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LAKHRA COAL MINE AND POWER GENERATION PROJECT

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ISLAMIC REPUBLIC OF PAKISTAN

DRAFT ENVIRONMENTAL MITIGATION PLAN

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## 1. INTRODUCTION

The Draft Environmental Mitigation Plan is intended to provide those parties concerned with the design, funding, implementation, operation and maintenance of the proposed Lakhra Coal Mine and Power Plant Project with an advance understanding of proposed environmental mitigation activities which may be taken to avoid or reduce adverse environmental impacts associated with implementation of the proposed Project. The preparation of an Environmental Mitigation Plan is consistent with the following environmental procedures:

- . Government of Pakistan Environmental Policy and Regulations (Ordinance No. XXVII of 1983, Environmental Pro forma);
- . Asian Development Bank Environmental Policy;
- . United States Agency for International Development Environmental Policy (PD-6, "Environmental and Natural Resource Aspects of Development Assistance") and Environmental Regulations (22 CFR 216, "A.I.D. Environmental Procedures");
- . World Bank Environmental Policy.

It should be noted that a Final Environmental Mitigation Plan will be collaboratively developed and adopted by the Government of Pakistan and representatives of international development organizations which will support the Project prior to a formal decision to proceed with implementation. This document will specify which Government of Pakistan organizations and which donor organizations will be responsible for funding, implementation and monitoring of specific elements of the mitigation plan.

## 2. NATIONAL COAL DEVELOPMENT PROGRAM MITIGATION ACTIVITIES

### A. Strategy for Environmentally Sound Development of Coal in Pakistan

Problem: Implementation of the Lakhra Coal Mine and Power Project represents the first of an anticipated series of major investments by the Government of Pakistan, international development organizations, the Pakistani private sector and international investors in the development of indigenous coal resources for the generation of power and industrial uses. In addition, the Government of Pakistan and international

development organizations are currently reviewing the potential development of power generating capacity using imported coal at selected coastal sites. The development of modern mines, transportation and storage facilities, power plants and industrial facilities to use coal may result in potentially significant environmental impacts to air quality, water quality, soils, mineral resources and regional economic development.

Proposed Mitigation: It is proposed that an element of the Project include support for development of a Strategy for Environmentally Sound Development of Coal in Pakistan. The strategy would address environmental concerns associated with the development of local coal and the proposed use of imported coal. The study would be designed to complement coal resources studies presently being implemented by the Government of Pakistan and A.I.D. It would focus on environmental aspects of coal mine, power plant and industrial technology, mine and plant siting impacts, reclamation costs and benefits, pollution control, and occupational safety and health. It would outline and provide cost estimates for a comprehensive program of recommended actions which would address in a pragmatic and cost-effective manner the environmental impacts of coal development.

Implementing Organizations: The study should be implemented by a designated Government of Pakistan agency which would report to a study committee composed of representatives of the following organizations: planned Pakistan Environmental Protection Agency (PEPA), Geological Survey of Pakistan, Pakistan Mineral Development Corporation (PMDC), Ministry of Energy (ENERPLAN), Ministry of Health, Ministry of Industry, Ministry of Planning and Development, and the Water and Power Development Authority (WAPDA). Preparation of the study would be assisted by an international consultant.

Estimated Cost: Preparation of the study is anticipated to cost \$200,000 for the services of an international consultant in addition to costs associated with the salaries and overhead costs for Government of Pakistan personnel assigned to the study.

Duration of Study: The study will require 24 months to develop and can be prepared concurrently with the implementation of the Project.

Funding Sources: To be prepared with support from the Government of Pakistan and international development organizations.

B. Development and Implementation of National Air Quality Standards for Energy Development in Pakistan

Problem: The Government of Pakistan presently does not have air quality standards or an institutional structure for implementation of such regulations. The environmentally sound development of mining operations, power plants and industrial facilities which utilize a variety of fuels, including indigenous coal, requires development of such guidelines to assist in the selection of technology, guide decisions on the siting of individual facilities and industrial zones, and to assure proper operation and maintenance. It is critical that these guidelines reflect realistic and achievable air quality standards which are cost effective, monitorable and enforceable under conditions existing in Pakistan.

Proposed Mitigation: It is proposed that an element of the Project include support for development of both air quality standards and an institutional structure for their routine implementation. This program would be conducted in two phases:

Phase I: Development of Air Quality Standards

Development of air quality standards would be done with recognition of the needs to both protect the environment and to support rapid economic development. The standards would be developed with a primary emphasis on health effects and all standards would be realistically monitored under prevailing conditions. The standards would be developed to assist both regulatory and operational organizations meet their responsibilities and provide for a phased implementation program from existing facilities.

Phase II: Implementation of Air Quality Standards

The implementation program would include: (a) procurement and installation of air quality monitoring equipment and (b) the training of Pakistani personnel in selected regulatory and

operational organizations. The scope of the program would be restricted to providing support for selected high priority actions and setting in place a framework for implementation of air quality standards.

Implementing Organizations: The program should be implemented by a designated Government of Pakistan agency which would report to a program committee composed of representatives of the following organizations: planned Pakistan Environmental Protection Agency (PEPA), Pakistan Council for Scientific and Industrial Research (PCSIR), Pakistan Mineral Development Corporation (PMDC), Ministry of Energy (ENERPLAN), Ministry of Health, Ministry of Industry, Ministry of Planning and Development and the Water and Power Development Authority (WAPDA). Preparation of the study would be assisted by an international consultant.

Estimated Cost: Preparation of the program is anticipated to cost \$50,000 for Phase I and \$300,000 for Phase II (\$200,000 capital equipment, \$50,000 spares and expendable materials, \$50,000 training) for the services and materials from outside Pakistan in addition to salaries and overhead costs for Pakistani personnel assigned to the program. It should be noted that recurrent costs for the operation and maintenance of air quality monitoring equipment provided under the program would need to be met by the Government of Pakistan.

Duration of Program: The program would require 24 months for Phase I and 36-48 months for Phase II. Both Phases could be done concurrently with the implementation of the project.

Funding Sources: To be prepared with support from the Government of Pakistan and international development organizations.

### 3. LAKHRA COAL MINE DEVELOPMENT MITIGATION ACTIVITIES

#### A. Development of an Environmental, Safety and Health Management Staff for Mine Operations

Problem: Environmentally sound implementation of the coal mine requires employment and support for a professional staff to address environmental, safety and health issues. The primary responsibilities of this staff would include:

- . Environmental monitoring (air quality, water quality, etc.);
- . Monitoring of the reclamation program;
- . Monitoring of the disposal of waste materials;
- . Supervision of the Safety and Health Program;
- . Supervision of the Emergency Prevention, Planning and Management Program;
- . Implementation of the provisions of the Archaeological Chance Finds Procedures.

Proposed Mitigation: The coal mine operator will be required to provide properly trained personnel to staff an Environment, Safety and Health Unit at the mine and provide support for their implementation of programs in these areas. It is anticipated that such a unit would include 3-5 individuals including a full-time environmental officer and a full-time safety and health officer.

Implementing Organizations: Personnel would be provided by the operator of the coal mine. Monitoring of the performance of these personnel would be conducted by the planned Pakistan Environmental Protection Agency (PEPA), Ministry of Labor and the Government of Sind Mine Inspectorate. Performance would also be routinely monitored by the international Mine Safety and Health Advisor proposed in item 3.D. below. It should be noted that the Advisor will also provide training for personnel assigned these responsibilities by the mine operator.

Estimated Cost: Personnel salaries and support costs for operations to be determined by the coal mine operator.

Duration: A properly staffed and supported Environmental, Safety and Health Unit would be required for the duration of coal mine operations.

Funding Sources: Personnel and support costs for the Environmental, Safety and Health Unit would be met by the coal mine operator. The Government of Pakistan, Government of Sind and international donor organizations would support costs for monitoring activities.

B. Development and Implementation of an Environmental Monitoring Program for Coal Mine Operations

Problem: The development and implementation of an environmental monitoring program is required to assure both the environmental soundness of the coal mine and to assist in

operation and maintenance activities. Primary elements of the monitoring program would include:

- . Environmental monitoring (air quality, water quality, etc.);
- . Monitoring of the reclamation program;
- . Monitoring of the disposal of waste materials.

The design criteria for mining operations require that they comply with both Government of Pakistan laws and regulations and World Bank environmental guidelines.

Proposed Mitigation: Development of a long-term environmental monitoring program by the mine operator will provide for routine monitoring of coal mine compliance with environmental requirements, provide quantitative and qualitative input for operation and maintenance activities including safety and health programs, and establish baseline data for other similar operations in Pakistan. Mitigation activities will focus on the development of a design for environmental monitoring, training of Pakistani personnel and the procurement of selected scientific equipment for monitoring critical parameters. Monitoring equipment would include testing equipment for carbon monoxide, carbon dioxide, methane, etc.

Implementing Organizations: Personnel would be provided by the operator of the coal mine. Monitoring of the performance of these personnel would be conducted by the planned Pakistan Environmental Protection Agency (PEPA) and the Government of Sind Mine Inspectorate. Performance would also be periodically monitored by representatives of international development organizations.

Estimated Cost: Personnel salaries and support costs for operations to be determined by the coal mine operator. It is anticipated that \$100,000 in international support would be required to fund the initial stages of the monitoring program. These funds would be used for the design of a monitoring program (\$20,000), training of Pakistani personnel (\$30,000) and the procurement of selected scientific equipment (\$50,000). It should be recognized that the long-term implementation of the program will also require recurrent costs for operation and maintenance of monitoring equipment.

Duration: A properly implemented environmental monitoring program will be required for the duration of coal mine operations.

Funding Sources: Personnel and support costs for the Environmental, Safety and Health Unit to conduct the monitoring program would be provided by the coal mine operator. The Government of Pakistan, Government of Sind and international donor organizations would support costs for design of the monitoring program, training of personnel, procurement of selected equipment and monitoring activities.

C. Performance of Mine Reclamation

Problem: Implementation of the proposed project will result in several types of physical and biological impacts associated with mine development and operation:

- a. Significant local and moderate regional short and medium term air quality and health impacts will result from surface mining due to dust generation unless steps are taken to suppress dust during mining operations and basic reclamation is conducted following the completion of mining operations.
- b. Moderate local long-term impacts will occur unless physical structures associated with mining operations are removed following the completion of mining operations.
- c. Significant local long-term safety risks will exist unless mine shafts and other openings leading to underground mines are properly sealed following the completion of mining activities.
- d. Significant local long-term impacts to land use will occur as the result of subsidence associated with the removal of coal in underground operations. While the subsidence cannot be avoided, careful adherence to good mining practices can limit the impact. The provision of accurate maps of underground mining operations to national, provincial and local government authorities will allow for proper land use planning in these areas in the future.

Proposed Mitigation: The mine operator will implement reclamation programs for both surface mining and underground operations as outlined in the technical and feasibility studies prepared for Project mining operations. Given the natural physical conditions at the Lakhra site and present levels of overgrazing, it is not anticipated that reclamation will include full restoration of native vegetation. However, the mine operator will be expected to restore slopes to approximate grade, implement siltation control programs and attempt to stabilize disturbed surfaces.

Implementing Organizations: Equipment and personnel required for implementation of the reclamation program would be provided by the operator of the coal mine. Monitoring of the performance of these personnel would be conducted by the planned Pakistan Environmental Protection Agency (PEPA) and the Government of Sind Mine Inspectorate. Performance would also be periodically monitored by representatives of international donor organizations.

Estimated Cost: Implementation of a reclamation program is assumed in technical and feasibility studies prepared for the Project.

Duration: Implementation of the reclamation program would be required for the duration of coal mine operations.

Funding Sources: Costs for the reclamation program would be met by the coal mine operator. The Government of Pakistan, Government of Sind and international donor organizations would support costs for monitoring activities.

D. Development of an Implementation Plan for Coal Mine Occupational Safety and Health

Problem: The implementation of both surface and underground mining operations results in the creation of a wide range of occupational safety and health risks to those employed in the facility. It should be noted that coal mining, especially underground mining, has a very high accident rate on a worldwide basis when compared to other industries. These occupational risks include:

- . Death or permanent disability from lung ailments due to coal dust inhalation (Coal Workers Pneumoconiosis - CWP);
- . Death or injury from roof collapse;
- . Death or injury from haulage accidents;
- . Death or injury from accidents involving machinery;
- . Death or injury from improper handling of explosives;
- . Death or injury from dust and gas explosions;
- . Permanent or temporary loss of hearing due to noise exposure.

In order to reduce such risks both the Government of Pakistan and international donor organizations require the development of occupational safety and health programs for coal mines.

Proposed Mitigation: The coal mine operator would be required to prepare and implement an Occupational Safety and Health Plan which would conform with the "Coal Mining Occupational Safety and Health Guidelines" prepared by the Office of Environmental Affairs, The World Bank (May 1984). These guidelines are supplemented with site-specific occupational safety and health guidelines developed by John T. Boyd Company and included as an Annex to the Draft Lakhra Coal Mine and Power Plant Environmental and Social Soundness Assessment. In addition, any coal purchased for use at the power plant by other coal mines would be required to comply with these guidelines to ensure the Project promotes internationally recognized occupational safety and health standards.

Development of a Coal Mine Occupational Safety and Health Plan acceptable to the Government of Pakistan and international donor organizations will be required prior to the start-up of coal mining operations. The Plan will include a detailed implementation plan which will anticipate routine external monitoring to assure compliance with safety and health guidelines.

Implementing Organizations: The coal mine operator will be responsible for development and implementation of the Occupational Safety and Health Plan. Primary implementation responsibility will rest with the Environmental, Safety and Health Management Unit of the mine. Compliance with the provisions of this Plan would be monitored by the Ministry of Labor and the Government of Sind Mine Inspectorate. In the initial years of the Project, implementation of the Plan would be routinely monitored by an international Mine Safety and Health Advisor who would be funded under the Project. The implementation of the Plan would also be periodically monitored by representatives of international donor organizations.

The Mine Safety and Health Advisor would be responsible for the following activities:

- . Conducting routine monitoring visits to coal mines which are either directly supported by the Project or which sell coal to the power plant to assure compliance with internationally recognized coal mine safety and health standards;

- . Assisting the Government of Pakistan and Government of Sind personnel design and plan mine safety and health inspection programs;
- . Assisting the mine management and environmental, health and safety personnel design and plan mine safety and health inspection programs;
- . Conducting training programs for Government of Pakistan and Government of Sind personnel in mine safety and health;
- . Conducting training programs for mine management and environmental, safety and health personnel in mine safety and health.

In addition, the Advisor will be responsible for assisting in the implementation of the Emergency Prevention, Planning and Management Plan which is outlined below in 3.E.

Estimated Cost: Personnel salaries and support costs for operations to be determined by the coal mine operator. It is anticipated that an international Mine Safety and Health Advisor will be required full-time for a period of three years at a total cost of \$300,000 (\$100,000 per year) and that up to two person-months per year will be required for an additional 2 years at an estimated total cost of \$50,000 including air fare and per diem.

Duration: Implementation of the Plan for Occupational Safety and Health will be required throughout the operational period of the coal mine.

Funding Sources: The coal mine operator would fund the development of the Occupational Safety and Health Plan. In addition, the operator would provide personnel and support costs for the Environmental, Safety and Health Staff to implement the plan. The Government of Pakistan, Government of Sind and international donor organizations would support costs for monitoring activities.

E. Development and Implementation of a Plan for Emergency Prevention, Planning and Management

Problem: The implementation of both surface and underground mining operations results in the creation of a wide range of potential emergency situations which create a major risk to those employed at the facility. It should be noted that coal mining, especially underground mining, has a very high incidence of emergency situations a worldwide basis when compared to other industries. These emergency situations arise often from the following situations:

- . Major gas or coal dust explosion;
- . Large scale underground mine roof collapse;
- . Large scale surface or underground explosion resulting from the explosives;
- . Combustion of coal at face of mining operations or in storage piles.

In order to reduce such risks many international donor organizations require the development of Emergency Prevention, Planning and Management Plans for coal mines.

Proposed Mitigation: The coal mine operator would be required to prepare and implement an Emergency Prevention, Planning and Management Plan which would conform to the principles outlined in "Manual of Industrial Hazard Assessment Techniques" prepared by the Office of Environmental and Scientific Affairs, The World Bank (October 1985) and supplemented by site-specific emergency management recommendations developed by John T. Boyd Company and included as an Annex to the Draft Lakhra Coal Mine and Power Plant Environmental and Social Soundness Assessment. In addition, any coal purchased for use at the power plant by other coal mines would be required to develop and implement site-specific Coal Mine Emergency Prevention, Planning and Management Plans.

Development of a Coal Mine Emergency Prevention, Planning and Management Plan acceptable to the Government of Pakistan and international donor organizations will be required prior to the start-up of coal mining operations. The Plan will include a detailed implementation plan which will anticipate routine external monitoring.

Implementing Organizations: The coal mine operator will be responsible for development and implementation of the Coal Mine Emergency Prevention, Planning and Management Plan. Primary implementation responsibility will rest with the Environmental, Safety and Health Management Staff of the mine. Compliance with the provisions of this Plan would be monitored by the Ministry of Labor and the Government of Sind Mine Inspectorate. In the initial years of the Project implementation of the Plan would be routinely monitored by an international Mine Safety and Health Advisor who would be funded under the Project (see item 3. D. above). The implementation of the Plan would also be periodically monitored by representatives of international donor organizations.

In addition to tasks outlined in 3.D., the Mine Safety and Health Advisor would also be responsible for the following activities in the area of Emergency Prevention, Planning and Management:

- . Conducting routine monitoring visits to coal mines which are either directly supported by the Project or which sell coal to the Lakhra Power Plant to assure implementation of Emergency Prevention, Planning and Management Plans;
- . Assisting the Government of Pakistan and Government of Sind personnel design Emergency Prevention, Planning and Management Plans;
- . Assisting the mine management and environmental, health and safety personnel design Emergency Prevention, Planning and Management Plans;
- . Conducting training programs for Government of Pakistan and Government of Sind personnel in Emergency Prevention, Planning and Management;
- . Conducting training programs for mine management and environmental, safety and health personnel in Emergency Prevention, Planning and Management.

Estimated Cost: Personnel salaries and support costs for operations to be determined by the coal mine operator. It is anticipated that an international Mine Safety and Health Advisor will be required full-time for a period of three years at a total cost of \$300,000 (\$100,000 per year) and that up to two person-months per year will be required for an additional 2 years at an estimated total cost of \$50,000 including air fare and per diem. These costs have been previously noted in section 3.D.

Duration: Implementation of the Emergency Prevention, Planning and Management Plan will be required throughout the operational period of the coal mine.

Funding Sources: The coal mine operator would fund the development of the Emergency Prevention, Planning and Management Plan. In addition, the operator would provide personnel and support costs for the Environmental, Safety and Health Staff to implement the plan. The Government of Pakistan, Government of Sind and international donor organizations would support costs for monitoring activities.

#### 4. LAKHRA POWER PLANT MITIGATION ACTIVITIES

##### A. Safety Program During Construction of the Power Plant

Problem: The construction of a power plant involves major construction which creates a number of serious safety problems most noteworthy of which is the building of the stacks. The construction of most power plants results in the serious injury and loss of life due to routine accidents, however, steps can be taken to reduce the loss-of-life and serious injury to acceptable levels.

Proposed Mitigation: The construction supervisor contractor for the power plant will be required to retain a full-time safety officer who will be responsible for assuring proper safety procedures are used by all construction contractors. In addition, construction contractors for elements which are known to pose special construction risks will be required to provide special safety plans and retain full-time safety officers.

Implementing Organizations: Safety officers would be provided by the construction supervision and construction contractors. Monitoring of the performance of these personnel would be conducted on a periodic basis by the Ministry of Labor, the Water and Power Development Authority (WAPDA) and representatives of international development organizations.

Estimated Cost: Personnel salaries and support costs for safety officers to be determined by the construction supervision and construction contractors and included as an element of the cost proposal.

Duration: A full-time safety officer will be required for the duration of the construction period.

Funding Sources: Personnel and support costs for the safety officer would be met by the construction supervision and construction contractors and be included as a cost within their contracts to be funded by the Project consortium. The Government of Pakistan and international donor organizations would support the costs for monitoring activities.

B. Development of an Environmental, Safety and Health Management Staff for Power Plant Operations

Problem: Environmentally sound implementation of the power plant requires employment and support for a professional staff to address environmental, safety and health issues. The primary responsibilities of this staff would include:

- . Environmental monitoring (air quality, water quality, etc.);
- . Monitoring of the disposal of waste materials;
- . Supervision of the Health and Safety Program;
- . Supervision of the Emergency Prevention, Planning and Management Program;
- . Implementation of the Provisions of the Archaeological Chance Finds Procedures.

Proposed Mitigation: The power plant operator will be required to provide properly trained personnel to staff an Environment, Safety and Health Unit at the power plant and provide support for their implementation of programs in these areas. It is anticipated that such a unit would include 3-5 individuals including a full-time environmental officer and a full-time safety and health officer.

Implementing Organizations: Personnel would be provided by the operator of the power plant. Monitoring of the performance of these personnel would be conducted by the planned Pakistan Environmental Protection Agency (PEPA) and the Ministry of Labor. Initial performance would also be periodically monitored by the international Power Plant Safety and Health Advisor proposed in item 4.D. below. It should be noted that the Advisor will also provide training for personnel assigned safety and health responsibilities by the power plant operator.

Estimated Cost: Personnel salaries and support costs for operations to be determined by the power plant operator.

Duration: A properly staffed and supported Environmental, Safety and Health Unit would be required for the duration of power plant operations.

Funding Sources: Personnel and support costs for the Environmental, Safety and Health Unit would be met by the power plant operator. The Government of Pakistan, Government of Sind and international donor organizations would support costs for monitoring activities.

C. Development and Implementation of an Environmental Monitoring Program for Power Plant Operations

Problem: The development and implementation of an environmental monitoring program is required to assure both the environmental soundness of the power plant and to assist in operation and maintenance activities. Operation of a coal-fired power plant may result in air quality impacts at both a local and regional scale. Primary elements of the monitoring program would include:

- . Environmental Monitoring (air quality, water quality, etc.);
- . Monitoring of the Disposal of Waste Materials.

The design criteria for power plant operations require that they comply with both Government of Pakistan laws and regulations and World Bank environmental guidelines.

Proposed Mitigation: Development of a long-term environmental monitoring program by the power plant operator will provide for routine monitoring of power plant compliance with environmental requirements, provide quantitative and qualitative input for operation and maintenance activities including safety and health programs, and establish baseline data for other similar operations in Pakistan. Mitigation activities will focus on the development of a design for environmental monitoring, training for Pakistani personnel and the procurement of selected scientific equipment for monitoring critical parameters. Monitoring equipment would include testing equipment for sulfur dioxide.

Implementing Organizations: Personnel would be provided by the operator of the power plant. Monitoring of the performance of these personnel would be conducted by the planned Pakistan Environmental Protection Agency (PEPA) and the Water and Power

Development Authority (WAPDA). Performance would also be periodically monitored by representatives of international development organizations.

Estimated Cost: Personnel salaries and support costs for operations to be determined by the power plant operator. It is anticipated that \$85,000 in international support would be required to fund the initial stages of the monitoring program. These funds would be used for the training of Pakistani personnel (\$5,000), the procurement of a sulfur dioxide monitor (\$75,000), and the procurement of an initial supply of spare parts and materials (\$5,000). It should be recognized that the long-term implementation of the program will also require recurrent costs for operation and maintenance of monitoring equipment. The provision of this equipment would complement existing monitoring equipment at Jamshoro and allow for the development of an area air quality monitoring network.

Duration: A properly implemented environmental monitoring program will be required the duration of power plant operations.

Funding Sources: Personnel and support costs for the Environmental, Safety and Health Unit to conduct the monitoring program would be by the power plant operator. The Government of Pakistan and international donor organizations would support costs for design of the monitoring program, training of personnel, procurement of selected equipment and monitoring activities.

D. Development and Implementation of a Plan for Power Plant Occupational Safety and Health

Problem: The operation of a coal-fired power plant results in a variety of occupational safety and health risks to employees. It should be noted that the safety and health record for the operation of coal-fired power plants indicates that they have significantly lower accident rates than coal mining. The occupational risks associated with power plants include:

- . Death or injury from burns, slips and falls;
- . Death or injury from fires and explosions;
- . Death or injury from bronchitis and associated health complications;
- . Death or injury from accidents involving machinery;

- . Death or injury from exposure to hazardous levels of sulphur dioxide, carbon monoxide and nitrogen dioxide;
- . Injury from dermatitis for workers exposed to coal ash dust.
- . Permanent or temporary loss of hearing due to noise exposure
- . Injury and stress due to heat stress experienced by workers in boiler operations

In order to reduce such risks both the Government of Pakistan and international donor organizations require the development of occupational safety and health programs for power plants.

Proposed Mitigation: The power plant operator would be required to prepare and implement an Occupational Safety and Health Plan which would conform with the "Power Plants, Coal and Fuel Oil Occupational Safety and Health Guidelines" prepared by the Office of Environmental Affairs, The World Bank (April 1984). These guidelines are supplemented with facility specific occupational safety and health guidelines developed by Gilbert Commonwealth International, Inc. and included as an Annex to the Draft Lakhra Coal Mine and Power Plant Environmental and Social Soundness Assessment.

Development of a Power Plant Occupational Safety and Health Plan acceptable to the Government of Pakistan and international donor organizations will be required prior to the start-up of power plant operations. The Plan will include a detailed implementation plan which will anticipate periodic external monitoring to assure compliance with safety and health guidelines.

Implementing Organizations: The power plant operator will be responsible for development and implementation of the Occupational Safety and Health Plan. Primary implementation responsibility will rest with the Environmental, Safety and Health Management Staff of the power plant. Compliance with the provisions of this Plan would be monitored by the Ministry of Labor and the Water and Power Development Authority (WAPDA). In the initial years of the Project implementation of the Plan would be routinely monitored by an international Mine Safety and Health Advisor who would be funded under the Project. The implementation of the Plan would also be periodically monitored by representatives of international donor organizations.

The part-time Power Plant Safety and Health Advisor would be responsible for the following activities:

- . Conducting routine monitoring visits to the power plant to assure compliance with power plant safety and health standards;
- . Assisting the Government of Pakistan and WAPDA personnel design and plan power plant safety and health inspection programs;
- . Assisting the power plant management and environmental, safety and health personnel design and plan power plant and health inspection programs;
- . Conducting training programs for Government of Pakistan and WAPDA personnel in power plant safety and health;
- . Conducting training programs for power plant management and environmental, safety and health personnel in power plant safety and health.

In addition, the Advisor will be responsible for assisting in the implementation of the Emergency Prevention, Planning and Management Plan which is outlined below in 4.E.

Estimated Cost: Personnel salaries and support costs for operations to be determined by the power plant operator. It is anticipated that an international Power Plant Safety and Health Advisor will be required part-time for a period of three years to conduct two one-month visits annually at a total cost of \$75,000 (\$25,000 per year) including air fare and per diem.

Duration: Implementation of the Plan for Occupational Safety and Health will be required throughout the operational period of the power plant.

Funding Sources: The power plant operator would fund the development of the Plan for Occupational Health and Safety. In addition, the operator would provide personnel and support costs for the Environmental, Safety and Health Staff to implement the Plan. The Government of Pakistan and international donor organizations would support costs for monitoring activities.

E. Development and Implementation of a Plan for Emergency Prevention, Planning and Management

Problem: The implementation of a coal-fired power plant results in the creation of a wide range of potential emergency

situations which create a major risk to those employed at the facility. These emergency situations arise often from the following situations:

- . Boiler explosion;
- . Explosion or fire from combustion of coal in storage piles;
- . Major break in the stack or lines resulting in exposure to hazardous levels of sulphur dioxide, carbon monoxide and/or nitrogen dioxide.

In order to reduce such risks many international donor organizations require the development of Emergency Prevention, Planning and Management Plans for power plants.

Proposed Mitigation: The power plant operator would be required to prepare and implement an Emergency Prevention, Planning and Management Plan which would conform to the principles outlined in "Manual of Industrial Hazard Assessment Techniques" prepared by the Office of Environmental and Scientific Affairs, The World Bank (October 1985) and supplemented by site-specific emergency management recommendations developed by Gilbert Commonwealth International, Inc. and included as an Annex to the Draft Lakhra Coal Mine and Power Plant Environmental and Social Soundness Assessment.

Development of a Power Plant Emergency Prevention, Planning and Management Plan acceptable to the Government of Pakistan and international donor organizations will be required prior to the start-up of power plant operations. The Plan will include a detailed implementation plan which will anticipate routine external monitoring.

Implementing Organizations: The power plant operator will be responsible for development and implementation of the Emergency Prevention, Planning and Management Plan. Primary implementation responsibility will rest with the Environmental, Safety and Health Management Unit of the power plant. Compliance with the provisions of this Plan would be monitored by the Ministry of Labor and the central management offices of Water and Power Development Authority (WAPDA). In the initial years of the Project, implementation of the Plan would be periodically monitored by an international Power Plant Safety and Health Advisor who would be funded under the Project (see item 4. D. above). The implementation of the Plan would also be periodically monitored by representatives of international donor organizations.

In addition to tasks outlined in 4.D., the Mine Safety and Health Advisor would also be responsible for the following activities in the area of Emergency Prevention, Planning and Management:

- . Assisting the Government of Pakistan and WAPDA personnel design Emergency Prevention, Planning and Management Plans;
- . Assisting power plant management and environmental, health and safety personnel design Emergency Prevention, Planning and Management Plans;
- . Conducting training programs for Government of Pakistan and WAPDA personnel in Emergency Prevention, Planning and Management;
- . Conducting training programs for power plant management and environmental, safety and health personnel in Emergency Prevention, Planning and Management.

Estimated Cost: Personnel salaries and support costs for operations to be determined by the power plant operator. It is anticipated that an international Power Plant Safety and Health Advisor will be required part-time for a period of three years to conduct two one-month visits annually at a total cost of \$75,000 (\$25,000 per year) including air fare and per diem. These costs have previously noted in section 4.D.

Duration: Implementation of the Plan for Emergency Prevention, Planning and Management will be required throughout the operational period of the power plant.

Funding Sources: The power plant operator would fund the development of the Plan for Emergency Prevention, Planning and Management. In addition, the operator would provide personnel and support costs for the Environmental, Safety and Health Staff to implement the plan. The Government of Pakistan and international donor organizations would support costs for monitoring activities.

##### 5. Development of a Management Plan for Solid Waste, Overburden and Mine Wastes

Problem: Implementation of coal mine and power plant operations will result in the production of a variety of waste materials which must be properly disposed of to avoid negative environmental impacts to air, land and water resources. These waste materials potentially include the following:

- . acidic overburden and interburden material;
- . alkaline overburden and interburden material;
- . cleaning waste;
- . demineralization sludges;
- . gop (mining wastes);
- . power plant fly and bottom ash;
- . sludges;
- . sanitary wastes.

Proposed Mitigation: A Management Plan for Soild Waste, Overburden and Mine Wastes will be developed on a site specific/plant specific basis. This plan will review the different types of materials that may be generated as the result of Project implementation and identify procedures for cost-effective storage, transport and disposal. This plan will be implemented as an element of the Project by the coal mine and power plant operators.

Implementing Organizations: The proposed Plan would be developed by a Project funded international consultant in collaboration with representatives of the coal mine and power plant operators. Primary implementation responsibility for the Plan will rest with the Environmental, Safety and Health Management Unit of the mine and power plant. Compliance with the provisions of this Plan would be monitored by the proposed Pakistan Environmental Protection Agency (PEPA), Ministry of Health and the Government of Sind Mine Inspectorate. The implementation of the Plan would also be periodically monitored by representatives of international donor organizations.

Estimated Cost: Preparation of the Plan is anticipated to cost \$50,000 for the services of an international consultant in addition to costs associated with the salaries and overhead costs for coal mine, power plant and Government of Pakistan personnel assigned to the study. It is not presently possible to estimate costs for implementation; these will determined as an element of the study.

Duration: The study will require 6 months to develop and can be prepared concurrently with the implementation of the Project. Implementation of the Management System for Soild Waste, Overburden and Mine Wastes will be required for the duration of the Project.

Funding Sources: The Government of Pakistan, coal mine and power plant operators would provide personnel and support costs for their representatives on the planning team. The Government of Pakistan and international donor organizations would support costs for an international consultant to assist in the preparation of the Plan.

#### 6. Performance of Feasibility Studies on Waste Product Utilization

Problem: Operation of project supported coal mines and power plant will result in the generation of moderate amounts of waste products some of which may have economically beneficial uses.

Proposed Mitigation: It is proposed that a small-scale applied research program be incorporated as an element of the project to determine which waste materials may have cost-effective uses. This program would include a review of all significant waste products produced as the result of mining and power plant operations and determine which, if any, may have an economic use in the Pakistani context. The program will also support small scale demonstration activities to show the use of these materials.

Implementing Organizations: The proposed plan would be implemented through a series of small grants to be administered by a designated Government of Pakistan organization in collaboration with representatives of the coal mine and power plant operators. It is anticipated that organizations involved in preparation of studies will include: the Pakistan Council for Scientific and Industrial Research (PCSIR), Mehran University, University of Sind and Pakistani private sector organizations. The Environmental, Safety and Health Management Unit of the mine and power plant. The implementation of the program would be periodically monitored by representatives of international donor organizations.

Estimated Cost: Implementation of the program of studies is anticipated to cost up to a maximum of \$50,000 equivalent in local currency.

Duration: The program will support a series of studies and demonstration activities over a period of 5 years.

Funding Sources: The Government of Pakistan would provide support for this mitigation as a contribution to the Project.

#### 7. Infrastructure and Public Services Mitigation Activities

Problem: Implementation of the Project will result in a wide range of impacts to infrastructure (primary and secondary) and public services. Traditionally, the management of these types of impacts resulting from coal mine and power plant projects has been extremely difficult to mitigate as the responsibility for their funding and management is outside the scope of the Project. In most cases the costs for infrastructure improvements and public services are the responsibility of regional and local governmental organizations which do not have adequate access to funds for capital investment, operation and maintenance and/or salaries. The failure to adequately address these types of impacts in other similar projects has resulted in serious negative impacts on project implementation, regional economic development and public welfare.

The anticipated impacts will predominantly be the result of additional numbers of people who will be resident in the greater project area as the result of construction and operation of the coal mine and power plant. This population will be added to by individuals attracted to the area by employment opportunities in service industries and perceived employment opportunities. Impacts will also result to the regional and local road network from the hauling of heavy materials for the construction and operation of the coal mine and power plant.

On the basis of detailed field surveys conducted by Environmental Science and Engineering, Inc. and Gilbert Commonwealth International, Inc., the following items have been

identified as requiring development and implementation of mitigation activities:

A. Upgrading and Improvement of the Lakhra Highway

Development of the proposed coal mine and power plant will result in large traffic increases on the Lakhra Highway. The highway as presently designed is inadequate to handle these increases in terms of both the projected volume of traffic and anticipated vehicle weights. These increases in traffic volume and vehicle weights will have a significant increase road maintenance requirements and reduce the life of the road.

B. Planning and Management of Secondary Development in the Area of the Coal Mine and Power Plant

Unless controlled by the development and strict enforcement of a land use plan uncontrolled formal and informal development will occur in the vicinity of the coal mine and power plant. This development will create demands for the provision of public facilities and services by the Government of Sind, Dadu District Government and the Water and Power Development Authority (WAPDA) in the site area significantly beyond those presently planned. Unless development is strictly controlled settlement may extend over areas planned for future mine development and areas potentially subject to subsidence from underground coal mining. In addition, unrestricted development may result in the settlement of areas which might be subject to either significant pollution under certain conditions or at risk under potential emergency situations.

C. Planning and Management of Secondary Development in Khanot

Unless controlled by the development and strict enforcement of a land use plan uncontrolled formal and informal development will occur in the vicinity of Khanot. This development will create demands for the provision of public facilities and services by the Government of Sind, Dadu District Government and the Water and Power Development Authority (WAPDA). Unless development is strictly controlled settlement may extend over areas planned for future expansion of the power plant colony and/or mine workers colony. Uncontrolled development may also result in the infringement on road rights-of-way through Khanot which will delay traffic.

D. Potable Water Stations in Khanot

The anticipated increase in population in Khanot as the result of Project implementation will result in demand for additional potable water services. If additional potable water facilities are not developed users will be required to haul water from either sites on the Indus River or from groundwater wells on the floodplain.

E. Coordination with Local Officials to Provide for Increased Public Services in the Project Area

It will be necessary to closely coordinate with local officials in advance of Project implementation to assure that they are aware of anticipated demands for services which will result directly from the Project and associated secondary population growth. If these demands are not properly anticipated and addressed there would be serious negative impacts on the standards of living experienced by those resident in the power plant colony, coal miner colony and other settlements in the project area.

The most serious problem will be the demands for the provision of the following types of facilities and public services:

- . Housing;
- . Commercial services;
- . Religious facilities;
- . Educational facilities;
- . Medical services;
- . Police services;
- . Water supply;
- . Wastewater management;
- . Solid waste management.

F. Coordination with Local Officials to Identify and Develop Secondary Employment in the Project Area

Implementation of the Project will result in the movement of people into the Project area seeking employment. Unless steps are taken to develop secondary employment for those who settle and do not find employment in the coal mine and power plant there will be a significant unemployment problem in the area.

Proposed Mitigation: Presently available information indicates that the following mitigations should be adopted to address the problems reviewed above. It is planned that as additional information becomes available these sections will be expanded.

A. Upgrading and Improvement of the Lakhra Highway

It is proposed that the existing highway and road maintenance program be upgraded to accommodate both the anticipated volume of traffic and the weight loads which will occur as a result of implementation of the project.

B. Planning and Management of Development in the Area of the Coal Mine and Power Plant

It is proposed that the Project support the preparation and implementation of a development and land use plan for the area of the coal mine and power plant. This plan should be prepared in collaboration with representatives of the Government of Sind and Dadu District Government.

C. Planning and Management of Secondary Development in Khanot

It is proposed that the Project support the preparation and implementation of a development and land use plan for Khanot. This plan should be prepared in collaboration with representatives of the Government of Sind and Dadu District Government.

D. Potable Water Stations in Khanot

It is proposed that potable water stations be constructed in Khanot as a Project mitigation activity. These stations should be located to support rational development of Khanot. Their projected water requirements should be factored into the design of the water supply system from the Indus River to the coal mine.

E. Coordination with Local Officials to Provide for Increased Public Services in the Project Area

Representatives of the parties responsible for the design and implementation of the Project should meet with the Government of Sind and Dadu District Government to discuss projected increases in population and to review the types of demands for infrastructure and public services. This process should include the preparation of a plan for the timely development of the infrastructure and provision of services. The plan should include budget estimates for capital costs, operation and maintenance costs, and personnel costs.

F. Coordination with Local Officials to Identify and Develop Secondary Employment in the Project Area

Representatives of the parties responsible for the design and implementation of the Project should meet with the Government of Sind and Dadu District Government to discuss increases in people seeking employment in the project area. This process should include the preparation of a plan to address this issue.

Implementing Organizations: It is anticipated that the primary implementing organizations will be the Government of Sind, Dadu District Government and Water and Power Development Authority (WAPDA). The specific organization which will be responsible for each mitigation will be identified as an element of studies which are presently being prepared by Gilbert Commonwealth International, Inc. The implementation of the program would be periodically monitored by representatives of international donor organizations.

Estimated Cost: The estimated cost of the proposed mitigation activities identified above are presently being developed by Gilbert Commonwealth International, Inc. and will be provided in a later version of the Environmental Mitigation Plan.

Duration: It is anticipated that the mitigation activities identified above will be implemented in a staged manner concurrently with the implementation of other elements of the Project.

Funding Sources: The Government of Pakistan, the Government of Sind and Dadu District Government would be responsible for the funding of local currency costs to support the implementation of the mitigation program. International donor organizations would support costs for international consultants to assist in the preparation of designs/studies and selected imported commodities required for implementation of the mitigations.

8. Displacement of Seasonal Grazing and Destruction of Limited Areas Used for Run-off Cropping

Problem: The development of surface mining operations will result in permanent small-scale changes in local land use in the Project area which include: (a) the loss of limited seasonal grazing at the site of the power plant and in areas subject to mining operations and (b) the destruction of limited

areas used for run-off cropping in the northwestern section of the proposed East Pit after year 11 of mining operations. These impacts are anticipated to be minor; however, steps need to be taken to mitigate the impact on users, whether the basis of their land tenure is formal or informal in nature.

Proposed Mitigation: It is proposed that the Project support the development of comparable areas for grazing and run-off cropping as a mitigation activity. The present mining and reclamation plan includes the development of runoff control which could be modified to produce level areas of fine material which water can be directed to for the production of both grazing materials (introduced and native plants) and run-off cropping. The Government of Pakistan would need to determine which groups and/or individuals are presently using these areas, the form of land tenure they have and develop a program to provide access rights to new areas created by the mitigation activity.

Implementation Organizations: The mine operator will be responsible for implementation of the proposed mitigation as an element of the mining and reclamation plan. The Government of Pakistan would be responsible for identification of current users and establishment of a program for controlled access to the areas developed for grazing and run-off cropping. Implementation of the mitigation would be monitored by the coal mine Environmental, Safety and Health Unit and the Government of Sind Inspectorate of Mines. Implementation of the procedures will be periodically monitored by the Department of Archaeology and representatives of international development organizations.

Estimated Cost: The proposed mitigation represents a minor change in the mining and reclamation plan and is not anticipated to result in increased costs.

Duration: The proposed mitigation program will be conducted throughout the implementation period of the Project.

Funding Source: The coal mine operator will be responsible for funding this mitigation as an element of the reclamation program.

## 9. Endangered Animal Species

Problem: The implementation of the Project will result in the loss of habitat for the desert monitor (Varanus griseus), a CITES (Convention on International Trade in Endangered Species) and a Government of Pakistan/Government of Sind listed endangered species. The destruction of rare and endangered plant and animal species and/or their critical habitat is in violation of the policies of the Government of Pakistan and most international development organizations.

Proposed Mitigation: It is the understanding of A.I.D. based on discussions with wildlife experts from both the Government of Pakistan, Zoological Survey and the U.S. Fish and Wildlife Service that implementation of the proposed project will not impact the critical habitat of the desert monitor. In addition, it has been stated that the desert monitor is listed as an endangered species principally to restrict further pressure on existing populations due to a demand for skins.

It is presently planned that an international expert on the desert monitor will conduct a study of the ecology and status of the species in the Sind including Lakhra. This study will provide information for management of the species in the Lakhra area as well as provide recommendations for mitigation activities for inclusion in the proposed Strategy for Environmentally Sound Development of Coal Resources In Pakistan.

Implementing Organizations: The mitigation will be implemented by an investigator working in coordination with the Government of Pakistan, Zoological Survey and the U.S. Fish and Wildlife Service.

Estimated Cost: The study has already been funded.

Duration of Study: The study will require a period of six months and must be implemented prior to development of the coal mine and power plant.

Funding Sources: The study will be funded under the existing Cooperative Program between the Government of Pakistan, Zoological Survey and the U.S. Fish and Wildlife Service.

## 10. Archaeological and Historical Sites

Problem: The development of coal mines and power plants are often subject to surveys for archaeological and/or historical sites. Such procedures are especially common in the case of surface coal mines due to the extremely large land areas which are disturbed as the result of mining operations. The Pakistan Mining Development Corporation (PMDC) Tract and the Lakhra Power Plant site have been subject to an archaeological survey performed by the Department of Archaeology of the Government of Pakistan. This survey determined that there are no known sites of archaeological and/or historical significance in the project area.

However, sites which are buried or were not located by the survey may be discovered during the course of project implementation. Such sites are protected under the provisions of the Antiquities (Amendment) Act, 1976. The granting of an archaeological clearance for the Project by the Department of Archaeology has been made contingent on the development and implementation of "Archaeological Chance Find Procedures" to support the provisions of Article 5A. "Accidental discovery of antiquity to be reported to Director" and Article 28. "Regulation of mining, quarrying, etc. -". It should be noted that the implementation of such procedures is consistent with long standing concerns for archaeological and/or historical sites of an number of international development organizations.

Proposed Mitigation: The "Archaeological Chance Find Procedures" contained in Annex A will be implemented to assure compliance with the requirements of the Antiquities (Amendment) Act, 1976. The "Archaeological Chance Find Procedures" will be included in all contracts for construction and operation of both the coal mine and power plant to be supported under the Project. In addition, all contractors and operators will be provided with a copy of the Antiquities Act and a list of contacts in the Department of Archaeology.

Implementing Organizations: Implementation of the "Archaeological Chance Find Procedures" will be the responsibility of the management and environmental staff of each organization responsible for a construction or operational activity. The Environmental, Safety and Health Unit for the coal mine and power plant will have primary long-term

responsibility to assure implementation of the procedures. Implementation of the procedures will be periodically monitored by the Department of Archaeology and representatives of international development organizations.

Estimated Cost: It is not possible to estimate the cost for implementation of the "Archaeological Chance Find Procedures" as they have been developed to address an undetermined risk. Present legislation requires that the costs of archaeological salvage, if determined necessary, would be borne by the Government of Pakistan. Potential support from international development organizations participating in implementation of the Project will be restricted to the provision of expert technical assistance to assist Government of Pakistan funded personnel in the planning, excavation and evaluation of archaeological and/or historical materials located as the result of Project implementation. It should be noted, however, that the construction contractor or operator would sustain costs associated with a delay in implementation or a requirement to redirect operations into other areas.

Duration: Implementation of the "Archaeological Chance Find Procedures" will be conducted throughout the duration of coal mine and power plant operations.

Funding Sources: Environmental, Safety and Health personnel will be provided by the coal mine and power plant operators. The Government of Pakistan will provide personnel from the Department of Archaeology to provide technical assistance and conduct archaeological studies as determined necessary. Costs for special technical assistance to the Department of Archaeology and for periodical monitoring of the implementation of the procedures will be funded by international development organizations.

## ANNEX A

### Lakhra Coal Mine and Power Plant Project - "Archaeological Chance Find Procedures"

#### 1. Introduction

The following "Archaeological Chance Find Procedures" are intended to support implementation of the provisions of the Antiquities (Amendment) Act, 1976 of the Islamic Republic of Pakistan. The development of coal mines and power plants are often subject to surveys for archaeological and/or historical sites. Such procedures are especially common in the case of surface coal mines due to the extremely large land areas which are disturbed as the result of mining operations. The Pakistan Mining Development Corporation (PMDC) Tract and the Lakhra Power Plant site have been subject to an archaeological survey performed by the Department of Archaeology of the Government of Pakistan. This survey determined that there are no known sites of archaeological and/or historical significance in the project area.

However, sites which are buried or were not located by the survey may be discovered during the course of project implementation. Such sites are protected under the provisions of the Antiquities (Amendment) Act, 1976. The granting of an archaeological clearance for the Project by the Department of Archaeology has been made contingent on the development and implementation of "Archaeological Chance Find Procedures" to support the provisions of Article 5A. "Accidental discovery of antiquity to be reported to Director" and Article 28. "Regulation of mining, quarrying, etc. -". These procedures address steps which shall be taken when archaeological and/or historical materials are encountered in the course of construction or mining activities.

It should be noted that implementation of the "Archaeological Chance Find Procedures" is both legally required by the Government of Pakistan and consistent with long standing concerns for archaeological and/or historical sites of a number of international development organizations.

#### 2. Implementation

Implementation of the "Archaeological Chance Find Procedures" will be the responsibility of the management and environmental staff of each organization responsible for a construction or

operational activity. The Environmental, Safety and Health Unit for the coal mine and power plant will have primary long-term responsibility to assure implementation of the procedures. Implementation of the procedures will be periodically monitored by the Department of Archaeology and representatives of international development organizations.

### 3. Archaeological Chance Find Procedures

#### A. Definition of an Archaeological Chance Find

An archaeological chance find is the unanticipated discovery of material remains of an archaeological and/or historical nature. Most frequently such finds are found with 0-3 meters of the present surface and often are characterized by concentrations of pottery, worked stone, human and animal bones, and in some cases the remains of mud-brick structures. These materials are often of no commercial value, however, they may be of significant importance to to archaeologists, historians and others who are involved in studying the people, culture and environment of ancient Pakistan.

#### B. Notification of the Department of Archaeology

When a discovery has been made of archaeological and/or historical materials, or it is believed that such material may exist in an area to be disturbed, the Department of Archaeology should be notified immediately and requested to send a representative to make a site inspection. The request should be made both in writing and by telephone to the Department of Archaeology office in Hyderabad. All work should immediately cease in the vicinity of the find and not be resumed until a Department of Archaeology representative has visited the site. The Department should be advised of any materials that have been observed and any support which might be available from the contractor or operating organization to assist in examination of the material.

#### C. Response Period for the Department of Archaeology

The Department of Archaeology has a maximum of 72 hours from being notified by telephone to provide a representative to inspect the chance find, to determine the significance of the material and to make recommendations concerning what steps should be taken to salvage or formally excavate the material. If at the end of the 72 hour period the Department of

Antiquities has not responded to the request for field assistance any observed materials will be removed from their archaeological context and placed in storage for later collection by the Department.

D. Archaeological Salvage Procedures

The Department of Archaeology has the authority to conduct formal archaeological excavations and/or salvage any materials discovered as the result of "chance finds". It should be noted that all Pakistani rupee costs for the planning, management and conduct of such actions will be the responsibility of the Government of Pakistan. Potential support from international development organizations participating in implementation of the Project will be restricted to the provision of expert technical assistance to assist Government of Pakistan funded personnel in the planning, excavation and evaluation of archaeological and/or historical materials located as the result of Project implementation.

4. Penalties for Violations of the Procedures

It should be noted that the provisions of Article 5A., (4) state that "If any person who discovers or finds any moveable antiquity contravenes the provisions of sub-section (1) or subsection (2), he shall be punishable with imprisonment for a term which may extend to three years, or with fine, or with both, and the court shall direct that the antiquity in respect of which such contravention has taken place shall stand forfeited to the Federal Government."

5. Other Archaeological Concerns

It is important that all contractors and operators note and advise their personnel of the provisions of the following articles:

Article 26. "Export of Antiquities"

This article prohibits the export of any antiquity except under a license granted by the Director of Antiquities.

Article 29. "Prohibition of archaeological excavation or exploration without license"

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This article prohibits the conduct of archaeological excavation or exploration without a license issued by the Director of Antiquities.

All contractor and operator personnel should be strongly discouraged by their management from engaging in the illegal excavation, collection and/or export of antiquities.

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