

## Literature Cited

3

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BEST AVAILABLE DOCUMENT

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LOGICAL FRAMEWORK

Project Title & Number: Control of Barley Diseases for the Lower Developed Countries of the World

Task No. \_\_\_\_\_  
 Total U.S. Dollars \_\_\_\_\_  
 Date Prepared: \_\_\_\_\_

OPERATIVE SUMMARY	OBJECTIVELY VERIFIABLE INDICATORS	MEANS OF VERIFICATION	IMPORTANT ASSUMPTIONS
<p><b>Operative Summary Goal:</b> The broader objective is to help the project countries: (a) improve quality of life of the poorest of the poor in dry areas where barley can be most advantageously grown; (b) control of barley diseases.</p>	<p><b>Measures of Goal Achievement:</b></p> <p>Increased productivity of barley and well-being of people involved in the LDC's</p>	<p>Country statistics from Ministries of Agriculture</p> <p>USAID reports</p> <p>On-site observations</p>	<p><b>Assumptions for achieving goal target:</b></p> <p>Recipient Countries give priority to food production.</p>
<p><b>Project Purpose:</b></p> <p>Pyramid genes for resistance to barley diseases in agronomically suitable genetic backgrounds. Establish serodiagnostic test for BSMV at ICARDA &amp; CIMMYT.</p>	<p>Conditions that will indicate purpose has been achieved: End of project status. Barley stocks incorporated into barley breeding programs of target areas resulting in better disease protection and improved barley production. Serodiagnosis routinely used for testing seed lots for BSMV.</p>	<p>LDC reports</p> <p>Contractor reports</p> <p>On site evaluations</p>	<p><b>Assumptions for achieving purpose:</b></p> <p>Selection procedures are adequate</p> <p>Diversity of germ plasma is present in starting materials</p>
<p><b>Outputs:</b></p> <ol style="list-style-type: none"> <li>1. populations with broad-based resistance</li> <li>2. populations homozygous for resistance but heterozygous for other characters.</li> <li>3. Germ plasma bank - both resistance sources and pathogen virulence types.</li> <li>4. Data on reaction of entries in uniform tests to several diseases.</li> </ol>	<p><b>Magnitude of Outputs:</b></p> <p>Four populations for each disease</p> <p>Virus-free barley seed stocks</p> <p>Catalog of resistance gene combinations</p> <p>Catalog of virulences represented in the various diseases.</p>	<p>Contractor reports and on-site observations</p>	<p><b>Assumptions for achieving outputs:</b></p> <p>Genetical assumptions are correct. Selection procedures or successful entries are available for testing.</p> <p>Cooperators complete sowing of experimental materials.</p>
<p><b>Inputs:</b></p> <p>AID financial support, technical help &amp; facilities provided by MSU, AID &amp; LDC's</p> <p>Provide logistical support in LDC's.</p>	<p><b>Implementation Target (Type and Quantity)</b></p>	<p>AID reports, on-site observations &amp; contractor reports correspondence with LDC cooperators.</p>	<p><b>Assumptions for providing inputs:</b></p> <p>Approval of proposal. Adequate personnel available for contract and Int'l Center linkages.</p>

5/18/78

AGENCY FOR INTERNATIONAL DEVELOPMENT  
**PROJECT AUTHORIZATION AND REQUEST  
 FOR ALLOTMENT OF FUNDS PART I**

1. TRANSACTION ( )  
 A ADD  
 C CHANGE  
 D DELETE

PAF

2. DOCUMENT CODE  
 5

3. COUNTRY/ENTITY  
 DD BUREAU PD-AAK-008-137

4. DOCUMENT REVISION NUMBER

5. PROJECT NUMBER (7 digits)  
 [931-1318]

6. BUREAU/OFFICE  
 A SYMBOL B CODE  
 [ ] [ ]

7. PROJECT TITLE (Maximum 40 characters)  
 [Control of Barley Diseases for LDCs]

8. PROJECT APPROVAL DECISION  
 A APPROVED  
 D DISAPPROVED  
 DE DEAUTHORIZED

9. EST. PERIOD OF IMPLEMENTATION  
 YRS. [3] QTRS [ ]  
 9311318 (4)

10. APPROVED BUDGET AID APPROPRIATED FUNDS (\$000)

A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY 78		H. 2ND FY 79		K. 3RD FY 80	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1)	111 E	763		224		230		270	
(2)									
(3)									
(4)									
TOTALS				224		230		270	

A. APPROPRIATION	N. 4TH FY		O. 5TH FY		LIFE OF PROJECT		11. PROJECT FUNDING AUTHORIZED	
	C. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	ENTER APPROPRIATE CODE(S): 1 - LIFE OF PROJECT 2 - INCREMENTAL LIFE OF PROJECT	A. GRANT B. LOAN
(1)					724			2
(2)								
(3)								
(4)								
TOTALS					724			30

12. INITIAL PROJECT FUNDING ALLOTMENT REQUESTED (\$000)

A. APPROPRIATION	B. ALLOTMENT REQUEST NO.	
	C. GRANT	D. LOAN
(1)		
(2)		
(3)		
(4)		
TOTALS		

13. FUNDS RESERVED FOR ALLOTMENT

TYPED NAME (Chief, SER/EM/FSD)  
 SIGNATURE  
 DATE

SOURCE ORIGIN OF GOODS AND SERVICES

100  941  LOCAL  OTHER

14. FOR AMENDMENTS, NATURE OF CHANGE PROPOSED

This project pertains to Project # 931-0580.11 "Inheritance Improvement of Barley Quality and Content in Barley".

**BEST AVAILABLE DOCUMENT**

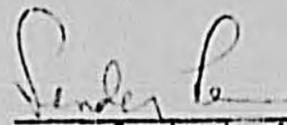
FOR PRO/PAS USE ONLY	15. AUTHORIZING OFFICE SYMBOL	17. ACTION DATE	19. ACTION REFERENCE (Optional)	ACTION REFERENCE DATE
		MM DD YY		MM DD YY

PROJECT AUTHORIZATION AND REQUEST FOR ALLOTMENT OF FUNDS

PART II

ENTITY : DS Bureau  
PROJECT : Control of Barley Diseases for LDCs  
PROJECT NUMBER : 931-1318

1. I hereby authorize a new project activity in the "Control of Barley Diseases for the Lesser Developed Countries of the World" to be implemented by Montana State University, Bozeman, Montana.
2. This three year project was recommended for approval by RAC at its March 31, 1978 meeting at a total funding level of \$724,000.
3. This project is based on an unsolicited proposal from Montana State University. I hereby determine that this unsolicited proposal is the product of original thinking, has significant scientific or technical merit, and will contribute to AID's research program objectives. On this basis, consistent with the provisions of AIDPR 7-4.5301(e), a negotiated contract with the subject contractor without consideration of other competitive sources is considered appropriate.



Sander Levin  
Assistant Administrator  
for Development Support

Enclosures:

1. Research Project Statement
2. Memo, Hesser-AA/DS, dated 4/26/78
3. RAC Recommendations
4. Memo, Byergo-Darvin, dated 5/18/78

Clearances:

DS/AGR, LHesser by DFP Date: 5/18/78  
DS/AGR, M Mozynski mem Date: 5/18/78  
DS/PO, RSimpson SS Date: 5/19

MEMORANDUM

June 2, 1978

TO: Leon Hesser, DS/AGR

THRU: Robert Simpson, DS/PO *RS*

FROM: Caroline D. McGraw, DS/EXD

SUBJECT: Control of Barley Diseases for the LDCs

Mr. Levin has signed the documentation for the subject project but has asked that in some appropriate fashion the project record show more clearly the basis for non-competition. He feels that the files does not clearly indicate that this revised project (i.e., revised from the original unsolicited proposal) is still reflective of the original thinking on the part of the proposer and thus still constitutes a basis for non-competitive negotiations. Clearly we will have to be much more careful on documenting our decisions for non-competitive procurements.

PD-AAK-008-21

APR 27 1978

5/25/78

ACTION MEMORANDUM FOR THE ADMINISTRATOR

9311318

THRU: ES

FROM: AA/DS, Sander Levin

5

Problem: Your approval is requested for the implementation of nine research projects along the lines of recommendations of the Research Advisory Committee.

Discussion: As indicated in my memorandum to you on February 24 (TAB A), I am now resubmitting for your approval eight of the nine research proposals which were authorized by you for review of the Research Advisory Committee at its meeting on March 30-31. Four proposals are for new projects and four proposals are for extension of ongoing activities. A list of the projects and funds proposed for their implementation is attached under TAB B.

Appended as TAB C-L are for each project: the RAC recommendation, a Note on the substance of RAC discussion, and a summary of the project as submitted to RAC.

In brief, the RAC endorsed two projects as proposed, recommended approval of six projects subject to specified modification, and deferred consideration of one project.

In addition to these projects, RAC also recommended that supplementary funds in the amount of \$60,582 be provided to an ongoing Rockefeller University project on malaria parasites to enable the principal investigator to explore fully his present discoveries leading to the eventual development of malaria vaccine.

We agree with the RAC recommendations and shall incorporate them into the Project Authorization (PAFs) for my signature if you give your approval.

The initial environmental examinations (IEEs) for the nine recommended projects have been completed and threshold determinations have been made by me that none of these projects will have a significant effect on the human environment.

**BEST AVAILABLE DOCUMENT**

Your approval of the eight projects listed at TAB B constitutes the authorization to negotiate contracts for "Development Research" which is required by Section 7-3.211 of the AID Procurement Regulations.

Recommendation: That you approve the implementation of the eight projects listed at TAB B.

Approved: [Signature]

Disapproved: \_\_\_\_\_

Date: 5-25-78

Attachments:

- TAB A - AID/PS Action Memorandum dated 2/24/78
- TAB B - List of projects and funds proposed for implementation
- TAB C - C-1 Summary of RAC Recommendations March 30-31, 1978

Clearances:

cc/Smith	Date
cc/Smith; Michelson	Date
cc/Smith; Drew	Date
cc/Smith; Simpson	Date

DS/USA: Michelson; Date: 4/7/78; 1251/20

Seven projects includes population research project entitled "Development and Fertility Research Program (DFRP)" which will be conducted currently.

<u>Project #</u>	<u>Title</u>	<u>Funding Proposed for Authorization</u>	<u>Period Proposed for Authorization</u>
		\$000	
1318	Control of Barley Disease for the Lesser Developed Countries of the World (New) - Montana State University <sup>1/</sup>	723	3 years
1168	Regional Development Impacts of Agricultural Change (New) - Yale University	230	2 years
0453	Cultivation of Human Malaria ( <u>Plasmodium falciparum</u> ) and the use of the Culture for Experimental Immunizations of Monkeys (Expansion) - Rockefeller University	61	N.A.
C. <u>Deferred</u>			
0227	Control of Iron Deficiency (New) - Kansas University Medical Center		
	Total	15,409	

<sup>1/</sup> In view of RAC recommendations, the budget might be reduced

Summary of RAC Recommendations - March 30-31, 1978

Control of Barley Diseases for the Lesser  
Developed Countries of the World (New) -  
Montana State University. Duration of project,  
3 years; estimated cost \$723,000  
\*Moss, Black, Peterson, Schweigert

Recommendation: RAC is concerned about the work as proposed. RAC approves the proposal only with the following restrictions. Major emphasis should be placed on the plant pathological aspects of the proposal. Montana State University should:

- a. limit the number of diseases emphasized in the program to perhaps four or five;
- b. establish disease nurseries as a service to barley breeders at International Centers and in LDCs; and
- c. restrict genetic aspects of the proposal to the recurrent selection population, rather than the translocation and primary trisomic work.

A review by AID, with RAC representation on the team, should be conducted toward the end of the first year. Further funding beyond the first year should be contingent upon the results of the review.

Note: The RAC noted the importance of disease as the primary constraint to increased barley production in some of the world's poorest countries where barley is a major food. Also, it was noted that the contractor has an excellent international reputation in plant pathology. On the other hand, the RAC felt this proposal was overly ambitious in the plant breeding area where the research would be based upon unproven theoretical assumptions. It was recommended, therefore, that the proposal be narrowed in scope to focus primarily on barley disease resistance studies. The plant breeding components of the project would be left to other investigators in other universities and in International Agricultural Research Centers.

\*RAC review subcommittee; chairman underscored

May 30, 1978

MEMORANDUM FOR THE ASSISTANT ADMINISTRATOR, DEVELOPMENT SUPPORT BUREAU

THROUGH: DS/PO, Robert Simpson *RS*  
FROM: DS/AGR, Leon F. Hesser *by Dean F. Hesser Acting*  
SUBJECT: Control of Barley Diseases for the Lesser Developed Countries of the World

Problem: Your approval is required for a new three year \$723,000 contract for the research project on "Control of Barley Diseases for the Lesser Developed Countries of the World" with Montana State University.

Background: A previous barley project "Improvement of the Nutritive Quality and Productivity of Barley" was terminated at the recommendation of RAC. RAC recommended that in place of that broader project, a new project should be developed to focus primarily on barley diseases. The present document is the outgrowth of that recommendation. The R & DC Committee approved the project proposal on January 10, 1978 and RAC approved the project on March 30, 1978. This new project will allow Montana State University to develop breeding populations of barley lines carrying broad levels of resistance to several serious diseases. These populations will be screened and utilized for site specific adaptation to LDCs. There will be very close cooperative ties established between CIMMYT and ICARDA.

Recommendation: That you approve the subject project by signing the PAF enclosed herein.

Enclosure:  
Project Authorization and Request  
for Allotment of Funds

Clearance:  
DS/PO/RES:M.Rehcg1 \_\_\_\_\_ Date: 5/31/78

January 5, 1978

NE/TECH/AD, Victor Lateef

"Control of Barley Diseases for the Lesser Developed Countries of the World"

NE/TECH/AD, Dr. Russell O. Olson, Chief

As requested, I reviewed the PID for the subject project and gave you my comments earlier.

Yesterday, Mr. Yoke, manager of the referenced project and I met and discussed the draft PP since Mr. Dalton had given me a copy of it on January third for review.

Mr. Yoke and I reviewed the importance of barley as a food and animal feed crop in the Near East and North African regions as well as the basic elements of the proposed project. In response to my question why the breeding and drouth stress components of the original project were dropped by the Research Advisory Committee, Mr. Yoke informed me that the contractor failed to make headway on both of these important components during its four years of operation. However considerable progress was made on disease and pathogenes and it was decided to follow this thru and drop the other elements of the program. The diseases in which the contractor was engaged are those extant in Montana State and not necessarily extended to include LDC conditions. Nevertheless the scientific methodology of isolation, inoculation and testing of resistant genes will be valid scientifically and could be incorporated in future barley projects when BIFAD Title XII projects are started. Also they can be incorporated within the framework of CIMMYT and ICARDA programs.

Mr. Yoke expressed agreement for the need to develop barley with the scientific disciplines stated in my previous memorandum to you. As I see it, a barley variety that can be bred to give 100 to 200 percent increase in yield with disease resistance would be analogous to Maxipak wheat which was developed by CIMMYT and which sparked the green revolution in the sixties. A mediocre harley variety improved in yield by a limited small percentage equivalent to the loss of the crop by disease factors may not likely give sufficient incentive to LDC cultivators to embark on a barley production program.

In view of my past experience with a project that dealt with a comprehensive cereal crop development and involved 12 USDA/TC scientists in 13 West African countries, I felt that the expansion of the project to include the scientific disciplines listed in my previous memorandum to you is valid. I am glad that you are in agreement with that viewpoint. However, in view of Mr. Yoke's background information on the project, the limited available resources and the importance of barley in the Near East region there is no recourse but to support the proposed project.

cc+ NE/TECH/SP-RD: Dr. James Dalton

## memorandum

DATE: January 3, 1978

TO: NE/TECH/AD, Victor Lateef

SUBJECT: Comments on PID for Control of Barley Diseases for LDCs

TO: NE/TECH/AD, Russell O. Olson

Barley is next to rice, wheat, corn, sorghum and millet in importance as a world staple food crop and foremost in developing countries as a concentrate for livestock feed. However, only relatively recently did international research centers such as CIMMYT, ICRISAT and other regional and national organizations have begun to survey and assess barley development problems.

Although an estimated 21 million metric tons of barley were reported produced by developing countries in 1976 as compared to 170 million tons by developed countries, most of this production in the developing countries was used for human food and animal feed. On the other hand, barley production in developed countries was earmarked primarily for feed and industrial use. Therefore any future development of this crop should focus on its end use for human food, animal feed and industrial use successively.

Comments

1. The proposed ~~project~~ project submitted by TAB/AGR falls short of its promulgated PID goals. These are quoted "to make a significant contribution to improved staple food supplies for the small farmer in the semi-arid regions of the developing world".

The selection of Montana State University as contractor (an eminently qualified institution) is commendable. Montana State has the ideal ecology and environment which makes the state highly suitable for barley crop production and development. Matter of fact, the USDA barley production estimates for Montana were 1,122,000 metric tons for 1977, which places Montana as the second largest barley producer in the United States. It is exceeded only by North Dakota with a production of 2,015,000 metric tons and followed by California with 1,114,000 metric tons.

The referenced Barley Improvement Project (1974-77) which was extended for an additional year by the Research Advisory Committee (RAC) appears to be given too short a period to achieve the stated complex goals on a world wide basis, i.e., 1 - breeding for protein quality 2 - drought resistance and 3 - disease control.

The original life of the project should have been longer since it takes 8 to 9 years to develop a barley variety and three to four years to develop a germ plasm. It takes considerable time to develop disease resistant

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genes in a plant as one must take into account the necessary processes of identification, surveys, isolation, inoculation, field testing of disease and resistant pathogenes, organisms, strains, lines etc. Therefore, it would seem that the former project contract should have been for a minimum period of five years, and extended for another five years to achieve the planned objectives. This is due, in part, to the seasonal limitations for field planting, testing and the articulate nature of the work involved. Also the geographic area of the project should have been expanded to enable research scientists to grow more than one cultivar per season in more than one environmental setting.

2. Since the avowed purpose of the project is to assist LDCs in barley development, it would be incumbent on the contractor to coordinate and collaborate closely with International Research Centers, the USDA and national and regional organizations engaged in barley development, on a global basis, to prevent duplication of effort and to improve the efficiency of collaborators.

3. To achieve the objectives of increasing barley production by small farmers in the LDCs; there is obvious need to systematically inventory all available information pertaining to barley germ plasma, economic insect and disease problems, varietal adaptability factors, soil types and ecological factors in the major world regions. In addition, the following key factors should be taken into consideration:

- a. Fertilization Availability - depletion of soil nutrients around the world requires fertilizer application of the right type and right proportion in a timely manner regardless of varietal and disease problems.
- b. Breeding - most barley varieties are not completely adapted from the standpoint of agronomic and pathological characteristics which makes plant breeding as important as fertilization. The development of high yielding varieties, the selection of superior plant types not vulnerable to wind and humidity conditions that cause lodging; shorter stems, better tillering, high yielding and built in disease resistant genes must be essential components of a breeding program.
- c. Soil conservation - due to inadequate moisture there is always need for moisture and soil conservation techniques. How soon to plow after the crop is harvested to remove weeds and stubble? What farming systems, models, rotations and fallow systems are to be followed in each area?
- d. Control of predators - locusts, rats and a great many insects cause extensive crop damage throughout the world. By way of example a rat epidemic occurred in Senegal and in other West African countries in 1976, and locust invasions which are endemic and often constitute a real menace to crops throughout Africa and Asia, are important elements to cope with. In addition, a host of other perennial insects and predators are ubiquitous.

- e. Weeds - are a major cause of loss of cereal crops. Different weed types flourish throughout the LDCs and should be identified, researched and controlled.
- f. Government policies - planners need to make available the fertilizers, pesticides and the desired seeds when needed. Also governments must have pricing policies that give incentive to farmers to grow the crop.
- g. Photosensitivity - the selection and adaptation of cereal varieties has often misled producers of cereal's sensitivity. By way of example the following experiment is telling: the Minnesota wheat variety Thatcher grown in the northern USA and southern Canada is sensitive to day length. When planted with Sonora variety in May i.e. one month before daylight starts to get shorter, at a latitude of 45° to 50° North, both varieties showed a difference of only two days in flowering. However, when both were planted at a latitude of 28° in (October - November) i.e. when daylight is longer; the difference in maturity between both varieties was 70 days. As to yield, Sonora gave equal or slightly higher yields than Thatcher in the first instance and five times more than Thatcher in the second instance.

4. It is stated under Summary of Problem that disease caused the loss of 13.5 percent of barley crops in the U.S. between 1951-1960. It is not quite clear whether the stated loss is annual or cumulative. It would be rather difficult to appraise losses caused by disease in developing countries since trained plant pathologists who can identify and assess such losses are few. Those who could develop disease resistant plants are even far more scarce. Generally, barley crop losses from disease in developing countries, are less significant than losses due to insects and predators, weeds, soil nutrients, drought stress, lodging and poor unadapted low yielding varieties.

Small farmers in developing countries in black Africa usually plant hardy crops such as millet while barley is planted in North Africa and Asia on poor and marginal land with low rainfall. Better land with more abundant moisture supplies are reserved for the more desirable food crops such as wheat, rice and corn.

5. The development of disease resistant barley alone, without meeting the aforementioned conditions, will not achieve the worldwide desired effects. What is needed, is an integrated comprehensive global analyses of barley problems and barley development to have a more durable effect. Even then, a disease resistant variety only remains effective for a few years, say three to four years before it succumbs to new strains and lines of pathogenes. To be successful, the program should include the four essential disciplines i.e., agronomy, genetics, plant pathology

and entomology. Agronomy will include the study of ecological factors and plant-soil relationships, fertilizer application, cultivation, time of planting and management aspects. Breeding will include development of high yielding adapted varieties, short stemmed, non lodging, heavy tillering, drouth resistant and high protein variety development. The world germ plasm collection should be tapped in every way possible in support of this endeavor. Pathology will include identification and study of different lines and strains of pathogenes and vectors and development of disease resistant varieties. All worldwide available information on disease should be utilized in coordination with the plant breeder. Entomology will deal with the identification, study, appraisal, control and development of insect resistant plants.

All four basic disciplines need to be integrated with national, international and regional research organizations in a comprehensive action program.

6. Lastly, a PP should be structured to reflect a global research approach for barley development. Project funds will need to be increased to reflect the added inputs submitted herein to strengthen and improve the project. Included within the project design should be an element of social studies dealing with the different aspects of interrelationships of barley crop production with small farmers in arid regions of the world where barley is grown. The role of women and the potential benefits they will derive from this project should also be included to comply with the Congressional mandate.

Fortunately, the training of scientists from developing and cooperating countries in barley crop development was given due recognition in the referenced PID.

*Handwritten notes*

*P. H.*

December 30, 1977

MEMORANDUM FOR: Research and Development Committee Members

*(2) / 313*

FROM: DS/PPU, Robert C. Simpson

SUBJECT: Discussion of Project Paper for Control of Diseases  
January 10, 1977 - Research and Development Committee Meeting

*Encley*

The PID on subject project was discussed by the R & DC Members on December 13, 1977 resulting in a recommendation that a project paper be developed and presented to the Committee for discussion as per attached minutes.

You are invited to attend a meeting for such a discussion on January 10, 1977 at 2:00 p.m., in Room 3886, N.S.

Attachments:

1. Distribution list
2. R & DC Minutes 12/13/77
3. Project Paper

**BEST AVAILABLE DOCUMENT**

DISTRIBUTION FOR RESEARCH AND DEVELOPMENT COMMITTEE MEETINGS (R & DC)

Research and Development Committee

A. Core Members

AFR/DP, Frank Moore  
  
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CMB, Ed Sanders

D. Other

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A. Schwarzwalder  
H. Fleming  
W. Rodgers  
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R. Robinson  
A. Firfer  
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M. Cruit  
J. Hafenrichter  
DS/PPU Analysts (as appropriate)  
DS/AGR, L. Hesser  
DS/DA, N. Luykx  
DS/EHR, R. Schmeding  
DS/H, L. Howard  
DS/N, M. Forman  
DS/GST, H. Arnold  
DS/RFS, M. Rechcigl  
DS/ED, H. Hobgood  
DS/ID, W. Miner  
DS/MGT, R. Thacher \*  
DS/PPU, E. Shields

\* Attachment(s) on request

**BEST AVAILABLE DOCUMENT**