

Proj. 4890711 (2)
PN - PD-ADD-489-
B1

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
Washington, D.C. 20541

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations
For the Review of the
Development Loan Committee

KOREA - STANDARD RESEARCH INSTITUTE

DAI-AC/P-2088

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

UNCLASSIFIED

AID-DLC/P-2088

May 22, 1975

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Korea - Standard Research Institute

Attached for your review are the recommendations for authorization of a loan to the Government of the Republic of Korea ^{1/} ("Borrower") in an amount not to exceed Two Million Dollars (\$2,000,000) to be made available to finance the foreign exchange costs of certain technical assistance, training, and equipment to assist in the establishment of the Korea Standards Research Institute. It is our intention to authorize an additional Three Million, Three Hundred Thousand Dollars (\$3,300,000) early in FY 1976, subject to the availability of funds, to provide the remaining foreign exchange required for the establishment of this institute.

This loan proposal is scheduled for consideration by the Development Loan Staff Committee on Friday, May 30, 1975; please note your concurrence or objection is requested by close of business on Wednesday, June 4, 1975. If you are a voting member a poll sheet has been enclosed for your response.

Development Loan Committee
Office of Development
Program Review

Attachments:

Summary and Recommendations
Project Analysis
ANNEXES A - H

1/ The project paper provides justification for an A.I.D. loan of \$5,300,000 and our objective is to authorize this amount in FY 1975. However, current information on fund availabilities suggest that authorization of the full amount may not be possible in FY 1975. In that event, it is our intention to commit the total funding required in two stages: an authorization of \$2,000,000 in FY 1975, and an authorization of \$3,300,000 in early FY 1976.

UNCLASSIFIED

KOREA - KOREAN STANDARDS RESEARCH INSTITUTE PROJECT

TABLE OF CONTENTS

<u>Topic</u>	<u>Page Nos.</u>
Summary and Recommendations	1
I. Description of Project	
A. Introduction to <u>Subject Matter-Standardization</u>	1
B. Project Design, <u>Using Logical Framework Methodology</u>	4
1. Sector Goal	4
2. Project Purpose	4
3. Project Outputs	7
4. Project Inputs	10
C. Beneficiaries	12
II. Justification and Background	
A. History and Development of Proposal	13
1. Identification of Constraint to Korean Development	13
2. Consideration of <u>Alternative Investments in the NSS</u>	14
B. Related Experience in Korea and Other Countries	17
1. ROKG Policies and Programs for NSS	17
2. Technical and Feasibility Studies	19
3. Other Donor Activity	21
4. Prior AID Support for Science and Technology Programs in Korea	22
5. Prior AID Experience	23
C. Relationship to AID Strategy	24
III. Project Appraisal	
A. Economic Aspects	25
1. Economic Feasibility of KSRI	25
2. Potential Effect on U.S. Economy	29
B. Financial Viability	31
1. ROKG Commitment to Finance Local Currency Costs	31
2. Self-sustaining Financial Status of KSRI	32
3. ROKG Ability to Repay Loan	33
C. Technical Soundness	35
1. Evidence of Demand for KSRI Services	35
2. Effective Functioning of Entire NSS	36
3. Availability of Manpower Required for KSRI	37
4. Provision of Support Facilities in Science Town	38
D. Administrative Feasibility	41
1. Inter-Ministerial Support for KSRI	41
2. Structure and Management of KSRI	42
3. Korean Capability to Construct KSRI Facilities	43
E. Policy Considerations	44
1. Legislation and Policy Supporting KSRI's Role	44
2. Legal Aspects Concerning Establishment of KSRI	46

Page Nos.

3. Advantages of Autonomous Institution	48
F. Social Aspects	49
1. Quality-Control Consciousness among Korean Public	49
2. Interest by Industrial Sector in Improved Measurement	50
3. Integration of Women into Development Process	51
IV. Project Implementation	
A. Implementation Plan	53
1. Plan for Establishment of KSRI	53
2. Loan-financed Activities	54
3. Implementation Procedures	58
4. Financial Plan	61
5. Disbursement Procedures	64
B. AID Monitoring Strategy	65
1. Locus of Monitoring Responsibility	65
2. Illustrative Outline of Principle Events	65
3. Monitoring Procedures	65
4. Reporting Arrangements	66
C. Evaluation Plan	67
1. Evaluation Design	67
D. Summary of Issues	69
1. Timing of Local Currency Availability	69
2. Support Facilities at DaeDuk Science Town	69
3. Competition between KSRI and FIC	69
4. <u>Low Industrial Interest in Improved Measurement</u>	70
E. Conditions Precedent and Special Covenants	71

List of Annexes

- A - Draft Loan Authorization
- B - Section 611(e) Certification
- C - Checklist of Statutory Criteria
- D - ROKG Loan Application
- E - Project Design Summary (Log-Frame Matrix)
- F - Discussion of Issues Identified by AID/W
- G - Environmental Impact Assessment
- H - Information Memorandum to the Deputy Administrator

KOREA

KOREA STANDARDS RESEARCH INSTITUTE PROJECT

1. Borrower: The Government of the Republic of Korea (ROKG). The project will be implemented by the Industrial Advancement Administration (IAA) of the Ministry of Commerce and Industry (MCI). The IAA will appoint an Establishment Committee to be responsible for implementation activities until the Korea Standards Research Institute is operational.
2. Amount of Loan: Five million three hundred thousand dollars (\$5.3 million)
3. Duration of Loan Project: Three years, with disbursements expected to occur in CY 1976-78.
4. Terms: Repayment within 40 years, including a ten-year grace period; interest at two percent (2%) annually during the grace period, and three percent (3%) thereafter.
5. Purpose: To establish a Korean system that will insure reliability of industrial measurements.
6. Project Description: The project will assist the ROKG to develop an effective national metrology standards system and to create a Korea Standards Research Institute (KSRI) to head that system.) KSRI will insure the reliability of industrial measurements by establishing national measurement standards traceable to international standards; disseminating these standards to measurement laboratories and industrial firms; maintaining these standards and instrument accuracy through a national calibration service and inspection activities; and refining national standards through research, development and advisory services.
7. Project Costs and Financing Arrangements: The total cost of establishing KSRI is estimated at \$11,500,000, of which \$5,300,000 represents foreign exchange costs and \$6,200,000 (won equivalent) represents local currency costs. All foreign exchange costs will be financed by the proposed A.I.D. loan; the ROKG will finance all local currency (won) costs.
8. Other Sources of Financing: Other sources of financing are not available to assist this project.

9. Mission Views: USAID/Korea views this project as being a key element of its current program which emphasizes: "The assurance of higher level technology, including both competence in the sciences and the sophisticated resource planning and management needed to guide and support the acceleration in the growth of Korea's economy at the rate envisaged in the 1981 plans."

10. Issues: Issues concerning the project are discussed in Section IV-D of the Project Paper. In the Project Committee's judgment, all of these issues are being satisfactorily addressed.

11. Statutory Criteria: All statutory criteria have been satisfied (see Annex C).

12. Recommendation: Authorization of a loan to the ROKG in the amount of \$5.3 million to finance the foreign exchange costs of the project, subject to the terms and conditions stated in the Draft Loan Authorization attached as Annex A.

USAID Project Committee:

Loan Officer and Chairman:	Zachary M. Hahn, DLD
Legal Advisor:	John W. Roxborough, LEG
Engineer:	George D. Reasonover, ENGR
Controller:	Morley H. Gren, CONT
Program Officer:	Dennis P. Barret, PRM
Program Specialist I:	Chang Oh Kim, DLD
AID/W Personnel on TDY:	John Fry, TA/OST
	Robert S. Queener, EA/CCD

AID/W Project Committee:

Loan Officer and Chairman:	M. Milburn Pehl, EA/CCD
Private Enterprise Officer:	Richard Goodrich, EA/CCD/PE
Engineer:	James Cooperman, ENGR/OPS
Country Desk Officer:	Rodolphe Ellert-Beck, EA/EAA/K
Legal Advisor:	Herbert Morris, GC/EA

Drafting Officers:

Zachary M. Hahn, DLD
Robert S. Queener, EA/CCD

Part I. Description of Project

A. Introduction to Subject Matter-Standardization

Standardization, broadly defined, is the set of attributes of goods and services involved in agreements between parties, such as in the sale of goods or services between buyer and seller. More specifically included are engineering and other product standards which describe minimum requirements; they may apply just to one factory, firm or association, or they may be recognized as national, regional, or fully international. Basic to this process is the development of standards for a specific good, preferably by consensus of all parties concerned, and the tests of conformity, which themselves are the subjects of standards. Compliance may be voluntary or made mandatory by legislation. Standardization includes specifications and codes. Specifications are conditions applicable to a limited group of articles to be supplied by a vendor, and codes are non-specific conditions applicable to a group of items or people entering into commercial transactions. Examples are safety codes for workmen and building codes under a given jurisdiction. Of special significance are the physical standards that represent the units of measure such as the kilogram for weight or the meter for length.

It follows from the definitions that standardization is directly involved in all industry, trade and commerce. Only through standardization can equity be assured in the most primitive market place or interchangeability be achieved for the most complex part of a product of high-technology. It is widely accepted that standardization is vital to industrial growth of any modern economy, and that the complexities involved make it almost essential for each country to have a central national capability for standardization, the guardian of the National Standards System (NSS). Perhaps its most challenging technical component is the provision of stable national physical standards compatible with international standards. The requirements in measurement science (metrology) make a national metrology institute a part of virtually every modern nation.

Examples of principle concerns of a NSS are:

- 1) the unification of definitions of terms in trade and the greater use of an international system of units of measures (SI);
- 2) the institution of a calibration service for instruments and physical standards that can not be calibrated by SRD or SRM's;
- 3) the supply of standard reference materials (SRM's) certified to represent accurately one or more physical or chemical properties for calibration of instruments and comparison with the same property in a raw material or manufactured good;

- 4) The dissemination of standard reference data (SRD) - accurately evaluated property data for well characterized materials to facilitate engineering design, measurement of material properties and self-calibration of instruments;
- 5) the realization of advantages from harmonization of national with international standards including the compatibility of physical standards;
- 6) the capability for production controls in factories and quality control of products;
- 7) the restriction of unnecessary proliferation of manufactured sizes;
- 8) the provision of schemes for informative labelling of products, quality marking and credible compliance certification in accord with established statistical principles and inspection procedures;
- 9) the establishment of critical measures for air and water pollution for environmental control;
- 10) the concern for disaster avoidance, fire prevention and fighting, safety in mines and factories, food and drug controls, etc,
- 11) the wholesomeness of food;

Because metrology plays a crucial role in standardization, a standards system must include a national capability for physical measurement which can help establish the needed level of measurement accuracy in laboratories and firms throughout the country. Figure I-1 (attached) helps to visualize the traditional view of a national metrology standards system, with a national standards organization at the top maintaining primary standards that are traceable to internationally recognized standards and that provide calibration services for government and private measurement laboratories. At the base are industrial firms and commercial operations whose needs are the justification of the entire system. Their working standards are calibrated by measurement laboratories and when the need dictates, by the national standards organization itself. As shown in Figure I-1, metrology standards are traditionally classified in a hierarchy of primary, secondary, tertiary, and working standards according to the purpose of use and range of accuracy required. Primary standards, normally maintained only by the national standards organization, are devices which establish the definition of basic measurement units. These standards are transferred to measurement laboratories through various means, including calibration of standard devices maintained there. Since the required accuracy and corresponding performance of these standard devices are slightly lower than the primary standards, these devices are referred to as secondary and tertiary standards. Similarly, these standards may be transferred to industrial and commercial establishments through calibration, again with a slight reduction in accuracy requirement and performance.

Figure I-2 illustrates the relationship between primary, secondary, tertiary, and working standards, using the example of length measurement. An essential feature of the entire system is that industrial measurements are traceable back to standards maintained by the national standards organization. Independent measurements of the same property by two or more different entities should be compatible provided that each entity's measurement standards are traceable to national standards, and the environment in which the measurements are made is under control.

Definition of Terms Used in This Project Paper:

- 1 - Metrology is the science of measurement.
- 2 - Legal Metrology is the body of legislation and administrative regulations governing the measurement system, especially those concerned with retail markets.
- 3 - Accuracy of a measurement is its agreement with the applicable true value.
- 4 - Traceability is the measurement link with a measurement standard of greater credibility.
- 5 - Calibration: the adjustment (or provision of quantitative correction constants) of a measurement standard or device so that it will yield true values within its degree of accuracy.
- 6 - Standard Reference Materials are sample materials with one or more certified property values at accuracies at or near the "state of the art." SRM's facilitate self-calibration of measuring devices.
7. Standard Reference Data are quantitative information in the physical, chemical and engineering sciences, such as on the properties of well characterized materials, which is accurate and carefully evaluated for its reliability. SRD also facilitate self-calibration of measurement devices, and are needed throughout science and technology for optimum engineering design.

Figure I-1
SCHMATIC OUTLINE

OF A
NATIONAL METROLOGY STANDARDS SYSTEM

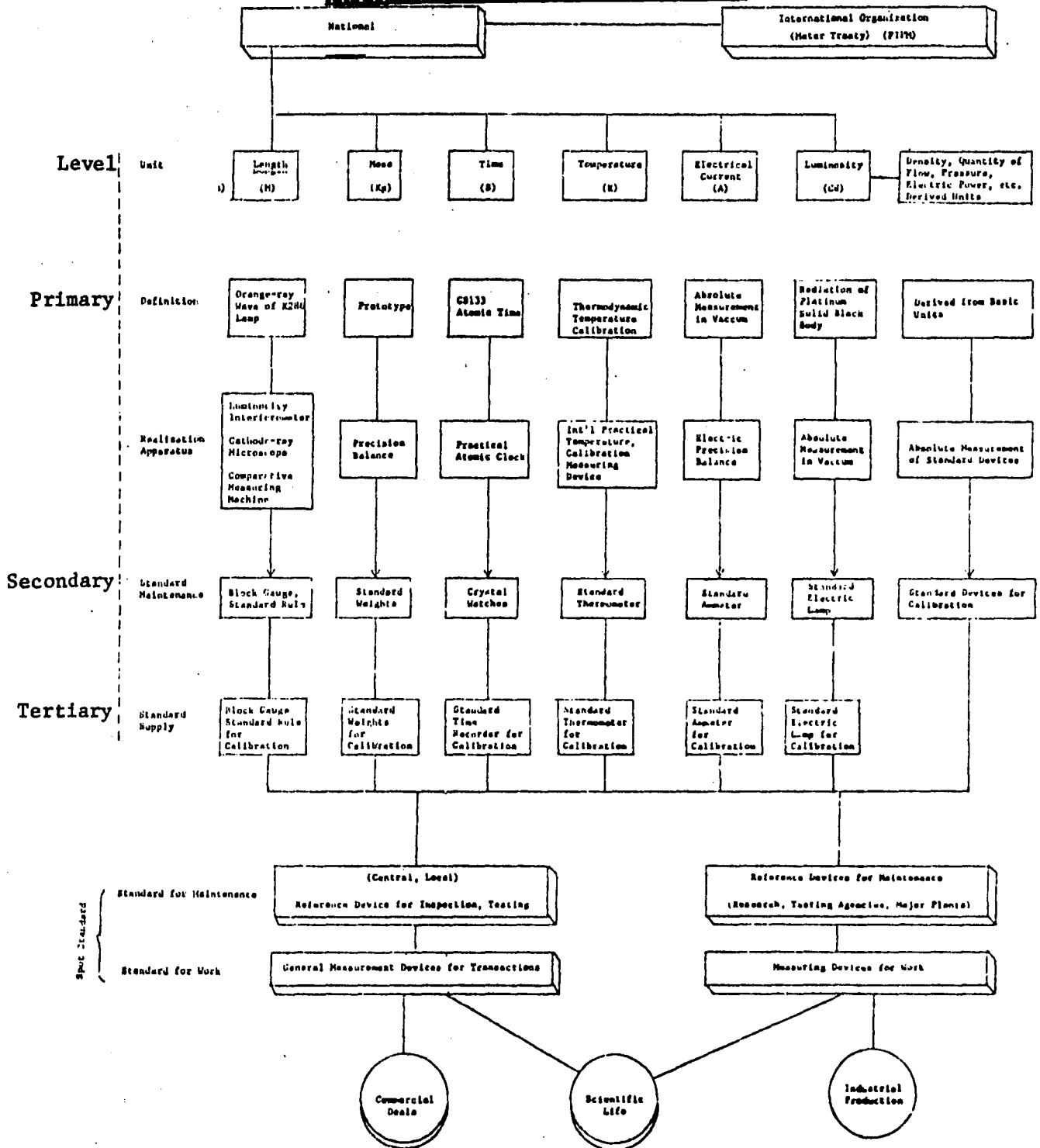
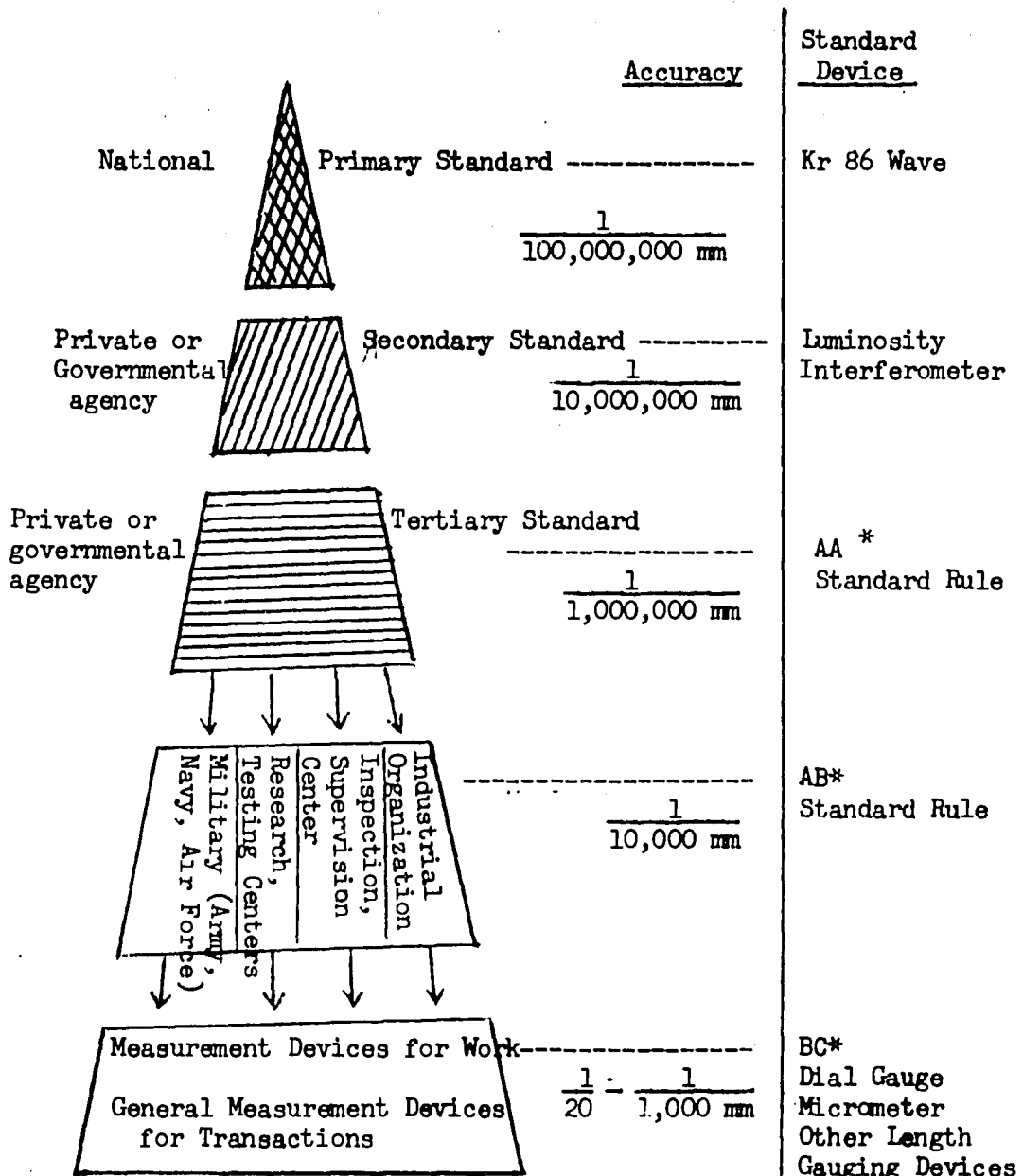


Figure I-2

Measurement Supply System

(Example for a Length Standard)



* Designations of accuracy of standard.

B. Project Design, Using Logical Framework Methodology¹

1. Sector Goal: to Support the Expansion of Korean Industry, with Particular Emphasis on Heavy and Chemical Industry

This goal is one of the principal concerns of the Korean Government (ROKG) for the decade of the 1970's and will be assigned high priority in the forthcoming Fourth Five Year Plan (1977-1981). During the ten-year period 1972-1981, ROKG plans call for the share of manufacturing in total output to increase from 25% to over 40%, and its share in export earnings to rise from 73% to 93%. During the same period, the greater emphasis on heavy and chemical industry² is expected to result in significant increases in the share of heavy and chemical industry in total manufacturing output (from 35% to 51%) and in manufactured exports (from 27% to 65%).

The sector goal was supported by the World Bank Economic Mission of 1973, which stated that "the deepening of the industrial structure through a relatively greater emphasis on intermediate and heavy manufactures is both necessary and desirable, if the rapid growth of industry is to be maintained."³ The AID Development Assistance Program for Korea (FY 1975 - FY 1981) acknowledged the importance of this goal and established as one of the principles of AID strategy "the assurance of higher level technology, including both competence in the sciences and the sophisticated resource planning and management needed to guide and support the acceleration in the growth of Korea's economy at the rate envisaged in the 1981 plans."⁴

2. Project Purpose: to Establish a Korean System That will Insure Reliability of Industrial Measurements

The project will assist the ROKG to develop an effective national metrology standards system and to create a highly competent and scientific Korea Standards Research Institute (KSRI) to head that system. The system will be responsible for insuring the reliability of Korean industrial measurements. Reliability should be understood in a dual sense: (1) the compatibility of two or more independent measurements of the same property within Korea requiring that the various working standards employed are traceable to a national standard, and (2) the compatibility of a Korean measurement with independent measurements of the same property made in one or more other countries because the Korean standard and the non-Korean standards employed are all traceable to an international standard.

-
1. Refer to Annex E, Log-frame matrix for project design summary.
 2. The Economic Planning Board use of this term encompasses metal and metal products, machinery, chemicals, petrochemicals, shipbuilding, automobiles, clay/glass/stone products, and electronics.
 3. IBRD, Current Economic Position and Prospects of the Republic of Korea, February 20, 1974 P. 60.
 4. AID, Development Assistance Program for Korea, February 1974, P. 53.

The Korean national metrology standards system and KSRI, in particular, will insure measurement reliability by carrying out the following primary functions:

- a - establishing national measurement standards.
- b - disseminating these standards in useable form to measurement laboratories and industrial firms.
- c - maintaining these standards and instrument accuracy through supervision of a national calibration service, inspection activities, and control over the measurement instrument industry.
- d - refining and upgrading national standards through research, development, and advisory activities.

Contribution of Project Purpose to Sector Goal

Increased reliability of industrial measurements is essential for the expansion of industrial production for the following reasons:

a - Market acceptability of manufactured products, particularly for the heavy and chemical industries which Korea is trying to promote, depends greatly upon the ability of these products to conform with and perform according to specifications. These requirements can be satisfied only with the aid of reliable measurement, both within Korea and especially in the more demanding, quality-conscious world market. ||

b - Industrial firms can lower unit costs and increase efficiency by reducing the number of defective and sub-standard products they manufacture and by reducing the amount of raw material used per product unit. In order to achieve this increased efficiency, they require improved measurement capabilities to both control the manufacturing process and to appraise the finished product as a test of the process itself. ||

c - Precise measurement capabilities are required to exploit successful results of research and development and to adapt the most advanced foreign technology to Korean use. National documentary standards are an important means of disseminating such technology throughout industry. However adoption of higher technology standards presupposes a capability to devise effective test methods, to control the manufacture of products within industry, and to measure with precision the compliance of products with standards. KSRI can supply this capability.

Assumptions Concerning Linkage of Purpose to Goal

Important as it is, the national metrology standards system is only one of many efforts that in combination will enable Korea to achieve its goal of expanded industrial production and exports. In

the Project Committee's judgment, the national metrology standards system is the area which has been most neglected and where the gap between existing and required capabilities is greatest. Therefore, it is the most logical candidate for the U.S. assistance being proposed. However, failure to progress in any of the other areas of effort would diminish the impact of an otherwise successful project in metrology standards on the sector goal. In our project design, we assume reasonable progress in these other areas as follows:

a - Industrial expansion, with particular emphasis on heavy and chemical industry, will continue to receive the highest ROKG priority in terms of promotion, investment, and special incentives throughout the Fourth Five Year Plan. This assumption appears valid in light of Presidential statements, preliminary plans of the Economic Planning Board¹, and the creation in 1973 of a special planning office for the promotion of heavy and chemical industry.

b - Korean capabilities in research and development and the supply of competent scientific and technical manpower will be adequate to support the planned expansion of industry. The assumption about R & D capabilities appears valid in light of the demonstrated competence of the Korean Institute of Science and Technology (KIST) and the Ministry of Science and Technology's plan to establish five strategic industry research institutes in a new Science Town near Taejon, Korea (shipbuilding, oceanography, mechanical industries, petrochemical, and electronic communications) at a total cost of \$72 million. The manpower assumption seems justified by heavy ROKG investments in higher education and technical training, including projects such as the continued development of the Korean Advanced Institute for Sciences (KAIS), a post-graduate engineering institution, and plans to strengthen the post-graduate center of natural sciences at Seoul National University (SNU). AID has assisted KIST through grant and loan-funding (approximately \$9 million), KAIS through loan-funding (\$6 million still being disbursed), and will propose a \$5 million loan for SNU's College of Natural Sciences for authorization in FY 1975.

c - Factor costs and productivity in Korean industry will permit its products to be competitively priced in the world market. Korea's previous experience with light manufacturing products and its continued low labor costs suggest that Korea can achieve competitive prices. Moreover, the proposed project in metrology standards will contribute to higher productivity.

1. Refer to EPR, Long-term Prospects for the Korean Economy, 1972-1981, 1973.

d - The ROKG will continue efforts to strengthen other components of the National Standards System (NSS) responsible for industrial standards, quality control, and quality assurance of industrial products, and these efforts will be effective. The Project Committee believes that the vigor and vision of the leadership of the Industrial Advancement Administration (IAA), the IAA's existing plans for strengthening the NSS, and the diagnosis and recommendations for improving the NSS to be provided by a consultant team from GE-TEMPO provide ample justification for this assumption.

e - Corresponding improvements in product and process engineering will occur at the plant level. This is an area that will require considerable effort. In the Project Committee's judgment, industrial interest in such engineering capabilities and demand for appropriate training services will increase as a result of KSRI's activities, greater emphasis by the ROKG on quality control and reliable measurement, and possible legislation providing financial advantages to firms with better quality control programs. However, progress in this area should be assessed periodically.

f - Korea will continue to strengthen its capabilities in industrial statistics and in market analysis, as required for effective industrial planning. The Economic Planning Board, the Korea Development Institute, and the Ministry of Commerce and Industry are all concerned with these activities. However, some improvement will still be needed, particularly in the very important area of market analysis, if Korea is to expand its output and exports of increasingly more sophisticated goods. Progress in this area should also receive periodic assessment.

3. Project Outputs

The principal output is the establishment of KSRI, including construction of the building, provision of the controlled environment required for preservation and use of standards and related equipment, development of a full staff complement, and organization of basic measurement labs and supporting facilities. The other outputs are the organization of systematic programs for the following functions:

- dissemination of standards through calibration, SRM's, SRD collections, etc.
- maintenance of standards and instrument accuracy through supervision of a national calibration service
- research on standards and measurement
- training of metrology personnel
- metrology propagation program to promote the improvement of measurement capabilities within industrial firms.

- promotion of the measurement instrument industry
- technical information service

Contribution of Outputs to Project Purpose

Push

The combined effect of all of KSRI's programs, if effectively implemented, will be the establishment and utilization of Korean national standards traceable to internationally recognized standards with periodic calibration to maintain that traceability; a high percentage of industrial firms with capabilities for accurate measurement; decreased reliance by Korean laboratories and firms on foreign facilities for the supply of standards and calibration services; and an increasing number of measurement standards developed or modified to satisfy Korean needs.

Assumptions Concerning Linkage of Outputs to Purpose

a. The KSRI salary structure and working environment will be adequate to attract and retain scientific/technical staff. This assumption appears valid because KSRI will be established as an autonomous institution and will be able to offer salaries ~~two~~ ^{two/three} times greater than those permissible under government pay scales and comparable to other autonomous scientific institutions. It is expected that KSRI can provide an attractive scientific environment with an appropriate degree of flexibility for goal-oriented research and the facilities, supporting staff, and funds to support such research. The experience of KIST and KAIS, both progressive autonomous institutions, provide relevant models for KSRI's development.

b. The IAA will successfully implement its plan to strengthen provincial inspection and testing organizations (PITO's) and establish specialized industrial testing labs (SITL's). In its overall plan to promote industrial development, the IAA intends to add further dimension to the national metrology standards system by strengthening the measurement and testing capabilities of the PITO's and establishing SITL's to attend to specialized measurement and testing needs of heavy and chemical industry. KSRI would advise these agencies on test methodology and provide them calibration services; the agencies in turn would help to extend KSRI's influence and services throughout industry, thereby increasing KSRI's effectiveness in achieving the project purpose.

The ROKG has approved this plan in principle and is seeking financial assistance from various foreign donors, so far without definite commitments. Delay in creation of the SITL's should not jeopardize KSRI's effectiveness since KSRI, the inspection departments of the National Industrial Standards Research Institute, and several autonomous and private laboratories can initially share the functions intended for the SITL's. KSRI, once established, will provide advisory services to the IAA in detailed planning for the SITL's.

c. Industrial firms will be induced to strengthen their measurement capabilities and seek the services of the national metrology standards system. This inducement should arise through the combined influence of existing regulatory legislation, government promotion, semi-mandatory policies by government, demands of the world market and profit incentives. This assumption is the one requiring most careful examination and is analyzed thoroughly later in the project paper. In general, there is limited current perception by Korean firms of the necessity and value of improving their measurement capabilities. However, the Project Committee believes that greatly increased industrial concern for measurement capabilities can be achieved for the following reasons:

- i. KSRI will help to create this greater concern
- ii. The system of KS marking, which requires participating firms to have acceptable measurement capabilities, is being extended to many more products
- iii. The IAA Quality Control Campaign in 1975 will effectively focus industrial attention on the essential role of measurement in quality control.
- iv. The ROKG will apply such semi-coercive measures as making government purchases only from firms who have demonstrated competence in quality control and measurement.

d. The ROKG will endeavor to promote the growth of the precision measurement instrument industry through investment and incentive policies. This assumption appears valid in light of the Ministry of Commerce and Industry's precision machine industrial development program, including 24 precision machine plants to be constructed at the Changwon Machine Industrial Estate on Korea's south coast by 1981. KSRI will provide R & D and advisory services to this industry.

e. KSRI will develop cooperative horizontal relationships with research institutions, science departments of universities, and government agencies, and other measurement laboratories. The purpose of collaboration is to facilitate mutual scientific enrichment, coordination of effort, and exchange of technical information.

The location of KSRI in the Dae Duk Science Town is a constructive approach to such collaboration. The already strong interest of the Ministry of Science and Technology in KSRI's future activities and the proposed representation of Korea's science community on KSRI's Board of Trustees are other positive factors. Ultimately, however, the validity of this assumption will depend upon the conscious policy and initiative of KSRI's leadership.

f. All ROKG agencies requiring metrological expertise will draw on the relevant capabilities of KSRI. Other ROKG Ministries concerned with agriculture, transportation, health, etc. are responsible for standards and codes pertaining to their area of interest. The cost effectiveness of KSRI will be greatly enhanced if these other ministries and regulatory agencies utilize KSRI's capabilities rather than develop their own expertise. Current inter-ministerial interest suggests that KSRI may be able to provide a government-wide service, but KSRI's ability to establish a reputation for high-level performance will be the determining factor.

4. Project Inputs

The proposed AID loan of \$5,300,000 will finance the following inputs:

Equipment and Standard Reference Materials (including computer terminals)	\$ 3,550,000
Recruitment of Korean Manpower now in U.S.	270,000
Staff Training	780,000
U.S. Consultants	300,000
Specialized Library Materials	100,000
Contingency	300,000
Total	\$ 5,300,000

Disbursement of loan funds is planned for a three-year period, 1976-1978. Recruitment and training, and equipment orders will be scheduled for staff availabilities and equipment deliveries by the proposed date of completion of physical facilities - July 1977. Approximately six months will be needed for testing equipment and organizing laboratories, and normal KSRI operations are expected to begin by January 1978.

The ROKG counterpart contribution in the won equivalent of \$6,200,000 will finance the following inputs: 1/

Cost of Construction of KSRI Facilities, including land acquisition and architectural and engineering fees	\$5,170,000
Cost of planning, coordination and staff services prior to normal KSRI operations	820,000
Staff training in Korea	210,000
Total	\$6,200,000

In addition, the ROKG will finance the following facilities at the Science Town that will either directly support or be accessible to KSRI:

1. The current exchange rate of U.S. \$1 = W480 is used throughout this paper.

- Computer, Technical Library, Conference Building and Other Joint Facilities
- Community Infrastructure

According to plan, KSRI will be established as an autonomous institution under the Specific Research Institutes Promotion Act, which will enable KSRI to be included in the complex at the Science Town and permit government-owned equipment at NISRI and other institutions to be transferred to KSRI. The Ministry of Commerce and Industry will appoint an Establishment Committee, headed by the Director of the IAA, to be responsible for planning and constructing the KSRI facilities and early implementation of the loan until KSRI is operational. The building, support facilities, and community infrastructure in the Science Town are scheduled for completion by June 1977.

Assumptions Concerning Linkage of Inputs to Project Outputs

a. The necessary competence to construct the KSRI building, including special environment controls, by June 1977, is available in Korea. This assumption appears valid because of past successful experiences with KIST and KAIS facilities. However, the loan will finance U.S. consulting assistance in building design and planning the environmental controls. Since all loan-financed activities will be coordinated with an opening date of July 1, 1977, construction progress will be closely monitored.

b. Metrology equipment at other Korean institutions which is suitable for KSRI can be transferred to KSRI. The GE-TEMPO equipment analysis team identified equipment at existing institutions that is appropriate for a primary standards institution (KSRI) and recommended that this equipment be transferred to KSRI, to minimize redundancy and reduce procurement costs. Much of this equipment is located at NISRI, and will be transferred pursuant to the Specific Research Institutes Promotion Law. NISRI¹ is preparing a plan to arrange for transfer of equipment from other institutes to KSRI.

c. ROKG is willing to budget foreign exchange as part of the recurring KSRI budget, to cover the cost of parts replacement and some additional training. The ROKG will need to establish a regular foreign exchange budget for KSRI by 1978, to cover the costs of replenishing the spare parts inventory and stock of standard reference materials. In addition, some overseas training may be necessary even after the AID Loan has been fully disbursed. Based on the experience of KIST, the Project Committee believes that KSRI will be able to obtain the necessary foreign exchange allocation from the ROKG.

d. Korean personnel working overseas can be attracted to the special environment of the Science Town and the facilities of KSRI. Much of the manpower needed to staff KSRI, with appropriate educational

1. NISRI is the National Industrial Standards Research Institute, which assisted in the preparation of this Project Paper.

qualifications and work experience, is currently employed in the U.S. and Europe - part of Korea's "brain drain". It is proposed that 80% of KSRI's senior staff be recruited from this group of overseas Koreans and then given limited specialized training. It is believed that the excellent scientific facilities to be organized at KSRI, the higher salaries that an autonomous institution can offer, and the quality of life in the Science Town can induce overseas Koreans to return. The past experience of KIST, which succeeded in repatriating numerous overseas Koreans, demonstrates the effectiveness of this approach. However, since employment near Taejon may not be as attractive as work in Seoul, the progress of this recruitment campaign should be followed closely.

C. Beneficiaries

The direct benefits of the Project will accrue to those firms (and their owners) who are able to increase sales, diversify production, and reduce unit costs as a result of improved measurement capabilities. The goal orientation towards expanded production and exports is, at best, neutral concerning such questions as equity and income distribution. The broad justification for the project is that it and a project to strengthen Seoul National University's Graduate School of Natural Sciences represent the culmination of a well-developed strategy in science and technology worked out for Korea with AID assistance over the past decade. The project was presented in this context in the DAP for Korea and the FY 1975 Congressional Presentation, and an information memorandum on this strategy was sent to the Deputy Administrator by the Assistant Administrator, PPC, on February 11, 1975. (See Annex H).

The indirect results of the Project, however, are more far-reaching and will extend broad-scale benefits to large numbers of Koreans at all levels of the socio-economic ladder. These benefits include the following:

1. increased consumer satisfactions as the quality of Korean-manufactured goods is improved.
2. reduced hazards associated with Korean consumer products as safety standards are strengthened and more effectively enforced as a result of improved measurement and inspection techniques.
3. cost savings associated with more accurate means of verifying the reliability of meters and weight and volume labels on product containers.
4. increased job opportunities created by the expansion of the industrial structure in Korea.
5. creation of new career opportunities for high school graduates and non-finishers in a variety of technical jobs arising out of the emphasis on improved measurement and quality control within industry.

Part II. JUSTIFICATION AND BACKGROUND

A. History and Development of Proposal

1. Identification of a Constraint to Korean Development

The ROKG has planned an ambitious program of economic growth through 1981, the end of its Fourth Five Year Plan. During the 10 years from 1972 through 1981, GNP at 1970 prices is planned to increase almost 4 times, from \$9.8 billion to \$36.1 billion (end of 1974: \$17.2 billion). Per capita GNP is scheduled to increase from \$302 to \$983 (at the end of 1974 it was about \$513).^{1/}

Korea's basic strategy, which it has employed so effectively in the past, will be to promote a strong export sector to generate a high overall economic growth rate. This basic strategy is dictated to Korea by its relatively poor endowment of natural resources; Korea must "export to live." To date, light industry has been the detonator of Korea's export "boom," but Korea now plans to increase the proportion of heavy and chemical industrial products

in exports from about 35% in 1974 to 51% in 1981. Such a shift will broaden the base of Korean exports, increase the proportion of value added in Korean exports, and compensate for an expected levelling-off of light manufactured exports as a result of increasing competition from other developing nations.

The successful pursuit of this strategy will require a significantly broader and deeper technological base for the economy and an enhanced Korean reputation for quality production. Many projects have been initiated or are planned for early implementation that will help to assure the presence of these vital factors. Such projects include the creation of specialized industrial research institutes, various university programs to strengthen science-related education, and promotion of greater quality-control consciousness among industrial management and labor.

An improved capability in industrial standardization is as important to Korea's long-range strategy as these other activities, but has received comparatively much less attention in the past. The enrichment of Korea's technological base requires in large part the successful adoption and adaptation of technological advances developed in other countries. However, Korea's ability to do so depends upon its ability to manufacture according to international standards associated with such technology and to accurately measure the conformance of its products with these standards. The percentage of Korean industrial

^{1/} EPB, Long-Term Prospects for the Korean Economy, 1972-1981, P. 19.

standards fully compatible with international standards is an apt indicator of the productive capability of Korean industry and thus a measure of Korea's success in promoting rapid technological development. This percentage, currently between 0-10%, must rise significantly if Korea is to achieve its production and export goals.

The other key factor in Korea's long-range strategy - an enhanced reputation for quality products - also depends upon an improved capability in standardization. A continuum of standards-related activities is necessary for quality assurance: the setting of standards and performance specifications, quality control of production with emphasis on process engineering and instrumentation, and testing and inspection to verify that products conform with established standards.

Accordingly, the ROKG now recognizes that the national standards system is inadequate to serve industry's current needs and that it must be provided the capability for more effective performance. ROKG planners are convinced that potential payoffs in the form of more efficient production, reduction of waste, increased receptivity of foreign markets, etc., fully justify substantial investments in improvement of the standards system. The reality of such economic benefits is confirmed by expert consultants who have studied the Korean situation and by broad quantitative assessments which are described in Section III-A-1 of this paper.

2. Consideration of Alternative Investments in the NSS

As Korean officials responsible for the NSS reached a consensus on the need to improve Korean standards, they also recognized the need for consultant help in formulating an appropriate strategy and identifying organizational and equipment requirements, given Korea's present needs and level of development. The GE-TEMPO Center for Advanced Studies of the General Electric Company was contracted to undertake a feasibility study and to make comprehensive recommendations on ways to strengthen the NSS and eliminate its present inadequacies. GE-TEMPO initiated the study in September, 1974, and their work has progressed sufficiently to yield recommendations which have been incorporated in this project paper.

GE-TEMPO has concluded that the existing standards system is basically well-organized and coordinated. However, metrology standardization is the least adequately performed function of the national standards system and yet the function promising more beneficial spin-off effects for the rest of the system. As a matter of first priority, therefore, the GE-TEMPO consultant team has recommended that the metrology base of the system be substantially strengthened by creating a strong central organization to coordinate metrology standards activities, to supply technical guidance and instruction on measurement, to insure that these activities are efficient and effective, and to link the Korean metrology system to the international one.

The National Industrial Standards Research Institute (NISRI), which is currently charged with the responsibility for national metrology standards has neither the staff nor the facilities to carry out this responsibility effectively. The Weights and Measures Department of NISRI has only 38 personnel, of which 30 are full-time employees and only 13 have regular appointments. Three staff members (two of them on contract) have post-graduate degrees, 15 have bachelor degrees, and the remainder have high school or lower educational qualifications. Only one staff member has more than 10 years of job experience, and 32 have less than 3 years of experience. Moreover, the Department has little chance of attracting scientists and technical personnel with higher educational qualifications and broader experience because of the low salary structure dictated by civil service regulations. Many younger staff apparently regard NISRI as a convenient place to obtain technical experience before passing on to higher-paying jobs in industry.

The present physical facilities of the Weights and Measures Department are inadequate in terms of both layout and environmental control for the needs of a national metrology standards institution. Despite the fact that NISRI is supposed to be the primary standards organization providing guidance and calibration services to entities like FIC and the Korean Air Force Calibration Center (KAFCC), most of NISRI's instruments have only secondary and tertiary standards capability. In reality, there is no sound basis for differentiating between NISRI, FIC, and KAFCC in terms of standards, precision, and technical expertise. NISRI's service is mostly for legally-required inspection of measurement instruments, and calibration for the supply of standards is severely limited.

To remedy the primary defect of the NSS, GE-TEMPO has recommended and the ROKG has endorsed the establishment of an institution to be called the "Korea Standards Research Institute" (KSRI), which will be the immediate and principal output of the proposed project. Both GE-TEMPO and the ROKG believe that the establishment of KSRI represents the most effective use of the proposed AID loan and counterpart ROKG resources. Both feel in particular that KSRI's establishment makes more sense than the other major alternative available, that of strengthening various existing elements of the NSS. In essence, their judgment arises from the conviction that strengthening the already fairly good present system without providing for the requisite metrology functions and scientific leadership of KSRI would prove to be wasteful, because the basic measurement capabilities on which the rest of the system depends would still be lacking. It is recognized that this strategy will result in a period during which the instrumentation of KSRI will be somewhat overdeveloped technically, but this is by design as instrument requirements have been dictated by projections of the 1980 industrial structure and its associated metrology requirements.

With substantial agreement on the need to establish KSRI, it was decided that the proposed KSRI should be an autonomous organization.

-
1. FIC is the Fine Instruments Center.

The autonomous status of the institution will allow it more freedom of action than would be possible as a line organization of the government. This status will allow KSRI to pay salaries above those offered by the ROKG's civil service scale, a necessary feature if KSRI is to recruit and retain staff of the quality needed to carry out its mission. These personnel will be recruited not only within Korea but also from among Koreans now working in Europe or the United States. The decision to set up KSRI as an autonomous organization is primarily the result of the organizational pattern established in Korea over the past ten years. One such organization is KIST, the Korea Institute for Science and Technology. KIST was organized in 1966 to undertake advanced research projects for industry and government in Korea. It is considered an outstanding success in its ability to perform its functions well and efficiently.

The remaining decision is the optimal location for KSRI. The strong preference of both the Ministry of Commerce and Industry and the Ministry of Science and Technology (MOST) is to locate KSRI in the huge Dae Duk Science Town project being constructed near Taejon in central Korea. The Science Town is a MOST initiative and a top-priority project of the ROKG for the Fourth Five Year Plan. Recognizing that effective research, development, and technical support will be a prime factor in the expansion of heavy and chemical industries, the ROKG has decided to establish five new specialized industrial research institutes (shipbuilding, oceanography, mechanical engineering, petrochemical, and electronic communications) in one well-planned complex. In addition, several existing institutes such as the Food Research Institute, National Institute for Agricultural Materials, National Geological Mining Research Institute, Electrical and Telecommunication Laboratory, etc. will be transferred to the Dae Duk Science Town. The advantages of the Science Town are that it will provide an environment conducive to research, foster inter-disciplinary contact and cooperation, and facilitate joint use of expensive central facilities such as an electronic data processing center and an extensive technical library. The location of KSRI among this constellation of institutions is viewed as necessary to facilitate scientific interaction and KSRI support for the other institutions in metrology standards and measurement systems.

Two alternative KSRI locations were considered by the ROKG but considered less advantageous than the Dae Duk Science Town despite possible short-term cost savings. One possibility was a new NISRI annex situated in the Yeoung-deong-po suburb of Seoul, which now houses the Weights and Measures Department of NISRI. This alternative was discarded because of its remoteness from the planned center of scientific activity at Taejon and because the physical layout and environment controls are inadequate for KSRI's purposes. MCI is considering the transfer of part of NISRI's Industrial Inspection and Testing Division to the Yeoung-deong-po facility when the Weights and Measures Department is incorporated in KSRI.

1/ Ministry of Commerce and Industry

A second alternative was to locate KSRI at KIST under the overall supervision of the latter institution. This approach was considered infeasible for several reasons: the organizational objectives of KIST and KSRI are complementary but quite different; KIST's personnel strength of approximately 900 has already reached the limit of effective management and span of control; physical space at the Science Park where KIST is located is now limited; and KIST and KSRI are in different Ministerial spheres of authority - MOST and MCI, respectively.

B. Related Experience in Korea and Other Countries

1. ROKG Policies and Programs for NSS

The National Standards System (NSS) in Korea has a long history, but the fundamentals of the current system were conceived in the early 1960's. As the ROKG formulated the First Five Year Development Plan, it began to concern itself with improvement of the quality of industrial products and productivity in order to achieve the goals of that plan: industrial development, replacement of imports with local products, export expansion, diversification of the industrial structure, and protection of consumers.

In 1961, the government enacted the Industrial Standardization Law to improve the quality of industrial products, promote interchangeability of manufactured products, and increase industrial efficiency. The Bureau of Industrial Standards was organized, with responsibility for the establishment of Korean industrial standards. In addition, a KS-mark system was initiated to encourage quality control.

Also in 1961, the ROKG enacted the Weights and Measures Law to establish and disseminate metrology standards and support quality control and industrial standardization efforts. Consequently, the Bureau of Weights and Measures^{1/} within the Ministry of Commerce and Industry was made responsible for matters relating to weights and measures.

In 1962, the Export Goods Inspection Law was passed to guarantee the quality of export goods. The National Industrial Research Institute was made responsible for the inspection of export goods in accordance with the Law, while organizations for testing various industrial products were established by the private sector in line with the rapid expansion of exports.

In 1967, the government passed the Industrial Product Quality Control Law to improve the quality of industrial products and protect consumers. Under the Law, quality inspection and quality marking were made mandatory for certain classes of products.

1/ Now a department within NISRI

Korea's current plans to promote heavy and chemical industrial development with a view to boosting the per capita GNP to \$1,000 and exports to \$10 billion by the early 1980s, reinforces the need to strengthen quality control and industrial standardization activities. Therefore, the ROKG has given the highest priority to strengthening the NSS.

In 1973, the government established the Industrial Advancement Administration (IAA), subordinate to the Ministry of Commerce and Industry, to more effectively supervise programs concerned with the quality control of industrial products, industrial standardization, inspection of export goods, and protection of consumers. Concurrently, the National Industrial Research Institute was reorganized into the National Industrial Standards Research Institute (NISRI) with broader responsibilities for the maintenance of national standards, quality control, testing, inspection, and standards research. The reorganization was made in accordance with a recommendation by an NBS/AID survey team which assessed the Korean standards system in 1972.

Since 1973, the Korean NSS has been organized in the fashion shown in the following diagram: (Figure II-1)

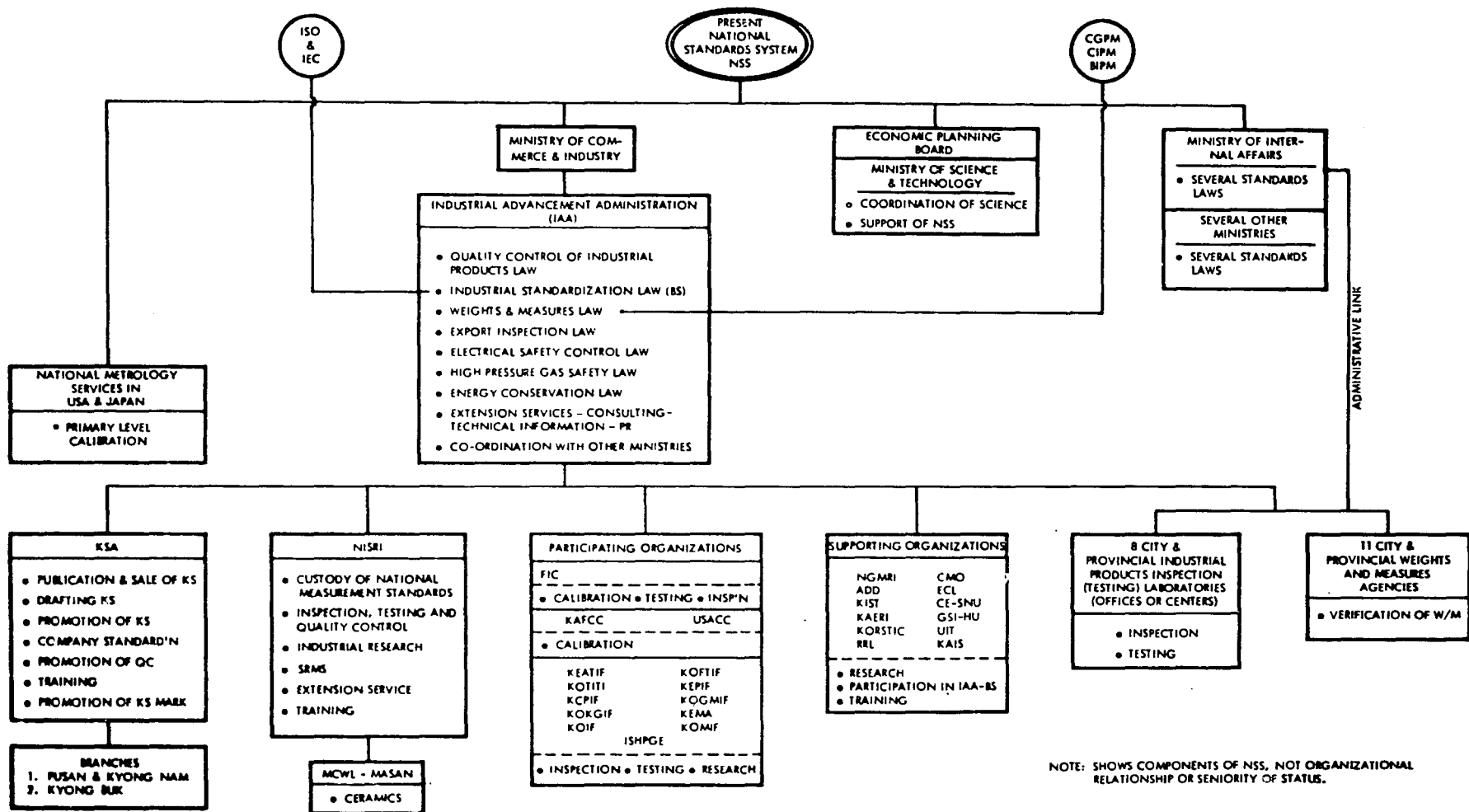


Figure II-1 Components of existing Korean NSS.

2. Technical and Feasibility Studies Concerning NSS and Their Recommendations (Summary)

a. 1967: National Bureau of Standards (NBS) Team Survey

An AID-financed NBS survey team, headed by Dr. Forest Harris and including Mr. Steffen Peiser and Dr. Ronald Eby, recommended the strengthening of the NSS, with prime responsibility for industrial standards, metrology standards, and quality control to be combined in one government agency. At the time, however, other Korean development needs appeared more urgent, and no action was taken on the recommendations.

b. 1972: NBS Team Survey

A second NBS survey was conducted in 1972, with AID-funding. Members of the team included Dr. Thomas D. Coyle, Dr. Eby and Mr. Peiser.

The NBS team made recommendations for improvement of numerous areas, among them that the NSS strengthen its efforts in metrology standards. In accordance with other recommendations of the survey, the nation established the IAA, and reorganized NIRI into NISRI. However, since the survey was conducted in ten days and was necessarily cursory, a more detailed feasibility study was deemed necessary before any decision could be made concerning the appropriateness of AID assistance.

c. 1973: IAA Survey

Report for Establishment of a National Standards and Testing System in Korea

The IAA survey had two basic purposes: (1) to determine the extent and nature of calibration activity for measurement devices in government agencies and industrial firms and (2) to determine the domestic demand for SRM's. Although the response to questionnaires was disappointing, the IAA was able to conclude that there was limited understanding of the value of calibration, that few firms actually prepared calibration schedules or had their instruments calibrated, and that few of the standards and measurement instruments in use were Korean-made. There was also limited understanding and use of SRM's. This survey reinforced the IAA's conviction of the need to establish a strong national metrology standards system.

1890697 d. December 1974 - June 1975: GE-TEMPO Feasibility Study

The purpose of this study, financed by AID under the Second Feasibility Study Loan (489-H-083), is to survey the existing

relate

NSS and recommend the creation of new organizations and/or suitable restructuring of existing ones to produce an NSS fully adequate to support current and future economic development plans.

The survey team will complete its report in June 1975, but has already submitted these conclusions on the main features of the NSS that need strengthening:¹

- 1 - A primary level national repository of metrology standards traceable to international standards is lacking.
- 2 - Korean participation in international industrial standardization activities needs to be intensified.
- 3 - Industry, commerce and the consumer should be more actively involved in the standards writing process.
- 4 - Consideration should be given to developing private inspection laboratories into specialized industrial testing labs.
- 5 - Presently dispersed responsibilities for administering the Industrial Standardization Law should be more centralized.
- 6 - Various ministries administering standards and safety laws should make more intensive use of the standards writing facilities available in the Bureau of Standards.
- 7 - The IAA should intensify public relations and public education on standards.

Based on its conclusions, the GE-TEMPO Team has made two principal recommendations:

- 1 - that the IAA assume a more aggressive technical role through closer supervision and control to ensure the effective functioning of the NSS.
- 2 - that a Korea Standards Research Institute (KSRI) be established as an autonomous organization to maintain national metrology standards and promote improved measurement capabilities throughout Korea.

1 - GE-TEMPO - Interim Report on the Organizational Structure of the National Standards System of Korea, PP. 50-51.

3. Other Donor Activity

At present, neither of the major multilateral donors, the World Bank and the Asian Development Bank (ADB), nor Korea's principal bilateral donor, Japan, plans any assistance to Korea's NSS. The ROKG applied for a \$7 million loan from the ADB for the purpose of strengthening Provincial Inspection and Testing Organizations (PITO's), but the ADB declined on the basis that the assistance desired, mostly importation of equipment, was essentially a program loan. The ROKG now plans to seek World Bank or U.S. Ex-Im Bank financing for this project.

The ROKG is currently negotiating possible loans with West Germany, Belgium, and France for the establishment of various specialized industrial testing and inspection laboratories (SITL's). Germany has agreed to finance feasibility studies of SITL's for metal materials and machinery, with the studies scheduled to commence in May 1975. If the projects are proved feasible, the SITL's will be located in the Changwon machinery complex on the south coast. Belgium and France are reported to be seriously considering loans for SITL's for electric and electronic products, and for petrochemicals, respectively.

The current ROKG cost estimates for the four proposed SITL's are shown in the following table:

	Desired Loan Amount in \$	ROKG Funding in \$ Equivalent	Total Project Cost \$
1. Metal Material	1,170,400	1,169,000	2,339,400
2. Machinery	1,670,000	2,221,000	3,891,000
3. Electric and Electronic Prod.	1,950,000	Undetermined	Undetermined
4. Petrochemicals	1,210,000	Undetermined	Undetermined

The United Nations Development Program (UNDP) has provided two grants totalling \$1,951,000 to assist the Fine Instruments Center (FIC), located in Seoul, in a program spanning the period 1966-76. The principal functions of FIC are to train technicians in the use and repair of fine instruments, to test and inspect electrical and electronic products for safety and export-certification, to provide secondary calibration services to industry, and to promote the electronics and fine instrument industries. The UNDP grants have provided large amounts of equipment, technical assistance and training in support of these functions.

In conversations with the Project Committee, a UNDP representative and members of the UNDP consultant group at FIC expressed concern that calibration services to be provided by KSRI would compete with services currently being offered by FIC and thereby reduce a potentially important source of FIC's income. Upon analyzing the possible effects of KSRI upon FIC, however, the Project Committee concluded that the net result of KISRI would be beneficial. This issue is discussed in greater detail in Section IV-D.

The UNDP has also tentatively reserved \$600,000 in its program budget to assist Korea in the industrial standards field, with emphasis on export-promotion. The details of such a project have not been delineated as both the ROKG and the UNDP are awaiting the recommendations of the GE-TEMPO study.

4. Prior AID Support for Science and Technology Programs in Korea

The pre-eminent place of science and technology in Korea's list of priorities is evidenced in many ways: the Constitution's recognition of the vital contribution of science and technology to national development, extensive and imaginative promotional programs like the Dae Duk Science Town, the current "scientification of the people" movement to elevate the entire nation's awareness of and ability to apply scientific principles, etc. The strategy of AID in Korea has been to support this commitment to science and technology, and the resulting AID program has assisted Korea in science policy planning, scientific and technical manpower development, and creation of the institutional infrastructure for research and development. Highlights of this program include:

- grant and loan-funding of the Korea Institute of Science and Technology.
- loan-funding of the Korea Advanced Institute for Sciences (post-graduate engineering education).
- hundreds of AID fellowships for post-graduate study in the sciences and engineering at U.S. universities.
- partial-financing of Joint U.S.-Korean Science Workshops to discuss Korea's science policy and agenda of priority programs (coordinated by the National Academy of Sciences)
- proposed loan-funding of Seoul National University's post-graduate Center for the Natural Sciences

In the field of standardization, AID has financed visits by National Bureau of Standards experts to Korea in 1967 and 1972 to assess the programs, potential, and problems of the National Standards System (NSS). AID is also financing the on-going GE-TEMPO study of the NSS with approximately \$400,000 from the Second Feasibility Study Loan (489-H-083). Symbolic of this long collaborative U.S.-Korean effort in science and technology was President Lyndon Johnson's donation of a set of prototype standards to Korean President Park, Chung Hee in 1967.

5. Prior AID Experience with Standards Projects in Other Countries

Over the course of the past ten years, AID has provided significant grant and loan assistance to developing countries designed to strengthen institutional capabilities in standardization and measurement services, and utilization of quality control procedures and weights and measures to enhance domestic and international commerce. In Ecuador, assistance was aimed at establishing and appropriately equipping a standards institution to achieve greater impact on standardization and quality control in local industry. A similar but substantially larger project in South Viet Nam focussed on providing selected precision measuring instruments and related equipment for use in connection with upgrading quality control practices in local industry. Under the current science and technology loan to Brazil, a significant effort is being made to strengthen the competence of the Technological Research Institute in Sao Paulo in standardization and measurement through provision of technical advisory services of the U.S. National Bureau of Standards (NBS), commodities such as standard reference materials, and related training.

These projects reflect the developing countries' understanding of the important role of standardization and measurement services in industrializing economies. This role is perhaps best illustrated by the Japanese experience after World War II. Dr. W. Edwards Deming, a standards expert on General MacArthur's staff, convinced leading industrialists that in order to transform the earlier image of poor-quality Japanese products, it was essential to give highest priority to standardization and quality control in industrial production and to activate an appropriate organizational capability needed for sustained efforts in these fields. The nation-wide observance of "Deming Day" each year in Japan reflects the importance of his contribution to Japanese post-war industrialization.

There is pervasive need for and potential economic benefits from improving standardization and measurement services at all levels of national economic development - whether weights and measures for rural market transactions in Ethiopia, quality control for agricultural exports from Thailand, or standardization for industrial production processes in Korea. In response to this need, the Office of Science and Technology of AID is sponsoring a small project with NBS for limited technical assistance to developing countries through surveys, workshops, distribution of standards literature and reference materials, and training. The purpose of this effort is to improve institutional capabilities in standardization, quality control, and measurement services to benefit domestic commerce and export expansion. Evaluation of previous AID support for standardization, the earlier Japanese experience, U.S. experience as reflected in studies of costs and benefits of metrification, and initial reaction and broadening demand for AID/NBS activities support the concept and approach of the project described in this paper.

C. Relationship to AID Strategy

In the current AID Development Assistance Program (DAP) for Korea, the inventory of critical development problems includes "the introduction of new technology; expansion of the professional capability of Korea's core of managers, planners, scientists, and engineers; and upgrading the technical competence of the labor force as the nation moves to deepen and expand the structure of its industrial plant" (p. 31). In response to these problems, the U.S. Country Team established as one of the principal guidelines of development assistance policy "concentrating available FAA resources on those activities that assure a higher level technology, including both competence in the sciences and the sophisticated resource planning and management needed to guide and support acceleration in the growth of Korea's economy at the rate envisaged in the revised 1981 plans" (p. 53). The DAP proposes an FAA loan of \$5.5 million for an Industrial Standards Development Project, if the feasibility study in progress results in a favorable recommendation. (p. 70)

In summary, the proposed project arose out of the Country Team's strategy and is fully compatible with it. The industrial standards project is regarded as a significant contribution to Korea's continuing progress from a "middle-level economy" to a self-sustaining industrial economy.

The project is also fully consistent with the guidelines of AID Policy Determination 51 - Guidance Statement on Selected Aspects of Science and Technology. PD-51 places emphasis on "Strengthening the capabilities of LDC industrial service institutions to assist local industries in selecting, adopting and using technologies," with special reference to industrial research, extension, and standards institutes.

III. PROJECT APPRAISAL

A. ECONOMIC ASPECTS

1. Economic Feasibility of KSRI

The proposed investment in KSRI and projected recurring costs are substantial, as itemized below: ||

Establishment Costs: (1975 - 1978)

-- initial foreign exchange cost of establishing KSRI	\$ 5,300,000
-- local currency cost of constructing KSRI facilities at Dae Duk	5,170,000
-- local currency cost of planning and coordination, in-country training, etc.	1,030,000
	<u>\$11,500,000</u>

Recurring Operational Cost (beginning in 1978)

-- annual government subsidy for KSRI operation (average for 1978-1982)	\$ 2,000,000 ^{1/}
-- annual recurring FX cost for imported parts and materials (average for 1978-1982)	300,000
	<u>\$ 2,300,000</u>

Appraisal of KSRI's economic feasibility is difficult because the project, basically qualitative in nature, is not susceptible to benefit/cost or internal rate of return calculations. A project to increase the reliability of industrial measurements lies somewhere in between the class of projects that directly result in production increases and, hence, a stream of quantifiable benefits on the one hand,

1. Refer to Section III-B-2 for a discussion of sources of income.

and social overhead projects on the other. The economic case for a program to improve metrology and measurement practice is that it fosters more efficient production, reduction of waste, and increased sales through opening of domestic and foreign markets. The problem is that the beneficial effects of measurement improvements are inseparable from the effects of other factors such as research and development, more efficient management, increased labor productivity, more aggressive marketing techniques, improvements in and more rigorous application of industrial standards, and more effective quality control measures. A stream of benefits directly attributable to improved measurement simply cannot be distilled out of this complex factor mix. The task is further complicated by the fact that this project is directed at an improvement in capabilities on a national scale and the direct impact on a given industry or particular firm is not predictable.

This disclaimer having been made, it is still possible to identify some indicators for the cost effectiveness of improved measurement, in general, and KSRI in particular, and attach some rough order-of-magnitude figures to these indicators. It is expected that the project will result, directly and indirectly, in the following types of cost savings:

(a) Savings to Korean industry:

- (1) Reduction in the cost of quality control systems;
- (2) Reduction in the number of foreign buyer claims against substandard Korean products;
- (3) Reduction in the number of Korean measurement instruments that fail pre-sale inspection.

(b) Savings to inspection and testing laboratories:

- (1) Reduction in unit cost of services performed;
- (2) Reduction in cost of standards calibration services (now obtained overseas).

(c) Social savings:

(1) Fewer personal injuries and property losses caused by substandard products and materials;

(2) Reduction of pollution and environmental degradation through more effective measurement and control;

(3) Savings resulting from increased accuracy of meters and conformance of actual product weight/volume with labels on product containers.

Although most of these savings are difficult to quantify with any reliability, the GE-TEMPO consulting team estimated those associated with the effect of improved measurement on industrial quality control systems (item a-1). On the basis of long experience with analysis and improvement of quality control (QC) related functions within the General Electric Company, the Corporate QC Advisory Group has developed quantifiable relationships to predict the cost implications of introducing various improvements in QC systems. The basic equation is:

$$\begin{aligned} \text{Total QC cost (T)} &= \text{cost of QC technology (A)} \\ &+ \text{inspection cost (B)} + \text{cost of product rejects (C)} \\ &+ \text{cost of process adjustment (D)}. \end{aligned}$$

An improvement in measurement capabilities affects the variables on the right side of the equation. Procedural improvements, i. e., more efficient and relevant measurement methods, with existing equipment configurations reduce factors B, C, and D without affecting factor A. Eventually, further procedural improvements become impossible because of equipment limitations, and new equipment purchase is necessary to achieve additional cost savings. The new equipment and associated procedures will increase factor A and reduce B, C, and D, with net additional savings. The amount of these savings will vary by industry and product line. However, assuming total quality control costs at 6% of gross sales, typical savings from the procedural improvements in measurement might amount to 1/2%, and savings from equipment another 1/4%, reducing total quality control costs to 5-1/4% of sales.

The G. E. Corporate QC Advisory Group made rough estimates of the cost savings possible for ten major industrial groups in Korea in 1980, attributable to the establishment of KSRI and successful promotion of reliable measurement in industry. The total estimated saving in 1980 alone, subject to an error of +/- 25%, was the won equivalent of \$170 million. This estimate assumes the output projections contained in the Economic Planning Board's Long Term Prospects for the Korean Economy 1972-1981; then applies the G. E. experience with the equation and typical quality control costs in U. S. industrial situations adjusted for differences in product line and level of technology in Korea. Although the resulting figure is subject to wide error and only a percentage could be attributed solely to the activities of KSRI, it nevertheless indicates the magnitude of possible savings achievable through improved industrial measurements.

No attempt was made to quantify the second and third types of benefits listed under savings to Korean industry, but both have practical examples. The Korean Association for Arbitration of Commercial Transactions reports that the number of foreign buyer claims against Korean products rose from 286 reported cases in 1973 to 614 cases in 1974, and the number continued to rise in the first quarter of 1975. The estimated value of the 614 claims was \$2,169,000. Only a small portion of this increase in claims is attributable to export growth; the balance is due to poor quality, failure to comply with specifications, and delayed delivery. In addition to these reported claims, an undetermined but undoubtedly larger number of claims were resolved between foreign buyers and Korean exporters without going to arbitration. Most of these products were inspected and approved by government inspection laboratories prior to export. This example illustrates the potential savings that would result from a national metrology standards organization which succeeds in promoting greater reliability of measurement equipment and methods, both in industry and in the export inspection laboratories.

Regarding the inspection of Korean-manufactured measurement instruments, approximately 10% of such instruments have failed government inspections during the last five years and thereby have been disqualified from sale. The number of instruments (primarily gauges) so disqualified has averaged 30,000 per year during this period. KSRI success in assisting the Korean measurement instrument industry to

reduce the failure rate to 5%, for example, through advisory services, training, research, and dissemination of standards, could generate substantial savings.

The cost-savings effect of KSRI on Korean inspection and testing laboratories will be achieved through research on measurement problems, development of improved and more efficient measurement/testing procedures, and assurance of more reliable measurements that will permit less expensive sampling procedures. The combined 1974 budgets of the eleven largest inspection laboratories and the Provincial Inspection and Testing Organizations was approximately \$3.7 million. If KSRI could assist these laboratories to reduce costs by 10%, the annual savings at current budgetary levels would be \$370,000. Added to this would be the savings resulting from obtaining calibration services from KSRI rather than foreign sources.

The social savings described arise from the combined effects of better prepared standards, improved measurement capabilities, and well-enforced legislation. The importance of KSRI to the control of pollution and environmental degradation is discussed in Annex G, the Environmental Impact Assessment. Basically, effective enforcement of environmental legislation requires precise measurement capabilities and relevant tests, many of which can be developed only through the type of research that KSRI will be uniquely capable of undertaking.

On balance, the Project Committee concludes that the proposed investment in KSRI is justified by the significant economic and social benefits that will result from the KSRI program.

2. Potential Effect on U. S. Economy

There is no way to predict with certainty what impact improved measurement capabilities, more effective standards practices, and expanded industrial output, particularly in the heavy and chemical industries, will have on the U.S. economy. In the short run, growth of Korean heavy and chemical industry and concomitant Korean economic growth will probably broaden the market for U.S. products; in the longer run, as these industries increase the variety and quantity of output, the market for U.S. goods in Korea will be restricted. On the basis of the post-war experience with Japan, the timing of these sharply

contrasting impacts on the U.S. economy may be expected to occur over a period of 15 years or longer.

With respect to the specific focus of this project -- metrology and standardization -- it is believed that more rigorous application of standards by other countries may actually improve the competitive position of high-performance U.S. industries and could result in long-term benefits to the U.S. economy through expanded participation in international trade. Accordingly, the U.S. Congress is now considering legislation that would authorize the Department of Commerce and the National Bureau of Standards to intensify efforts to encourage more intensive international standardization programs, with special concern for developing countries.

B. FINANCIAL VIABILITY:

1. ROKG Commitment to Finance Local Currency Cost of Project:

The local currency costs of establishing KSRI are estimated at the won equivalent of \$6,200,000 for the following purposes:

- \$5,170,000 for construction of KSRI facilities;
- \$820,000 for planning, coordination, and staff services prior to normal KSRI operations;
- \$210,000 for staff training in Korea

The Economic Planning Board approved the Ministry of Commerce and Industry's (MCI) application plan for the establishment of KSRI, including the local currency budget that was submitted as part of this plan. On April 29, 1975, the Deputy Prime Minister officially requested an AID loan for the foreign exchange costs of KSRI and provided assurance that the ROKG would provide adequate budgetary support for the institute (Annex D). The letter implicitly approved the allocation of the won equivalent of \$6.2 million for the establishment of KSRI as requested by the MCI application.

The timing of the availability of local funds is as important as the total amount. If funds are not made available on schedule in the required amounts during 1975 and 1976, building construction will be substantially delayed and loan-financed activities-- all keyed to a building completion date of July 1, 1977 -- will be ill-timed. The budget for KSRI calls for the won equivalent of \$383,000 to be made available in 1975 to finance detailed planning and initiation of KSRI facilities at the Dae Duk Science Town. These funds must be appropriated in the first supplementary budget for 1975, which will be finalized in the early Fall. The AID Loan Agreement will require as a condition precedent to disbursement evidence that the necessary funds have been included in this supplementary budget, and that the approved budget for 1976 includes sufficient funds to sustain planning and construction activities during 1976.

2. Self-sustaining Financial Status of KSRI (Post-Loan)

The attached financial plan (Figure III-1) for KSRI's initial five-year period of operations, 1978-1982, differentiates between source of income and class of expenditures. The plan shows that KSRI's income will arise from various sources as follows:

(i) ROKG budget allocations		55%
(ii) KSRI earnings		
- contract research and reimbursable consultation	12%	
- calibration, distribution of SRM's, and inspection services	31%	
- other	<u>2%</u>	
		45%

The reasonableness of this financial plan depends on two factors: continuing ROKG budgetary support for KSRI, and the ability of KSRI to generate average earnings from research and services of \$1,300,000 per year throughout the 1978-82 period. The assumption concerning ROKG funding appears acceptable at this point; regular government subsidies are anticipated under the Specific Research Institute Promotion Law, and the ROKG has agreed to provide continuing financial support according to the needs and progress of the institute. ROKG support could be provided in several ways: through annual budgetary allocations, by establishing an endowment fund to generate a uniform flow of income for KSRI, or by a combination of the two approaches. Figure III-1 assumes a situation in which both an endowment fund and annual allocations are used. In this hypothetical situation, an endowment fund in the amount of \$6,250,000 (won equivalent) would be established over a three-year period and, once established, would yield an annual income of \$1,250,000. In addition, an annual allocation of approximately \$700,000 would be needed to supply a government-source income of \$1,950,000 per year. The ROKG has not yet made a final decision concerning the creation of a KSRI endowment fund. However, the Project Committee does not believe that such a fund is vital to the project's success; if the fund is considered impractical, an amount equivalent to the annual yield of a fund could be added to the annual budgetary allocation for KSRI. Both approaches have been used successfully in the past: an endowment fund was created for KIST, while KAIS receives its budgetary support through the ROKG budget.

The more questionable factor in KSRI's financial plan is the earning capacity of KSRI itself. In 1974, NISRI earnings from calibration and inspection totalled \$222,000 (in won equivalent); annual KSRI earnings shown in Figure III-1 would be roughly six times this figure. GE-TEMPO consultants believe that this higher level of income is plausible but can be achieved only in the context of a much greater industrial demand for metrology standards-related services than presently exists. Thus KSRI's earning capacity will depend upon its competence and aggressiveness, government policy and legislation requiring greater emphasis on accurate measurement, and ROKG efforts to promote greater industrial interest and investment in improved

Figure III-1 Pro-forma KSRI Financial Plan (1978 - 1982)

(Unit: U.S. \$ 000)

Description	Year					Total
	1978	1979	1980	1981	1982	
<u>Gov't budget support</u>	<u>2,217</u>	<u>2,639</u>	<u>2,575</u>	<u>661</u>	<u>840</u>	<u>8,932</u>
Operating subsidy	133	555	491	661	840	2,680
Endowment fund	2,084	2,083	2,084			6,252
<u>Korean FX(or other donor)</u>	<u>129</u>	<u>264</u>	<u>278</u>	<u>295</u>	<u>315</u>	<u>1,281</u>
<u>Income from services</u>	<u>927</u>	<u>1,152</u>	<u>1,268</u>	<u>1,394</u>	<u>1,534</u>	<u>6,275</u>
<u>Research & Consultation</u>	<u>250</u>	<u>312</u>	<u>344</u>	<u>378</u>	<u>416</u>	<u>1,700</u>
Calibration, SRM, and Inspection income	625	833	918	1,008	1,109	4,493
Misc. income	52	6	6	8	9	82
<u>Interest on endowment fund</u>	<u>386</u>	<u>833</u>	<u>1,250</u>	<u>1,250</u>	<u>1,250</u>	<u>4,969</u>
<u>Depreciation</u>	<u>416</u>	<u>416</u>	<u>416</u>	<u>416</u>	<u>416</u>	<u>2,080</u>
<u>Total fund provided</u>	<u>4,075</u>	<u>5,304</u>	<u>5,787</u>	<u>4,016</u>	<u>4,355</u>	<u>23,537</u>
<u>Investment to fixed asset</u>	<u>129</u>	<u>264</u>	<u>278</u>	<u>295</u>	<u>315</u>	<u>1,281</u>
Korean FX (or other donor)	129	264	278	295	315	1,281
<u>General Admin./research expenses</u>	<u>1,408</u>	<u>2,440</u>	<u>2,909</u>	<u>3,205</u>	<u>3,524</u>	<u>13,486</u>
Salary	683	1,371	1,508	1,658	1,824	7,044
Operating costs	318	516	572	634	696	2,736
Research project	407	553	829	913	1,004	3,706
<u>Interest payment for AID loan</u>	<u>69</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>469</u>
<u>Non cash items</u>	<u>2,469</u>	<u>2,500</u>	<u>2,500</u>	<u>416</u>	<u>416</u>	<u>8,301</u>
<u>Total fund used</u>	<u>4,075</u>	<u>5,304</u>	<u>5,787</u>	<u>4,016</u>	<u>4,355</u>	<u>23,537</u>

measurement capabilities. The realism of this planning figure must be carefully reassessed in 1978, when KSRI is fully operational and the growth in demand for its services can be more objectively estimated. At that time, it may be necessary to adjust the financial plan. For the present, however, the Project Committee believes that the financial plan is an acceptable representation of the self-sustaining financial character of KSRI following full loan disbursement.

3. Assessment of ROKG Ability to Repay Loan

a. Korea's Balance of Payment Position and Debt Service Capacity

While "oil crisis" effects have greatly increased Korea's import bill and temporarily eliminated export growth (in the latter part of 1974 and probably the first half of 1975) Korea's long-term balance of payments prospects remain good, based on its past performance and favorable competitive factors.

After two relatively small BOP deficits and a large increase in foreign exchange reserves in 1972-73, Korea experienced a very large deficit in 1974 and only a small increase in gross reserves. As Table III-A indicates, the current account deficit increased from \$309 million to over \$1.8 billion in 1974. Exports were up 39% but imports expanded by 63%, mainly due to price increases. Invisible payments were also up sharply but service receipts remained the same due to a decline in revenue from Japanese tourists. Despite an increase of nearly \$600 million in long-term capital inflows in 1974, another \$800 million in net additional short-term credits were required to finance the large deficit.

Due to the international recession, Korea's exports began a downward trend in the second half of 1974 which is likely to last through the first half of 1975. While the government has made an optimistic official forecast of a 32% increase in exports in 1975, the general expectation is that, while stronger in the second half, exports will be about the same for the year as a whole and that imports will be up roughly 10%. The tentative Embassy estimates shown in Table III-A forecast a current account deficit of \$2.4 billion in 1975, which will be financed largely by long-term capital inflows, including bank loans, special IMF credits, and Korea's first IBRD program loan.

Assuming an end to the current international recession, Korea should resume strong export growth and begin to narrow its BOP deficit in 1976. The government is proceeding with its long-term heavy industry plan for 1973-81, although original plan estimates have been outdated by events in 1973-74. No formal revision of the 1973-81 estimates has been made, although the estimate of total foreign capital needs has been informally increased from \$10 billion to \$14-15 billion, due to the BOP and price effects of the oil crisis.

Korea's debt-service ratio improved in 1974, as foreign exchange earnings again outpaced debt service. The ratio dropped from 13.9% in 1973 to 12.4% (see Table III-B). Since 1970 the ratio has fallen steadily from a potentially dangerous 21% level, due partly to a shift to longer-term debt obtained on more favorable terms. This trend will be reversed in 1975 since export earnings are expected to increase very little and debt service will probably increase by about 25%, with most of the increase occurring in interest payments. The Embassy estimates that the debt service ratio will rise to approximately 15% in 1975.

For the longer term no great increase in the debt service ratio is expected, on the assumption that export growth of about 20% p. a. (or much less than in the past) is resumed in 1976. The government, which had previously expected the service ratio to decrease steadily through 1981, has informally estimated that the effect of the oil crisis on the BOP will be to increase the previously estimated ratio for 1981 by 2-4%, about the levels prevailing in 1973-74.

b. Specific Arrangements for Repayment of Loan

Repayment of this loan will be charged against ROKG general resources. From sub-section A above it can be seen that the Korean economy should have no problem with undertaking this additional foreign exchange debt servicing burden. USAID further believes that ROKG revenues will be sufficient to provide budgetary resources for servicing of this proposed debt.

Table III - A

Balance of Payments Forecast

In million U. S. dollars

	1972	1973	P1974	E1975
I. Goods and Services	-541	-499	-2,072	-2,700
1. Merchandise Exports	1,676	3,271	4,537	4,550
2. Merchandise Imports	2,250	3,837	6,241	6,800
Trade Balance	-575	-566	-1,704	-2,250
3. Invisible Receipts	551	849	850	900
4. Invisible Payments	517	782	1,218	1,350
Invisible Balance	34	67	-368	-450
II. Transfer Payments (Net)	170	190	233	300
Current Account Balance	-371	-309	-1,839	-2,400
III. Capital Transactions (Net)	489	630	2,000	2,400
5. Long-term Capital (Gross)	782	984	1,581	2,157
6. Amortization (on LT Cap.)	-272	-404	-428	-476
7. Short-term Capital (Net)	-21	46	847	719
IV. Errors & Omissions	41	19	-146	
V. Changes in Foreign Exchange Holdings (Increase = minus)	-159	-340	-15	0
VI. Foreign Exchange Holdings	694	1,034	1,049	1,049

Source: ROKG data for 1972-74 and Embassy estimates for 1975.

Table III-B

Debt Service Payments and Ratios
(million of dollars)

	<u>A1972</u>	<u>A1973</u>	<u>P1974</u>	<u>E1975</u>
A. Foreign Exchange Earnings	<u>2,227</u>	<u>4,120</u>	<u>5,387</u>	<u>5,450</u>
1. Commodity Exports	<u>1,676</u>	<u>3,271</u>	<u>4,537</u>	<u>4,550</u>
2. Service Earnings	551	849	850	900
B. Principal Repayments	272	404	428	476
C. Interest Payments	<u>126</u>	<u>170</u>	<u>239</u>	<u>350</u>
D. Total Debt Service	398	574	667	826
E. (Of which 1-3 year debt)	(44)	(62)	(63)	(75)
F. Debt Service Ratio (D/A x 100)	17.9	13.9	12.4	15.2

Source: ROKG data and Embassy estimates.

C. TECHNICAL SOUNDNESS

1. Evidence of Demand for KSRI Services

In the initial years of KSRI's operations, demand for standards dissemination through calibration and supply of SRM's and SRD will be relatively low. This low initial demand is due to limited industrial appreciation of the value of reliable measurement and calibration of their instruments to assure such reliability, as determined by the 1973 IAA survey. During this period, which may extend until 1980, KSRI will devote relatively more staff time to its program functions of research, metrology propagation, advisory services, and training. KSRI would seek representation on various technical committees concerned with the development of industrial standards and undertake research relevant to the improvement of existing standards, preparation of selected high priority new Korean standards, and development of standards for test methods. It would also conduct research of its own selection on industrial problems of measurement and improved means of disseminating standards. KSRI staff would be called upon by the IAA to assist in the planning of the six SITL's and strengthening of PITO's. In summary, KSRI would devote considerable time to problem-solving and to strengthening various elements of the NSS and the national metrology standards subsystem of the NSS.

During this period, the policies and activities of the IAA should stimulate an enormous increase in the demand for KSRI services by industry and measurement laboratories. The most effective stimulus will be public education programs such as the National Quality Control Campaign now in progress. (Refer to Section III-F for description). The IAA is also considering various policy measures which would provide strong incentives for industrial firms to improve their measurement capabilities. These measures could include a Government procurement policy to buy only from firms that have demonstrated quality control consciousness and evidence of a reliable measurement system, and special tax incentives and preferential import privileges for such firms. To the extent that the Government's promotional and semi-coercive measures succeed, industrial requirements for measurement instruments, calibration services, and

trained measurement personnel will multiply several times. KSRI itself can assist the IAA effort through its own metrology propagation, advisory, and training activities.

The GE-TEMPO consultant team believes that an appropriate balance of the KSRI workload will evolve by 1980, with staff time equally divided between services related to the dissemination and maintenance of standards, and program functions.

2. Effective Functioning of the Entire NSS

The effectiveness of KSRI, as one element in the NSS, ultimately depends on the performance of all other elements of the system, i. e., those concerned with industrial standards, quality control, and inspection and certification. On the basis of the GE-TEMPO analysis, these other elements appear to be functioning reasonably well. The GE-TEMPO team made various recommendations for these elements concerning procedural changes and consolidation of responsibilities, particularly in the area of industrial standards, but none of these recommendations suggested major additional efforts in training, equipment procurement, or facility upgrading. It is believed that all of the desired changes can be effected through the IAA's leadership.

One other area of the NSS, however, that does require substantial improvement is the testing and inspection sub-structure. The IAA recognizes this need and has formulated a strategy that calls for strengthening the capabilities of eight Provincial Inspection and Testing Organizations and establishing six Specialized Industrial Product Testing Laboratories. The IAA's efforts to obtain foreign donor assistance for these laboratories were previously described in Section II-B-3. The place of these laboratories within the system are shown in Figure III-2 (attached), the Proposed Korean NSS concept.

Whereas the metrology standards function is now the weakest element in the NSS, the creation of KSRI should "leapfrog" this function to a situation of superior performance in the system. The expectation is that KSRI, with high-level scientific expertise, will exert a qualitative pull on the rest of the system. This pull will be exercised through

KSRI participation in and research for industrial standards committees, assistance in providing the essential metrology ingredient in quality control systems, and standards calibration and development of improved test methods for inspection labs.

3. Availability of Manpower Required for KSRI Staff

The KSRI organizational plan identifies 35 positions (top administrators, department chiefs, and section heads) that require personnel with Ph. D. qualifications and 10 positions (junior researchers) requiring personnel with M. S. degrees. This highly-qualified scientific and technical manpower is not readily available in the Korean job market, and Korea's university system is not yet able to supply them. However, large numbers of Koreans with the requisite educational qualifications and work experience are currently employed in other countries; the Ministry of Science and Technology estimates that 3000 such personnel are working in the United States, 300-400 in Europe, and an undetermined, but significant number in Japan. Many of these Koreans could be repatriated to Korea by an attractive employment package offering reasonable pay incentives, a professional working environment, an opportunity to apply their scientific talents effectively, and comfortable living conditions and social amenities. Convinced that KSRI will be able to provide these inducements, the IAA proposes to recruit 80% of KSRI's senior administrative and scientific staff from the group of overseas Koreans (approximately 35 persons). In adopting this approach, KSRI will be following the successful examples of the Korea Advanced Institute of Science (KAIS), which recruited many of its staff members overseas, and KIST which recruited 65 of its staff in this manner.

The KSRI recruitment strategy appears feasible in light of the large numbers of qualified overseas Koreans, the earlier experiences of KIST and KAIS, and the apparent desire of many of these overseas Koreans to return to attractive work situations in Korea. KIST, KAIS, and the Korean Atomic Energy Research Institute have lists of numerous overseas Koreans who have applied for employment in these institutions but could not be accommodated. Initial contact with this overseas pool of manpower will be relatively simple. In addition to the lists of job applicants mentioned above, MOST maintains a directory of Korean Scientists and Engineers in America (the most recent update was conducted in 1974), identifying the individual,

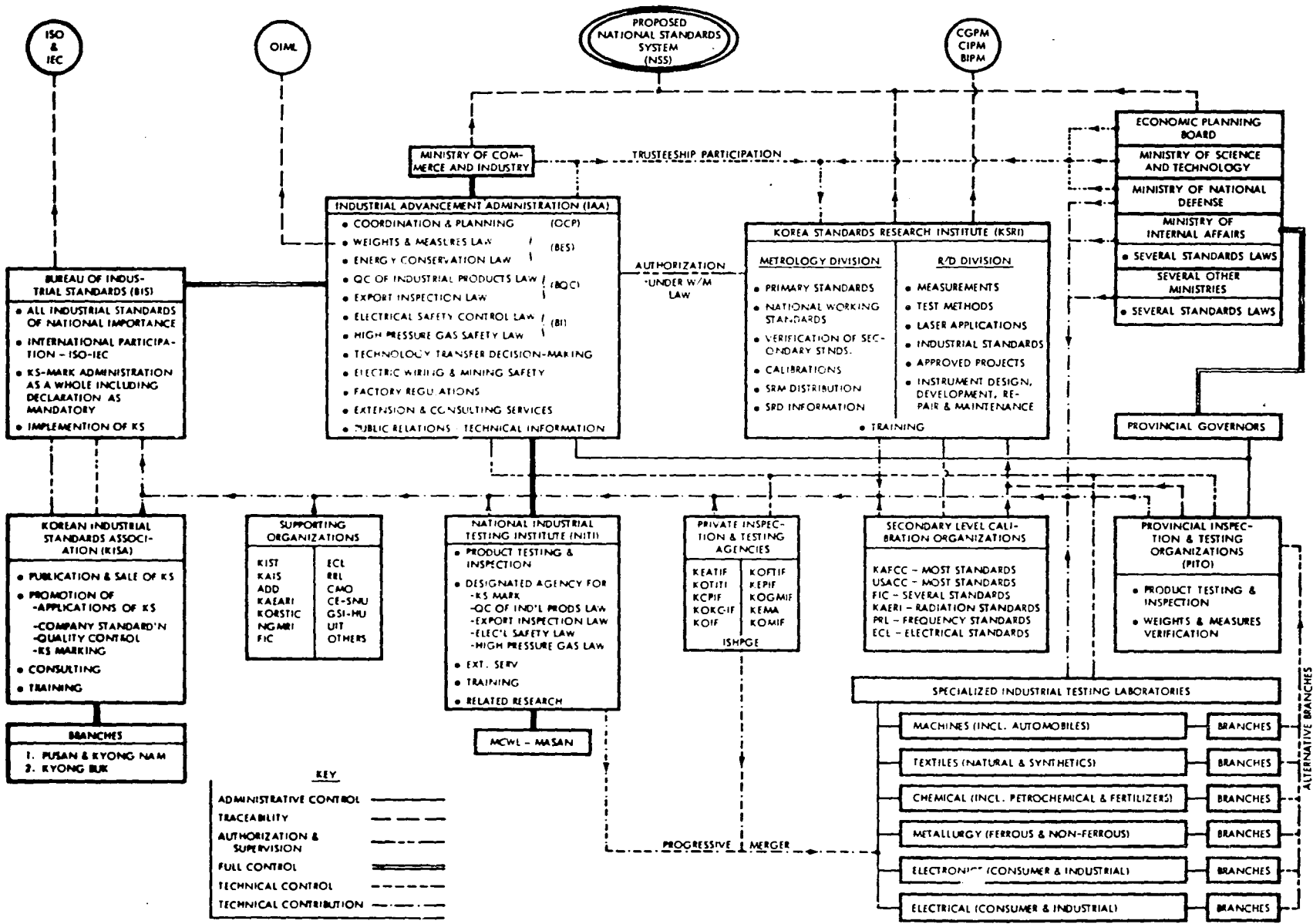


Figure III-2 Proposed Korean NSS concept.

his educational qualifications, work experience, present place of employment, and current address. Moreover, Korean scientists and engineers working in the U.S. have formed their own professional association. This organization supplies MOST its information and can assist KSRI in its recruitment activities.

Once an overseas Korean has agreed to employment with KSRI, loan funds will be used to finance the return of the prospective staff member and his family to Korea, the shipment of his personal effects, and a relocation allowance. The repatriated Korean would sign a two-year contract, to be renewed or converted into tenure appointment by mutual agreement. As this initial two-year appointment expires, it is expected that the scientific environment of KSRI and the living conditions of the Science Town will be sufficient to insure the staff member's continued employment at KSRI.

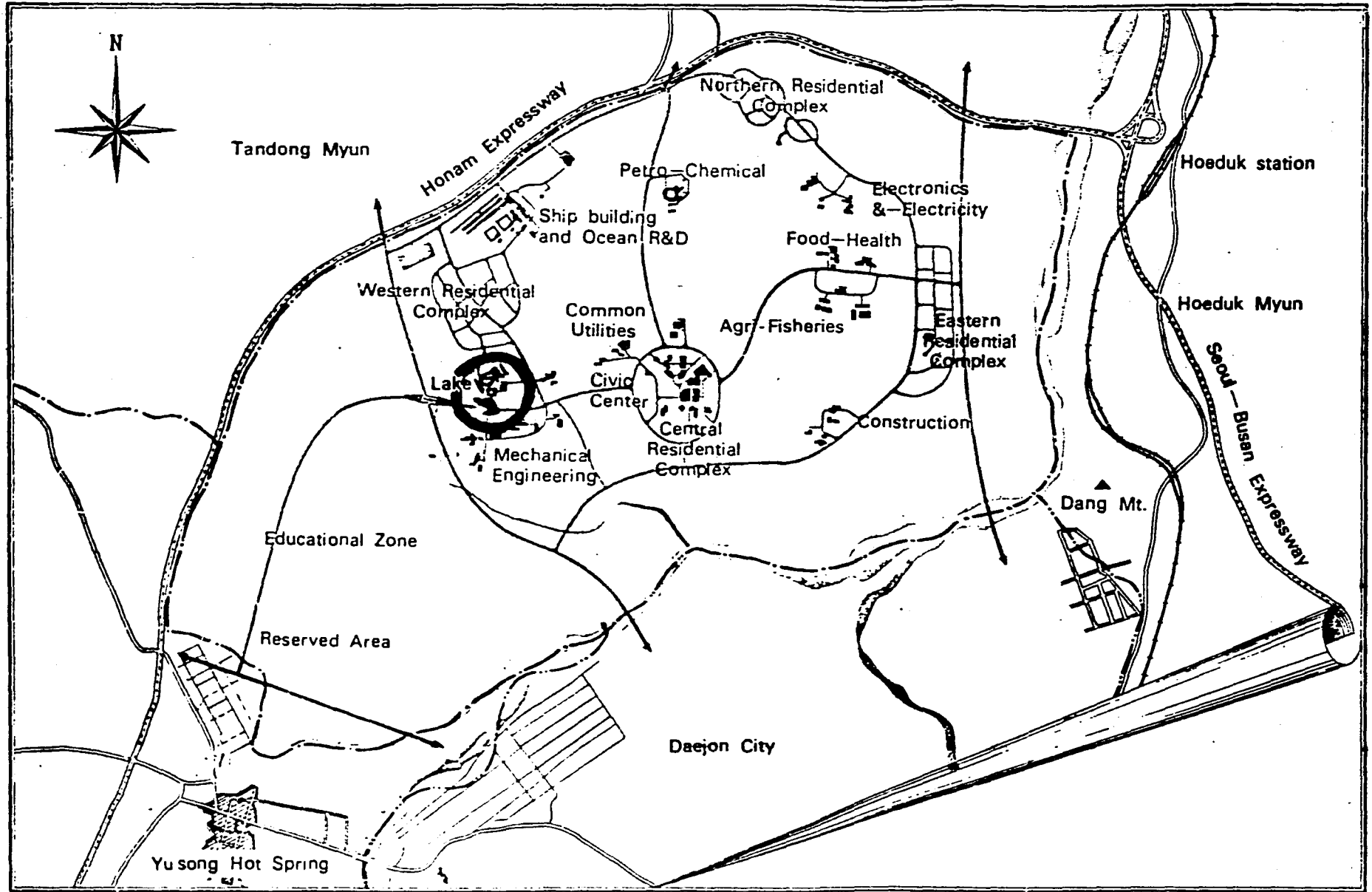
Personnel required for KSRI's research assistant and technician positions can be recruited and/or trained in Korea. One of KSRI's early efforts will be to organize its own training program in metrology to provide for continuing staff upgrading and to train replacement needs that arise through staff attrition. In addition, by 1980, the AID-supported post-graduate programs at KAIS and Seoul National University's College of Natural Sciences (proposed) should be supplying highly-qualified scientific and technical manpower to the Korean job market. This output will provide a domestic source for KSRI staff additions and replacements.

4. Provision of Support Facilities in Science Town

The Dae Duk Science Town is being planned as a fully integrated complex of scientific institutions, centralized professional support facilities, and family requirements such as housing and schools. Figure III-3 shows the layout of the Science Town and the proposed KSRI location. Completion of at least the social and support facilities that will serve KSRI must be coordinated with the construction schedule for the KSRI building if KSRI is to be fully operational and provide an attractive family environment by its planned inauguration date of July 1977.

(Fig. III-3)

Master Plan for Daeduk Science Town



A Science Town Construction Committee was established by Presidential Decree on September 4, 1973, with responsibility for preparing a master plan for the construction of the Science Town, planning the layout of new institutions, planning the establishment and operation of support facilities, and supervising all construction activities. The master plan was published in August 1974, and construction planning is well-advanced, with execution of various elements of the overall plan assigned to appropriate government agencies, e. g. the Korea Housing Corporation is responsible for constructing family housing.

The current schedule is sketched below:

- highways: principal avenues to be completed in 1976
- water supply: commence laying the main supply line in June 1976
- electricity: commence construction of a transmission substation in the Fall of 1976
- telephone lines: installation to be completed by the Spring of 1977
- housing: begin construction of homes and apartments in the Fall of 1976 to meet initial requirements
- schools: three primary schools and one middle school are already in the area; construction of three new primary schools, two new middle schools, and two high schools are planned but will be initiated only after institutional plans and population figures are more firmly established. High school facilities are now available in Taejon, a 30-40 minute drive from the Science Town site.
- support facilities (computer center, library, conference building, central workshop); again, detailed plans depend upon firm decisions concerning the establishment of the science institutes.

Officials at MOST who are responsible for the execution of the Dae Duk Science Town project are aware of KSRI's needs and will concentrate initial development efforts in the western half of the Science Town, where KSRI and two other research institutes now under construction will be located. They recognize that some adjustment of their timetable may be necessary to accord with KSRI's implementation plan, but understandably prefer to wait until KSRI is officially approved and funded before proceeding with such adjustment. The MOST 1976 budgetary request for planning and construction of Science Town facilities is the won equivalent of \$4,200,000.

As planning for KSRI progresses, the KSRI Establishment Committee must assure effective coordination of their plans with those of the Science Town Construction Committee.

D. ADMINISTRATIVE FEASIBILITY

1. Inter-Ministerial Support for KSRI

The Project Committee found evidence of support for the establishment of KSRI at the highest levels of the ROKG, as described below:

a. Economic Planning Board (EPB)

The EPB, which is responsible for the formulation and implementation of Korea's economic development plans, supports the establishment of KSRI and overall reinforcement of the NSS as essential factors in heavy and chemical industrial development and promotion of increased industrial exports, both major targets of the Fourth Five Year Plan. The EPB formally approved the KSRI Establishment Plan submitted by NSRI in April 1975, and provided assurance of the local currency required for the new institute.

b. Ministry of Science and Technology (MOST)

MOST, which is responsible for the promotion of Korean science and technology, formulation of science policy, and overall coordination of activities in this sector, has readily incorporated KSRI in the overall planning for the Dae Duk Science Town. MOST is making the necessary arrangements to include KSRI in the Enforcement Decree designating the various institutes to be situated in the Science Town. This process should be completed by the second quarter of 1975. MOST officials have promised to make every effort in Science Town to facilitate normal operations of KSRI by its scheduled inauguration date.

c. Ministry of Commerce and Industry (MCI)

The MCI and its Industrial Advancement Administration (IAA), which provides overall supervising of the NSS, have assigned the KSRI project top priority. The IAA regards KSRI as the most important element in a broad strategy to strengthen the NSS. Correspondingly, it requested an AID loan for the foreign exchange necessary to establish KSRI and has argued persuasively for the necessary financial support from the ROKG.

d. Ministry of National Defense (MND)

The MND has met on several occasions with the IAA to discuss ways to improve the capabilities of the Agency for Defense Development (ADD), which maintains standards and provides calibration services for defense facilities. The MND supports the establishment of KSRI as a primary level standards organization that can insure the traceability of ADD's standards to international standards and replace the current reliance on foreign sources for such services. The MND will be represented on KSRI's Board of Trustees, and the equipment selection for KSRI will incorporate the requirements of the military and defense industry.

2. Structure and Management of KSRI

Contingent upon favorable consideration of this loan proposal by AID/W, the Minister of Commerce and Industry (MCI) would appoint the Director of KSRI shortly after authorization of the AID Loan. The Director would then appoint several other KSRI staff members to form a task force responsible for planning and coordination of all activities leading to the inauguration of KSRI and initiation of normal operations. These activities would include supervision of construction, staff recruitment and training, equipment procurement, evaluation of progress, reporting, and other functions necessary to insure the effective operation of KSRI. The work of this task force would be supervised by an Establishment Committee appointed by the MCI and chaired by the Administrator of the IAA.

The formal structure of KSRI would be headed by a Board of Trustees. Ex-officio trustees would include the Vice Minister of the EPB, IAA Administrator, Vice Minister of MOST, and the Vice Minister of the Ministry of National Defense. Other trustees to be appointed would include a representative of USAID/Korea (until loan funds are fully disbursed), a representative from an established "sister" research institute in the U. S. (possibly the National Bureau of Standards), and five trustees elected from the scientific and industrial communities.

The Director of KSRI would also appoint a Deliberation Council, composed of eight KSRI staff members, to assist him in establishing policy on standards, research, advisory services, and other matters of importance to KSRI.

In the Project Committee's judgment, these arrangements provide adequate assurance of effective early management of KSRI activities, despite the fact that the KSRI Director and staff members who will compose the taskforce cannot yet be identified. The leadership, vision, and managerial competence of the Director will, of course, be vital to the successful performance of KSRI. The fact that all key Ministries will be represented on KSRI's Board of Trustees, the vigor and effectiveness with which the IAA has guided planning efforts to date, and the dedication demonstrated by the special NISRI working group who helped prepare this project paper are all valid indicators of the seriousness with which the ROKG approaches the task of establishing KSRI.

3. Korean Capability to Construct KSRI Facilities

Adequate design and construction of the KSRI facilities are essential for KSRI's subsequent operational effectiveness. Special requirements include:

a. Careful attention to layout that will facilitate efficient management and create a physical setting conducive to scientific enquiry.

b. Provision of standard environmental conditions necessary to insure reliable performance of measurement instruments and to prevent deterioration of these instruments. These conditions vary according to the specific instrument, but the most common requirements are precise control of temperature and humidity and minimization of vibration and sound.

Korean architects and construction firms have in the past demonstrated their competence by constructing facilities at KAIS, the Korea Atomic Energy Research Institute, and the Agency for Defense Development (ADD) with a minimum of foreign consultation. A local construction consulting firm employed by NISRI already surveyed the KSRI site at the Dae Duk Science Town, prepared a preliminary architectural layout, and provided the construction cost estimates that are included in the overall financial plan. This firm, the Kuk Min Environmental Research Institute, and its director, Professor Kim, Hyung Man, have had extensive previous experience in the design and construction of scientific facilities, including

buildings for KIST, KAIS and ADD. It is expected that the KSRI Establishment Committee will contract the Kuk Min firm to prepare the design for and supervise the construction of the KSRI facility. Because of the special layout and environmental considerations described above, the Establishment Committee will also arrange for four man-months of U.S. consultants (to be loan-financed) to advise on facility planning and construction; two man-months in 1975 to examine the architectural design, engineering specifications, and environmental planning; and two man-months in 1976 to assess construction progress. The Project Committee believes that these arrangements are adequate to ensure a well-planned, well-constructed facility.

The ability of KSRI to adhere to the construction schedule is critical since staff recruitment/training and equipment procurement are all being synchronized with the planned building completion date of July 1, 1977. The Mission does not believe that this tight scheduling will be a major problem since construction was implemented according to plan in earlier AID-funded projects involving construction (KIST, KAIS), and the most common factor resulting in construction delays in Korea is inadequate funding.

Evidence of an acceptable design and building specifications, availability of the necessary funding, and an acceptable, detailed construction chronogram will all be made conditions precedent to disbursement.

E. POLICY CONSIDERATIONS:

1. Legislation and Policy Supporting KSRI's Role:

The effectiveness of KSRI depends in part upon the existence of legislation that requires a reasonable level of performance by industry in standardization and quality control. This section analyzes ways in which current legislation will support and facilitate the proposed activities of KSRI.

a. Legal Metrology in Korea

The Weights and Measures Law defines legal units of measure for use in Korea; provides for regulation of the manufacture,

sale, repair and use of measurement instruments; and assigns to IAA the responsibility for matters relating to weights and measures, including national standards. Proper enforcement of this law would insure a higher level of accuracy in all measurement instruments used in industrial production and commercial transactions. However, because of the limitations of NISRI previously described, the IAA has heretofore been unable to organize an effective national calibration and inspection service. The establishment of KSRI would remedy this situation by providing Korea with a primary level metrology standards capability. However, if KSRI is to be responsible for maintenance of standards, inspection activities, and regulatory functions under the Weights and Measures Law, the IAA will have to delegate the responsibility to KSRI - a non-governmental entity. The IAA foresees no problem with this action and will assure that the law is appropriately amended by the time KSRI becomes operational.

b. Industrial Standardization Law

The Industrial Standardization Law defines procedures for establishing industrial standards, calls for a Korea Standard marking (KS-mark) system for manufacturers of mining and industrial products, and provides special advantages for products with authorized KS-marks. Under the KS marking system, the Bureau of Standards (BIS) of the IAA designates products that will be eligible for KS-marks and invites manufacturers to apply for authorization to use the KS-mark. Personnel from the IAA then inspect the applicant's plant to assess management, plant standards, quality control procedures, measurement and testing capabilities, and the product's compliance with the pertinent Korean industrial standard. If the IAA makes a favorable assessment, the manufacturer is authorized to affix the KS-mark on his products. Periodic inspections of the product and plant conditions are made to insure that the manufacturer maintains satisfactory performance; otherwise, his privilege is withdrawn.

Products bearing KS-marks have several advantages: they are given priority in procurement by governmental agencies, and they are exempted for quality inspections required under the Industrial Quality Inspection Law and export inspections required under the Export Goods Inspection Law. Despite these advantages, only 265 firms have obtained permission to use KS-marks to date. The IAA is considering several measures to increase industrial participation in the program,

including the following:

- increasing the number of eligible products (now only 217);
- making KS-marks mandatory for certain classes of products, e. g., those required by the Defense sector, those involving potential consumer hazards, and those for which imports are prohibited; and
- adding stronger incentives such as granting KS-mark firms preferential treatment in the allocation of foreign exchange for imports. In addition, the IAA plans to strengthen the program by more frequent inspection to verify that KS-mark products actually conform to standards.

KSRI will facilitate the mandatory application of the KS-marking program to certain designated products by helping industrial firms to develop the measurement capabilities necessary for standardized production. It will also contribute to more effective control of the program by making more accurate inspection possible. Conversely, to the extent that the IAA stimulates greater interest in the KS-marking program by any of the measures described above, the demand for KSRI's services will increase.

2. Legal Aspects Concerning the Establishment of KSRI:

The establishment of KSRI as an autonomous institution situated in the Dae Duk Science Town involves several separate legislative and administrative actions, as described below:

a. Inclusion of KSRI in the Enforcement Decree of the Special Research Institute Promotion Law:

The referenced decree officially recognizes the planned complex at Dae Duk as a Science Town and designates five institutions to be included in this complex as "specific research institutes" covered by the Special Research Institute Promotion Law. This designation signifies that the institutions may be created as autonomous entities, yet may receive government funding for construction

and operating costs and receive government-owned property on the basis of either transfer or gratuitous loan. In addition, the institutes will be able to utilize support services provided by the Dae Duk Science Town Management Headquarters. MOST has agreed to add KSRI to the five designated institutions and believes that the Enforcement Decree can be so amended by June 1975.

b. Enactment of KSRI's Articles of Incorporation:

Enactment of these Articles will formally establish KSRI as an autonomous institution to be located in the Dae Duk Science Town. These Articles have already been drafted for legislative actions I); they describe the KSRI organizational structure, principal functions, owned property, sources of revenue, and the nature of its relationship with MCI, its sponsoring Ministry. It is expected that these Articles will be passed without difficulty in June 1975, following authorization of the AID loan and legal designation of KSRI as a "specific research institute."

c. Transfer of Existing Primary Standards and Measurement Instruments from other Government Agencies to KSRI:

The GE-TEMPO equipment analysis team identified equipment at three government institutions that was necessary for use by KSRI and would be more appropriately placed with a primary standards institution. The team, therefore, recommended that this equipment be transferred to KSRI, thereby reducing additional equipment costs and minimizing duplication of facilities. Most of the identified equipment is currently held by NISRI, with additional items at KIST (standard prototypes for length, mass and volume, and instruments for their intercomparison), and the Electrical Communication Laboratory (ECL). The transfer of NISRI equipment is practically automatic since KSRI will assume the metrology functions now performed by NISRI and the legal basis for transfer is incorporated in the Specific Research Institutes Promotion Law. It is believed that KIST will readily transfer the standard prototypes and related instruments in its possession since these standards are rarely used by KIST. The transfer of ECL equipment will have to be negotiated, but NISRI officials are optimistic about cooperation with ECL. If for any reason this latter transfer cannot be effected, the contingency portion of the loan budget contains sufficient

funds to cover the acquisition cost of the necessary equipment.

3. Advantages of Autonomous Institution in Korean Context:

a. Legal Definition of Autonomy:

In Korea, an autonomous institution is a juridical corporation established under special legislation to perform tasks which are necessary to help attain national goals, but for various reasons cannot be managed effectively by a state-run agency. However, an autonomous organization takes neither the form of a private corporation nor a government organization, falling somewhere in between. It enjoys the independence of program management, recruitment and salary practices, and disposition of earnings of a private corporation, but is still subject to some governmental control and supervision, as described below:

b. Degree of Government Control and Supervision:

The nature of government control and supervision that will apply to KSRI is defined in the Specific Research Institute Promotion Law and its auxiliary regulations:

(1) KSRI shall submit project and budgetary plans to the MCI in accordance with pre-established rules, and report any change in these plans to the Ministry.

(2) The MCI may require changes in these plans when they do not appear consistent with KSRI's Articles of Confederation or the purpose for which it was established.

(3) KSRI will submit annual reports on program activities to the MCI.

(4) Government subsidies for KSRI operations shall be made within the formal budget drafted by the MCI on the basis of the original project and budgetary plans.

c. Ability to Offer Attractive Salaries:

One of the principal reasons for creating an autonomous KSRI is the need to offer attractive salaries to recruit first-

calibre scientific and technical personnel. Government pay scales are controlled by civil service regulations and are too low to be competitive with the private sector or to interest overseas Koreans in repatriation. KSRI salaries will be established at levels similar to those offered by KIST, KAIS, and KAERI. The proposed salary structure for KSRI, amplified by related benefits for housing, vehicle operation, education and resettlement, is considered adequate to enable KSRI to assemble and retain the high-level staff required.

The salary structure proposed for KSRI is compared with current government salaries in the following table:

Comparison of Salary Structures

<u>Ranks</u>	<u>KSRI (Proposed)</u>	<u>Gov't. Research Organizations 1/</u>
Director	\$7,300	\$3,400
Department Chief	6,600	2,750
Section Head	5,900	1,800
Researchers	5,200	1,400
Assistant Researchers (college graduates)	3,000	1,100

F. SOCIAL ASPECTS:

1. Quality-Control Consciousness among the Korean Public:

The GE-TEMPO consultant team observed "that the overall national quality-consciousness could be raised" and that "there is a great deal of room for intensifying public relations and public education in respect to the aims and value of standards and

1/ Organizations adhering to Civil Service Salary scales.

standardization." One of the most effective forces in compelling Korean industry to increase its attention to and investment in quality control measures would be a Korean public that demands improved quality and performance from industrial products. Such a phenomenon would directly reinforce KSRI's efforts to improve the reliability of measurements throughout Korea.

Striving to create that public consciousness, the LAA recently launched a nation-wide quality control campaign, designating 1975 as National Quality Control year in Korea. The Administrator of the IAA initiated the campaign on April 22, 1975, with a keynote address to representatives from industry and government. The campaign will direct much of its activity towards establishing effective quality control within industrial firms (see following section), but will include widespread use of lectures, slide presentations, and publicity to create a nation-wide mood for quality control.

2. Interest by the Industrial Sector in Improved Measurement:

The 1973 IAA Survey of Industrial Measurement Practices uncovered a general pattern of neglect of instrument calibration and limited understanding of the value of accurate measurement. The survey revealed that 88% of measurement instruments did not have fixed calibration schedules, 86% had not been calibrated, and the degree of precision was not marked on 34%. The GE/TEMPO Equipment Analysis Team that visited Korean industrial firms confirmed this general lack of interest in more accurate measurement capabilities. These firms were generally reluctant to invest in improvements in their measurement capabilities because the cost of such improvements can be readily quantified, whereas profit increases attributable to more accurate measurement are less predictable.

The IAA is addressing the problem of low industrial interest in several ways. As described in Section III-E-1, it plans to extend the coverage of the KS-marking system, increase the number of products for which the KS-mark is mandatory, and strengthen incentives for industrial participation. An imaginative, supplementary approach is the national quality control campaign of 1975. The IAA has invited

500 Korean firms to participate actively in the campaign; participation would commit these firms to carrying out the following quality control program:

- (1) organization of a quality control system;
- (2) establishment of reliable metrology standards and improved measurement procedures;
- (3) employment of quality control officers;
- (4) participation of managerial staff and quality control officers in seminars and training programs sponsored by the IAA;
- (5) orientation of employees in quality control through open-panel discussions and in-service training.

Firms that carry out all aspects of this program in a satisfactory manner, as determined by IAA assessment teams, will be officially designated "quality-conscious firms" at the end of the year. These firms will be accorded the same advantages and privileges as those which qualify for participation in the KS-mark program.

Finally, it will be incumbent upon KSRI itself to elevate the understanding and appreciation of more reliable measurement by industrial firms through its metrology propagation activities.

3. Integration of Women into the Development Process:

a. Women, as Beneficiaries of the Project:

Korean women will share equally with men in the indirect social benefits of the project: increased consumer satisfaction with higher-quality products, reduced consumer hazards resulting from better-enforced safety standards, and greater reliability of metering and weight/volume labelling.

b. Women, as Agents of the Development Process:

The active involvement of Korean women in project activities will be minimized by the otherwise sound strategy to recruit

most managerial, scientific and technical manpower from the group of qualified Koreans currently employed overseas. Because of past patterns in Korean higher education, this manpower source is predominantly male. There is some evidence that these educational patterns are changing (Refer to the section on the role of women in the Project Paper for Seoul National University's College of Natural Sciences). As Korean women with appropriate qualifications appear on the job market, the all-male nature of KSRI and other Korean scientific institutions will also gradually change.

IV. PROJECT IMPLEMENTATION

A. IMPLEMENTATION PLAN

1. Plan for establishment of KSRI

Figure IV-1 is a diagrammatic implementation schedule showing the timing and relationship of principle events leading to the establishment of KSRI. As the diagram indicates, KSRI will be formally created in July 1975, following (and contingent upon) authorization of an AID Loan. Under the overall guidance of a Ministerial Establishment Committee, a KSRI Task Force will coordinate the various activities necessary to make KSRI fully operational by January 1978. The scheduled completion date of the KSRI facilities at the Dae Duk Science Town is July 1977, and six months are projected for installation and testing of equipment. Figure IV-2 is a diagrammatic construction schedule, which indicates that the building design will be completed by December 1975, the construction contract will be executed by January 1976, and the building will be ready for occupancy by July 1977. Detailed, updated chronograms for construction and the entire KSRI project will be required as conditions precedent to initial disbursement.

The attached Figure IV-3 outlines the proposed organizational structure of KSRI, and Figure IV-4 is a staffing plan showing anticipated staff requirements according to position, age, educational qualification, and professional experience. The organizational structure is based on the recommendations of the GE-TEMPO team, and calls for three divisions: Metrology, Programs, and Support. The Metrology Division is organized into six departments according to metrological discipline: mechanical, electric, thermal, radiation, chemical, and materials. The Programs Division consists of three departments - research and development, metrology propagation, and instrument development, and has only departmental heads permanently assigned to the division. The programs of the division are to be carried out through "matrix management" whereby the department head recruits personnel from the Metrology Division and, as appropriate, the Support Division to collaborate on a specific task. The Support Division, as the name suggests, provides technical and administrative services to assist the work of the other two divisions, e. g. , equipment maintenance, computer services, budget and accounting, etc.

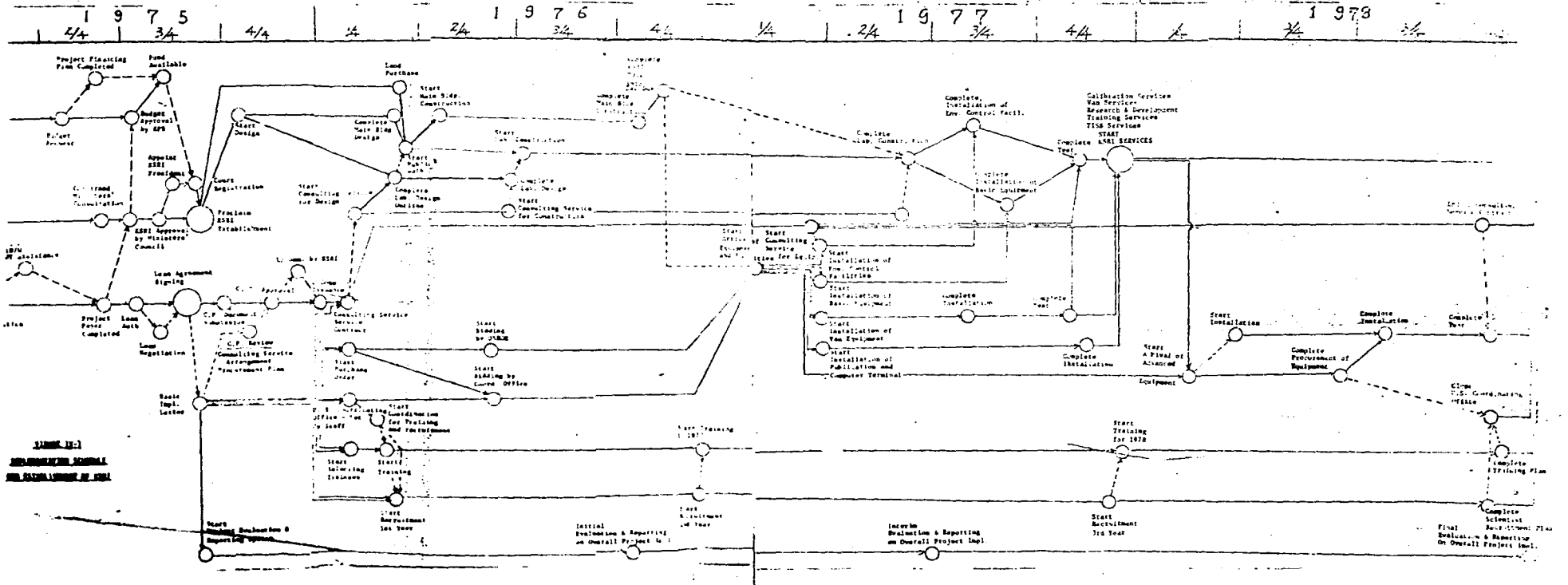
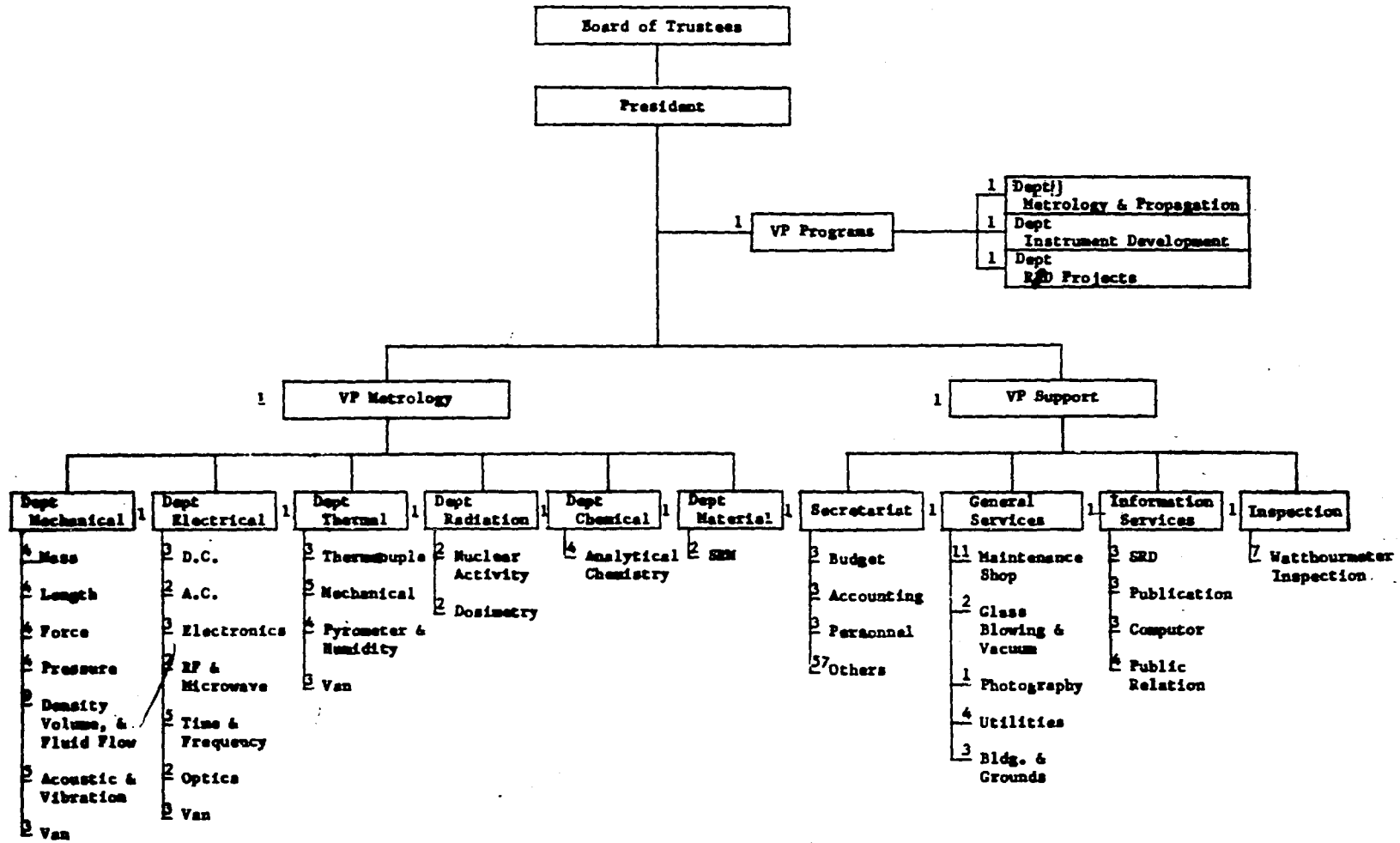


Figure IV-3

Organizational Chart of KSRI



Total: 202 persons

Fig. IV-4 - KSRI Staffing Plan

A - Personnel Chart

Serial No.	Designation	Approx EPB Level	Number Required	Min. Educ'n Degree	Discipline	Experience in Years		Age	Skills	Probable Vanua Recruit
						Research + Prof's'nal	Management			
1	President		1	Ph. D	Sci, Eng	10	10	45-55	High Leadership	
2	Vice President -M		1	"	"	10	5	40-50	"	
3	" -F		1	"	"	10	5	"	"	
4	" -S		1	"	Eng, Adm	10	5	"	"	
5	Dept. Chief -Mech	RCM	1	"	Sci, Phys	7	5	30-45	Leadership	
6	" -Elec	"	1	"	"	7	5	"	"	
7	" -Ther	"	1	"	"	7	5	"	"	
8	" -Rad	"	1	"	"	7	2-3	30-40	"	80% Abroad
9	" -Chem	"	1	"	Chem	7	2-3	"	"	Recruited (excluded No. 14, 15, 16, 17)
10	" -Mat	"	1	"	"	7	2-3	"	"	
11	" -Prob	"	1	"	Sci, Eng	7	2-3	"	"	
12	" -ID	"	1	"	"	7	2-3	"	"	
13	" -RD	"	1	"	"	7	2-3	"	"	
14	" -Sec	ACM	1	MA	Adm	7	2-3	"	"	
15	" -GS	TCM	1	MS	Eng	7	2-3	"	"	
16	" -IS	ACM	1	MA	Adm	7	2-3	"	"	
17	" -Insp	TCM	1	MS	Eng	7	2-3	"	"	
18	Senior Researcher (Section Heads)	RCM	22	Ph. D	Sci, Eng	5	-	25-40	Research	
19	Junior Researcher	RM	10	M3	"	4	-	25-35	"	
20	Senior Engineer	TM	7	BS	Eng	5	2-3	30-45		Korea
21	Admin. Section Heads	AM	6	BA	Adm	4	2-3	30-45		"
22	Research Ass't	RAM	45	BS	Sci, Eng	3	-	25-35		"
23	Junior Engineer	TAM	8	BS	Eng	3	-	25-35		"
24	Admin. Clerks	AAM	7	BA	Adm	2	-	25-35		"
25	Technicians		16			3	-	25-40		"
26	Ass't Clerks		7			1	-	25-35		"
27	Others		57							
Total			202							

RCM: Research Co-ordinating Member

ACM: Administrative Co-ordinating Member

RM : Research Member

AM : Administrative Member

RAM: Research Ass't Member

AAM: Administrative Ass't Member

TCM: Technical & Co-ordinating Member

TM : Technical Member

TAM: Technical Ass't Member

Fig. IV-4 - KSRI Staffing Plan

B. Recruitment Plan

Year Group	1975	1976	1977	1978
President & Vice-President Level	2	2	4	4
<u>Managerial Group</u>				
Senior	1	2	2	2
Junior	3	5	5	6
Assistant	3	4	6	7
Worker	1	2	5	6
Sub-Total:	10	15	22	23
<u>Research Group</u>				
Senior	2	4	8	9
Junior	2	5	14	22
Assistant	4	6	10	10
Technician		5	25	46
Sub-Total:	8	20	57	87
<u>Engineer Group</u>				
Senior		1	1	2
Junior	1	2	4	7
Assistant		1	4	8
Technician		1	5	16
Sub-Total:	1	5	14	33
Other Assistant Group	8	10	26	57
TOTAL	27	50	118	202

The staff requirements for each division and section were estimated by the GE-TEMPO team on the basis of anticipated workloads through 1980, and assumptions concerning the amount of staff time necessary to perform the essential services of KSRI. The staffing pattern assumes a balanced workload whereby personnel devote half of their time to service functions and half to the activities of the Programs Division.

Table IV-A, attached, describes the principal roles of KSRI during the period 1977-1980, and various tasks associated with those roles, with indications of priority. Activation of KSRI is assumed by July 1977, when the buildings will be ready, equipment deliveries have begun, and the staff begin to assemble at their duty stations. Initial priority will be given to installing and testing equipment and developing procedures for normal operation. Following this "shake-down" period, KSRI should begin to address its regular workload, and tasks with designated priorities 2-4 will be taken up.

2. Loan-financed activities

To assist KSRI in assembling a well-qualified staff, establishing the necessary scientific and technical facilities, and organizing personnel and equipment into effectively functioning programs, the AID loan of \$5,300,000 will finance the following activities:

a. Equipment Procurement

The required equipment lists were developed by three teams of industrial and metrology experts from GE-TEMPO who visited various Korean firms representative of nine major industry groups. These industry surveys provided the necessary information to estimate measurement and accuracy requirements, determine the demand for calibration services, and thereby to identify the potential calibration workload of the Korean Standards Research Institute by 1980. Present calibration requirements were expanded according to forecasted trends of production and technology.

The methodology used by the GE-TEMPO equipment analysis teams and the resulting equipment procurement lists are contained in GE-TEMPO's Interim Report on Laboratory Equipment and Capabilities Analysis for the National Standards System of Korea (GE 75 TMP-10), and will not be repeated here.

TABLE IV-A

Early Tasks and Priorities of KSRI

Role No.	ROLE	Task No.	TASK	Priority
1.	To maintain base units of measurement involving procurement and custody of national prototypes of all standards.	1.1	Receive, unpack and register equipment, registration being done in a card index or computer memory.	1
		1.2	Assemble and install equipment.	1
		1.3	Run initial trials on each piece and assembly.	1
2.	To maintain international traceability of national prototypes to international standards through BIPM.	2.1	Check all certificates of calibration accompanying equipment and ensure their traceability to BIPM.	1
		2.2	Check, cross-check and/or calibrate if possible all such equipment as can be so handled, employing SRM where available and feasible.	1
		2.3	Prepare the recalibration plan for each type of equipment.	2
		2.4	Board of Trustees to apply for membership of CGPM.	3

Table IV-A, Page 2

Role No.	ROLE	Task No.	TASK	Priority
3.	To assist regulatory agencies by providing measurement expertise to public authorities.	3.1	Provide the requisite service and advise.	As demanded.
4.	To support secondary level calibration laboratories.	4.1	Invite such laboratories to have their standards and instruments calibrated.	2
		4.2	Render requisite service promptly.	2
		4.3	Formalise relationship with PITO for calibration of their weights and measures standards on basis of defined schedule.	2
		4.4	Prepare and organize training courses for the staff of PITO and such of the secondary level laboratories as may be desired, in calibration and metrology techniques. (Common to Roles 8 and 9.)	2
		4.5	Establish regular calibration facility for industry and all technical institutions, including testing and inspection laboratories.	2
		4.6	Organize the mobile vans service.	2
		4.7	Establish data collection system to determine the length of time secondary standards & instruments remain calibrated. Set schedules for recalibration. (Related to Tasks 2, 3 and 10.1.)	3

Table IV-A, Page 3

Role No.	ROLE	Task No.	TASK	Priority
5.	To prepare and/or Supply Standard Reference Materials, SRM.	5.1	Receive, catalogue and stock pile SRM obtained from overseas sources.	1
		5.2	To publish catalogue of available SRM and offer them for sale.	2
		5.3	Initiate activity in preparation of secondary level SRM.	3
6.	To maintain and disseminate up-to-date Standard Reference Data, SRD.	6.1	Collect and assemble literature on SRD and prepare appropriate card index to assist in retrieval of information when required.	1
		6.2	Supply SRM and SRD whenever requested. (Common to Role 5)	As demanded.

Table IV-A, Page 4

Role No.	ROLE	Task No.	TASK	Priority
7.	To conduct research and development on industrial standardization problems, product testing and so on.	7.1	Establish relationship with BIS and secure representation on such Technical Committees and Councils of BIS as may be of interest to KSRI, namely where KSRI could make contribution to the preparation of Korean Standards.	2
		7.2	In cooperation with BIS, initiate a general survey of BIS committee program to determine what investigations and research could usefully be undertaken by KSRI to assist in improving the existing or preparing new Korean Standards or developing or improving certain test methods.	3
		7.3	Initiate new Standards writing projects in BIS as indicated by KSRI experience.	4
8.	To offer consultant service and training facilities in metrology including seminars, guest workers, training courses and so on.	8.1	See Task No. 4.4 above.	2
		8.2	Start planning of seminars and initiate regular staff meetings for discussion of recent developments in the field of metrology.	2

Table IV-A, Page 5

Role No.	ROLE	Task No.	TASK	Priority
9.	To disseminate information on metrology and measurement techniques.	9.1	See Task No. 4.4 above.	2
		9.2	Organize publicity of KSRI facilities being made available to institutions and industry, to all possible clients. Prepare a special brochure to be widely publicized and distributed.	1
		9.3	Prepare specialized brochures dealing with techniques of measurements in different fields of interest to Korean metrologists engaged in secondary level laboratories.	4
10.	To design, develop, repair and maintain instruments.	10.1	With the help of maintenance shop and staff, repair such instruments and equipment as may have been received in damaged condition.	1
		10.2	Prepare schedules for preventive maintenance and periodical calibration of KSRI instruments. (See also Task 2.3.)	2
		10.3	Explore the field for the development of those instruments as may be urgently required in Korea and not being locally produced.	2
		10.4	Prepare program for instrument development and pursue it through matrix management.	3

Table IV-A Page 6

Role No.	ROLE	Task No.	TASK	Priority
11.	To offer consultancy service on transfer of technology from indigenous and foreign sources.	11.1	Undertake preparation of detailed plans for the establishment of Specialized Industrial Testing Laboratories as recommended in Volume I under the direction of IAA. (related to Role 7)	2
12.	To handle product evaluation, product safety, problems requiring scientific evaluation.	12.1	See Task No. 7.2.	3
		12.2	Contact government ministries including IAA and other similar Administrations to refer problems involving safety, public health and environment protection for investigation to KSRI.	2
		12.3	Generate through staff consultation and consider undertaking research and development projects of industrial interest holding promise of early fruition and exploitation.	2

However, several aspects of the equipment team's analysis which have bearing on project feasibility and economy are summarized below:

i - High-low values were estimated for the calibration workload of each instrument and piece of equipment. The low value represents industry's requirements for calibration given its present limited interest in more reliable measurement capabilities. The high value represents the potential requirements of Korean industry by 1980, if all firms desire to achieve higher standards of measurement performance, an evolution in attitudes that could arise through the pressures of the market place and/or government legislation. Recommended equipment lists and related staff requirements, however, assume calibration workloads nearer the low end of the scale.

ii - The type of equipment recommended is appropriate for the projected needs of Korean industry by 1980 and does not represent the state of the art in measurement technology.

iii - The equipment analysis team identified various pieces of equipment existing in Korea that were suitable for use by KSRI. Wherever the condition, transportability, and the present function and degree of use of such equipment suggested that the equipment could be transferred to KSRI, the equipment team recommended that such transfer be made.

iv - The equipment lists that resulted from this analysis were prioritized and scrutinized for items that would deliver a low return on investment during the next five years. Lower priority items were deleted from the lists.

b. U.S. Advisory Assistance

Approximately 42 man-months of short-term consulting assistance is considered necessary for the following tasks:

- review of building design and construction
- Organization of effective metrology programs in each of six basic areas
- review and further detailing of equipment specifications

- periodic assessment of program and fostering of "sister" relationship between KSRI and U.S. institution (preferably the NBS)
- coordination of U.S. services

c. Recruitment of overseas Koreans

Overseas recruitment is fully described in Section III-D-3. Approximately 35 top-level managers, scientists, and engineers will be recruited in this manner.

d. Training

Different training programs and courses will be developed to meet the specialized needs of different levels of staff. The training programs can be categorized as follows:

- i - customized - intended only for the KSRI president, vice president, and selected department heads. This type of program will involve visits to international standards agencies, other national standards organizations, and outstanding measurement laboratories. The objective will be to develop a better understanding of effective organization and management of metrology functions, as well as to become acquainted with the leadership of other standards organizations. Typical duration: 4-6 weeks.
- ii - "broad brush" - intended for department heads and section leaders of metrology disciplines. The objective will be to study metrology practice for a given discipline, with emphasis on methodology and use of equipment. Typical duration: 3 weeks.
- iii - precision measurement - intended primarily for scientists/engineers, and technicians, but will also include section leaders to facilitate their contribution to course. The objective will be to impart detail-oriented training in metrology procedures within sub-disciplines. Typical duration: 6 weeks for each subdiscipline.
- iv - test methods - intended primarily for scientists/engineers and technicians, but will again include section leaders. The course objective will be to learn how to set

up, maintain and utilize equipment. Emphasis will be on flexible application of basic equipment to the requirements and test methods anticipated for KSRI operations. Typical duration: 6 weeks.

It is anticipated that only the top management staff, including selected department heads and section leaders, will receive training in the U.S. After completion of this training, the same course structure and materials will be used to present "broad brush," precision measurement and test methods courses in Korea, where KSRI's scientists/engineers and technicians will be trained. After refinement, these courses will be institutionalized as part of the KSRI regular program with training available to measurement personnel from laboratories and industry.

e) Library Materials

Besides general books and periodicals in the physical, chemical, engineering and mathematical sciences, the library will acquire:

- (I) texts and selected journals concerned with the technologies of specific industries;
- (II) a core collection of published international and other national standards;
- (III) microfiche and film collections relevant to KSRI; and,
- (IV) a collection of original scientific papers concerned with critical measurements of pollutants.

Using these acquisitions as a resource base, the KSRI library will organize a Technical Information Service System (TISS) to channel information and technical documents to industry, measurement laboratories, and other government agencies. The TISS concept is illustrated in Fib. IV-5 (attached).

RESOURCES DEVELOPMENT
& EXTENSION

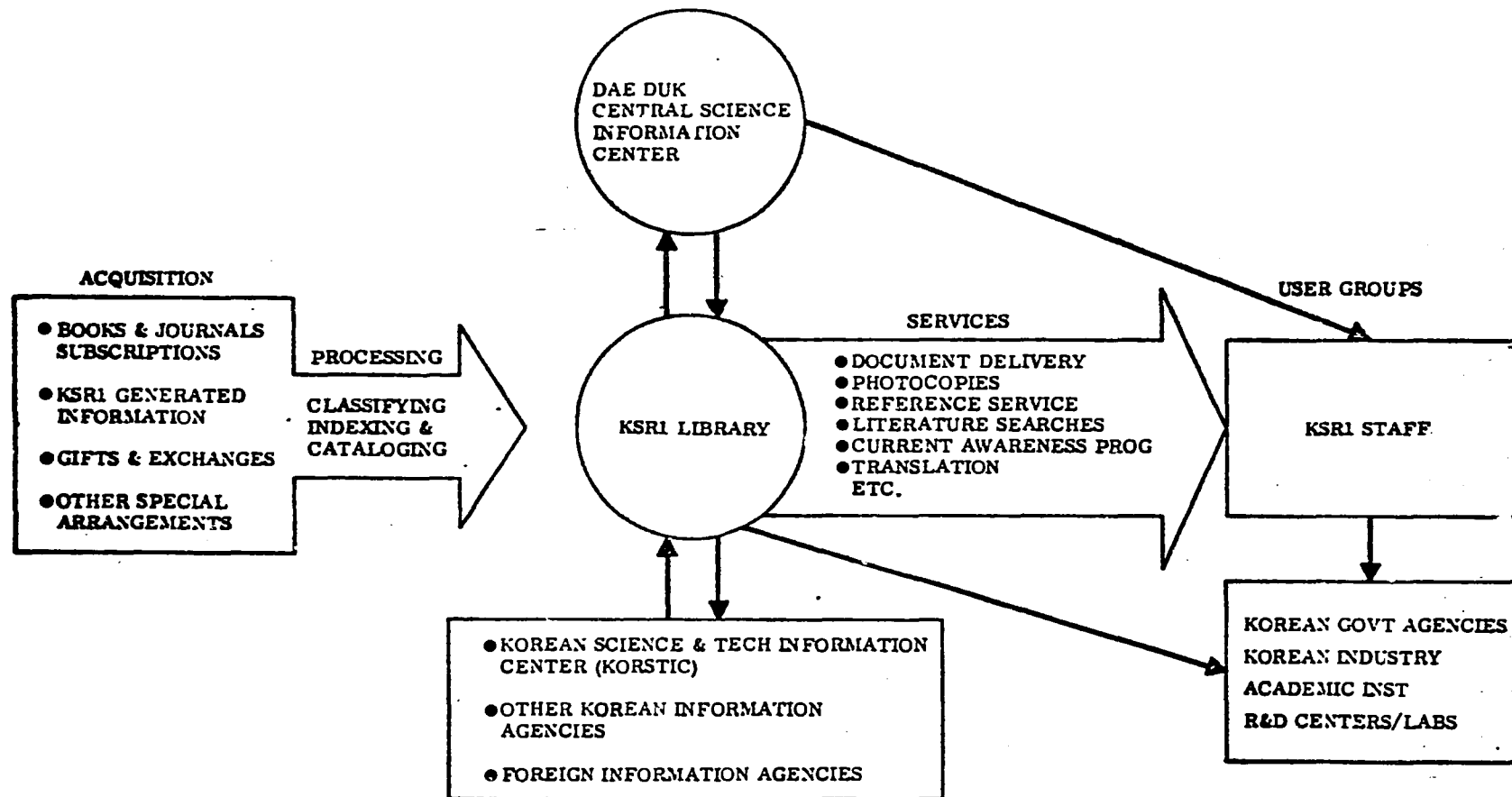


Fig. IV-5

KSRI TECHNICAL INFORMATION SERVICE SYSTEM

3. Implementation Procedures

a) Strategy for Obtaining U.S. Services

The first order of business under the heading of implementation procedures is to select an efficient mechanism for delivery of all the foreign services that are required to assist in the establishment of KSRI. These services include development of course materials, presentation of courses, and scheduling of customized training programs; short-term consultant services in building design, organization of metrology functions in basic disciplines, and guidance on overall program management; possible assistance in recruitment; and possible assistance in preparing detailed equipment specifications and in actual procurement.

The leadership of the IAA and NISRI have expressed a strong preference for selection of one U.S. organization that can orchestrate all these services, an arrangement that has the advantages of administrative simplicity and use of one main communications channel with the U.S. For the reasons described below, the Korean officials responsible for the establishment of KSRI would like such an arrangement with the U.S. National Bureau of Standards (NBS):

1 - During the NBS survey team's visit to Korea in 1967, representatives of the NBS and the ROKG agreed in principle to foster a "sister" relationship between the NBS and the Korean institution responsible for metrology standards. This relationship has not yet materialized, primarily because of the lack of funding. However, it remains an important IAA objective that could be realized by a loan-financed service agreement.

2 - The Korean leadership justifiably believe that KSRI's eventual success depends greatly on its establishing a reputation for scientific competence. Accordingly, they would like to draw upon the recognized scientific expertise and diversified experience of the NBS to help develop that reputation.

3. In their view, the proposed role and functions of KSRI are more comparable with those of the NBS than any other organization. Moreover, the NBS is the most appropriate, and perhaps unique, source of some of the consultant advice and specialized training required for KSRI.

During the week of April 21-25, Mr. Steffen Peiser, Chief of the Office of International Relations of the NBS, was in Seoul to provide guidance on the preparation of the project paper. Mr. Peiser was receptive to the idea of an agreement between the NBS and KSRI to provide scientific and technical advice and operational assistance as required by KSRI. He agreed to discuss the possibility with NBS leadership and advise both the IAA and AID concerning NBS' willingness and capability to undertake this responsibility. Two principal problems were discussed:

1 - Some of the consulting services and a large portion of the training services could not appropriately be offered by NBS. These services would need to be obtained from private firms, universities, or other government organizations. Locating sources for such services and arranging contracts or agreements might saddle the NBS with an administrative burden it would be unwilling to undertake.

2 - Because of current staff overload within the NBS, it would be necessary to recruit a program coordinator at the NBS who would be loan-funded. It was suggested that a Korean living in the U.S. and "well-travelled" in U.S. industrial and scientific communities might be recruited as KSRI's employee for this purpose.

The other feasible alternative would be to utilize an agreement with the NBS to facilitate the desired "sister" relationship and to finance those services which the NBS can most effectively provide, and a separate agreement or contract with another organization to provide the remaining services, including the development and "packaging" of training courses. It was suggested that it might be advantageous for KSRI to have a contractual relationship with a private U.S. firm because KSRI's success also depends on a practical understanding of and orientation to Korean industrial needs. This second alternative remains a consideration, but for reasons already stated, the Korean leadership is still hopeful of one agreement with the NBS to coordinate all required services.

b) Procedural Guidelines

Broad procedures for construction and recruitment were described previously in Sections III-D-3 and III-C-3, respectively, and will not be repeated here. Procedures for advisory assistance were implied in the discussion of a strategy for obtaining U.S. services. The paragraphs below provide a general understanding of how training and equipment procurement will be carried out.

i - Training

One of the GE-TEMPO tasks is to "develop a training program outline which will assist the NSS to develop the required staff for the projected organization (i.e., KSRI) and estimate the cost thereof." GE-TEMPO personnel have surveyed appropriate organizations and educational institutions in the U.S. and have tentatively concluded that courses suitable for KSRI are not available in the U.S. The search is not yet complete, but if GE-TEMPO confirms its current impression, it will recommend that relevant courses be designed and presented specifically for KSRI personnel. This approach has several advantages: the course materials can be tailored to Korea's special needs, the course package can be transferred to Korea after assessment and refinement to train the bulk of KSRI personnel and to be incorporated in KSRI's ongoing training

program, and it may provide a model for use in training personnel from other countries--a matter of particular interest to TA/OST and the NBS.

A second, but less desirable alternative would be to send KSRI personnel to courses known to exist in Japan. Apart from the need to obtain a non-code 941 waiver, this alternative has the disadvantage of the historic relationship between the Koreans and the Japanese.

ii - Equipment Procurement

Procurement will be carried out according to AID Capital Project Guidelines, including procurement by competitive tender and restriction to Code 941 countries. It is likely that KSRI will need U.S. assistance in preparing detailed equipment specifications for bidding purposes, since the equipment lists prepared by GE/TEMPO will be limited to performance specifications and model number. KSRI can obtain such assistance indirectly through the proposed agreement with the NBS or such other contractual relationship as it may develop.

The KSRI Task Force will have overall responsibility for equipment procurement, but will utilize the services of the Office of Supply of the Republic of Korea (OSROK). USAID can attest to OSROK's procurement competence, which has been demonstrated through long experience with AID-financed procurement activities. OSROK is well-staffed with capable and experienced personnel who have earned a reputation for efficient and reliable administration. In addition, NISRI has had considerable experience in purchasing similar laboratory equipment for its own operational needs, as well as in the installation and maintenance of such equipment.

The KSRI Task Force will make the necessary arrangements for Standard Reference Materials (SRM) and other technical materials with the NBS, and be responsible for customs clearance and inland delivery of all equipment to the Dae Duk project site. In view of the past Korean experience, the Project Committee does not foresee any major problem with equipment procurement.

4. Financial Plan

a) Plan for Use of Loan Funds

The following table shows the proposed loan budget, with projected disbursements by year and type of expenditure:

Activity \ Year	1975	1976	1977	1978	TOTAL
<u>Equipment</u>			<u>2352</u>	<u>1198</u>	<u>3550</u>
- Primary Equipment			1744	1198	2942
- Calibration vans (2)			270		270
- Computer terminals (2)			88		88
- Environmental controls			250		250
<u>Staff Training</u>		<u>300</u>	<u>305</u>	<u>175</u>	<u>780</u>
<u>Overseas Recruitment</u>	<u>2</u>	<u>113</u>	<u>122</u>	<u>33</u>	<u>270</u>
<u>Technical Advisory Services</u>	<u>22</u>	<u>137</u>	<u>116</u>	<u>25</u>	<u>300</u>
<u>Library Materials</u>			<u>100</u>		<u>100</u>
<u>Contingency (6%)</u>			<u>100</u>	<u>200</u>	<u>300</u>
TOTAL	24	550	3095	1631	\$5300

b) Detailed Analysis of Cost Estimates

1 - Equipment:

The equipment cost estimates shown in the table are those developed by the GE-TEMPO Equipment Analysis Teams. The itemized cost of primary equipment, e.g., primary standards, measurement devices, and related instruments, is summarized in GE/TEMPO's Interim Report on Laboratory Equipment and Capabilities Analysis for the National Standards System of Korea. Estimates for the calibration vans, computer terminal,

and environmental controls were submitted separately by various GE-TEMPO consultants and will be incorporated in the final GE-TEMPO report.

Several observations should be made concerning the cost estimates for primary equipment, which represent nearly 60% of total loan requirements. The GE-TEMPO estimates included an inflation allowance of nearly 6% per year, an inventory of spare parts valued at 20% of equipment acquisition cost, and packing and shipping charges CIF Seoul based on estimates provided by three major U.S. instrument producers. The initial recommended procurement list was then reassessed by GE-TEMPO and reduced to eliminate several expensive, lower priority items (advanced radio-frequency equipment and atomic time-frequency standards) and electrical measurement equipment that is already available at the Electrical Communications Laboratory.

The GE-TEMPO Equipment Analysis Teams assured the Project Committee that assumed lead times for delivery are realistic and that all equipment can be delivered well within the three-year loan disbursement period.

ii- Staff Training:

Firm cost estimates for staff training are not yet available since the GE-TEMPO team had not completed its interim report on training by the time this project paper was concluded. Moreover, the cost estimates to be included in the GE-TEMPO report will be highly tentative because the substantial cost of developing specialized training courses and course materials is not easily predictable. GE-TEMPO consultants furnished the following rough estimates of training costs:

- Course development:	\$250,000
- Course presentation in U.S.:	100,000
- Travel and logistics costs for KSRI personnel trained in U.S.	400,000
- Collaboration of contractor personnel in training courses presented in Korea:	30,000
	<hr/>
Total	\$780,000

Some cost savings in travel and logistics costs may be achieved by scheduling training of overseas staff recruits prior to their return to Korea, thereby eliminating the need for these persons to make round-trips Korea-U.S.-Korea to participate in training. To

Figure IV-6 Plan for Technical Advisory Services

	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>
1. Coordinator		<u>* * * *</u> 1 man full time		
		<u>Part-time typing, secretary</u>		
2. Sistership Relationship (NBS)		<u>Av. 2 man days per week</u>		
(A) Coordination Assistance				
(B) Trustee Membership	* 1wk*	* 1wk* * 1wk*	* 1wk* * 1wk*	* 1wk*
3. Consultation				
(A) Specialized Fields				
-- General metrology		* 1man*	* 1man*	* 1man*
-- Mechanical metrology		* 1man*	* 1man*	
-- Electrical metrology		* 1man*	* 1man*	
-- Thermal metrology			* 1man*	
-- Radiation			* 1man*	
-- SRM chemist			* 1man*	
(B) Equipment Specifications		<u>* * *</u>		
(C) Building Consultation				
(i) Design	* 1man*	* 1man*		
(ii) Environment	* 1man*	* 1man*		
4. Evaluation				* 2man*

* * denotes one round trip from U.S. to Korea

Figure IV-7 - Budget for Technical Advisory Services

(\$000)

<u>Item</u>	<u>Year</u>				<u>Total</u>
	<u>1975</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	
1. Coordinator					
-- Salary plus costs	--	35.0	35.0	--	70.0
-- Int'l travel and per diem	--	3.2	--	--	3.2
-- Secretarial assistance	--	10.0	10.0	--	20.0
2. Sistership (NBS)					
(A) Coordination Assistance					
-- Salary plus overhead	--	26.0	14.0	--	40.0
(B) Trustee Membership					
-- Salary plus overhead	1.2	2.4	2.4	1.2	7.2
-- Int'l travel and per diem	1.6	3.2	3.2	1.6	9.6
3. Consultation					
(A) Specialized Fields					
-- Fee plus in-country per diem	--	15.0	30.0	5.0	50.0
-- Int'l travel and per diem	--	4.8	9.6	1.6	16.0
(B) Equipment Specifications					
-- Fee plus in-country per diem	5.0	15.0	--	--	20.0
-- Int'l travel and per diem	0.8	0.8	--	--	1.6
(C) Building Consultation					
-- Fee plus in-country per diem	10.0	10.0	--	--	20.0
-- Int'l travel and per diem	3.2	3.2	--	--	6.4
4. Evaluation	--	--	--	12.0	12.0
Subtotals	<u>21.8</u>	<u>128.6</u>	<u>104.2</u>	<u>21.4</u>	<u>276.0</u>
Inflation allowance	<u>0</u>	<u>6.2%</u>	<u>11.5%</u>	<u>17.1%</u>	
TOTAL	21.8	136.6	116.0	25.0	299.4

Figure IV-8

TECHNICAL INFORMATION SYSTEM COSTS

1. Books: 2000 titles at \$20 ea. = \$40,000	
2. Library Equipment:	
(a) One copy machine	\$30,000
(b) One catalog card duplicator & supplies	1,800
(c) One labeling system	1,800
(d) Two microfilm reader/printers & supplies	7,200
(e) Five microfilm filing cabinets	3,000
(f) Miscellaneous	<u>3,300</u>
Subtotal:	\$47,100
Total Books and Library Equipment:	\$87,100
Packing & Shipping Allowance (3%):	2,600
Subtotal:	\$89,700
Inflation Allowance (1977):	11.5%
TOTAL:	\$100,000

the extent such savings are obtained, funds will be available for specialized training experiences, participation in international workshops and conferences, and limited post-doctoral research activity in 1978.

iii - Overseas Recruitment:

The following table shows the anticipated recruitment schedule:

Position	Year			Total
	1976	1977	1978	
Department Chief	4	4	1	9
Section Head	5	9	4	18
Scientist/Engineer	6	2	-	8
Total.	15	15	5	35

The average recruitment cost per staff member is \$6500: \$3000 for travel of the staff member and family to Korea, \$2500 for shipment of personal effects, and \$1000 as a relocation allowance. The total recruitment cost for 35 staff members, allowing for inflation, is approximately \$250,000. In addition, \$30,000 is budgeted for an average of three recruitment trips per year to the U.S. by the KSRI president or other authorized personnel.

iv - Technical Advisory Services:

The plan for technical advisory services and corresponding budget are shown in Figures IV-6 and IV-7, attached. The total estimated cost is \$300,000.

v - Technical Information System:

The estimates for library publications and materials are found in Figure IV-8 and are largely self-explanatory. It should be stressed that this budget is, at this time, illustrative only. Final determination of the publications to be ordered will be made after close consideration of the requirements of KSRI in light of the planned collection in the central library at Dae Duk. GE-TEMPO has compiled a list of suggested titles for procurement by KSRI which will be used as a starting point for determining the publications to be bought. KSRI plans to have a full-time professional librarian to spearhead its library acquisition program and plans to consult fully with its sister organization and pertinent consultants prior to making final selection.

vi - Contingency

A contingency allowance of \$300,000 is believed desirable to provide for the following possibilities:

- price increases larger than those assumed in developing cost estimates
- equipment requirements that may have been omitted from the procurement lists
- greater need for technical advisory services in building design and equipment procurement than is now believed necessary.

c) Local Currency Budget for the Establishment of KSRI

The following table shows how local currency funds for the establishment of KSRI will be disbursed, by year and by class of expenditure:

(Unit: \$1000)

Year Expenditure	1975	1976	1977	1978 ^{1/}	TOTAL ^{1/}
<u>Construction cost</u>	<u>266</u>	<u>2600</u>	<u>2292</u>		<u>5158</u>
- Land acquisition	150	150	220		500
- Buildings		1656	1459		3115
- Civil works	53	272	175		500
- Environmental control		313	313		626
- Ancillary facilities	83	209	125		417
<u>Planning, coordination, and staff services</u>	<u>117</u>	<u>286</u>	<u>429</u>		<u>832</u>
<u>Staff training in Korea</u>			<u>70</u>	<u>140</u>	<u>210</u>
Total Cost	383	2886	2791	140	\$6200

5. Disbursement Procedures

No deviation from AID established disbursement procedures is anticipated. The bulk of project costs, i.e., all equipment procurement and service contracts for training and consultants will be financed through Letter of Commitment procedures. In a few special situations where personal service contractors are required, e.g., consultants on building design and specifications, financing will be provided through a "Direct Reimbursement Approval," as described in Para. II-C, Manual Order 1134.1.

B. AID MONITORING STRATEGY

1. Locus of Monitoring Responsibility

Responsibility for monitoring the proposed project will be vested in the Development Loan Division (DLD) of USAID/Korea. DLD will enlist the assistance of other USAID offices, such as Engineering and Controller, in specific areas of project monitoring. As the USAID staff is reduced and DLD is phased out, monitoring responsibilities will be transferred to the USAID Program Office.

2. Illustrative Outline of Principal Events

The Outline of Principal events described below assumes that fund availabilities will permit authorization of the full loan amount in FY 1975. However, if budget constraints make this impossible, it is proposed that the authorization be divided between FY 1975 (\$2.0 million) and FY 1976 (\$3.3 million). Authorization of the second portion could not occur until 8/1/75, when a Continuing Resolution for A.I.D. will probably be passed. Signature of the Loan Agreement might then be delayed until 10/30/75, and all subsequent actions also delayed by 1-2 months.

<u>Date</u>	<u>Event</u>
6/15/75	Loan Authorized
8/30/75	Loan Agreement Signed
8/30/75	First Implementation Letter Issued
9/30/75	Submission of Documentation for Initial CP's
10/7/75	Approval of Initial CP's
10/7/75	Request for DRA for Design and Specification Consultants
10/20/75	Design Consultants Arrive
10/30/75	Submission of Documentation for Remaining CP's
11/14/75	Approval of Remaining CP's
11/15/75	Request for L/Comm. for Technical Assistance Services, Training and Recruitment
11/30/75	Sistership Agreement signed with NBS and, if appropriate, service contract signed with other U.S. Organization
12/15/75	First Board of Trustees Meeting
12/30/75	Signature of Contract for Training Services
2/1/76	Construction of KSRI Facilities Begins
3/1/76	Request for L/Comm for Equipment
6/1/76	Request for L/Comm for Technical Information System (Library Materials and Supplies)
11/15/76	Main Building Completed
12/15/76	KSRI Core Staff relocated to Dae Duk
6/30/77	Lab construction completed and equipment installation begins.
1/1/78	Beginning of regular KSRI operations

3. Monitoring Procedures

USAID personnel will make periodic visits to KSRI to assess implementation progress and discuss existing or potential problems. USAID will also monitor progress closely through periodic KSRI reports and through participation in Board of Trustee meetings. A refined version

of the outline of principal events acceptable to USAID will be required as a condition precedent. After approval and submission of this outline to AID/W, USAID will provide periodic reports of actual progress. If implementation is delayed, USAID will provide an analysis of the factors responsible for the delay, revised target dates, and a plan of action for meeting the target dates.

4. Reporting Arrangements

All project reporting will be submitted by KSRI to USAID through the Economic Planning Board.

Two categories of reports will be required. The first will consist of quarterly progress reports which describe activities undertaken during the reporting period, and provide an acceptable accounting of loan fund expenditures. The second will consist of annual reviews which analyze the project's success in achieving the outputs incorporated in the project design and progress towards achieving the project purpose. Through the end of 1977, these reports will focus on the achievement of outputs necessary for the initiation of KSRI services. They will include a full analysis of the Borrower's performance in meeting target dates included in the chronogram and outline of significant events. If delays have occurred, the reports will include an analysis of the factors responsible for delay, a plan of action to realign actual with planned progress, establishment of new targets as necessary for significant events, and measures to avoid similar implementation delays in the future. These early reports will also describe progress in formulating the evaluation plan and in obtaining base-line data to be utilized for comparison after KSRI operations and, hence, the evaluation phase begin. After 1977, reporting will emphasize evaluation of progress towards achievement of the project goal and purpose as defined in the project design, using objectively verifiable indicators to measure progress.

C. EVALUATION PLAN

1. Evaluation Design

The basis for project evaluation is provided by the Log-Frame Matrix (Annex D); the "objectively verifiable indicators" selected for the project design will be used to measure goal and purpose achievement and output performance. "Means of verification" have been suggested in the right-hand column of the Log-Frame; however, the teams given the responsibility for evaluation will undoubtedly want to add or substitute their own verifiers. Base-line data for the various indicators will be collected by personnel from the KSRI Task Force during the fourth quarter of 1977, just prior to the beginning of normal KSRI operations. On the basis of this data collection effort, new targets more realistically oriented to the then-existing situation will be established for the "objectively verifiable indicators." KSRI will collect data on the same characteristics on an annual basis thereafter to provide a progress profile. A report of the base-line data collection effort and appropriate revision of targets will be required as part of the Annual Review submission for CY 1977.

The three-year loan-disbursement period and the beginning of KSRI operations late in this period make meaningful evaluation difficult. At best, an evaluation could be conducted in late 1978, but it will be difficult for KSRI to achieve a discernible influence on progress indicators in less than one year. However, it is still recommended that a joint U.S.-Korean team conduct an evaluation of KSRI in the last quarter of 1978 to focus on the following tasks:1/

1. Possible changes in the project setting, particularly any changes that would affect:
 - project justification and approach
 - linkages between different levels of the project design
 - assumptions
2. Clarification of the project design, if deemed necessary
3. Evaluation of progress to the extent possible, and recommendations for improvement

The evaluation team should include one expert in metrology standards (preferably from the NBS) and one representative of U.S. private industry fully knowledgeable about metrology and measurements practice in industry. These non-AID participants would be loan-funded under the appropriate KSRI agreement with a U.S. organization.

A second, more thorough joint U.S.-Korean evaluation should be undertaken in the last quarter of 1980, when the KSRI program is fully established and is impacting on the Korean industrial structure.

1. See AID Guidelines for the Evaluation of Capital Projects, pp. 4-7.

The U. S. participation in this evaluation is problematical, since loan funds will have been fully disbursed, and any remaining Mission in Korea will not have funds to cover the cost. Hopefully, the dollar costs of such an evaluation could be funded by AID/W, i.e. TA/OST.

KSRI intends to create a Council for Evaluation that will be an adjunct of the Board of Trustees. This Council will be responsible for organizing evaluation activities, selecting Korean personnel to participate in joint evaluations, and supervising the collection of data for continuous evaluation.

D. SUMMARY OF ISSUES

1. Crucial nature of timing of local currency availabilities for the establishment of KSRI (Reference: Section III-B-1)

All aspects of loan implementation, i.e., equipment procurement, staff recruitment and training, and advisory services, will be keyed to a planned completion date of July 1, 1977 for the KSRI facilities at Dae Duk. Local currency funds for the establishment of KSRI must be available on schedule in order to facilitate smooth progress in loan implementation and assure that trained staff and delivered equipment can be housed in a working institution. Evidence of the availability of local currency when needed will be made a condition precedent to disbursement.

2. Assurance that support facilities required by KSRI at the Dae Duk Science Town are constructed prior to KSRI's scheduled opening date of July 1, 1977. (Reference: Section III-C-4)

By the scheduled date of its opening, KSRI will need housing and social facilities at the Science Town in order to attract high-calibre staff, and technical support services in order to organize effective programs. The Ministry of Science and Technology and the Ministry of Commerce and Industry should agree on an implementation plan and related financial plan to assure that such facilities will be available when needed by KSRI. These plans should be included in the C.P.'s to disbursement.

3. Potential unproductive competition between KSRI and the Fine Instruments Center (FIC) (Reference: Section II-B-3)

There is possible overlap in the proposed program of KSRI and the current program of FIC in the supply of secondary calibration services to industry. The Project Committee examined this issue and concluded that despite possible competition in the field of calibrations, the overall effect of KSRI on FIC will be beneficial for several reasons:

a) FIC's standards do not have current traceability to international standards since available standards with NISRI are not adequate for the purpose. Therefore FIC must have its standards calibrated abroad to maintain the desired degree of international traceability at considerable expense and loss of time. KSRI, once operational, will be able to calibrate FIC's standards with national standards.

b) Calibration services are currently a minor element in the FIC program, and income from such services represents only 5% of the Annual FIC budget. An important role of KSRI will be to promote improved measurement capabilities within

industry and increase industrial consciousness of the value of calibration. On balance, it would appear that a successful KSRI would increase the volume of FIC's calibration services as well as generate a sizeable demand for services directly from KSRI.

c) In the overall national metrology standards system, FIC will have a well-defined role as a secondary standards laboratory in the fields of dimensional and electrical metrology.

The Project Committee still recognizes the desirability of minimizing areas of potential, non-productive overlap between KSRI and FIC during project implementation. It therefore recommends that the Ministry of Commerce and Industry develop a policy statement establishing discrete roles for KSRI and FIC in areas of common interest, except in specified areas where there is scope for both to perform the same role. Such a statement should be made a C.P. to disbursement.

4. Current low level of industrial interest in improving measurement capabilities (Reference: Section III-F-2)

KSRI's influence and eventual success will depend greatly on an increased industrial interest in precise measurement and willingness to invest in improved capabilities. The Industrial Advancement Administration should develop a comprehensive strategy for motivating industry to improve measurement capabilities, and thereby enhancing the effectiveness of KSRI. Definition of such a strategy should be made a C.P. to disbursement.

E. CONDITIONS PRECEDENT AND SPECIAL COVENANTS

The Project Committee recommends that the following conditions precedent to disbursement and special covenants be incorporated in the Loan Agreement for this project. However, it should be noted that USAID/Korea is continuing discussions with high-level ROKG officials in an attempt to definitively resolve various issues that give rise to some of these conditions precedent and covenants. If, prior to Loan Agreement negotiation and execution, the Mission and the ROKG reach agreement on a given issue and develop acceptable evidence of satisfaction thereof, the corresponding condition precedent will, of course, be eliminated from the following list.

1. Conditions Precedent to financing the services of Consultants in Building Design and Specifications

a) An opinion of the Minister of Justice of the Borrower that this Loan Agreement has been duly authorized or ratified by, and executed on behalf of, the Borrower and that it constitutes a valid and legally binding obligation of the Borrower in accordance with its terms;

b) Statements of the names of the persons who will act as the representatives of the Borrower pursuant to Section 9.1 hereof, together with evidence of their authority and a specimen signature of each such person, certified as to its authenticity by either the person rendering the legal opinion pursuant to Section 3.1(a) or the person executing this project.

c) An executed contract for architectural and engineering services for the construction of the KSRI building at the DaeDuk Science Town

d) Draft contracts acceptable to AID for consultant services in building design and specifications.

2. Conditions Precedent to all other disbursements

a) Evidence that the Korea Standards Research Institute (KSRI) has been legally established as an autonomous institution to be incorporated in the DaeDuk Science Town.

b) Description of organizational arrangements for executing this Loan Agreement and carrying out all planning and coordination functions leading to normal KSRI operations no later than January 1978. Such description shall include identification of the President of KSRI and other designated leadership of KSRI.

c) Evidence of adequate building design and engineering specifications for KSRI facilities to be constructed at the DaeDuk Science Town.

- d) An implementation plan to provide staff housing, related social facilities, and technical support services at the DaeDuk Science Town when needed by KSRI, and evidence that the required local currency financing will be available.
- e) A detailed implementation plan for the project, including building construction, which provides a schedule of all important events necessary for initiation of full KSRI services by January 1978; such plan shall include a summary outline of principal events that may be used to monitor project progress.
- f) A financial plan for the project including a schedule of expenditures by category and a schedule of funding by source from project inception through the end of 1982;
- g) Evidence that local currency required for the project during 1975 has been included in the First supplementary Budget for 1975, and that local currency required during 1976 has been included in the regular ROKG Budget for that year.
- h) A plan which details the procedures to be followed in effecting the procurement of A.I.D.-financed equipment, materials, and related services; such plan shall include a definitive equipment procurement list.
- i) A functional statement of mission for KSRI outlining its specific responsibilities and duties; additionally the statement should define, as appropriate, discrete roles in the national metrology standards system for KSRI, FIC, and other Korean organizations with at least secondary standards capabilities.
- j) A statement of the planned policy of the Government of the Borrower, acting through the Industrial Advancement Administration to (i) strengthen other aspects of the national standards system in addition to KSRI (ii) foster quality control and standardization consciousness and practice in industry, trade and society in general and (iii) insure that those government entities charged with responsibility for metrology and standardization are responsive to the needs of the Korean public in these areas;

3. Particular covenants and warranties concerning this project

Except as A.I.D. may otherwise agree in writing, the Borrower covenants and agrees that it shall:

- A) Carryout the Project, or cause the Project to be carried out in conformity with Annex A to this Agreement--Project Description, with due diligence and efficiency, and in conformity with sound engineering, construction, financial, administrative, and management practices.

- b) Adequately maintain, repair and operate in accordance with sound engineering, financial, administrative, and management practices all equipment and facilities financed by the Loan.
- c) Adhere to the implementation plans, financial plans, and operational policy statements submitted in satisfaction of Conditions Precedent to disbursement.
- d) Provide all resources in addition to this Loan and all Korean won which may be necessary for the punctual and effective carrying out of the Project. Such provision shall specifically include a foreign exchange allocation, as necessary, to replenish stocks of spare parts and SRM's that will initially be financed by the Loan.
- e) Amend ^{in timely fashion} the Weights and Measures Law to delegate to KSRI the responsibility for maintenance of metrology standards, inspection activities, and regulatory functions under the law.
- f) Arrange ^{in timely fashion} for the transfer to KSRI of all suitable equipment now belonging to the Weights and Measures Department of the National Industrial Standards Research Institute; and the transfer of equipment at other public institutions which is more appropriate for a national metrology standards institution and is not being effectively used at the present time.
- g) Establish an Evaluation Council ^{subordinate to KSRI's Board of Trustees} or other satisfactory administrative mechanism with responsibility for continual evaluation of the KSRI program.
- (h) Submit to A.I.D. for its approval:
 - 1. All bid documents and documents concerning the solicitation of proposals relating to the goods and services financed under the Loan, and any modification thereof, prior to their execution.
 - 2. All contracts financed under the Loan, and any modifications thereof, prior to their execution.

PROJECT PAPER
FOR
KOREA STANDARDS RESEARCH INSTITUTE

ANNEXES

A.I.D. Loan No. 489-W-093
Project No. 489-22-290-711

DRAFT

LOAN AUTHORIZATION

Provided from: Selected Development Problems
(Korea: Korea Standards Research Institute Project)

Pursuant to the authority vested in me as the Assistant Administrator, Bureau for East Asia, Agency for International Development ("A.I.D."), by the Foreign Assistance Act of 1961, as amended, (the "Act") and the Delegations of Authority issued thereunder, I hereby authorize the establishment of a loan pursuant to Part I, Chapter I, Section 106 and Chapter 2, Title I, the Development Loan Fund, to the Government of the Republic of Korea ("Borrower") of not to exceed Two Million Dollars (\$2,000,000)¹ to be made available to finance the foreign exchange costs of certain technical assistance, training, and equipment to assist in the establishment of the Korea Standards Research Institute. It is our intention to authorize an additional Three Million, Three Hundred Thousand Dollars (\$3,300,000) early in FY 1976, subject to the availability of funds, to provide the remaining foreign exchange required for the establishment of this institute. The loan is to be subject to the following terms and conditions:

1. Interest Rate and Terms of Repayment

This loan shall be repaid by the Borrower within forty (40) years after the date of the first disbursement thereunder including

¹ The Project Paper provides justification for an A.I.D. loan of \$5,300,000, and our objective is to authorize this amount in FY 1975. However, current information on fund availabilities suggest that authorization of the full amount may not be possible in FY 1975. In that event, it is our intention to commit the total funding required in two stages: an authorization of \$2,000,000 in FY 1975, and an authorization of \$3,300,000 in early FY 1976.

a grace period of not to exceed ten (10) years from the date of first disbursement. The interest on the outstanding balance of the loan, including any due and unpaid interest thereon, shall accrue from the date of the first disbursement at the rate of two percent (2%) per annum during the grace period and at the rate of three percent (3%) per annum throughout the remaining life of the loan.

2. Currency of Repayment

Provision shall be made for repayment of the loan and payment of the interest in United States dollars.

3. Other Terms and Conditions

Unless A.I.D. otherwise agrees in writing, the following terms and conditions shall apply to the loan project:

- a. Equipment, materials and services financed under this loan shall have their source and origin in countries under A.I.D. Geographic Code 941 (Selected Free World).
- b. The loan disbursement period shall be three years following satisfaction of the conditions precedent to disbursement.
- c. Prior to disbursement of loan funds for all activities except consultant services for building design and specifications, Borrower must submit the following in form and substance satisfactory to A.I.D.:

i- evidence that the Korea Standards Research Institute has been legally established as an autonomous institution;

ii- a detailed implementation plan for the entire Project;

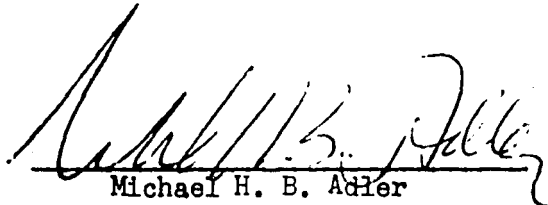
- iii- a financial plan for both foreign exchange~~and~~ local currency requirements of the Project, including evidence that local currency will be available when needed;
- iv- a plan detailing procedures to be used in effecting the procurement of A.I.D. financed equipment, materials, and related services;
- v- a statement of the planned policy of the Government of the Borrower to strengthen the entire Korean National Standards System and to promote quality control and standardization consciousness and practice in industry, commerce, and society in general.

Assistant Administrator, Bureau for East Asia

Date

CERTIFICATION PURSUANT TO SECTION 611(e) OF
THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Michael H. B. Adler, the principal officer of the Agency for International Development in Korea, having taken into account among other things, the maintenance and utilization of projects in Korea previously financed or assisted by the United States, do hereby certify that in my judgement Korea has both the financial capability and the human resources capability to utilize effectively the assistance to be provided under the Industrial Standards Development Project Loan.


Michael H. B. Adler

APR 10 1975

Date

CHECKLIST OF STATUTORY CRITERIA
(Korea Standards Research Institute Project)

Project No. 489-22-290-711

The following abbreviations are used:

FAA - Foreign Assistance Act of 1961, as amended.

FAA, 1973 - Foreign Assistance Act of 1973.

App. - Foreign Assistance and Related Programs
Appropriation Act, 1974.

MMA - Merchant Marine Act of 1936, as amended.

BASIC AUTHORITY

1. FAA §103; §104; §105;
§106; §107. Is loan being made
 - a. for agriculture, rural development or nutrition; 1.a. No.
 - b. for population planning or health; 1.b. No.
 - c. for education, public administration, or human resources development; 1.c. No.
 - d. to solve economic and social development problems in fields such as transportation, power, industry, urban development, and export development; 1.d. Yes.
 - e. in support of the general economy of the recipient country or for development programs conducted by private or international organizations. 1.e. No.

COUNTRY PERFORMANCE

Progress Towards Country Goals

2. FAA §201(b)(5), (7) & (8);
§208.

A. Describe extent to which country is:

(1) Making appropriate efforts to increase food production and improve means for food storage and distribution.

2.A.(1). From 1962 through 1972 the National Income accounts show that the real value added in the agriculture sector increased by approximately 55% (a growth rate of 4.5% per year). Significantly, this period included the two drought years of 1967 and 1968; however, significant investments have been and are being made in irrigation facilities which will minimize future weather influences on production.

Beginning in 1970, the ROKG adopted a high rice price policy and significantly increased rice prices relative to other prices. Rice prices were increased 23% in 1970, 35% in 1971 and 25% in 1972. Since then prices have been increased approximately in line with increases in the general price level. These increases have provided additional incentive for farmers to use fertilizer and other inputs required to increase production.

Under loan 489-H-088 for agricultural research, substantial effort and expenditure will be made to develop and introduce new crop varieties. Under previous A.I.D. assistance, food storage capacity was improved and increased.

(2) Creating a favorable climate for foreign and domestic private enterprise and investment.

2.A.(2). Korea has taken a number of effective steps to create a favorable investment climate. A liberal foreign investment law was enacted, and intensive study is being undertaken by the ROKG of means of expanding capital markets. An investment center has been established, and domestic investment has been assisted by a number of A.I.D. loans such as the loans to the Korea Development Bank.

(3) Increasing the public's role in the developmental process.

2.A.(3). Koreans are basically a homogeneous people whose society is relatively free and politically stable. Korea does not possess deep sectional, religious or social cleavages. Korea's rapid economic development benefits increasingly larger segments of the population.

(4)(a) Allocating available budgetary resources to development.

2.A.(4)(a). Korea has wisely allocated its resources in such a way as to maximize its economic development while maintaining sufficient military forces to insure a relative freedom from threatened external aggression.

(b) Diverting such resources for unnecessary military expenditure (See also Item No. 20) and intervention in affairs of other free and independent nations.) (See also Item No. 11).

2.A.(4)(b). Korea is not so diverting such resources and is not intervening in other free and independent nations' affairs.

(5) Making economic, social, and political reforms such as tax collection improvements and changes in land tenure arrangements, and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise.

2.A.(5). Korean land reform programs have eliminated the large landholding class and have created a large number of independent farmers who own their own small farms. The ROKG has assisted in the establishment of a number of farm and fishery cooperatives which have been of significant assistance to the farm and fishery communities.

Korea basically has a private enterprise type economy. AID has assisted the ROKG in its efforts to reform

the equity of tax rates and collection procedures. These reforms have greatly increased both the amount of taxes collected and the equity with which the program is administered.

On October 17, 1972, the President of Korea declared martial law, giving as reasons domestic and international political developments. Under the martial law, political liberties were restricted and the Korean press was placed under tight control. A new constitution has since been adopted and martial law lifted on December 13, 1972, but restrictions on political activity and press freedom continue.

(6) Willing to contribute funds to the project or program.

2.A.(6). The ROKG will provide at least 25% of the total cost of the project.

(7) Otherwise responding to the vital economic, political, and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

2.A.(7). The ROKG has made significant progress in its efforts to provide a better life for the average Korean citizen. The Government has encouraged the rapid expansion of small and medium industry, stimulated the development of farmer credit unions and fishing cooperatives and has helped in many other ways to better the lot of its people. Korea already has a high literacy rate and is concerned about extending better health care to all its people.

B. Are above factors taken into account in the furnishing of the subject assistance?

2.B. Yes.

Treatment of U.S. Citizens and Firms.

3. FAA §620(c). If assistance is to government, is the government liable as debtor or unconditional guarantor on any debt to a U.S. citizen for goods or services furnished or ordered where (a) such citizen has exhausted available legal remedies and (b) debt is not denied or contested by such government?

3. No such situation is known to exist.

4. FAA §620(e)(1). If assistance is to a government, has it (including government agencies or subdivisions) taken any action which has the effect of nationalizing, expropriating, or otherwise seizing ownership or control of property of U.S. citizens or entities beneficially owned by them without taking steps to discharge its obligations toward such citizens or entities?

4. No such actions are known to have occurred.

5. FAA §620(o); Fishermen's Protective Act §5. If country has seized, or imposed any penalty or sanction against, any U.S. fishing vessel on account of its fishing activities in international waters,

5. Korea has not so seized or imposed any penalty or sanction.

a. has any deduction required by Fishermen's Protective Act been made?

5.a. Not applicable.

b. has complete denial of assistance been considered by A.I.D. Administrator?

5.b. Not applicable.

Relations with U.S. Government and Other Nations

6. FAA §620(a). Does recipient country furnish assistance to Cuba or fail to take appropriate steps to prevent ships or aircraft under its flag from carrying cargoes to or from Cuba?

6. No.

7. FAA §620(b). If assistance is to a government, has the Secretary of State determined that it is not controlled by the international Communist movement?

7. Yes, the required determination has been made.

8. FAA §620(d). If assistance is for any productive enterprise which will compete in the United States with United States enterprise, is there an agreement by the recipient country to prevent export to the United States of more than 20% of the enterprise's annual production during the life of the loan?

8. The loan is not intended for such purposes.

9. FAA §620(f). Is recipient country a Communist country?

9. No.

10. FAA §620(i). Is recipient country in any way involved in (a) subversion of, or military aggression against, the United States or any country receiving U.S. assistance, or (b) the planning of such subversion or aggression?

10. No.

11. FAA §620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction, by mob action, of U.S. property?

11. No such situation is known to have occurred.

12. FAA §620(l). If the country has failed to institute the investment guaranty program for the specific risks of expropriation, inconvertibility or confiscation, has the A.I.D. Administrator within the past year considered denying assistance to such government for this reason?

12. Korea has instituted such a program.

13. FAA §620(n). Does recipient country furnish goods to North Viet-Nam or permit ships or aircraft under its flag to carry cargoes to or from North Viet-Nam?

13. No.

14. FAA §620(q). Is the government of the recipient country in default on interest or principal of any A.I.D. loan to the country? 14. No.
15. FAA §620(t). Has the country severed diplomatic relations with the United States? If so, have they been resumed and have new bilateral assistance agreements been negotiated and entered into since such resumption? 15. No.
16. FAA §620(u). What is the payment status of the country's U.N. obligations? If the country is in arrears, were such arrearages taken into account by the A.I.D. Administrator in determining the current A.I.D. Operational Year Budget? 16. Korea is not a member of the United Nations.
17. FAA §481. Has the government of recipient country failed to take adequate steps to prevent narcotics drugs and other controlled substances (as defined by the Comprehensive Drug Abuse Prevention and Control Act of 1970) produced or processed, in whole or in part, in such country, or transported through such country, from being sold illegally within the jurisdiction of such country to U.S. Government personnel or their dependents, or from entering the U.S. unlawfully? 17. No.
18. FAA, 1973 §29. If (a) military base is located in recipient country, and was constructed or is being maintained or operated with funds furnished by U.S., and (b) U.S. personnel carry out military operations from such base, has the President determined that the government of recipient country has authorized regular access to U.S. correspondents to such base? 18. See Presidential Determination No. 74-14, made January 28, 1974.

Military Expenditures

19. FAA s620(s). What percentage of country budget is for military expenditures? How much of foreign exchange resources spent on military equipment? How much spent for the purchase of sophisticated weapons systems? (Consideration of these points is to be coordinated with the Bureau for Program and Policy Coordination, Regional Coordinators and Military Assistance Staff (PPC/RC).)

19. For 1974, 29.5% of the budget is for military expenditures, including an estimated \$15 million of foreign exchange resources for military equipment. No money for sophisticated weapons has been spent since the statutory limitation became effective.

Conditions or The Loan

General Soundness

20. FAA §201(d). Information and conclusion on reasonableness and legality (under laws of country and the United States) of lending and relending terms of the loan.

20. The interest rate is not higher than Korea's applicable legal rate of interest. Re the reasonableness of the loan terms, see the PP, Section III.B.3.b.

21. FAA s201(b)(2); s201(e). Information and conclusion on activity's economic and technical soundness. If loan is not made pursuant to a multilateral plan, and the amount of the loan exceeds \$100,000, has country submitted to A.I.D. an application for such funds together with assurances to indicate that funds will be used in an economically and technically sound manner?

21. The ROKG has submitted an application for such funds containing the requisite assurances. Re the project's economic and technical soundness, see the PP, Section III.A. and III.C.

22. FAA s201(b)(2). Information and conclusion on capacity of the country to repay the loan, including reasonableness of repayment prospects.

22. See the PP, Section III.B.3.a.

23. FAA s201(b)(1). Information and conclusion on availability of financing from other free-world sources, including private sources within the United States.

23. Financing of this project on terms comparable to those proposed for this loan is believed not to be available from other free-world sources, including private sources within the U.S.

24. FAA s611(a)(1). Prior to signing of loan will there be (a) engineering, financial, and other plans necessary to carry out the assistance and (b) a reasonably firm estimate of the cost to the United States of the assistance?

24. Yes.

25. FAA s611(a)(2). If further legislative action is required within recipient country, what is basis for reasonable expectation that such action will be completed in time to permit orderly accomplishment of purpose of loan?

25. The Korea Standards Research Institute must be formally established as an autonomous legal entity. Moreover some legislative changes will be required to shift responsibilities for certain standardization and metrology functions from various governmental entities to the new institution. Previous satisfactory experience with such required legislative changes indicates that there is a very good chance that they will be completed in time to permit orderly accomplishment of the purpose of the loan.

26. FAA s611(e). If loan is for Capital Assistance, and all U.S. assistance to project now exceeds \$1 million, has Mission Director certified the country's capability effectively to maintain and utilize the project?

26. The Mission Director has so certified. See Annex B.

Loan's Relationship to Achievement of Country and Regional Goals

27. FAA s207; s113. Extent to which assistance reflects appropriate emphasis on; (a) encouraging development of democratic, economic, political, and social institutions; (b) self-help in meeting the country's food needs; (c) improving availability of trained manpower in the country; (d) programs designed to meet the country's health needs; (e) other important areas of economic, political, and social development, including industry; free labor unions, cooperatives, and Voluntary Agencies; transportation and communication; planning and public administration; urban development,

27. (a) Assistance will be utilized in project to create new institution to provide leadership within Korea in the fields of standardization and metrology; its primary effect will be to strengthen economic institutions; (b) project will be only remotely related to self-help in food production; (c) one of the aims of the new institution will be to provide appropriate training to those in industry in its fields of interest; (d) project will be only remotely related to improving health services; (e) all of these areas (except industry, which will be directly benefitted) are only tangentially benefitted by the Project, i.e., to whatever extent better metrology and standardization, and awareness of them and their utilization, improve

and modernization of existing laws; or (f) integrating women into the recipient country's national economy.

activities in these areas; and (f) project will have only a marginal effect on integrating women into Korea's national economy.

28. FAA §209. Is project susceptible of execution as part of regional project? If so why is project not so executed?

28. No.

29. FAA §201(b)(4). Information and conclusion on activity's relationship to, and consistency with, other development activities, and its contribution to realizable long-range objectives.

29. The ROKG and USAID believe that the project addresses a crucial need in the country's present stage of development. The project dovetails extremely well with other developmental activities in the country and its goal is the achievement of the ROKG's long-range development objectives, as expressed in the Fourth Five Year Plan.

30. FAA §201(b)(9). Information and conclusion on whether or not the activity to be financed will contribute to the achievement of self-sustaining growth.

30. The purpose of the project is the establishment of a national metrology standards system, a prerequisite for truly self-sustaining growth.

31. FAA §209. Information and conclusion whether assistance will encourage regional development programs.

31. Assistance will have only marginal impact on regional development programs.

32. FAA §111. Discuss the extent to which the loan will strengthen the participation of urban and rural poor in their country's development, and will assist in the development of cooperatives which will enable and encourage greater numbers of poor people to help themselves toward a better life.

32. One of the objectives of the project is to provide increased employment opportunities through the strengthening of Korean industry. While this will mostly benefit the urban poor, to the extent that the country is successful in its plans to disperse new industry in rural areas, the rural poor will be benefitted. The project will not assist in the development of cooperatives.

33. FAA §201(f). If this is a project loan, describe how such project will promote the country's economic development taking into account the country's human and material resources requirements and relationship between ultimate objectives of the project and overall economic development.

33. The project will promote economic development by allowing more efficient use of scarce raw materials, by improving the quality of the metrology and standardization tools available to the industrial labor force, and by training the force in their use. The ultimate objective's relationship to overall economic growth is discussed in Item 29 above.

34. FAA s281(a). Describe extent to which the loan will contribute to the objective of assuring maximum participation in the task of economic development on the part of the people of the country, through the encouragement of democratic, private and local governmental institutions.

35. FAA s281(b). Describe extent to which program recognizes the particular needs, desires, and capacities of the people of the country; utilizes the country's intellectual resources to encourage institutional development; and supports civic education and training in skills required for effective participation in governmental and political processes essential to self-government.

36. FAA §201(b)(3). In what ways does the activity give reasonable promise of contributing to the development of economic resources, or to the increase of productive capacities?

37. FAA §601(a). Information and conclusions whether loan will encourage efforts of the country to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture and commerce; and (f) strengthen free labor unions.

34. The project will have virtually no direct effect in encouraging democratic, private and local governmental institutions.

35. The project will utilize Korean intellectual talent to address one of the crucial problems which must be solved before the country can efficiently and effectively reach its economic development goals. It will have little or no effect on civic education for effective participation in the political process.

36. See Item 29 above and others.

37. There is no direct relationship between this loan and the objectives stated in Sec. 601(a) of the Foreign Assistance Act, except for improving and strengthening the system of industrial standards, which will facilitate increased Korean trade.

38. FAA §619. If assistance is for newly independent country, is it furnished through multi-lateral organizations or plans to the maximum extent appropriate?

38. Korea is not a newly independent nation.

Loan's Effect on U.S. and A.I.D. Program.

39. FAA §201(b)(6). Information and conclusion on possible effects of loan on U.S. economy, with special reference to areas of substantial labor surplus, and extent to which U.S. commodities and assistance are furnished in a manner consistent with improving the U.S. balance of payments position.

39. It is expected that virtually all the loan will be expended for U.S. goods and services.

40. FAA §202(a). Total amount of money under loan which is going directly to private enterprise, is going to intermediate credit institutions or other borrowers for use by private enterprise, is being used to finance imports from private sources, or is otherwise being used to finance procurements from private sources.

40. All of the loan will be used to finance the procurement of equipment, materials, and services from private sources.

41. FAA §601(b). Information and conclusion on how the loan will encourage U.S. private trade and investment abroad and how it will encourage private U.S. participation in foreign assistance programs (including use of private trade channels and the services of U.S. private enterprise).

41. All of the goods and most of the services are expected to come from private U.S. sources, in view of their general unavailability in other Code 941 countries. The project will enable better technical communications between U.S. and Korean buyers and sellers and so should have an indirect beneficial effect on U.S.-Korean trade.

42. FAA §601(d). If a capital project, are engineering and professional services of U.S. firms and their affiliates used to the maximum extent consistent with the national interest?

42. Not applicable.

43. FAA §602. Information and conclusion whether U.S. small business will participate equitably in the furnishing of goods and service financed by the loan.

43. The loan agreement will so provide.

44. FAA §620(h). Will the loan promote or assist the foreign aid projects or activities of the Communist-Bloc countries?

44. No.

45. FAA §621. If Technical Assistance is financed by the loan, information and conclusion whether such assistance will be furnished to the fullest extent practicable as goods and professional and other services from private enterprise on a contract basis. If the facilities of other Federal agencies will be utilized, information and conclusion on whether they are particularly suitable, are not competitive with private enterprise, and can be made available without undue interference with domestic programs.

45. All such assistance will be furnished from private sources on a contract basis.

Loan's Compliance with Specific Requirements

46. FAA §110(a); §208(e). In what manner has or will the recipient country provide assurances that it will provide at least 25% of the costs of the program, project, or activity with respect to which the Loan is to be made?

46. The loan agreement will so provide and the planned administrative arrangements will assure it. The project budget calls for 54% of the total financing to be provided by the recipient country.

47. FAA §112. Will loan be used to finance police training or related program in recipient country?

47. No.

48. FAA §114. Will loan be used to pay for performance of abortions or to motivate or coerce persons to practice abortions?

48. No.

49. FAA §201(b). Is the country among the 20 countries in which development loan funds may be used to make loans in this fiscal year?
49. Yes.
50. FAA §201(d). Is interest rate of loan at least 2% per annum during grace period and at least 3% per annum thereafter?
50. Yes.
51. FAA §201(f). If this is a project loan, what provisions have been made for appropriate participation by the recipient country's private enterprise?
51. Korea's private enterprises will be the primary users and customers of the services provided.
52. FAA §604(a). Will all commodity procurement financed under the loan be from the United States except as otherwise determined by the President?
52. Commodity procurement will be limited to Code 941 countries.
53. FAA §604(b). What provision is made to prevent financing commodity procurement in bulk at prices higher than adjusted U.S. market price?
53. No part of this loan will be used for bulk commodity procurement.
54. FAA §604(d). If the cooperating country discriminates against U.S. marine insurance companies, will loan agreement require that marine insurance be placed in the United States on commodities financed by the loan?
54. Yes.
55. FAA §640(e). If offshore procurement of agricultural commodity or product is to be financed, is there provision against such procurement when the domestic price of such commodity is less than parity?
55. No part of this loan will be used for such procurement.
56. FAA §604(f). If loan finances a commodity import program, will arrangements be made for supplier certification to A.I.D. and A.I.D. approval of commodity as eligible and suitable?
56. Not applicable.

57. FAA §608(a). Information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items.

57. U.S. Government excess property is not appropriate for use in the activity to be financed hereunder.

58. FAA s611(b); App. s101. If loan finances water or water-related land resource construction project or program, is there a benefit-cost computation made, insofar as practicable, in accordance with the procedures set forth in the Memorandum of the President dated May 15, 1962?

58. Not applicable.

59. FAA s611(c). If contracts for construction are to be financed what provision will be made that they be let on a competitive basis to maximum extent practicable?

59. Not applicable.

60. FAA s612(b); s636(h). Describe steps taken to assure that, to the maximum extent possible, the country is contributing local currencies to meet the cost of contractual and other services, and foreign currencies owned by the United States are utilized to meet the cost of contractual and other services?

60. Korea is not an excess currency country. Local costs approximating 54% of total project cost will be contributed by Korea.

61. App. s113. Will any of loan funds be used to acquire currency of recipient country from non-U.S. Treasury sources when excess currency of that country is on deposit in U.S. Treasury?

61. Korea is not an excess currency country.

62. FAA s612(d). Does the United States own excess foreign currency and, if so, what arrangements have been made for its release?

62. No.

63. FAA s620(g). What provision is there against use of subject assistance to compensate owners for expropriated or nationalized property? 63. The loan agreement stipulates that only eligible commodities and services can be financed under the loan.
64. FAA s620(k). If construction of productive enterprise, will aggregate value of assistance to be furnished by the United States exceed \$100 million? 64. Not applicable.
65. FAA s636(i). Will any loan funds be used to finance purchase, long-term lease, or exchange of motor vehicle manufactured outside the United States or any guaranty of such transaction? 65. No.
66. App. s103. Will any loan funds be used to pay pensions, etc., for military personnel? 66. No.
67. App. s105. If loan is for capital project, is there provision for A.I.D. approval of all contractors and contract terms? 67. Not applicable.
68. App. s107. Will any loan funds be used to pay UN assessments? 68. No.
69. App. s108. Compliance with regulations on employment of U.S. and local personnel. (A.I.D. Regulation 7). 69. The loan agreement will so provide.
70. App. s110. Will any of loan funds be used to carry out provisions of FAA §209(d)? 70. No.
71. App. s114. Describe how the Committee on Appropriations of the Senate and House have been or will be notified concerning the activity, program, project, country, or other operation to be financed by the Loan. 71. The Committee will be given the requisite notice before the loan is authorized.
72. App. s601. Will any loan funds be used for publicity or propaganda purposes within the United States not authorized by Congress? 72. No.

73. MMA s901. b; FAA s640 C.

(a) Compliance with requirement that at least 50 per centum of the gross tonnage of commodities (computed separately for dry bulk carriers, dry cargo liners, and tankers) financed with funds made available under this loan shall be transported on privately owned U.S.-flag commercial vessels to the extent that such vessels are available at fair and reasonable rates.

73.a. The loan agreement will so provide.

(b) Will grant be made to loan recipient to pay all or any portion of such differential as may exist between U.S. and foreign-flag vessel rates?

73.b. No.

74. Section 30 and 31 of PL 93-189 (FAA of 1973). Will any part of the loan be used to finance directly or indirectly military or paramilitary operations by the U.S. or by foreign forces in or over Laos, Cambodia, North Vietnam, South Vietnam, or Thailand?

74. No.

75. Section 37 of PL 93-189 (FAA of 1973); App. s. 111. Will any part of this loan be used to aid or assist generally or in the reconstruction of North Vietnam?

75. No.

76. App. s112. Will any of the funds appropriated or local currencies generated as a result of AID assistance be used for support of police or prison construction and administration in South Vietnam or for support of police training of South Vietnamese?

76. No.

77. App. s604. Will any of the funds appropriated for this project be used to furnish petroleum fuels produced in Southeast Asia for use by non-U.S. nationals?

77. No.



ECONOMIC PLANNING BOARD
REPUBLIC OF KOREA
Seoul, Korea

Mr. M.H.B. Adler
Director
USAID/K
Seoul, Korea

April 29, 1975

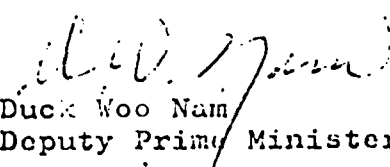
Dear Mr. Adler:

This is our request for a Development Loan of Five Million Dollars (U.S.\$5,000,000) for financing Establishment of Korea Standards Research Institute proposed by the MCI (NISRI).

The project was, as you are well aware, worked out based on the finding and recommendations by a consultant team from the G.E.-Tempo who has been conducting a feasibility study for the matter since last September 16, 1974. The G.E.-Tempo team suggested a program in an amount of about seven million dollars of foreign funding and 3.2 billion won of local currency funding. However, we had, considering a financial constraint, the NISRI to reshape the program with a foreign funding of five million dollars and 2,980 million won in local currency. I would like to assure that the project will receive an adequate budgetary support over its first three years, but its annual budgetary arrangements will be flexible according to the progress of requested loan and program itself.

I sincerely hope that all the necessary actions for this project promotion be taken by you in time.

Sincerely yours,


Duck Woo Nam
Deputy Prime Minister
and
Minister of Economic Planning
Board

ANNEX E

PROJECT DESIGN SUMMARY - LOGICAL FRAMEWORK

Life of Project:
 From FY 1976 to FY 1979
 Total U.S. Funding \$5,300,000
 Total Host Country Funding \$6,200,000
 Date Prepared May 1, 1975

Project Title - Establishment of Korea Standards Research Institute (KSRI)

Narrative Summary Goal	Objectively Verifiable Indicators Measures of Goal Achievement ¹	Means of Verification
Support expansion of Korean industry, with particular emphasis on heavy and chemical industry.	1.- Increase in industrial production. (value added) 2 - Increase in industrial exports. (total earnings) 3 - Increase in proportion of industrial production and export earnings contributed by heavy and chemical industry 4*- Increase in variety of Korean products substitutable for products of industrialized nations both in Korea and in world market 5*- Performance of increasing %of Korean industrial products conforms with specifications and labelling. 6*- Increased industrial efficiency resulting from fewer defective and sub-standard products. 7*- Harmonization of increasing number of Korean industrial standards with international standards 8*- Reduction in industrial property losses caused by fire, explosion, etc.	1 - National accounts 2 - National accounts 3 - National accounts 4 - Records of MCI: examination of export-import accounts. 5.-Records of KSRI, NISRI, and testing labs: number of foreign claims against Korean products. 6 - Records of individual firms and industrial testing institute 7 - Records and analysis of Korean Bureau of Industrial Standards 8 - Records maintained by MCI and manufacturing groups.

* More direct indicators of project's partial contribution to goal

1. A column for "performance targets" is being prepared by the National Industrial Standards Research Institute and will be incorporated in the logical framework matrix after review by the IAA and AID. This column will provide current estimates for magnitudes of project indicators (goal, end-project conditions, and outputs) and specify targets for 1978, the last year for loan disbursements, and 1980, when KSRI's effectiveness and influence should be fully established.

In 1977, KSRI will make a more detailed survey of the current status of standardization, measurement, and quality control in Korea in order to develop base-line data for project planning and evaluation. On the basis of this data-collection effort, KSRI will reassess project targets and revise them as appropriate, in collaboration with AID.

Project Purpose	End-of-Project Status ¹	Means of Verification	Assumptions Linking Purpose/Goal
<p>Establish a Korean system to insure reliability of industrial measurements - a national metrology standards system (NMSS)</p>	<ol style="list-style-type: none"> 1. Enhanced Korean reputation for accurate/precise measurement 2. KSRI, the top-level institution within the NMSS, is capable of maintaining national metrology standards without consultant assistance and without foreign donor financing. 3. Traceability of Korean national metrology standards to international standards in all basic measurement area. 4. High proportion of industrial firms with accurate measurement systems, traceable to national standards. 5. Decreased number of Korean standards calibrated by foreign institutions. 6. Increase in number of Korean documentary standards approved for measurement methodologies and measurement devices. 7. Decrease in number of defective and sub-standard products that are passed by Korean inspection laboratories (% of total items inspected). 	<ol style="list-style-type: none"> 1. Survey of other national organizations and international bodies concerned with metrology; opinion survey of foreign buyers of Korean products; reduced number of foreign buyers who require their own inspection personnel in Korea. 2. Profile of staff qualifications; financial soundness of KSRI; assessment by experts from NBS and/or metrology standards organizations in other countries. 3. Existence of primary standards in all disciplines; records of periodic calibration and certification by international bodies. 4. Evaluation of industrial capabilities by KSRI and/or expert consultants; examination of records of national calibration service. 5. Survey of labs and industrial firms with secondary metrology standards; IAA records. 6. Records of IAA and BIS 7. Records of Korean Association for Arbitration of Commercial Transactions; survey of industrial experience with claims, arbitration, and returned goods. 	<ol style="list-style-type: none"> 1. Industrial expansion, with special emphasis on heavy and chemical industry, will remain a high ROKG priority throughout the fourth Five Year Plan (1979-1981). 2. Korean investments in R&D and research capabilities will be adequate to support planned expansion of industry. 3. Factor costs and productivity will permit Korean industrial products to be competitively priced in the world market. 4. ROKG will continue efforts to strengthen other components of National Standards System (BIS, BIQC, KISA, NITI) responsible for specification standards, quality control, and quality assurance of industrial products, and these efforts will be effective. 5. Corresponding improvements in product and process engineering will occur at the plant level. 6. Korea will continue to strengthen its capabilities in industrial statistics and in market analysis, as needed for effective industrial planning.

1. See Footnote 1 on page one.

Outputs	Measures of Output Production ¹	Means of Verification	Assumptions Linking Outputs/Purpose
1. Establishment of KSRI	A. Legal establishment B. Completion of building C. Provision of environmental control D. Number of trained staff 1. Managerial 2. Scientists/Engineers 3. Technical E. Organization of metrology labs in all basic measurement areas F. Organization of support facilities	1. A - Enactment of Articles of Incorporation B - Acceptance of building by KSRI C - Acceptance of building by KSRI; assessment by expert consultant D - KSRI records E - Inspection of labs; assessment by expert consultant F - Inspection of facilities; KSRI experience in use of facilities	1. KSRI salary structure and working environment will be adequate to retain scientific/technical staff. 2. IAA will successfully implement its plan to strengthen provincial inspection and testing organizations and specialized industrial testing labs.
2. Program for dissemination of standards	A. No. of service visits by vans, annually B. No. of SRM's distributed, annually C. No. of SRD distributed, annually	2. A, B, C - KSRI records	3. Industrial firms will be induced to strengthen their measurement capabilities and seek the services of NMSS through the combined influence of existing regulatory legislation, government promotion, semi-mandatory policies by government, and profit incentive.
3. Program to maintain standards - national calibration service	A. Establishment of national calibration service B. No. of laboratories accredited to provide calibration services C. No. of instruments/devices covered by service D. Increase in No. of measurement instruments that have been calibrated on schedule	3. A - Existence of formalized system and procedures B - KSRI records C,D - Records of KSRI and accredited laboratories; survey of firms	4. The Korean government will promote the growth of the precision measurement instrument industry through investment and incentive policies.
4. Research on Standards and measurement methodology	A. No. of research services performed for stds committees B. No. of research projects completed. C. No. of projects resulting in improvements in NMSS D. No. of SRM's indigenously produced	4. A,B - Records of BIS and KSRI C - Assessment by IAA and KSRI; independent opinion by outside consultants D - KSRI records; NBS assessment	5. Cooperative horizontal relationships will be developed with research institutes, science departments of universities, government agencies, and measurement laboratories. 6. All ROKG agencies requiring metrological expertise will draw on the relevant capabilities of KSRI.

1. See Footnote 1 on page one.

Outputs (continued)	Measures of Output Production	Means of Verification
5. Advisory and extension service in metrology	A. No. of consultations with industry B. No. of recommendations implemented C. Income generated by consultancies	A - KSRI records B - Survey of firms receiving services C - KSRI accounts
6. Training program for metrology personnel	A. No. and type of training courses established B. Numbers trained, by type C. Institution of licensing procedures D. % of metrology specialists licensed	A,B KSRI records C - Existence of formalized procedures D - IAA and KSRI records; sample survey of metrologists in labs and industrial firms
7. Metrology propagation program to foster improved measurement capabilities in industry	A. Increase in no. of firms that set regular calibration schedules B. Increase in industrial expenditures on calibration services C. Increase in number of firms with trained measurement personnel D. Increase in No. of firms qualifying for KS marking.	A,B,C - IAA records; survey of firms D - IAA records
8. Promotional program for measurement instrument industry	A. No. of licensed firms B. Increase in value added in manufacture of measurement instruments C. % of measurement instruments in use of Korean manufacture D. % of Korean-made instruments that pass inspection following manufacture	A - IAA records B - National accounts C - Survey of firms D - Records of KSRI, NISRI, FIC and other accredited labs; Survey of producers
9. Technical information service	A. No. of documents distributed B. No. of literature searches performed C. No. of clients, annually	A,B,C - KSRI records

Inputs	Implementation Schedule (Quantity and Timing)				Financial Plan				Assumptions Linking Inputs/Outputs		
	Input (type)	1975	1976	1977	1978	Input (\$,000)	Year				
1. AID Loan - \$5,300,000	% of needs	-	-	67%	33%	3550	-	-	2352	1198	1. Competence to construct KSRI building, including special environmental controls, is available in Korea. 2. Metrology equipment at other Korean institutions which is suitable for KSRI can be transferred to KSRI. 3. ROKG is willing to budget foreign exchange as part of recurring KSRI budget, to cover cost of parts replacement and some additional training. 4. Korean personnel working overseas can be attracted to special environment of science town and facilities of KSRI.
1. Equipment and SRM's	Trainees*	-	30	39	21	780	-	300	305	175	
2. Staff Training	#re-cruits	-	15	15	5	270	2	113	122	33	
3. Recruitment of Korean manpower in U.S.	mm	3	26	24	3	300	22	137	116	25	
4. U.S. consultants	books	-	-	2000	-	100	-	-	100	-	
5. Specialized library materials		-	-	-	-	300	-	-	100	200	
6. Contingency		-	-	-	-	5300	24	550	3095	1631	
Totals											
1. ROK Counterpart - \$6,200,000	Event	Design Com-plete	Main Bldg. Com-plete	All facil-ities Cmplte.	Normal Ops.	\$5158	266	2600	2292	-	
1. Construction costs, including land acquisition	Staff	27	23	68	84	832	117	286	429	-	
2. Planning, Coordination & Staff Services	Trainees*	-	-	50	90	210	-	-	70	140	
3. Staff Training in Korea		-	-	-	-	\$8200	383	2886	2791	140	
Totals											

* No. of trainees indicates the number of persons enrolled in a specific course. Since many staff members will take at least two courses, the total number of trainees is a multiple of the number of staff members undergoing training.

Discussion of Issues Identified by AID/W (STATE 024099)1. Assurance that Equipment Existing in Korea will not be Duplicated Unproductively by Loan-financed Procurement

The GE-TEMPO Equipment Analysis Teams identified existing equipment that was suitable for use by and appropriate for transfer to KSRI. Equipment presently located at NISRI is available for transfer to KSRI. The KSRI Establishment Committee will also seek the cooperation of other institutions and ministries in transferring appropriate equipment to KSRI. For more detailed discussion, see Section III-E-2-C (P. 47).

2. Means of Addressing Standardization, Metrology, and Testing Needs of Small/Medium Firms

In Korea, a small or medium firm of industrial manufacturing is defined as an enterprise having no more than \$100,000 paid-in capital and/or 200 employees. In the early 1970's, small and medium firms contributed approximately 45% of all industrial employment, 27% of value added in manufacturing, and 35% of export earnings. Such levels of economic performance have made small/medium firms the target of special ROKG promotional efforts, including the establishment of the Medium Industry Bank in 1961 to channel credit to such firms. A planning document published by the Economic Planning Board, Long-Term Prospects for the Korean Economy 1972-1981, states that "the alignment of medium and small enterprises with existing industries and projected mother enterprises in the heavy and chemical industrial sector will be promoted positively. This will help medium and small enterprises to obtain stable markets, resolve their financial difficulties, promote their technology, and ensure growth. To promote such alignment, medium and small enterprises will be encouraged to move into industrial estates and specifications of spare parts will be standardized" (underlining supplied).

In order to sustain their strong export performance and to satisfy the more demanding requirements of large Korean enterprises with which they will be aligned, small and medium firms must place more emphasis on quality control and conformance with standards. They must strengthen quality control and measurement procedures within their limited means, and at the same time must rely on central facilities such as inspection laboratories at industrial estates for more expensive measurement, testing, and inspection services.

KSRI will be able to assist small and medium firms in several ways: by assisting inspection laboratories to develop reliable measurement systems and more relevant methods for the special needs of small and medium firms; by providing calibration services directly to such firms through mobile van activities; and by supplying technical information on improved measuring methods and SRD collections to these firms.

3. How Will the Project Promote and Help Develop Quality Control Systems in Individual Firms?

KSRI will not be directly involved in assisting firms to develop improved quality control (QC) systems. This effort is the responsibility of the IAA and the Korean Standards Association, a private organization that distributes industrial standards, promotes greater emphasis on QC within industry, and provides QC training for industrial employees. KSRI can make a vital contribution to this effort by helping firms to develop more reliable measurement capabilities which are essential for an effective QC system. KSRI will accomplish this task through dissemination of measurement standards, advisory services, training, and supply of technical information.

4. How Will the Project Ensure Staff Salary and Benefits Capable of Attracting and Retaining the Most Highly Skilled Personnel?

As an autonomous institution, KSRI will be able to offer salaries equivalent to those prevailing at other high-prestige scientific institutions and substantially higher than those possible in government agencies. For more detailed discussion, see Section III-E-3-c (P. 48).

Environmental Impact Assessment

Industry, and especially heavy and chemical industry, the expansion of which will be assisted by realization of the proposed project, are notorious contributors to pollution. Any increase in such industrial activities necessarily brings with it the danger of additional environmental degradation. Heavy industry, moreover, adds to noise pollution in often overcrowded areas and despoils the countryside by accumulation of waste products.

There is already cause for grave concern about the quality of the environment in Korea. Examples are oil and toxic chemical spills and sewage contamination that reach estuaries and endanger shellfish and seaweed beds. Power plants emit noxious gases such as sulfur and nitrogen dioxides, which under some weather conditions reach dangerous levels.

To date, Korea has not developed truly effective measures to protect the quality of the country's environment -- as attested to by frequent newspaper reports of suits against polluting companies or complaints about excessive pollution and its effects. There is only one law concerned with the quality of the environment, entitled the "Public Nuisance Prevention Law". Yet this law, which is administrated by the Ministry of Health and Social Affairs, only specifies maximum levels for the emission of harmful gases, wastes and contaminated water from new industrial plants. Every ministry which has authority to approve an industrial project is required to submit the project to MHSA for approval of the design in terms of these maximum levels. As far as can be determined, there is only minimal subsequent follow-up to determine that the levels have in fact not been exceeded once a project is in operation.

There are no other legally established controls of extra-industrial pollution. There are occasionally administrative actions taken which, for instance, inhibit the number of automobiles entering a certain area of a main city during times of great pollution. However, there is evidence of a growing public concern for the environment in Korea and recognition of the need for a central authority for environmental protection, such as the Environmental Protection Agency in the U.S. Koreans are aware of the development of such organizations in all industrialized countries and, in particular, receive frequent reports on the high level of concern about environmental quality which is developing in Japan.

As public concern is reflected in official action, and the Korean Government begins to take more effective measures to control pollution, the proposed project should make a strong contribution to the improvement

of Korea's environment. The specific purpose of this project is to provide a national metrology standards system, which carries with it the only method of environmental control of all those pollutants that challenge measurement capabilities. This project therefore will provide the capability to apply orderly planning to the control of the inevitable, additional pollution which will accompany the firmly planned industrial expansion. Because many of today's pollution problems require the most advanced metrological capabilities, KSRI should rapidly become the national focal point for attention to environmental measurements, including automatic alarm systems.

Examples of the techniques which KSRI will be able to apply to environmental control are manifold. SRM's to be provided under this loan will enable metallic trace contaminations in water streams to be continuously monitored. The optical scattering measurement facility will yield particulate dispersions in air to be recorded with size distribution data. The noise measurement devices will be suitable for ascertaining the risk of hearing impairment to operators.

Project design will attempt to maximize the capability for dealing with pollution problems. Training courses to be included under a possible cooperative program with the U.S. National Bureau of Standards would include such elements as the use of SRM's designed to deliver a constant rate of a given amount of certain noxious gases for comparison with unknown contaminated air samples. NBS advice will be sought with regard to the books being ordered for KSRI's library, to ensure that a proper emphasis is given to environmental control in their selection.

In summary, it is claimed that the impact of this project on Korea's environment will be highly beneficial, and that there is no practical other means of achieving these benefits.

Assessment prepared by: H. Steffen Peiser, Chief, Office of International Relations, National Bureau of Standards, Washington, D.C.

DEPARTMENT OF STATE
AGENCY FOR INTERNATIONAL DEVELOPMENT
WASHINGTON, D.C. 20523

Feb. 11, 1975

INFORMATION MEMORANDUM FOR THE DEPUTY ADMINISTRATOR

THRU: ES

/s/ Alexander Shakow

FROM: AA/PPC, Philip Birnbaum

SUBJECT: Korean Phase-Out Projects

The approved Korea DAP outlined a strategy for a phase-out program which included assistance in science and technology to round out an area of previous AID assistance and to foster a continuing relationship between U.S. and Korean scientific communities in the post-AID era. In line with this approach, two IRRs have recently been approved by the East Asia Bureau and PPC: a \$5 million loan to establish an industrial standards organization and a \$5 million loan to Seoul National University to develop a graduate school of natural science. Project Papers are now being prepared with project authorization anticipated in the last quarter of FY '75.

While neither project is directly responsive to the main theme of the Congressional Mandate (which is the reason for this information memo to you), they are appropriate to Korea's relatively advanced State of Development and have been fully described in the FY 1975 Congressional Presentation. The standards loan was listed as a line item under section 106 while the education loan was included as a shelf item under section 105.

Clearance: PPC/DPRE:AMHandly (Cleared)