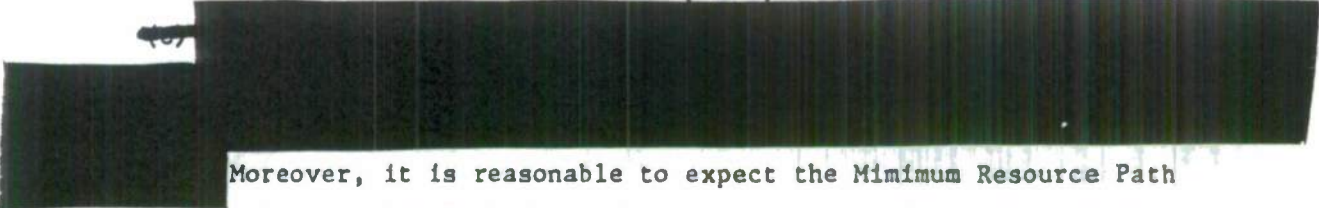
<sup>1</sup> (U) This section develops hypothetical situations, the disclosure of which could be detrimental to U.S. interests.

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~~(S)~~ As developed in the overview and in the analysis of the nuclear power industry, the current state of development of the industry is quite primitive. The decisions required for the hedge option would include construction and operation of fuel fabrication plants, the securing of adequate sources of uranium and the expansion of research and development centers. In a normal development of these assets, the time required would be lengthy. While Iran has been suggested as having the finances to expedite this or some smaller set of assets into a minimum time effort, the political assessment at this time is that there is no major impetus to engage in a crash program.

OSD 3.3(b)(2),(6)

~~(S)~~  Moreover, it is reasonable to expect the Minimum Resource Path approaching the Minimum Time Path in the limit. A merger of the Minimum Resource and Minimum Time paths will be analyzed; Minimum Technical Constraint Path on the other hand is not applicable to Iran because of the technology needs of the country.

DIA 3.3(b)(2),(6)

3. ~~(S)~~ Evaluation of Alternate Paths

a. ~~(S)~~ Hedge Option Path (U)

~~(S)~~ When analyzing the observed performance of Iran against the Hedge Option Path, it is evident that Iran is endeavoring to be as self-sufficient as is possible. Plans include many of the elements of the fuel cycle, but the program is not blatantly of a proliferation nature. For example, selection of light water reactors, which are known to be poor plutonium production reactors and which in turn, require use of safeguarded enrichment services, suggests that a capability to produce weapons grade plutonium is not a high priority item.

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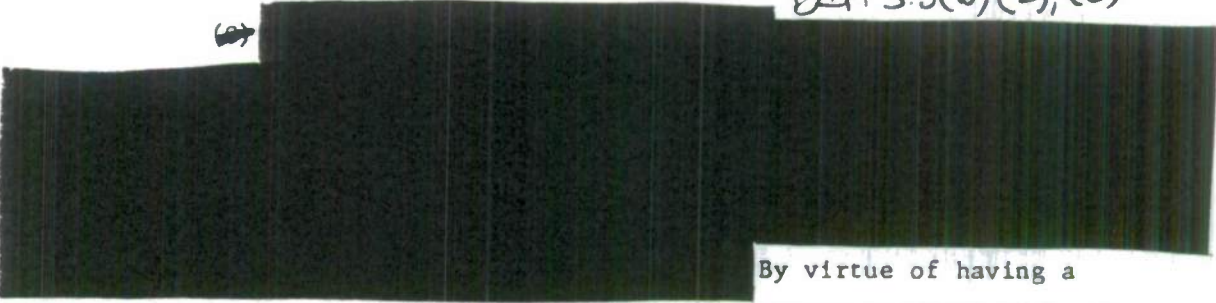

~~(S)~~ In opposition to this, however, is the observation that Iran is exploring the full range of fuel cycle components and is endeavoring to obtain domestic fuels, enrichment and reprocessing capabilities, the latter apparently at a much earlier time and state of nuclear development than is generally considered economically necessary. Recalling that the Iranian nuclear program as seen today was developed in the halcyon days of high oil revenues and has not had critical economic review, it will be interesting to see if it evolves as originally planned in 1974. It is important to note that only the power reactors are currently under contract and procurement of most of the fuel cycle support activities remains exploratory. The technical potential for the Hedge Option Path is not currently present and is moot in the mid term.

~~(S)~~ Iran may choose to emphasize the nuclear power program and develop a support base for an eventual proliferation. This is viewed as a long term project requiring no major commitment to a weapons program at this time, but insuring the viability of the option at some future unspecified date near the turn of the century.

b. ~~(S)~~ Minimum Resource Path (U)

OSD 3.3(b)(2),(6)

DIA 3.3(b)(2),(6)

~~(S)~~  By virtue of having a shorter time horizon than the hedge option, the minimum resource path was adopted as the model for potential Iranian proliferation. 

OSD 3.3(b)(2) DIA 3.3(b)(2)

~~(S)~~ Key factors in the development of this program are the nuclear research center and the 70 MW(t) reactor. The former has been contracted

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OSD 3.3(b)(2)(G) DIA 3.3(b)(2)(G)

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~~(S)~~  
and is projected for operation in 1980. Following commissioning, the nature and direction of the research program will provide insight into the Iranian interest in weapons. The reactor, on the other hand, has not been contracted; however, there was mention in the French press of this possibility, an event that elicited unfavorable public response.

4. ~~(S)~~ Comparison of Alternative Paths (U)

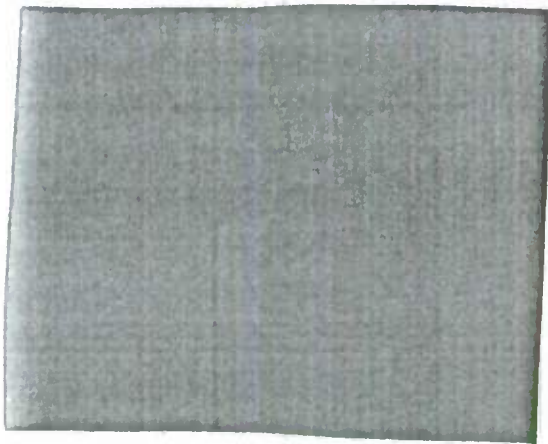
~~(S)~~ At this time, the necessary elements of a weapons program are not available in Iran. For both the hedge option and the minimum resource paths, there is a poor scientific and technology base, and a lack of capacity for research and development and weapon fabrication. For the hedge option the availability of fissile material and the option data would be well into the future after a self-sufficient nuclear program is developed. For the minimum resource mode, small quantities of fissile material could be produced and made available in the mid-1980s, however, such an event requires some outside technical cooperation and probably would be telegraphed a long time prior to the actual event. Iran does have a modern Air Force capable of aerial delivery of nuclear weapons.

~~(S)~~ Most elements of a weapons program have not been actualized, and there are not enough specific accomplishments to test against the model. Government interest measured thus far in acquiring elements of the nuclear energy program are not inconsistent with a program of proliferation. Acquisition of a high power test reactor or a HWR, both of which would be capable of plutonium production, would flash a warning sign of concern that the minimum resource path to proliferation may become viable. Continual interest in fuel service support in light of poor economics and possible adverse public reaction would signal a strong desire for self-sufficiency. Such a continuing interest would signal a movement toward the hedge option.

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(C) SUMMARY OF HEDGE OPTION  
PATH TO PROLIFERATION (U)

Table 5

|                                  | <u>Current</u> | <u>Critical Element</u>   |
|----------------------------------|----------------|---|
| Scientific and technology base   | Weak           |  |
| Fissile material                 | No             |   |
| Weapons research and development | No             |   |
| Weapons fabrication              | No             |   |
| Delivery system                  | Air only       | Not critical  |

*DIA 3.3(b)(2), (6)*

<sup>1</sup>The most critical item.

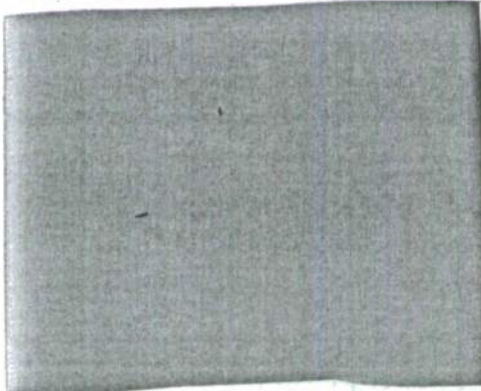
*OSD 3.3(b)(2), (6)*

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~~(S)~~ SUMMARY OF MINIMUM RESOURCE  
PATH TO PROLIFERATION (U)

Table 6

|                                  | <u>Current</u> | <u>Critical Element</u>   |
|----------------------------------|----------------|---|
| Scientific and technology base   | Weak           |  |
| Fissile material                 | No             |   |
| Weapons research and development | No             |   |
| Weapons fabrication              | No             |   |
| Delivery system                  | Air only       | Not critical  |

DIA 33(b)(2),(6)

<sup>1</sup>The most critical item.

OSD 3.3(b)(2),(6)

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F. (C) Conclusion (U)

(C) If one assumes that the nuclear power program is what it is claimed to be and is focused upon generating a significant fraction of Iran's electrical energy by the year 2000, one cannot observe any actions taken thus far that would not support this hypothesis. Moreover, at this time the power program clearly does not have the assets to insure successful proliferation. The present observables, in the form of accomplishments and plans do not make a compelling argument for proliferation.

(C) While there is, therefore, a consistency in the evidence that Iran is not presently developing a nuclear program that can support proliferation, or is carrying on a weapons program, these conclusions require further comment. In one case, the lack of adequate technical base, the lack of a research and development capacity and lack of a domestic source of fissile material make a strong case for a lack of capacity. Certainly this presents a strong disincentive for proliferation at this time. On the other hand, the Iranian program is in its infancy and hence its true character has yet to emerge. Iran has stated ambitions for a nuclear program and has the ability to amass the needed capital. Iran could embark on a program to acquire the needed assets that in time could support proliferation. The next few years will be important ones for determining the strength of Iran's commitment to nuclear power and research programs which would favor the basis for acquisition of a nuclear capability.

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~~(S)~~ COMMENTARY (U)

(U) In the Technical Evaluation the monitoring method attempts, in part, to develop an understanding of who makes what technical decision and for what reason. The nuclear power program provides the basis for initial examination simply because it provides the bulk of the assets required for a weapons program. In the analysis, the nuclear power program, therefore, is examined to determine its place in the energy economy, its character, and finally, without any preconceived notions on proliferation in the country, if the program could support a weapons program.

~~(S)~~ For Iran the analysis shows that all energy and specifically electrical energy and nuclear power is governmentally controlled and is afforded a central position in the economic development plans of the country. By virtue of central planning, much information on present and future capabilities was available. Present nuclear capabilities are seen to be quite limited so it was easy to conclude that the present structure of the nuclear power program would not technically support weapons development.

~~(S)~~ As a second part of the analysis, two possible scenarios of proliferation were examined. For this, the analysis assumed a forced position of proliferation and in turn endeavored to construct a technically feasible course of action. The observables and future plans in the nuclear area were held up to test against an assumed course of proliferation. Satisfaction of the test suggests that proliferation by one or more paths might be feasible possibly with the exception of certain critical elements singled out on that path. These critical items in turn can provide an insight to the next step, if proliferation is an objective.

~~(S)~~ In the case of Iran because of the very early stage in the growth of the technology in the country the analysis was structured about two contrived situations. Notwithstanding, the use of straw-man programs in the method revealed the need for observing certain logical next steps in

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the evolution of the power program. This showed that Iran is technically weak and dependent upon outside support, so the amount and rate of flow of technology and key production reactor and fuel service capabilities will shape the future potential for proliferation. Eventually these technical elements will be ranked with the military, economic and political elements in the net assessment, and the critical elements will be integrated into information requirements. The hedge option, while always a matter for contention, was considered remote in time. The minimum resource path on the other hand while possible will require outside assistance in specific areas.

~~(C)~~ One further comment is appropriate. While it is not an explicit part of the methodology, the present frustration of an Iranian controlled technical path to proliferation should be pointed out to the nontechnical analyst. This could be a potential problem and in his area of consideration if Iran would seek to obtain direct support in the form of treaties, economic pressure, barter, etc.

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V (U) MOTIVATIONAL TRENDS (U)

A. Purpose

The purpose of this phase of the analysis is to evaluate the factors influencing Iran's political-military and general economic motivations for acquiring a nuclear capability.

B. Organization

The section is organized by the major information categories which comprise the nuclear proliferation data base. They are:

- Threat
- Security Guarantees
- Political Utility
- Military Utility
- Arms Control Positions
- Attitudes toward Foreign Reaction
- Domestic Political Factors
- Economic Factors

The section concludes with an identification of "other incentives and disincentives", i.e., those events with a lower likelihood of occurrence of factors not having a major influence at present on the assessment of motivational trends, but events and factors which a major change in context or environment could become more important in the evaluation of Iran's movement toward or away from acquisition of nuclear weapons.

Since this report represents an illustrative application of the monitoring method to a selected country, there is a brief italicized section following the conclusion which identifies any special problems encountered in preparing the assessment of motivational trends.

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## C. Perceived Threat

1. General. A sense that survival, security, or vital interests are threatened is a critical factor in leading a country to the acquisition of nuclear weapons. Historically, the threat emanating from one of the super-powers or the hope of gaining leverage over the actions of a powerful nuclear ally caused countries to develop nuclear arsenals. However, as the Indian detonation of a Peaceful Nuclear Explosion (PNE) and subsequent reactions elsewhere in Asia suggests, regional threats may become stronger incentives to proliferation in the decades ahead, as the technical capability to go nuclear comes within the grasp of more countries. A third dimension of the threat is the challenge posed to internal order by terrorists or subversive organizations. Although internal threats as such cannot be contained with nuclear weapons, the weapons could serve to deter other local powers from assisting the insurgents.

2. The Superpower Threat. As noted in the Overview, Iran shares a common border with the Soviet Union, and relations between these two countries, while somewhat better in recent years, have never been cordial. The threat of direct Soviet aggression cannot be ignored, but it does not seem likely that Iran would acquire nuclear weapons in response to the Soviet threat for three reasons.

- An Iranian nuclear capability would be regarded as a potential threat by the USSR and might actually trigger hostile acts by Moscow;
- Given the size, quality, and proximity of Soviet forces, it is highly doubtful if Iran could develop a credible deterrent vis-a-vis Moscow, that is an assured second-strike capability, in the foreseeable future, and;
- Even though Iran's ties to the United States are close, they are not as close as those linking U.S. strategic offensive forces to

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the defense of Europe. In the event of Iranian use of nuclear weapons to thwart a Soviet attack, the U.S. deterrent would not be automatically triggered.

3. The Regional Threat. On the other hand, the regional threat has several dimensions which might incline the Iranian government to keep its options open. Although Iran and Iraq reached an agreement in March 1975 that settled the Shatt al-Arab boundary dispute, ended Iranian support for the Kurds in their struggle with Baghdad, and presumably ended Iraqi support of Arab and Baluchi dissidents in Iran, the tradition of conflict between the two countries, which spanned nearly two decades, suggests a dentente that can lapse quickly. The Soviet presence in Iraq remains sizable, and the Shah is known to be disturbed by evidence of an international terrorist base operating in Baghdad.

As a status quo power committed to rapid industrialization, Iran also has an important interest in maintaining friendly regimes along the south shore of the Persian Gulf. In the past, Iranian officials have spoken of "ideological encirclement" as a potential threat, and the ongoing military buildup has been justified in part by the need to support the conservative rulers of the Gulf's Arabian littoral against externally assisted radical movements. Iranian forces are assisting the Sultan of Oman in his campaign to finish off the Marxist guerrillas operating in the southern region of the Dhofar Province.

The present balance of power on the Indian subcontinent constitutes another potential threat to Iran. Since the Indo-Pakistan war of 1971, the balance has shifted heavily in India's favor. Pakistan is no longer a match for India, and the latter's security ties to Moscow and demonstrated capacity for acquiring nuclear weapons have made it a more formidable regional power. Tehran seeks to shore up Pakistan against Soviet and Indian pressure and assist the Pakistanis in containing the internal threat of Baluchi and Pathan dissidence.

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4. Internal Order. Baluchi separatism, periodically supported by Iraq and the Soviet Union, is a potential threat to Iran which also has sizable Arab and Kurdish minorities. The dissident and terrorist groups active in Iran are supported by hostile governments, and the extent of their activity is usually related to state of relations between Iran on the one hand and Iraq and the Soviet Union on the other.

5. Summary. The perceived threat to Iran appears to arise from the following sources:

- Direct aggression by the Soviet Union:
- Renewal of the rivalry with Iraq;
- Hostile regimes on the Gulf's south shore;
- Soviet and Indian pressure on Pakistan;
- Baluchi and Pathan dissidence on the subcontinent, and;
- Internal subversion and terrorism.

None of these threats seem sufficiently strong to trigger an Iranian decision to acquire nuclear weapons. Iran's growing military power and the relative stability achieved by Iranian diplomacy probably act as a disincentive to the acquisition of nuclear weapons. Looking out to 1985, however, it appears that the regional threat emanating from Iraq to the West and India to the East might lead Iran to reconsider its non-nuclear status. India has already detonated a PNE, and Iraq retains close relations with the Soviet Union. In addition, there have been persistent rumors that the Soviets have promised to build Libya a nuclear reactor and train Libyan scientists in advanced nuclear technology. Such a development could indicate a reversal of Soviet policy regarding the extension of nuclear technology assistance to its client states, and might suggest an eventual Soviet willingness to consider supporting Iraqi nuclear development.

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D. Security Guarantees

1. General. Insecurity arising from perceived threats can be mitigated to some extent by security guarantees. It is frequently argued, for example, that the extension of such guarantees to such technologically advanced allies of the United States and the Federal Republic of Germany (FRG) have served to check the spread of nuclear weapons. On the other hand, the bond of U.S. alliances have weakened in recent years because of growing political multipolarity, the growth of Soviet strategic and conventional forces, the U.S. defeat in Southeast Asia, and the continuing debate in the United States about the proper extent of American foreign commitments.

Monitoring a country's proliferation potential involves knowledge of the provisions of existing security pacts, official interpretations of such treaties, domestic attitudes toward them, relevant international attitudes as to their viability, and possible events or circumstances which might render the security pacts inoperative.

2. Existence. Iran is a member of the Central Treaty Organization (CENTO) in which the United States is an observer. Under provisions of a 1959 bilateral treaty, the United States agreed to take appropriate action--including the use of armed forces--in case of aggression by a communist state against Iran.

3. Official Interpretations. The Shah believes that his alliance with the United States deters direct Soviet aggression against his country. In 1965, however, he was disturbed when CENTO did not come to Pakistan's defense in her war against India. With the historic withdrawal of British forces from the Persian Gulf and the improvement of U.S.-Soviet relations in the early 1970s, the Shah became convinced that in any war that did not involve the superpowers, Iran would have to rely on its own resources in defense of regional interests.<sup>1</sup>

<sup>1</sup>Stanford Research Institute, Strategic Studies Center, Iran: An Emerging Power, by Hamilton A. Twitchell et al., SSC-ISR-10 (Washington, D.C.: March 1976), p.121

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4. Domestic Attitudes. Owing to the closed character of the Iranian ~~political system, domestic attitudes toward security guarantees that are~~ at variance with official interpretations are not known, except for the extreme left which opposes Iran's security ties to the United States.

5. International Attitudes. It is the consensus of most strategic analysts that the U.S. guarantee still acts as a deterrent to direct Soviet aggression against Iran, but would be unlikely to result in U.S. military support against a regional aggressor.

6. Summary. It is clear from a variety of sources that while Iran values its security tie to the United States, it recognizes the American connection does not cover all contingencies. Clearly, U.S. guarantees are still valued, but probably not as highly as before. In general, security guarantees are seen as a disincentive to proliferation.

## E. Political Utility

1. General. Historically, the alleged political utility of a nuclear weapon capability has been sometimes cited by leaderships determined to acquire nuclear weapons. Membership in the "nuclear club" has been seen as conferring prestige, giving the new nuclear power a "voice in world councils," and deterring a direct attack against the national homeland. Nuclear weapons are also alleged capable of deterring the ambitions of nuclear opponents, intimidating non-nuclear rivals, lessening dependence on allies, and enhancing regional or international status. In some countries approaching the nuclear threshold, it has even been argued that the acquisition of a nuclear capability can guarantee the country's neutrality and non-involvement in superpower conflicts.

2. Deterrence and Intimidation. Iran's ambitious modernization program requires stability in three contiguous zones of interest shown in

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Figure V-1.<sup>1</sup> In general, Iran seeks to contain radicalism and Soviet influence, ~~remove sources of regional tension, especially the ever explosive~~ Arab-Israeli conflict, and gradually reduce the military presence of the superpowers. Efforts to create a regional security pact in the gulf foundered recently when a foreign ministers' conference broke up after only one day's deliberations in Muscat in November 1976. In the present strategic setting, Tehran appears to have no overriding need either to deter would-be aggressors or intimidate regional rivalries.

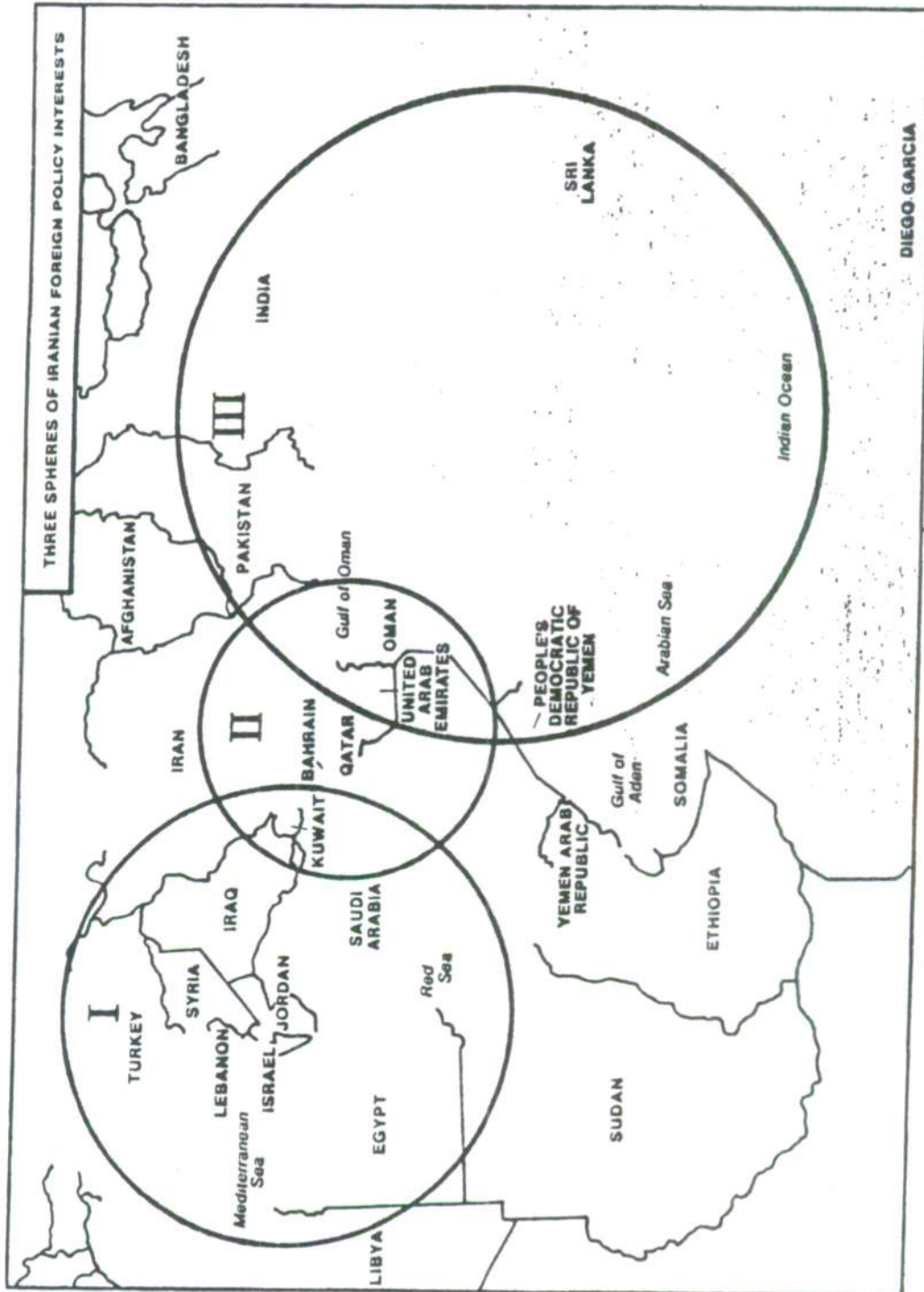
3. Enhance Regional Status. Iran's present regional status is not contingent upon the possession of nuclear weapons. The Shah himself has said, "We do not want nuclear arms just for the sake of having them. The costs would be prohibitively high..." In the same interview, however, he added that "Iran will have to acquire atomic bombs if every upstart in the region gets them."<sup>2</sup> Given the real prospects for proliferation in the zones of Iranian security interests, considerations of regional status might argue for the acquisition of nuclear weapons particularly in light of India's demonstrated nuclear option and Tehran's continuing concern about the security of Pakistan. It may also be recalled that the Iranian military buildup is designed to support a wider range of security interests in the 1980s, when--it is assumed--Iran will have achieved a political-military importance commensurate with greater economic influence.

4. Reduce Dependence on Allies. As noted above, the Shah appears convinced that Iran's security ties to the United States deter direct Soviet aggression against his country. He also realizes that the U.S. guarantee would not be operable in all contingencies. In an interview with the West

<sup>1</sup>See the concept of interlocking zones of interest in Rouhollah K. Ramazani, "Emerging Patterns of Regional Relations in Iranian Foreign Policy," Orbis, XVIII (Winter 1975), pp. 1043-69

<sup>2</sup>"Defending Iran's Lifeline First Duty--Shahanshah," transcript of an interview given the Shah to Hassanein Heikal, Kayan International, September 20, 1975, p.5

Figure V-1



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German television network, the Shah alluded to the threat of regional and ~~limited wars which are over in a few weeks and in which "no one intervenes,~~ not even the United Nations." He went on to say that Iran must be equipped to defend its territorial integrity in the event of such occurrences, "not only in the face of obvious dangers but of concealed dangers."<sup>1</sup> In the light of such an analysis by an absolute monarch, it seems reasonable to suppose that under certain circumstances, the possession of nuclear weapons might reduce Iranian dependence on allies.

5. Achieve Neutrality. In the present international political environment, neutrality is really not an option for oil-rich, monarchist Iran, particularly in view of its proximity to the Soviet Union.

6. Summary. In the current strategic context, Iran would not appear likely to derive much political utility from a nuclear weapons capability. This disincentive could change to an incentive over time, however, if (as likely) the following factors take on increasing strategic importance in the decade ahead:

- The need to counter the nuclear ambitions of regional powers;
- The increasing need to buttress Pakistan against combined Soviet-Indian pressure, and;
- The perceived need to support expanding security interests in the 1980s.

## F. Military Utility

1. General. A country's military profile indicates how nuclear

<sup>1</sup>"Vast Possibilities for West German Industries," Transcript of the Shah's interview with West Germany's television network, Kayan International September 27, 1975, p. 1

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weapons might be integrated into its armed forces. The analyst monitoring a given N<sup>th</sup> country should be aware of its military strategy, tactics, doctrine, force deployment, and weapons and equipment. The analyst must also consider potential military advantages accruing from a decision to go nuclear. These can include: developing a regional deterrent; defense against aggression; triggering the nuclear forces of an allied country, and; perhaps even replacing conventional forces with purportedly less costly (at least over the long-term) and smaller nuclear-equipped forces. For some threshold countries that might perceive their national existence actually threatened (e.g., Israel, South Africa, or the Republic of China (Taiwan), a nuclear capability may be seen as providing a possible weapon of last resort.

2. Deterrent to Aggression. Although Iran's growing conventional strength seems adequate to deter aggression from any combination of powers in the Gulf, (see Figure V-2) Iran is also concerned with the power balance on the Indian Subcontinent, where the rump state of Pakistan is no longer a credible counterweight to India. The Shah envisions a major security role for Iran in the northwest quadrant of the Indian Ocean in the decades ahead. Were India to actually deploy nuclear weapons, the Shah might feel the need to counter this potential threat to Pakistan and Iran.<sup>1</sup>

3. Defense against Aggression. Given the current level of Iran's technical and industrial base (see below), it is unlikely that an Iranian military nuclear program would be capable of producing weapons that would improve significantly the defensive (as distinguished from the deterrent) capabilities of the Imperial Iranian Armed Forces (IIAF). Still, the possession of nuclear weapons might enable Iran to make any attack by the Soviet Union the signal of a nuclear war.

4. Trigger Allied Nuclear Forces. There would be undoubtedly

<sup>1</sup> Alvin J. Cottrell, "The Foreign Policy of the Shah," Strategic Review, III (Fall 1975), pp. 37-39

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Figure V - 2

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## THE ARMED FORCES OF IRAN

Population: 33,810,000.  
Military service: 2 years.  
Total armed forces: 300,000.  
Estimated GDP 1975: \$56.8 bn.  
Defence expenditure 1976-77: 666,000m rials  
(\$9,500m).  
\$1=70.1 rials (1976), 66.6 rials (1975).

ARMY: 200,000.  
3 armoured divisions.  
4 infantry divisions.  
4 indep brigades (w inf, 1 AB, 1 special force).  
1 SAM battalion with HAWK  
Army Aviation Command.  
500 Chieftain, 400 M-47/48, 460 M-60A1 med  
tks; about 2,000 M-113, BTR-50/60 APC; 650  
guns and how, incl 75mm, 330 105mm, 130mm,  
100 155mm, 175mm SP, 203mm, 203mm SP; 64  
M-21 RL; 106mmRCL; ENTAC, SS-11, SS-12,  
TOW ATGW; 650 23mm (20SP), 35mm, 40mm,  
57mm (80SP) and 85mm AA guns; HAWK SAM.  
(1,480 Chieftain med, 250 Scorpion lt tks;  
Fox scout cars; Dragon, TOW ATGW; ZSU-23-4  
SP AA guns; Rapier SAM on order.)  
Aircraft include 45 Cessna 185, 10 O-2A and 6  
Cessna 310.  
60 AH-IJ, 100 Bell 214A, 20 Huskie, 52 AB-205A,  
15 CH-47C hel (187 Bell 214A, 142 AH-IJ on  
order).

DEPLOYMENT: OMAN: 3,000: 1bde, 1 hel sqn;  
Syria (UNDOF): 391

RESERVES: 300,000.

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Figure V - 2

THE ARMED FORCES OF IRAN  
(continued)

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NAVY: 18,500

- 3 destroyers (1 with SEACAT, 2 with Standard SAM)
- 4 frigates with Mk 2 Seakiller SSM and Seacat SAM.
- 4 corvettes (ex-US patrol frigates).
- 25 patrol boats (9 under 100 tons).
- 5 minesweepers (3 coastal, 2 inshore).
- 2 landing ships.
- 2 landing craft.
- 2 logistic support ships
- 8 SRN-6 and 6 Wellington BH-7 hovercraft.

NAVAL AIR:

- 1 MR sqn with 6 P-3F Orion.
- 1 ASW hel sqn with 6 S-65A.
- 1 transport battalion with 5 AB-205A, 14 AB-206A,  
6 AB-212, 10 SH-3D hel.
- 3 marine battalions.
- (3 Tang-class submarines, 6 Spruance-class des-  
troyers, 12 FPBG with Exocet SSM, .2 landing craft,  
6 S-SA hel on order.)

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Figure V - 2

## THE ARMED FORCES OF IRAN (continued)

AIR FORCE: 81,500; 316 combat aircraft.  
10 FB sqns with 32 F-4D, 141 F-4E with Sidewinder  
and Sparrow AAM, Maverick ASM.  
10 FGA sqns with 12 F-5A, 100 F-5E  
1 fighter sqn with 15 F-14A Tomcat  
1 recce sqn with 4 RF-4E, 13 RF-5A.  
4 med tpt sqns with 57 C-130E/H.  
1 tanker sqn with 12 Boeing 707, 3 Boeing 747.  
4 lt tpt sqns with 18 F-27, 6 C-54, 5 C-47, 7 Beaver,  
3 Aero Commander 690, 4 Falcon 20, 30 F-33A/C.  
10 Huskie, 45 AB-205, 70 AB-206A, 5 AB-212,  
5 CH-47C, 16 Super Frelon hel.  
Trainers incl 30 T-41, 9 T-33, T-6, 2 E-3A, 18 F-5B.  
Rapier and Tigercat SAM.  
(65 F-14A, 36 F-4, 41 F-SE fighters; 12 RF4-E  
recce; 6 P-3 Orion MR; 12 Boeing 747, 19 Bonanza,  
2 F-27 tpts; 22 CH-47, 39 Bel 214C hel; Blindfire  
SAM radar on order.)  
  
Para-Military Forces: 70,000 Gendarmerie with  
1t ac and hel; 40 patrol boats.

Source: The International Institute of Strategic Studies,  
The Military Balance 1976-1977. London: 1977,  
pp. 33-34.

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circumstances in which the use of Iranian nuclear weapons might be perceived ~~as capable of triggering the use of U.S. strategic offensive forces, but~~ such circumstances would be rare. An Iranian regional deterrent would not have the same relation to the U.S. deterrent as French nuclear forces have to NATO and U.S. strategic forces.

5. Replace Conventional Forces. It might be argued that Iran's acute shortage of skilled manpower may eventually favor reduced defense spending and a cutback in the size of the IIAF. Were this policy option selected a case could be made for developing a nuclear deterrent to offset conventional force reductions. On the other hand, the Shah's vision for the future projects an active Iranian security role in the Gulf and the Indian Ocean which would almost certainly require large conventional forces.

6. Weapon of Last Resort. Iran's alliance with the United States, improved relations with the USSR, and great political and economic influence in the Middle East and within OPEC councils give the Shah considerable diplomatic latitude in international politics. In the present strategic environment, it is highly unlikely that Iran would suddenly be confronted by a threat of such magnitude as to require the acquisition of nuclear weapons as weapons of last resort.

7. Summary. The military, as distinguished from political, utility of nuclear weapons seems somewhat more difficult to establish. Possible motivations are:

- To deter a nuclear armed India, and;
- To cause any direct hostilities between Iran and the Soviet Union to immediately assume nuclear consequences.

Neither motivation appears particularly strong at the present writing and the military utility of nuclear weapons appears to act as a disincentive to Iranian proliferation.

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G. Arms Control Positions

1. General. A country's formal arms control positions are a reasonably accurate reflection of its attitude toward nuclear weapons. Although such positions are not irrevocable, they do represent commitments by governments to certain policy courses. Four indications of official attitudes toward arms control are: adherence or non-adherence to the nuclear Non-Proliferation Treaty (NPT) and acceptance of International Atomic Energy Agency safeguards; adherence or non-adherence to the partial nuclear test ban treaty; position on nuclear free zones, and; attitudes toward conventional arms transfers. Equally important in an assessment of this kind are the views of "alternative leaderships," that is other political parties, factions, or groups that stand a reasonable chance of becoming the national leadership over the next few years.

2. NPT. Iran has signed and ratified the NPT and accepted IAEA safeguards. Although the Shah has indicated that circumstances might compel Iran to withdraw from the NPT, Iran's present orientation reflects continued support for the NPT regime.

3. Test Ban Treaty. Iran is also a full party to the Treaty banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water.

4. Nuclear Free Zones. In 1974, Iran, later supported by Egypt, called for the establishment of a nuclear free zone in the volatile Middle East. Iran also supports Sri Lanka's call for a "zone of peace" in the Indian Ocean. The latter proposal calls for the removal of all bases in the region, a ban on the introduction of nuclear weapons, and renunciation of force by all littoral states.

5. Conventional Arms Transfers. As one of the world's biggest customers for weapons and military equipment (some \$10.4 billion worth of military equipment and services were ordered from the United States alone

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in the 1972-1976 period),<sup>1</sup> Iran has taken no stand against the transfer of conventional arms, and has even expressed interest in the purchase of additional sophisticated aircraft, such as the Northrop F-18L.<sup>2</sup>

6. Summary. Iranian arms control positions militate against acquisition of nuclear weapons and act as a disincentive to proliferation.

## H. Attitudes toward Foreign Reaction

1. General. Hostile reaction to proliferation by allies, regional opponents, and other nations may be powerful external constraints to exercising the nuclear option.<sup>3</sup> Superpower reaction, for example, can be critical: one N<sup>th</sup> country may fear to provoke a potentially hostile nuclear giant, or, on the other hand, fear losing the support of a powerful ally. Adverse regional reaction can also inhibit nuclear proliferation. In Western Europe, for example, the attitudes of West Germany's NATO allies reinforce the determination by both superpowers to discourage Bonn's acquisition of nuclear weapons. Adverse reaction by allies and trading partners could also militate against a choice for nuclear weapons. Third World reaction is not as severe a constraint, but may become increasingly important in the decades ahead as access to critical raw materials becomes a major problem for most countries. The way in which near nuclear countries react to external criticism will be a key indicator of a willingness to push ahead with a military program.

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<sup>1</sup> Kenneth H. Jacobson and Helen Lewis, The Modernization of Iran: Promise and Challenge (Menlo Park, Ca., Stanford Research Institute, December 1976), p. 5.

<sup>2</sup> John H. Cooley, "Shah Plans to Restore Arms Cuts--Iran Leader Seeks to Move His Nation Away from Dependence on Oil Income." The Christian Science Monitor, February 28, 1977, pp. 14-15.

<sup>3</sup> Hudson Institute, Trends in Nuclear Proliferation, 1975-1995, Vol. 1, Projections, Problems, and Policy Options, by Lewis A. Dunn & Herman Kahn (New York: October 15, 1975), pp. 13-14.

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2. Superpower Reaction. Iranian acquisition of nuclear weapons would encounter strong adverse reaction from the Soviet Union. Indeed, the Soviets would probably react sharply even to an Iranian declaration of withdrawal from the NPT. The United States would also be likely to oppose Iranian proliferation, as indicated by the recent impasse over the sale of eight U.S. reactors to Iran. (The United States insisted upon Tehran's acceptance of U.S. Safeguards that require spent nuclear fuel to be shipped out of the country.) Concern about adverse superpower reaction could act to restrain an Iranian decision to acquire nuclear weapons.

3. Regional Reaction. Iranian efforts to neutralize the Persian Gulf from the U.S.-Soviet rivalry and establish a regional security system of littoral countries could be further undermined if Tehran acquired nuclear weapons. The fragile detente between Iran and Iraq probably would not survive such a step, and an accelerated regional arms race between these two countries would probably be the result. In addition, Saudi Arabian suspicions about the Shah's aspirations to regional hegemony could be aroused, with the probable result of a deterioration in relations between Riyadh and Tehran. Iran could not ignore such reaction in weighing the decision to exercise the nuclear option.

4. Third World Reaction. Third World reaction to Iranian proliferation would probably be mixed. In the so-called "North-South" dialogue, Iran has emerged as a spokesman for the developing countries in demanding more favorable terms of trade with the developed world. To the extent that her acquisition of nuclear weapons was seen as a demonstration of independence, Third World reaction might be even mildly favorable. On the other hand, if the development of Iranian nuclear weapons was seen strictly within the context of the East-West conflict, it would probably be bitterly denounced by many developing countries on the grounds that superpower tensions divert resources which might otherwise be used to alleviate problems of global poverty. At the same time, it is unlikely that adverse reaction from the Third World would act as a very serious restraint on an Iranian decision to acquire nuclear weapons.

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5. Summary. Iranian attitudes toward external reactions to a decision  
~~in Tehran to acquire nuclear weapons could be characterized as follows:~~

- The system would reflect a moderate degree of sensitivity to external opinion;
- The leadership would be concerned about adverse reaction from both the Soviet Union and the United States;
- There would also be concern about adverse regional reaction, especially from Iraq and Saudi Arabia, and;
- There would be little concern about adverse reaction from the Third World.

In general, concern about possible superpower and regional reaction acts as a disincentive to proliferation.

I. Domestic Political Factors

1. General. Patterns of political decision making can favor or militate against a sudden policy change on the need to acquire nuclear weapons. In highly centralized political systems, for example, where decision making is concentrated at the top and where public opinion exerts little influence on political leaderships, a decision to exercise the nuclear option may be constrained only by resource and technical limitations. In other systems, where power is diffused among branches of government and where public opinion is an important consideration, a shift in policy may be far more difficult to execute. Political stability is another critical internal factor. Frequent crises or changes in government may be such that no continuous nuclear development program (either civilian or military) can be implemented. Other key factors critical in any evaluation of the probable direction of a country's nuclear policy are: (1) the relative strengths of various interests groups (particularly the armed forces)

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within a political system, and; (2) the degree of influence exerted by elite and public opinion on the political process.

2. The Political System. To an extraordinary degree, political decision making in Iran is vested in the Shah and his closest advisors. Two students of Iranian foreign policy have noted that the Shah can "make a decision on the spot, conclude agreements that in other states might take months and reverse himself overnight if he so chooses."<sup>1</sup> Such a concentration of political power at the top acts means, for example, that the Shah could withdraw Iran from the NPT and repudiate existing safeguards agreements with a stroke of the pen.

3. Characteristics of the Elite. The Iranian political elite is drawn from seven major groups, which were listed in decreasing order of power and influence: (1) The inner circle, (2) The Royal family, (3) Courtiers and confidants, (4) Military and Savak leaders, (5) Ministers and deputy ministers, (6) Members of parliament (Majlis) and the Senate, and (7) High-ranking business, professional and quasi-governmental personalities.<sup>2</sup> Some 250 to 400 persons comprise the elite. They compete intensely to move higher in the imperial system, but as the Shah is the center of the system whose influence is all pervasive, it is difficult for "outside" factions to exert much influence.

4. Stability of the System. Despite sporadic, if widely reported terrorist activity, the Iranian system has been remarkably stable since Mussadiq's attempted coup in 1953. Over the past two decades, the Shah has strengthened his political position at the expense of traditional power

<sup>1</sup> Shahram Chubin and Sepehr Zabih, The Foreign Relations of Iran: A Developing State in a Zone of Great Power Conflict (Berkeley, CA: University of California Press, 1974), p. 301

<sup>2</sup> James A. Bill, "The Patterns of Elite Politics in Iran," Political Elites in the Middle East, ed. by George Lenczowski, ed. (Washington, D. C.: American Enterprise Institute, 1975), p. 22

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centers, such as the landholding class and the Shiite Muslim clergy. As his power has grown, so has that of his new state bureaucracy, which is currently managing the massive modernization effort.

5. Military Influence. The IIAF are a favored institution in Iran. As a supporting pillar of the monarchy, their status and prestige have risen with the Shah. The military services get the newest and most advanced weapons and have first claim on the country's small pool of skilled labor.

6. Influence of Other Interest Groups. In the guided Iranian political system, the influence of other interest groups is comparatively weak. Discernible groupings include the growing state bureaucracy, the newly wealthy business class, and the traditionally oriented Shiite clergy. None of these appears predisposed to act as a political barrier to the acquisition of nuclear weapons.

7. Elite Opinion. Elite opinion is concentrated in the state bureaucracy and among the nouveau riche. It is generally supportive of the Shah's efforts to modernize while recalling the "Great Civilization" of the Persian empire. Dissident elite opinion may be found among university students, many of whom are critical of the Shah's authoritarian rule, but student protest acts as a very mild constraint on the government.

8. Public Opinion. Public opinion is not highly developed in Iran. Roughly one-third of the population is literate. The media is tightly controlled, and the issue of nuclear proliferation is far removed from the everyday concerns of the largely rural population.

9. Summary. The Iranian political system exhibits the following characteristics.

- A highly centralized political decision making process;

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- The influence of competing interest groups is comparatively weak, and
- Public opinion is not highly developed owing to a low level of literacy and a controlled media.

(U)In general, the centralized decision making process, authoritarian governmental structure, and limited channels for the expression of public opinion provide a mild incentive to proliferation.

J. Economic Factors

1. General. The level of national economic development is a critical factor in determining a country's capacity to become a nuclear power. Much of the literature supporting measures to control proliferation has tended to emphasize the cost incurred by a decision to go nuclear. The cost is high, but it can vary considerably according to the kind of force desired and the country's level of technological development. Few if any threshold countries are likely to adopt superpower standards of sophisticated weaponry.<sup>1</sup> Among the factors that should be considered in any evaluation of a country's capability to produce or otherwise acquire nuclear weapons are the following:

- The industrial base, that is the processes and techniques mastered by local industry;
- Infrastructure, that is the basic transportation, communication, utilities and services that tie a country together;
- The country's basic economic position, specifically the capital available for investment;

<sup>1</sup>William Van Cleave, "Nuclear Technology and Weapons," Nuclear Proliferation Phase II, edited by Robert M. Lawrence and Joel Larus (Lawrence/Manhattan/Wichita: University of Kansas Press, 1974), p. 30.

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- The cost of energy, and

- The opportunity costs, that is the value foregone by having selected nuclear weapons over other investment alternatives.

2. Infrastructure. The Iranian infrastructure has been the achilles heel of industrialization. The country's ports, railways, and roads are inadequate to meet the rising volume of imports. Bottlenecks in distribution and a critical shortage of skilled manpower have delayed completion of major development projects. Although the current Fifth and succeeding Sixth plans place emphasis on improved infrastructure, its current state serves to retard the development of high technology in Iran.

3. Industrial Base. Current development strategy seeks to maximize oil revenues to create an industrial base capable of producing export competitive goods long after the oil and gas are gone. Progress has been made in mining, refining, petro-chemicals, metals processing, and other industries, but the Iranian industrial base remains narrow.

4. Capital Availability. An unanticipated slump in oil sales, combined with the rising cost of imports (especially military sales) led to a double digit inflation rate and a \$2.4 billion deficit in the current budget. This cash flow problem has been embarrassing for the Shah. Tehran has borrowed heavily on international markets and has negotiated several arrangements to barter oil for sophisticated U.S. aircraft and British and other military systems. Nonetheless, Iran will have the resources to fund a military nuclear program if the Shah decides he wants one. Indeed, it is based largely on considerations of economic strength and investment potential capital that place Iran on the list of nuclear threshold powers.

5. Energy Costs. Iran's abundant oil and natural gas reserve mean that any kind of nuclear program would not be constrained by exorbitantly high energy costs.

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6. Opportunity Costs. A decision to go nuclear would mean that ~~resources not normally allocated to defense would have to be withdrawn~~ from Iran's numerous development projects. Some choice would have to be made among competing development objectives.

7. Summary. Important economic factors bearing upon an Iranian choice to acquire nuclear weapons include the following:

- Iran presently possesses the infrastructure of a developing country;
- The industrial base is growing steadily but remains narrow;
- The country's potential for capital formation remains high, and;
- The competition among various development objectives is likely to remain keen.

In short, the potential for capital formation notwithstanding, Iran's present stage of economic development acts as a disincentive to proliferation.

## K. Other Incentives

At this point in the evaluation of motivational trends it is desirable for the analyst to consider the possible effect of events and circumstances that could alter the present balance between incentives and disincentives to proliferate. An attempt should be made to examine hypothetical changes either in the external strategic setting or the internal political climate that could give rise to new incentives for acquiring nuclear weapons, some of which might seem implausible in the current international environment. The introduction of possible "wild card" changes during the phase of the analysis serves two purposes: first, they challenge logic developed so far

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and second, they force analysts to consider the possibility of major departures from the current motivational trend.

In the Iranian case, several "wild card" incentives to proliferation suggest themselves:

- In the succession crisis following the death of the Shah, a military junta establishes tenuous control over the country. In an effort to elicit domestic political support and to discourage both regional adventurism and superpower intervention in Iranian affairs, the junta decides to acquire nuclear weapons.
- Frustrated by sluggish domestic industrial development, angered by Saudi intransigence on the issue of crude oil pricing, and determined to remove the threat of Arab radicalism from the Persian Gulf once and for all, the Shah intensifies Iran's military buildup and embarks on a campaign of regional confrontation politics. As a hedge against adverse military developments, he quietly directs that a military nuclear program be given highest priority.
- To the surprise of the international community, the United States and the Soviet Union reach agreement on a far-ranging arms reduction pact, which involves not only force ceilings but deep cuts in existing military arsenals. The two super powers, now seeking to cap the nuclear volcano together, press for strict adherence to the NPT by all nations. The Shah, realizing that the option of nuclear power status might be now forever foreclosed, immediately initiates a crash weapons development program.

L. Conclusion

It is the conclusion of this phase of the analysis that--at present--motivations to acquire nuclear weapons appear balanced by equally strong

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motivations to adhere to the NPT regime. Over the next decade, however, the motivational trend would appear to incline Iran increasingly toward nuclear weapon status as Tehran's regional security interests expand, and as the higher Iranian military profile, in twin, stimulates other regional powers to improve their military capabilities.

## *Commentary*

*The applicability of the non-technical information categories as evaluative tools is demonstrated in the analysis concluded above. They appear to provide a reasonably comprehensive template for examining the incentives and disincentives influencing a national leadership's decision to acquire nuclear weapons. The eight categories discussed above, however, differ from technical information categories, such as "national nuclear industry" or "fissile materials" in that the former require analysts monitoring the proliferation phenomenon in an N<sup>th</sup> country to seek interpretive rather than factual answers to such questions as "how does the national leadership view the political utility of nuclear weapons?"*

*Specific comments on the applicability of the non-technical information to the Iranian case study are as follows:*

- The way in which Iran perceives various security threats is reasonably easy to establish. No major data gaps are apparent in this category.*
- Official and semi-official interpretations of existing security guarantees (and their weaknesses) are likewise easy to obtain.*
- "Political Utility," on the other hand presents some problems in that there has been little open speculation in Iran about the specific ways in which nuclear weapons are alleged to provide political utility.*

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- *"Military Utility" is an important information category, but as in the case above, there was little evidence of any national discussion on the military utility of nuclear weapons.*
- *"Arms Control Positions," is a category in which there is little trouble identifying what are official arms control views. Yet, the key is not only what the positions are but the rationale in arriving at the official positions. Very little data exists on this because of the centralized nature of Iranian decisionmaking.*
- *"Attitudes toward Foreign Reaction" is the least satisfactory of the non-technical information categories because the information collected is necessarily very speculative. While one can project with some confidence the probable reaction of other countries to an N<sup>th</sup> country proliferation decision, it is much more difficult to project how N<sup>th</sup> country decision makers would react to foreign reaction.*
- *Because the Iranian elite is entirely dependent on the Shah for favors and promotions, it is difficult to ferret out policy differences within the elite. Personal differences abound, but these differences have little to do with the advocacy of contending ideas. This was a country specific problem encountered with the information category, "Domestic Political Factors."*
- *No major problems were encountered with obtaining or interpreting data on the Iranian economy.*

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VI ~~(S)~~ NET ASSESSMENT (U)

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A. ~~(S)~~ Conclusions (U)

~~(S)~~ The net assessment of the interaction of incentives and disincentives currently favors disincentives. Yet, while disincentives to nuclear proliferation far outweigh incentives at present, the motivational trend--over the next decade--would appear to incline Iran increasingly toward nuclear weapon acquisition.

- No overriding pressures appear likely to push Iran to acquire nuclear weapons in the near term (3-5 years), and the country's level of nuclear development militates strongly against a successful near-term nuclear weapons program.
- Pressures to acquire a nuclear weapon capability will increase during the mid-term period (5-12 years) at the end of which acquisition of several weapons is feasible. There are factors that may mitigate these pressures, for example: a significant reduction in the presence of threats to Iran; increased confidence in the U.S.'s ability and commitment to play a stabilizing role in the region; stricter safeguards placed on the sale of nuclear reactors and technology; or a lack of availability of any reactors.
- Unless there is a fundamental stabilization of regional politics, the long-term (12-20 years) outlook is for a nuclear armed Iran.

~~(S)~~ These conclusions are supported by the pace of the Iranian nuclear power program, nuclear development objectives, and the apparent Iranian desire to achieve a high degree of energy self-sufficiency.

~~(S)~~ Iranian plans for the exploitation of nuclear power are extensive.

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As petroleum reserves are depleted toward the end of the century, nuclear power is seen as a major component in the Iranian energy mix. (The Ministry of Energy projects that nuclear power will provide some 35 percent of all energy needs by 1987).<sup>1</sup> The program of expansion involves acquisition of reactors and fuel cycle services, and suggests a high degree of self-sufficiency over the long run.

~~(S)~~ Attainment of these goals means overcoming some formidable constraints, including the following:

- Dependence on Light Water Reactors (LWR) for plutonium production;
- Dependence on foreign sources of supply for uranium and enrichment services;
- Scarcity of requisite physicists, engineers, and other technically skilled personnel.

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~~(S)~~ [REDACTED] At present there is no firm evidence of feasibility studies or contract negotiations pertaining to the development or purchase of such a reactor.<sup>2</sup> If a decision were made in late 1977 to purchase a research reactor, a nuclear device would be available by 1983 or 1984. The detonation of the device as part of a test program, however, would signify violations of safeguard provisions and inhibit significantly further program development. [REDACTED]

Moreover,

OSD 3.3(b)(2)

<sup>1</sup> (U) Jahangir Amuzegur, Energy Policies of the World: Iran (Newark, Delaware: University of Delaware, College of Marine Studies, 1975), p. 63.

<sup>2</sup> (U) A recent press report is not considered sufficient evidence of a firm decision.

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these availability dates would only be feasible if the use of the reactor is ~~dedicated in large part to the weapons program, thereby increasing the probability~~ of detection of the program. The more likely availability dates would therefore be 2-3 years later.

~~(C)~~ The Hedge Option Path is a clearly feasible long-term program. The current commitment to a nuclear power program will provide an opportunity to divert materials for a weapons program. The availability of the first weapon would not be expected before 1995, or even after 2000 if domestic reprocessing were to be employed in the nuclear fuel cycle. A more attractive variant of the Hedge Option Path is the mating of an Iranian power program with a foreign reprocessing program, such as would be possible with Pakistan. The availability date for the first device would move forward to 1986-1987 with similar but possibly less inhibiting problems associated with a test program as are noted for the Minimum Resource Path. Development of requisite fissile material in a domestic laboratory facility appears to be less attractive than developing a reprocessing relationship with Pakistan because of the potential of the domestic program being detected.

~~(C)~~ Iran wishes to acquire the assets that would strengthen its nuclear scientific and technological base, including a research center, and possibly a large research reactor and prototype fuel cycle plants. With these, it could follow a Minimum Resource Path. While the economic value or wisdom of the commitment of scarce technological assets to an indepth research and development capability has yet to be proven, Iran may consider such assets are vital to her national nuclear power plans, and may go to considerable lengths to acquire them. Acquisition of these facilities will be indicative of the country's changing potential for nuclear weapon proliferation.

B. ~~(C)~~ Uncertainties in the Analysis (U)

(U) Several uncertainties are implicit in the foregoing analysis.

1. (U) The projection of the development of a national nuclear power program

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is speculative in some respects. The program is sketched out only in general terms at present. ~~Many of the important decisions affecting program choices~~ and milestones remain to be made. Thus, the program could be compressed over the period projected above or, conversely, stretched out or reduced in scope.

2. (C) The projection of a major research program is based on the acquisition of a large scale research reactor. For example, the acquisition from France of a reactor like the OSIRIS, which would support an inference of proliferation along a Minimum Resource Path, was only intimated in recent news reports, which immediately gave rise to a wave of adverse comment in the French press. It is not clear whether this acquisition was seriously considered by Iran, whether it is still being negotiated, and what the chances are that the deal will be consummated.

3. (C) The value that the Shah places on the international prestige of acquiring a nuclear weapons capability is unknown. Clearly, the authoritarian character of the Iranian political system implies that the Shah's views play a more critical role in Iran than do the views of political leaders in other non-nuclear countries. Little is known regarding the Shah's personal views as to the utility of nuclear weapons in dealing with other nations.

4. (U) Next to the Shah, the military would probably play the second most important role in the development of nuclear weapons. Military views on the political implications and military utility of the weapons are not well known at present.

C. (C) Near-Term Critical Issues (U)

(C) Within the framework of the conclusions presented, the critical issues which will influence the interaction of incentives and disincentives during the next several years include:

1. (U) The stability of the detente with Iraq. An end to the two-year-old detente with Iraq and a return to the confrontation politics of the early 1970s, including the border skirmishing of 1974 could lead the Shah and his

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planners to upgrade their assessment of the regional threat.

2. (U) The stability and continuation of the conservative role on the Gulf's south shore. The Shah has frequently expressed his concern about the possibility of "ideological encirclement," that is, encirclement by the Soviet Union, Iraq, and possibly another Arab socialist regime on the Gulf's Arabian littoral.

3. The impact on Iran's assessment of the reliability of the U.S. as an ally if there is a flaccid U.S. response to the Soviet naval buildup in the Indian Ocean and Soviet and Cuban penetration of East Africa, especially of the Horn. A reassessment in Tehran of the viability of the U.S. presence and security guarantees could significantly increase the likelihood of recourse to the Minimum Resource Path.

4. (U) Economic conditions as they relate to the development of the national nuclear program. A capital shortage resulting from the press of competing development objectives could lead to a scaling down of the nuclear program. Similarly a critical study of interfuel economics might lead energy planners to use domestic fossil fuels in power plants and hence reduce the scale of nuclear power expansion.

5. Progress in the development of a nuclear research center. The center is scheduled to be completed in 1980. Delays in its development or problems relating to staffing would impact on the feasibility of both the Minimum Resource Path and the Hedge Option Path.

6. A decision to proceed with the acquisition of a large scale research reactor. Some evidence exists that this is under consideration but it does not appear that a firm decision to proceed has been made. Such a facility is central to the early availability (mid-1980) estimates via the Minimum Resource Path. It also plays a contributory role to the development of a technically self-sufficient national nuclear program.

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D. ~~(C)~~ Circumstances that Might Significantly Change the Conclusions and the Interaction of Incentives and Disincentives. (U)

~~(C)~~ Certain events could occur which could change significantly the relationship of incentives and disincentives upon which the above near-mid and long-term assessments are based. Given that proliferation is viewed as a dynamic phenomenon, identification of these circumstances ensure that as events evolve, the assessment and policy responses can be adjusted appropriately. They include:

- A major shift in the existing balance in the Gulf between traditional and socialist status. A shift to socialist status by the Arab states south of the Gulf would favor incentives.
- Deployment of nuclear weapons by India. Given the Iranian commitment to Pakistani independence, Indian deployment would be an incentive for Iran to go-nuclear.
- Amelioration of the Pakistani-Indian tensions. This would reduce the regional threat to Iran and hence the probability of a close nuclear relationship with Pakistan. This change would probably also be accompanied by a reduction of Soviet influence in the Indian Ocean.
- The deployment or development of nuclear weapons by other countries leading to the perception that 'modern' great powers 'require' a nuclear weapons capability.
- A major failure of political will by the United States in its rivalry with the USSR. Clearly, this would significantly shift the current balance toward incentives.
- The death or replacement of the Shah by a new national leader. The net effect of such a change on the acquisition of a weapons capability is uncertain.

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- Access to weapons grade materials (even in very limited quantities) and weapons technology via an ally.
- A major lowering in the development priority of nuclear power. This would lower the feasibility of the Hedge Option Path. A large research reactor could still be procured, however, under the guise of a shift to an R&D program emphasis rather than development of generating capacity.

~~(S)~~ COMMENTARY (U)

(U) *The conduct of the Iranian analysis indicated no major problems with the role of the net assessment in the evaluation procedure. The concept of viewing the interaction of incentives and disincentives in distinct time periods (current, near-mid-long term) was relatively easy to apply. Yet several items should be noted.*

~~(S)~~ *First, the embryonic nature of Iran's technical capability prevented the development of clear near end and mid-term conclusions regarding availability. The estimation of availability is dependent upon development of 'representative' programs, given the absence of definitive national programs. Yet, since the concern is as much "when could they proliferate" as "will they" given the long-term strategic trends, the requirement to use 'representative' programs does not weaken the analysis.*

(U) *Second, the trends and nature of interaction of incentives and disincentives are relatively firm. There is probably less ambiguity in the Iranian case than in many other Nth countries, and there are few problems in weighting an incentive vs a disincentive.*

~~(S)~~ *Third, one path to proliferation was clearly favored. In other Nth countries, this will probably not be true. For these, several paths may prove to be equally desirable and the ambiguity contained in assessing a*

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particular event or technical data in general greater than for Iran. In these cases, the evaluation procedure that includes more than one path as an integral part in the analysis is an effective way of handling apparently conflicting information and communicates the important fact that many routes are possible. Even within the four dominant paths included in the monitoring system, there are many combinations and variants possible.

(U) The difference between the three subsections--uncertainties in the analysis, near-term critical issues and circumstances that might significantly change the conclusions regarding the interaction of incentives and disincentives--warrants comment. Unless the difference is understood, points made under each section will tend to blend.

(U) The uncertainties in the analysis section documents known limitations in data or in the weighting of factors in the development of the net assessment. Critical issues, on the other hand, are those factors which are in the near-term (3-5 years) within the framework of the conclusions of the net assessment. The 'circumstances' section lists these shifts, changes, or events which are feasible but do not have as high a likelihood as to warrant inclusion as a dominant factor in assessing motivational trends or technical capability. The method attempts in two places to explicitly insert in the analysis a means to include items which would not be part of 'conservative' or 'surprise-free' analyses<sup>1</sup>--first, the identification of 'other incentive and disincentives' under the assessment of motivational trends and secondly in the 'circumstances' section of the net assessment.

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<sup>1</sup> (U) As a consequence "conservative" and "surprise-free" analyses can be derived on a less arbitrary basis.

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VII ~~(C)~~ INTELLIGENCE REQUIREMENTS (U)

A. (U) General (U)

(U) The preparation of the net assessment indicates that the priority intelligence needs are the following. Note that the coding reference is to the information categories of the monitoring system outlined in Monitoring Nuclear Proliferation, SRI SSC-TN-4802-1, May 1977 (SECRET).

B. ~~(C)~~ Technical Data Requirements (U)

~~(C)~~ In the assessment of the information needs for Iran, it is evident that the present state of technical development is such that Iran must develop its internal scientific and technology base and continue to expand its domestic nuclear industry as a precondition to economic growth or nuclear proliferation. As a result of the analysis of possible proliferation paths, there is a specific need for more data on the Iranian approach to the acquisition of fissile material and a weapons research and development capability.

1.0 ~~(C)~~ Scientific and Technology Base (U)

~~(C)~~ More information is needed on the rate and manner at which nuclear technology is assimilated in the Atomic Energy Organization, the power industry and the universities. Additional data is also needed on the specifics of training and education programs. Category 1 information should be routinely monitored with moderate additional emphasis placed on international cooperation (1.1) and engineers and scientists (1.3).

2.0 ~~(C)~~ National Nuclear Industry (U)

~~(C)~~ Major national emphasis is on the acquisition of foreign turnkey plants for Iran. Material on the national nuclear industry

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should also be routinely monitored for downward revisions in the total nuclear generation capacity objective for the year 2000 and for AEO efforts to assume a greater participatory role in nuclear power plant or fuel service installations.

3.0 ~~(S)~~ Fissile Material (U)

~~(S)~~ This category has been singled out as the critical element of a postulated Minimum Resource Path to proliferation. A modest effort should be maintained for the next year to better understand the national potential for acquisition of fuel. Of particular interest are categories 3.2 "Large Research Reactors" and 3.3 "Uranium Reserves and Production." In the latter category, interest should cover both domestic exploration and nondomestic arrangements.

4.0 ~~(S)~~ Weapons Research and Development (U)

~~(S)~~ This category is not critical at this time; only routine monitoring is recommended. Data should be gathered however in the area 4.1 "Organization and Facilities for Applied Research."

5.0 ~~(S)~~ Weapons Fabrication (U)

~~(S)~~ This category is not critical at this time; only routine monitoring is recommended.

6.0 ~~(S)~~ Delivery System (U)

~~(S)~~ This category is not critical at this time; only routine monitoring is recommended.

C. ~~(S)~~ Non-Technical Data Requirements (U)

~~(S)~~ The intelligence requirements for non-technical data are as follows:

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1.0 ~~(S)~~ Perceived Threat (U)

~~(S)~~ Only routine monitoring is recommended at this time.

2.0 ~~(S)~~ Security Guarantees (Domestic Attitudes) (U)

~~(S)~~ Are there domestic attitudes toward security guarantees that are significantly at variance with official interpretations? If so, are such attitudes concentrated in certain parts of the elite? Are they held with enough conviction to be influential under a successor regime? Do they favor or militate against nuclear weapons acquisition?

3.0 ~~(S)~~ Political Utility (U)

~~(S)~~ Only routine monitoring is recommended at this time. Some effort should be expended to ascertain the Shah's reaction to the international prestige India gained (if any) from the detonation of her device.

4.0 ~~(S)~~ Military Utility (Deterrent to Aggression) (U)

~~(S)~~ Given the victory of the less pro-Soviet Janata Regime in the recent elections, is there evidence to suggest greater Indian reluctance to produce and deploy nuclear weapons? (This would change the Iranian perception of the military value of nuclear weapons in the region.) Is there evidence (diplomatic initiatives, force deployments, other signals) that the new Indian government intends to relax pressure on Pakistan?

5.0 ~~(S)~~ Arms Control Positions (Nuclear Free Zones) (U)

~~(S)~~ Again assuming the possibility of change in Indian attitudes (not only toward regional powers but toward the superpowers as well), is there evidence of renewed Iranian interest in the so-called "zone of peace" concept for the Indian Ocean?

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6.0 ~~(S)~~ Attitudes Toward Foreign Reaction (U)

~~(S)~~ Only routine monitoring at this time. One item of interest is the Iranian reaction to the new U.S. administration's foreign policy initiatives. Is the U.S. perceived as having more or less political will to confront the Soviets in a crisis? Is the U.S. more or less effective in countering the shifting balance of power in U.S./USSR relations?

7.0 ~~(S)~~ Domestic Political Factors (U)

~~(S)~~ Are there major policy issues in Iran on which the military opposes the Shah and his inner circle to any important degree? What are these issues? How deep is the military's institutional feeling on them? Do any of them suggest a potential divergence of opinion as to the advisability of acquiring nuclear weapons?

8.0 ~~(S)~~ Economic Factors (U)

~~(S)~~ Only routine monitoring at this time. Of particular interest is the nature of the current problems in executing the national economic development plan. Is the role of nuclear power being given more or less emphasis? What programs appear to be direct competition for the investments needed for the national power program?

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