

PD-ABE 863

11707

**Storage Technology Development and Transfer**  
**Contract No. 391-0491-C-00-6080-00**

# Semiannual Report

**Kansas State University**  
**Food and Feed Grains Institute**  
**Manhattan, Kansas 66506-2202**

**January - June 1992**

## CONTENTS

<u>Section</u>	<u>Page</u>
I	PROJECT ACTIVITIES . . . . . 1
	Activities Planned . . . . . 1
	Progress During the Reporting Period . . . . . 2
	Other Activities . . . . . 11
	Project Reports . . . . . 12
	FFGI Staff and Consultant Utilization . . . . . 13
	Constraints . . . . . 13
	Projected Activities . . . . . 13
II	ADMINISTRATIVE . . . . . 15
	Expenditures . . . . . 15
	Foreign Country National Trainees . . . . . 15
	Personnel Employed . . . . . 15
APPENDIX I	Quarterly Report (April-June '92), PARC/STDC Activities . . . . . 21
APPENDIX II	Bulk Wheat Procurement and Handling . . . . . 23
APPENDIX III	Demonstration of Bulk Wheat Handling, Supreme Flour Mills . . . . . 29
APPENDIX IV	Planning for Delivery of Bulk Wheat to Flour Mills . . . . . 63
APPENDIX V	Recommendations from Seminar/Workshop on Grain Storage, Management Research, and Training . . . . . 85
APPENDIX VI	Bulk Wheat Handling Equipment Training and Field Exercises . . . . . 97
APPENDIX VII	American Soybean Association, Pakistan Feed Technology Workshop . . . . . 99
APPENDIX VIII	Brochures on Private-Sector Instruction . . . . . 101
APPENDIX IX	Bangladesh Delegation Material . . . . . 105
APPENDIX X	Letter of Appreciation . . . . . 117
APPENDIX XI	Summary of STDT Project Training Activities to Date . . . . . 119

## SECTION I

### PROJECT ACTIVITIES

The goal of the Storage Technology Development and Transfer (STDT) project is to improve the capacity of the Government of Pakistan (GOP) to manage the national food security program effectively and efficiently. The activities will ultimately enhance the capabilities of the public-sector agencies and concerned private-sector firms to store food grains over extended periods of time.

The purposes of the project are to (1) strengthen the capability of the Pakistan Agricultural Research Council (PARC) and cooperating institutions for testing and developing improved grain storage technology appropriate to local conditions, (2) organize and implement training programs for the rapid extension of improved technology to all levels of managerial and operational personnel in the grain handling and storage sector, and (3) provide training to enhance the skills of researchers and those personnel for training programs.

The following activities were planned for the six-month period January 1 - June 30, 1992, to attain the objectives of the project.

#### Activities Planned

1. Pursue institutionalization program with the University of Agriculture, Faisalabad (UAF).
2. Revise grain storage reference manual to include bulk handling system.
3. Issue an STDT project newsletter.
4. Finalize bulk wheat handling and storage research program for 1992.
5. Conduct bulk wheat handling and storage research program during the 1992 harvest and assist the Pakistan Agricultural Storage and Services Corporation (PASSCO) and Punjab Provincial Food Department (PPFD) in bulk wheat procurement during the 1992 harvest season.
6. Continue testing portable grain dryer and start testing paddy ganji dryer.
7. Continue assisting Sihala and Sadiq Flour Mills in Islamabad and Peshawar, respectively, in the installation of their bulk handling and storage systems.
8. Conduct a demonstration in mechanized filling of hexagonal bins and bulk delivery of wheat at Rawalpindi.
9. Complete the trial delivery of 500 mt of clean wheat from the Sahiwal hexagonal bins to a local flour mill.

10. Explore with the Northwest Frontier Province Food Department (NWFFPD) possible mechanized filling of hexagonal bins in Peshawar and eventual transfer of bulk handling equipment to NWFFPD.
11. Conduct bulk handling demonstration in Lahore area, April 1992.
12. Investigate potential for establishing private-sector institution to continue STDT activities.
13. Train PASSCO and PPFDD personnel in bulk handling.

#### Progress During the Reporting Period

Research Activities. Progress in accomplishing activities in this area are as follows.

##### **Calibration of Moisture Meters for Paddy**

This experiment was initiated to devise linear regression equations for different moisture meters to determine the actual moisture content of rough rice. Different varieties of rough rice were obtained from the Rice Research Institute, Government of the Punjab, Kala Shah Kaku. The initial moisture of each sample by variety was determined by the Oven Standard Method (OSM). Samples ranged from 13% to 15% moisture. The moisture of each sample was lowered to 12% by drying in the oven for the required time. A measured quantity of distilled water was added in each sample to obtain a moisture range from 12% to 25%. The samples were then conditioned for four to five weeks to equilibrate the samples with the relative humidity.

##### **Determination of Phosphine Dosage to Control Resistant Insects**

This experiment involves insects collected from 17 different storage sites. The most resistant insect strains were found to be Trogoderma granarium collected from the Chichawatni silos. Twelve days of exposure to phosphine was required to achieve complete mortality. Rhizopertha dominica and Tribolium castaneum collected from this site required five and four days, respectively. Trogoderma granarium collected from Muzaffer Garh, Bhakar, and Multan required seven-, seven-, and five-days exposure to phosphine, respectively, for complete mortality. Rhizopertha dominica collected from Muzaffar Garh, Bhakar, and Vehari required four, three, and four days, respectively, while Tribolium granarium collected from same sites required four, five, and three days, respectively. Insect strains collected from remaining sites were found susceptible.

To determine the phosphine dosage for insect strains from the NorthWest Frontier Province (NWFP) and the remaining districts of Punjab, insect collection was conducted. The insects were collected from the godowns of Haripur, Nowshera, Azakhel, Peshawar, Kohat, Bannu, Dera Ismail Khan, Dera Ghazi Khan, Layyah, Rajanpur, and Rahim Yar Khan. They were brought to the laboratory and put in an insect room for acclimatization.

## **PARC/STDT Activities**

The PARC/STDT report of April-June 1992, is attached as Appendix I. It contains summaries of research on calibration of rice moisture meters, insect resistance work, assessment of rice milling yields, and fumigations conducted for the private sector.

Bulk Wheat Handling and Storage Research Program Activities. These activities were undertaken in cooperation with PASSCO and PPF. Progress in accomplishing activities in this area are as follows.

### **Completion of Bulk Delivery of Cleaned Wheat from Hexbins to Flour Mills, Sahiwal**

Delivery of 503.7 mt of cleaned wheat in bulk was completed from hexbins to a local flour mill. This operation began the last of December and was completed in January. Protein analysis of cleanings was 8.37% as tested by UAF. The flour mill owner was satisfied with the clean wheat and bulk delivery and intends to procure wheat in bulk during 1992 season.

### **Efficiency of Rotary Grain Cleaner Used at Sahiwal**

The wheat reclaimed from hexagonal bins, in the above described operation, was cleaned with a rotary grain cleaner. To determine the cleaning ability of the grain cleaner, wheat samples were drawn before and after the cleaning operation. Samples were drawn from three depths in each bin before cleaning. These were analyzed in the laboratory for percentage of dust and foreign material. The data was averaged for all bins. The percentage dust and dockage observed in these samples was 0.31% and 1.20%, respectively. Samples were also taken from each wagon after the cleaning process by a compartmental bulk probe. The analysis of these samples showed 0.12% dust and 0.95% foreign material remaining in the wheat. The cleaner was able to remove 61.30% of total dust and 20.83% of total foreign material present in the wheat. The efficiency of the cleaner in removing foreign material could be improved by adding a blower to remove straw from the wheat.

### **Bulk Wheat Handling and Storage Research Program for 1992**

The STDT project collaborated with PASSCO in preparing the 1992 bulk procurement plan. It was to be implemented by PASSCO in four sites: Depalpur, Bunga Hayat, Pakpattan, and Chichawatni. The target was to collect and store 30,000 mt of wheat completely in bulk form. The PASSCO engineers converted nine godowns for bulk wheat handling in the first three sites. The STDT project trained the PASSCO technicians on the use of two core drilling machines for the conversion work. This equipment was provided to PASSCO by the STDT project.

At the last moment, PASSCO declined to follow through on the program. PASSCO was not able to reach an agreement with the Food Department on the allocation of buying territories until after the start of the procurement season. PASSCO was also undergoing considerable internal stress involving reassignment of personnel.

The onset of the harvest season was delayed by about two weeks. The STDT project had previously agreed to provide assistance to PPF for loading hexagonal bins

at Okara and Sihawal. The equipment and personnel were in place when wheat was received at these locations. In mid-May, PPF requested bulk handling assistance in the Multan area. Additional personnel and bulk handling equipment were shifted to Multan. A complete bulk handling chain was quickly established from Galawala to the Multan silos. Another team filled hexagonal bins in Multan with wheat delivered from other procurement centers.

In all, the STDT project fielded four teams to assist with the bulk handling. The STDT project personnel remained in the field from mid-May until Eid and then resumed after the holidays. Field work was nearly complete by the end of June, when some equipment was shifted to Bahawalpur. During the last week of June, the STDT project personnel surveyed all work sites to assess location and condition of equipment, and collect all equipment performance costs and volume data available from each location. This data is to be analyzed and reports prepared during the last half of 1992.

Preliminary results of this year's bulk exercises were most encouraging. While the STDT project personnel were in the field for assistance as required, the PPF personnel assumed responsibility for operation and maintenance of the bulk handling equipment. A farmer's organization and a transport contractor have requested that the bulk program be continued and expanded. A truck operator has inquired about leasing the bulk trailers used in the exercise for year-around delivery of wheat in bulk to flour mills. Additional information is shown in Appendix II.

#### **1992 Bulk Wheat Handling and Storage Research Program Results**

The complete bulk handling chain from Galawala to the Multan silos produced positive results. At Galawala, a farmer group which produces 10,000 tons a year asked the STDT project to have the bulk program continued next year. These farmers were very enthusiastic about delivering wheat in bulk using two gravity wagons provided for wheat collection. This solved many of their labor and transport problems. The traders in the area said they would "go all out" to purchase and trade wheat in bulk next year.

The Galawala bulk wheat collection has truly been an educational experience. Now we know, or at least have some indication, of what works and what does not.

Number one is gaining the confidence of producers and traders. In the field collection process, the STDT project provided a bulk scale (weigh buggy) to check the weights of the buying station's scale. After a few loads, the producers and traders accepted the buying station's weights on a truck scale. The STDT project personnel and farmers made a platform for the the scale by simply constructing a platform of bags. Piling bags around the intake hoppers of the grain pumps is standard procedure to make a "surge bin." This is not as neat and tidy as one might like, but it works with virtually no cost.

During the first few loads in the 20T trailer taken to the Multan silo, Shamsheer Haider Khan, STDT project Lahore Training Center (LTC), took sellers to a private truck scale along the highway to check the weights against the scale at the Multan silo. The weights were nearly identical. Now it is accepted that the

PPFD scale is accurate, and the truckers now only check every fourth or fifth load at the private scales.

The trucker who is pulling the semi-trailer is also thinking ahead. He now sees some design changes in the trailer he would like to make. His semi-tractor is oversized - if the tandem trailer could have been used in tandem, the load size would have been about right. However, road and urban traffic conditions would not permit it. On June 5, a large Russian-made tractor was used to make two trips with the 20T tandem trailer between Galawala and the Multan silo.

Someday, this trucker, or others, will want to build a larger convertible bulk carrier. The trucker now sees the advantages of bulk commodity transport and wants to arrange some kind of lease for the trailer. In pulling a 36-ton flatbed trailer with bagged wheat, it takes about two hours to load, and one and one-half to two hours to unload, plus additional waiting time if other bagged-grain carriers are waiting to unload. Most of the time, this transporter could get only one load per day. The PPF rate is Rs 1,100 a load for that particular distance. With the bulk truck, the trucker gets two loads a day with about a 45 minute loading time at the buying station with a 35" grain pump and sweep auger. Unloading time is about 18 minutes because the volume of straw and other foreign material causes elevator leg and conveyor choke-ups at high volumes. Unloading speed isn't as critical now as there are no other bulk carriers waiting to unload. When the bulk carrier is not there, the silo is filled by cutting bags and pouring from two to four trucks at a time. All other warehouse space in the Multan area has been filled. The labor crews are quite happy about the bulk system. It is much easier to cut and pour than stacking 18 bags high as they did 100,000 bags in the adjacent warehouses.

Now the trucker has worked out a system to get two and one-half to three loads per day. He returns to the buying station at night and loads up for an early morning start. Both the procurement center and the Multan silo can load-out and receive loads almost anytime, as it requires only two persons to be at each site. The bag labor crews work only from 7:00 a.m. to 4:00 p.m.

Another feature the trucker likes very much is that due to labor shortages, he must "tip" the bag handling crews Rs 100 for loading and unloading above what they get from the PPF contractor. The trucker is not paying "tips" for bulk loads. The trucker's daily gross income has increased from Rs 900 to between Rs 2,200 and Rs 3,000. Word of this income potential from bulk handling will spread through the trucking fraternity and more will be offering their services. Eventually, competition for bulk loads will reduce transport costs.

The procurement station is developing its own system for bulk handling. They plan for the next truck load, and have a grain pile ready. While the STDT project stationed an employee there for training and equipment maintenance, the equipment operator at Galawala is a physically handicapped individual who is both deaf and mute. He is very proud to be the equipment operator and pays very close attention to the functioning of the equipment. In a remarkably short time, he seems to have figured out how to pile the wheat to get maximum productivity from the grain pump and sweep auger.

The same is true at other locations in filling hexagonal bin complexes. This year, STDT and PPFDF will fill five complexes that have not been used, or at least used only partially for the past several years. The labor costs of filling are prohibitive, even if someone could be found who would be willing to carry bags up those stairs. At Multan last year, only 21 bin units were filled in 30 days due to costs and labor problems. The STDT project and PPFDF filled half of the 84 bin units in about one week. STDT shifted equipment to Bawalapur to fill all the hexagonal bins at this location.

PPFDF formed a high-level task force to develop programs and terms for delivery of wheat in bulk to flour mills. This included pricing for quality differentials for cleaning. PPFDF wants to deliver in bulk all wheat now stored in that form and encourage flour mills to develop bulk receiving facilities. PPFDF wants to develop a permanent system for bulk wheat procurement and releases.

The outlines of a compatible public- and/or private-sector grains system may be emerging. It seems possible to locate areas with heavy concentrations of wheat and other grains. There are farmers or family groupings who possess sufficient volumes to warrant investing in temporary or permanent bulk storage facilities. A possible model is the bulk oil tank conversion at the Ravi Feed Mills. Wheat collected around these storage areas in bulk could be made available for load-out to transport the crop directly from rural storage areas to flour mills without urban storage, or transported by fewer trucks operating on a regular transport schedule.

The public or private sector could pay for the rural storage. When wheat stocks are exhausted, the storage space would be available for corn or other feed grains. Grain cleaning and other services could be performed at rural sites to enhance value and earn additional income.

#### **Bulk Handling and Storage Demonstration**

A demonstration of mechanical loading of hexbins and the bulk delivery of wheat was held in Rawalpindi on February 26, 1992. The STDT project organized the bulk wheat storage and delivery demonstration which was attended by officials of the Ministry of Food, Agriculture, and Cooperatives (MINFA), Provincial Food Departments, PASSCO, United States Agency for International Development (USAID), and the private sector (including bankers). A large crowd of flour millers attended this event. They were particularly interested in how the distribution system could be changed so they too could receive clean wheat in bulk. Approximately 125 persons were in attendance at the demonstration.

#### **Mechanized Loading of Hexbin, Peshawar**

The STDT project personnel visited NWFPPDF in early March to explore their interest in possible mechanized filling of hexagonal bin complexes. For various reasons, NWFPPDF declined to participate in bulk handling at that time.

#### **Bulk Wheat Handling Demonstration**

A demonstration of bulk wheat handling was held at the Supreme Flour Mills, Km 22, Multan Road, Lahore, on April 26, 1992. Supreme Flour Mills is owned by the

National Group of Industries, Lahore. National officials participated in the Rawalpindi bulk wheat handling demonstration in February and extended the offer to use the new Supreme Flour Mills for a bulk handling demonstration. The STDT project/LTC, planned to show alternative bulk handling systems including a model procurement station, four forms of bulk transport, five types of conveying equipment, two weighing systems, three cleaning systems, and a hammer mill for converting grain cleanings into livestock feed.

An aspirator-type grain cleaner was locally fabricated by the STDT/LTC project for this event. Educational displays and demonstrations were also provided by the PARC/STDT group and the Nestle-Milk Pac Company of Lahore.

The demonstration was attended by 177 persons. A summary of attendance at the demonstration is as follows:

Private sector - flour/feed millers	45
Private sector - feed/flour dealers	80
Private sector - others	6
Pakistan-German Training Program	3
MINFA, PPF, PASSCO, UAF	18
USAID, U.S. Embassy, STDT Project	<u>25</u>
Total	177

Flour and feed millers who attended were from Karachi, Lahore (35), Sargodha, Bahawalpur, Kasur, Sialkot, Bhai Pharu, and Sheikapura. Traders were from all areas of the Punjab Province.

Haji Mohammad Bashir, Chief Executive, National Group of Industries, was host for the program. He made a public offer to support the creation of a grain milling school in the private sector. The Punjab Minister for Food, Dewan Ashiq Hussain Bukhari, announced formation of a committee to develop a program for bulk wheat delivery flour mills wanting to receive wheat in this form. The STDT project was named as a member of this committee.

A special issue of STDT BREIFS (STDT project newsletter) was prepared for the bulk handling demonstration. Further information is provided in Appendix III.

#### **Program for Bulk Wheat Deliveries to Flour Mills**

As mentioned above, the Punjab Minister for Food announced formation of a committee to develop a program for bulk wheat delivery to flour mills wanting to receive wheat in this form. This committee is planning for bulk wheat deliveries on a permanent basis to all flour mills wanting this service, and a plan for financing expansion of the bulk wheat handling system. PPF is also establishing a bulk handling department at the deputy secretary level to handle all matters related to expansion of the bulk wheat handling system.

Planning has begun in selecting flour mills for bulk delivery of wheat. Appendix IV provides a survey on bulk wheat delivery to flour mills.

Training Activities. Progress in accomplishing training activities was as follows.

#### **Seminar/Workshop on Grain Storage Management Research and Training**

On March 2-3, 1992, a Seminar/Workshop on Grain Storage Management Research and Training was conducted at UAF. The chief guest was the Minister for Agriculture, Punjab. The seminar was intended to publicize the diploma program and acquaint the government and the private sector with the UAF program in grain storage. About 100 persons from the government, private sector, agriculture faculty, students, USAID/Pakistan, and the STDT project attended.

The STDT project provided a one-hour presentation on the present state of grain storage with the use of video tapes. Richard Maxon presented a paper entitled "Importance of Grain Grading". The UAF presentations showed their isolation from storage development in Pakistan, lack of support services, and reference materials. The STDT project will have to work much more closely with the UAF staff than anticipated. Four UAF graduate students are now working with the STDT project on various activities.

The private sector made significant contributions. Two speakers from the private sector asked for increased government support, or at least some consistency in government actions. Frequent changes in government policies are the major source of concern in private-sector development.

Resolutions passed by the seminar/workshop are attached as Appendix V. Proceedings of the Seminar/Workshop on Grain Storage Management Research and Training will be published.

#### **Bulk Wheat Handling Equipment Training and Field Exercises**

Training in bulk wheat handling equipment operation and bulk wheat storage procedures was conducted on April 28-29, at the Supreme Flour Mills in the proposed milling school building. The training was attended by 26 persons. PASSCO declined to send any trainees. A summary of attendance at the demonstration is as follows:

Private sector - flour/feed millers	7
PPFD	15
Nestle-Milk Pac	<u>4</u>
Total	26

Presentations were made by the LTC staff, the PARC/STDT researchers, and the UAF staff. Extensive "hands-on" practice in equipment operation was provided using the equipment from the bulk handling demonstration. Appendix VI contains further information.

#### **American Soybean Association Workshop**

Presentations on bulk storage and grain marketing were made by STDT to the American Soybean Association (ASA) Feed Technology Workshop, May 30-June 3, in Karachi. Ulysses Acasio, Long-Term Advisor for Storage, LTC, presented a paper

entitled "Raw Materials Handling and Storage", and Richard Maxon, Long-Term Advisor, Chief-of-Party, presented a paper entitled "Feed Grain Marketing In Pakistan." The presentations were well received and reprinted by ASA for distribution to feed millers and large-scale poultry producers in Pakistan, as well as the ASA Singapore office. The STDT project took the opportunity to discuss the proposed private-sector milling institute and the UAF institutionalization program with interested feed millers and poultry producers. A schedule of the Feed Technology Workshop is attached as Appendix VII.

Technology Transfer. All technology transfer and technical assistance activities under this category involved working with the Pakistani private sector. Progress in accomplishing activities in the area of technology transfer was as follows.

#### **Assistance to Sihala and Sadiq Flour Mills**

Continued assistance was rendered to the Sihala and Sadiq Flour Mills (in Islamabad and Peshawar, respectively), in the installation of their bulk handling and storage systems.

Construction of the Sadiq Flour Mills' convertible godown was at a point where advise on the exact placement of the grain loop was needed. Ulysses Acasio provided this assistance on May 17. The godown should be completed by the end of July.

After long delays, the Sihala Flour Mills purchased an elevator leg to complete mechanization of a 4,000T convertible godown. Ulysses Acasio provided additional information on placement of the leg during a visit to Islamabad on June 9. This godown should be mechanized by the end of August.

#### **Supreme Flour Mills**

The Supreme Flour Mills are now completing construction of a 7,000 mt bulk storage facility. Ulysses Acasio advised on the design and placement of the conveying equipment.

The STDT project also assisted the Supreme Flour Mills in procurement of bulk wheat during the 1992 harvest season.

#### **Steel Oil Tank Conversion for Grain Storage**

The STDT project assisted Ravi Feeds in converting two 40-ft diameter by 25-ft high welded steel tanks for grain storage. The tanks used to be vegetable oil storage tanks which have been sitting idle for a number of years. Ulysses Acasio designed a grain handling and aeration system for the silos. The STDT project loaned the firm a 65-ft grain pump, gravity wagon, self-tipping trolley, and three portable augers for initial operation until recently purchased equipment arrives. The silos are now both operational.

About 300 mt of wheat was loaded in the silo with a grain pump. Before fumigation, sampling was done down to the bottom of the silo to ascertain the degree of infestation and the insect pest species present in the grain mass. The initial analysis of samples revealed that 4% to 6% of wheat grains had been

damaged. The dominant insect species encountered were Sitophilus oryzae, followed by Rhizopertha dominica, Tribolium castaneum, Sitotroga cerealella and Oryzaephilus surrenamensis. Phosphine fumigation was done by using 666 tablets of aluminum phosphide. Considering the grain depth (16 ft) and the gas-tight situation in the silo, all the tablets were placed on the grain surface. All leakage points were closed by using a polyethylene sheet. The phosphine gas and the temperature was recorded daily up to 11 days. The gas was retained in all parts of the grain bulk well above 200 ppm for more than seven days. The gas retention was good. To confirm the effectiveness of fumigation, a sampling was conducted after complete removal of the gas.

In addition to the oil tanks, the STDT project evaluated the specifications and layout of two Butler silos that Ravi Feeds imported from the U.S. to increase their storage capacity. The installation of the Ravi Feed Mills' steel bins began in May. Ulysses Acasio suggested some modification in placement of the aeration fans for greater efficiency in operation. This was to be done, but while being constructed, the silo was destroyed by a violent windstorm in mid-June. Construction has not started on the second silo. The Ravi Feed Mills have requested some additional advice and information on reconstruction and repair alternatives.

#### **Testing a Portable Paddy Batch Dryer and Ganji Dryer**

The portable paddy batch dryer was shifted to the Ravi Feed Mills. An engineering student from UAF is responsible for collecting data and analyzing the performance of the dryer.

#### **Preliminary Rough Rice Dryer Design for Bari Rice Mills**

Ulysses Acasio made preliminary designs for an 8.8 mt and 10.5 mt, LSU-type, continuous-flow grain dryer for the Bari Rice Mills, Muridke, Punjab. This dryer is to supplement their existing 25 mt capacity continuous-flow Cimbria dryer. The owner will review the designs and will find a local machine shop to fabricate it with supervision from STDT.

#### **Continuous-Flow Grain Dryers**

Two private-sector rice mills have each contracted a Lahore machine shop to build continuous-flow dryers for paddy rice. The design was developed by Ulysses Acasio, upon their request, and he will supervise the construction. The only continuous-flow dryers in Pakistan are imported and very expensive. Developing local capability for dryer construction could greatly assist the rice and feed milling industry.

#### **National Feeds -- Grain Handling**

National Feeds requested the STDT project to assess the feasibility of mechanizing the handling of feed ingredients from their warehouses to the feed processing plant. The feed ingredients are all in bag which require manual handling resulting in excessive losses due to spillage on the floor. Ulysses Acasio will prepare designs for mechanizing the handling system. A problem with

the dryer was investigated and corrective measures were described to the management.

#### **Pak Feed Industries, Gujranwala**

On request of Pak Feed Industries, Gujranwala, a visit was made by the STDT project on March 17, 1992. The major storage facilities consisted of six steel silos and one covered shed. The possibilities of grain protection in the silo and shed were critically examined. The silos were found difficult to fumigate due to (1) the fast turnover rate, (2) non-gas tight conditions, and (3) difficult access into the silos. Outside of the silo, on the floor area, a large number of insects were observed. Insects were also present in the shed area. To control these insects, surface spraying with 2% Coopex was advised. To protect the cereal commodities stored in the shed area, phosphine fumigation under polyethylene is the only solution. It was also urged that the general sanitation and housekeeping be improved in the whole storage area for better management.

The rotary cleaner used prior to storage was non-functional. The STDT project will provide assistance in making it operational.

#### **Other Activities**

##### **STDT Project Newsletter**

The STDT project has initiated a newsletter entitled "STDT BREIFS." The purpose of the newsletter is to provide information which can easily be communicated during special events. Editions of a newsletter were issued during the bulk handling demonstration at the Supreme Flour Mills, the seminar/workshop held at UAF, and the visit of a Bangladesh wheat study team delegation. Copies are located in Appendix II, V, and IX.

##### **Institutionalization - Private-Sector Institute**

A leading Pakistan flour and feed milling organization offered a building, space, financial assistance, and other support for the creation of a grain storage management institute.

The STDT project prepared a concept paper for a private-sector grain management institute and a brochure on the subject, which was distributed at the demonstration of bulk wheat handling held at the Supreme Flour Mills and the Feed Technology Workshop held in Karachi. The brochure is attached as Appendix VIII. The idea was also discussed with the joint secretary, MINFA, and various other public- and private-sector personnel including owners/managers of feed, flour and rice mills, poultry farms, and educational institutions. Various funding alternatives were explored including the Punjab Education Foundation, USAID NGO grants, private-sector donations, and other international assistance programs. Some preliminary budgeting indicates that a grain management institute could become largely self sustaining within one to two years provided (1) initial capital requirements can be obtained through donations, (2) the private sector is willing to sponsor employees or trainees in short courses, and (3) laboratory and consulting services can be provided at near commercial rates.

The next step is to determine the market potential for training among the nation's 400 flour mills, 25-30 commercial feed mills, and an unknown number of rice mills, seed processing plants, poultry farms, and other users of storage and milling technology.

Efforts to pursue these matters were further handicapped by the absence of some key public- and private-sector individuals due to foreign travel and personal problems. Arrangements are being made with UAF to jointly study the issues and organize a conference of interested persons in September, to finalize or reject plans for a private-sector institute.

#### **UAF Institutionalization Program**

The Seminar/Workshop on Grain Storage Management Research and Training was conducted at UAF during March, as part of an institutionalization process to acquaint the government and the private sector with the UAF program in grain storage. A meeting was held with the vice chancellor, UAF, and the grain programs committee on June 24. The University is planning to inaugurate the diploma program in grain storage in late July or August. The vice chancellor remains fully committed and supportive of the diploma program and instructed the committee to develop a plan for creating a department of grain science.

The STDT project discussed transfer of bulk equipment to UAF. A staff member from the Farm Machinery Department was identified as the person to receive and manage this equipment. He has bulk handling experience from overseas and is the recipient of a GOP grant for external training. The STDT project has forwarded his application to Kansas State University with recommendations for acceptance into a PhD program in grain storage engineering. UAF has recently applied to GOP for a large grant to start an agribusiness department. Discussions were held on the potential for cooperation between the agribusiness program and the transfer of the STDT project's grain storage and research program to UAF. While the physical aspects of the STDT project are readily transferred, the economic, managerial, and social components are yet to be firmed up. The agribusiness program should provide an ideal counterpart. The STDT project was assured of UAF's cooperation in this regard by Dr. Bashir Ahmad, Chairman, Agribusiness Committee.

#### **Bangladesh Delegation**

A three-member delegation from Bangladesh visited the STDT project on May 17 and 18. Information was provided on the STDT bulk handling research and the grain storage training program. Several research reports were provided to the group, and a tour of a local flour mill was arranged. Further information is contained in Appendix IX.

#### **Project Reports**

Acasio, U. and A. Javed. "Converting a PASSCO-Type Godown for Bulk Storage." January 1992.

Maxon, R. "Importance of Grain Grading." March 1992. Paper presented at the Seminar/Workshop on Grain Storage Management Research and Training, University of Agriculture, Faisalabad, March 2-3, 1992.

Acasio, U. "Raw Materials Handling and Storage." May 1992. Paper presented at the American Soybean Association (ASA) Feed Technology Workshop, Karachi, Pakistan, May 30-June 3.

Maxon, R. "Feed Grain Marketing In Pakistan." May 1992. Paper presented at the American Soybean Association (ASA) Feed Technology Workshop, Karachi, Pakistan, May 30-June 3.

Printed copies of STDT Project Report No. 9, "Refresher Course on Fumigation Technology" were distributed to conference participants. A letter of appreciation is attached as Appendix X.

#### Food and Feed Grains Institute (FFGI) Staff and Consultant Utilization

No other FFGI staff or consultant utilization was undertaken in this reporting period in addition to Richard C. Maxon, Chief-of-Party, stationed in Islamabad, and Ulysses Acasio, Grain Storage Advisor, stationed in Lahore.

#### Constraints

The inability of PASSCO and PPF to achieve their procurement targets affected plans for the technical and economic analysis of the bulk handling equipment. Some additional work of filling hexagonal bins for PPF partly offset the shortfall in filling open bulkheads at PASSCO and the Chichawatni Silo Complex.

The use of Section 144, Criminal Procedures Act to control inter-district movement on wheat, greatly hampered the STDT project's efforts to develop and improve wheat storage in the private sector. The restrictions were removed in late June, after the main harvest and procurement season had passed. Plans to assist in the bulk collection and storage of wheat by the private sector had to be abandoned. The private sector will be very reluctant to construct additional storage or improve their operations unless they receive assurances that government policies will permit long-range planning and recovery of their investments in advanced storage and processing methods.

#### Projected Activities

1. Plan and initiate delivery of wheat in bulk to flour mills in cooperation with PPF.
2. Plan and begin distribution of bulk handling equipment to PASSCO and Provincial Food Departments in accordance with a program developed jointly by MINFA, PASSCO, Provincial Food Departments, and the STDT project.
3. Analyze data from the 1992 bulk wheat handling and storage research program and prepare reports.
4. Follow-up on institutionalization program with UAF and the private sector.

5. Conduct external training in bulk grain handling and storage engineering, bulk grain storage and handling management, and grain standards and grading for the Government of O and the Provincial Food Department's personnel approved by GOP and USAID.

SECTION II  
ADMINISTRATIVE

Expenditures

Expenditures for project activities to date are detailed in Table 1.

Foreign Country National Trainees

As reflected in the project activities described in Section I, the following training was completed.

A demonstration of mechanical loading of hexbins and the bulk delivery of wheat was held in Rawalpindi. Approximately 125 persons were in attendance at the demonstration.

A demonstration of bulk wheat handling was held at the Supreme Flour Mills, Lahore. The demonstration was attended by 177 persons.

A Seminar/Workshop on Grain Storage Management Research and Training was conducted at UAF. About 100 persons were in attendance.

Personnel Employed

Time utilization of the FFGI staff and consultants is shown in Table 2. Specific personnel employed under the project, during this time period, are shown in Table 3.

TABLE 1

**KANSAS STATE UNIVERSITY/FOOD AND FEED GRAINS INSTITUTE**  
**Storage Technology Development and Transfer**  
**Contract No. 391-0491-C-00-6080-00**

**Total Expenditures**  
**(\$)**

	Budget Amount	This Period	To Date 6/30/92	Balance
Salaries and Wages	1,214,104.00	97,236.07	1,163,589.51	50,514.49
Fringe Benefits	277,093.00	17,904.25	209,281.51	67,811.49
Overhead	1,121,090.00	45,638.27	994,263.88	126,826.12
Consultants	119,252.00	0.00	117,142.91	2,109.09
Local Staff Salaries	317,451.00	31,933.53	241,947.67	75,503.33
Travel, Transporta- tion and Per Diem	448,253.00	15,322.36	383,665.37	64,587.63
Expendable Supplies	179,630.00	7,569.10	129,323.38	50,306.62
Non-Expendable				
Property	601,475.00	1,885.00	603,558.38	(2,083.38)
Training	132,980.00	0.00	132,324.73	655.27
Subcontracts	58,300.00	3,999.89	48,509.97	9,790.03
Other Direct Costs	<u>332,784.00</u>	<u>24,252.05</u>	<u>266,592.28</u>	<u>66,191.72</u>
<b>TOTAL</b>	<b>4,802,412.00</b>	<b>245,740.52</b>	<b>4,290,199.59</b>	<b>512,212.41</b>

TABLE 2

KANSAS STATE UNIVERSITY/FOOD AND FEED GRAINS INSTITUTE  
 Food Security Management Project  
 Storage Technology Development and Transfer  
 Contract No. 391-0491-C-00-6080-00

Time Utilization

	FY 87	FY 88	FY 89	FY 90	FY 91	FY 92/93	TOTAL
<b>In-Country</b>							
<b>Short-Term TA</b>							
Budgeted	378.0	200.0	44.0	44.0	671.0	38.5	1375.5
Actual	467.5	177.0	17.5	79.5	395.0	5.0	1141.5
%	123.7	88.5	39.8	180.7	58.9	13.0	83.0
<b>On-Campus</b>							
<b>Short-Term TA</b>							
Budgeted	188.0	96.0	47.0	0.0	0.0	0.0	331.0
Actual	155.0	296.0	96.0	16.0	0.0	0.0	563.0
%	82.4	308.3	204.3	0.0	0.0	0.0	170.1
<b>Long-Term TA</b>							
Budgeted	120.0	292.0	520.0	520.0	520.0	693.5	2665.5
Actual	168.0	292.0	524.0	520.0	444.0	520.0	2468.0
%	140.0	100.0	100.8	100.0	85.4	75.0	92.6
<b>Home Office</b>							
Budgeted	345.0	345.0	345.0	345.0	144.0	86.0	1610.0
Actual	295.0	323.0	365.0	353.5	318.0	203.0	1857.5
%	85.5	93.6	105.8	102.5	220.8	236.0	115.4
<b>Total</b>							
Budgeted	1031.0	933.0	956.0	909.0	1335.0	818.0	5982.0
Actual	1085.5	1088.0	1002.5	969.0	1157.0	728.0	6030.0
%	105.3	116.6	104.9	106.6	86.7	89.0	100.8

TABLE 3

KANSAS STATE UNIVERSITY/FOOD AND FEED GRAINS INSTITUTE  
 Food Security Management Project  
 Storage Technology Development and Transfer  
 Contract No. 391-0491-C-00-6080-00

Name	Position	Activity Area
<b>FFGI Staff</b>		
R. Maxon	Long-Term Advisor Chief-of-Party	Project implementation/management Project management
U. Acasio	Agricultural Engineer Long-Term Advisor for Storage	Research and training
R. Borsdorf	Agricultural Economist/ Coordinator	Home office administration
K. Dungey	Office Specialist	Home office administration
<b>FFGI Pakistani Employees</b>		
A. Raza	Administrative/Management Specialist	Islamabad office
K. Saba	Administrative Assistant	Islamabad office
M. Qureshi	Chauffeur	Islamabad office
S. Haider	Administrative Specialist	Lahore Training Center
A. Javed	Mechanical Engineer	Lahore Training Center
A. Mansoor	Receptionist	Lahore Training Center
Z. Baig	Accounts Assistant	Lahore Training Center
A. Javed	Research Assistant	Lahore Training Center
M. Iqbal	Research Assistant	Lahore Training Center
S. Javed	Chauffer/Mechanic	Lahore Training Center
Y. Gill	Chauffer/Mechanic	Lahore Training Center

TABLE 3 (Continued)

Staff		
Name	Position	Activity Area
K. Hussain	Chauffer	Lahore Training Center
K. Mahmood	Chauffer	Lahore Training Center
<b>FPGI Pakistani Consultants/PSCs</b>		
F. Ahmed	Laboratory Assistant	Lahore Training Center
B. Ahmad	Laboratory Assistant	Lahore Training Center
A. Haider	Field Assistant	Lahore Training Center
G. Mohammad	Field Assistant	Lahore Training Center
M. Aslam	Field Assistant	Lahore Training Center

## APPENDIX I

### QUARTERLY REPORT (APRIL-JUNE 1992) PARC/STDT ACTIVITIES

#### Research Activities

Calibration of Moisture Meters for Paddy. In this study, the following nine moisture meters were evaluated for their accuracy and were calibrated against the Standard Oven Method (SOM).

Burrows Digital Moisture Computer-700  
Dole-500 Moisture Tester  
Dickeyjohn DJGMT Moisture Tester  
Motomco Moisture Tester  
Insto Moisture Tester  
Datatec P-25 Moisture Analyzer  
Kett Riceter-L Moisture Tester  
Delmhorst Crop Moisture Detector  
Shizuoka Comet Run Moisture Meter

Four commonly cultivated rice varieties were used for the calibration of these moisture meters. The varieties were (1) IRRI-6, (2) KS-282, (3) Basmati-385, and (4) Basmati-Pak (kernel).

Samples of these varieties were conditioned for moisture content from 11% to 24% for five weeks in gas-tight glass jars. After the stipulated period, the glass jars were opened and the moisture content of the grains were measured by all of the above-mentioned moisture meters. Three replicate measurements were taken for each meter. The moisture content of each sample was then determined by SOM. Eleven samples were kept at 130°C for two hours according to the International Standard Organization's method (No. R-172), and the International Seed Testing Association Standards. Then the moisture content of each sample on wet basis was calculated. For each moisture meter, regression equation, the correlation coefficient ( $r$ ), coefficient of determination ( $r^2$ ), and standard error of slope was determined using the M. State computer program. Conversion tables and accuracy ranges were prepared. A report on this study is under way and will hopefully be completed by the second week of July.

Determination of Phosphine Dosage to Control Resistant Insects. The insects collected from different districts of NWFP were analyzed under this study. The full-grown larvae of Trogoderma granarium collected from D.I. Khan, Bannu, and Azakhel were found to be slightly resistant to phosphine and required only a four-day exposure period for complete mortality. The other two species, Rhizopertha dominica and Tribolium castaneum were found susceptible to phosphine gas. Samples are being incubated and the final results will be achieved at a later date.

Assessment of Milling Yield at Different Moisture Contents. This study has been initiated to determine the milling yield of different varieties of paddy at various moisture levels. The major objective of this study is to investigate a

moisture content of rough rice at which a higher yield of head rice can be speculated. This information will be helpful for rice millers in increasing their production of head rice and to avoid excessive losses in the form of brokens. Samples of different varieties of rough rice used in moisture meter calibration studies are being used for the present study. Samples having different moisture contents (11% to 24%) are being milled and polished by using the laboratory rice mill. Head rice and brokens are separated and weighed. Finally, the percentage of both will be calculated. Work on this study is in progress.

#### Assistance Provided to the Private Feed Mills

Ravi Feed Mills, Sheikhpura Road, Shahdra. On the request of the Ravi Feed Mills, a phosphine fumigation demonstration was set up in a steel tank loaded with maize. The gas concentration was noted for seven days. Sufficient gas concentrations were recorded in the head space, top, and middle grain layers. In the bottom layer, however, a lethal concentration remained for three days only. The gas retention can be further improved by probing the tablets in the grain mass.

National Feed Mills, Sheikhpura. A demonstration of a whole godown phosphine fumigation was conducted at the National Feed Mills, Sheikhpura. About 20,000 bags of corn were stored in the godown. The stock was heavily infested with all major stored-grain insect pests. Before fumigation, all doors and ventilators were sealed by using sheets of polyethylene and PVC self-adhesive tape. The fumigant was applied at the dose rate of 1 tablet/cm of the internal space of the godown. The structure was not suitable for good retention of phosphine gas. Therefore, gas could only be retained for short periods of time. A detailed report, including recommendations for better storage at the feed mill, has been submitted.

APPENDIX II

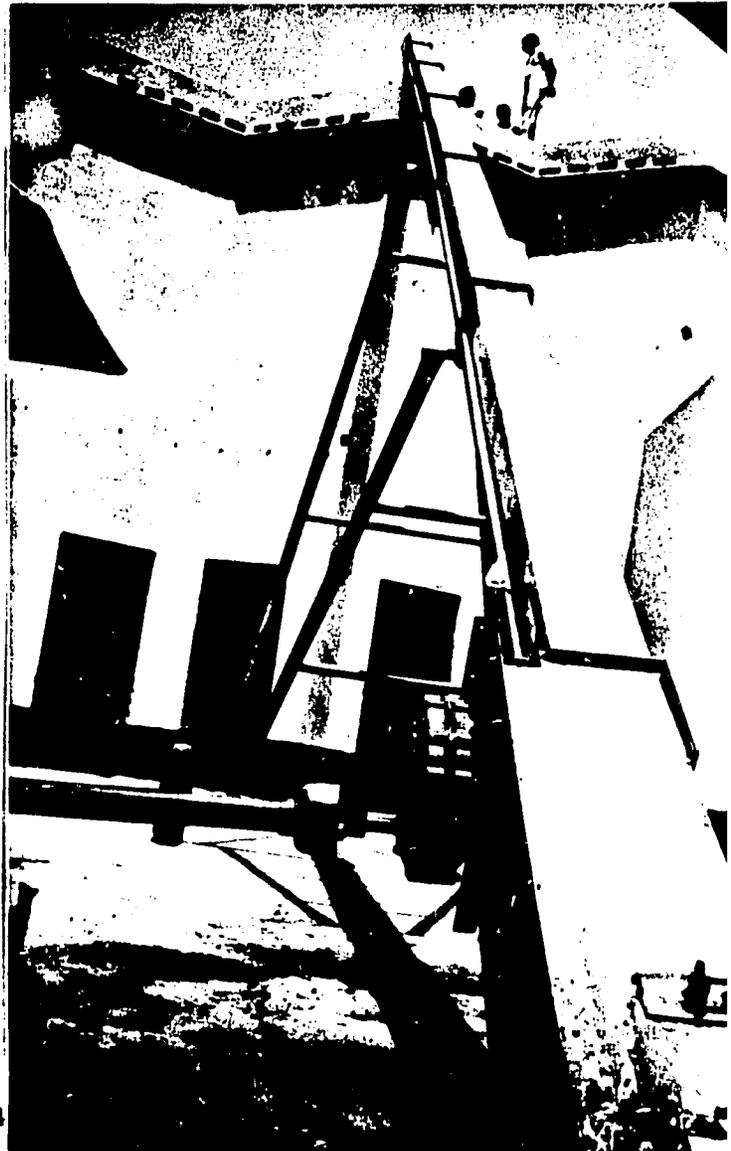
BULK WHEAT PROCUREMENT AND HANDLING



Collecting wheat from a large farm near Sihawal, using a sweep, grain pump, and gravity wagon.



A 20T "portable" weigh bridge permanently mounted at Sihawal. The capacity has been increased 3 cubic tons to receive wheat directly from the farms.



Filling hexagonal bins, Sihawal, 1992.

Filling hexagonal bins, Sihawal, 1992.



To

Dr. Richard c Maxon,  
Chief of Party STDT  
Islamabad.

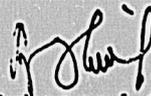
**SUBJECT: BULK PROCUREMENT OF WHEAT AT MULTAN.**  
-----

Dear D Maxon

It is matter of great satisfaction that STDT is helping Punjab Food Department in procurement, handling and storage of wheat at Okara and Sahiwal. The equipment provided by STDT is being utilized effeciently at these places. We have learnt that STDT have still some equipment available at some places not being utilized. This would be worthwhile if STDT can spare some more equipment which can be tried at Multan. The District Food Controller Multan Mr. Abdul Hafiz and Storage and Enforcement Officer Mr. Ibrahim Dasti has reported that there are still chances in Multan to get involved in bulk handling of wheat at Silos and Hexbins during this harvest. This will help to promot the introduction of bulk handling system in the Punjab Food Department and in the country.

Mr. Ibraheem Dasti will be the contact person for bulk procurement at Multan.

With best regards.



Ch. Muhammad Sharif  
Additional Director Food  
punjab.

C.C.

1. Dr. Ulysses A Acasio.
2. Secretary Food Punjab.
3. Director Food, Punjab.
4. Deputy Director Food, Multan.
5. District Food Controller, Multan.
6. S C Multan.
7. D P (M) Multan.

Fax from PCO Multan

HAJI MOHAMMAD AJMAL & CO.

C/O THATTA GOOD FORWARDING AGENCY  
BCG CHOWK, MULTAN

Dr. Richard C. Maxon  
Chief-of-Party  
STDT/FFGI,  
29 Elue Area,  
Islamabad.

June 09, 1992

Subject: Bulk Handling of Wheat 1992 Crop.

Dear Sir:

We, Mohammad Ajmal & Co. are the carriage contractor of Punjab Food Department for Makhdoom Rashid, Makhdoom Ali, Chak No. 357/WB, Khothi Gawen, Zarif Shahid, Khaniwal, Mutubpur, Chaliwala for Multan Wheat Crop 1992. We had a chance to see the performance of Bulk Handling Equipment and trailers provided by STDT/USAID for handling of wheat in bulk form. As we are the carriage contractor for shifting of wheat from Gholewala to Multan, we found this new system of handling useful, efficient and cost effective. We had a chance to provide power machines for the trailers and the truck. We worked up to the satisfaction of the department with whole responsibility. We would like to offer that in future if STDT and Punjab Food Department intends to go into Bulk Handling in this area, we are ready to assist for the services. Moreover, if PFD or STDT desire to issue wheat in bulk to the flour mills in Multan area, we are ready to offer our services to get the hopper bottom on lease for delivery to the mills, or any other arrangement in this regard will be appreciated.

We are ready to work for the transportation in bulk and if the trailers and trolleys are provided to us we will be responsible for all maintenance.

/s/

Haji Mohammad Ajmal & Co.

Copy to:

Shamsher Haider Khan,  
STDT/USAID

Ibrahim Dasti,  
Punjab Food Department  
Multan

M/S Razzaq Agro Services  
Galawala, Tehsil Lodhran  
MULTAN.

08 June 1992

Dr. Richard C. Maxon  
Chief-of-Party  
STDT, USAID  
Islamabad.

Subject: Introduction of Bulk Handling 1992 Wheat Harvest.

We are very pleased and thankful to your department for introducing very useful handling system of grains in bulk in our area. Your team under the supervision of Mr. Shamsheer and Mr. Mohd Ibrahim Dasti has introduced and proved this as a perfect, time saving and economical systems.

We belong to a farmer community and handle about 6 to 8 thousand M.T. of Wheat every year. We collect the wheat from farmers and bring at our collection point Galawala purchase center with in the radius of 10 to 20 kms and then deliver this wheat to Punjab Food Department.

The collection of wheat from farm to center is a big problem of transportation. This year your team has developed a system and provided us gravity wagons and conveyors to pickup wheat from farm to the center. This scheme is excellent and we wish that Punjab Food Department and STDT will continue this in future.

We offer our every support and assistance to establish this center as permanent bulk purchase center in next year.

I again thankful for your and Dr. Acasio's visit at our place on June 4, 1992.

With best regards.

/s/

Abdul Razzaq  
Ch. Umaid Khan  
Galawala, Distt. Lodhran  
P.C.O. Tel. 06517-2983

APPENDIX III

DEMONSTRATION OF BULK WHEAT HANDLING  
SUPREME FLOUR MILLS

**National Flour & General Mills (Pvt) Ltd.**

*in collaboration with*  
STORAGE TECHNOLOGY DEVELOPMENT & TRANSFER PROJECT  
AGRICULTURAL SECTOR SUPPORT PROGRAM, USAID, AND THE  
PUNJAB FOOD DEPARTMENT

*cordially invites you to a*  
**DEMONSTRATION OF BULK WHEAT HANDLING**

**on Sunday, April 26, 1992**

*at*

**SUPREME FLOUR MILLS**  
(Unit of National Group)  
22 Km, Multan Road, Lahore

Honourable **Dewan Ashiq Hussain Bokhari**  
Minister for Food, Punjab  
will be the Chief Guest.

R.S.V.P.  
Haji Mohammad Bashir  
Tel: 475821-23

**Program Enclosed**

Preparation for Demonstration



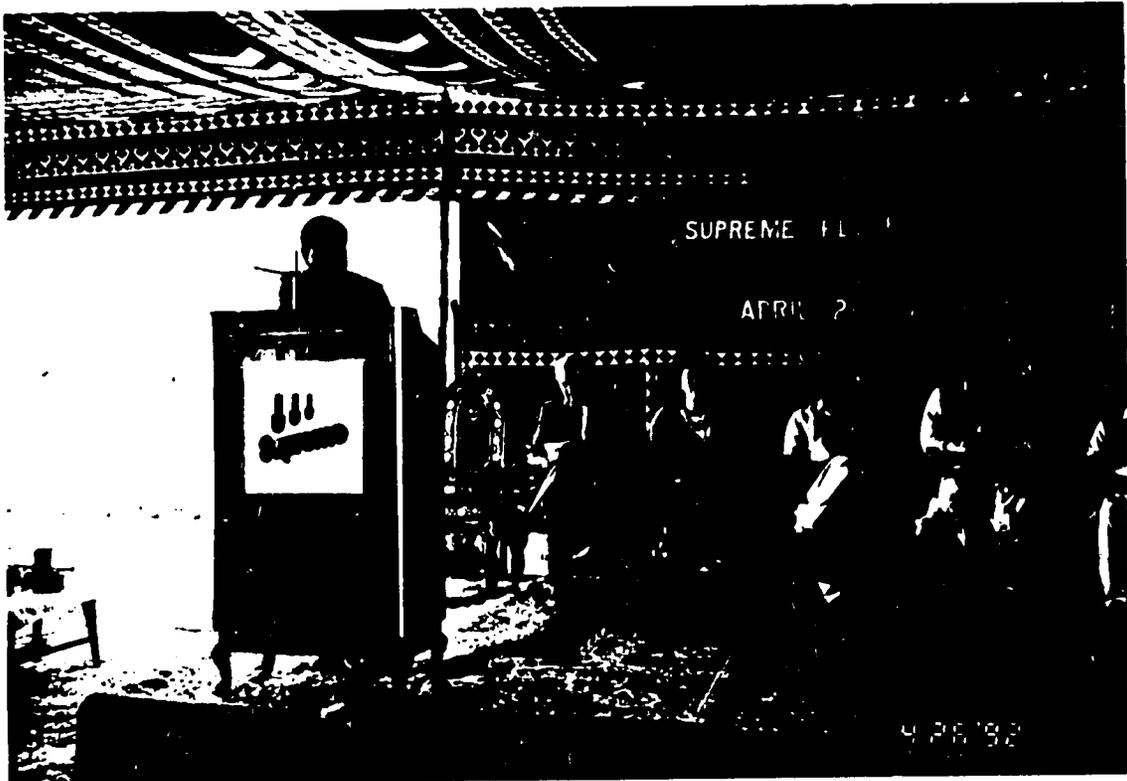
Preparation for Demonstration



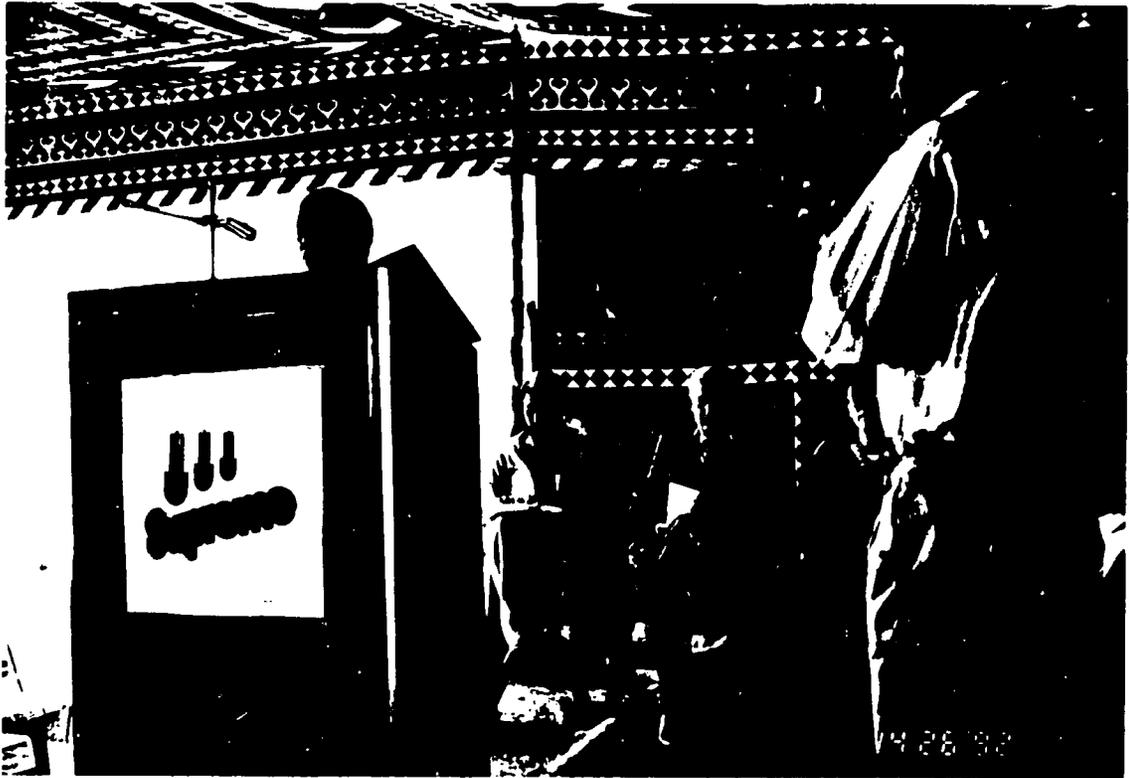
Registration



Opening Ceremonies



Opening Ceremonies





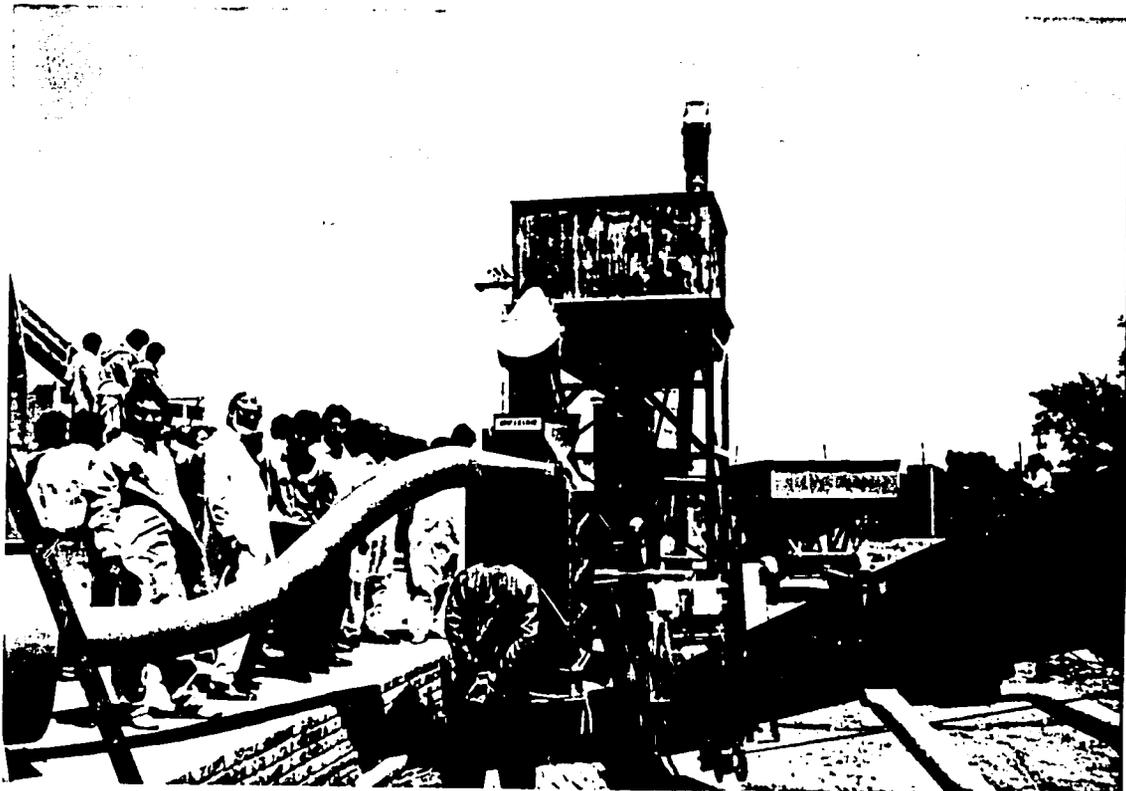
Moving to the demonstration areas



Demonstration of three cleaning systems: (Right to Left) (1) Surge bin to gravity cleaner below, (2) auger to blower-aspirator and then movement to bulkhead by conveyor, and (3) rotary cleaner in background with hammermill



Movement of bulk wheat from gravity wagon by conveyor to surge bin shown above



Aspirator in front of surge bin and gravity cleaner.



Rotary cleaner and grain pump demonstration.



Explaining cleaning systems.



Inside a 40 x 88 ft godown before filling with grain slinger.



Explaining flour quality evaluation procedures.



Demonstrating bulkhead fumigation with a grain probe.

*Storage Technology Development and Transfer Project  
Agriculture Sector Support Program, USAID Pakistan*

In cooperation with

*Punjab Food Department*

and

*National Flour & General Mills (Pvt) Ltd.*

will present a

**DEMONSTRATION OF BULK WHEAT HANDLING & STORAGE**

on

*Sunday, 26 April 1992*

at the

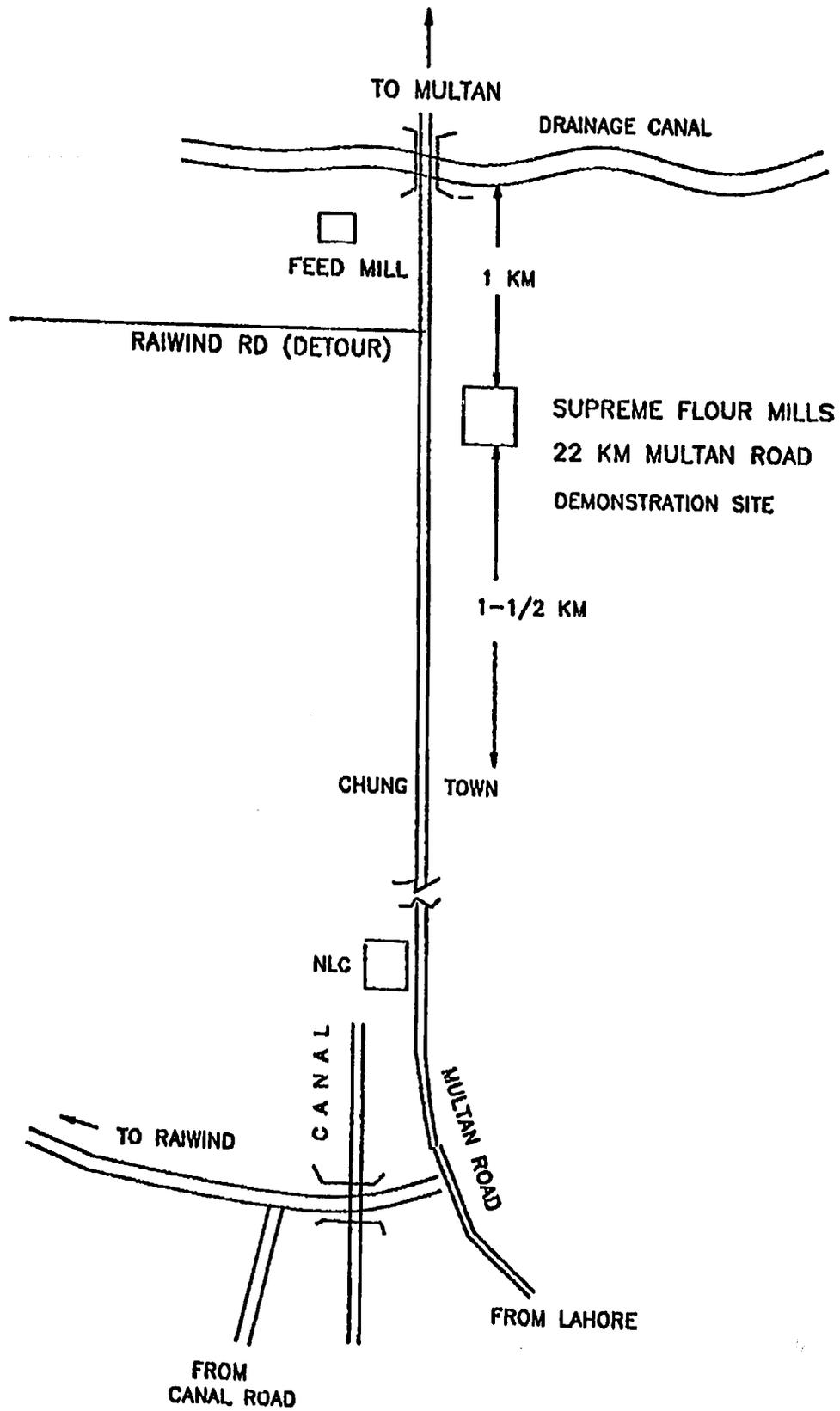
*Supreme Flour Mills*

22 Km Multan Road

**P R O G R A M**

10:00 - 11:00	Visit of Flour Mills and Bulk Handling Exhibits (Optional)	
11:00 - 11:30	Registration of Guests	STDT Staff
11:45	Arrival of Chief Guest	
11:50 - 11:55	Recitation from the Holy Quran	
11:55 - 12:00	Welcome Remarks	H. Mohammad Bashir Chief Executive National Group of Industries
12:00 - 12:05	Why this Exercise?	Dr. Richard C. Maxon Chief-of-Party, STDT/USAID
12:05 - 12:10	Plan of Demonstration	Dr. Ulysses A. Acasio Advisor, STDT/USAID
12:10 - 12:15	Remarks of the Chief Guest	Hon. Dewan Ashiq Hussain Bokhari Minister for Food, Punjab
12:15 - 12:45	Bulk Handling and Storage Demonstration	
13:00 - 14:00	Lunch and informal discussions	
14:00	Concluding Remarks and Adjournment	Mr. Arnold Rudi Chief, ARD/USAID Islamabad

(Please see back page for direction)



**WELCOME REMARKS**  
**BY HAJI MOHAMMAD BASHIR**  
Chief Executive of the National Group

*ON THE OCCASION OF THE PUBLIC OPENING OF THE SUPREME FLOUR MILLS  
AND BULK HANDLING DEMONSTRATION*

Lahore, 26 April 1992

With the name of God, the Merciful, beneficent.

Honorable Dewan Ashiq Hussain Bukhari, Minister for Food Punjab. Ms. Laurie A. Johnston Consul General, American Consulate, Lahore; Mr. Arnold Radi, Agriculture & Rural Development Chief, USAID; Mr. Dennis Weller USAID, Dr. Richard Maxon, Storage Technology Development and Transfer Project, the Secretary Food and Director of Food Punjab Department, and all our distinguished guests.

Aslamoaalukum and welcome to this auspicious occasion.

In the beginning I would like to thank you, our respected guests who have come here on our invitation despite your busy schedule. The purpose of this meeting is to share with you our gratitude and good fortune in being able to develop this new flour mill. This mill is the result of support shown to us by our loyal customers, suppliers and vendors for the National Group of companies. For this we express our appreciation and dedicate this mill to providing even better products and services in the future.

We firmly believe that our National Group of Companies can grow and prosper only if we exist in a progressive and competitive industry environment. Three years ago, I discussed the idea of bulk handling with the Storage Technology and Development Project. As you can see today, this idea has now become a reality. The maximum locally produced machinery has been installed in this mill. We have found that while technical advise on the design grain handling systems is lacking in our country, the capability exists to make machinery to our requirements once the system is defined. In this respect, we are most appreciative to Dr. Acasio and STDT for the continuing advice and counsel on the bulk handling systems. We are greatly pleased with the results and want to share this knowledge with you.

The Storage Technology Development and Transfer Project of USAID has been working since last four years for the improvement of grain storage system in Pakistan. The project has rendered excellent services in grain storage and protection. The STDT project has conducted research and training courses in collaboration with the public sector and for flour/feed milling industry.

The grain industry is now taking the initiative to improve and

change its storage practices. Progress is being made to convert from labor intensive bag handling to mechanization. PASSCO and the Food Department are planning to procure wheat in bulk this year. For their efforts to be totally successful, they must have clientele who can receive in bulk.

The over all performance of the mill is the sum of the individual performance of every person and department in the mill. We have tried to provide maximum facilities and modern equipment for the workers and staff. Our next step is to establish a quality control laboratory at the mill for guidance of our management and mill operators. We will be looking to the STDT for assistance in defining our equipment and staffing requirements.

In Pakistan thousands of tonnes wheat are wasted each year due to our traditional handling system. Most of the staff does not have any technical training. The rate of progress and product development is slow for this reasons. There is no such forum available in Pakistan for the grain milling industry in the manner of training for the petroleum, fertilizer, textile, electronics and other industries. Those industries would be far less advanced today if they had not taken it upon themselves to develop skilled and motivated employees.

It is not too late to develop a proper grain milling training facility. How can this be done? This is a question to which we do not have the complete answer. What we do know is we have to start from where we are and join hands on most important subject. To get started and open discussion on this vital issue, I offer to provide the classroom facilities and the electricity charges free of cost for the period of two years for the establishment of a grain milling training program. With the help from all concerned who recognized need , we can make a grain milling school a reality. For a beginning, I would like to suggest that a way be found to preserve the training and research program established by the STDT. This could be done in the form an institute of some type. The institute would have much to offer initially, and in the longer term could be a major force in shaping the future of the milling industry.

This issue is far to complex to discuss at length now. I would therefore propose that with the help of all concerned we join together in an open forum after this harvest season to fully explore the creation of some sort or grain institute for Pakistan.

At the end I again thank you honorable Chief Guest, the Minister food punjab and other distinguished guests to this important occasion. We hope this event today will lead us towards better tomorrow for the grain industry.

Thank you and  
Pakistan Zinda Bad

PRESENTATION TO BULK HANDLING DEMONSTRATION  
SUPREME FLOUR MILLS, MULTAN ROAD, LAHORE  
APRIL 26, 1992

WHY THIS EXERCISE

WE ARE HERE TODAY TO LOOK AT TOMORROW. THE USEFUL LIFE OF A FLOUR MILL IS 40 TO 50 YEARS. WHAT YOU SEE HERE BEFORE YOU WILL BE PROVIDING A STAPLE FOOD FOR YOU, YOUR SPOUSE AND CHILDREN, AND CHILDREN'S CHILDREN WELL INTO THE NEXT CENTURY.

WHAT YOU OBSERVE HERE TODAY IS ANOTHER IRREVERSIBLE TREND - THE STORAGE AND PROCESSING OF BASIC FOODSTUFFS NEARER THE POINT OF PRODUCTION, AND TRANSPORT OF THE FINISHED OR SEMI-FINISHED PRODUCTS TO THE URRAN AREA. IT IS NO LONGER NECESSARY - AND INDEED IS BECOMING SOCIALLY AND ECONOMICALLY UNDESIRABLE - TO MAINTAIN LARGE STOCKS OF UNPROCESSED AGRICULTURAL COMMODITIES IN OUR OVERCROWDED URBAN AREAS.

THE GRAIN PROCESSING INEVITABLY CREATES WASTES, BY-PRODUCTS, AND ENVIRONMENTAL PROBLEMS THAT ARE NOT EASILY DEALT WITH IN AN URBAN SETTING. IN A LOCATION SUCH AS THIS, THE WASTES AND BY-PRODUCTS MAY BECOME ECONOMICALLY VIABLE COMMODITIES IN THE FORM OF POULTRY AND ANIMAL FEEDS, SOIL CONDITIONERS, FERTILIZERS, ETC. THE WATER USED IN WASHING MIGHT FIND USE IN IRRIGATION AND RECYCLED INTO THE GROUND WATER TABLES.

WE ARE ALSO HERE TO LOOK AT THE FUTURE OF GRAIN STORAGE - NOT JUST WHEAT ITSELF. THE GOVERNMENT OF PAKISTAN IS RAPIDLY DIVESTING ITSELF OF PROCESSING PLANTS - AND BY IMPLICATION - STORAGE FACILITIES IN RICE, EDIBLE OILS, AND OTHER COMMODITIES. CAN WHEAT BE FAR BEHIND? AS MORE RESPONSIBILITY IS PLACED UPON THE PRIVATE SECTOR - THE STORAGE IS SHIFTED BACK TO PRODUCERS, MIDDLEMEN, AND RELATIVELY SMALL SCALE PROCESSORS.

A LARGE VACUUM IS DEVELOPING - ONE THAT NEEDS TO BE FILLED BY A NEW TYPE OF ENTERPRISE. THIS IS THE COMMERCIAL STORAGE COMPANY THAT BUYS - SELLS AND CONDITIONS GRAINS, OR SIMPLY RENTS STORAGE SPACE TO OTHERS. IT DOES NOT MATTER IF THE OWNERSHIP IS A COOPERATIVE, PRIVATE INDIVIDUAL, OR CORPORATION - THE NEED, FUNCTIONS ARE THE SAME FOR ALL. THE OPPORTUNITIES ARE RAPIDLY EMERGING. EACH NEW FIRM WILL HAVE TO DECIDE UPON THE APPROPRIATE STORAGE TECHNOLOGY BE USED. WE HOPE THAT WHAT IS SEEN HERE TO DAY MAY PROVIDE SOME INSPIRATION TO THOSE WHO MAY WANT TO ENTER THIS NEW FIELD.

SEVERAL COMPETING GRAIN HANDLING SYSTEMS ARE OFFERED FOR YOUR EVALUATION. OVER TIME, COMPETITION WILL DECIDE WHICH IS BEST FOR A PARTICULAR USE. THE STDT PROJECT HAS TAKEN THE COURSE OF BUILDING UPON WHAT IS AVAILABLE, OF ADAPTING, MODIFYING, AND USING THE ABUNDANCE OF LOCAL TALENT TO ACHIEVE AND ECONOMICAL AND

ACCEPTABLE END RESULT. SOME OF WHAT YOU WILL SEE TODAY MAY BECOME THE STANDARD FOR TOMORROW.

WE WISH TO EXPRESS OUR APPRECIATION TO OUR HOST, HAJI MOHAMMAD BASHIR, AND HIS NATIONAL GROUP OF COMPANIES. HE IS TO BE CONGRATULATED FOR THIS EXEMPLARY NEW FLOUR MILL. THE COOPERATION AND ARRANGEMENTS LEAVE NOTHING TO BE DESIRED. WE ALSO WISH TO EXPRESS OUR APPRECIATION TO USAID WHOSE GENEROUS SUPPORT HAS PERMITTED US TO FREELY EXPERIMENT ALTERNATIVE GRAIN STORAGE METHODS. APPRECIATION IS ALSO DUE TO PASSCO AND THE PUNJAB FOOD DEPARTMENTS WHO HAVE ALLOWED THE STDT TO USE THEIR FACILITIES, STOCKS, AND PERSONNEL IN TRAINING AND STORAGE RESEARCH.

IT IS ALSO APPROPRIATE TO RECOGNIZE THE TIRELESS EFFORTS OF DR. ACASIO, SHAMSIER, ARIF, AND ALL OF THE STDT LAHORE CENTER STAFF WHO HAVE ASSEMBLED THIS DEMONSTRATION FOR YOU TODAY.

MOST OF ALL, ON BEHALF OF THE STDT PROJECT, WE WISH TO THANK ALL OF YOU FOR THE TIME AND EFFORT YOU HAVE TAKEN TO PARTICIPATE IN THIS EVENT.

Richard C. Maxon  
Chief-of-Party  
STDT/Islamabad

## PLAN OF DEMONSTRATION

Today you will observe various processes involved in handling bulk wheat from the market, to storage, and to a flour mill. This will include testing grain and flour quality in the laboratory and use of modern bulk handling equipment from procurement to storage. Most of the grain handling equipment you will see are standard equipment used at farm level in the United States. However, the volume of wheat that is normally handled at the farm level in the U.S. would approximate the volume of wheat handled at a typical storage center of the Food Department or PASSCO. For this reason we have imported these pieces of equipment and adapted them for Pakistan Conditions.

In addition to the standard farm equipment, you will also see a grain cleaning device widely used in the milling industry in the U.S. and European countries. We adopted the basic grain cleaning principle with slight modification to suit Pakistan conditions. This cleaning device is suitable to use either before storing the grain or just before milling or processing. We set it up on the ground for you to see. Normally, it is installed at the third or fourth floor of a mill close to the discharge spout of a bucket elevator.

Another equipment you will see is a very high capacity grain slinger. This is suitable to use under tremendous volume of grain to handle such as at a very large storage center with open bulkheads or at a port facility. We are demonstrating it for use in a large flat bulk storage system as that of the Supreme Flour Mills. This flat storage system is a pioneering effort of Mr. Haji Mohammad Bashir, our kind host today. Because of his pioneering spirit, he has kindly agreed to host this historic event. Thank you.

Ulysses A. Acasio  
STDT Advisor  
5-23-92

## Govt to cut wheat handling expenses

LAHORE. April 26: The Punjab Food Department is spending huge amounts on the wheat operation from procurement to distribution of about 3 million tonnes of wheat every year. The government is keen to cut down this expenditure by adopting bulk wheat handling and storage technology.

Punjab Food Minister Dewan Ashiq Hussain Bukhari said this while speaking as chief guest at a demonstration of bulk wheat handling, at Supreme Flour Mills, Manga Mandi near here on Sunday.

According to a handout, the minister said the Food Department was handling and storing 2.5 to 3 million tonnes of wheat besides maintaining storage capacity for over 2.5 million tonnes of wheat all over the province.

He said, that apart from 60,000 bulk storage capacity, the rest of storage was still in traditional form.

Dewan Ashiq said that seeing in this perspective, the efforts made by the USAID through the Storage Technology Development and Transfer (STDT) project in Pakistan was a step in the right direction.

The minister said that last year the Punjab Food Department handled 2500 tonnes wheat in bulk in collaboration with the STDT project in Sahiwal and this year also pilot project of bulk wheat handling will be started at Okara and Sahiwal.

The minister welcomed the idea of establishment of a milling school in the private sector. He expressed hope that such institutions would help in providing qualified manpower for running flour mills in future.

Dewan Ashiq Hussain said that the STDT project was now about to close and it would be the responsibility of Food Department,

PASSCO and the private flour mills to pick-up the threads from where they have left and to ensure that new practice and techniques learned by us for the last few years are put to practice on a wide scale.

The minister announced the constitution of a working group with Additional Director Food as its convener to prepare its recommendations for future working plan. The said working group would also include representatives from PASSCO, Flour Mills Association and the STDT project and would come up with a blue print within three months, he said.

Earlier in his address, Mr Arnold Radi said that STDT project was originally started in Pakistan under the Food Security Management agreement, in mid 80's, to provide an adequate food supply at reasonable cost for all Pakistani citizens.

He said that in one phase 600,000 metric tonnes of wheat storage were rehabilitated. He said that STDT project spread out to a successful training programme that included over 1,800 persons in the public and private sectors.

Dr Richard C. Maxon, Dr Ulysses A. Acasio and Haji Mohammad Bashir, Chief Executive National Group of Industries also spoke on the occasion.

The function was attended by Miss Lauri Johnson, Consul-General of US in Lahore; Mr Arnold Radi, Chief ARD/USAID in Islamabad; Dr Richard C. Maxon, Chief-of-Party, STDT/USAID; Dr Ulysses A. Acasio, Advisor, STDT/USAID, Secretary, Food Punjab; Mr Khalid Saeed and other officers and officials of PASSCO and Food Department.

Later, bulk wheat handling cleaning and storage was also demonstrated.—APP



# STDT BRIEFS

## STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER AGRICULTURAL SECTOR SUPPORT PROGRAM

29 Blue Area, Islamabad 14-L, Model Town Ext., Lahore

April 1992

### WELCOME TO THE DEMONSTRATION OF BULK WHEAT HANDLING

A warm and hearty welcome to all our distinguished guests and colleagues on behalf of the Storage Technology Development and Transfer Program, and our hosts, the National Group of Industries and the Chairman, Haji Mohammad Bashir. Today's program is a dual event. The National Group invites you see their newest and most advanced flour mill. This new mill is designed for the future, with maximum flexibility for producing a wide range of wheat based products.

The second event is demonstrations of alternative methods of testing, receiving, cleaning, and storing wheat. The emphasis is on having a complete system for transport, receiving, cleaning, and storage. Cleaning is a step not normally taken until the wheat enters the flour mill. Cleaning before storage prevents many storage problems and enable the mill to operate with greater efficiency and to maintain quality control.

Two previous demonstrations of bulk wheat cleaning and deliveries were conducted in Sihawal and Rawalpindi. The previous events were limited in scope. Today's demonstration greatly expands and integrates all activities at one site.

The Supreme Flour Mill is constructing a large mechanized storage complex, plus making provision for rapid receipt of wheat in bulk or bagged form during the harvest season. As government policies turn more activities over to the private sector to store grains, it is anticipated that flour mills and other grains processors will construct more of their own storage. Modernized storage is also needed for maize, oilseeds, and other commodities. It is our hope that today's demonstrations will provide ideas and encouragement for those contemplating building new storage space, or converting existing space to bulk handling.

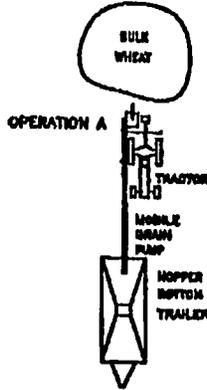


# PLAN FOR SUPREME BULK HANDLING DEMONSTRATION

APRIL 26, 1992  
 DEMONSTRATION OF BULK WHEAT  
 HANDLING AND STORAGE  
 SUPREME FLOUR MILLS

APRIL 27-28, 1992  
 BULK HANDLING AND STORAGE  
 TRAINING FOR: FOOD DEPARTMENT,  
 PASSCO, AND PRIVATE SECTOR

ENTRANCE



PROPERTY LINE

## DEMONSTRATION LAYOUT

### OPERATIONS

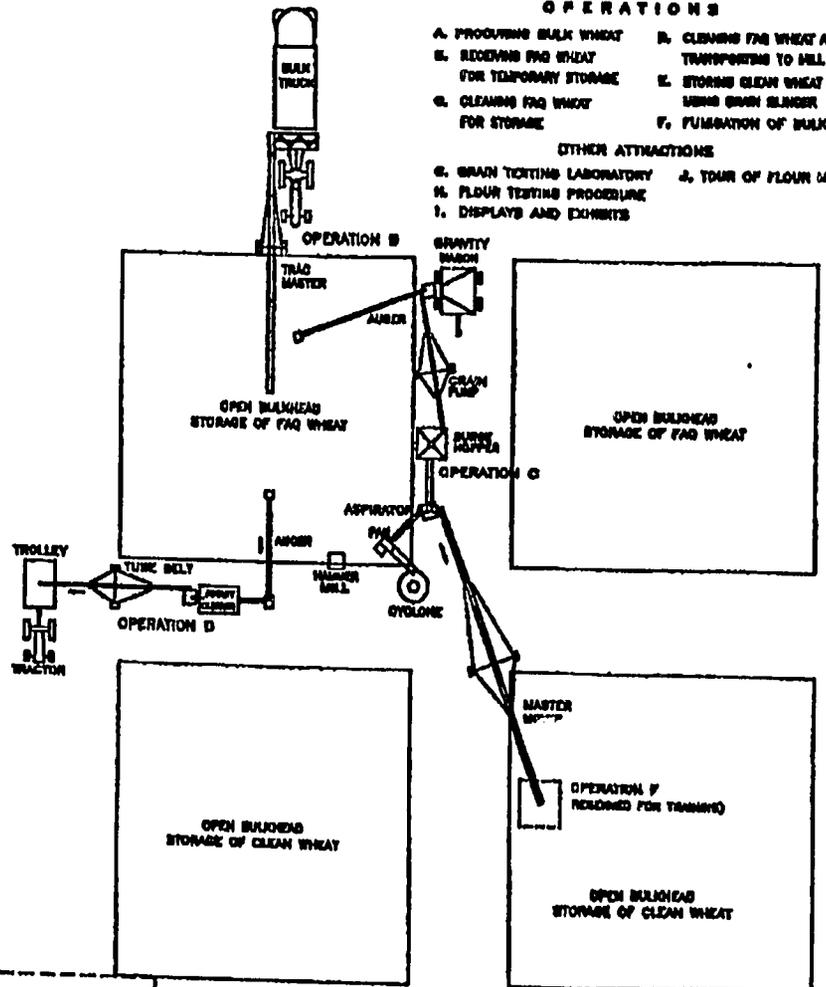
- A. PRODUCING BULK WHEAT
- B. RECEIVING FKG WHEAT FOR TEMPORARY STORAGE
- C. CLEANING FKG WHEAT FOR STORAGE
- D. CLEANING FKG WHEAT
- E. CLEANING FKG WHEAT AND TRANSPORTING TO MILL FOR TEMPORARY STORAGE
- F. STORING CLEAN WHEAT IN BULK USING GRAIN SLINGER
- G. BRAN TOTTING LABORATORY
- H. FLOUR TESTING PROCEDURE
- I. DISPLAYS AND EXHIBITS
- J. TOUR OF FLOUR MILL
- K. CLEANING FKG WHEAT AND TRANSPORTING TO MILL
- L. STORING CLEAN WHEAT IN BULK USING GRAIN SLINGER
- M. FUMIGATION OF BULK WHEAT

### OTHER ATTRACTIONS

- G. BRAN TOTTING LABORATORY
- J. TOUR OF FLOUR MILL
- H. FLOUR TESTING PROCEDURE
- I. DISPLAYS AND EXHIBITS

FLOUR MILL

FLOUR MILL



BULK GODOWNS

Briefs...2

## STDT WORKING TO IMPROVE GRAIN STORAGE

The Storage Technology Development and Transfer project (STDT) is sponsored by USAID in cooperation with the Ministry of Food Agriculture and Cooperatives. The project aims are to strengthen the national capabilities in grain storage and stored grain protection. The major activities are the testing of bulk handling systems, research and training in storage technology, all phases of storage and distribution. A number of initiatives have been very successful. The present priority is being given to transfer the technology developed to local institutions.

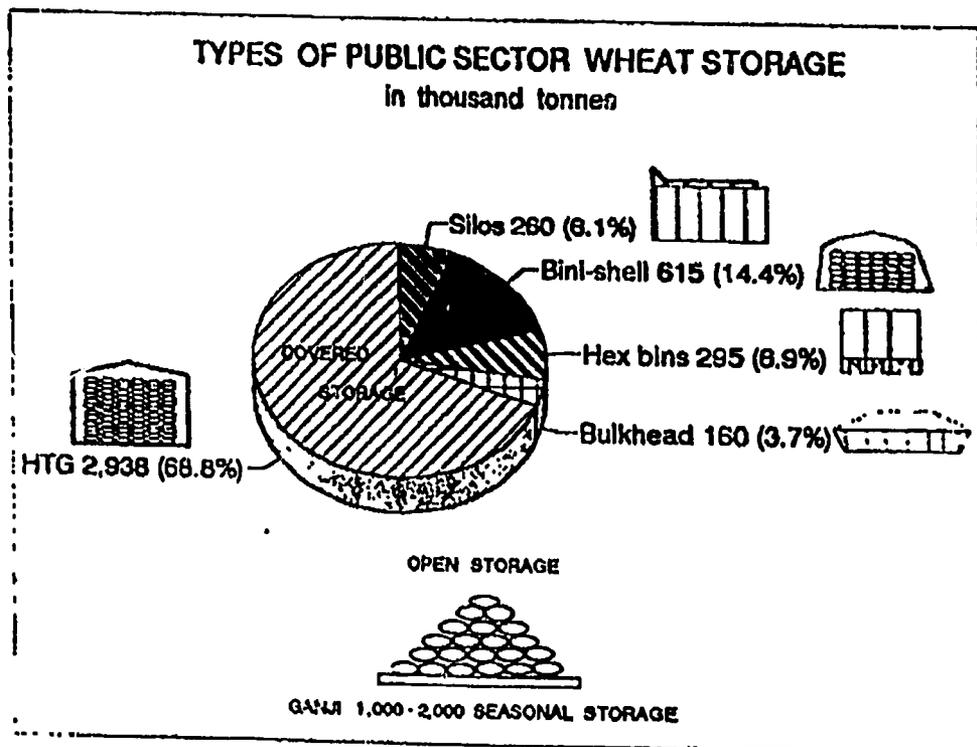
## WHEAT STORAGE - A HIDDEN INDUSTRY

Another bountiful wheat harvest is under way. It is time to give thanks and reflect upon the abundance that the nation's agriculturalists are capable of production. It is also a time for considering how well this commodity is stored and protected until needed for consumption.

Wheat accounts for about 30 percent of the value of all agricultural production in Pakistan, and 60 percent of the value of food crops. Literally millions of persons are involved in wheat production and harvesting. Yet relatively little attention has been paid to what happens after the harvest.

Wheat storage is Pakistan's largest "hidden industry". Over 12,000 public employees are used to manage federal and provincial wheat procurement and distribution. Thousands more work full or part time in the bagging, stacking, and transporting to the nation's atta and flour mills. After this year's harvest, government wheat stocks worth Rs. 20 billion, will be kept in storage centers worth rs. 36 billion.

How many of these wheat storage systems you can recognize.



## PASSCO's PIONEERING EFFORTS IN BULK HANDLING OF GRAINS

Pakistan Agricultural Storage and Services Corporation (PASSCO) in collaboration with STDT is developing new grain handling systems. Following are ongoing and recently completed activities.

- Developed and tested a complete bulk grain handling system from purchase center to storage point for two seasons.
- Mechanized 30 open bulkheads.
- Rehabilitated the Chichawatni and Multan silos with 110,000 tonnes total storage capacity.
- Converted 9 house type bagged godowns to bulk storage.
- Assisted in research with STDT/PARC personnel on protection of bulk wheat in bulk cum bag godowns, hexagonal bins, open bulk heads, and silos.
- Conducted training of personnel in operation and maintenance of grain handling equipment.

Managing Director PASSCO Syed Mykhtar H. Shah recently declared intentions to expand bulk handling in PASSCO during 1992. The areas for bulk procurement has been selected as Chichawatni, Pakpattan, Bungahayat, and Depalpur. PASSCO plans to procure about 50,000 tonnes of wheat in bulk.

## FOOD DEPARTMENT MARKETS FOR CLEAN WHEAT

STDT has recently conducted a trial of cleaning and delivery of 500 tonnes of bulk wheat to a flour mill in Sahiwal earlier this year. The Sahiwal area was chosen because the PFD has stored wheat in bulk form in hexagonal bins at the city godown complex. The STDT assisted by providing equipment for bulk storage at the time of procurement.

This was the first time that the Food Department has sold wheat other than FAQ. The test marketing was repeated in Rawalpindi in February. The Sahiwal and Rawalpindi tests generated much interest in the scheme on the part of flour millers. Today's demonstration is a direct result of the participation in the Rawalpindi event by H. Mohammad Bashir. The STDT, Punjab Food Department and PASSCO have previously teamed up to deliver wheat in bulk to flour mills in Multan, Lahore, Okara and Sahiwal.

The Food Department sold the cleaned wheat at a premium price to cover cleaning costs and weight losses. Mill owners, the Food Department, and consumers benefitted from the sale of cleaned wheat. Reduced cleaning losses, higher flour yields and reduced operating costs compensated for the higher priced wheat.

## WHEAT CLEANING BOOSTS ANIMAL FEED SUPPLY

A bonus from cleaning is the recovery of materials for animal feeds. The materials cleaned from the wheat were laboratory tested for use as animal feed ingredients. The protein content of the materials screened from the wheat were found to be higher in animal feed value than the wheat

Briefs. 4

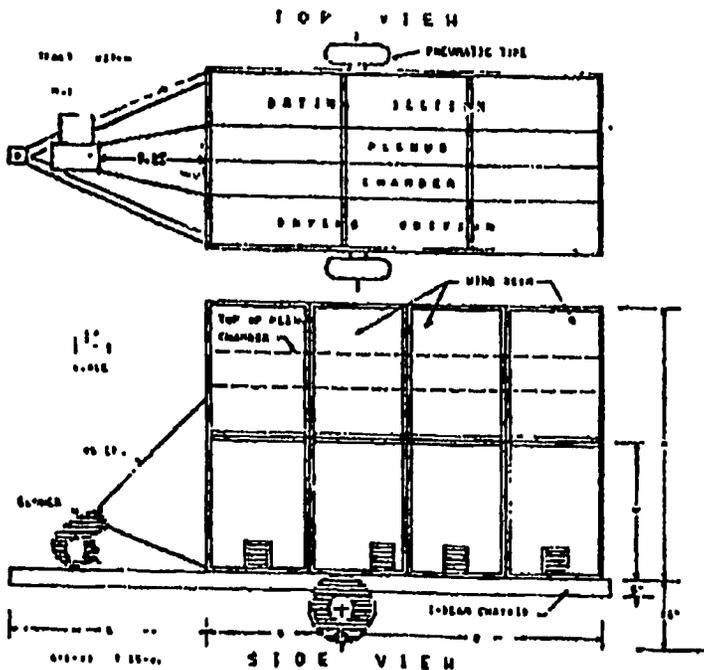
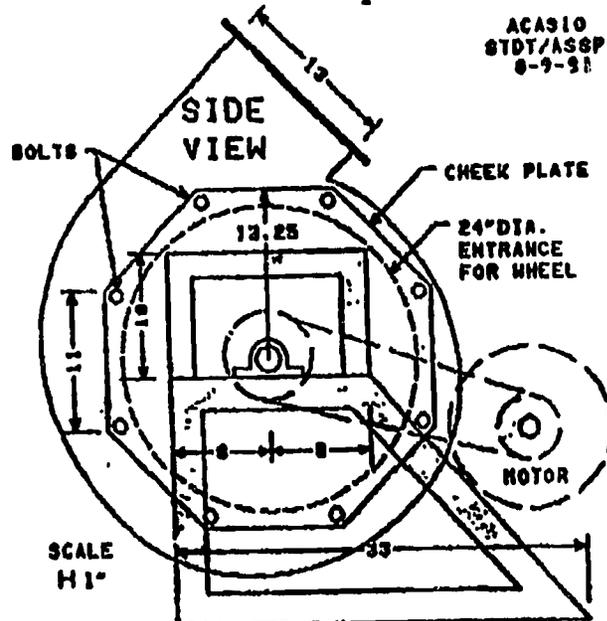
from which it was separated. In handling of wheat, small particles of wheat break off from the wheat kernel. Much of what we see as 'dust or dirt is actually microscopic pieces of wheat protein. It is estimated by the STDT that 70,000 to 80,000 tonnes of additional feeds could be available if screening are properly collected .

The bulk demonstration at the Supreme Flour Mills will feature a hammer mill and protein testing devices to show how screening might be used in animal feed production.

**LOCAL MADE MAKES THE GRADE**

Is all of the equipment used by the STDT imported? By no means. A major component in the STDT bulk handling and demonstration programs is making and adapting grain handling equipment to local conditions. Several elements are at work here. Take the engineering skills of Dr. Ulysses A Acasio STDT Advisor, add in his artistry with computer assisted design (CAD) programs, the comprehension, skills, and ingenuity of the STDT Lahore staff and local machine shops, and soon most any problem can be solved from complex electronic

systems for silos and grain dryers to simple ramps and surge bins . The grain aspirator on display at the bulk handling demonstration in Lahore is about 60-40 imported and locally made .



The STDT staff and machine shop personnel are very adept at scrounging through Lahore's hardware and machinery markets and spotting the materials they need. A junkyard gearbox is the key component for in mounting a grain pump on a tractor to make a mobile pickup system for wheat in mandis.

Go to almost any rural machine shop, describe the problem, and they will inevitably come up with a solution. For example, a bearing and drive shaft were damaged on a Masster mover

during the peak harvest. The problem was quickly solved by modifying parts for sugar mill equipment.

Dr. Ulysses A Acasio, designed a portable rice dryer suitable for Pakistan conditions. The dryer has been completely fabricated locally. The dryer was initially tested and 'fine tuned' at PASSCO Manga storage complex. Later it was moved to a rice milling complex Sheikhpura to test the dryer under commercial conditions. More recently it has been tested by a feed mill for drying maize. The dryer has turned to be portable and versatile. Several private sector firms have expressed interest in having dryers made for them.

A rice milling complex has requested assistance with the expansion of its dryer capacity. The rice mill wants to greatly increase its participation in the export market, but drying its immediate bottleneck. There is no time to import a dryer for the next season. Dr. Acasio designed two dryers that can meet their needs and can be fabricated locally before the next season. A decision to proceed should be made soon.

### CONVERSION OF HOUSE TYPE GODOWNS TO BULK STORAGE

The STDT has converted a house type godown for complete bulk storage. The house type godown are used for bag or bag cum bulk storage. The trial has been done in PASSCO Complex Manga. The purpose of the trial was to demonstrate a complete mechanized bulk storage system for house type godown. This convertible godown is capable of storing 1600 MT. in bulk, about 40 percent more than the designed capacity of 1100 MT. in bags. Preliminary data suggests that cost of filling and unloading converted godown is about rs. 9.0 per ton. This compares favorably with the cost of storing and retrieving one ton in bags of rs. 10.50 and rs. 21 per ton for bulk cum bag storage. Cost per ton of additional storage capacity is about rs. 69. PASSCO is using the design and converted nine house type godown for bulk storage in the current harvest season.

For your copy of the design specifications and operating results, ask for FFGI Report 10, Converting a PASSCO Type Godown to Bulk Storage from the STDT Lahore or Islamabad

### GRAIN STORAGE GOES ACADEMIC..

The University of Agriculture, Faisalabad has established a diploma course in grain storage and management. The course curriculum includes subject matter from the Departments of Entomology, Crop Physiology, Basic Engineering, Food Technology, Agricultural Marketing and Plant Physiology. This is the first time that storage of agricultural commodities has been recognized as an academic subject in Pakistan. The diploma course was developed in response to a request by the Punjab Food Department.

The courses for this diploma have been approved by the University. The Ministry of Food Agriculture and Cooperatives MINFA, and STDT are extending every possible help for this program. Eventually, the University wants to establish a complete course offerings all physical and economic aspects of post harvest activities, including processing. The University and STDT

Briefs...6

conducted a two day seminar on bulk handling and storage on March 2 and 3 to introduce the diploma program.

### **CONVERTING STEEL OIL TANKS FOR GRAIN STORAGE AT A FEED MILL**

STDT has assisted a local feed mill in converting their two 40 ft diameter by 25 ft high welded steel tanks for grain storage. The tanks were installed for vegetable oils but the company has since withdrawn from that business. The tanks have been idle for a number of years while storage problems for feed ingredients were multiplying. The mill originally contacted the STDT Lahore Center for help on another matter. Dr. Acasio designed a grain handling and aeration systems for the silos. STDT loaned a 65 ft grain pump, gravity wagon, self tipping trolley, three portable augers. The silos are now operational. PARC/STDT researchers fumigated the newly converted silos. The converted oil tanks held the phosphine gas concentration better than any grain storage structure tested by STDT thus far. The feed mill is interested in getting additional welded steel tanks for storage. Other firms have also shown keen interest in the idea. A new industry is born?

### **LOW COST - LOW TECH WAY TO BETTER FUMIGATION**

What to do 60 liter plastic drum, glass jars, and plastic tubing have to do with grain storage research? Plenty. Mix them together in an ingenious fashion, and you have a 'low cost, low tech method for determining dosage required to properly fumigate stored wheat.

PARC scientific personnel stationed at the STDT Lahore Center have developed an effective means of determining how much fumigant should be applied to particular godown complexes. The method can be applied to single godowns which have particularly difficult insect resistance problems. Fumigation is improved and costs are reduced by applying only as much fumigant as is needed for the time required to eliminate the insect pests. The usual method is to fumigate on a schedule by applying a fixed amount of fumigants per godown for a uniform time period.

The Lahore staff recently collected insect samples from the NWFP and southern areas of Punjab province. Another round of insect resistance testing is underway, and recommendations for the Food Departments will be available soon.

### **METHYL BROMIDE FUMIGATION EXPENSIVE BUT PROMISING**

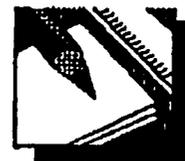
From December 18-22, 1991 the STDT/PARC team conducted a trial fumigation of wheat in a Chichawatni silo. They introduced a methyl bromide fumigant in the free space above the grain and distribute the gas through the stored grain mass by using the silo's down draft aeration fans. When the gas was detected at the bottom of the silo by using a methyl bromide meter, the aeration fans were shut down. The fumigation was completed in two days, and all insects present were destroyed. Phosphine fumigation was not possible due to difficulties in sealing the total structure.

Methyl bromide is about 4 times as expensive as phosphine gas and is very dangerous to use. The gas weighs 3 times as much as air. It is very toxic and fast acting. Methyl bromide is effective against a wide variety of insects. Its higher cost can be justified by its effectiveness and fast action which permits access to the fumigated product in a short time period. For this reason, it is most frequently applied to exports of fruits, vegetables, rice, cotton, and other commodities where fumigation is required as a condition of international trade.

STDT Report No. 9, Refresher Course on Fumigation Technology, October, 1991 contains detailed information on methyl bromide and phosphine fumigation. For your copy, contact the STDT offices in Lahore or Islamabad.

<u>FFGI/STDT Pakistani Staff</u>	
<b>Islamabad</b>	
Richard C. Maxon Asim Raza Kausar Saba Iqbal Qureshi	Chief of Party Adm/Mngt. Specialist Administrative Assistant Chauffeur
<b>Lahore</b>	
Ulyses A. Acasio Shamsher Haider Khan Arif Javed Zafar Ali Baig M. Asif Javed Muzaffar Iqbal Arif Mansoor Shafiqat Javed Yaqoob Gill Khalid Mahmood Khadim Hussain Ghulam Mohammad M. Aslam Ashfaq Haider Shaukat Ali Fayyaz Ahmed	Long Term Advisor Administrative Specialist Mechanical Engineer Accounts Assistant Research Assistant Research Assistant Receptionist Chauffeur/Mechanic Chauffeur/Mechanic Chauffeur Chauffeur Field Assistant Field Assistant Field Assistant Lab. Assistant Lab. Assistant
<b>PARC Associates</b>	
Sajjad Ahmed Tariq Mahmood Saeed Ahmed	Scientific Officer Assistant Scientific Officer Field Assistant

## **press release**



### **A Look Ahead in Wheat Handling and Storage**

**Lahore: 28 April 1992**

Throw wheat into a godown from the distance of a sixer? Vacuum clean wheat before storage? These were two of the grain storage techniques shown the milling industry and public officials at the Supreme Flour mills on Multan road. The demonstration was hosted by the National Flour Mills (Pvt) Ltd. and the Storage Technology Development and Transfer (STDT) component of the USAID Agricultural Sector Support Project. Punjab Minister for Food, Dewan Ashiq Hussain Bokhari was Chief Guest at this occasion.

With the wheat harvest to start soon, mechanical handling is seen as a means of reducing handling costs and reducing storage losses by getting wheat under cover more rapidly. This was the message brought to the assembled crowd, as wheat was traced from a mock procurement center to temporary storage for cleaning, and on to permanent storage in the flour mill's new godowns -all in bulk form. Previous attempts at introduction of bulk handling in Pakistan have largely unsuccessful.

One of the primary reasons for failures in bulk handling was that the technology might have been too advanced for the situation in which it was used, explained Dr. Ulysses Acasio, the head of the STDT Lahore Training Center. He cited instances where wheat in bags was dumped into modern grain silos, only to be re-bagged again when distributed. Here you have the worst of two worlds, Dr. Acasio commented. You have high labor costs and intensive handling on the one hand, and a very high capacity facility that is vastly underutilized on the other. Bulk handling is economical only when it can be transferred from one stage to the next without bags. While four forms of bulk handling are currently used by the public storage agencies, there are few linkages between them.

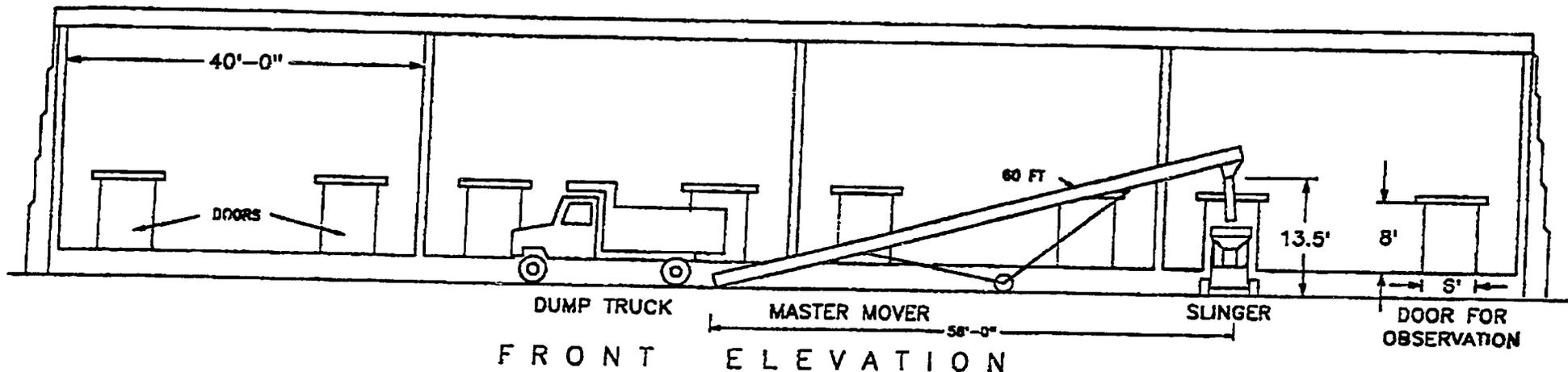
With the support and encouragement of USAID, PASSCO and the Provincial Food Departments have been testing various forms of bulk handling for the past two seasons with technical assistance from the STDT. Trial of deliveries of wheat in bulk have been made in Multan, Okara, Lahore, Sialkot and Rawalpindi. In the latter two locations, the wheat was cleaned prior to deliver and sold at a premium price to compensate the Food Department for its losses. In the present context, flour mills have the most to gain from using bulk handling as they use about the same quantity of wheat every day. Mechanization is most useful where it can be constantly used for repetitive tasks or where very large volumes must be handled in a very short time.

Today's activities highlighted some possible trends in wheat handling and storage. The use of portable grain handling equipment provides flexibility and year around use.

**Adapting existing storage structures to bulk handling is more economical than building new storage structures. Cleaning makes sense. Cleaned wheat occupies less space than wheat containing chaff and other extraneous materials. Cleaning also removes broken and damaged grains that could be used as animal feeds. Cleaned wheat needs less fumigation or other chemicals for insect control.**

**Dr. Richard Maxon, Chief of Party for the STDT program reminded the audience that the new flour mill and storage facilities would be serving Pakistan's consumers well into the next century. This mill, and other grain handling facilities need to be designed for future as well as present needs. He congratulated Haji Mohammad Bashir and his National Group of Companies for the new facilities, and their generous offer to help establish a training institute in the private sector that would serve the entire milling industry.**

# SUPREME FLOUR MILLS BULK GODOWNS

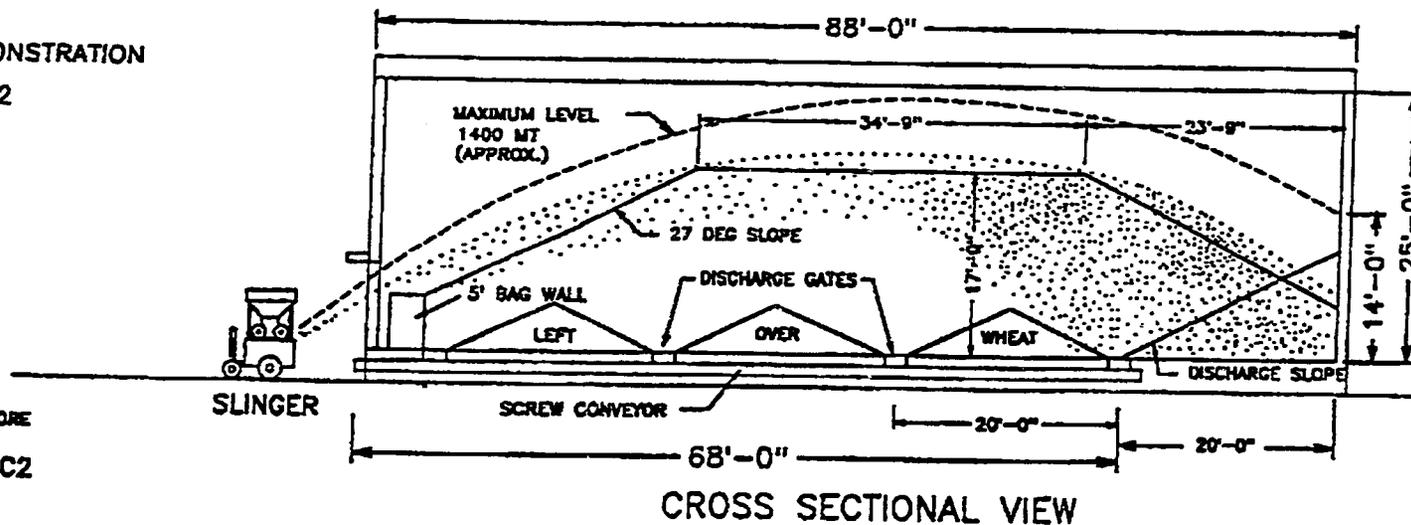


58

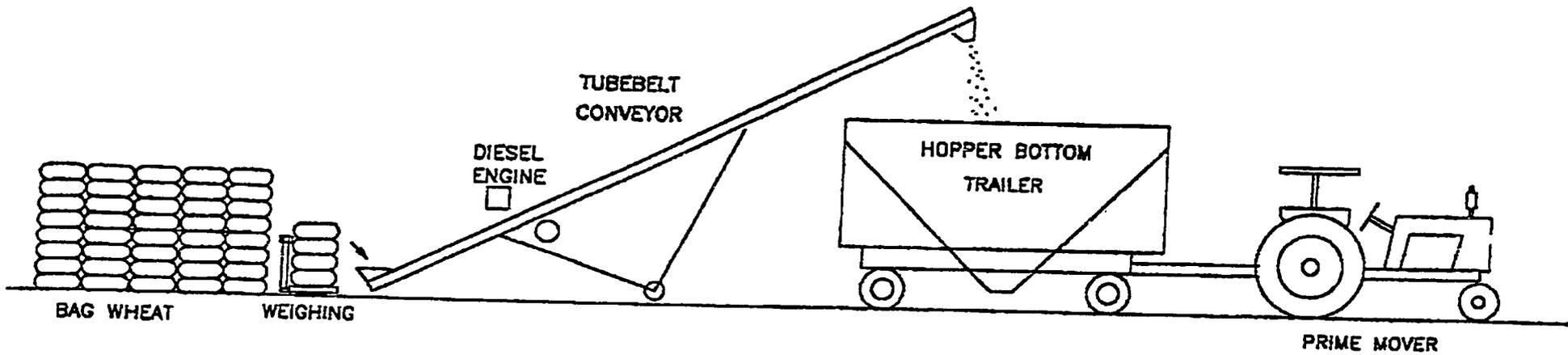
STORAGE TECHNOLOGY DEVELOPMENT  
 & TRANSFER PROJECT  
 ASSP/USAID PAKISTAN

## LOADING BULK WHEAT USING A GRAIN SLINGER

BULK HANDLING DEMONSTRATION  
 APRIL 26, 1992

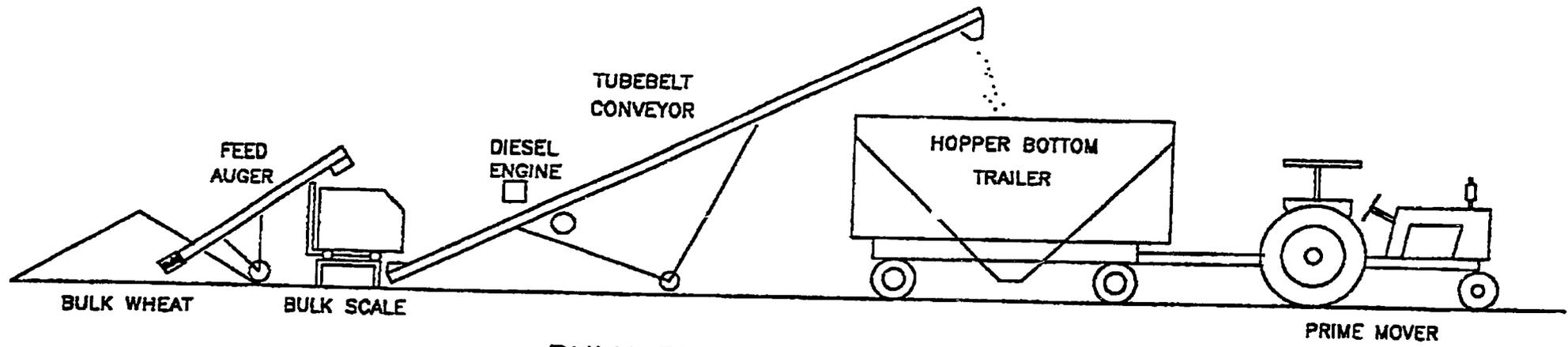


PREPARED BY: ACASIO/STDT LAHORE  
 FILENAME: SLINGMOV.DC2



BULK CONVERSION AT PROCUREMENT

59



BULK PROCUREMENT SETUP

FILENAME: BUUBULK.DC2

STDT LAHORE 4-5-92 (EID DAY)

# SUPREME FLOUR MILLS BULK HANDLING DEMONSTRATION LAYOUT

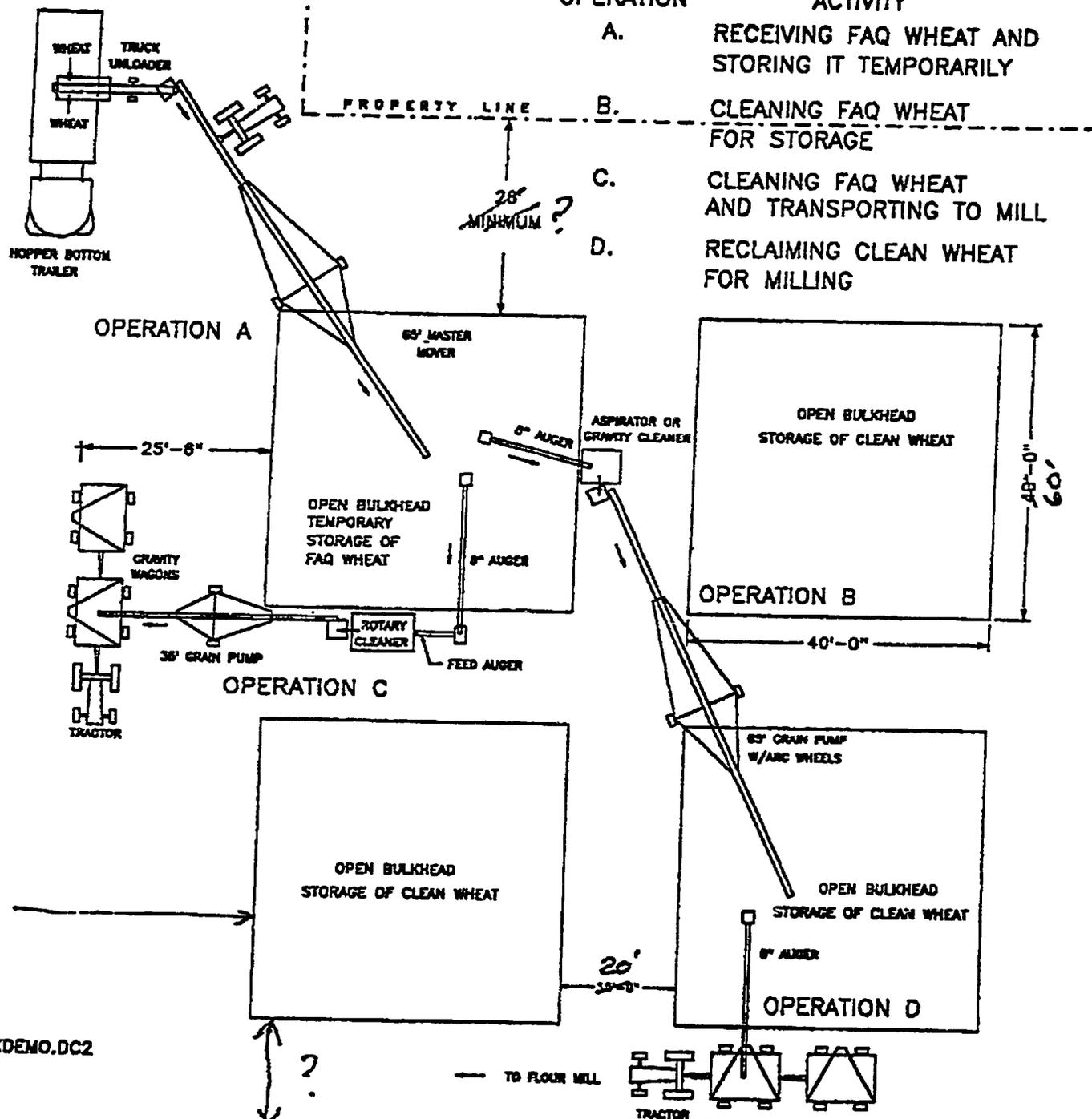
PREPARED BY: U. A. ACHARD/STOT LANSING 4-4-82

## OPERATION

## ACTIVITY

- A. RECEIVING FAQ WHEAT AND STORING IT TEMPORARILY
- B. CLEANING FAQ WHEAT FOR STORAGE
- C. CLEANING FAQ WHEAT AND TRANSPORTING TO MILL
- D. RECLAIMING CLEAN WHEAT FOR MILLING

FLOUR MILL LINE



FILENAME: BULKDEMO.DC2

69

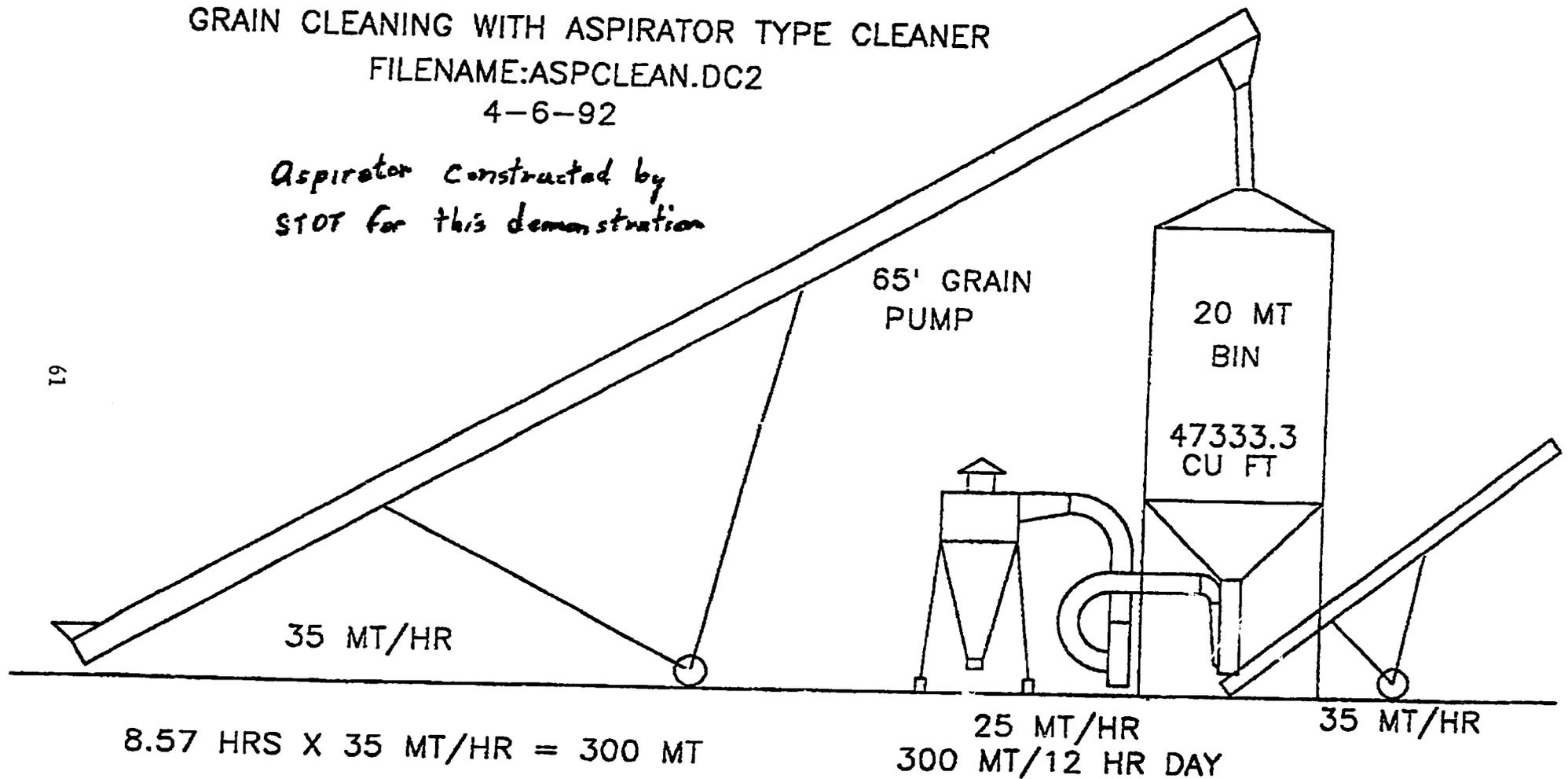
TO FLOUR MILL

GRAIN CLEANING WITH ASPIRATOR TYPE CLEANER

FILENAME:ASPCLEAN.DC2

4-6-92

*Aspirator constructed by  
STOT for this demonstration*





DY. SECRETARY (F)

D.O.NO.SGF(I)3(9)/91.  
GOVERNMENT OF THE PUNJAB  
FOOD DEPARTMENT

Dated Lahore, the 6th May, 1992

Subject: -BULK WHEAT HANDLING--CONSTITUTION  
OF WORKING GROUP.

Dear Ch.Muhammad Sharif,

Your kind attention is invited to the constitution of a working group, with you as convenor, by the Minister for Food, Punjab during the demonstration of bulk wheat handling at the Supreme Flour Mills, Multan Road, Lahore on 26.4.1992. The task of this working group would be to formulate a future working plan within three months on the possibilities of supply of wheat in bulk to the flour mills of Punjab.

2. As a first step, you are requested to identify suitable representatives of PASSCO, Pakistan Flour Mills Association and the USAID's Agriculture Sector Support Program, STDT, who would be associated with you as members of this working group. You are further requested to frame terms of reference, and forward these, alongwith the names of the proposed members of the working group, for the approval of this Department.

With warm regards,

Yours sincerely,

  
( SOHAIL AHMAD )  
Deputy Secretary Food

APPENDIX IV

PLANNING FOR DELIVERY OF BULK WHEAT TO FLOUR MILLS

STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER  
AGRICULTURAL SECTOR SUPPORT PROGRAM  
14-L MODEL TOWN EXT. LAHORE

TO: Dr. Richard C. Maxon  
Chief of Party STDT/ASSP  
Islamabad.

Dr. Ulysses A. Acasio  
Advisor STDT/USAID Lahore.

From: Shamsheer H. Khan  
Arif Javaid  
Ibrahim Dasti

Date: July. 7, 1992

Subject: *TRIP REPORT- June.29 through July 2,1992.  
Delivery of bulk wheat to Flour Mills.*

The Punjab Food Department and STDT held a meeting in the office of Ch. Mohammad Sharif Additional Director Food Punjab. The purpose of the meeting was to plan the procurement of wheat and possible delivery of bulk wheat to flour mills.

The Minister for food Punjab announced at Supreme Flour Mills on April 26, 1992 that the program for possible delivery of bulk wheat to flour mills should be finalized very soon. For this purpose PFD and STDT selected Okara, Sahiwal and Multan districts for procurement of wheat in bulk and then onward delivery to flour mills in bulk. The wheat purchase season is over by now. STDT and PFD conducted a very successful bulk operation in above districts. The report on bulk procurement of wheat 1992 will be issued shortly. In relation to the above program STDT and PFD team comprising of Mr. Ibrahim Dasti, Mr. Arif Javed and Mr. Shamsheer visited several flour mills. The team surveyed the locations and selected the equipment required for delivery of bulk wheat to flour mills. The details are given below.

**DELIVERY OF BULK WHEAT AFTER CLEANING**

The STDT and PFD team explored the possibility of issuing clean wheat to the flour mills at premier price. This exercise was done last year at Sahiwal. Almost all the mills liked the proposal and requested for the delivery of clean wheat to the mills at premium price. Their written requests are attached with the report.

## *OKARA*

### *RAFI FLOUR MILLS*

The Rafi flour mills is the only big flour mill in Okara. In 1990 STDT and Punjab Food Dept. issued about 1500 MT. of wheat to this flour mill. The owner said he is ready to modify the grain receiving pit if PFD arranges delivery of bulk wheat on regular basis. However the owner liked the idea and requested to consider his mill for possible delivery of bulk wheat. The owner promised to do the required modification before the start of this operation. The equipment and further details are given in the Annex. The dump pit right now is inside the godown and can be modified for straight delivery with dump trollies. The distance of the mill from hexbin is about 2 KM.

## *SAHIWAL*

### *BABA FARID FLOUR MILLS*

The Mill is located on Pakpattan road, about 4 KM from Hexbin storage. The STDT team briefed Haji Mohammad Sajjad, owner of the mill about STDT project and the future bulk program. The owner took the team to the mill site and showed the whole mill. The dump pit of the mill is located out side under a shed type storage. The tipping bulk trolley can very easily be dumped without any additional equipment. The owner liked very much the scheme and desired to convert the shed type storage in to bulk storage . The owner then invited us to his other newly built flour mill about one KM away from Baba Farid mill on Pakpattan road.

### *BABA MOHAMMAD HUSSAIN FLOUR MILLS*

The Mill owner mentioned that they have recently started operating this mill . The PFD did not provide them quota last year. The owner was hopeful that he would be able to get quota for this new mill from PFD this year. The dump pit of the mill is outside the mill and seems suitable for bulk delivery of wheat. The owner said that he is willing to pay for the transportation if provided by the STDT/PFD.

The owner mentioned that they were not able to purchase much wheat this year because of financial constraint. However he was hopeful to get the wheat from market on weekly basis but at little higher price. The owner does not like to pay high markup to the banks if he borrows higher capital from them . He said that the wheat still be available in the market or with some growers until they get from punjab food department.

# MULTAN

## *SAIFAL FLOUR MILLS*

This mill is newly built having a very large area available for the mill premises. The mill is located on by pass road about 20 KM from the silos. The delivery of bulk wheat to this mill can be made with hopper bottom trailers deploying the 35 feet grain pump. The mill owner liked the program and still willing to modify the grain receiving system if PFD issues wheat on regular basis. This mill has five bodies . The owner said they have procured enough wheat for a month or two and later on they will be depending on PFD for issuance of quota. The STDT team found this mill suitable for bulk delivery.

## *NEW HAFIZ FLOUR MILLS*

The mill is located on the same by pass Multan road at the distance of 20 KM from Silos. The dump pit is located outside under a steel structure. The mill was not running because the stocks of the mill were mortgaged with some of the bank. The manager told that they will soon be able to release the stocks after making payments to the bank . The manager desired that during regular supply of the wheat from PFD they would prefer to get wheat in bulk . The dump pit is big enough to accommodate about 20 ton.

## *AL-NOOR FLOUR MILLS*

The mill is very close to Hafiz Flour Mill at the distance of about 9 KM from the silos. The dump pit is located on a 2 feet raised platform under a steel structure. The manager said they will modify the platform for tipping trollies. The mill management was ready to get wheat in bulk . They said bulk system is in their own benefit.

## *ADNAN ASLAM FLOUR MILLS*

The mill is located in the industrial estate Multan . The mill seemed purchased lot of wheat stocks this year. The owner was not available. The dump pit is located inside the main building and not easily accessible. The team does not recommend this mill for bulk delivery .

## *NAWAB FLOUR MILLS*

The mill is located on Lahore Multan road at the distance of about half a KM. The mill is very close to the Multan silos. The dump pit is located on a raised platform. The Mill manager said they will modify the platform for tipping trollies. The mill is located at very ideal distance. The mill manager said that they will contact Mr. Ibrahim Dasti Storage & Enforcement Officer for further details and showed their keen interest in this program.

## ***BAHAWAL PUR***

### ***NASIR FLOUR MILLS***

The mill is located Shahdara road industrial area Bahawalpur. The mill is about 1 KM from the Bahawalpur Hexbins. The team had an exclusive discussion with owner about bulk handling system and possible delivery of wheat in bulk at the mill. The owner was very happy to know about the coming program. The dump pit is located outside the main building on a raised platform . The mill will modify platform for trollies.

He mentioned that they are building another flour mill in Bahawalpur at Samasata road and would like to build a bag cum bulk store. The team also visited the mill under construction .

### ***ASIA FLOUR MILLS***

### ***BATALA FLOUR MILLS***

The team also visited the above mentioned mills and found that mills are unsuitable for operation because the dump pits are located inside main building and not easily approachable.

### ***MAQBOOL FLOUR MILLS***

The mill consists on 6 bodies . The two more bodies are being added. The mill purchased the sufficient quantity during this harvest. The owner welcomed the team and requested to include his mill in the bulk delivery program. The dump pit is located outside in the open. The letter of willingness is attached with the report.

FLOUR MILLS FOR BULK WHEAT DELIVERY

STATION: OKARA  
NAME: RAFI FLOUR MILLS  
SAMADPURA OKARA  
TEL: 4004

LOCATION OF DUMP PIT:  
DUMP PIT LOCATED INSIDE MASONARY STRUCTURE WITH TWO DOORS  
OPENING. NOT ACCESSABLE WITH TROLLEYS.

EQUIPMENT REQUIRED AT MILL  
GRAIN PUMP 35 FT ONE  
GRAVITY WAGONS FOUR  
TRACTOR MF 240 TWO

RECOMMENDED X NOT RECOMMENDED

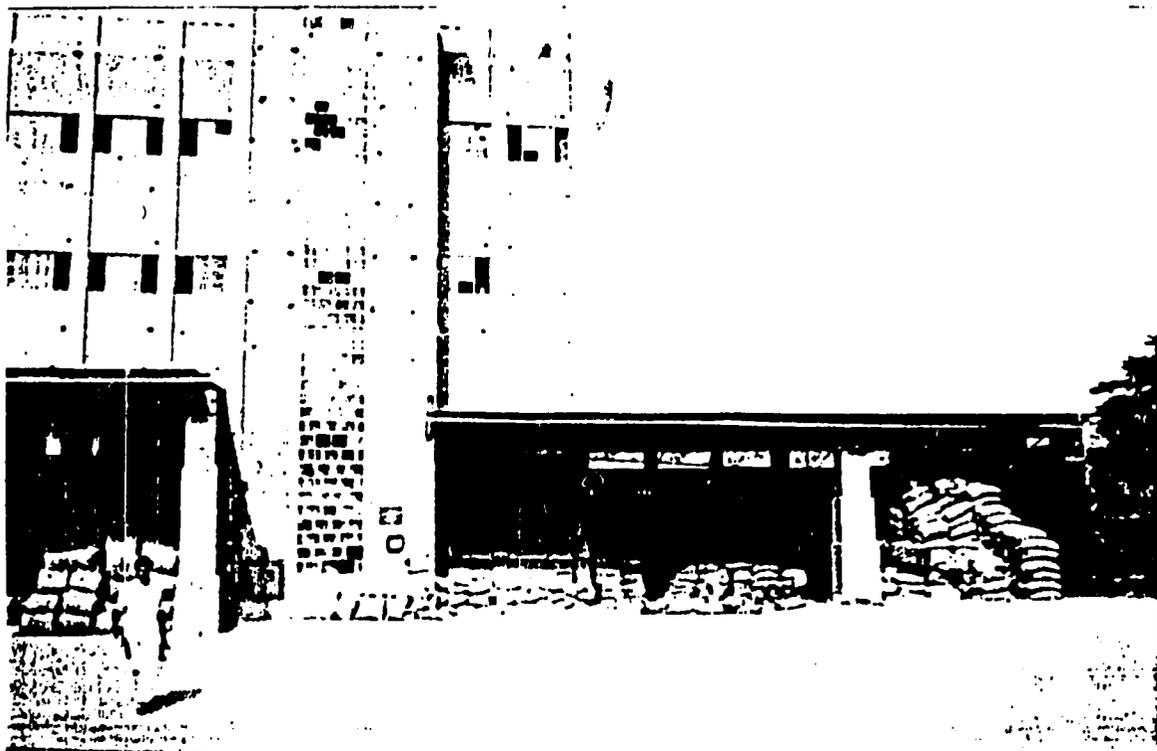


STATION:	SAHIWAL
NAME:	BABA FARID FLOUR MILLS PAKPATTAN ROAD SAHIWAL TEL:

LOCATION OF DUMP PIT:
DUMP PIT LOCATED OUTSIDE IN THE OPEN. ACCESSABLE WITH TIPPING TROLLEYS.

EQUIPMENT REQUIRED AT MILL	
TIPPING TROLLEYS	TWO
TRACTOR MF 240	TWO

RECOMMENDED	X	NOT RECOMMENDED
-------------	---	-----------------



STATION:	SAHIWAL
NAME:	MONTGOMARY MODERN FLOUR MILLS MULTAN ROAD SAHIWAL TEL:

LOCATION OF DUMP PIT:
DUMP PIT LOCATED INSIDE MASONARY STRUCTURE WITH SINGLE DOORS OPENING. NOT ACCESSABLE WITH TROLLEYS.

EQUIPMENT REQUIRED AT MILL	
GRAIN PUMP 35 FT	ONE
TRUCK UNLOADER C/TYPE	ONE
GRAVITY WAGONS	FOUR
TRACTOR MF 240	TWO

RECOMMENDED	NOT RECOMMENDED X
-------------	-------------------

STATION:	SAHIWAL
NAME:	BABA M. HUSSAIN FLOUR MILLS PAKPATTAN ROAD SAHIWAL TEL:

LOCATION OF DUMP PIT:
DUMP PIT LOCATED OUTSIDE IN THE OPEN ON A 2 FT RAISED PLATFORM. MILL WILL MODIFY PLATFORM FOR TIPPING TROLLEYS.

EQUIPMENT REQUIRED AT MILL	
TIPPING TROLLEYS	TWO
TRACTOR MF 240	TWO

RECOMMENDED	X	NOT RECOMMENDED
-------------	---	-----------------



STATION:	MULTAN
NAME:	SAIFAL FLOUR MILLS CHOWK NAAG SHAH, BYPASS RD, MULTAN TEL:

LOCATION OF DUMP PIT:
DUMP PIT LOCATED INSIDE MASONARY STRUCTUE.

EQUIPMENT REQUIRED AT MILL	
GRAIN PUMP 35 FT	ONE
TRUCK UNLOADER C/TYPE	ONE
BULK TRAILER D/AXLE	TWO
TRACTOR MF 375	TWO

RECOMMENDED	X	NOT RECOMMENDED
-------------	---	-----------------



STATION: MULTAN  
NAME: NEW HAFIZ FLOUR MILLS  
BYPASS RD, MULTAN  
TEL:

LOCATION OF DUMP PIT:  
DUMP PIT IS LOCATED OUTSIDE UNDER A STEEL STRUCTURE.

EQUIPMENT REQUIRED AT MILL  
TIPPING TROLLEYS TWO  
TRACTOR MF 240 TWO

RECOMMENDED X NOT RECOMMENDED



STATION:	MULTAN
NAME:	ADNAN ASLAMI FLOUR MILLS 22 INDUSTRIAL ESTATE ,MULTAN TEL:

LOCATION OF DUMP PIT:	
DUMP PIT IS LOCATED INSIDE MAIN BUILDING. NOT EASILY ACCESSABLE.	

EQUIPMENT REQUIRED AT MILL	
GRAIN PUMP 35 FT	ONE
TRUCK UNLOADER C/TYPE	ONE
GRAVITY WAGONS	TWO
TRACTOR MF 240	TWO

RECOMMENDED	NOT RECOMMENDED	X
-------------	-----------------	---

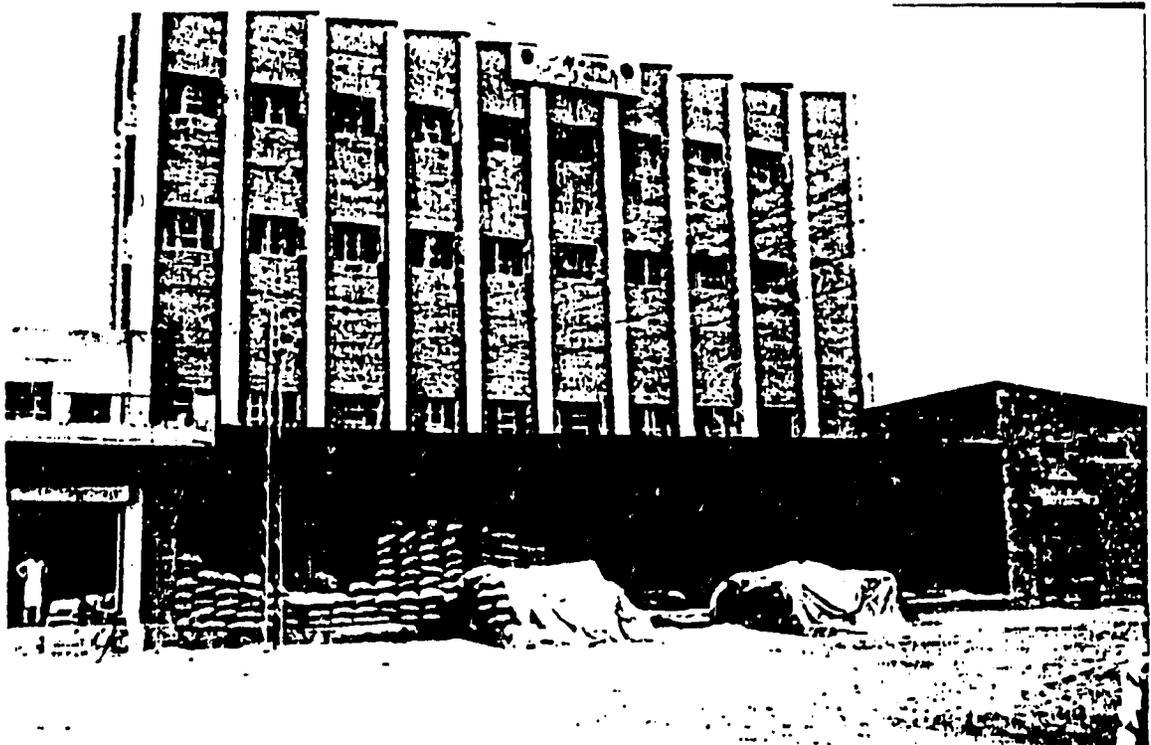


STATION:	MULTAN
NAME:	ALNOOR FLOUR MILLS BYPASS RD, MULTAN TEL:

LOCATION OF DUMP PIT:
DUMP PIT IS LOCATED ON A 2 FT RAISED PLATFORM UNDER A STEEL STRUCTURE. MILL WILL MODIFY PLATFORM FOR TIPPING TROLLEYS.

EQUIPMENT REQUIRED AT MILL	
TIPPING TROLLEYS	TWO
TRACTOR MF 240	TWO

RECOMMENDED	X	NOT RECOMMENDED
-------------	---	-----------------

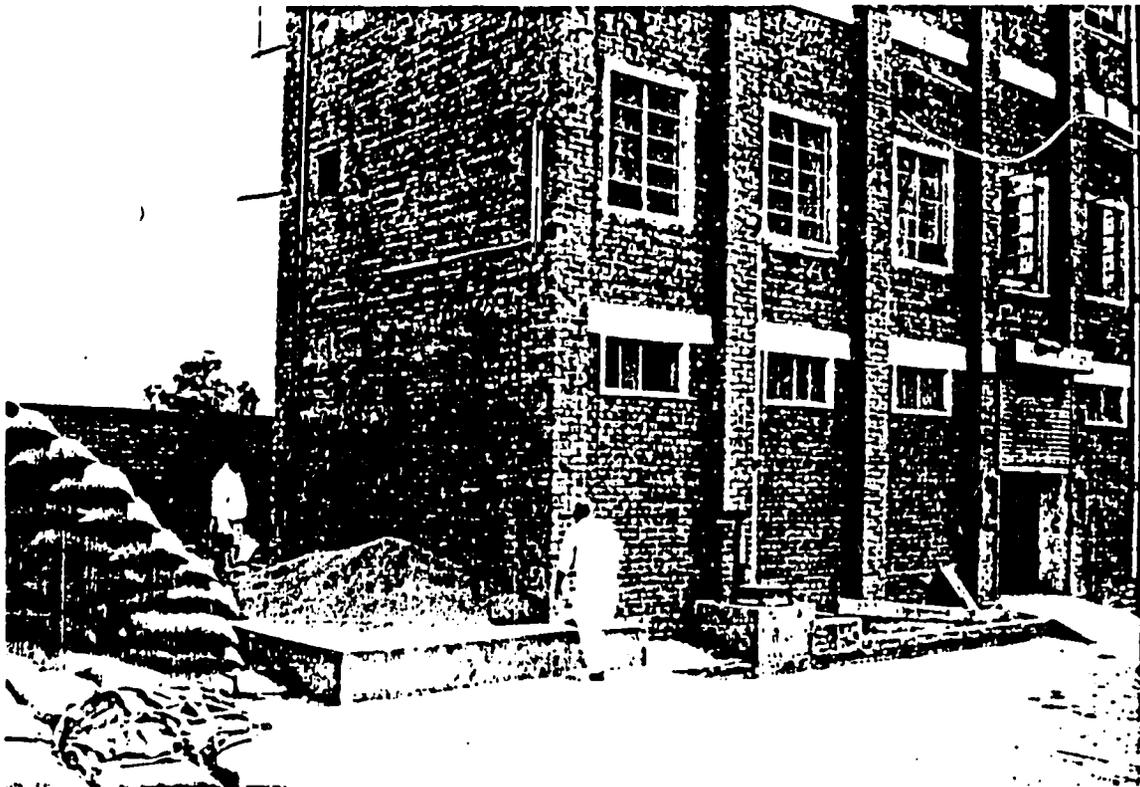


STATION:	MULTAN
NAME:	NAWAB FLOUR MILLS LAHORE ROAD, MULTAN TEL:

LOCATION OF DUMP PIT:
DUMP PIT IS LOCATED OUTSIDE MAIN BUILDING ON A RAISED PLATFORM. MILL WILL MODIFY PLATFORM FOR TROLLEYS.

EQUIPMENT REQUIRED AT MILL	
TIPPING TROLLEYS	TWO
TRACTOR MF 240	TWO

RECOMMENDED	X	NOT RECOMMENDED
-------------	---	-----------------

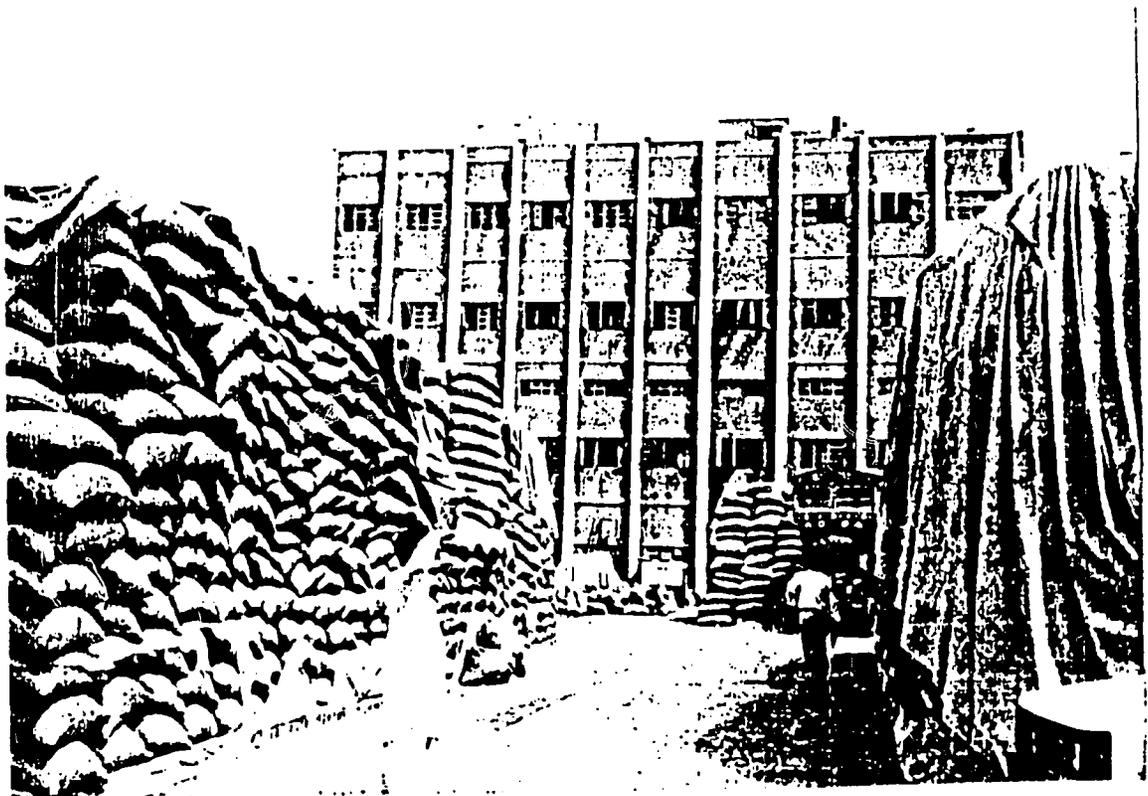


STATION:	BAHAWALPUR
NAME:	NASIR FLOUR MILLS SHAHDRA ROAD INDUSTRIAL AREA, BAHAWALPUR. TEL:

LOCATION OF DUMP PIT:
DUMP PIT IS LOCATED OUTSIDE MAIN BUILDING ON A RAISED PLATFORM. MILL WILL MODIFY PLATFORM FOR TROLLEYS.

EQUIPMENT REQUIRED AT MILL	
TIPPING TROLLEYS	TWO
TRACTOR MF 240	TWO

RECOMMENDED	X	NOT RECOMMENDED
-------------	---	-----------------



STATION:	BAHAWALPUR
NAME:	BATALA FLOUR MILLS SHANDRA ROAD INDUSTRIAL AREA, BAHAWALPUR. TEL:

LOCATION OF DUMP PIT:
DUMP PIT IS LOCATED OUTSIDE MAIN BUILDING ON A 4 FT RAISED PLATFORM.

EQUIPMENT REQUIRED AT MILL	
GRAIN PUMP 35 FT	ONE
TIPPING TROLLEYS	TWO
TRACTOR MF 240	TWO

RECOMMENDED	NOT RECOMMENDED	X
-------------	-----------------	---



STATION:	BAHAWALPUR
NAME:	ASIA FLOUR MILLS MULTAN ROAD, BAHAWALPUR. TEL:

LOCATION OF DUMP PIT:
DUMP PIT IS LOCATED INSIDE MAIN BUILDING.

EQUIPMENT REQUIRED AT MILL	
GRAIN PUMP 35 FT	ONE
TIPPING TROLLEYS	TWO
TRACTOR MF 240	TWO

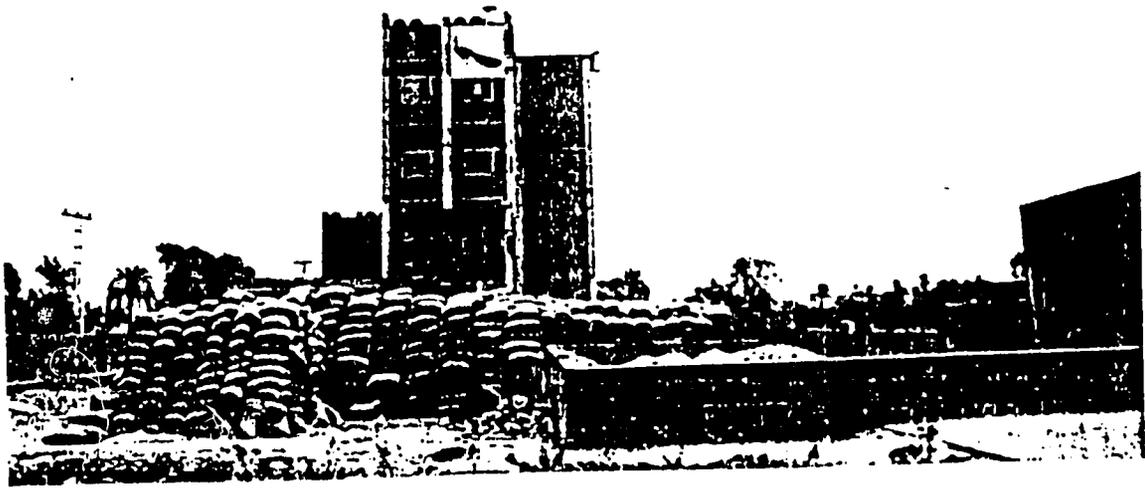
RECOMMENDED	NOT RECOMMENDED	X
-------------	-----------------	---

STATION:	BAHAWALPUR
NAME:	MAOBOOL FLOUR MILLS BYPASS ROAD, BAHAWALPUR. TEL:

LOCATION OF DUMP PIT:	
DUMP PIT IS LOCATED OUTSIDE IN THE OPEN.	

EQUIPMENT REQUIRED AT MILL	
TIPPING TROLLEYS	TWO
TRACTOR MF 240	TWO

RECOMMENDED	X	NOT RECOMMENDED
-------------	---	-----------------





2100  
Phones : 4004 Off.  
3366 Res.

CONTRACTORS TO GOVERNMENT  
**RAFI GENERAL FLOUR MILLS**  
MANUFACTURERS OF HIGH CLASS ATTA

SAMADPURA  
OKARA

Ref. No.

Date 5-7-92

To:

Dr. Richard C Maan  
Chief of Party STDT-USAID  
Islamabad.

Subject: DELIVERY OF BULK WHEAT TO FLOUR MILLS IN OKARA

Dear Sir,

We are pleased to know that STDT and Punjab Food Department is going to undertake the delivery of bulk wheat to Flour Mills this year also. As we had very useful experience in 1990 when STDT and FFD did a trial of bulk handling system in Okara. We are lucky if we have a chance to associate with FFD & STDT in delivery of bulk wheat at our Mill. We are also ready to purchase clean wheat from Punjab Food Department at the rates mutually agreed.

Thank and regards.

  
Yours faithfully,

# NASIR FLOUR MILLS (PRIVATE) LTD.

HEAVY INDUSTRY AREA BAHAWALPUR  
PHONES : MILL : 5586 - 6566



Ref. No. ....

Dated..1-7-1992

To

Dr. Richard C Maxon  
Chief of Party STDT USAID  
Islamabad.

Punjab Food Department, Bahawalpur.

Subject :- Delivery of Bulk wheat to Flour Mills.

Dear Sir,

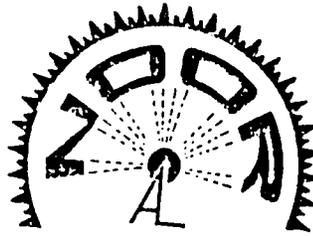
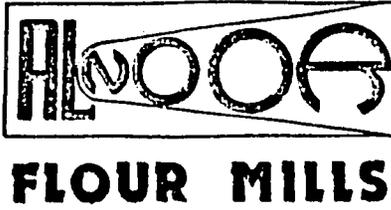
The STDT and Punjab Food Department Team comprising Mr. Shamsher, Arif Javid, Ruzulhas and Mr. Ibrahim Dasti visited our mill on 1-7-92. We are pleased to know about the progress of Bulk handling system of grains in the country. We will be happy if STDT and P.F.D decides to deliver the wheat at our mill in Bulk.

If the delivery of clean wheat is arranged we would like to get the clean wheat from P.F.D in bulk at the rates decided by the department.

We offer our co-operation for the success of this system.

(M. Mahmood)  
Nasir Flour Mills  
Bahawalpur

1-7-92



النور فلور ملز

She. Shah. B. Pass Road  
Near Nag. Shah. Chowk. Multan

شرکت النور سیکرٹری جنرل ملتان

Ref .....

Date - 30-6-1992

ڈاک ریپورٹ منسٹری سٹیٹ ایڈ USAID (سپریم کورٹ) ملتان  
موضوع :- سپریم کورٹ (سٹیٹ ایڈ) ملتان

مجاہد علی

خود ڈیپارٹمنٹ کے لیے برائے ریفرنس آف  
پراجیکٹ کے لیے سپریم کورٹ (سٹیٹ ایڈ) ملتان کے لیے  
بے انتہا کوششوں کے باوجود  
میں آئیے (سٹیٹ ایڈ) ملتان میں تمام ملز کے لیے  
فائل کے لیے سپریم کورٹ (سٹیٹ ایڈ) ملتان کے لیے خود ڈیپارٹمنٹ  
میں رہنے کے مواقع فراہم کر کے دیے تیار ہیں۔  
میں کسٹم جملہ از سر شروع کیا جاوے گا۔  
(سٹیٹ ایڈ) ملتان کے لیے شکریہ ادا کرتے ہیں۔

النور فلور ملز  
شیر شاہ بائی پاس روڈ - ملتان  
فون : 81679-81779

النور میڈہ انورسوجی سیون سٹار آٹا



Office : 6159 - 6178  
Residence : 4171 - 6271

# MAQBOOL FLOUR MILLS

BY PASS KARACHI ROAD, BAHAWALPUR.

Ref. No. \_\_\_\_\_

ڈاکٹر احمد سے مہینے

Date 1-7-92

حصہ آف باری STDT اسلام آباد  
پنجاب فوڈ ڈیپارٹمنٹ بہاول پور

ترسیل کھلی گندم برائے فلور ملز

موضوع

ہمیں یہ جان کر بہت خوش ہوئی ہے کہ STDT اور پنجاب فوڈ ڈیپارٹمنٹ کے درمیان طرز

ملک میں کھلی گندم کی ترسیل کے بارے میں کوشش کر رہے ہیں۔ اس سال کافی جگہ  
پر گندم بیک میں فریڈ ہو گئی ہے۔

فریڈ ہارنگ کے بعد گندم کی ملوں میں فراہمی ایک بہت فائدہ مند

پروگرام ہے۔ اس سلسلہ میں ہم ہر قسم کے تعاون کے لئے تیار ہیں۔

اور نہ صرف بیک گندم بلکہ صاف گندم کی ملوں کو فراہمی کو رینٹ کے

منظور شدہ نرخوں پر لینے کو تیار ہیں۔

ہم اسکے لئے تعاون پر مشکور ہیں۔

AT/7

# Saifal Flour & General Mills

Phones: { 01630  
42332  
31936

Multan Office :  
Saifal Building  
Old Shujabad Road,  
M U L T A N



By Pass Road,  
HAMIDPUR  
(Multan)

Ref. No. \_\_\_\_\_

Dated 29-6-1992

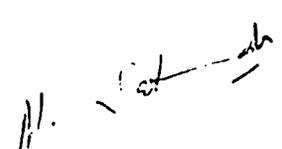
To

DR. Richard C Mazon  
Chief of Party STDT  
US AID Islamabad.

Subject - DELIVERY of Bulk Wheat to Mills.

Dear Sir,

Your Project Team along with Mr. Ibraheem Dasti SRO  
Multan Punjab food Dept. visited our mill on 29 June 1992.  
they explained us about the possible delivery of bulk  
wheat at our mills. As we know that STDT Project  
has been doing lot of efforts to introduce and establish  
bulk handling system in the country. We wish  
that this system should come quickly. We are  
also willing to purchase the clean wheat in bulk  
as practical in Sahiwal last year.  
With best Regards.

M.   
SAIFAL Flour & General Mills  
By Pass Road, Hamidpur, Multan

APPENDIX V

RECOMMENDATIONS FROM  
SEMINAR/WORKSHOP ON GRAIN STORAGE  
MANAGEMENT RESEARCH AND TRAINING  
UNIVERSITY OF AGRICULTURE,  
MARCH 2-3, 1992

Those in attendance at the above named workshop have deliberated the issues presented and reached a consensus on the following.

Be it resolved that:

**Resolution 1.** Grain Storage Management be recognized as a profession requiring knowledge and training.

- a. There should be nationwide awareness of the importance of proper storage in protection of health and welfare of citizens.
- b. Due recognition must be given to the storage of materials for both human consumption and production of animal feeds.
- c. Changing attitudes of officials and management toward proper storage is the first step in changing the present system.

**Resolution 2.** There is a need for development and strict application of grades and standards for grains and grain products applicable to Pakistani conditions.

- a. A first step should be the proper enforcement of present FAQ standards.
- b. Research should be initiated on the development of more suitable standards oriented towards the needs of consumers and industry.
- c. The feasibility of using differentiated prices for procurement and release of wheat should be studied further. The experimental release of cleaned wheat by the Punjab Food Department should be continued in different areas to test the practicality of the pricing system.

**Resolution 3.** Storage systems.

- a. Initiate changes in the storage system in order to incorporate the bulk system when and where feasible. Such preparations should include the development of minimum design standards for bulk systems.
- b. Conduct research on long-term strategies for grain storage, including:
  - (1) Specifications for storage structures.
  - (2) Type and location of procurement centers, storage reservoirs, and the national food reserves.

- (3) The role of the private sector in procurement and storage.
- (4) The social and economic impact of shifting to bulk handling.

**Resolution 4.** The role of the University in Grain Storage.

- a. A center of training for personnel in the grain storage industry, including short-term academic training for the public and private sector.
- b. Create an atmosphere in which grain storage issues can be fully explored and creative solutions can emerge from cooperative efforts with the public and private sector.
- c. Establish a grain milling school in cooperation with the flour milling association. Such a school should be designed to address the needs of the Pakistan milling industry, and be supported by the public and private sectors.



# STDT BRIEFS

## STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER AGRICULTURAL SECTOR SUPPORT PROGRAM

29 Blue Area, Islamabad.

14-L, Model Town Ext. Lahore.

### STDT WORKING TO IMPROVE GRAIN STORAGE.

The Storage Technology Development and Transfer project (STDT) is sponsored by USAID in cooperation with the Ministry of Food Agriculture and Cooperatives. The Food and Feed Grains Institute of Kansas State University is providing technical assistance. The STDT staff consists of 6 technical and 12 support staff stationed in Islamabad and Lahore. The STDT cooperates closely with the provincial food departments, PASSCO, PARC and the private sector. The project aims are to strengthen the national capabilities in grain storage and stored grain protection. The major activities are the testing of bulk handling systems, research and training in storage technology. The present priority is being given to transfer this technology developed to local institutions.

### GRAIN STORAGE GOES ACADEMIC

The University of Agriculture, Faisalabad has established a diploma course in grain storage and management. The course curriculum includes subject matter from the Departments of Entomology, Crop Physiology, Basic Engineering, Food Technology, Agricultural Marketing and Plant Physiology.

This is the first time that storage of agricultural commodities has been recognized as an academic subject in Pakistan. The diploma course was developed in response to a request by the Punjab Food Department. The courses for this diploma have been approved by the University. The Ministry of Food Agriculture and Cooperatives MINFA, and STDT are extending every possible help for this program. The UAF will host a two days conference at UAF 2-3 March 1992 to discuss grain storage problems and introduce the diploma course.

## Why be concerned about wheat storage?

Wheat accounts for about 30 percent of the value of all agricultural production in Pakistan, and 60 percent of the value of food crops. Literally millions of persons are involved in wheat production and harvesting. Yet relatively little attention has been paid to what happens after the harvest. Wheat is the basic staple food of Pakistan, accounting for about 60 percent of the daily caloric intake of the population. What happens to wheat in storage affects not only its cost, but nutritional values. This is reason to be concerned about post harvest activities. See below.

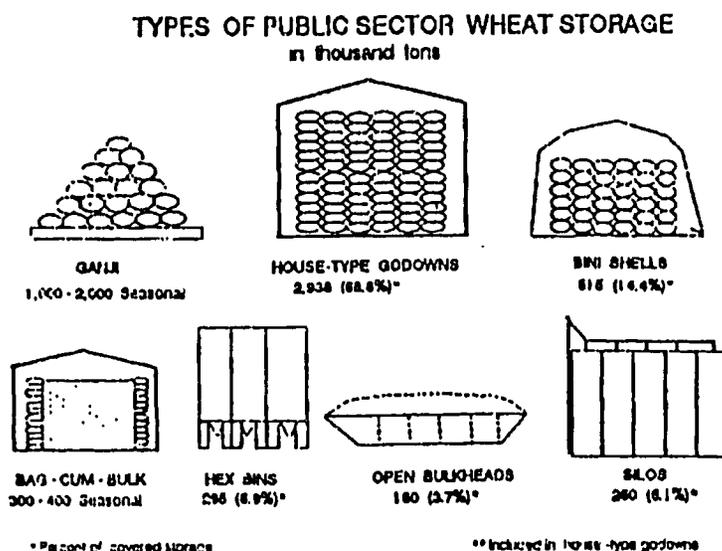
## WHEAT STORAGE - PAKISTAN'S LARGEST HIDDEN INDUSTRY

Wheat storage is Pakistan's largest "hidden industry". Over 12,000 public employees manage federal and provincial wheat programs. Thousands more are used as contract labor in bagging, stacking, and transporting wheat in procurement, godown complexes, urban distribution centers.

After the 1992 harvest, publicly owned wheat stocks worth Rs. 20 billion, will be kept in storage structures with over 5 million tons capacity. Bags add another 1.3 billion to the total investment. The structures alone have a replacement cost of over rs. 36 billion, plus billions more for the real estate they occupy. This vast amount alone is not sufficient to hold the harvest. Every year, additional millions of rupees are spent for bricks, tarpaulins, and labor to erect temporary storage.

Many types of storage structures and systems are in use. Management of these far flung storage centers is a complex task requiring technical skills and training. The nation has no permanent training centers to provide the needed manpower. Organized research in to the nation's grain storage problems began in the early 1980's.

There is much catching up to do. The STDT with is cooperating institutions are trying to fill some of the more pressing gaps and develop individuals and institutions to meet the need.



## **PASSCO's PIONEERING EFFORTS IN BULK HANDLING OF GRAINS**

Pakistan Agricultural Storage and Services Corporation (PASSCO) in collaboration with STDT is developing new grain handling systems. Following are ongoing and recently completed activities.

- ◆ Developed and tested a complete bulk grain handling system from purchase center to storage point for two seasons.
- ◆ Introduction and mechanization of open bulkheads
- ◆ Rehabilitation of Chichawatni and Multan silos.
- ◆ Conversion of house type bagged godown into complete bulk storage.
- ◆ Research in stored grain protection by testing the various methods of fumigation.
- ◆ training of personnel in operation and maintenance of grain handling equipment.
- ◆ Developed computerized accounting systems.

## **PASSCO PLANS TO EXPAND BULK HANDLING IN 1992 HARVEST**

Managing Director PASSCO Syed Mukhtar H. Shah recently announced plans to expand bulk handling in PASSCO. For this purpose a committee from PASSCO in collaboration with STDT have finalized the recommendations for bulk procurement. The areas for bulk procurement has been selected as Chichawatni, Pakpattan, Bungahayat, and Depalpur. PASSCO plans to procure about 50,000 tonnes of wheat in bulk.

The bulk purchased wheat will be stored in silos and open bulk heads. Nine sets of house type godowns will be converted for bulk storage in these areas. STDT will provide technical assistance and equipment to PASSCO for this conversion.

## **FOOD DEPARTMENT MARKETS CLEAN WHEAT**

The Punjab Food Department and STDT recently concluded a trial cleaning and delivery of 300 tonnes of bulk wheat to a flour mill in Sahiwal. The Sahiwal area was chosen because the PFD has stored wheat in bulk form in hexagonal bins at the city godown complex. The STDT assisted by providing equipment for bulk storage at the time of procurement. Selling in bulk form avoided the bagging of wheat for delivery. One benefit of bulk handling is that it permits cleaning of the grain stream during storage and reclaim activities.

This is the first time that the Food Department has sold wheat other than FAQ. The government issue price on FAQ is 3100/= per MT. As part of the experiment, the Punjab Food Department (PFD) offered cleaned wheat to flour mills in the Sahiwal area on the basis of tenders. The price was sold to Montgomery Modern mills on a bid price of Rs. 3146 per tonne. The mill owner, Food Department, and consumers benefitted from the sale of cleaned wheat. The mill assured the Food Department that

there would be no increase in flour price due to paying a higher price for cleaned wheat. This was possible because of saving to the mill cleaning costs, reduction of waste and cleaning losses, and higher atta yields from the clean wheat. The higher delivered price of cleaned wheat paid for both the costs of cleaning and cleaning losses.

### Clean wheat pays!

COST RS/T	INITIAL MC %	INITIAL FM%	FINAL MC %	FINAL FM %	NET COST Rs/T
3,100	9.5%	3.0%	15.5%	0.0%	3,042
3,100	10.5%	2.0%	15.5%	0.0%	2,996
3,146	9.5%	1.0%	15.5%	0.0%	2,981
3,146	10.5%	0.0%	15.5%	0.0%	2,995

The STDT, Punjab Food Department and PASSCO have previously teamed up to deliver wheat in bulk to flour mills in Multan, Lahore, Okara and Sihawal. PASSCO's contribution was providing trucks for bulk wheat delivery.

### LOW COST-LOW TECH WAY TO BETTER FUMIGATION

What to do 60 liter plastic drum, glass jars, and plastic tubing have to do with grain storage research? Plenty. Mix them together in an ingenious fashion, and you have a 'low cost, low tech' method for determining dosage required to properly fumigate stored wheat.

PARC scientific personnel stationed at the STDT Lahore Center have developed an effective means of determining how much fumigant should be applied to particular godown complexes. The method can be applied to single godowns which have particularly difficult insect resistance problems. Conventional insect resistance screening methods only indicate how resistant to fumigants the insects have become.

The improved fumigation technique reduces costs by applying only as much fumigant as is needed for length of time required to eliminate the insect pests. This pioneering methodology developed by Dr. Hafiz Ahmed, Sajjad Ahmed, and Tariq Mahmood of PARC has succeeded where more elaborate and sophisticated methods have failed.

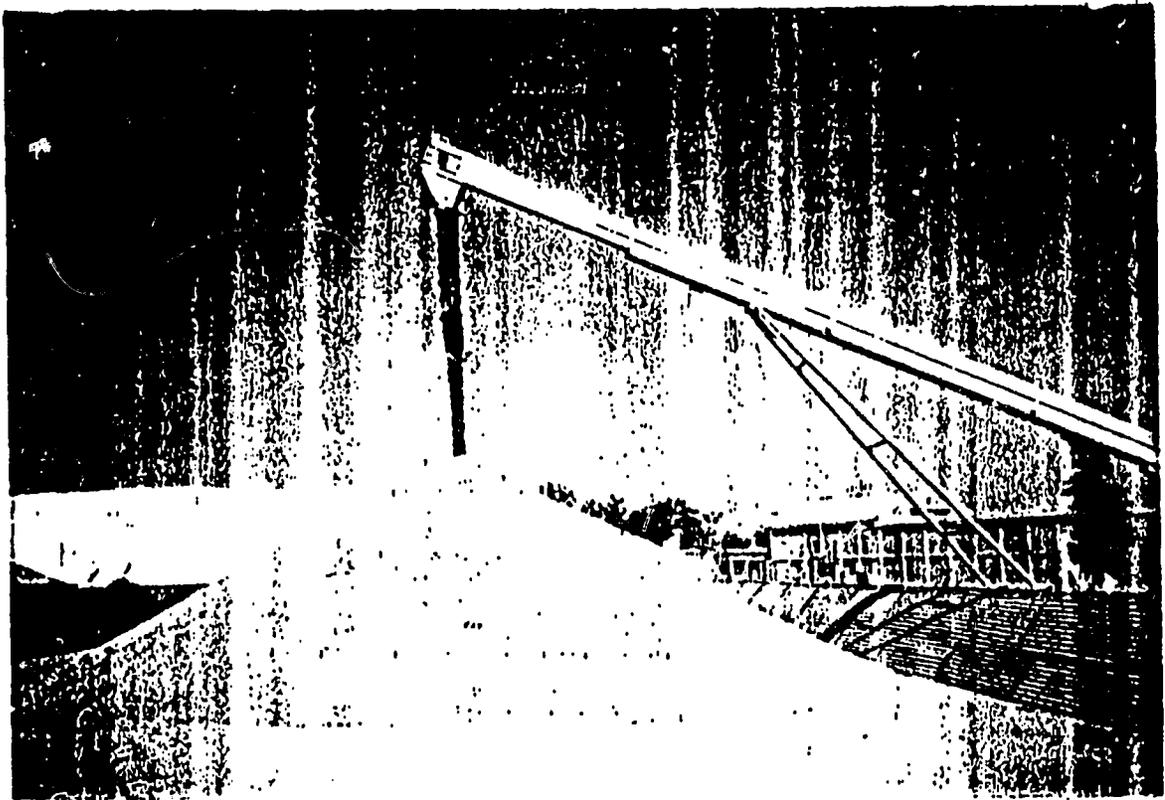
### METHYL BROMIDE FUMIGATION EXPENSIVE BUT PROMISING

In mid December 1991, the STDT/PARC team conducted a trial fumigation of wheat in a Chichawatni silo. They introduced a methyl bromide fumigant in the free space above the grain and distributed the gas through the stored grain mass by using the silo's down draft aeration fans. When the gas was detected at the bottom of the silo, the aeration fans were shut down. The fumigation was completed in two days, and all insects present were destroyed. A routine event? By no means, this was another significant milestone in developing an appropriate methodology for Pakistan's wheat storage problems.

Methyl bromide is about 4 times as expensive as phosphine gas and is very dangerous to use. The gas weighs 3 times as much as air, and settles in low places. It is very



**Collection of Bulk Wheat by PASSCO from purchase center**



**Loading of PASSCO open bulkhead with STDT bulk equipment**

toxic and fast acting. Its higher cost can be justified by its effectiveness and fast action which permits access to the fumigated product in a short time period. For this reason, it is most frequently applied to exports of fruits, vegetables, rice, cotton, and other commodities where fumigation is required as a condition of international trade. Methyl bromide should be handled by trained and equipped personnel only. STDT report No. 9 contains details of methyl bromide and phosphine fumigation techniques.

## **WHEAT CLEANING BOOSTS ANIMAL FEED SUPPLY**

A bonus from cleaning is the recovery of materials for animal feeds. The materials cleaned from the wheat were laboratory tested for use as animal feed ingredients. The protein content of the materials screened from the wheat were found to be higher in animal feed value than the wheat from which it was separated. In handling of wheat, small particles of wheat break off from the wheat kernel. Most what we see as 'dust or dirt' is actually microscopic pieces of wheat protein.

Much of what flour mills screen out of wheat prior to milling is discarded into heaps around the flour mills. Recovery of wheat cleanings in large volume can increase the supply of poultry and animal feed without affecting the quantity of atta available for consumers. It is estimated that 70,000 to 80,000 tonnes of additional feeds could be available if screenings are properly collected and used. Another significant effect of clean wheat storage is the distribution of phosphine gas more effectively than the uncleaned wheat. This observation was made at Sahiwal hexbins during the cleaning and storage exercise. Foreign material and broken kernels are the major source of insect infestation in stored wheat. Removing these items before storage can greatly reduce or eliminate the need for fumigation.

## **CONVERSION OF HOUSE TYPE GODOWNS TO BULK STORAGE**

The STDT has converted a house type godown for complete bulk storage. The house type godowns are used for bag or bag cum bulk storage. The trial has been done in PASSCO Complex Manga. The purpose of the trial was to demonstrate a complete mechanized bulk storage system for house type godown. This convertible godown is capable of storing 1600 MT. In bulk, about 40 percent more than the designed capacity of 1100 MT. In bags.

Preliminary data suggests that cost of filling and unloading converted godown is about rs. 9.0 per ton. This compares favorably with the cost of storing and retrieving one ton in bags of rs. 10.50 and rs. 21 per ton for bulk cum bag storage. Cost per ton of additional storage capacity is about rs. 69. The complete report will be available from the STDT about March 1st. PASSCO has decided to convert nine house type godowns for complete bulk storage this year. This is in conjunction with the planned procurement of 50,000T wheat in the Chichawatni area during the upcoming harvest season. STDT will provide technical assistance and necessary equipment for this exercise.

## **STDT DEVELOPS A LOW COST PADDY RICE DRYER**

Dr. Ulysses A Acasio STDT Advisor and Director of the STDT Lahore Center, designed a portable rice dryer suitable for Pakistan conditions. The dryer has been completely fabricated locally. The dryer was initially tested and 'fine tuned' at PASSCO Manga storage complex. Later it was moved to PASSCO rice mill complex Shelkhpura to test the dryer under commercial conditions. During the paddy drying trials Dr. Acasio decided to replace the kerosene burner with a biomass furnace-heat exchanger. This change makes the dryer more cost effective and attractive for adoption by paddy merchants and millers.

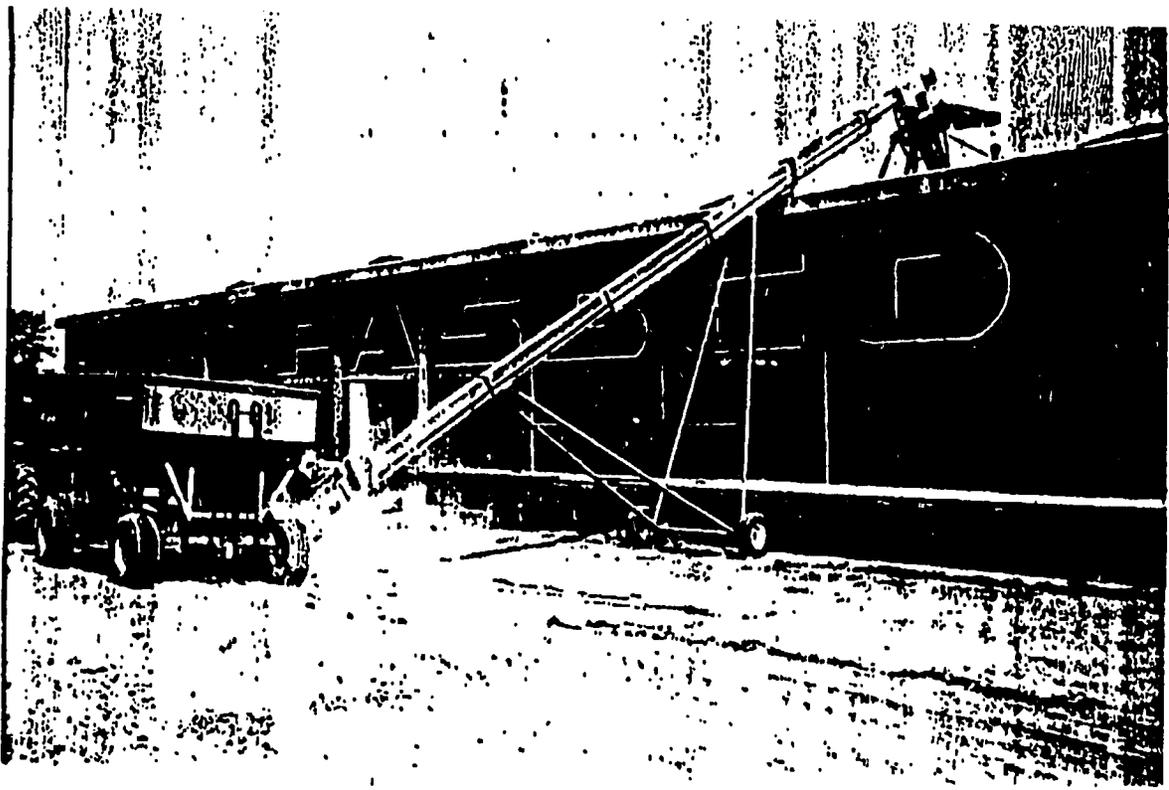


A related idea being tested is the using a biomass furnace and blower for drying rice stacked in ganjles. Unfortunately, frequent loadshedding in the area prevented the system from being fully tested until the present time.

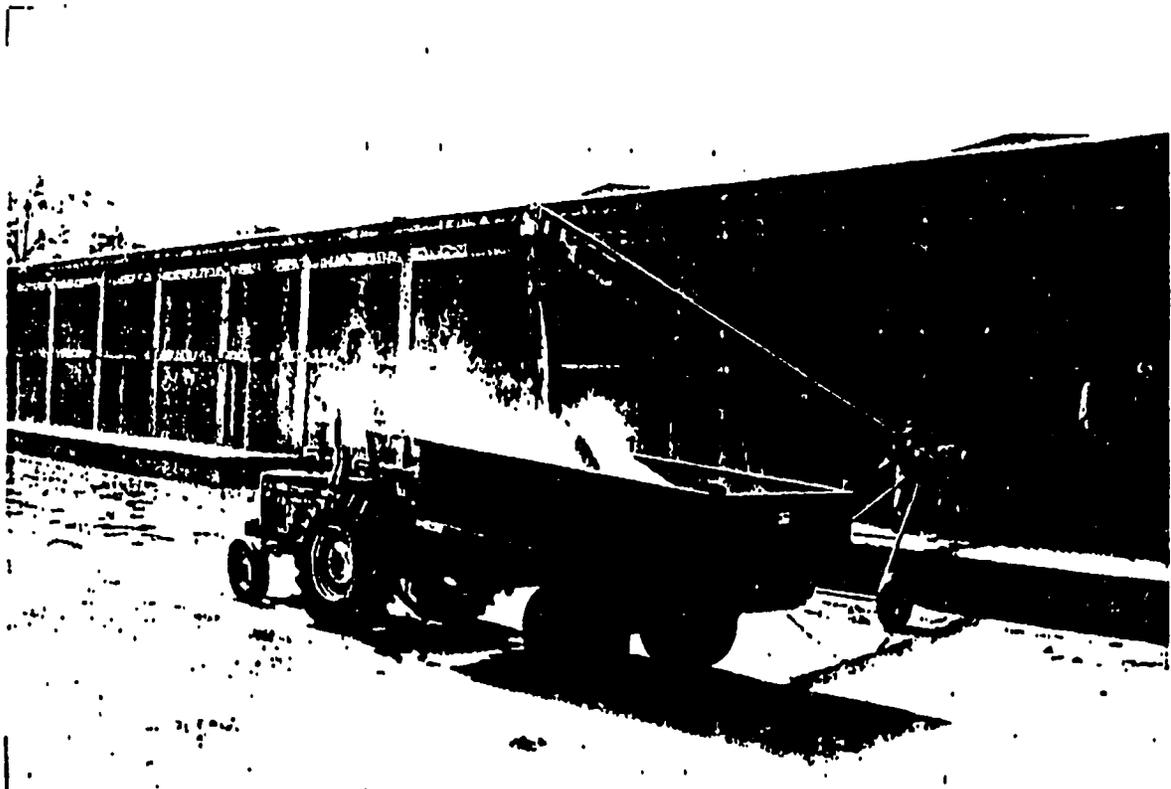
## **FROM OIL TANKS TO BULK STORAGE – THE RAVI STORY**

Ravi Feed Mills, near Lahore had a big problem. In Pakistan, feed mills have to buy their basic ingredients when and where available. Food Departments store wheat for flour mills until it is requested from nearby godowns. There are no government storage programs for feed grains. Ravi had lots of feed ingredients grains arriving but there was no place to store them. Feed ingredients are sensitive to weather conditions, and will spoil quickly in temporary outdoor storage. What to do? The mill has a bulk handling system on order from a US manufacturer. It is on a ship off the Karachi port and can't be installed in time to help the present situation.

The Ravi management heard about the STDT storage experts through the Lahore grapevine. After contact with the Lahore STDT, Dr. Ulysses "Uly" Acasio, the Lahore STDT Long Term Advisor visited the mill. Uly immediately saw solutions to their problems. Ravi was formerly in the edible oils business. The mill had two large edible



**Loading of house-type godown with bulk equipment**

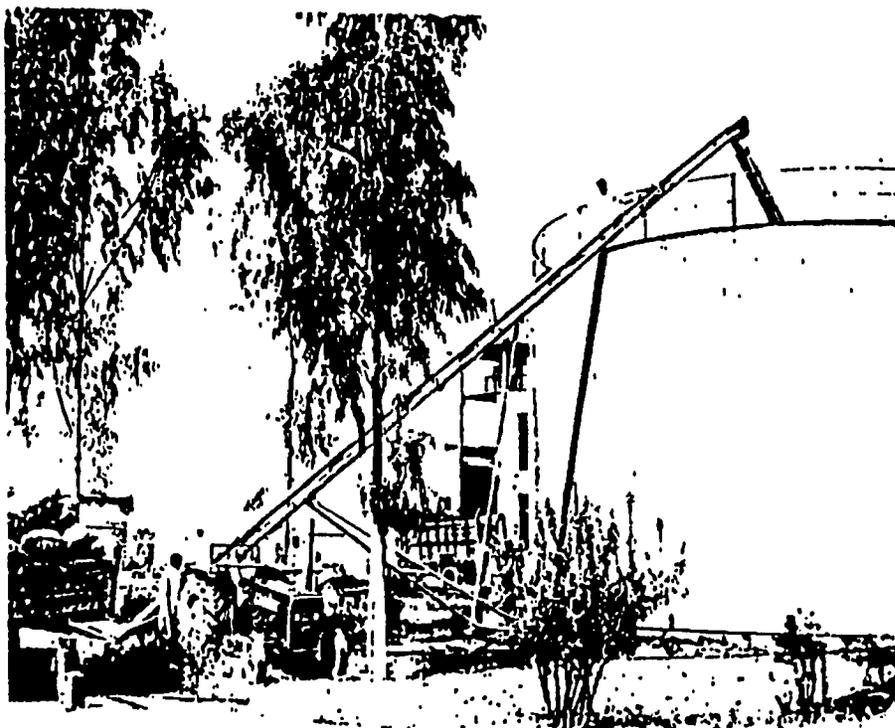


**Reclaim of wheat in bulk using STDT equipment from HTG**

oil tanks that were empty. Why not make the tanks into bulk storage? Aeration fans can do the drying job without additional heat in the Pakistani environment. With a few stokes on his CAD program, Dr. Acasio prepared a design to do the trick. Ravi management immediately adopted it, but Ravi technicians didn't quite understand the computer generated design. Back to the drawing board - rather modeling table. A simple cardboard and wood model of the design set off a flurry of activity. Oil tank to bulk storage conversion was completed in a week.

The STDT loaned the mill some bulk handling equipment for filling the oil tanks and recovery of the stored grain. The mill was so impressed with the results they are inquiring about buying bulk equipment and more oil-cum-bulk tanks from a local manufacturer. With the addition of a pelletizing

mill for poultry feed, Ravi is now a potential customer for wheat cleanings. An open house and storage demonstration is planned at the mill.



### **Bulk Handling and Storage Demonstration In Rawalpindi**

The Punjab Food Department, PASSCO STDT, and the private sector combined to take a very special look at an unremarkable event. By way of background, about 3,500 truck loads of wheat are unloaded at the nation's flour mills every working day of the year. Those trucks will carry 350,000 bags worth rs. 9.7 million at new bag prices. The foreign materials carried by the wheat trucks were equal to 50 to 70 truck loads. Seventy percent of this wheat is issued by the Provincial Food Departments.

What made the Rawalpindi event so special was that on February 26th, three trucks did not use bags for making deliveries. Two additional significant events marked the occasion. The bulk trucks were loaded mechanically from Food Department hexbins which had previously been filled with wheat cleaned by STDT bulk handling equip-

ment. The cleaned wheat was sold at premium price to the Rawalpindi Flour and General Mills, Ltd.

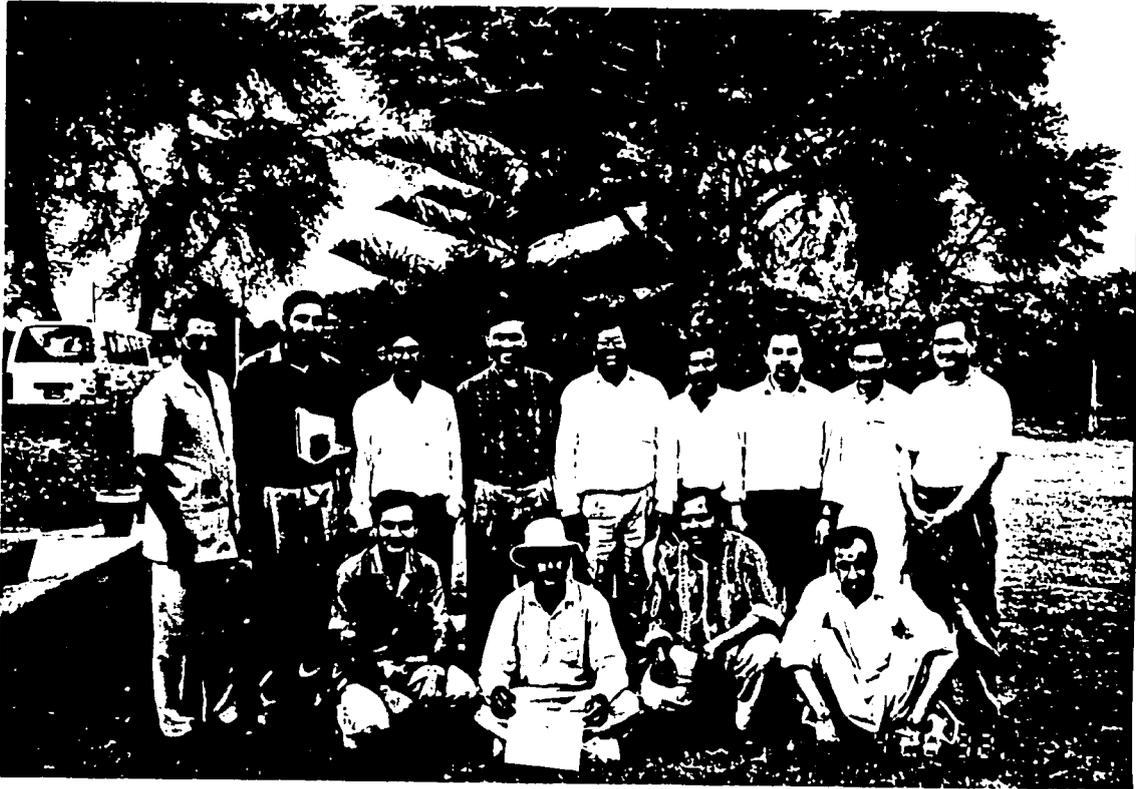
The STDT organized bulk storage and delivery demonstration was attended by an audience of flour millers, provincial food department officials, PASSCO, the Ministry of Food, Agriculture, and Cooperatives., and USAID. The Punjab director for Food, Raja Mhd. Aslam, and PASSCO General Manager (Field) Mhd. Asif Toor, stress that trials and demonstrations are the only way to improve the efficiency of the wheat storage system. Mr. Mohammad Shabir, Rawalpindi Flour and General Mills remarked that by reducing the amount of foreign material received in the wheat, the flour mill could afford to pay rs. 30 to 50 per tonne more, and still benefit by reduced transport, cleaning, and storage costs. He hoped this lesson could be passed through to wheat producers to encourage them to bring better quality wheat to market,

A large crowd of flour millers attended this event. They were particularly interested in how the distribution system could be changed so they too could received clean wheat in bulk.

<u>FPGI/STDT Pakistan Staff</u>	
<b>Islamabad</b>	
Richard C. Maxon	Chief of Party
Asim Raza	Adm/Mngt Specialist
Kausar Seba	Administrative Assistant
M. Iqbal Qureshi	Chauffeur
<b>Lahore</b>	
Ulysses A. Acasio	Long Term Advisor
Shamsher Haider Khan	Administrative Specialist
Arif Javed	Mechanical Engineer
Zafar Ali Baig	Accounts Assistant
M. Asif Javed	Research Assistant
Muzaffar Iqbal	Research Assistant
Arif Mansoor	Receptionist
Shafqat Javed	Chauffeur/Mechanic
Yaqoob Gill	Chauffeur/Mechanic
Khalid Mahmood	Chauffeur
Khadim Hussain	Chauffeur
Ghulam Mohammad	Field Assistant
M. Aslam	Field Assistant
Ashfaq Haider	Field Assistant
Shaukat Ali	Lab. Assistant
Fayyaz Ahmed	Lab. Assistant
<b>PARC Associates</b>	
Sajjad Ahmed	Scientific Officer
Tariq Mahmood	Assistant Scientific Officer
Saeed Ahmed	Field Assistant

APPENDIX VI

BULK WHEAT HANDLING EQUIPMENT TRAINING AND FIELD EXERCISES



Lahore Training Center staff at the site of the Supreme Flour Mills.



Training class at Manga.



Training in Aspirator use

APPENDIX VII

AMERICAN SOYBEAN ASSOCIATION  
 PAKISTAN FEED TECHNOLOGY WORKSHOP, KARACHI, SHERATON  
 May 30 - June 3, 1992

Program

<b>Date/Time Venue</b>	<b>Description</b>	<b>Speaker</b>
May 30, 4:00pm Sheraton	Briefing for speakers	
7:30pm	Inauguration dinner	
May 31 Sheraton	Session I	
9:00am	Feed Pellets vs Mash	R.Rowland
9:50am	Use of Fats in Broiler Rations	R.Rowland
10:40am	BREAK	
11:00am	Role of a.a. in Poultry	D.Creshwell
11:50am	Economics of Replacing Fishmeal	D.Creshwell
	Session II	
Sheraton		
2:00pm	Importance of Quality Rations and Management	P.Miller
4:00pm	BREAK	
4:30pm	Panel Discussion	
6:00pm	Close	
June 1 Sheraton	Session III	
9:00am	Feed Formulation and Trading Decision	M.Clark
9:50am	Stochastic Formulation	M.Clark
10:40am	BREAK	
11:00am	Molds and Mycotoxins	Mansoor Ahmed
11:50am	Grain Storage and Handling	U.Acasio
12:40pm	LUNCH	
	Session IV	
Sheraton		
2:00pm	Microingredient Storage	Pfizer
2:50pm	Laboratory Techniques for Quality Control	Zouzzar Ali
3:40pm	BREAK	
4:00pm	Panel Discussion	
5:30pm	Close	
June 2 Sheraton	Session V	

	9:00am	Feed Mixing	Pfizer
	9:50am	Pelleting Technology	R.Tan
	10:40am	BREAK	
	11:00am	Feed Grain Marketing in Pakistan	R.Maxon
	11:50am	Panel Discussion	
	12:40pm	LUNCH	
	2:30pm	Workshops	
June 3			
	9:00am	Workshops	
	2:30pm	Workshops	
PCIR			
	7:30pm	Dinner and Certificate Distribution	
Sheraton			

Your future is...

## GRAIN STORAGE..... GRAIN PROCESSING

### Food and Feed Grains: Pakistan's future

Cereals, feed grains, oilseeds and pulses account for more than 80% of the nation's food supply. The demand for cereal based products is growing at about 5 percent per year.

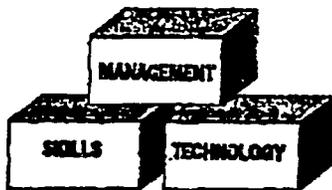


The nation has hundreds of flour, feed and rice mills, edible oils and seed processing plants, plus bakeries, biscuit making, poultry and dairy farms, and other forms of "down stream" processing. Progress and technological change is slowwise to lack of trained personnel.

Government controls and ownership has been the dominant feature of the grain industry since the beginning of the nation. With denationalization and movement toward a market oriented economy, the private sector will assume a greater role in grain storage and industry development.

If our grain industries are to improve, we must clearly make the effort ourselves. A rare opportunity now exists to make up for lost time and prepare our industries for the next century.

The industry's future depends upon



### A Pakistan Grain Management Institute - the time has come.

A model of what is needed exists in Lahore. The Storage Technology Development and Transfer (STDT) project of USAID has supported a grain storage training and research center since 1988. The Center functions under guidelines set by the Ministry of Food, Agriculture, and Cooperatives (MINFA). The Food and Feed Grains Institute of Kansas State University, USA operates the Center in cooperation with the Pakistan Agricultural Research Council (PARC).

The STDT Training Center primarily benefits Provincial Food Departments, PASSCO and the Federal Ministry of Food, Agriculture, and Cooperatives. The Center has also organized training for the flour milling industry, and provided technical assistance for flour, feed, and rice millers. For the past two years, the STDT has concentrated on the introduction of bulk handling systems.

USAID support for the STDT Training Center will end this year. If the Pakistan grain industries act now, this Center can become the

foundation of a nationwide effort to improve private sector milling and storage capabilities.

A Lahore based firm has offered facilities to develop a grain milling school. A Pakistan Grain Management Institute is needed essentially take over and expand the programs of the STDT Training Center for service to the private/public sectors and develop the grain milling program.

To make the Pakistan Grain Management Institute a reality is dependent upon widespread support from the cereals industries with the cooperation of the provincial and federal governments.

### The objectives of the Pakistan Grain Management Institute are to:

- train personnel in grain milling and storage technology
- develop laboratory support and quality control programs
- provide technical support and consultancy services for bulk handling and pest control problems



### In the longer term, the Pakistan Grain Management Institute will

- establish a Grain Milling school
- develop appropriate grain and materials handling and processing technology
- develop industry standards for storage structures and bulk handling
- identify quality control procedures for raw materials and finished products
- establish standards for fumigation and chemical applications
- conduct training courses for grain inspection and grading
- assist "in-house training" for specific needs of companies
- develop energy conservation and environmental strategies
- improve existing products and develop new products
- develop means of using mill wastes and by products

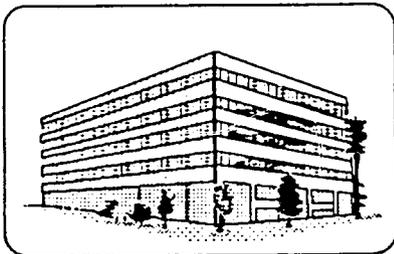


TRAINING NEEDS

### How will the Institute be financed?

Contributions from major sponsors and other interested donors will sustain the initial operation. The Institute will develop programs and activities that can become fully or partially self sustaining. Fees for training programs and conferences can defray training costs. Laboratory work in connection with quality control of stored grains and finished products can provide service to the industry on a self sustaining basis.

Grants and contracts may be solicited from various sources as long as these are in line with policy directives of the Board of Directors, and advance the objectives of the Institute. The Institute might also undertake various commercial or semi-commercial enterprises on a small scale to provide practical experience for the trainees and to offset some training costs. Examples of this are fumigation of bulk storage, grain cleaning and conditioning, sale of products from storage and milling training exercises, and consultation on grain handling systems or storage facilities. In the longer term, it is hoped that the Institute will achieve near self sufficiency in its operating budget. Capital items and advancement into new areas may have to rely upon donors or fee service fees.



### Who are the prospective sponsors?

H. Mohammad Bashir, Chief Executive Officer, National Flour & General Mills, Pvt. Ltd. has generously offered use of building space as a location for a milling school.

Kansas State University, USA has offered to collaborate and seek support of other international groups for cooperation with the Pakistan Grain Management Institute.

Many trade associations and individuals have expressed interest in establishing a Pakistan training scheme for their industries. Now is the time for them to come forward. The last column of this brochure indicates how you may participate in this noble cause.

### How will the Institute be governed ?

The Pakistan Grain Management Institute will be established as a not for profit foundation under the applicable laws of the Federal and Provincial governments. A board of directors will be selected from among the major donors to the institute plus representation from the Ministry of Food, Agriculture, and Cooperatives, Punjab Food Department, and University of Agriculture, Faisalabad. Each board member shall have one vote regardless of size of any contributions that might have been made or organization represented.

An executive committee of not more than 3 persons will be elected from the board members to oversee the day to day operations of the Institute. The Executive Committee will hire the Executive Director of the Institute, set policy guidelines, and approve budgets.

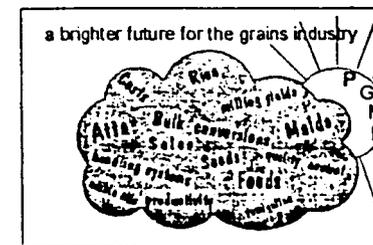
### How you can help

- Volunteer your time, efforts, and ideas for improvement of the industry
- Donate cash, equipment and supplies
- Sponsor training for your own employees
- Use the PGMI laboratory and consultancy services
- Develop intern and on-the-job training programs in your mill and storage areas
- Offer yourself and qualified employees as lecturers in the training courses

- Support local, provincial, and national efforts to modernize and improve industry rules and regulations

### How a PGMI can help you

- Improved employee efficiency and morale reduces labor turnover and eases the burden on management.
- Less wastage and down time increases milling yields, cuts operating and maintenance costs, and provides more products to sell.
- Improved and consistent product quality enhances your reputation and repeat sales.



### Organization Meeting

A conference will be held soon for formation of the Pakistan Grain Management Institute and milling school. If your organization would like to be represented, please fill out the attached form and deposit it with the registration desk at the Bulk Handling Demonstration or contact to:

Haji Mohammad Bashir  
National Flour & General  
Mills (Pvt) Ltd.

78-Shadman II,  
Lahore Tel. 475821-23 Fax 475821

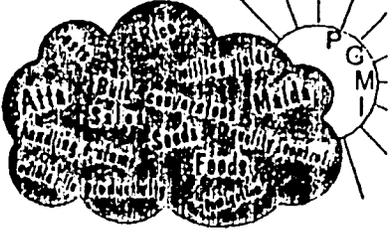
STDT Lahore Training Center  
14-L, Model Town Extension  
Lahore Tel . 862897 Fax 835744

\*\*\*\*\*

*A prospectus will be sent to all interested parties prior to the meeting .*

**STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER  
NATIONAL FLOUR & GENERAL MILLS PVT LTD  
BULK HANDLING DEMONSTRATION**

Name		Position	
Organization		Telephone	Fax
Address			City
<b>I AM INTERESTED IN</b>		Comments	
<input type="checkbox"/> Flour milling	<input type="checkbox"/> Fumigation		
<input type="checkbox"/> Bulk handling	<input type="checkbox"/> Oil seed extraction		
<input type="checkbox"/> Feed milling	<input type="checkbox"/> Energy conservation		
<input type="checkbox"/> Rice milling	<input type="checkbox"/> Grain cleaning		
<input type="checkbox"/> Quality Control	<input type="checkbox"/> Marketing		
<input type="checkbox"/> Grades - standards	<input type="checkbox"/> Accounting		
<input type="checkbox"/> Employee Training	<input type="checkbox"/> Management		
<input type="checkbox"/> Grain transport	<input type="checkbox"/> Other-----		

<p>a brighter future for the grains industry</p> 	<b>Yes , I want to know more about the Pakistan Grain Management Institute</b>			
	Name		Position	
	Organization		Telephone	Fax
	Address		City	
<b>I AM INTERESTED IN</b>	<input type="checkbox"/> Send prospectus	<input type="checkbox"/> Notify about organization meeting		
<input type="checkbox"/> Flour milling	<input type="checkbox"/> Fumigation	<input type="checkbox"/> Notify my home office		
<input type="checkbox"/> Bulk handling	<input type="checkbox"/> Oil seed extraction			
<input type="checkbox"/> Feed milling	<input type="checkbox"/> Energy conservation			
<input type="checkbox"/> Rice milling	<input type="checkbox"/> Grain cleaning			
<input type="checkbox"/> Quality Control	<input type="checkbox"/> Marketing			
<input type="checkbox"/> Grades - standards	<input type="checkbox"/> Accounting			
<input type="checkbox"/> Employee Training	<input type="checkbox"/> Management			
<input type="checkbox"/> Grain transport	<input type="checkbox"/> Other-----			
	Comments			

**STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER  
AGRICULTURAL SECTOR SUPPORT PROJECT**

29 Blue Area, Islamabad

14 L Model Town Ext. , Lahore

OBJECTIVES

- Strengthen institutional research capability in grain storage
- Improve storage practices
- Determine feasibility of bulk handling of wheat

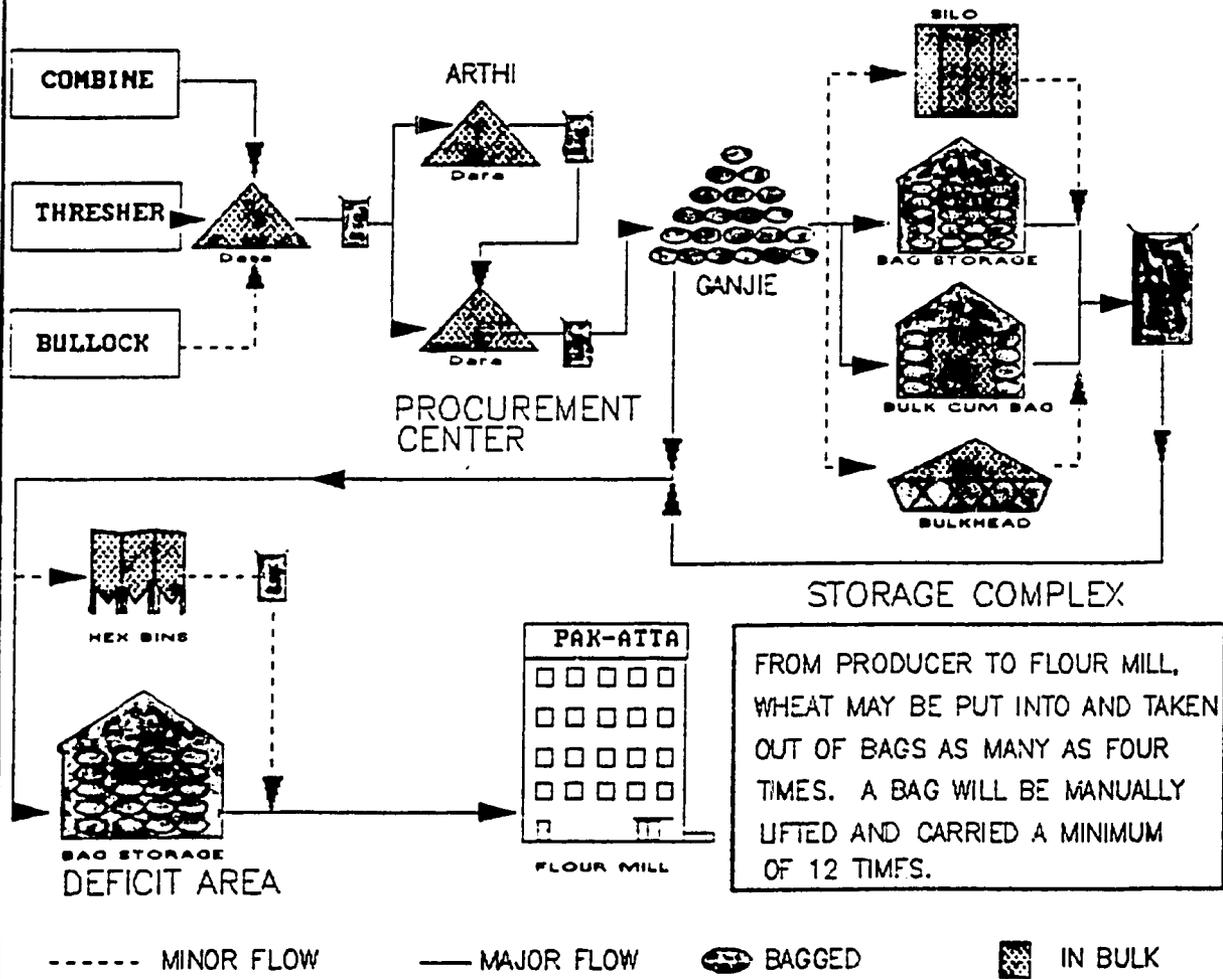
Activities

- Provided equipment and technical support to PARC institutions.
- Conducted large scale research on bagged grain storage
- Operated training center for storage personnel
- Introduced bulk handling technology

Accomplishments

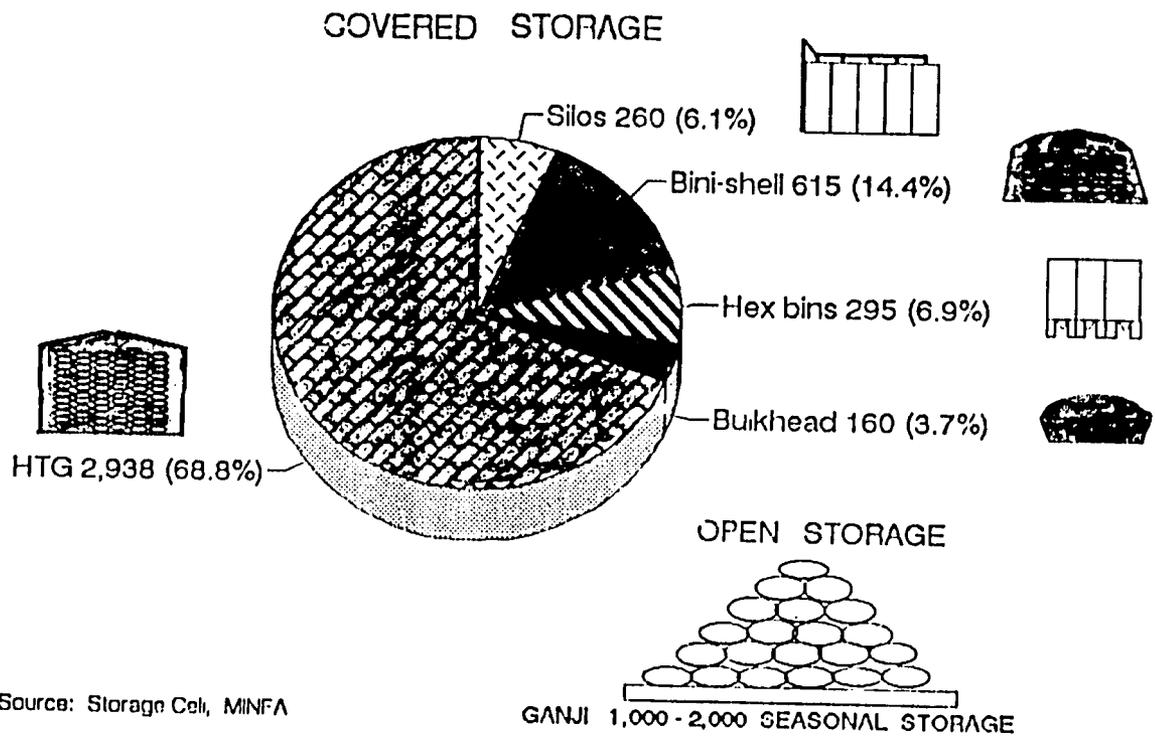
- Developed improve storage methodology for bagged grains
- Trained 1,800 persons in storage technology
- Pioneered insect control procedures for 4 types of bulk storage
- Developed low cost method for determining insect resistance to phosphine fumigation
- Developed bulk handling chain from producer to flour mills
- Built and modified bulk handling equipment for local conditions.
- Extended technical assistance and training to the private sector
- Recommended wheat grades and standards

# WHEAT FLOW FROM PRODUCER TO FLOUR MILLS



FROM PRODUCER TO FLOUR MILL, WHEAT MAY BE PUT INTO AND TAKEN OUT OF BAGS AS MANY AS FOUR TIMES. A BAG WILL BE MANUALLY LIFTED AND CARRIED A MINIMUM OF 12 TIMES.

## TYPES OF PUBLIC SECTOR WHEAT STORAGE (000 Tonnes)





# STDT BRIEFS

## STORAGE TECHNOLOGY DEVELOPMENT AND TRANSFER AGRICULTURAL SECTOR SUPPORT PROGRAM

29 Blue Area, Islamabad 14-L, Model Town Ext. Lahore.

### WELCOME TO THE DISTINGUISHED DELEGATION FROM BANGLADESH

A warm and hearty welcome to all our distinguished guests and colleagues from the Ministry of Food and IFPRI from Bangladesh. We are honored that Joint Secretary A. F. M Imam Hossain, Mr. M Entazul Haq, and Mr. M. Ghaisuddin Ahmed have come to Pakistan. It is our hope that any information that we may provide on our programs will be of benefit to you and your country.

This Briefs highlights some activities of the Storage Technology Development and Transfer, Agricultural Sector Support Program. (STDT/ASSP). The STDT is sponsored by USAID in cooperation with the Ministry of Food Agriculture and Cooperatives. The project aims are to strengthen the national capabilities in grain storage and stored grain protection. The major activities are the testing of bulk handling systems, research, and training in storage technology. The present priority is being given to transfer the technology developed to local institutions. The STDT portion of ASSP will close in October 1992.

### PAKISTAN WHEAT HARVEST UNDERWAY

The Pakistan wheat harvest is in full swing in the Punjab wheat belt. The harvest season has been slightly delayed over previous years due to wet and cool weather in March and April. The wait was well worthwhile. Preliminary estimates by the Agricultural Data Collection unit indicate yields are higher than in previous survey years.

The STDT is in the field with two public sector organizations; the Punjab Food Department, and the Pakistan Agricultural Storage and Services Corporation. This year, assistance is being provided to the private sector in for bulk collection of wheat by flour mills, design of bulk storage facilities, and provision of equipment for collection of seed wheat.

Both PASSCO and the Food Department will make full use of the two silos renovated under the Storage Rehabilitation Program of USAID. This is the first year the silos have been available for use to their maximum potential. The STDT is proud to have provided technical assistance for the renovation and training for operators. STDT technicians will be stationed in the silos to provide technical assistance as needed. Data is being collected for analysis of the physical and economic aspects of bulk handling for comparison with the present manual methods.

## **BULK HANDLING DEMONSTRATION HELD IN LAHORE.**

On April 26, the STDT in cooperation with the Supreme Flour Mill and the Punjab Food Department held its largest and most successful bulk wheat handling demonstration. The audience of nearly two hundred included flour and feed millers, flour distributors, middlemen, and officials from the Punjab Government and USAID.

The main features of the demonstrations were alternative methods of testing, receiving, cleaning, and storing wheat. The emphasis was on complete systems for transport, receiving, cleaning, and storage. Cleaning is a step not normally taken until the wheat enters the flour mill. Cleaning before storage prevents many storage problems and enable the mill to operate with greater efficiency and to maintain quality control. Three cleaning systems were on display including gravity cleaners, rotary cleaners, and aspirators. A small hammermill demonstrated how animal feeds could be made from the materials removed from the wheat during the cleaning operations. The aspirator was constructed in a local shop to the design specifications of the STDT.

Several kinds of conveying equipment were shown, including augers, grain pumps, en masse conveyors, tube-belt conveyors, tractor mounted conveyors, and a high capacity grain slinger. Wheat was transported at the site by tipper trucks, tractor drawn tipper trolleys, and gravity wagons.

The Supreme Flour Mill is the newest and largest of its type in Pakistan. The Supreme mill is constructing a large mechanized storage complex, plus making provision for rapid receipt of wheat in bulk or bagged form during the harvest season. As government policies turn more activities over to the private sector to store grains, it is anticipated that flour mills and other grains processors will construct more of their own storage.

### **Private Sector Support for Training in Milling and Storage**

Haji Mohammad Bashir, Chief Executive of the National Group of Companies which includes the Supreme Flour Mill, announced an offer of support by his company for the development of a grain milling school. This offer was made during the opening ceremony for the bulk handling demonstration. The National companies will provide a building and other support for the school for a period of two years. He challenged others in the industry to come forth to support this badly needed training institution. At present, there are very few trained personnel in grain milling and storage. The milling school and training institute would be patterned upon activities now being conducted by the STDT.

The Punjab Food Department has announced formation of a committee from the Food Department, PASSCO, MINFA and the STDT to consider future training and bulk handling activities after the close of the STDT project on October 31, 1992. This offer by the private sector is very timely and could compliment programs undertaken by government.



## **WHEAT STORAGE - A HIDDEN INDUSTRY**

Another bountiful wheat harvest is under way. It is time to give thanks and reflect upon the abundance that the nation's agriculturalists are capable of production. It is also a time for considering how well this commodity is stored and protected until needed for consumption.

Wheat accounts for about 30 percent of the value of all agricultural production in Pakistan, and 60 percent of the value of food crops. Literally millions of persons are involved in wheat production and harvesting. Yet relatively little attention has been paid to what happens after the harvest.

Wheat storage is Pakistan's largest "hidden industry". Over 12,000 public employees are used to manage federal and provincial wheat procurement and distribution. Thousands more work full or part time in the bagging, stacking, and transporting to the nations atta and flour mills. After this year's harvest, government wheat stocks worth Rs. 20 billion, will be kept in storage centers worth rs. 36 billion.

## **PASSCO's PIONEERING EFFORTS IN BULK HANDLING OF GRAINS**

Pakistan Agricultural Storage and Services Corporation (PASSCO) in collaboration with STDT is developing new grain handling systems. Following are ongoing and recently completed activities.

- Developed and tested a complete bulk grain handling system from purchase center to storage point for two seasons.
- Mechanized 30 open bulkheads.
- Rehabilitated the Chichawatni and Multan silos with 110,000 tonnes total storage capacity.
- Converted 9 house type bagged godowns to bulk storage.
- Assisted in research with STDT/PARC personnel on protection of bulk wheat in bulk cum bag godowns, hexagonal bins, open bulk heads, and silos.
- Conducted training of personnel in operation and maintenance of grain handling equipment.

Managing Director PASSCO Syed Mukhtar H. Shah recently directed implementation a bulk procurement campaign during 1992. The areas for bulk procurement has been selected as Chichawatni, Pakpattan, Bungahayat, and Depalpur. PASSCO plans to procure about 50,000 tonnes of wheat in bulk.

## **FOOD DEPARTMENT MARKETS FOR CLEAN WHEAT**

STDT has recently conducted a trial of cleaning and delivery of 500 tonnes of bulk wheat to a flour mill in Sahiwal earlier this year. The Sahiwal area was chosen because the PFD has stored wheat in bulk form in hexagonal bins at the city godown complex. The STDT assisted by providing equipment for bulk storage at the time of procurement.

Briefs...4

This was the first time that the Food Department has sold wheat other than FAQ. The test marketing was repeated in Rawalpindi in February. The Sihawal and Rawalpindi tests generated much interest in the scheme on the part of flour millers. The STDT, Punjab Food Department and PASSCO have previously teamed up to deliver wheat in bulk to flour mills in Multan, Lahore, Okara and Sihawal.

The Food Department sold the cleaned wheat at a premium price to cover cleaning costs and weight losses. Mill owners, the Food Department, and consumers benefitted from the sale of cleaned wheat. Reduced cleaning losses, higher flour yields and reduced operating costs compensated for the higher priced wheat.

### **WHEAT CLEANING BOOSTS ANIMAL FEED SUPPLY**

A bonus from cleaning is the recovery of materials for animal feeds. The materials cleaned from the wheat were laboratory tested for use as animal feed ingredients. The protein content of the materials screened from the wheat were found to be higher in animal feed value than the wheat from which it was separated. In handling of wheat, small particles of wheat break off from the wheat kernel. Much of what we see as 'dust or dirt' is actually microscopic pieces of wheat protein. It is estimated by the STDT that 70,000 to 80,000 tonnes of additional feeds could be available if screening are properly collected.

### **LOCAL MADE - MAKES THE GRADE**

Is all of the equipment used by the STDT imported? By no means. A major component in the STDT bulk handling and demonstration programs is making and adapting grain handling equipment to local conditions. Several elements are at work. Take the engineering skills of Dr. Ulysses A Acasio STDT Advisor, add in his artistry with computer assisted design (CAD) programs, the comprehension, skills, and ingenuity of the STDT Lahore staff and local machine shops, and soon most any problem can be solved from complex electronic systems for silos and grain dryers to simple ramps and surge bins. The grain aspirator on display at the bulk handling demonstration in Lahore is about 60-40 imported and locally made. The STDT staff and machine shop personnel are very adept at scrounging through Lahore's hardware and machinery markets and spotting the materials they need. A junkyard gearbox is the key component for mounting a grain pump on a tractor to make a mobile pickup system for wheat in mandis.

Go to almost any rural machine shop, describe the problem, and they will inevitably come up with a solution. For example, a bearing and drive shaft were damaged on a Masster mover during the peak harvest. The problem was quickly solved by modifying parts for sugar mill equipment.

Dr. Ulysses A Acasio, designed a portable rice dryer suitable for Pakistan conditions. The dryer has been completely fabricated locally. The dryer was initially tested and 'fine tuned' at PASSCO Manga storage complex. Later it was moved to a rice milling complex Sheikhpura to test the dryer under commercial conditions. More recently it has been tested by a feed mill for

Briefs...5

drying maize. The dryer has turned to be portable and versatile. Several private sector firms have expressed interest in having dryers made for them.

A rice milling complex has requested assistance with the expansion of its dryer capacity. The rice mill wants to greatly increase its participation in the export market, but drying its immediate bottleneck. There is no time to import a dryer for the next season. Dr. Acasio designed two dryers that can meet their needs and can be fabricated locally before the next season.

### **CONVERSION OF HOUSE TYPE GODOWNS TO BULK STORAGE**

The STDT has converted a house type godown for complete bulk storage. The house type godown are used for bag or bag cum bulk storage. The trial has been done in PASSCO Complex Manga. The purpose of the trial was to demonstrate a complete mechanized bulk storage system for house type godown. This convertible godown is capable of storing 1600 MT. in bulk, about 40 percent more than the designed capacity of 1100 MT. in bags. Preliminary data suggests that cost of filling and unloading converted godown is about rs. 9.0 per ton. This compares favorably with the cost of storing and retrieving one ton in bags of rs. 17.50 and rs. 21 per ton for bulk cum bag storage. Cost per ton of additional storage capacity is about rs. 69. PASSCO is using the design and converted nine house type godown for bulk storage in the current harvest season.

For your copy of the design specifications and operating results, ask for FFGI Report 10, Converting a PASSCO Type Godown to Bulk Storage from the STDT Lahore or Islamabad

### **GRAIN STORAGE GOES ACADEMIC..**

The University of Agriculture, Faisalabad has established a diploma course in grain storage and management. The course curriculum includes subject matter from the Departments of Entomology, Crop Physiology, Basic Engineering, Food Technology, Agricultural Marketing and Plant Physiology. This is the first time that storage of agricultural commodities has been recognized as an academic subject in Pakistan. The diploma course was developed in response to a request by the Punjab Food Department.

The courses for this diploma have been approved by the University. The Ministry of Food Agriculture and Cooperatives MINFA, and STDT are extending every possible help for this program. Eventually, the University wants to establish a complete course offerings all physical and economic aspects of post harvest activities, including processing. The University and STDT conducted a two day seminar on bulk handling and storage on March 2 and 3 to introduce the diploma program.

### **CONVERTING STEEL OIL TANKS FOR GRAIN STORAGE AT A FEED MILL**

STDT has assisted a local feed mill in converting their two 40 ft. diameter by 25 ft. high welded steel tanks for grain storage. The tanks were installed for vegetable oil s but the company has since withdrawn from that business. The tanks have idle for a number of years while storage problems for feed ingredients were multiplying. The mill originally contacted the STDT Lahore Center for help on another matter. Dr. Acasio designed a grain handling and aeration systems for the silos. STDT loaned a 65 ft. grain pump, gravity wagon, self tipping trolley, three portable augers. The silos are now operational. PARC/STDT researchers fumigated the newly converted silos. The converted oil tanks held the phosphine gas concentration better than any grain storage structure tested by STDT thus far. The feed mill is interested in getting additional welded steel tanks for storage. Other firms have also shown keen interest in the idea. A new industry is born?

### **LOW COST - LOW TECH WAY TO BETTER FUMIGATION**

What to do 60 liter plastic drum, glass jars, and plastic tubing have to do with grain storage research? Plenty. Mix them together in an ingenious fashion, and you have a 'low cost, low tech' method for determining dosage required to properly fumigate stored wheat.

PARC scientific personnel stationed at the STDT Lahore Center have developed an effective means of determining how much fumigant should be applied to particular godown complexes. The method can be applied to single godowns which have particularly difficult insect resistance problems. Fumigation is improved and costs are reduced by applying only as much fumigant as is needed for the time required to eliminate the insect pests. The usual method is to fumigate on a schedule by applying a fixed amount of fumigants per godown for a uniform time period.

The Lahore staff recently collected insect samples from the NWFP and southern areas of Punjab province. Another round of insect resistance testing is underway, and recommendations for the Food Departments will be available soon.

### **METHYL BROMIDE FUMIGATION EXPENSIVE BUT PROMISING**

From December 18-22,1991 the STDT/PARC team conducted a trial fumigation of wheat in a Chichawatni silo . They introduced a methyl bromide fumigant in the free space above the grain and distribute the gas through the stored grain mass by using the silo's down draft aeration fans. When the gas was detected at the bottom of the silo by using a methyl bromide meter , the aeration fans were shut down. The fumigation was completed in two days, and all insects present were destroyed. Phosphine fumigation was not possible due to difficulties in sealing the total structure.

Methyl bromide is about 4 times as expensive as phosphine gas and is very dangerous to use. The gas weighs 3 times as much as air. It is very toxic and fast acting. Methyl bromide is effective against a wide variety of insects . Its higher cost can be justified by its effectiveness and fast action which permits access to the fumigated product in a short time period. For this

reason, it is most frequently applied to exports of fruits, vegetables, rice, cotton, and other commodities where fumigation is required as a condition of international trade.

STDT Report No. 9, Refresher Course on Fumigation Technology, October, 1991 contains detailed information on methyl bromide and phosphine fumigation. For your copy, contact the STDT offices in Lahore or Islamabad.

<u>FFGI/STDT Pakistan Staff</u>	
<b>Islamabad</b>	
Richard C. Maxon	Chief of Party
Asim Raza	Adm/Mngt. Specialist
Kausar Sabn	Administrative Assistant
Iqbal Qureshi	Chauffeur
<b>Lahore</b>	
Ulysses A. Acasio	Long Term Advisor
Shamsheer Haider Khan	Administrative Specialist
Arif Javed	Mechanical Engineer
Zafar Ali Balg	Accounts Assistant
M. Asif Javed	Research Assistant
Muzaffar Iqbal	Research Assistant
Arif Mansoor	Receptionist
Shafiqat Javed	Chauffeur/Mechanic
Yaqoob Gill	Chauffeur/Mechanic
Khalid Mahmood	Chauffeur
Khadim Hussain	Chauffeur
Ghulam Mohammad	Field Assistant
M. Aslam	Field Assistant
Ashfaq Haider	Field Assistant
Shaukat Ali	Lab. Assistant
Fayyaz Ahmed	Lab. Assistant
<b>PARC Associates</b>	
Sajjad Ahmed	Sr. Scientific Officer
Tariq Mahmood	Assistant Scientific Officer
Saeed Ahmed	Field Assistant

LETTER OF APPRECIATION

# National Fumigation Corporation (Pvt) Limited

Specialist in: TERMITE PROOFING, FUMIGATION, DISINFESTATION & EXPORT GOODS FUMIGATION

(PEST CONTROL SERVICES)

33, 4th Floor,  
Al-Yousuf Chambers, New Chali,  
Shahrah-e-Liaquat,

Karachi: February 11, 1992

Our Ref No: NKCL/91-92/0365

Mr. Richard C. Maxon,  
Chief of Party,  
Storage Technology Development and Transfer  
Agricultural Sector Support Project,  
29 Blue Area,  
ISLAMABAD.

## ACKNOWLEDGEMENT

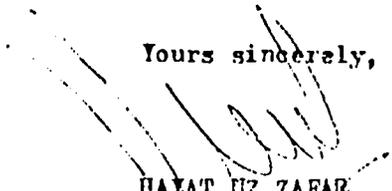
Dear Sir,

Thank you very much for sending me the preceding refresher course on fumigation technology. I personally studied it and witnessed the colourful photographs etc., found it very informative and interesting on fumigation technology.

I once again thanks for your this act of kindness and hope that in future I will receive more informations on modern technology of fumigation and pest control procedures.

I remain,

Yours sincerely,

  
HAYAT UZ ZAFAR  
(DIRECTOR OPERATIONS)

APPENDIX XI

SUMMARY OF STDT PROJECT TRAINING ACTIVITIES TO DATE

Invitational Study Tours

**Postharvest Technology in Agriculture**

Umar Khan Balock, PARC

**Bulk Grain Handling and Storage Facilities Management**

Mohammad Tariq Janjuah, MINFA

Muhammid Rashid Sheikh, MINFA

S. Anwar Haider, Sind Food Department

Shaukat Gul, NWFP Food Department

Muhammad Taj, PASSCO

Haji Muhammad Kahn, PASSCO

Naiz Mohammad Khan, Balochistan Food Department

Zia Ul Huq, Punjab Food Department

M. Gulzar Qazi, USAID

Muhammad Akram, PASSCO

Muhammad Bashir Agmad, Ministry of Finance

Salahuddin Soliman, MINFA

C. Shah Muhammad, PASSCO

Muhammad Ayub Shah, MINFA

Yousaf Pathan, Balochistan Food Department

Shoukat Ali Chaughtai, USAID

Thomas Olson, USAID

**Postharvest Literature Documentation**

Shaheen Majid, NARC Library

**Postharvest Research Procedures**

Ahmed Mubarik, PMRI

External Short Courses

**Grain Storage and Marketing Short Course, Kansas State University  
1987**

M. Rafiq Khan, University of Agriculture, Faisalabad

Maken Sikander Hayat, MINFA

Mukhtar Ali Baig, PASSCO

Abdul Latif Dasti, Punjab Food Department

Sohrab Khan Kalwar, Sind Food Department

1988

Ghulam Rasul, Ayub Agricultural Research Institute, Faisalabad

Irshad Ahmed Junejo, Sind Food Department

Ghulam Ally Memon, Sind Food Department

1989

Iqbal Ahmed Baluch, private farmer

Nasrullah Khan Malik, MINFA

Abdul Hameed Chaudhry, Punjab Seed Corporation

Shahabuddin, MINFA

1990

Tariq Mahmood, PMRI  
Sajjad Ahmed, PMRI  
Sirajuddin Ahmed, MINFA  
Aklaq Ahmed, PMRI

**Operations of Varian Chromatograph, Zug Switzerland**  
Shahida Parveen, PMRI

**Grain Storage Management Short Course, Kansas State University**

1990

M. Abbas, NWFP Food Department  
M. Azhar, Punjab Food Department  
M. Kassi, PASSCO  
C. Iqbal, PASSCO  
A. Shah, PASSCO  
S. Taireja, MINFA  
M. Hussain, Punjab Seed Corporation  
M. Khattak, MINFA  
M. Alam, Punjab Cotton Research Institute  
A. Qadir, Cereal Crop Research Institute

**U.S. Grain Marketing System, International Grains Program, Kansas State University**

1990

T. Naximi, PASSCO  
M. Bashir, MINFA

**Flour Milling Executive Training Program, Kansas State University**

1990

Tariq Sadiq, Sinhala Flour and General Mills Ltd, Islamabad  
Mohammad Shabbir, Rawalpindi Flour and General Mills Ltd, Rawalpindi

Total of 31 individuals, external short courses

External Conferences

Sirajuddin Ahmed, MINFA - 10th ASEAN Seminar on Grain Postharvest Technology  
Hafiz Ahmed, PMRI - 11th ASEAN Conference on Postharvest Technology

Total of 2 individuals, external conferences

Academic Training

N. Ullah, PMRI, Ph.D., Grain Science, KSU  
Faqir Mohammad Anjum, Ayub Research Institute, Ph.D., Grain Science, KSU  
Abdul Hamid, Punjab Agricultural Department, M.S., Agricultural Engineering, KSU  
Total of 3 individuals, academic training

Total of 36 individuals, external training programs

In-Country Short Courses, Conferences, Seminars, and Workshops

**Statistical Analysis for Microcomputer Course - ADC/FSM**

Jamshed Khan, PMRI

Akfaq Ahmed, PMRI

**STDT/LTC - Master Trainers Course**

Nazar Muhammad Kha, Balochistan Food Department

Akhtar Muhammad Khan, Balochistan Food Department

Muhammad Paryal Channa, PASSCO

Abdul Latif Menon, Sind Food Department

Haibat Khan Rind, Sind Food Department

Khushi Muhammad, PASSCO

Shamsher Haider Khan, PASSCO

Abdul Khaliq, PASSCO

Mohammad Ibrahim Dasti, Punjab Food Department

Zia Ahmed Malik, Punjab Food Department

Riaz-ul-Haq Chaudry, Punjab Food Department

Rana Abbas Ahmed, Punjab Food Department

Arjumand Khan, NWFP Food Department

Tariq Javed, NWFP Food Department

Mohammad Taj, PASSCO

Asghar Ali Bajwa, PASSCO

Badaruddin Shaikh, Sind Food Department

Mohammad Afzal, private sector

Total of 18 individuals

**STDT/LTS - PASSCO and PFD Storage Operations Personnel**

PASSCO - 261 operational personnel

Punjab Food Department - 109 operational personnel

Sind Food Department - 102 operational personnel

Balochistan Food Department - 72 operational and 42 management personnel

Directorate General Food, Karachi - 18 operational personnel

Central Testing Laboratory, Karachi - 6 operational personnel

Pakistan Flour Millers Association - 3 operational personnel

Sind Food Department - 17 operational personnel

DG Food MINFA - 17 operational personnel

Central Testing Laboratory - 6 operational personnel

Unity Flour Mills (private sector) - 1 operational personnel

Indus Flour Mills (private sector) - 1 operational personnel

Rasool Flour Mills (private sector) - 1 operational personnel

NWFP Food Department - 48 operational personnel

Total of 697 individuals

**National Seminar and Workshop on Wheat Procurement and Storage Policies, 1989**

80 participants - MINFA, PFDs, private sector, PARC

**Flour Milling Seminars/Workshops, 1989**

Islamabad - 110 participants for seminars, 75 participants for workshops

Lahore - 100 participants for seminars, 60 participants for workshops

Karachi - 275 participants for seminars, 40 participants for workshops

**Flour Milling Seminars/Workshops, 1990**  
Islamabad - 64 participants for seminars  
Karachi - 43 participants for seminars  
Total of 767 individuals

**STDT/LTC - Bulk Wheat Handling and Storage Research Program Equipment Operations**  
PASSCO - 9 operational personnel (March 1990)  
PASSCO - 26 operational personnel (March 1990)  
Total of 35 individuals

**PASSCO/STDT/LTC Bulk Wheat Handling and Storage Research Program Equipment Demonstration, 1990**  
MINFA, PFDs, PASSCO, USAID, private sector - 110

**Corn Drying and Feed Mill Operations, Gijuranwala, 1990**  
Private sector - 10

**Non-Degree Academic Training Program, 1990/91**  
Shah Mahmood, EW/MINFA  
Ahmad Salman, SIND Department of Agriculture  
M. Baqir Mufti, Punjab Department of Agriculture  
Muhammad Aslam, EW/MINFA  
M. Ajmal Baig, PIDE  
Abdul Shakoor Sabri, EW/MINFA  
Ijaz Hussain, Punjab Department of Agriculture  
Mohammad Yousaf Haleem, EW/MINFA  
Abdul Majeed, EW/MINFA  
Mubasher Ahmad, EW/MINFA  
Sajjad Hussain Malik, EW/MINFA  
Mohammad Ramzan, EW/MINFA  
Mohammad Younas, EW/MINFA  
Mohammad Mawaz, EW/MINFA  
M. Aijaz, Sind Department of Agriculture  
Abjul Qaddus Paracha, EW/MINFA  
Mohammad Wasil, EW/MINFA  
Salim Akhtar, EW/MINFA  
Abdul Rehman Jami, Punjab Department of Agriculture  
S. Yar Mohammad Shah, University Tandojam SIND Agriculture  
Total of 20 individuals

**Fumigation and Pest Management Training, 1991**  
Punjab Food Department - 122

**Bulk Equipment Operations and Maintenance, 1991**  
PFD and PASSCO - 100

**Bulk Wheat Handling and Storage Conference, 1991**  
MINFA-PARC - 14  
Food Departments - 15  
PASSCO - 16  
University researchers - 10  
Private Sector (ag. chemicals, flour, rice milling) - 24

USAID - 7  
STDT/FSM Project - 12  
NRI - Great Britain - 1  
Total of 98 individuals

**Training Demonstrations Fumigation of Hexagonal Bins, 1991**  
PASSCO and Punjab Food Department - 170

**Computer Operations Training Course, 1991**  
PASSCO - 10  
Punjab Food Department - 6  
Total of 16 individuals

**Refresher Course on Fumigation Technology, 1991**  
Department of Plant Protection (Sind) - 14  
Rice Export Corporation of Pakistan - 4  
Grain Storage Research Laboratory - 4  
Public and Private Business Firms - 31  
Total of 53 individuals

**Training Demonstration of FEPF Technique, 1991**  
Punjab Food Department - 30

**Training Demonstration of Fumigation for Open Bulkheads, 1991**  
Punjab Food Department - 30

**Demonstration and Training in Warehouse Fumigation, 1991**  
Sihala Flour Mills and Other Private Sector - 10

**Demonstration and Training in Silo Fumigation, 1991**  
National Flour Mills and Other Private Sector - 10

**Bulk Wheat Handling and Storage Demonstration, 1992**  
Rawalpindi - 125

**Bulk Wheat Handling Demonstration, 1992**  
Supreme Flour Mills, Lahore - 177

**Seminar/Workshop on Grain Storage Management Research and Training, 1992**  
University of Agriculture, Faisalabad - 100

**Bulk Wheat Handling Equipment Training and Field Exercises - 1992**  
Private Sector - flour/feed millers - 7  
Punjab Food Department - 15  
Nestle-Milkpac (private sector) - 4  
Total of 26 individuals

Other Short Course Activities

**Integrated Pest Management Training Course, FAO/PARC, 1989 - 23 participants**  
**Training Session on Wheat and Rice Grading, CIMMYT/IIID/APC, 1990 - 26 participants**  
Total of 49 individuals

**Total of 2,384 individuals, in-country training activities**

**Total of individuals in all training programs to date - 2,441**