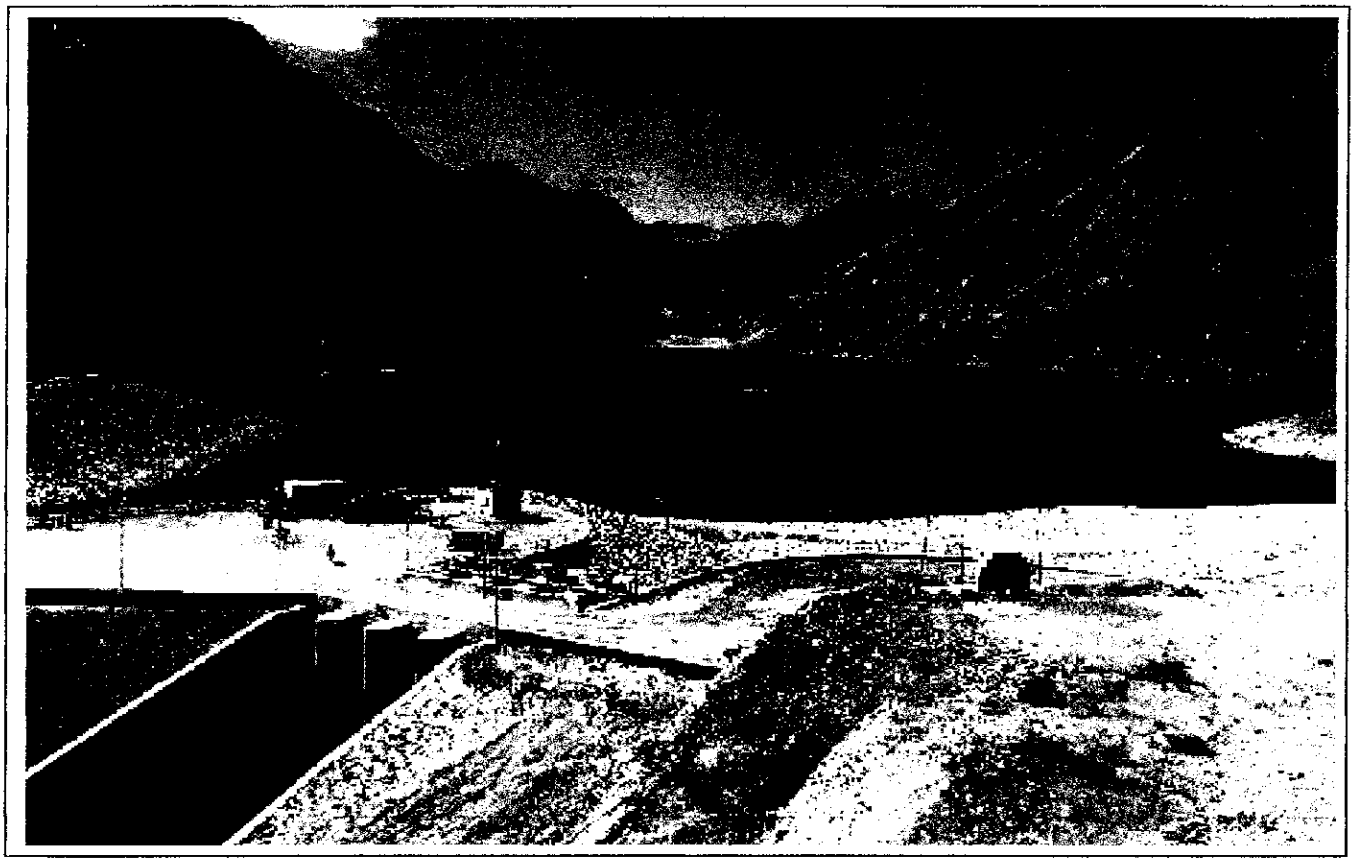
WATER AND POWER DEVELOPMENT AUTHORITY

Consultancy Services for Implementation of

SATPARA DAM PROJECT

MONTHLY PROGRESS REPORT
for the Month of April 2012



SDC SATPARA DAM CONSULTANTS

A Joint Venture of: Pakistan Engineering Services (Pvt.) Ltd. Zaheeruddin Consultants (Pvt.) Ltd. M M Pakistan (Pvt.)Ltd. IN Consult (Pvt.)Ltd. Project Advisor: Conyne.et. Bellier Mirza Associates Engineering Services (Pvt.) Ltd. Technica International

Consultancy Services for Implementation of Satpara Dam Project

Table of Contents

Description		Page#
Executive Summary		1
1.0	Introduction	5
1.0.1	Project Description	5
1.0.2	Project History	5
1.0.3	Objectives of Satpara Dam Project	5
2.0	Consultancy Services	6
2.0.1	Contractual Context	6
2.0.2	Scope of Consultancy Service / TOR	6
3.0	Components of the Project	6
3.0.1	Lot-1A (Civil and Hydraulic Steel Works)	6
3.0.2	Lot-1B (Electrical & Mechanical Works)	7
3.0.2.1	Major Activities at Consultants Office	7
3.0.3	Lot: 2(Irrigation System) International Bidding	8
3.0.4	Progress Status Lot-2 (Irrigation System)	8
3.0.5	Lot-4 (Shatung Nullah Diversion)	8
4.0	Status of Contractor IPC	
4.0.1	Contract lot-1A, Dam Powerhouse	9
4.0.2	Contractor Lot-2, Irrigation System	12
4.0.3	Contract Lot-1B, E&M Works	14
4.0.4	Contract Lot-1A (Powerhouse 3 & 4)	15
4.0.4	Contract Lot-1B(A) E&M Works for PH-3 & 4	15
5.0	Over-all Contracts Progress	16
Figure-1	Project Layout Scheme	
Figure-2	Irrigation Outline Plan	
Annexure – A, S-Curve, S-Curve E&M Works		
Progress Photographs		

IMPLEMENTATION OF EMMP

FOR

POWER HOUSES 3 & 4

AND REMAINING WORKS

SATPARA DAM PROJECT

April, 2012

SATPARA DAM PROJECT

IMPLEMENTATION OF EMMP

1. IMPLEMENTATION STRATEGY

1.1 Remaining Works

EMMP Work Plan has been prepared to ensure its implementation during project activities in the field. EMMP provides the mechanism to implement the mitigation measures identified during the environmental and social analysis. The EMMP includes a mitigation plan, which defines the mitigation actions against each of the potential impacts and Project activity, and also assigns responsibilities for these actions. It also identifies the environmental parameters to be monitored during various project phases.

The Consultants (PES), the Contractor (DESCON) and the Client (WAPDA) are responsible for their respective areas of responsibilities including implementation of EMMP. The Construction Contractor has designated Mr. Malik Baqi Khan as EHS Officer and the Consultants has designated Mr. Zafar Abbas (B.Sc Civil Engineer) as EHS Engineer. The EHS officers of the contractors will be responsible for implementing the mitigation measures and other aspects of EMMP. The EHS Engineer will maintain day-to-day coordination with the EHS Officer and ensure that the EMMP is adequately implemented. The EHS Engineer will also liaise with the Pak-EPA and GB EPA for matters related to environmental management in the project area.

1.2 O & M Phase

The EHS Engineer will implement various aspects of EMMP. The EHS Engineer will maintain liaison will outside agencies including the national and provincial EPA's for matters relating to the environmental management and compliance of environmental rules and regulations during the project operation. WAPDA Environmental Cell (WEC) will maintain supervision of the EMMP at the site.

2. IMPLEMENTATION SCHEDULE

The schedule for the implementation of EMMP on monthly basis has been drawn up for Remaining Works at the Dam and Powerhouses 3 & 4. The field work is underway since 01 May 2011. The relevant proformas completed for the month of November 2011 complying with NEQS and World Bank Guidelines EHS are enclosed.

The key issues which are essential part of environmental monitoring include air quality, noise, liquid/ solid waste management and environmental health and safety. In particular, wastewater from construction camps is treated by the use of septic tanks/ oxidation ponds to comply with NEQS before

final disposal. For the drinking water, GA PWD has the proper treatment plant based on Satpara lake water whose quality is monitored by them on regular basis. The water from the treatment plant is also used by the Contractor's construction camp.

Field data used for preparation of EMMP Works Plan from February 01 to February 29, 2012 appears as Annexure which are attached and list below:

Annexure

1	**:**	**Office Order / Appointment Letter for EHS Engineer and EHS Officer**
2	**:**	**WHO Ambient Air Quality Standards**
3	**:**	**NEQS for Motor Vehicle Exhaust and Noise**
4	**:**	**NEQS for Water Effluent**
5	**:**	**Common Diseases in Skardu**
6	**:**	**Updated Status of Land Acquisition**
7	**:**	**Inflow Outflow Data of Satpara Dam**
8	**:**	**Drinking Water Quality Analysis Results**
9	**:**	**National Drinking Water Quality Standard**
10	**:**	**Meteorological Data**

CHECKLIST FOR IMPLEMENTATION EMMP WORK PLAN

Date: April 01, 2012 to April 30, 2012 **Project Site: SDP-Power House 3 & 4 and Remaining Works**

Items	Yes	No	N/A	Comments
A. CONTRACTOR'S MOBILIZATION/DEMOBILIZATION				
1. Soil Erosion/ Contamination				
o Vehicles and equipment not repaired in the field. If unavoidable, impervious sheathing will be used avoid soil and water contamination	Y			o Vehicles repair and maintenance done after laying plastic sheets on the ground to prevent soil and water contamination
o Stockpiles adequately protected from erosion	Y			o To prevent stockpiles erosions
2. Air Quality				
o Construction machinery and vehicles kept in good working condition and properly tuned in order to minimize the exhaust emissions	Y			o Appropriate maintenance of generators and vehicles ensured to minimize exhaust emissions as per WHO Ambient Air Quality Standard attached as Annexure – 2.
o Fugitive dust emissions minimized by appropriate methods, such as spraying water on soil where required, appropriately	Y			-
3. Noise				
o Vehicles have exhaust mufflers to minimize noise generation	Y			o Maintained at 85 Db(A) as per requirements of NEQS for motor vehicles exhaust and noise. The standards are given in Annexure -3.
o Night traffic avoided near human settlements. Local population will be taken into confidence if such work is unavoidable	Y			o Construction activity largely conducted daytime to avoid inconvenience to local population at night
o Vehicular traffic through the communities avoided as far as possible. Vehicle speed kept low, and horns used while passing through or near the human settlements	Y			-
o The vehicles noise comply with the NEQS	Y			o Maintained at 85 Db(A) as per requirements of NEQS for motor vehicles exhaust and noise. The standards are given in Annexure -3.

Items	Yes	No	N/A	Comments
4. Safety Hazards/Risks				
o Employees provided with safety equipment	Y			o During monitoring, EHS Officer at site ensures compliance with all precautionary measures for workers and local population
o Hazardous goods stored in bounded area or in secure sheds	Y			
o Explosives stored in guarded bunkers	Y			
o Hazardous goods used according to manufacturer's specifications				
o The access routes to the Powerhouses 3 and 4 will not pass through the communities	Y			
o Road signage fixed at appropriate locations to reduce safety hazard associated with project related vehicular traffic	Y			
o Project drivers trained on defensive driving	Y			
o Vehicles speeds near/within the communities kept low to avoid safety hazards and dust emissions	Y			
5. Damage to Infrastructure				
o All damaged infrastructures restored to original or better condition	Y			o Till date no damage to existing infrastructure observed.
B. CONSTRUCTION CAMP ACTIVITIES				
1. Soil Erosion/ Water Contamination				
o Contractor waste disposal plan and submission to SC/EHS Engineer for approval	Y			o The construction contractor's EHS plan includes waste disposal plan which is being implemented under supervision of SC/ EHS Engineer.
o For the domestic sewage, appropriate treatment and disposal system constructed having adequate capacity, in accordance with NEQS	Y			o Sewage from construction camps is treated in the on-site septic tanks/ oxidation ponds to ensure compliance with NEQS (See Annexure - 4). This is the only way of domestic sewage treatment and disposal as the quantity is small and the hilly terrain does not allow construction of more elaborate wastewater treatment system. Sewage effluents laboratory results are given in Annex-8.

Items	Yes	No	N/A	Comments
o Waste oils collected in drums and sold to the recycling contractors in Skardu	Y			o The waste oils collected in drums are sold to the recycling contractor or workshops in Skardu.
o The inert recyclable waste from the site (such as card board, drums, broken/used parts, etc.) sold to recycling contractors in Skardu. The hazardous waste kept separate and handled according to the nature of the waste	Y			o The construction contractor has made appropriate arrangements for collection and disposal of waste including hazardous material.
o Domestic solid waste from the construction camp disposed of in a manner that does not cause soil contamination	Y			o Solid waste from construction camp is being disposed of as per municipal committee instructions at designated locations.
o The camp sites completely restored after the completion of the construction works	Y			o The camp will be handed over to the employer (WAPDA) after completion of works.
o All temporary structures demolished, land leveled and re-contoured to the original condition or better	Y			-
o All debris and any other material removed from the site. The photographs if taken prior to the camp establishment used to restore the area	Y			o EHS Engineer takes steps to ensure that all debris removed from the site.
2. Air Quality Deterioration				
o Generators and vehicles kept in good working condition and properly tuned in order to minimize the exhaust emissions	Y			o Appropriate maintenance of generators and vehicles ensured to minimize exhaust emissions (See Annexure – 3)
o Fugitive dust emissions minimized by appropriate methods such as spraying water on soil where required and appropriate	Y			-
3. Loss of Vegetation				
o The construction crew provided with LPG as cooking (and heating, if required) fuel	Y			-
o Use of fuel wood not allowed	Y			-

Items	Yes	No	N/A	Comments
4. Noise				
o Generators and vehicles have exhaust mufflers (silencers) to minimize noise generation	Y			o As per NEQS, 85 Db(A) (See Annexure – 3)
o Compliance with NEQS ensured	Y			o NEQS limits, 85 Db(A) (See Annexure – 4)
5. Safety Hazards				
o Protective fencing to be installed around the Camp to avoid any accidents.	Y			-
o Firefighting equipment made available at the camps	Y			-
o The camp staff provided fire fighting training	Y			-
o All safety precautions taken to transport handle and store hazardous substances, such as fuel	Y			-
o EHS Plan to be followed				o EHS Plan is in use by the construction contractor.
6. Public Health				
o The construction camps and site offices will have first-aid kits	Y			o First aid kits are available in construction camps and site offices
o The construction crew will be provided awareness for the transmissible diseases (such as HIV/AIDS), hepatitis B and C)	Y			o A representative of director health services, GB Skardu met the construction crew member and discussed the precautionary measures related to common diseases in Skardu. A letter from him is attached in Annexure – 5.
7. Social and Gender Issues				
o Employment to locals will be maximized	Y			o Hiring of locals with appropriate experience has been ensured
o No child labor will be employed	Y			o No child labour employed in the project activity.

Items	Yes	No	N/A	Comments
C. TRANSPORTATION OF EQUIPMENT AND CONSTRUCTION MATERIAL				
1. Soil Erosion and Contamination				
o Vehicular traffic on unpaved roads will be avoided as far as possible	Y			-
o Vehicles and equipment not repaired in the field. If unavoidable, impervious sheathing will be used to avoid soil and water contamination	Y			o Vehicles repair and maintenance done after laying plastic sheets on the ground to prevent soil and water contamination.
2. Air Quality Deterioration				
o Vehicles kept in good working condition and properly tuned, in order to minimize the exhaust emissions	Y			o Appropriate maintenance of generators and vehicles ensured to minimize exhaust emissions as per emission standards given in Annexure -2
o Fugitive dust emissions minimized by appropriate methods such as spraying water on soil where required and appropriate	Y			-
3. Noise				
o Vehicles have exhaust mufflers (silencers) to minimize noise generation	Y			o As per NEQS, 85 Db(A). See Annexure -3.
o Nighttime traffic avoided near the communities. Local population taken in confidence if such work is unavoidable	Y			o Construction activity largely conducted daytime to avoid inconvenience to local population at night
4. Safety Hazards				
o Road signage fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic	Y			o Construction contractor has installed road signage at appropriate location.
o Project drivers trained on defensive driving	Y			o HTV license holder with experience in heavy vehicle driving employed in the field.
o Vehicle speeds near/ within the communities kept low, to avoid safety hazard and dust emissions	Y			o The speed limits are strictly followed by the drivers.

Items	Yes	No	N/A	Comments
o EHS Plan to be strictly followed				o EHS Plan is in use by the construction contractor.
5. Damage to Infrastructure				
o All damaged infrastructure restored to original or better condition	Y			o Till date, no damage to infrastructure observed.
D. CONSTRUCTION WORKS				
1. Blocked Access				
o A bypass route constructed at the project site avoiding the public traffic passing through the site	Y			-
2. Noise and Vibration				
o Construction machinery appropriate noise muffling arrangement NEQS followed	Y			o As per NEQS, 85 Db(A).See Annexure – 3.
3. Safety Hazards				
o The construction sites have protective fencing to avoid any unauthorized entry	Y			o Security guards stationed at appropriate location on the protective fencing at construction sites.
o EHS Plan to be strictly followed	Y			o EHS Plan is in use by the construction contractor.
4. Damage to Infrastructure				
o All damaged infrastructure restored to original or better condition	Y			-
5. Social Issues				
o Employment to locals maximized.	Y			o Local labour hired as appropriate for on-going construction activities
o No child labor employed	Y			-
6. Sites of Historical Cultural, Archaeological or Religious Significance				
o In case of chance find of any sites or artifacts of historical, cultural, archeological or religious significance, the work stopped at that site and the provincial and federal archeological departments notified immediately and their advice sought before resumption of the construction activities at such sites	Y			o Till date no chance find of any sites or artifacts of historical, cultural, archeological or religious significance is observed

Items	Yes	No	N/A	Comments
7. Soil/ Mountain Slope Erosion				
o The top 30 cm soil removed and stockpiled for redressing the land after removal of borrow material. The excavation in such areas limited to 50 cm depth. The fill material not obtained from any cultivation fields or orchards without the permission of the land owner/cultivator	Y			o The borrow areas are about 20 Km from the construction sites. The excavation is done as per Technical Specifications are US-AID Technical Document Volume-II.
o The borrow areas protected against land slide/soil erosion, through using appropriate techniques (such as terracing, gabions, vegetation, bioengineering, and others)	Y			o The borrow areas belong to private owners whose sell the borrow material as per mutual agreement. Regarding these aspects it is the responsibility of owners himself to take care of.
o After the completion of the construction works, campsites and other construction sites completely restored	Y			-
o No debris, surplus construction material or any garbage left behind	Y			o EHS Engineer takes steps to ensure that no debris, surplus construction material or any garbage left behind.
o Photographic record if maintained for pre-project conditions used to restore the area			N/A	-
8. Soil Contamination				
o Vehicles and equipment not repaired in the field (If unavoidable, impervious sheathing used to avoid soil and water contamination)	Y			o Vehicles repair and maintenance done after laying plastic sheets on the ground to prevent soil and water contamination
o Waste oils collected in drums and sold to the recycling contractors	Y			o The waste oils collected in drums are sold to the recycling contractor or workshops in Skardu.
o The inert recyclable waste from the site (such as card board, drums, broken/used parts, etc.) sold to recycling contractors. The hazardous waste kept separate and handled according to the nature of the waste	Y			o The construction contractor has made appropriate arrangements for collection and disposal of waste including hazardous material.

Date: April 01, 2012 to April 30, 2012 Project Site: SDP-Power House 3 & 4 and Remaining Works

Items	Yes	No	N/A	Comments
o Leaked oil collection arrangement incorporated in the design of the transformer foundations at the powerhouse and switchyard	Y			o The design of transformer foundations at the powerhouse and switchyard has incorporated leaked oil collection.
9. Air Quality Deterioration				
o Construction generators and vehicles kept in good working condition and properly tuned, in order to minimize the exhaust emission machines	Y			o Appropriate maintenance of generators and vehicles ensured to minimize exhaust emissions as per emission standards given in Annexure at the end.
o Relevant NEQS complied	Y			-
o Fugitive dust emissions minimized by appropriate methods, such as spraying water on soil, where required and appropriate	Y			-
10. Loss of Natural Vegetation Aesthetic Value				
o Tree plantation carried out at the site	Y			o Tree plantation to be undertaken by the client (WAPDA) in association with GB Forest Department.

Additional Comments:

DESCON Engineering Limited is currently working at Satpara Dam Project (Lot – 1A). It is ISO 14001 & ISO 9001 certified organization. DESCON has completed many prestigious & mega projects in Pakistan as well as overseas and won excellence awards for maintaining Health, Safety and Environments standards.

Reported By:

Resident Engineer
SDC Skardu

PROJECT DIRECTOR
SATPARA DAM PROJECT
WAPDA SKARDU

CHECKLIST FOR IMPLEMENTATION EMMP WORK PLAN

Period: April 01 to April 30, 2012 | Project Site: SDP – Reservoir

Items	Yes	No	N/A	Comments
A. IMPACTS ASSOCIATED WITH PROJECT DESIGN AND SITE				
Positive Impacts				
1. **Reduction of floods**	Y			
2. **Regulated supply of irrigation water from the reservoir, and hence increased cultivation in the command area.**	Y			
o Capacity building and awareness raising of farmers on efficient irrigation techniques	Y			
o Appropriate use of fertilizers and pesticides	Y			
o Promotion of organic farming and integrated pest management (IPM) practices	Y			
o Protection against water logging and soil salinity			N/A	
3. **Electricity generation from the project**				
o Availability of electricity to the local population. Spending a portion of the proceeds from the electricity generation on the area development	Y			o For the month of April, 2012 Powerhouses 1 & 2 generated 2.50 GWh of electricity for use in Skardu Town.
Negative Impacts				
1. **Resettlement Issues**				
o Prepare and implement Resettlement and Community Development Plan focusing on the community development, in addition to addressing any remaining resettlement issues			N/A	o The IEE of the project does not required RAP as the quantum of affectees/ loss of economic assets is small.

Items	Yes	No	N/A	Comments
o Early payment for the remaining portion of the compensation	Y			o In process. For detail compensation payment see Annexure – 6.
o Maintain liaison and coordination with the communities to address and resolve any pending issues or grievances associated with the land acquisition and compensation assessed/paid	Y			o No issues pending.
o Ensure complete transparency of the entire compensation assessment and payment of compensation	Y			o Revenue department and project proponent are ensuring transparent assessment and payment process.
o Establish grievance redressal mechanism to address grievances of the stakeholders, particularly the communities			N/A	o No issues raised for redressal of grievances.
o Maximize employment opportunities to the local population	Y			o Hiring of locals with appropriate experience has been ensured.
o Give priority to the directly affected communities			N/A	o No child labour employed in the project activity.
2. Land sliding, soil erosion and siltation in reservoir, thus reducing the reservoir capacity				o No land sliding observed.
o Develop and implement slope stabilization	Y			o A wraparound (designed and built integrally as a project component) safeguards stability issues for the steepest right abutment slopes of the reservoir.
o Watershed management and afforestation plan		N		-
o Appropriate terracing and where necessary gabions may be needed to protect the Deosai Plains road on the right bank of the Lake	Y			o The Deosai Road traverses at higher elevations along the right bank of the lake. Retaining walls are however built in immediate vicinity of the dam, within the narrow valley.

Items	Yes	No	N/A	Comments
3. Erosion of nullah bed downstream of dam (caused by release of silt-free water from reservoir)				
o Survey of nullah bed downstream of dam to identify potentially at-risk structures	Y			o The nullah bed just downstream of the spillway is treated with a reverse slope in riprap safeguarding the toe-drain outlet and the valve chamber from erosive actions in high discharges. o A line of transmission towers further downstream has been relocated from the edge of the nullah, to the right side of the road in view of possible risk in flooding.
o Reinforcement of bridges, culverts, and other structures where needed			N/A	
4. Dam collapse				
o Prepare and implement Project Operational Manual (OM). ERP to be part of OM Capacity building of O&M staff	Y			o Project Operation Manual is currently under preparation by SDC.
5. Modified water flow regime				
o Pre-project flow will be maintained in the Satpara nullah downstream of the diversion for the canals.	Y			o The dam does not divert, rather it regulates the flows all around the year.
o Install meteorological station at the dam site to record the key meteorological data including temperature, precipitation, humidity, and wind speed/direction.		N		o No meteorological station is required at the project site because the meteorological station namely Skardu already exist within the project area. The Skardu station is located about 9 km North-East of the project area having Latitude 35o18'00", Longitude 75o41' 00" and at an elevation of 7199 ft amsl. The Skardu meteorological station is operated by the Pakistan Meteorological Department.

Items	Yes	No	N/A	Comments
o Install river rim stations upstream and downstream of the dam, and monitor water inflow in the reservoir, water releases from the reservoir, irrigation water diverted in the canals, water released in the nullah downstream of canal diversion, and water reaching the Indus river				o An upstream gauge at the Satpara nullah exists for possible monitoring inflows. The inflows however are pre-dominantly snow-melt and subsurface recharges not readily measurable. All outflows from the dam are regulated through gated structures, adequately gauged and rated for different discharges at different gate openings. The data on inflow and outflow from the reservoir is given in Annexure–7.
6. Drinking water quality o A water quality monitoring system needs to be established, through which water samples should be collected from various location (upstream and downstream of settling tanks, near the major communities, and randomly at the consumer/household level. Depending upon the quality of water, appropriate treatment will need to be determined, and the treatment plant/arrangements established.	Y			o Results of water quality testing from KSC Lab w.r.t. consumer end, outlet of Satpara Dam and Contractor Camp attached – Annexure - 8. National drinking water quality standards (Draft) appear as Annexure – 9.
7. Decreased soil fertility because of decreased silt in irrigation water Rational use of fertilizer by the growers. Encourage using organic farming and IPM techniques. Capacity building and awareness raising needed.	Y			

Items	Yes	No	N/A	Comments
8. Groundwater table rise				
o Capacity building of farmers for appropriate cultivation and irrigation techniques; adopting to shallow groundwater; installation of tube-wells to extract groundwater in areas having shallow groundwater.			N/A	o Adaptation of use of shallow groundwater by installation of tubewells is not feasible because of hilly terrain.
9. Loss of natural vegetation and biodiversity in the project area				
o Compensation to be paid to the owners for cutting of trees on privately owned land	Y			o Paid.
o Re-plantation with local, non-invasive species; prepare re-plantation plan	Y			-
o Prepare and implement Wildlife Sanctuary Management Plan	Y			o Wildlife Sanctuary Management Plan already under implementation by GB Wildlife Department.
10. Project located in wildlife sanctuary				
o Prepare and implement Satpara Wildlife Sanctuary Management Plan	Y			o Wildlife Sanctuary Management Plan already under implementation by GB Wildlife Department.
o Conduct composite monitoring of biological resources in the area on a regular basis	Y			-
11. Increased fish population in reservoir				
o Planned and controlled introduction of appropriate non-invasive species.	Y			o The Client (WAPDA) in association with GB Fisheries Department to introduce non-invasive species of fish in the Reservoir after the operation stage.

Items	Yes	No	N/A	Comments
12. Increased risk of diseases caused by vectors such as mosquitoes				
o Integrated approach involving preventive as well as curative measures	Y			o A representative of director health services, GB Skardu met the construction crew member and discussed the precautionary measures related to common diseases in Skardu.
o Use of approved and non-toxic insecticides	Y			-
o Use of mosquito nets in buildings	Y			-
o Vaccination (where applicable), and awareness raising	Y			-
o Strengthen the health care facilities in the command area	Y			-
13. Reservoir induced seismicity				
o Conduct further earthquake studies and risk analysis		N		-
o Appropriate instruments to be installed to monitor the seismicity at the site	Y			o An accelerograph has been installed on the dam axis for monitoring seismicity at site.
14. Eutrophication of Reservoir				
o Trees and vegetation to be removed from the area to be inundated. Consider cutting the trees from the already submerged area during low flow				o Trees and vegetation stand removed from the reservoir area under submergence.
o Conduct further studies to determine the extent of problem, and to identify remedies				o The conservation level of the reservoir is fixed at 8740 ft amsl. The level of water in the reservoir since start of inflow is only 8717 ft amsl. The problems, if any, will be identified for remedial measures at that stage.

Items	Yes	No	N/A	Comments
15. PCB in Transformer Oil				
o Ensure that new transformers are PCB free (Obtain certificates from manufacturers)	Y			-
o Ensure that transformer oil brought to site is PCB free	Y			-
16. Climate change				
o Conduct studies to address concerns related to climate change (such as increased frequency and intensity of extreme events), and to frame any mitigation or adaptation measures for the Project.	Y			o Recent meteorological data does not reflect any extreme event.

Additional Comments:

DESCON Engineering Limited is currently working at Satpara Dam Project (Lot – 1A). It is ISO 14001 & ISO 9001 certified organization. DESCON has completed many prestigious & mega projects in Pakistan as well as overseas and won excellence awards for maintaining Health, Safety and Environments standards.

Reported By:

Chief Resident Engineer
SDC Skardu

PROJECT DIRECTOR
SATPARA DAM PROJECT
WAPDA SKARDU

CHECKLIST FOR IMPLEMENTATION EMMP WORK PLAN

Period: April 01 to April 30, 2012 **Project Site: SDP – O & M Activities**

Items	Yes	No	N/A	Comments
A. OPERATION AND MAINTENANCE OF PROJECT FACILITIES				
1. Soil and Water Contamination				
o For the domestic sewage, appropriate treatment and disposal system will be constructed having adequate capacity, in accordance with NEQS.				o Sewage from construction camps is treated in the on-site septic tanks/ oxidation ponds to ensure compliance with NEQS (See Annexure). This is the only way of domestic sewage treatment and disposal as the quantity is small and the hilly terrain does not allow construction of more elaborate wastewater treatment system. Sewage effluents laboratory results are given in Annexure – 8.
o Waste oils will be collected in drums and sold to the recycling contractors in Skardu.				o The waste oils collected in drums are sold to the recycling contractor or workshops in Skardu.
o The inert recyclable waste from the site (such as card board, drums, broken/used parts, etc.) will be sold to recycling contractors in Skardu. The hazardous waste will be kept separate and handled according to the nature of the waste.				o The construction contractor has made appropriate arrangements for collection and disposal of waste including hazardous material.
o Domestic solid waste from the site facilities will be disposed in a manner that does not cause soil contamination.				o Solid waste from construction camp is being disposed of as per municipal committee instructions at designated locations.
o The standard EHS Guidelines (eg, IFC'S EHS Guidelines) to be followed.	Y			o All the activities related to sewage is being followed by construction contractor as per waste disposal plan given in EHS Plan.

Items	Yes	No	N/A	Comments
2. Safety Hazards				
o The dam safety risk assessment will be carried out (if not already done) by an independent panel of experts.	Y			o A comprehensive dam safety risk assessment was conducted by SDC in the detailed design stage which was later on independently vetted by a PoE from WAPDA and third party visiting experts from US-AID at different stages.
o The standard operating procedures (SOPs) for dam and powerhouse O&M will be prepared and strictly implemented.	Y			o The standard operating procedures (SOPs) are under preparation by SDC.
o The standard EHS Guidelines will be made part of the SOPs mentioned above, and will be strictly followed.	Y			o Under preparation by SDC.
o The Emergency Response Plan (ERP) will be made available at the Project sites. Its salient points will be displayed at prominent places. The O&M staff will be given training on the ERP.	Y			o The Emergency Response Plan (ERP) is available with the construction contractor at project site.
o The O&M staff will be provided essential protective gears and equipment.	Y			-
o The O&M staff will be provided safety training. Refresher courses will be arranged on regular basis.	Y			
o The Project sites will have protective fencing to avoid any unauthorized entry.	Y			o Security guards stationed at appropriate location on the protective fencing at construction sites.
o The project drivers will be trained for defensive driving skills. Vehicular speeds near/within communities will be kept low to minimize safety hazards.	Y			o HTV license holder with experience in heavy vehicle driving employed in the field. The speed limits are strictly followed by the drivers.

Period: April 01 to April 30, 2012

Project Site: SDP – O & M Activities

Items	Yes	No	N/A	Comments
o Firefighting equipment will be made available at the site, fire extinguishers will be provided in the project vehicles. The powerhouse staff will be provided safety training, including the fighting.	Y			-
o All safety precautions will be taken to transport, handle and store hazardous substances, such as fuel.	Y			-
o Liaison with the community will be maintained for the canals maintenance works, where necessary.	Y			-
3. Loss of Agriculture				
o The crop damage will be minimized during the O&M activities of the irrigation canals.	Y			o No such damage is observed.
o Community liaison will be maintained during such operations.	Y			-
o Compensation will be paid to the grower for damage to crops or any other assets.	Y			-

Additional Comments:

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Reported By:

Chief Resident Engineer
SDC Skardu

DESCON ENGINEERING LIMITED

PROJECT DIRECTOR
SATPARA DAM PROJECT
WAPDA SKARDU

ANNEXURES

ANNEXURE - 1

OFFICE ORDER/ APPOINTMENT LETTERS

FOR EHS ENGINEER AND EHS OFFICER

SDC SATPARA DAM CONSULTANTS
Joint Venture of: Pakistan Engineering Services (Pvt.) Ltd. · Zaheeruddin Consultants (Pvt.) Ltd. · M M Pakistan (Pvt.) Ltd. · IN Consult (Pvt.) Ltd. · Project Advisor: Coyne et. Bellier · Mirza Associates Engineering Services (Pvt.) Ltd. · Technics International

Date: April 30, 2011

Ref: CRE/SDC/GEN/04/011/239

OFFICE ORDER

Mr. Zafar Abbas a Graduate Civil Engineer is hereby nominated to work as Environmental Health and Safety (EHS) Engineer for implementation of Environmental Mitigation Management Plan (EMMP) as per requirement of USAID Activity Agreement for the Satpara Dam Multipurpose Project with immediate effect.

He is directed to ensure implementation of EMMP Work Plan during project activities in the field and maintain compliance reports thereof on fortnightly basis.

30/04/11

[Ch. Farooq Ahmad]
Chief Resident Engineer
Field Office, Skardu

Distribution:

1. Mr. Jamil Anwer, Chairman (BOM), SDC, Project Office, Lahore.
2. Project Director, WAPDA, SDP, Field Office, Skardu.
3. Mr. Hussain Shigri, ARE-I & Mr. Abid Hussain, ARE-II, SDC, Field Office, Skardu.
4. Project Manager, DBSCON, SDP, Field Office, Skardu.
5. Project Manager, CCPG, Field Office, Skardu.
6. Office Copy.

Field office: Ali Abad Road, Satellite Town Skardu GPO Box No. 452, Skardu. Telephone: No (05815 - 454462, 454461) Fax No (05815-450411)

DESCON – J&P JOINT VENTURE

18 KM Ferozepur Road
Lahore – 53000
Pakistan

Phone: +92 (042) 5805134
Fax: +92 (042) 5811005
+92 (042) 5805137

SATPARA DAM CONSULTANTS
Satpara Dam Project,
Ali Abad Road, Satellite Town,
Skardu.

Our Ref: 6011-PO-SDC-LP-29974
Date: May 9, 2011

Attention: Chaudhary Farooq Ahmad – Chief Resident Engineer

Subject: Satpara Dam Project – Contract LOT 1A – Dam & Power Houses
Environment, Health and Safety (EHS)

Dear Sir,

With reference to our earlier discussions, it is to inform your good office that we have already an organized Environment, Health and Safety department to look after the affairs related to EHS. This team of EHS is working under Mr. Baqi Khan, who has vast experience in this field.

This is for your information please.

Assuring you of our best professional services at all times, we remain.

Regards

For DESCON – J&P (JV)

SATPARA DAM CONSULTANTS
RECEIPT OF LETTER
NO.
DATED
FIELD OFFICE SKARDU

Yousaf Mahmood
Project Manager

CC: (1) The Engineer, Satpara Dam Consultants, 180-Y, Commercial Area, DHA Lahore
(2) Project Director, SDP, (WAPDA), Skardu
(3) Head DCS, DESCON, World Headquarter, Lahore
(4) Principal Engineer Contracts, Satpara Dam Consultants, 180-Y, Commercial Area, DHA Lahore

ANNEXURE - 2

WHO AMBIENT AIR QUALITY STANDARDS

WHO Ambient Air Quality Standards

Pollutant	Maximum Allowable Limit	Units	Averaging Time
CO	35	ppm	1 hour
NO_X	106	ppb	1 hour
SO_2	134	ppb	1 hour
PM_{10}	70	$\mu g/m^3$	24 hours.

Source: World Health Organization.

ANNEXURE - 3

NEQS FOR MOTOR VEHICLES EXHAUST AND NOISE

NEQS for Motor Vehicles Exhaust and Noise

(i) For In-use Vehicles

	Parameter	Standard (Maximum Permissible Limit)	Measuring Method	Applicability
1	Smoke	40% or 2 on the Ringlemann Scale during engine acceleration mode.	To be compared with Ringlemann Chart at a distance 6 or more. r	Immediate effect
2	Carbon Monoxide	6%	Underlying conditions: Non-dispersive infrared detection through gas analyzer.	
3	Noise	85 db (A).	Sound meter at 7.5 meters from the source.	

(ii) For new Vehicles

Emission Standards For Diesel Vehicles.

(a) For Passenger Cars and Light Commercial Vehicles (g/Km)

Type of Vehicle	Category/Class	Tiers	CO	HC+ NOx	PM	Measuring Method	Applicability
Passenger Cars	M 1: with reference mass (RW) up to 2500 kg. Cars with RW over 2500 kg to meet NI category standards.	Pak-II IDI	1.00	0.70	0.08	NEDC (ECE 15+ EUDCL)	I. All imported and local manufactured diesel vehicles with effect from 01-07-2012
		Pak-II DI	1.00	0.90	0.10		
Light Commercial Vehicles	NI-I (RW<1250 kg)	Pak-II IDI	1.00	0.70	0.08		
		Pak-II DI	1.00	0.90	0.10		
	NI-II (1250 kg< RW <1700 kg0	Pak-II IDI	1.25	1.00	0.12		
		Pak-II DI	1.25	1.30	0.14		
	NI-III (RW> 1700 kg)	Pak-II IDI	1.50	1.20	0.17		
		Pak-II DI	1.50	1.60	0.20		

Parameter	Standard (maximum permissible limit)	Measuring Method
Noise	85 db (A)	Sound meter at 7.5 meters from the source.

(b) For Heavy Duty Diesel Engines and Large Goods Vehicles (g/Kwh)

Type of Vehicle	Category / Class	Tiers	CO	HC	NOx	PM	Measuring Method	Applicability
Heavy Duty Diesel Engines	Trucks and Buses	Pak-II	4.0	1.1	7.0	0.15	ECE-R-49	All imported and local manufactured diesel vehicles with the effect 1-7-2012
Large goods Vehicles	N2 (2000 and up	Pak-II	4.0	7.0	1.10	0.15	EDC	

Parameter	Standard (maximum permissible limit)	Measuring Method
Noise	85 db (A)	Sound meter at 7.5 meters from the source.

Emission Standards for Petrol Vehicles (g/km)

Type of Vehicle	Category / Class	Tiers	CO	HC+ NOx	Measuring Method	Applicability
Passenger	M 1: With reference mass (RW) up to 2500 kg. Cars with RW over 2500 kg. to meet N1 category standards	Pak-II	2.20	0.50	NEDC (ECE 15 + EUDCL)	All imported and new models* locally manufactured petrol vehicles with effect from 1st July, 2009**
Light Commercial Vehicles	N1-I (RW<1250 kg)	Pak-II	2.20	0.50		
	N1-II (1250 kg>RW <1700 kg)	Pak-II	4.00	0.65		
	N1-III (RW>1700 kg)	Pak-II	5.00	0.80		
Motor Rickshaws & motor Cycles	2.4 strokes <150 cc	Pak-II	5.50	1.50	ECER 40	
	2.4 strokes> 150 cc	Pak-II	5.50	1.30		

Parameters	Standard (maximum permissible limit)	Measuring Method
Noise	85 db (A)	Sound meter at 7.5 meters from the source

Explanations:

DI:	Direct Injection
IDI:	Indirect Injection
EUDCL:	Extra Urban Driving Cycle
NEDC:	New Urban Driving Cycle
M:	Vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat
N:	Motor vehicles with at least four wheels designed and constructed for the carriage of goods.
*	New model means both model and engine type change
**	The existing models of petrol driven vehicles locally manufactured will immediately switch over to Pak-II emission standards but not later than 30th June, 2012

ANNEXURE - 4

NEQS FOR WASTE EFFLUENTS

Selected NEQS for Waste Effluents

Parameter	Unit	Standards (Maximum Allowable Limit)
Temperature increase	°C	< 3
pH value (acidity/basicity)	pH	6-9
5-day biochemical oxygen demand (BOD) at 20 °C	mg/l	80
Chemical oxygen demand (COD)	mg/l	150
Total suspended solids	mg/l	200
Total dissolved solids	mg/l	3,500
Grease and oil	mg/l	10
Phenolic compounds (as phenol)	mg/l	0.1
Chloride (as Cl)	mg/l	1,000
Fluoride (as F)	mg/l	10
Sulfate (SO_4)	mg/l	600
Sulfide (S)	mg/l	1.0
Ammonia (NH_3)	mg/l	40
Cadmium	mg/l	0.1
Chromium (trivalent and hexavalent)	mg/l	1.0
Copper	mg/l	1.0
Lead	mg/l	0.5
Mercury	mg/l	0.01
Selenium	mg/l	0.5
Nickel	mg/l	1.0
Silver	mg/l	1.0
Total toxic metals	mg/l	2.0
Zinc	mg/l	5
Arsenic	mg/l	1.0
Barium	mg/l	1.5
Iron	mg/l	8.0
Manganese	mg/l	1.5
Boron	mg/l	6.0
Chlorine	mg/l	1.0

Source: Government of Pakistan (2000).

Notes:

1. The standard assumes that dilution of 1:10 on discharge is available. That is, for each cubic meter of treated effluent, the recipient water body should have 10 m^3 of water for dilution of this effluent.
2. Toxic metals include cadmium, chromium, copper, lead, mercury, selenium, nickel and silver. The effluent should meet the individual standards for these metals as well as the standard for total toxic metal concentration.

ANNEXURE - 5

COMMON DISEASES IN SKARDU

No. DHS-BR-5 (22) /Stats/ 2008 Annexure – 5

GOVERNMENT OF GILGIT – BALTISTAN

Office of the Director Health Services,
Baltistan Skardu

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Date: 30th April , 2012

To

The Chief Resident Engineer,
Sadpara Dam Consultants: Skardu.

Subject: **COMMON DISEASE IN SKARDU.**

Following disease are common in Skardu District.

1. Water born diseases:
   a. Infective Hepatitis
   b. Enteric Fever.
   c. Dysentery.
   d. Helmenthiasis.
   e. Diarrhoea.
2. ARI
3. Scabies
4. Hypertension
5. Goiter
6. Bronchitis /Asthma
7. Pharngities / Tonsillitis

Report is submitted as desired please.

ANNEXURE - 6

UPDATED STATUS OF LAND ACQUISITION

Annexure - 6

SATPARA DAM PROJECT
UPDATED STATUS OF LAND ACQUISITION

Date: April 30, 2012

Sr.#	Project Component	Land Acquired (Acres)	Amount Paid (Rs.M)	Land acquisition under process/ to acquired (Acres)	Cost of Land (Rs. M)
1	**Lot-1A**				
	a). Dam Site	33.306	59.106	4.856*	7.496*
	b). Contractor's Colony	6.09	9.418	-	-
	c). Spill Channal and Penstock	1.66	4.844	-	-
	d). Access Road to Forebay	0.0875	0.237	-	-
	Sub Total (1)	**41.143**	**73.605**	**4.856**	**7.496**
2	**Lot-1B**				
	a). 66 kV Grid Stationa and Powerhouse # 1 & 2	1.200	2.525	-	-
	b). Switchyard	0.200	2.104	-	-
	c). E&M Additonal Works (Tower No. 11 ZM6)	0.107	0.222	-	-
	Sub Total (2)	**1.507**	**4.851**	**0**	**0**
3	**Lot-2**				
	a). Left Bank Canal (LBC) & PH - 3 & 4	19.431	71.206	12.492	40.708
	b). Right Bank Canal (RBC)	5.700	19.415	0.131	1.737
	Sub Total (3)	**25.13**	**90.621**	**12.623**	**42.445**
	Grand Total (1+2+3)	**67.781**	**169.077**	**17.479**	**49.941**

Sr. No. 1. Lot-1A(a) Dam Site:- * The under process land 4.856 Accres consists of two Awards

2 DK-1(1)/2005 dated 21.10.2005 Amounting to Rs. 6.416 Million

3 DK-1(4)/2005 dated 21.10.2005 Amounting to Rs. 1.08 Million

Total two Nos. Awards Amount to Rs. 7.496 Million are subjuudice in the court of Civil Judge Skardu. After court decision the payment will be made accordingly.

The under process land 17.479 Acres and Amounts are tentative as few awards are yet to be finalized by the Revenue Department.

ANNEXURE – 7

INFLOW OUTFLOW DATA OF SATPARA DAM

Comparison of Inflow and Outflow of Satpara Dam

Date	Stilling basin Gauge Reading (ft.)	Discharge from Stilling basin (Cusecs)	Lake Level (ft.)	Dischrge Through PH#1 (Cusecs)	Estimated Seepge (Cusecs)	Total Outflow (Cusecs)	Storage capacity (Acre Feet)	Increased/ Decreased in Water Storage (Acre Feet)	Calcul. Inflow (Cusecs)	Water Released Per Day (Acre Feet)
1-Jun-10	0	0	8644.70	86.35	15	101.35	43319.50			201
2-Jun-10	0	0	8645.55	84.56	15	99.56	43650.50	331.00	266	197
3-Jun-10	0	0	8646.70	83.17	15	98.17	43989.00	338.50	269	195
4-Jun-10	0	0	8648.00	69.69	15	84.69	44508.00	519.00	346	168
5-Jun-10	0	0	8649.55	25.04	15	40.04	45038.00	530.00	307	79
6-Jun-10	0	0	8650.80	98.34	15	113.34	45577.00	539.00	385	225
7-Jun-10	0	0	8651.90	99.34	15	114.34	45942.00	365.00	298	227
8-Jun-10	0	0	8653.10	113.09	15	128.09	46314.00	372.00	316	254
9-Jun-10	0	0	8654.60	114.06	15	129.06	46879.50	565.50	414	256
10-Jun-10	0	0	8656.00	106.76	20	126.76	47454.00	574.50	416	251
11-Jun-10	0	0	8657.40	75.04	20	95.04	48040.50	586.50	391	189
12-Jun-10	0	0	8659.50	73.92	20	93.92	48835.00	794.50	494	186
13-Jun-10	0	0	8662.00	72.92	20	92.92	49850.00	1015.00	605	184
14-Jun-10	0	0	8664.75	72.92	20	92.92	50894.00	1044.00	619	184
15-Jun-10	0.5	65	8667.40	68.78	26	159.78	52177.00	1283.00	807	317
16-Jun-10	1	178	8669.60	67.66	32	277.66	53050.50	873.50	718	551
17-Jun-10	1.4	300	8671.10	58.66	32	390.66	53720.00	669.50	728	775
18-Jun-10	2.2	550	8672.80	57.68	44	651.68	54627.00	907.00	1109	1293
19-Jun-10	2.5	675	8675.00	53.45	44	772.45	55555.00	928.00	1240	1532
20-Jun-10	3	850	8677.15	74.43	44	968.43	56501.00	946.00	1445	1921
21-Jun-10	3.25	990	8679.10	81.05	44	1115.05	57461.00	960.00	1599	2212
22-Jun-10	3.33	1000	8681.05	74.35	53	1127.35	58436.00	975.00	1619	2236
23-Jun-10	3.75	1225	8683.15	79.96	53	1357.96	59425.00	989.00	1857	2693
24-Jun-10	4.00	1336	8684.95	86.60	53	1475.60	60423.00	998.00	1979	2927
25-Jun-10	4.17	1450	8686.10	55.63	53	1558.63	60928.00	505.00	1813	3091
26-Jun-10	4.17	1450	8686.40	78.08	53	1581.08	61182.50	254.50	1709	3136
27-Jun-10	4.17	1450	8686.95	87.46	53	1590.46	61437.00	254.50	1719	3155
28-Jun-10	4.17	1450	8687.70	72.29	53	1575.29	61692.50	255.50	1704	3125
29-Jun-10	4	1400	8688.50	89.14	53	1542.14	62204.50	512.00	1800	3059
30-Jun-10	4	1400	8689.00	85.33	53	1538.33	62461.00	256.50	1668	3051
1-Jul-10	4	1400	8688.35	76.4	53	1529.40	61948.00	-513.00	1271	3034
2-Jul-10	3.5	1150	8687.00	80.64	53	1283.64	61437.00	-511.00	1026	2546
3-Jul-10	2.5	750	8686.50	82	53	885.00	61182.50	-254.50	757	1755
4-Jul-10	2	550	8687.60	86.21	53	689.21	61692.50	510.00	946	1367
5-Jul-10	2	550	8688.40	76.02	53	679.02	62204.50	512.00	937	1347
6-Jul-10	2	550	8689.10	79.58	53	682.58	62461.00	256.50	812	1354
7-Jul-10	1.5	370	8689.40	80.65	53	503.65	62719.00	258.00	634	999
8-Jul-10	2.5	765	8690.70	88.28	53	906.28	63337.25	618.25	1218	1798
9-Jul-10	3.75	1295	8691.75	64.94	53	1412.94	63895.50	558.25	1694	2803
10-Jul-10	3.75	1295	8691.65	93.87	53	1441.87	44405.25	-19490.25	-8384	2860
11-Jul-10	3.25	1081	8691.80	84.03	53	1218.03	44405.25	0.00	1218	2416
12-Jul-10	2.5	765	8692.30	72.35	53	890.35	44307.00	-98.25	841	1766
13-Jul-10	1	218	8693.15	81.3	53	352.30	44256.00	-51.00	327	699
14-Jul-10	1.75	485	8694.40	78.26	53	616.26	44178.00	-78.00	577	1222
15-Jul-10	2	585	8694.90	76.61	53	714.61	44100.00	-78.00	675	1417
16-Jul-10	2.5	793	8695.10	72.28	53	918.28	43983.00	-117.00	859	1821
17-Jul-10	2	585	8695.50	72.13	53	710.13	43866.00	-117.00	651	1409
18-Jul-10	2	585	8696.30	75.18	53	713.18	43806.00	-60.00	683	1415
19-Jul-10	2.5	793	8697.10	75.96	53	921.96	43710.00	-96.00	874	1829
20-Jul-10	1.75	485	8697.20	79.49	53	617.49	42801.00	-909.00	159	1225
21-Jul-10	1	218	8697.40	80.06	53	351.06	42737.80	-63.20	319	696
22-Jul-10	1	218	8698.30	85.16	53	356.16	42586.60	-151.20	280	706
23-Jul-10	1	218	8699.20	90.66	53	361.66	42457.00	-129.60	296	717
24-Jul-10	0.75	144	8699.70	92.48	52.5	288.98	42284.20	-172.80	202	573
25-Jul-10	0.75	144	8700.40	94.58	54	292.58	42133.00	-151.20	216	580
26-Jul-10	0.75	144	8701.20	105.86	54	303.86	42051.10	-81.90	263	603
27-Jul-10	1.41	404	8702.30	102.12	54	560.12	41858.05	-193.05	463	1111
28-Jul-10	2	604	8702.80	110	50	764.00	41665.00	-193.05	667	1515
29-Jul-10	2.8	950	8704.15	75.6	50	1075.60	41493.40	-171.60	989	2133
30-Jul-10	2.5	928	8703.95	78.67	50	1056.67	41300.35	-193.05	959	2096
31-Jul-10	1.83	567	8704.20	72	51	690.00	41128.75	-171.60	603	1369
1-Aug-10	0.75	172.2	8705.20	72.54	54	298.74	40985.10	-143.65	226	593
2-Aug-10	0.75	172.2	8706.00	72.62	54	298.82	40771.60	-213.50	191	593
3-Aug-10	0.375	45	8706.60	74.67	54	173.67	40536.75	-234.85	55	344
4-Aug-10	0.00	0	8707.90	65.6	54	119.60	40323.25	-213.50	12	237
5-Aug-10	0.00	0	8709.25	80.62	54	134.62	40238.50	-84.75	92	267
6-Aug-10	1.13	295	8711.15	86.12	54	435.12	40048.60	-189.90	339	863
7-Aug-10	0.75	203	8711.65	91.6	53	347.60	39837.60	-211.00	241	689
8-Aug-10	1.33	440	8713.10	95.3	54	589.30	39647.70	-189.90	494	1169
9-Aug-10	1.50	460	8713.30	78.39	51	589.39	39533.76	-113.94	532	1169
10-Aug-10	1.50	460	8713.30	98.83	50	608.83	50515.80	10982.04	6146	1208
11-Aug-10	1.50	450	8713.20	95.2	50	595.20	50432.20	-83.60	553	1181

Date	Stilling basin Gauge Reading (ft.)	Discharge from Stilling basin (Cusecs)	Lake Level (ft.)	Dischrge Through PH#1 (Cusecs)	Estimated Seepge (Cusecs)	Total Outflow (Cusecs)	Storage capacity (Acre Feet)	Increased/ Decreased in Water Storage (Acre Feet)	Calcul. Inflow (Cusecs)	Water Released Per Day (Acre Feet)
12-Aug-10	1.13	290	8713.00	87.51	50	427.51	50348.60	-83.60	385	848
13-Aug-10	0.50	87	8712.95	104.44	52	243.44	50265.00	-83.60	201	483
14-Aug-10	0.00	0.00	8713.75	106.87	52	158.87	50182.00	-83.00	117	315
15-Aug-10	0.75	161	8714.60	89	54	304.00	50099.00	-83.00	262	603
16-Aug-10	1.25	339	8714.00	113.71	50	502.71	50016.00	-83.00	461	997
17-Aug-10	0.38	35	8713.75	107.07	52	194.07	50182.00	166.00	278	385
18-Aug-10	0.00	0	8714.10	103.04	52	155.04	49850.00	-332.00	-12	308
19-Aug-10	0.00	0	8714.70	104.59	54	158.59	-5204100.00	-5253950.00	-2648708	315
20-Aug-10	0.00	0	8715.20	102.21	54	156.21	-5238966.00	-34866.00	-17422	310
21-Aug-10	0.00	0	8715.60	99.33	54	153.33	-5238940.00	26.00	168	304
22-Aug-10	0.00	0	8716.00	102.58	53	155.58	-5258629.50	-19689.50	-9771	309
23-Aug-10	0.00	0	8716.25	90.32	53	143.32	77856.50	5336486.00	2690622	284
24-Aug-10	0.00	0	6716.40	90.66	53	143.66	77948.60	92.10	190	285
25-Aug-10	0.00	0	8716.80	65.13	53	118.13	78194.20	245.60	242	234
26-Aug-10	0.00	0	8716.55	32.99	53	85.99	78040.70	-153.50	9	171
27-Aug-10	0.00	0	8716.15	30.42	53	83.42	77795.10	-245.60	-40	165
28-Aug-10	0.00	0	8716.25	50.91	53	103.91	77856.50	61.40	135	206
29-Aug-10	0.00	0	8716.40	60.49	53	113.49	77948.60	92.10	160	225
30-Aug-10	0.00	0	8716.10	52.08	53	105.06	77764.40	-164.20	12	208
31-Aug-10	0.00	0	8715.70	43.41	52	95.41	77520.00	-244.40	-28	189
1-Sep-10	0.00	0	8715.30	30.84	52	82.84	77276.00	-244.00	-40	164
2-Sep-10	0.00	0	8714.85	61.85	52	113.85	77005.50	-270.50	-23	226
3-Sep-10	0.00	0	8715.00	56.59	51.2	107.79	77093.00	87.50	152	214
4-Sep-10	0.00	0	6715.00	59.62	50.3	109.92	77093.00	0.00	110	218
5-Sep-10	0.00	0	8715.05	59.5	48	107.50	77127.50	34.50	125	213
6-Sep-10	0.00	0	8715.05	57.02	47	104.02	77127.50	0.00	104	206
7-Sep-10	0.00	0	8715.10	55.98	47	102.98	77158.00	30.50	118	204
8-Sep-10	0.00	0	8715.10	53.94	46.5	100.44	77158.00	0.00	100	199
9-Sep-10	0.00	0	8715.05	59.00	44	103.00	77127.50	-30.50	88	204
10-Sep-10	0.00	0	8715.05	64.41	42	106.41	77127.50	0.00	106	211
11-Sep-10	0.00	0	8715.00	56.65	41.7	98.35	77093.00	-34.50	81	195
12-Sep-10	0.00	0	8715.00	56.77	41	97.77	77093.00	0.00	98	194
13-Sep-10	0.00	0	8714.90	61.6	53	114.60	77036.00	-57.00	86	227
14-Sep-10	0.00	0	8714.80	51.49	54	105.49	-5203893.00	-5280929.00	-2662363	209
15-Sep-10	0.00	0	8714.80	55.53	44	99.53	-5203845.00	48.00	124	197
16-Sep-10	0.00	0	8714.75	49.92	44	93.92	-5203793.00	52.00	120	186
17-Sep-10	0.00	0	8714.60	49.66	44	93.66	-5203738.00	55.00	121	186
18-Sep-10	0.00	0	8714.55	49.84	44	93.84	-5203682.00	56.00	122	186
19-Sep-10	0.00	0	8714.45	54.98	44	98.98	-5203682.00	0.00	99	196
20-Sep-10	0.00	0	8714.30	52.08	44	96.08	-5203564.00	118.00	156	191
21-Sep-10	0.00	0	8714.20	39.63	42	81.63	-5203501.00	63.00	113	162
22-Sep-10	0.00	0	8714.10	38.32	44	82.32	-5203433.00	68.00	117	163
23-Sep-10	0.00	0	8714.00	41.76	44	85.76	-5203363.00	70.00	121	170
24-Sep-10	0.00	0	6713.85	41.68	44	85.68	-5168338.00	35025.00	17744	170
25-Sep-10	0.00	0	8713.75	41.42	44	85.42	-5168256.00	62.00	127	169
26-Sep-10	0.00	0	8713.55	43.21	44	87.21	-5168170.00	66.00	131	173
27-Sep-10	0.00	0	8713.45	37.62	44	81.62	-5168081.00	69.00	126	162
28-Sep-10	0.00	0	8713.35	41.36	44	85.36	-5167990.00	91.00	131	169
29-Sep-10	0.00	0	8713.20	39.56	44	83.56	-5167898.00	92.00	130	166
30-Sep-10	0.00	0	8713.10	43.22	53	96.22	-5167801.00	97.00	145	191
1-Oct-10	0.00	0	8712.90	51.86	53	104.86	-5141463.00	26338.00	13384	208
2-Oct-10	0.00	0	8712.75	47	53	100.00	-5141352.00	111.00	156	198
3-Oct-10	0.00	0	8712.55	46.56	53	99.56	-5141238.00	114.00	157	197
4-Oct-10	0.00	0	8712.35	46.26	53	99.26	-5141121.00	117.00	158	197
5-Oct-10	0.00	0	8712.15	45.79	53	98.79	-5140999.00	122.00	160	196
6-Oct-10	0.00	0	8712.00	28.51	53	81.51	-5140873.00	126.00	145	162
7-Oct-10	0.00	0	8711.80	41.86	53	94.86	0.00	5140873.00	2591952	188
8-Oct-10	0.00	0	8711.60	46.33	53	99.33	0.00	0.00	99	197
9-Oct-10	0.00	0	8711.40	44.77	53	97.77	0.00	0.00	98	194
10-Oct-10	0.00	0	8711.15	43.14	40	83.14	0.00	0.00	83	165
11-Oct-10	0.00	0	8711.00	46.58	39	85.58	0.00	0.00	86	170

Date	Stilling basin Gauge Reading (ft.)	Discharge from Stilling basin (Cusecs)	Lake Level (ft.)	Dischrge Through PH#1 (Cusecs)	Estimated Seepge (Cusecs)	Total Outflow (Cusecs)	Storage capacity (Acre Feet)	Increased/ Decreased In Water Storage (Acre Feet)	Calcul. Inflow (Cusecs)	Water Released Per Day (Acre Feet)
12-Oct-10	0.00	0	8710.75	47.45	39	86.45	0.00	0.00	86	171
13-Oct-10	0.00	0	8710.55	44.41	39	83.41	0.00	0.00	83	165
14-Oct-10	0.00	0	8710.35	25.69	39	64.69	0.00	0.00	65	128
15-Oct-10	0.00	0	8710.15	37.17	39	76.17	0.00	0.00	76	151
16-Oct-10	0.00	0	8709.90	46	40	86.00	0.00	0.00	86	171
17-Oct-10	0.00	0	8709.70	46.8	40	86.80	0.00	0.00	87	172
18-Oct-10	0.00	0	8709.45	39.21	40	79.21	0.00	0.00	79	157
19-Oct-10	0.00	0	8709.20	42.26	41	83.26	0.00	0.00	83	165
20-Oct-10	0.00	0	8708.90	53	41	94.00	0.00	0.00	94	186
21-Oct-10	0.00	0	8708.70	45.2	41	86.20	0.00	0.00	86	171
22-Oct-10	0.00	0	8708.45	57.25	41	98.25	0.00	0.00	98	195
23-Oct-10	0.00	0	8708.15	51.05	41	92.05	0.00	0.00	92	183
24-Oct-10	0.00	0	8707.95	41.64	41	82.64	0.00	0.00	83	164
25-Oct-10	0.00	0	8707.60	60.55	41	101.55	0.00	0.00	102	201
26-Oct-10	0.00	0	8707.30	58.26	41	99.26	0.00	0.00	99	197
27-Oct-10	0.00	0	8707.05	62.47	40	102.47	72370.05	72370.05	36589	203
28-Oct-10	0.00	0	8706.70	61.19	40	101.19	72212.90	-157.15	22	201
29-Oct-10	0.00	0	8706.40	52.91	40	92.91	72084.80	-128.10	28	184
30-Oct-10	0.00	0	8706.10	64.98	40	104.98	71956.70	-128.10	40	208
31-Oct-10	0.00	0	8705.80	55.79	40	95.79	71676.60	-280.10	-45	190
1-Nov-10	0.00	0	8705.50	56.82	41	97.82	71548.50	-128.10	33	194
2-Nov-10	0.00	0	8705.20	62.94	41	103.94	71420.40	-128.10	39	206
3-Nov-10	0.00	0	8704.90	58.35	41	99.35	71129.80	-290.60	-47	197
4-Nov-10	0.00	0	8704.60	69.52	41	110.52	70958.20	-171.60	24	219
5-Nov-10	0.00	0	8704.25	75.22	41	116.22	70758.00	-200.20	15	231
6-Nov-10	0.00	0	8703.95	64.09	41	105.09	70593.55	-164.45	22	208
7-Nov-10	0.00	0	8703.60	50.12	41	91.12	70387.00	-206.55	-13	181
8-Nov-10	0.00	0	8703.30	42.97	41	83.97	70216.00	-171.00	-2	167
9-Nov-10	0.00	0	8703.00	43.64	41	84.64	70045.00	-171.00	-2	168
10-Nov-10	0.00	0	8702.70	46.41	41	87.41	69916.30	-128.70	23	173
11-Nov-10	0.00	0	8702.40	45.22	41	86.22	69705.40	-210.90	-20	171
12-Nov-10	0.00	0	8702.20	47.96	41	88.96	69592.20	-113.20	32	176
13-Nov-10	0.00	0	8701.95	47.11	41	88.11	69457.55	-134.65	20	175
14-Nov-10	0.00	0	8701.70	46.01	41	87.01	69310.70	-146.85	13	173
15-Nov-10	0.00	0	8701.40	46.11	41	87.11	69142.40	-168.30	2	173
16-Nov-10	0.00	0	8701.15	40.565	41	81.57	69002.15	-140.25	11	162
17-Nov-10	0.00	0	8701.25	83.92		83.92	69058.25	56.10	112	166
18-Nov-10	0.00	0	8700.40	73.49	39.7	113.19	68658.80	-399.45	-88	225
19-Nov-10	0.00	0	8700.10	65.6	39.7	105.30	68414.90	-243.90	-18	209
20-Nov-10	0.00	0	8699.70	35.76	39.7	75.46	68229.40	-185.50	-18	150
21-Nov-10	0.00	0	8699.40	40.75	39.7	80.45	68025.40	-204.00	-22	160
22-Nov-10	0.00	0	8699.10	34.69	39.7	74.39	67858.60	-166.80	-10	148
23-Nov-10	0.00	0	8698.90	41.38	39.7	81.08	67759.80	-98.80	31	161
24-Nov-10	0.00	0	8698.60	53.125	39.7	92.83	67582.20	-177.60	3	184
25-Nov-10	0.00	0	8698.30	64.2	39.7	103.90	67416.60	-165.60	20	206
26-Nov-10	0.00	0	8697.90	47.08	39.7	86.78	67207.40	-209.20	-19	172
27-Nov-10	0.00	0	8697.60	47.32	39.7	87.02	67032.20	-175.20	-1	173
28-Nov-10	0.00	0	8697.35	37.87	39.7	77.57	66895.45	-136.75	9	154
29-Nov-10	0.00	0	8697.05	47.7	39.7	87.40	66731.35	-164.10	5	173
30-Nov-10	0.00	0	8696.80	45.88	39.7	85.58	66627.20	-104.15	33	170
1-Dec-10	0.00	0	8696.50	41.15	39.7	80.85	66432.00	-195.20	-18	160
2-Dec-10	0.00	0	8696.20	36.17	39.7	75.87	66268.80	-163.20	-6	150
3-Dec-10	0.00	0	8695.95	47.53	39.7	87.23	66140.50	-128.30	23	173
4-Dec-10	0.00	0	8695.60	56.24	39.7	95.94	65944.00	-196.50	-3	190
5-Dec-10	0.00	0	8695.30	46.01	39.7	85.71	65782.00	-162.00	4	170
6-Dec-10	0.00	0	8695.00	51.08	39.7	90.78	65620.00	-162.00	9	180
7-Dec-10	0.00	0	8694.70	49.52	39.7	89.22	65503.00	-117.00	30	177
8-Dec-10	0.00	0	8694.40	58.82	39.7	98.52	65299.60	-203.40	-4	195
9-Dec-10	0.00	0	8694.05	60.5	39.7	100.20	65112.70	-186.90	6	199
10-Dec-10	0.00	0	8693.70	62.7	39.7	102.40	64969.00	-143.70	30	203
11-Dec-10	0.00	0	8693.40	66.07	39.7	105.77	64767.40	-201.60	4	210

Date	Stilling basin Gauge Reading (ft.)	Discharge from Stilling basin (Cusecs)	Lake Level (ft.)	Dischrge Through PH#1 (Cusecs)	Estimated Seepge (Cusecs)	Total Outflow (Cusecs)	Storage capacity (Acre Feet)	Increased/ Decreased in Water Storage (Acre Feet)	Calcul. Inflow (Cusecs)	Water Released Per Day (Acre Feet)
12-Dec-10	0.00	0	8693.00	95	38.2	133.20	64555.00	-212.40	26	264
13-Dec-10	0.00	0	8692.70	62.06	38.2	100.26	64437.10	-117.90	41	199
14-Dec-10	0.00	0	8692.30	61.41	38.2	99.61	64185.40	-251.70	-27	198
15-Dec-10	0.00	0	8692.00	76.88	38.2	115.08	64027.00	-158.40	35	228
16-Dec-10	0.00	0	8691.60	78.97	38.2	117.17	63869.80	-157.20	38	232
17-Dec-10	0.00	0	8691.20	64.32	36.9	101.22	63606.20	-263.60	-32	201
18-Dec-10	0.00	0	8690.80	44.99	36.9	81.89	63396.20	-210.00	-24	162
19-Dec-10	0.00	0	8690.50	48.32	36.9	85.22	63239.00	-157.20	6	169
20-Dec-10	0.00	0	8690.20	48.32	36.9	85.22	63081.80	-157.20	6	169
21-Dec-10	0.00	0	8689.90	49.89	35.6	85.49	62925.40	-156.40	7	170
22-Dec-10	0.00	0	8689.60	47.78	35.6	83.38	62770.60	-154.80	5	165
23-Dec-10	0.00	0	8689.30	43.69	35.6	79.29	62615.80	-154.80	1	157
24-Dec-10	0.00	0	8689.00	45.19	36.9	82.09	62461.00	-154.80	4	163
25-Dec-10	0.00	0	8688.70	50.36	34.1	84.46	62307.10	-153.90	7	168
26-Dec-10	0.00	0	8688.40	49.98	39.7	89.68	62153.20	-153.90	12	178
27-Dec-10	0.00	0	8688.10	49.98	39.7	89.68	61999.30	-153.90	12	178
28-Dec-10	0.00	0	8687.80	45.15	39.7	84.85	61845.80	-153.50	7	168
29-Dec-10	0.00	0	8687.45	48.12	39.7	87.82	61666.95	-178.85	-2	174
30-Dec-10	0.00	0	8687.15	45.15	39.7	84.85	61513.65	-153.30	8	168
31-Dec-10	0.00	0	8686.90	51.55	39.7	91.25	61386.10	-127.55	27	181
1-Jan-11	0.00	0	8686.60	53.22	39.7	92.92	61233.40	-152.70	16	184
2-Jan-11	0.00	0	8686.20	48.72	39.7	88.42	61029.80	-203.60	-14	175
3-Jan-11	0.00	0	8685.90	46.39	39.7	86.09	60877.50	-152.30	9	171
4-Jan-11	0.00	0	8685.55	48.322	41.0	89.33	60700.75	-176.75	0	177
5-Jan-11	0.00	0	8685.25	48.322	41.0	89.33	60549.25	-151.50	13	177
6-Jan-11	0.00	0	8685.00	40.78	41.0	81.79	60423.00	-126.25	18	162
7-Jan-11	0.00	0	8684.65	43.283	39.7	82.98	60247.65	-175.35	-5	165
8-Jan-11	0.00	0	8684.35	44.44	39.7	84.14	60097.35	-150.30	8	167
9-Jan-11	0.00	0	8684.10	46.8	39.7	86.50	59972.10	-125.25	23	172
10-Jan-11	0.00	0	8683.75	46.15	39.7	85.85	59797.75	-174.35	-2	170
11-Jan-11	0.00	0	8683.40	44.56	39.7	84.26	59623.80	-173.95	-3	167
12-Jan-11	0.00	0	8683.15	46.9	38.2	85.12	59499.55	-124.25	22	169
13-Jan-11	0.00	0	8682.90	45.35	38.2	83.57	59375.40	-124.15	21	166
14-Jan-11	0.00	0	8682.55	46.46	38.2	84.68	59201.80	-173.60	-3	168
15-Jan-11	0.00	0	8682.25	48.85	38.2	87.07	59053.00	-148.80	12	173
16-Jan-11	0.00	0	8681.90	46.35	38.2	84.57	58879.70	-173.30	-3	168
17-Jan-11	0.00	0	8681.65	43.43	36.9	80.34	58756.45	-123.25	18	159
16-Jan-11	0.00	0	8681.40	46.56	36.9	83.47	58633.20	-123.25	21	166
19-Jan-11	0.00	0	8681.00	54.27	36.9	91.18	58436.00	-197.20	-8	181
20-Jan-11	0.00	0	8680.70	54.53	36.9	91.44	58289.30	-146.70	17	181
21-Jan-11	0.00	0	8680.40	53.33	35.6	88.93	58142.60	-146.70	15	176
22-Jan-11	0.00	0	8680.00	53.68	35.6	89.28	57947.00	-195.60	-9	177
23-Jan-11	0.00	0	8679.70	53.28	36.91	90.19	57801.20	-145.80	17	179
24-Jan-11	0.00	0	8679.40	59.01	34.12	93.13	57655.40	-145.80	20	185
25-Jan-11	0.00	0	8679.00	89.81	34.12	123.93	57461.00	-194.40	26	246
26-Jan-11	0.00	0	8678.60	63.82	32.81	96.63	57268.20	-192.80	-1	192
27-Jan-11	0.00	0	8678.20	64.32	32.81	97.13	57075.40	-192.80	0	193
28-Jan-11	0.00	0	8677.80	62.53	30.02	92.55	56883.40	-192.00	-4	184
29-Jan-11	0.00	0	8677.45	61.4	30.02	91.42	56716.10	-167.30	7	181
30-Jan-11	0.00	0	8677.10	64.3	28.71	93.01	56548.80	-167.30	9	184
31-Jan-11	0.00	0	8676.70	59.22	28.71	87.93	56358.50	-190.30	-8	174
1-Feb-11	0.00	0	8676.30	57.62	24.61	82.23	56168.50	-190.00	-14	163
2-Feb-11	0.00	0	8676.00	58.96	21.82	80.78	56026.00	-142.50	9	160
3-Feb-11	0.00	0	8675.60	68.06	16.40	84.46	55837.60	-188.40	-11	168
4-Feb-11	0.00	0	8675.20	60.02	12.30	72.32	55649.20	-188.40	-23	143
5-Feb-11	0.00	0	8674.40	60.74	10.99	71.73	55275.40	-373.80	-117	142
6-Feb-11	0.00	0	8674.50	59.69	8.20	67.89	55322.00	46.60	91	135
7-Feb-11	0.00	0	8674.20	59.33	8.20	67.53	55182.20	-139.80	-3	134
8-Feb-11	0.00	0	8673.90	58.08	6.89	64.97	55055.80	-126.40	1	129
9-Feb-11	0.00	0	8673.55	68.02	5.41	73.43	54907.10	-148.70	-2	146
10-Feb-11	0.00	0	8673.20	68.17	28.71	96.88	54761.40	-145.70	23	192

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11-Feb-11	0.00	0	8672.82	68.19	28.71	96.90	54544.92	-216.48	-12	192
12-Feb-11	0.00	0	8672.40	66.43	28.71	95.14	54353.40	-191.52	-1	189
13-Feb-11	0.00	0	8672.00	68.59	28.71	97.30	54171.00	-182.40	5	193
14-Feb-11	0.00	0	8671.60	77.64	28.71	106.35	53990.60	-180.40	15	211
15-Feb-11	0.00	0	8671.20	69.8	28.71	98.51	53810.20	-180.40	8	195
16-Feb-11	0.00	0	8670.85	67.93	28.71	96.64	53652.80	-157.40	17	192
17-Feb-11	0.00	0	8670.45	59.49	28.71	88.20	53924.60	271.80	225	175
18-Feb-11	0.00	0	8670.10	65.19	24.61	89.80	53316.80	-607.80	-217	178
19-Feb-11	0.00	0	8669.70	68.05	24.61	92.66	53139.10	-177.70	3	184
20-Feb-11	0.00	0	6669.30	66.77	24.61	91.38	52961.90	-177.20	2	181
21-Feb-11	0.00	0	8669.00	75.05	24.61	99.66	52829.00	-132.90	33	198
22-Feb-11	0.00	0	8668.55	87.22	24.61	111.83	52632.80	-196.20	13	222
23-Feb-11	0.00	0	8668.10	101.13	24.61	125.74	52436.60	-196.20	27	249
24-Feb-11	0.00	0	8667.60	88.07	24.61	112.68	52220.20	-216.40	4	223
25-Feb-11	0.00	0	8667.20	90.06	21.82	111.88	52047.40	-172.80	25	222
26-Feb-11	0.00	0	8666.75	79.33	21.82	101.15	51853.75	-193.65	4	201
27-Feb-11	0.00	0	8666.30	90.26	21.62	112.08	51660.70	-193.05	15	222
28-Feb-11	0.00	0	8665.80	91.45	21.82	113.27	51446.60	-214.10	5	225
1-Mar-11	0.00	0	8665.40	95.33	21.82	117.15	51275.80	-170.80	31	232
2-Mar-11	0.00	0	8664.80	110.49	21.82	132.31	51020.60	-255.20	4	262
3-Mar-11	0.00	0	8664.30	135.95	21.82	157.77	50809.60	-211.00	51	313
4-Mar-11	0.00	0	8663.70	122.1	16.4	138.50	50557.60	-252.00	11	275
5-Mar-11	0.00	0	8663.10	120.02	16.4	136.42	50306.80	-250.60	10	271
6-Mar-11	0.00	0	8662.60	132.72	16.4	149.12	50099.00	-207.80	44	296
7-Mar-11	0.00	0	8661.80	107.68	16.4	124.08	49767.80	-331.20	-43	246
8-Mar-11	0.00	0	8661.30	114.44	16.4	130.84	49562.30	-205.50	27	260
9-Mar-11	0.00	0	8660.70	92.7	16.4	109.10	49317.80	-244.50	-14	216
10-Mar-11	0.00	0	8660.25	91.38	16.4	107.78	49136.00	-181.80	16	214
11-Mar-11	0.00	0	8659.90	91.38	12.3	103.68	48995.00	-141.00	33	206
12-Mar-11	0.00	0	8659.50	61.49	12.3	73.79	48835.00	-160.00	-7	146
13-Mar-11	0.00	0	6659.20	61.64	12.3	73.94	48715.00	-120.00	13	147
14-Mar-11	0.00	0	8658.90	64.43	12.3	76.73	48595.20	-119.80	16	152
15-Mar-11	0.00	0	8658.60	62.74	12.3	75.04	48475.80	-119.40	15	149
16-Mar-11	0.00	0	8658.30	62.87	12.3	75.17	48356.40	-119.40	15	149
17-Mar-11	0.00	0	8657.95	63.37	12.3	75.67	48217.35	-139.05	6	150
18-Mar-11	0.00	0	8657.60	65.94	10.99	76.93	48079.80	-137.55	8	153
19-Mar-11	0.00	0	8657.30	71.46	10.99	82.45	47961.90	-117.90	23	164
20-Mar-11	0.00	0	8656.90	71.46	10.99	82.45	47805.00	-156.90	3	164
21-Mar-11	0.00	0	8656.40	101.03	10.99	112.02	47610.00	-195.00	14	222
22-Mar-11	0.00	0	8655.80	102.7	10.99	113.69	47377.20	-232.80	-4	226
23-Mar-11	0.00	0	8655.40	103.7	10.99	114.69	47223.60	-153.60	37	227
24-Mar-11	0.00	0	8654.80	56.48	10.99	67.47	46993.80	-229.80	-48	134
25-Mar-11	0.00	0	8654.50	68.19	8.2	76.39	46879.50	-114.30	19	152
26-Mar-11	0.00	0	8654.20	68.23	8.2	76.43	46765.20	-114.30	19	152
27-Mar-11	0.00	0	8653.80	62.36	6.2	70.56	46614.00	-151.20	-6	140
28-Mar-11	0.00	0	8653.50	70.01	8.2	78.21	46501.50	-112.50	21	155
29-Mar-11	0.00	0	8653.20	72.17	8.2	80.37	46389.00	-112.50	24	159
30-Mar-11	0.00	0	8652.80	77.75	8.2	85.95	46239.60	-149.40	11	170
31-Mar-11	0.00	0	8652.35	64.94	8.2	73.14	46072.20	-167.40	-11	145
1-Apr-11	0.00	0	8652.00	64.45	8.2	72.65	45942.00	-130.20	7	144
2-Apr-11	0.00	0	8651.60	75.7	8.2	83.90	45796.00	-146.00	10	166
3-Apr-11	0.00	0	8651.20	62.385	8.2	70.59	45650.00	-146.00	-3	140
4-Apr-11	0.00	0	8650.90	66.15	8.2	74.35	45540.90	-109.10	19	147
5-Apr-11	0.00	0	8650.50	70.5	8.2	78.70	45396.50	-144.40	6	156
6-Apr-11	0.00	0	8650.15	67.087	8.2	75.29	45270.15	-126.35	12	149
7-Apr-11	0.00	0	8649.80	66.67	8.2	74.87	45144.80	-125.35	12	149
8-Apr-11	0.00	0	8649.40	68.62	5.41	74.03	45002.40	-142.40	2	147
9-Apr-11	0.00	0	8649.00	66.66	5.41	72.07	44860.00	-142.40	0	143
10-Apr-11	0.00	0	8648.70	69.27	5.41	74.68	44754.40	-105.60	21	148
11-Apr-11	0.00	0	8648.30	69.9	5.41	75.31	44613.60	-140.80	4	149
12-Apr-11	0.00	0	8648.00	66.3	5.41	71.71	44508.00	-105.60	18	142

Date	Stilling basin Gauge Reading (ft.)	Discharge from Stilling basin (Cusecs)	Lake Level (ft.)	Dischrge Through PH#1 (Cusecs)	Estimated Seepge (Cusecs)	Total Outflow (Cusecs)	Storage capacity (Acre Feet)	Increased/ Decreased In Water Storage (Acre Feet)	Calcul. Inflow (Cusecs)	Water Released Per Day (Acre Feet)
13-Apr-11	0.00	0	8647.75	76.3	5.41	81.71	44421.00	-87.00	38	162
14-Apr-11	0.00	0	8647.35	72.87	5.41	78.28	44281.80	-139.20	8	155
15-Apr-11	0.00	0	8646.95	69.82	5.41	75.23	44142.90	-138.90	5	149
16-Apr-11	0.00	0	8646.55	74.52	5.41	79.93	44006.10	-136.80	11	159
17-Apr-11	0.00	0	8646.20	43.77	5.41	49.18	43886.40	-119.70	-11	98
18-Apr-11	0.00	0	8645.90	75.83	5.41	81.24	43784.50	-101.90	30	161
19-Apr-11	0.00	0	8645.50	68.32	5.41	73.73	43650.50	-134.00	6	146
20-Apr-11	0.00	0	8645.10	78.5	5.41	83.91	43516.50	-134.00	16	166
21-Apr-11	0.00	0	8644.60	72.11	5.41	77.52	43352.20	-164.30	-5	154
22-Apr-11	0.00	0	8644.15	75.8	4.11	79.91	43516.50	164.30	163	158
23-Apr-11	0.00	0	8643.70	82.41	4.11	86.52	43060.00	-456.50	-144	172
24-Apr-11	0.00	0	8643.20	87.13	4.11	91.24	42900.00	-160.00	11	181
25-Apr-11	0.00	0	8642.60	86.9	4.11	91.01	42710.40	-189.60	-5	181
26-Apr-11	0.00	0	8642.05	87.17	4.11	91.28	42537.70	-172.70	4	181
27-Apr-11	0.00	0	8641.50	89.83	4.11	93.94	42368.50	-169.20	9	186
28-Apr-11	0.00	0	8640.95	101.2	4.11	105.31	42199.90	-168.60	20	209
29-Apr-11	0.00	0	8640.40	92.79	2.1	94.89	42033.80	-166.10	11	188
30-Apr-11	0.00	0	8639.90	90.41	8.2	98.61	41883.40	-150.40	23	196
1-May-11	0.00	0	8639.50	82.89	8.2	91.09	41765.00	-118.40	31	181
2-May-11	0.00	0	8639.00	82.89	8.2	91.09	41617.00	-148.00	16	181
3-May-11	0.00	0	8638.75	93.59	8.2	101.79	41529.40	-87.60	58	202
4-May-11	0.00	0	8638.70	101	8.2	109.20	41529.40	0.00	109	217
5-May-11	0.00	0	8639.83	81.98	8.2	90.10	41714.68	185.28	194	179
6-May-11	0.00	85	8640.16	28.6	2.79	116.39	41961.32	246.64	241	231
7-May-11	0.00	280	8640.40	0	2.79	282.79	42033.80	72.48	319	561
8-May-11	0.00	750	8640.25	0	2.79	752.79	41988.50	-45.30	730	1493
9-May-11	0.00	950	8639.70	0	2.79	952.79	41824.20	-164.30	870	1890
10-May-11	0.00	1190	8638.30	7.4	2.79	1200.19	41412.60	-411.60	993	2381
11-May-11	0.00	1260	8636.58	6.87	2.79	1269.66	40915.04	-497.56	1019	2518
12-May-11	0.00	1320	8634.39	9.41	2.79	1332.20	40288.76	-626.28	1016	2642
13-May-11	0.00	1300	8633.22	3.03	2.79	1305.82	39958.04	-330.72	1139	2590
14-May-11	0.00	1200	8632.83	8.09	2.79	1210.88	39848.23	-109.81	1156	2402
15-May-11	0.00	0	8632.66	3.18	2.79	5.97	39800.46	-47.77	-18	12
16-May-11	0.00	0	8633.66	0	2.79	2.79	40082.12	281.66	145	6
17-May-11	0.00	120	8636.58	54.97	2.79	177.76	40915.04	832.92	598	353
18-May-11	0.00	0	8639.92	114.62	2.79	117.41	41889.32	974.28	609	233
19-May-11	0.00	200	8642.10	37.08	2.79	239.87	42553.40	664.08	575	476
20-May-11	0.00	100	8644.80	26.96	2.79	129.75	43417.60	864.20	565	257
21-May-11	0.00	120	8647.00	10.03	2.79	132.82	44160.00	742.40	507	263
22-May-11	0.00	90	8647.95	83.46	2.79	176.25	44490.60	330.60	343	350
23-May-11	0.00	0	8648.40	97.92	4.1	102.02	44648.80	158.20	182	202
24-May-11	0.00	0	8649.70	110.7	4.1	114.80	45109.20	460.40	347	228
25-May-11	0.00	0	8651.50	102.97	5.41	108.38	45759.50	650.30	436	215
26-May-11	0.00	0	8653.90	78.04	5.41	83.45	46651.50	892.00	533	166
27-May-11	0.25	18	8655.40	86.32	6.89	111.21	47223.60	572.10	400	221
28-May-11	0.25	18	8656.20	54.69	8.2	80.89	47532.00	308.40	236	160
29-May-11	0.25	18	8657.40	51.76	9.51	79.27	48001.20	469.20	316	157
30-May-11	0.25	19	8659.10	68.04	9.51	96.55	48675.00	673.80	436	192
31-May-11	0.25	21	8660.95	55.73	12.3	89.03	49418.80	743.80	464	177
1-Jun-11	0.42	41	8662.90	60.44	13.62	115.08	50223.50	804.70	521	228
2-Jun-11	0.42	41	8663.65	68.46	13.62	123.08	50536.70	313.20	281	244
3-Jun-11	0.42	45	8663.80	78.18	13.62	136.80	50599.40	62.70	168	271
4-Jun-11	0.00	0	8663.90	86.1	13.62	99.72	50641.20	41.80	121	198
5-Jun-11	0.00	0	8664.75	66.29	13.62	79.91	50999.50	358.30	261	158
6-Jun-11	0.25	20	8666.10	75.82	13.62	109.44	51574.90	575.40	400	217
7-Jun-11	0.25	20	8667.00	81.85	15.09	116.94	51961.00	386.10	312	232
8-Jun-11	0.25	21	8668.00	58.4	15.09	94.49	52393.00	432.00	312	187
9-Jun-11	0.25	22	8669.10	54.35	17.72	94.07	52873.30	480.30	336	187
10-Jun-11	0.25	23	8670.10	58.93	17.72	99.65	53316.80	443.50	323	198
11-Jun-11	0.25	23	8671.20	51.98	17.72	92.70	53810.20	493.40	341	184
12-Jun-11	0.25	23	8672.25	[illegible]	19.19	42.19	54285.00	474.80	282	84

Date	Stilling basin Gauge Reading (ft.)	Discharge from Stilling basin (Cusecs)	Lake Level (ft.)	Dischrge Through PH#1 (Cusecs)	Estimated Seepge (Cusecs)	Total Outflow (Cusecs)	Storage capacity (Acre Feet)	Increased/ Decreased In Water Storage (Acre Feet)	Calcul. Inflow (Cusecs)	Water Released Per Day (Acre Feet)
13-Jun-11	0.25	23	8673.10	45.64	20.51	89.15	54673.20	388.20	285	177
14-Jun-11	0.25	23	8673.80	48	20.51	91.51	54996.60	323.40	255	182
15-Jun-11	0.25	23	8674.60	58.01	21.82	102.83	55368.60	372.00	290	204
16-Jun-11	0.50	68	8675.15	60.37	21.82	150.19	55625.65	257.05	280	298
17-Jun-11	0.50	68	8675.80	64.44	21.82	154.26	55931.80	306.15	309	306
18-Jun-11	0.50	68	8676.40	64.1	23.30	155.40	56216.00	284.20	299	308
19-Jun-11	0.50	68	8676.70	67.42	23.30	158.72	56358.50	142.50	231	315
20-Jun-11	0.50	68	8676.90	68.82	23.30	160.12	56453.50	95.00	208	318
21-Jun-11	0.50	69	8677.10	68.61	25.92	163.53	56548.80	95.30	212	324
22-Jun-11	0.50	69	8677.30	67.2	25.92	162.12	56644.40	95.60	210	322
23-Jun-11	0.50	69	8677.60	52.57	25.92	147.49	56787.80	143.40	220	293
24-Jun-11	0.50	69	8678.30	0	25.92	94.92	57123.60	335.80	264	188
25-Jun-11	0.25	69	8679.00	54.04	25.92	148.96	57461.00	337.40	319	295
26-Jun-11	0.25	69	8679.65	140.75	25.92	235.67	57776.90	315.90	395	467
27-Jun-11	0.00	0	8680.25	85.83	27.40	113.23	58069.25	292.35	261	225
28-Jun-11	0.00	0	8681.10	79.17	27.40	106.57	58485.30	416.05	316	211
29-Jun-11	0.00	0	8681.80	80.33	27.40	107.73	58830.40	345.10	282	214
30-Jun-11	0.00	0	8682.40	86	28.71	114.71	59127.40	297.00	264	228
1-Jul-11	0.00	0	8682.80	81.17	28.71	109.88	59325.80	198.40	210	218
2-Jul-11	0.00	0	8683.10	69.28	28.71	97.99	59474.70	148.90	173	194
3-Jul-11	0.00	0	8683.40	70.13	28.71	98.84	59623.80	149.10	174	196
4-Jul-11	0.00	0	8683.60	70.13	28.71	98.84	59723.20	99.40	149	196
5-Jul-11	0.00	0	8683.88	68.34	30.01	98.35	59862.36	139.16	169	195
6-Jul-11	0.00	0	8683.95	71.01	30.01	101.02	59897.15	34.79	119	200
7-Jul-11	0.00	0	8684.00	69.34	30.01	99.35	59922.00	24.85	112	197
8-Jul-11	0.00	0	8684.15	69.22	30.01	99.23	59997.15	75.15	137	197
9-Jul-11	0.00	0	8684.30	73.81	30.01	103.82	60072.30	75.15	142	206
10-Jul-11	0.00	0	8684.40	74.9	30.01	104.91	60122.40	50.10	130	208
11-Jul-11	0.00	0	8684.50	71.82	30.01	101.83	60172.50	50.10	127	202
12-Jul-11	0.00	0	8684.60	69.96	30.01	99.97	60222.60	50.10	125	198
13-Jul-11	0.00	0	8684.60	71.69	30.01	101.70	60247.65	25.05	114	202
14-Jul-11	0.00	0	8684.65	69.36	31.48	100.84	60297.75	50.10	126	200
15-Jul-11	0.00	0	8684.75	72.08	31.48	103.56	60297.75	0.00	104	205
16-Jul-11	0.00	0	8684.80	68.62	31.48	100.10	60322.80	25.05	113	199
17-Jul-11	0.00	0	8684.95	79.01	31.48	110.49	60397.95	75.15	148	219
18-Jul-11	0.00	0	8685.00	74.26	31.48	105.74	60423.00	25.05	118	210
19-Jul-11	0.00	0	8685.00	60.93	30.01	90.94	60423.00	0.00	91	180
20-Jul-11	0.00	0	8685.10	55.83	30.01	85.84	60473.50	50.50	111	170
21-Jul-11	0.00	0	8685.20	67.09	30.01	97.10	60524.00	50.50	123	193
22-Jul-11	0.00	0	8685.30	68.38	30.01	98.39	60574.50	50.50	124	195
23-Jul-11	0.00	0	8685.35	70.27	30.01	100.28	60599.75	25.25	113	199
24-Jul-11	0.00	0	8685.40	48.58	30.01	78.59	60625.00	25.25	91	156
25-Jul-11	0.00	0	8685.50	70.25	30.01	100.26	60675.50	50.50	126	199
26-Jul-11	0.00	0	8685.70	65.7	30.01	95.71	60776.50	101.00	147	190
27-Jul-11	0.00	0	8685.00	73.46	30.01	103.47	60423.00	-353.50	-75	205
28-Jul-11	0.00	0	8685.85	74.61	31.48	106.09	60852.25	429.25	323	210
29-Jul-11	0.00	0	8686.10	75.36	31.48	106.84	60978.90	126.65	171	212
30-Jul-11	0.00	0	8686.30	67.97	31.48	99.45	61080.70	101.80	151	197
31-Jul-11	0.00	0	8686.50	71.78	31.48	103.26	61182.50	101.80	155	205
1-Aug-11	0.00	0	8686.60	66.41	31.48	97.89	61233.40	50.90	124	194
2-Aug-11	0.00	0	8686.60	76.06	31.48	107.54	61233.40	0.00	108	213
3-Aug-11	0.00	0	8686.60	70.69	31.48	102.17	61233.40	0.00	102	203
4-Aug-11	0.00	0	8686.55	70.33	31.48	101.81	61207.95	-25.45	89	202
5-Aug-11	0.00	0	8686.50	65.2	31.48	96.68	61182.50	-25.45	84	192
6-Aug-11	0.00	0	8686.45	59.14	31.48	90.62	61157.05	-25.45	78	180
7-Aug-11	0.00	0	8686.40	48.33	31.48	79.81	61131.60	-25.45	67	158
8-Aug-11	0.00	0	8686.60	60.8	31.48	92.28	61233.40	101.80	144	183
9-Aug-11	0.00	0	8686.95	63.81	31.48	95.29	61411.55	178.15	185	189
10-Aug-11	0.00	0	8687.20	45.3	31.48	76.78	61539.20	127.65	141	152
11-Aug-11	0.00	0	8687.35	62.76	31.48	94.24	61615.85	76.65	133	187
12-Aug-11	0.00	0	8687.40	76.81	31.48	108.29	61641.40	25.55	121	215

Date	Stilling basin Gauge Reading (ft.)	Discharge from Stilling basin (Cusecs)	Lake Level (ft.)	Dischrge Through PH#1 (Cusecs)	Estimated Seepge (Cusecs)	Total Outflow (Cusecs)	Storage capacity (Acre Feet)	Increased/ Decreased In Water Storage (Acre Feet)	Calcul. Inflow (Cusecs)	Water Released Per Day (Acre Feet)
13-Aug-11	0.00	0	8687.50	69.41	31.48	100.89	61692.50	51.10	127	200
14-Aug-11	0.00	0	8687.60	59.94	31.48	91.42	61743.60	51.10	117	181
15-Aug-11	0.00	0	8687.65	59.3	31.48	90.78	61769.15	25.55	104	180
16-Aug-11	0.00	0	8687.70	56.23	31.48	87.71	61794.70	25.55	101	174
17-Aug-11	0.00	0	8687.75	56.23	31.48	87.71	61820.25	25.55	101	174
18-Aug-11	0.00	0	8687.80	61.01	31.48	92.49	61845.80	25.55	105	183
19-Aug-11	0.00	0	8687.80	65.52	31.48	97.00	61845.80	0.00	97	192
20-Aug-11	0.00	0	8687.80	65.52	31.48	97.00	61845.80	0.00	97	192
21-Aug-11	0.00	0	8687.60	61.6	31.48	93.08	61743.60	-102.20	42	185
22-Aug-11	0.00	0	8687.75	60.8	31.48	92.28	61820.25	76.65	131	183
23-Aug-11	0.00	0	8687.70	58.73	31.48	90.21	61794.70	-25.55	77	179
24-Aug-11	0.00	0	8687.65	52.29	31.48	83.77	61769.15	-25.55	71	166
25-Aug-11	0.00	0	8687.65	54.96	31.48	86.44	61769.15	0.00	86	171
26-Aug-11	0.00	0	8687.60	57.29	31.48	88.77	61743.60	-25.55	76	176
27-Aug-11	0.00	0	8687.60	50.12	31.48	81.60	61743.60	0.00	82	162
28-Aug-11	0.00	0	6687.60	44.85	31.48	76.33	61743.60	0.00	76	151
29-Aug-11	0.00	0	8687.65	47.62	31.48	79.10	61769.15	25.55	92	157
30-Aug-11	0.00	0	8687.70	54.59	31.48	86.07	61794.70	25.55	99	171
31-Aug-11	0.00	0	8687.65	53.25	31.48	84.73	61769.15	-25.55	72	168
1-Sep-11	0.00	0	8687.60	38.28	31.48	69.76	61743.60	-25.55	57	138
2-Sep-11	0.00	0	8687.55	50.32	31.48	81.80	61692.50	-51.10	56	162
3-Sep-11	0.00	0	8687.50	46.1	31.48	77.58	61692.50	0.00	78	154
4-Sep-11	0.00	0	8687.50	48.92	31.48	80.40	61692.50	0.00	80	159
5-Sep-11	0.00	0	8687.40	48.69	31.48	80.17	61641.40	-51.10	54	159
6-Sep-11	0.00	0	8687.40	45.44	31.48	76.92	61641.40	0.00	77	153
7-Sep-11	0.00	0	8687.30	48.6	31.48	80.08	61590.30	-51.10	54	159
8-Sep-11	0.00	0	8687.30	50.54	31.48	82.02	61590.30	0.00	82	163
9-Sep-11	0.00	0	8687.20	51.95	31.48	83.43	61539.20	-51.10	58	165
10-Sep-11	0.00	0	8687.15	54.83	31.48	86.31	61513.65	-25.55	73	171
11-Sep-11	0.00	0	8687.10	53.83	31.48	85.31	61488.10	-25.55	72	169
12-Sep-11	0.00	0	8687.20	54.83	31.48	86.31	61539.20	51.10	112	171
13-Sep-11	0.00	0	8687.10	52.24	31.48	83.72	61488.10	-51.10	58	166
14-Sep-11	0.00	0	8687.00	52.3	31.48	83.78	61437.00	-51.10	58	166
15-Sep-11	0.00	0	8686.95	56.74	31.48	88.22	61411.55	-25.45	75	175
16-Sep-11	0.00	0	8687.00	59.11	31.48	90.59	61437.00	25.45	103	180
17-Sep-11	0.00	0	8687.20	52.12	31.48	83.60	61539.20	102.20	135	166
18-Sep-11	0.00	0	8687.30	55.43	31.48	86.91	61590.30	51.10	113	172
19-Sep-11	0.00	0	8687.40	52.2	31.48	83.68	61641.40	51.10	109	166
20-Sep-11	0.00	0	8687.50	51.87	31.48	83.35	61692.50	51.10	109	165
21-Sep-11	0.00	0	8667.55	51.23	31.48	82.71	61718.05	25.55	96	164
22-Sep-11	0.00	0	8667.60	54.4	31.48	85.88	61743.60	25.55	99	170
23-Sep-11	0.00	0	8687.60	50.75	31.48	82.23	61743.60	0.00	82	163
24-Sep-11	0.00	0	8667.55	55.22	31.48	86.70	61718.05	-25.55	74	172
25-Sep-11	0.00	0	8687.50	55.82	31.48	87.30	61692.50	-25.55	74	173
26-Sep-11	0.00	0	8687.45	51.69	31.48	83.17	61666.95	-25.55	70	165
27-Sep-11	0.00	0	8687.35	55.24	31.48	86.72	61615.85	-51.10	61	172
28-Sep-11	0.00	0	8687.20	55.58	31.48	87.06	61539.20	-76.65	48	173
29-Sep-11	0.00	0	8687.10	55.23	31.48	86.71	61488.10	-51.10	61	172
30-Sep-11	0.00	0	8686.95	54.4	31.46	85.88	61411.55	-76.55	47	170
1-Oct-11	0.00	0	8686.80	48.75	31.48	80.23	61334.80	-76.75	42	159
2-Oct-11	0.00	0	8686.70	55.65	31.46	87.13	61283.70	-51.10	61	173
3-Oct-11	0.00	0	8686.50	53.28	31.48	84.76	61182.50	-101.20	34	168
4-Oct-11	0.00	0	8686.35	52.58	31.48	84.06	61106.15	-76.35	46	167
5-Oct-11	0.00	0	8686.20	52.12	31.48	83.60	61029.80	-76.35	45	166
6-Oct-11	0.00	0	8686.00	54.12	31.48	85.60	60928.00	-101.80	34	170
7-Oct-11	0.00	0	8685.50	59.53	31.48	91.01	60675.50	-252.50	-36	181
8-Oct-11	0.00	0	8685.45	55.19	31.48	86.67	8662.60	-52012.90	-26137	172
9-Oct-11	0.00	0	8685.40	50.85	31.48	82.33	8662.40	-0.20	82	163
10-Oct-11	0.00	0	8685.20	49.37	31.48	80.85	60524.00	51861.60	26228	160
11-Oct-11	0.00	0	8685.10	46.64	31.48	78.12	60473.50	-50.50	53	155
12-Oct-11	0.00	0	8684.95	47.18	31.48	78.66	60397.95	-75.55	41	156

Date	Stilling basin Gauge Reading (ft.)	Discharge from Stilling basin (Cusecs)	Lake Level (ft.)	Dischrge Through PH#1 (Cusecs)	Estimated Seepge (Cusecs)	Total Outflow (Cusecs)	Storage capacity (Acre Feet)	Increased/ Decreased In Water Storage (Acre Feet)	Calcul. Inflow (Cusecs)	Water Released Per Day (Acre Feet)
13-Oct-11	0.00	0	8684.75	47.65	31.48	79.13	60297.75	-100.20	29	157
14-Oct-11	0.00	0	8684.55	52.63	31.48	84.11	60197.55	-100.20	34	167
15-Oct-11	0.00	0	8684.40	45.3	31.48	76.78	60122.40	-75.15	39	152
16-Oct-11	0.00	0	8684.25	51.19	31.48	82.67	60047.25	-75.15	45	164
17-Oct-11	0.00	0	8684.05	52.34	31.48	83.82	59947.05	-100.20	33	166
18-Oct-11	0.00	0	8683.80	55.1	31.48	86.58	59829.00	-118.05	27	172
19-Oct-11	0.00	0	8683.60	54.61	31.48	86.09	59730.40	-98.60	36	171
20-Oct-11	0.00	0	8683.35	50.2	31.48	81.68	59603.85	-126.55	18	162
21-Oct-11	0.00	0	8683.20	38.39	31.48	69.87	59527.60	-76.25	31	139
22-Oct-11	0.00	0	8683.00	54.04	31.48	85.52	59425.00	-102.60	34	170
23-Oct-11	0.00	0	8682.75	53.73	31.48	85.21	59301.75	-123.25	23	169
24-Oct-11	0.00	0	8682.50	54.94	31.48	86.42	59177.50	-124.25	24	171
25-Oct-11	0.00	0	8682.25	58.81	31.48	90.29	59053.25	-124.25	28	179
26-Oct-11	0.00	0	8682.05	57.08	30.02	87.10	58953.85	-99.40	37	173
27-Oct-11	0.00	0	8681.65	55.97	30.02	85.99	58756.45	-197.40	-14	171
28-Oct-11	0.00	0	8681.35	63.22	30.02	93.24	58608.55	-147.90	19	185
29-Oct-11	0.00	0	8681.30	64.22	30.02	94.24	58583.90	-24.65	82	187
30-Oct-11	0.00	0	8681.25	60.02	30.02	90.04	58559.25	-24.65	78	179
31-Oct-11	0.00	0	8681.15	62	30.02	92.02	58509.95	-49.30	67	183
1-Nov-11	0.00	0	8680.95	61	30.02	91.02	58411.55	-98.40	41	181
2-Nov-11	0.00	0	8680.75	63.28	30.02	93.30	58313.75	-97.80	44	185
3-Nov-11	0.00	0	8680.60	64.35	30.02	94.37	58240.40	-73.35	57	187
4-Nov-11	0.00	0	8680.40	59.5	30.02	89.52	58142.60	-97.80	40	178
5-Nov-11	0.00	0	8680.20	46.82	30.02	76.84	58044.80	-97.80	28	152
6-Nov-11	0.00	0	8680.00	36.02	30.02	66.04	57947.00	-97.80	17	131
7-Nov-11	0.00	0	8679.75	44.62	30.02	74.64	57825.50	-121.50	13	148
8-Nov-11	0.00	0	8679.55	43.32	30.02	73.34	57728.30	-97.20	24	145
9-Nov-11	0.00	0	8679.35	31.29	30.02	61.31	57631.10	-97.20	12	122
10-Nov-11	0.00	0	8679.15	29.46	30.02	59.48	57533.90	-97.20	10	118
11-Nov-11	0.00	0	8678.98	37.46	29.00	66.46	57451.28	-82.62	25	132
12-Nov-11	0.00	0	8678.80	45.45	29.00	74.45	57364.60	-86.68	31	148
13-Nov-11	0.00	0	8678.60	45.7	29.00	74.70	57268.20	-96.40	26	148
14-Nov-11	0.00	0	8678.35	33.33	29.00	62.33	57147.70	-120.50	2	124
15-Nov-11	0.00	0	8678.15	48.61	29.00	77.61	57051.30	-96.40	29	154
16-Nov-11	0.00	0	8678.00	78.65	29.00	107.65	56979.00	-72.30	71	214
17-Nov-11	0.00	0	8677.80	30.51	29.00	59.51	56883.40	-95.60	11	118
18-Nov-11	0.00	0	8677.62	37.66	29.00	66.66	56797.36	-86.04	23	132
19-Nov-11	0.00	0	8677.45	45.16	29.00	74.16	56716.10	-81.26	33	147
20-Nov-11	0.00	0	8677.30	44.66	29.00	73.66	56644.40	-71.70	38	146
21-Nov-11	0.00	0	8677.10	44.6	29.00	73.60	56548.80	-95.60	25	146
22-Nov-11	0.00	0	8676.90	46.06	29.00	75.06	56453.50	-95.30	27	149
23-Nov-11	0.00	0	8676.70	45.69	29.00	74.69	56358.50	-95.00	27	148
24-Nov-11	0.00	0	8676.55	48.52	29.00	77.52	56287.25	-71.25	42	154
25-Nov-11	0.00	0	8676.35	34	29.00	63.00	56192.25	-95.00	15	125
26-Nov-11	0.00	0	8676.20	36	29.00	65.00	56121.00	-71.25	29	129
27-Nov-11	0.00	0	8675.95	35.5	29.00	64.50	56002.45	-118.55	5	128
28-Nov-11	0.00	0	8675.70	45.63	29.00	74.63	55884.70	-117.75	15	148
29-Nov-11	0.00	0	8675.50	37.7	29.00	66.70	55790.50	-94.20	19	132
30-Nov-11	0.00	0	8675.30	46.39	29.00	75.39	55696.30	-94.20	28	150
1-Dec-11	0.00	0	8675.05	50.01	29.00	79.01	55578.55	-117.75	20	157
2-Dec-11	0.00	0	8674.85	37.53	29.00	66.53	55485.10	-93.45	19	132
3-Dec-11	0.00	0	8674.60	42.58	29.00	71.58	55368.60	-116.50	13	142
4-Dec-11	0.00	0	8674.35	54.43	29.00	83.43	55252.10	-116.50	25	165
5-Dec-11	0.00	0	8674.00	51.49	29.00	80.49	55089.00	-163.10	-2	160
6-Dec-11	0.00	0	8673.65	40.98	29.00	69.98	54927.30	-161.70	-12	139
7-Dec-11	0.00	0	8673.35	44.28	29.00	73.28	54788.70	-138.60	3	145
8-Dec-11	0.00	0	8673.05	47.8	29.00	76.80	54650.10	-138.60	7	152
9-Dec-11	0.00	0	8672.80	46.48	29.00	75.48	54535.80	-114.30	18	150
10-Dec-11	0.00	0	8672.55	51.73	29.00	80.73	54421.80	-114.00	23	160
11-Dec-11	0.00	0	8672.25	52.99	26.00	78.99	54285.00	-136.80	10	157
12-Dec-11	0.00	0	8672.00	36.22	26.00	62.22	54171.00	-114.00	5	123

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13-Dec-11	0.00	0	8671.80	34.39	26.00	60.39	54080.80	-90.20	15	120
14-Dec-11	0.00	0	8671.65	45.54	26.00	71.54	54013.15	-67.65	37	142
15-Dec-11	0.00	0	8671.50	44.93	26.00	70.93	53945.50	-67.65	37	141
16-Dec-11	0.00	0	8671.30	35.45	26.00	61.45	53855.30	-90.20	16	122
17-Dec-11	0.00	0	8671.10	35.51	26.00	61.51	53765.10	-90.20	16	122
18-Dec-11	0.00	0	8670.90	49.09	26.00	75.09	53675.20	-89.90	30	149
19-Dec-11	0.00	0	8670.70	47.92	25.00	72.92	53585.60	-89.60	28	145
20-Dec-11	0.00	0	8670.50	38.6	25.00	63.60	53496.00	-89.60	18	126
21-Dec-11	0.00	0	8670.30	49.65	24.00	73.65	53406.40	-89.60	28	146
22-Dec-11	0.00	0	8670.10	45.66	23.00	68.66	53316.80	-89.60	23	136
23-Dec-11	0.00	0	8669.90	36.48	23.00	59.48	53227.70	-89.10	15	118
24-Dec-11	0.00	0	8669.70	37.54	23.00	60.54	53139.10	-88.60	16	120
25-Dec-11	0.00	0	8669.50	44.3	23.00	67.30	53050.50	-88.60	23	133
26-Dec-11	0.00	0	8669.30	37.95	22.00	59.95	52961.90	-88.60	15	119
27-Dec-11	0.00	0	8669.10	37.72	22.00	59.72	52873.30	-88.60	15	118
28-Dec-11	0.00	0	8668.90	30.3	22.00	52.30	52785.40	-87.90	8	104
29-Dec-11	0.00	0	8668.70	40.62	22.00	62.62	52698.20	-87.20	19	124
30-Dec-11	0.00	0	8668.50	37.96	21.00	58.96	52611.00	-87.20	15	117
31-Dec-11	0.00	0	8668.30	42.74	21.00	63.74	52523.80	-87.20	20	126
1-Jan-12	0.00	0	8668.10	40.05	21.00	61.05	42801.00	-9722.80	-4841	121
2-Jan-12	0.00	0	8667.90	40.05	21.00	61.05	42737.80	-63.20	29	121
3-Jan-12	0.00	0	8667.75	38.77	20.00	58.77	42586.60	-151.20	-17	117
4-Jan-12	0.00	0	8667.55	38.35	20.00	58.35	42586.60	0.00	58	116
5-Jan-12	0.00	0	8667.35	33.62	20.00	53.62	42284.20	-302.40	-99	106
6-Jan-12	0.00	0	8667.15	40.55	20.00	60.55	42133.00	-151.20	-16	120
7-Jan-12	0.00	0	8666.95	35.11	20.00	55.11	42051.10	-81.90	14	109
8-Jan-12	0.00	0	8668.80	38.86	20.00	58.86	41858.05	-193.05	-38	117
9-Jan-12	0.00	0	8666.60	35.38	19.00	54.38	41665.00	-193.05	-43	108
10-Jan-12	0.00	0	8668.40	37.21	19.00	56.21	41493.40	-171.60	-30	111
11-Jan-12	0.00	0	8666.20	38.61	19.00	57.61	41300.35	-193.05	-40	114
12-Jan-12	0.00	0	8666.00	40.1	19.00	59.10	41128.75	-171.60	-27	117
13-Jan-12	0.00	0	8665.80	41.54	19.00	60.54	40985.10	-143.65	-12	120
14-Jan-12	0.00	0	8665.60	55.44	19.00	74.44	40771.60	-213.50	-33	148
15-Jan-12	0.00	0	8665.20	51.63	19.00	70.63	40536.75	-234.85	-48	140
16-Jan-12	0.00	0	8665.05	37.81	19.00	56.81	40323.25	-213.50	-51	113
17-Jan-12	0.00	0	8664.85	40.9	19.00	59.90	40238.50	-84.75	17	119
18-Jan-12	0.00	0	8664.65	40.24	19.00	59.24	40048.60	-189.90	-37	118
19-Jan-12	0.00	0	8664.45	38.64	19.00	57.64	39837.60	-211.00	-49	114
20-Jan-12	0.00	0	8664.25	39.37	18.00	57.37	39647.70	-189.90	-38	114
21-Jan-12	0.00	0	8664.00	40.25	18.00	58.25	39533.76	-113.94	1	116
22-Jan-12	0.00	0	8663.80	42.48	18.00	60.48	39463.88	-69.88	25	120
23-Jan-12	0.00	0	8663.60	40.34	18.00	58.34	50515.80	11051.92	5630	116
24-Jan-12	0.00	0	8663.40	39.58	18.00	57.58	50432.20	-83.80	15	114
25-Jan-12	0.00	0	8663.20	35.96	17.00	52.96	50348.60	-83.60	11	105
26-Jan-12	0.00	0	8663.00	36.98	17.00	53.98	50265.00	-83.60	12	107
27-Jan-12	0.00	0	6662.80	36.4	17.00	53.40	50182.00	-83.00	12	106
28-Jan-12	0.00	0	8682.60	39.65	17.00	56.65	50099.00	-83.00	15	112
29-Jan-12	0.00	0	8662.40	37	16.00	53.00	50016.00	-83.00	11	105
30-Jan-12	0.00	0	8662.20	35.64	16.00	51.64	49933.00	-83.00	10	102
31-Jan-12	0.00	0	8662.00	36.9	16.00	52.90	49850.00	-83.00	11	105
1-Feb-12	0.00	0	8661.80	38.35	16.00	54.35	46192.10	-3657.90	-1790	108
2-Feb-12	0.00	0	[illegible]	39	15.00	54.00	46068.80	-123.30	-8	107
3-Feb-12	0.00	0	[illegible]	42.19	15.00	57.19	45986.60	-82.20	16	113
4-Feb-12	0.00	0	[illegible]	46.12	15.00	61.12	45904.40	-82.20	20	121
5-Feb-12	0.00	0	[illegible]	44.92	15.00	59.92	45842.75	-61.65	29	119
6-Feb-12	0.00	0	[illegible]	41.85	14.00	55.85	45782.80	-59.95	26	111
7-Feb-12	0.00	0	[illegible]	43.12	14.00	57.12	45702.00	-80.80	16	113
8-Feb-12	0.00	0	[illegible]	40.5	13.00	53.50	45601.00	-101.00	3	106
9-Feb-12	0.00	0	[illegible]	42.82	13.00	55.82	45459.60	-141.40	-15	111
10-Feb-12	0.00	0	[illegible]	40.72	13.00	53.72	45399.00	-60.60	23	107
11-Feb-12	0.00	0	[illegible]	39.19	13.00	52.19	45355.00	-44.00	30	104

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12-Feb-12	0.00	0	[illegible]	37.01	13.00	50.01	45255.00	-100.00	0	99
13-Feb-12	0.00	0	[illegible]	39.59	13.00	52.59	45115.00	-140.00	-18	104
14-Feb-12	0.00	0	[illegible]	42.71	12.00	54.71	45035.00	-80.00	14	109
15-Feb-12	0.00	0	[illegible]	43.78	12.00	55.78	44933.60	-101.40	5	111
16-Feb-12	0.00	0	[illegible]	45.3	12.00	57.30	44854.00	-79.60	17	114
17-Feb-12	0.00	0	[illegible]	45.6	12.00	57.60	44754.50	-99.50	7	114
18-Feb-12	0.00	0	[illegible]	45.92	12.00	57.92	44655.00	-99.50	8	115
19-Feb-12	0.00	0	[illegible]	44.41	12.00	56.41	44555.50	-99.50	6	112
20-Feb-12	0.00	0	[illegible]	45.64	12.00	57.64	44503.50	-52.00	31	114
21-Feb-12	0.00	0	[illegible]	45.56	12.00	57.56	44405.25	-98.25	8	114
22-Feb-12	0.00	0	[illegible]	46.98	12.00	58.98	44307.00	-98.25	9	117
23-Feb-12	0.00	0	[illegible]	43.88	12.00	55.88	44256.00	-51.00	30	111
24-Feb-12	0.00	0	[illegible]	43.97	11.00	54.97	44178.00	-78.00	16	109
25-Feb-12	0.00	0	[illegible]	47.39	11.00	58.39	44100.00	-78.00	19	116
26-Feb-12	0.00	0	[illegible]	45.36	11.00	56.36	43983.00	-117.00	-3	112
27-Feb-12	0.00	0	[illegible]	51.31	11.00	62.31	43866.00	-117.00	3	124
28-Feb-12	0.00	0	[illegible]	47.59	10.00	57.59	43806.00	-60.00	27	114
29-Feb-12	0.00	0	[illegible]	48.25	10.00	58.25	43710.00	-96.00	10	116
1-Mar-12	0.00	0	[illegible]	55.93	10.00	65.93	47204.40	3494.40	1628	131
2-Mar-12	0.00	0	[illegible]	45.28	10.00	55.28	47108.40	-96.00	7	110
3-Mar-12	0.00	0	[illegible]	43.21	10.00	53.21	47031.90	-76.50	15	106
4-Mar-12	0.00	0	[illegible]	41.18	9.00	50.18	46936.65	-95.25	2	100
5-Mar-12	0.00	0	[illegible]	43.69	9.00	52.69	46860.45	-76.20	14	105
6-Mar-12	0.00	0	[illegible]	43.11	9.00	52.11	46860.45	0.00	52	103
7-Mar-12	0.00	0	[illegible]	43.9	9.00	52.90	46689.00	-171.45	-34	105
8-Mar-12	0.00	0	[illegible]	44.33	8.00	52.33	46614.00	-75.00	15	104
9-Mar-12	0.00	0	[illegible]	44.15	8.00	52.15	46539.00	-75.00	14	103
10-Mar-12	0.00	0	[illegible]	45.21	8.00	53.21	46464.00	-75.00	15	106
11-Mar-12	0.00	0	[illegible]	45.4	8.00	53.40	46351.50	-112.50	-3	106
12-Mar-12	0.00	0	[illegible]	44.27	8.00	52.27	46239.60	-111.90	-4	104
13-Mar-12	0.00	0	[illegible]	44.26	8.00	52.26	46165.20	-74.40	15	104
14-Mar-12	0.00	0	[illegible]	46.85	8.00	54.85	46090.80	-74.40	17	109
15-Mar-12	0.00	0	[illegible]	43.31	8.00	51.31	46035.00	-55.80	23	102
16-Mar-12	0.00	0	[illegible]	45.63	8.00	53.63	45923.75	-111.25	-2	106
17-Mar-12	0.00	0	[illegible]	42.94	8.00	50.94	45850.75	-73.00	14	101
18-Mar-12	0.00	0	[illegible]	62.04	8.00	70.04	45759.50	-91.25	24	139
19-Mar-12	0.00	0	[illegible]	44.81	8.00	52.81	45631.75	-127.75	-12	105
20-Mar-12	0.00	0	[illegible]	44.07	8.00	52.07	45577.00	-54.75	24	103
21-Mar-12	0.00	0	[illegible]	45.9	8.00	53.90	45504.80	-72.20	17	107
22-Mar-12	0.00	0	[illegible]	54.71	8.00	62.71	45414.55	-90.25	17	124
23-Mar-12	0.00	0	[illegible]	47.26	8.00	55.26	45288.20	-126.35	-8	110
24-Mar-12	0.00	0	[illegible]	48.21	8.00	56.21	45216.00	-72.20	20	111
25-Mar-12	0.00	0	[illegible]	45.47	8.00	53.47	45109.20	-106.80	0	106
26-Mar-12	0.00	0	[illegible]	42.57	8.00	50.57	45038.00	-71.20	15	100
27-Mar-12	0.00	0	[illegible]	44.71	8.00	52.71	44949.00	-89.00	8	105
28-Mar-12	0.00	0	[illegible]	44.82	8.00	52.82	44860.00	-89.00	8	105
29-Mar-12	0.00	0	[illegible]	46.71	8.00	54.71	44772.00	-68.00	10	109
30-Mar-12	0.00	0	[illegible]	46.28	8.00	54.28	44684.00	-88.00	10	108
31-Mar-12	0.00	0	[illegible]	45.34	8.00	53.34	44596.00	-88.00	9	106
1-Apr-12	0.00	0	[illegible]	48.49	8.00	56.49	44508.00	-88.00	12	112
2-Apr-12	0.00	0	[illegible]	49.55	8.00	57.55	44438.40	-69.60	22	114
3-Apr-12	0.00	0	[illegible]	52.45	8.00	60.45	44368.80	-69.60	25	120
4-Apr-12	0.00	0	[illegible]	63.45	8.00	71.45	44299.20	-69.60	36	142
5-Apr-12	0.00	0	[illegible]	52.25	8.00	60.25	44194.80	-104.40	8	120
6-Apr-12	0.00	0	[illegible]	50.03	8.00	58.03	44102.40	-92.40	11	115
7-Apr-12	0.00	0	[illegible]	55.3	6.00	63.30	44011.00	-91.40	17	126
8-Apr-12	0.00	0	[illegible]	54.9	8.00	62.90	43941.00	-70.00	28	125
9-Apr-12	0.00	0	[illegible]	56.2	8.00	64.20	43818.00	-123.00	2	127
10-Apr-12	0.00	0	[illegible]	56.2	8.00	64.20	43700.75	-117.25	5	127
11-Apr-12	0.00	0	[illegible]	60	8.00	68.00	43583.50	-117.25	9	135
12-Apr-12	0.00	0	[illegible]	64.55	8.00	72.55	43483.00	-100.50	22	144

Date	Stilling basin Gauge Reading (ft.)	Discharge from Stilling basin (Cusecs)	Lake Level (ft.)	Dischrge Through PH#1 (Cusecs)	Estimated Seepge (Cusecs)	Total Outflow (Cusecs)	Storage capacity (Acre Feet)	Increased/ Decreased In Water Storage (Acre Feet)	Calcul. inflow (Cusecs)	Water Released Per Day (Acre Feet)
13-Apr-12	0.00	0	8644.60	74.66	8.00	82.66	43352.20	-130.80	17	164
14-Apr-12	0.00	0	8644.25	54.6	8.00	62.60	43237.75	-114.45	5	124
15-Apr-12	0.00	0	8643.90	84.31	8.00	92.31	43124.00	-113.75	35	183
16-Apr-12	0.00	0	8643.45	84.11	8.00	92.11	42980.00	-144.00	20	183
17-Apr-12	0.00	0	8643.00	66.4	8.00	74.40	42836.00	-144.00	2	148
18-Apr-12	0.00	0	8642.60	88.76	8.00	96.76	42710.40	-125.60	33	192
19-Apr-12	0.00	0	8642.15	71.52	8.00	79.52	42569.10	-141.30	8	158
20-Apr-12	0.00	0	8641.75	92.19	8.00	100.19	42445.25	-123.85	38	199
21-Apr-12	0.00	0	8641.30	88.86	8.00	96.86	42307.10	-138.15	27	192
22-Apr-12	0.00	0	8640.80	92.9	8.00	100.90	42154.60	-152.50	24	200
23-Apr-12	0.00	0	8640.25	91.75	8.00	99.75	41968.50	-166.10	16	198
24-Apr-12	0.00	0	8639.75	92.61	8.00	100.61	41839.00	-149.50	25	200
25-Apr-12	0.00	0	8639.25	89.75	8.00	97.75	41691.00	-148.00	23	194
26-Apr-12	0.00	0	8638.80	92.38	8.00	100.38	41558.60	-132.40	34	199
27-Apr-12	0.00	0	8638.30	93.16	8.00	101.16	41412.60	-146.00	28	201
28-Apr-12	0.00	0	8637.85	91.83	8.00	99.83	41281.65	-130.95	34	198
29-Apr-12	0.00	0	8637.35	91.99	8.00	99.99	41203.62	-78.03	61	198
30-Apr-12	0.00	0	8636.75	88.47	8.00	96.47	41082.24	-121.38	35	191
								(3,955.76)		217,861.89
			Total Inflow Quantity (Acre Feet) =					213,906		

ANNEXURE - 8

DRINKING WATER QUALITY ANALYSIS RESULTS

Karakurum Scientific Consultants®

Water Quality Testing Laboratory

Client Name: DESCON Skardu — Contact Person: Abdul Baqi, Chief Engineer
Sample Description: Source of Drinking Water at Ghimik Skardu
Nature of Sample: Spring
Sample Collected by: Wazir Iftikhar — Sample receiving date: October 25, 2010
Sample Code: DCnl-2 (10)/10 — Reporting date: November 10, 2010
Address for delivery of results: DESCON Engineering Company, Satpara Dam Project Office, Satpara Road, Skardu Baltistan

Analytical Result

Test Description	Sample Result	WHO Guideline Values (GVs)
Microbiological Parameters		
1. Total Coliform	0/100 ml	0/100 ml
2. Escherichia coli (E.coli)	0/100 ml	0/100 ml
Aesthetic/Physical Parameters		
1. Color	Colorless	<15 TCU
2. Odor	Odorless	Odorless
3. Taste	Not tested	Tasteless
4. Appearance	Clear (transparent)	Clear
5. Turbidity	<0.2 NTU	<5 NTU
6. pH	7.5	6.5 - 8.5
7. E. Cond.	620µS/cm	<1428 µS/cm
8. Temperature	Not tested	NGVS
Environmental Parameters		
1. Biological Oxygen Demand (BODs)	-	-
2. Chemical Oxygen Demand (COD)	-	-
3. Total Suspended Solids (TSS)	-	-
Chemical Parameters		
1. Nitrate (N)	3 mg/L	10 mg/L
2. TDS	231 mg/L	<1000 mg/L
3. Total Hardness (Calcium Carbonate)	202 mg/L	500 mg/L
4. Calcium hardness	57 mg/L	75 mg/L
5. Magnesium hardness	15 mg/L	150 mg/L
6. Sulfate	30 mg/L	NGVS
7. Potassium	10.2 mg/L	250 mg/L
8. Chlorides	8 mg/L	200 mg/L
9. Sodium	6 mg/L	200 mg/L
10. Carbonate	<5 mg/L	NGVs
11. Bicarbonate	167 mg/L	NGVs
12. Total Alkalinity	167 mg/L	NGVS

NGVS = No Guideline Values Set, E. Coli = Escherichia coli (an indicator pathogenic organism)

Comments:
The analytical results of sample found complying guidelines values for microbiological quality and significant chemical quality as per recommended by World Health Organization (WHO).

M. Abbas
Director

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KSC

Karakurum Scientific Consultants®

[illegible]

Water Quality Testing Laboratory

Client Name: DESCON Skardu
Contact Person: Abdul Baqi, Chief Engineer
Sample Description: Source of Drinking Water Supply System/ Outlet Satpara Dam
Nature of Sample: Surface Water (Stream)
Sample Collected by: Wazir Iftikhar
Sample receiving date: October 25, 2010
Sample Code: DCN-3 (10)/10
Reporting date: November 18, 2010
Address for delivery of results: DESCON Engineering Company, Satpara Dam Project Office, Satpara Road, Skardu Baltistan

Analytical Result

Test Description	Sample Result	WHO Guideline Values (GVs)
Bacteriological		
1. Total Coliform	0/100 ml	0/100 ml
2. Escherichia coli (E.coli)	0/100 ml	0/100 ml
Physical		
1. Color	Colorless	<15 TCU
2. Odor	Odorless	Odorless
3. Taste	Not tested	Tasteless
4. Appearance	Clear (transparent)	Clear
5. Turbidity	<0.2 NTU	<5 NTU
6. pH	7.8	6.5 - 8.5
7. E.Cond.	133µS/cm	<1420 µS/cm
8. Temperature	Not tested	NGVS
Chemical		
1. Nitrate (N)	0.5 mg/L	10 mg/L
2. TDS	73 mg/L	<1000 mg/L
3. Total Hardness (Calcium Carbonate)	67 mg/L	500 mg/L
4. Calcium hardness	17 mg/L	75 mg/L
5. Magnesium hardness	6 mg/L	150 mg/L
6. Sulfate	12mg/L	NGVS
7. Potassium	1.4 mg/L	250 mg/L
8. Chlorides	<2.0 mg/L	250 mg/L
9. Sodium	2 mg/L	200 mg/L
10 Carbonate	<5 mg/L	NGVS
11. Bicarbonate	52 mg/L	NGVS
12. Total Alkalinity	52 mg/L	NGVS

NGVS = No Guideline Values Set, E.Coli = Escherichia coli (an indicator pathogenic organism)

Comments:
The analytical results of sample respect to microbiological and chemical quality found complying guidelines values recommended by world health organization (WHO) for drinking water. However one time sampling does not represent the real situation for whole the year especially for surface water source. Therefore suggested to repeat the test during each season for whole the year.

M. Abbas
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KSC

Karakurum Scientific Consultants®

Water Quality Testing Laboratory

Client Name: DESCON Skardu — Contact Person: Abdul Bari, Chief Engineer
Sample Description: Sewage Effluent of DESCON staff colony
Nature of Sample: Waste Water Sample
Sample Collected by: Wazir Iftikhar — Sample receiving date: October 25, 2010
Sample Code: DCN-3 (10)/10 — Reporting date: November 10, 2010
Address for delivery of results: DESCON Engineering Company, Sadpara Dam Project Office, Sadpara Road, Skardu Baltistan.

Analytical Result

Test Description	Sample Result	WHO Guideline Values (GVs)
Environmental Parameters		
1. Biological Oxygen Demand (BOD_5)	122 mg/L	80 mg/L
2. Chemical Oxygen Demand (COD)	210 mg/L	150 mg/L
3. Total Suspended Solids (TSS)	27.3 mg/L	<1000 mg/L
Chemical Parameters		
1. Nitrate (N)		10 mg/L
2. TDS		<1000 mg/L
3. Total Hardness (Calcium Carbonate)		500 mg/L
4. Calcium hardness		75 mg/L
5. Magnesium hardness		150 mg/L
6. Sulfate		NGVS
7. Potassium		250 mg/L
8. Chlorides		200 mg/L
9. Sodium		200 mg/L
10. Carbonate		NGVS
11. Bicarbonate		NGVS
12. Total Alkalinity		NGVS
13. Nitrate (N)		10 mg/L

NGVS = No Guideline Values Set, E.Coli = Escherichia coli (an intestinal pathogenic organism)

Comments:

1. The analytical result of water samples taken from the effluent discharge found out of guideline values recommended by world health organization (WHO) and NEQS.
2. There is need to improve the treatment process to ensure safe effluent discharge to the environment.

M. Abbas
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ANNEXURE - 9

NATIONAL DRINKING WATER QUALITY STANDARDS (DRAFT)

National Drinking Water Quality Standards (Draft) [12]

Properties/Parameters	Standard Values for Pakistan
Bacterial	
All water intended for drinking (E.Coli or Thermotolerant Coliform bacteria)	Must not be detectable in any 100 ml samples
Treated water entering the distribution system (E.Coli or thermotolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml samples
Treated water in the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml samples. In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.
Physical	
Color	≤15 TCU
Taste	Non objectionable/Acceptable
Odor	Non objectionable/Acceptable
Turbidity	< 5 NTU
Total hardness as $CaCO_3$	<500 mg/l
TDS	< 1000
pH	6.5 – 8.5
Chemical	
Essential Inorganic	*mg/Liter*
Aluminum (Al)	≤0.2
Antimony (Sb)	≤0.005 (P)
Arsenic (As)	≤ 0.05 (P)
Barium (Ba)	0.7
Boron (B)	0.3
Cadmium (Cd)	0.01
Chloride (Cl)	<250
Chromium (Cr)	≤0.05
Copper (Cu)	2
Toxic Inorganic	*mg/liter*
Cyanide (CN)	≤0.05
Fluoride (F)*	≤1.5
Lead (Pb)	≤0.05
Manganese (Mn)	≤0.5
Mercury (Hg)	≤0.001
Nickel (Ni)	≤0.02

12 Full text of the Standards is available at the Pak-EPA website: (http://www.environment.gov.pk/info.htm).

Properties/Parameters	Standard Values for Pakistan
Nitrate (NO_3)*	≤50
Nitrite (NO_2)*	≤3 (P)
Selenium (Se)	0.01 (P)
Residual chlorine	0.2-0.5 at consumer end; 0.5-1.5 at source
Zinc (Zn)	5.0
Organic	
Pesticides mg/l	PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20-58 may be consulted.**
Phenolic compound (as phenols) mg/l	1
Polynuclear Aromatic hydrocarbon (as PAH) g/L	
Radioactive	
Alpha Emitters bq/L or pCi	0.1
Beta Emitters	1

* Indicates priority health related inorganic constituents which need regular monitoring.

** PSQCA: Pakistan Standards Quality Control Authority.

ANNEXURE - 10

METEOROLOGICAL DATA

Temperature Record August 2011

Date	Max	Min	General waether Condition
1-Aug-11	30 °C	16 °C	cloudy
2-Aug-11	35 °C	15 °C	Fair
3-Aug-11	36 °C	12 °C	Fair
4-Aug-11	38 °C	12 °C	Partially cloudy
5-Aug-11	38 °C	17 °C	cloudy
6-Aug-11	38 °C	17 °C	cloudy
7-Aug-11	26 °C	23 °C	cloudy
8-Aug-11	31 °C	15 °C	Partially Shower
9-Aug-11	33 °C	16 °C	Partially Shower
10-Aug-11	33 °C	16 °C	Partially Shower
11-Aug-11	32 °C	17 °C	cloudy with Shower
12-Aug-11	23 °C	15 °C	cloudy
13-Aug-11	28 °C	18 °C	cloudy
14-Aug-11	26 °C	14 °C	cloudy with Shower
15-Aug-11	26 °C	17 °C	cloudy
16-Aug-11	26 °C	16 °C	cloudy
17-Aug-11	28 °C	11 °C	cloudy
18-Aug-11	28 °C	15 °C	cloudy + rain
19-Aug-11	30 °C	14 °C	Partially cloudy
20-Aug-11	30 °C	15 °C	Partially cloudy
21-Aug-11	35 °C	13 °C	Fair
22-Aug-11	36 °C	13 °C	Fair
23-Aug-11	38 °C	14 °C	Fair
24-Aug-11	37 °C	15 °C	Partially cloudy
25-Aug-11	34 °C	18 °C	cloudy + rain
26-Aug-11	32 °C	15 °C	cloudy
27-Aug-11	30 °C	13 °C	cloudy
28-Aug-11	26 °C	13 °C	Partially cloudy
29-Aug-11	31 °C	14 °C	cloudy
30-Aug-11	30 °C	13 °C	cloudy
31-Aug-11	30 °C	13 °C	Partially cloudy

Temperature Record September 2011

Date	Max	Min	General waether Condition
1-Sep-11	26 °C	15 °C	cloudy
2-Sep-11	25 °C	17 °C	cloudy
3-Sep-11	27 °C	14 °C	Partially cloudy
4-Sep-11	26 °C	14 °C	cloudy
5-Sep-11	30 °C	15 °C	cloudy
6-Sep-11	33 °C	13 °C	Partially cloudy
7-Sep-11	34 °C	13 °C	Partially cloudy
8-Sep-11	30 °C	13 °C	cloudy
9-Sep-11	30 °C	15 °C	Partially cloudy
10-Sep-11	28 °C	14 °C	Partially cloudy
11-Sep-11	24 °C	13 °C	Partially cloudy
12-Sep-11	32 °C	11 °C	Partially cloudy
13-Sep-11	32 °C	12 °C	partially cloudy
14-Sep-11	29 °C	17 °C	cloudy
15-Sep-11	19 °C	15 °C	cloudy
16-Sep-11	15 °C	11 °C	cloudy
17-Sep-11	23 °C	09 °C	cloudy + rain
18-Sep-11	22 °C	13 °C	cloudy + rain
19-Sep-11	22 °C	11 °C	cloudy + rain
20-Sep-11	24 °C	10 °C	cloudy
21-Sep-11	26 °C	08 °C	Partially cloudy
22-Sep-11	24 °C	08 °C	partially cloudy
23-Sep-11	25 °C	08 °C	partially cloudy
24-Sep-11	25 °C	07 °C	partially cloudy
25-Sep-11	26 °C	06 °C	cloudy
26-Sep-11	24 °C	11 °C	Partially cloudy
27-Sep-11	24 °C	08 °C	Fair
28-Sep-11	25 °C	05 °C	Partially cloudy
29-Sep-11	26 °C	06 °C	Fair
30-Sep-11	26 °C	07 °C	Fair

Temperature Record October 2011

Date	Max	Min	General waether Condition
1-Oct-11	23 °C	10 °C	Partially cloudy
2-Oct-11	27 °C	07 °C	Partially cloudy
3-Oct-11	28 °C	05 °C	Fair
4-Oct-11	29 °C	05 °C	cloudy + rain
5-Oct-11	24 °C	05 °C	cloudy + rain
6-Oct-11	20 °C	11 °C	cloudy
7-Oct-11	17 °C	09 °C	Partially cloudy
8-Oct-11	19 °C	08 °C	Partially cloudy
9-Oct-11	21 °C	05 °C	Partially cloudy
10-Oct-11	20.5 °C	4.5 °C	Partially cloudy
11-Oct-11	23 °C	5 °C	Partially cloudy
12-Oct-11	25 °C	04 °C	Partially cloudy
13-Oct-11	25 °C	04 °C	rain + cloudy
14-Oct-11	24 °C	04 °C	cloudy
15-Oct-11	23 °C	06 °C	cloudy
16-Oct-11	22 °C	03 °C	Dry
17-Oct-11	20 °C	02 °C	Dry
18-Oct-11	20 °C	02 °C	Partially cloudy
19-Oct-11	19 °C	02 °C	cloudy + rain
20-Oct-11	16 °C	03 °C	cloudy
21-Oct-11	17 °C	05 °C	cloudy
22-Oct-11	16 °C	04 °C	cloudy
23-Oct-11	15 °C	06 °C	cloudy
24-Oct-11	19 °C	05 °C	cloudy
25-Oct-11	17 °C	M 01 °C	Partially cloudy
26-Oct-11	18 °C	03 °C	Fair
27-Oct-11	19 °C	M 01 °C	Fair
28-Oct-11	18 °C	00 °C	Fair
29-Oct-11	18 °C	02 °C	Partially cloudy
30-Oct-11	18 °C	05 °C	cloudy
31-Oct-11	18 °C	04 °C	cloudy

Temperature Record November 2011

Date	Max	Min	General waether Condition
1-Nov-11	16 °C	M 03 °C	cloudy
2-Nov-11	15 °C	M 05 °C	cloudy
3-Nov-11	11 °C	M 03 °C	cloudy
4-Nov-11	16 °C	M 03 °C	cloudy
5-Nov-11	17 °C	M 01 °C	partically cloudy
6-Nov-11	16 °C	M 02 °C	partically cloudy
7-Nov-11	13 °C	M 03 °C	cloudy
8-Nov-11	13 °C	M 03 °C	cloudy
9-Nov-11	09 °C	M 01 °C	rain
10-Nov-11	11 °C	M 03 °C	cloudy
11-Nov-11	12 °C	M 04 °C	rain
12-Nov-11	16 °C	M 01 °C	cloudy
13-Nov-11	15 °C	M 01 °C	partically cloudy
14-Nov-11	14 °C	M 01 °C	cloudy
15-Nov-11	12 °C	M 01 °C	cloudy
16-Nov-11	15 °C	00 °C	partically cloudy
17-Nov-11	12 °C	M 04 °C	cloudy
18-Nov-11	14 °C	M 04 °C	cloudy
19-Nov-11	13 °C	00 °C	cloudy
20-Nov-11	16 °C	00 °C	partically cloudy
21-Nov-11	16 °C	M 01 °C	partically cloudy
22-Nov-11	13 °C	M 03 °C	partically cloudy
23-Nov-11	15 °C	M 03 °C	cloudy
24-Nov-11	15 °C	M 03 °C	cloudy
25-Nov-11	16 °C	M 04 °C	fair
26-Nov-11	16 °C	M 04 °C	cloudy
27-Nov-11	16 °C	M 06 °C	fair
28-Nov-11	15 °C	M 06 °C	fair
29-Nov-11	12 °C	M 08 °C	fair
30-Nov-11	12 °C	M 08 °C	fair

Temperature Record December 2011

Date	Max	Min	General waether Condition
1-Dec-11	9.0 °C	M 6.0 °C	Cloudy
2-Dec-11	13.0 °C	M 6.0 °C	Partically Cloudy
3-Dec-11	13.0°C	M 5.0 °C	Fair
4-Dec-11	12.0°C	M 5.0 °C	Clear
5-Dec-11	11.0 °C	M 7.0 °C	Cloudy
6-Dec-11	12.0 °C	M 7.0 °C	Cloudy
7-Dec-11	9.0 °C	M 1.0 °C	Cloudy
8-Dec-11	12.0 °C	M 1.0 °C	Cloudy
9-Dec-11	10.0 °C	M 0.0 °C	Cloudy
10-Dec-11	10.0 °C	M 3.0 °C	Snowfall
11-Dec-11	9.0 °C	M 8.0 °C	Clear
12-Dec-11	8.0 °C	M 9.0 °C	Fair
13-Dec-11	7.0 °C	M 11.0 °C	Fair
14-Dec-11	7.0 °C	M 11.0 °C	Fair to Cloudy
15-Dec-11	6.0 °C	M 9.0 °C	Cloudy
16-Dec-11	7.0 °C	M 9.0 °C	Fair
17-Dec-11	7.0 °C	M 8.0 °C	Clear
18-Dec-11	8.0 °C	M 8.0 °C	Cloudy
19-Dec-11	6.0 °C	M 5.0 °C	Cloudy
20-Dec-11	6.0 °C	M 5.0 °C	Cloudy
21-Dec-11	9.0 °C	M 4.0 °C	Cloudy
22-Dec-11	7.0 °C	M 9.0 °C	Clear
23-Dec-11	5.0 °C	M 11.0 °C	Cloudy
24-Dec-11	3.0 °C	M 11.0 °C	Cloudy
25-Dec-11	6.0 °C	M 11.0 °C	Cloudy
26-Dec-11	10.0 °C	M 10.0 °C	Cloudy
27-Dec-11	6.0 °C	M 7.0 °C	Cloudy
28-Dec-11	8.0 °C	M 7.0 °C	Cloudy
29-Dec-11	10.0 °C	M 5.0 °C	Fair
30-Dec-11	8.0 °C	M 10.0 °C	Clear
31-Dec-11	6.0 °C	M 12.0 °C	Clear

Temperature Record January 2012

Date	Max	Min	Rainfall/Snowfall	General Weather Condition
1-Jan-12	06 C°	M 13 C°		Fair
2-Jan-12	06 C°	M 13 C°		Partially Cloudy
3-Jan-12	07C°	M 12 C°		Cloudy
4-Jan-11	04 C°	M 07 C°		Cloudy
5-Jan-12	04 C°	M 08 C°		Cloudy
6-Jan-12	02 C°	M 09 C°		Cloudy
7-Jan-12	02 C°	M 08 C°		Cloudy
8-Nov-12	05 C°	M 09 C°		Cloudy
9-Jan-12	03 C°	M 07 C°		Partially Cloudy
10-Jan-12	05 C°	M 10 C°		Partially Cloudy
11-Jan-12	03 C°	M 13 C°		Partially Cloudy
12-Jan-12	04 C°	M13 C°		Partially Cloudy
13-Jan-12	03 C°	M 13 C°		Partially Cloudy
14-Jan-12	02 C°	M 13 C°		Cloudy
15-Jan-12	M 01 C°	M 10 C°	2.4"	Light Snowfall
16-Jan-12	01 C°	M 05 C°	3.0"	Cloudy
17-Jan-12	01 C°	M 05 C°	1.5"	Partially Cloudy
18-Jan-12	02 C°	M 13 C°	Trace	Partially Cloudy
19-Jan-12	01 C°	M 13 C°		Cloudy
20-Jan-12	03 C°	M 08 C°		Cloudy
21-Jan-12	03 C°	M 11 C°		Cloudy
22-Jan-12	01 C°	M 11 C°		Cloudy/Light Snowfall
23-Jan-12	02 C°	M 12 C°		Cloudy
24-Jan-12	4.5 C°	M 12 C°		Partially Cloudy
25-Jan-12	03 C°	M 12 C°		Partially Cloudy
26-Jan-12	05 C°	M 08 C°		Cloudy
27-Jan-12	05 C°	M 07 C°		Partially Cloudy
28-Jan-12	04 C°	M 07 C°		Partially Cloudy
29-Jan-12	05 C°	M 06 C°		Partially Cloudy
30-Jan-12	05 C°	M 09 C°		Fair
31-Jan-12	05 C°	M 09 C°		Partially Cloudy

Temperature Record February 2012

Date	Max	Min	Rainfall/ Snowfall (mm)	General waether Condition
1-Feb-12	5.4 °C	M 7.5 °C	-	Cloudy
2-Feb-12	7.3 °C	M 6.6 °C	-	Cloudy
3-Feb-12	8.3 °C	M 5.6 °C	-	Cloudy
4-Feb-12	3.4 °C	M 2.6 °C	1	Cloudy
5-Feb-12	2.8 °C	M 2.6 °C	1.5	Cloudy
6-Feb-12	6.7 °C	M 1.5 °C	-	Partially Cloudy
7-Feb-12	7.2 °C	M 2.0 °C	-	Partially Cloudy
8-Feb-12	7.0 °C	M 5.0 °C	-	Partially Cloudy
9-Feb-12	8.0 °C	M 6.5 °C	-	Cloudy
10-Feb-12	7.6 °C	M 6.5 °C	-	Cloudy
11-Feb-12	6.7 °C	M 6.5 °C	-	Cloudy
12-Feb-12	5.8 °C	M 6.5 °C	-	Cloudy
13-Feb-12	6.4 °C	M 1.5 °C	-	Partially Cloudy
14-Feb-12	5.0 °C	M 2.0 °C	-	Partially Cloudy
15-Feb-12	7.0 °C	M 3.1 °C	-	Cloudy
16-Feb-12	5.4 °C	M 6.1 °C	-	Cloudy
17-Feb-12	5.6 °C	M 5.6 °C	-	Cloudy
18-Feb-12	7.0 °C	M 4.5 °C	-	Mostly Cloudy
19-Feb-12	1.4 °C	M 3.7 °C	6.4	Mostly Cloudy
20-Feb-12	1.4 °C	M 3.4 °C	20	Mostly Cloudy
21-Feb-12	3.0 °C	M 2.6 °C	4	Mostly Cloudy
22-Feb-12	9.2 °C	M 1.5 °C	2	Mostly Cloudy
23-Feb-12	5.2 °C	M 0.5 °C	1	Cloudy
24-Feb-12	5.0 °C	M 3.0 °C	0.9	Cloudy
25-Feb-12	9.6 °C	M 2.6 °C	-	Cloudy
26-Feb-12	4.5 °C	M 3.0 °C	Trs	Cloudy
27-Feb-12	6.0 °C	M 3.0 °C	1	Cloudy
28-Feb-12	5.0 °C	M 1.5 °C	2.9	Cloudy
29-Feb-12	9.2 °C	M 1.0 °C	Trs	Partially Cloudy

Temperature Record March 31, 2012

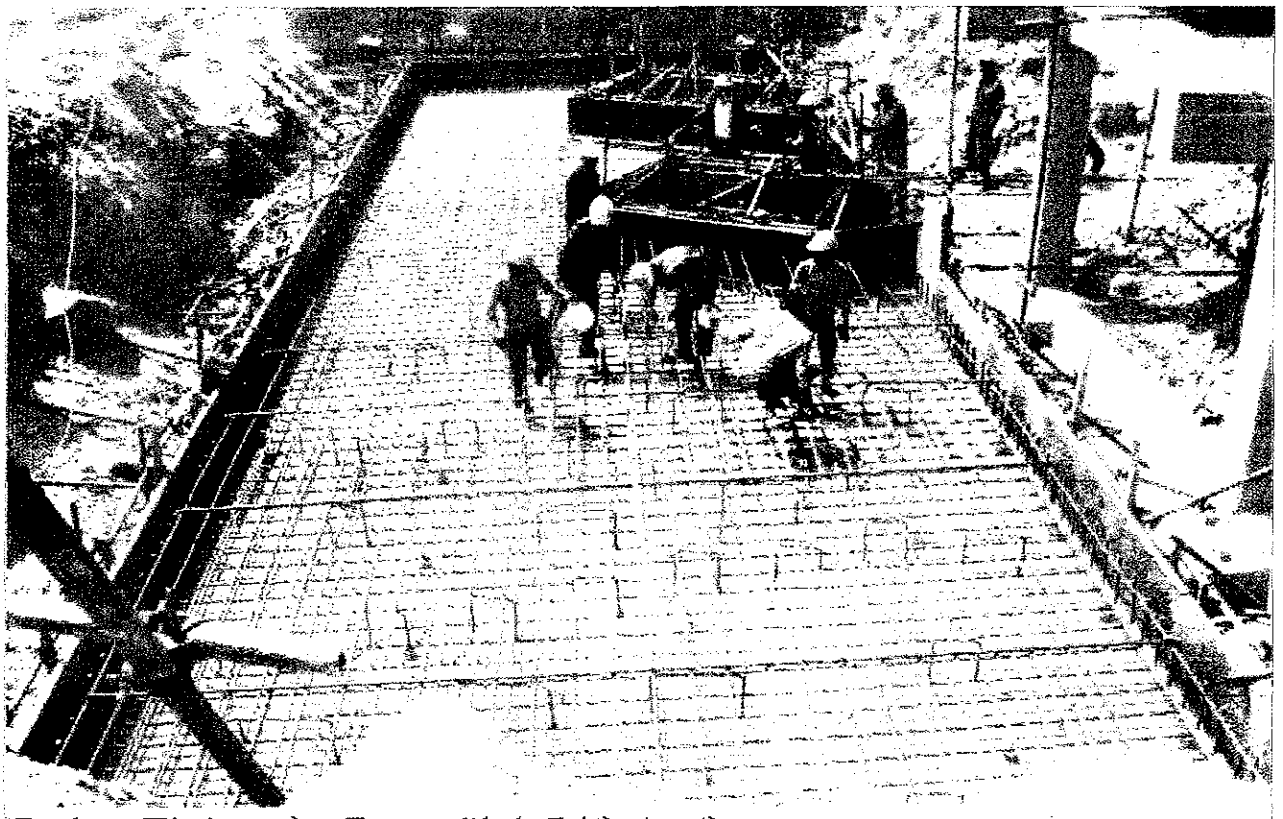
Date	Max	Min	Rainfall	Snowfall (mm)	General waether Condition
1-Mar-12	11 ^{0}C	1 ^{0}C	-	-	Partially Cloudy
2-Mar-12	10 ^{0}C	M 0.4^{0}C	-	-	Partially Cloudy
3-Mar-12	10 ^{0}C	M 0.4 ^{0}C	-	-	Partially Cloudy
4-Mar-12	5 ^{0}C	3 ^{0}C	-	-	Cloudy
5-Mar-12	9 ^{0}C	1 ^{0}C	8 mm	-	Cloudy
6-Mar-12	10 ^{0}C	0 ^{0}C	-	-	Cloudy
7-Mar-12	10 ^{0}C	0 ^{0}C	-	-	Overcost
8-Mar-12	10 ^{0}C	1 ^{0}C	-	-	Cloudy
9-Mar-12	10 ^{0}C	M 3 ^{0}C	-	-	Cloudy
10-Mar-12	9 ^{0}C	M 2 ^{0}C	-	-	Cloudy
11-Mar-12	11 ^{0}C	M 4 ^{0}C	-	-	Cloudy
12-Mar-12	10 ^{0}C	M 2 ^{0}C	-	-	Cloudy
13-Mar-12	12 ^{0}C	5 ^{0}C	-	-	Cloudy
14-Mar-12	12 ^{0}C	0.2 ^{0}C	-	-	Cloudy
15-Mar-12	12 ^{0}C	0 ^{0}C	-	-	Partially Cloudy
16-Mar-12	5 ^{0}C	M 0.5 ^{0}C	-	-	Snowfall
17-Mar-12	9 ^{0}C	M 1 ^{0}C		5 inches	Cloudy
18-Mar-12	8 ^{0}C	0 ^{0}C	1.8 mm	-	Cloudy
19-Mar-12	9 ^{0}C	4 ^{0}C	-	-	Cloudy + Overcast
20-Mar-12	5 ^{0}C	2 ^{0}C	-	-	Cloudy
21-Mar-12	11 ^{0}C	2 ^{0}C	-	-	Cloudy
22-Mar-12	12 ^{0}C	2 ^{0}C	-	-	Partially Cloudy
23-Mar-12	15 ^{0}C	3 ^{0}C	-	-	Partially Cloudy
24-Mar-12	13 ^{0}C	3 ^{0}C	-	-	Cloudy
25-Mar-12	15 ^{0}C	6 ^{0}C	-	-	Cloudy
26-Mar-12	12 ^{0}C	5 ^{0}C	-	-	Cloudy
27-Mar-12	13 ^{0}C	3 ^{0}C	-	-	Cloudy
28-Mar-12	15 ^{0}C	5 ^{0}C	-	-	Partially Cloudy
29-Mar-12	17 ^{0}C	5 ^{0}C	-	-	Cloudy
30-Mar-12	19 ^{0}C	4 ^{0}C	-	-	Fair
31-Mar-12	19 ^{0}C	4 ^{0}C	-	-	Cloudy + Chance of Light Rain

Temperature Record April 30, 2012

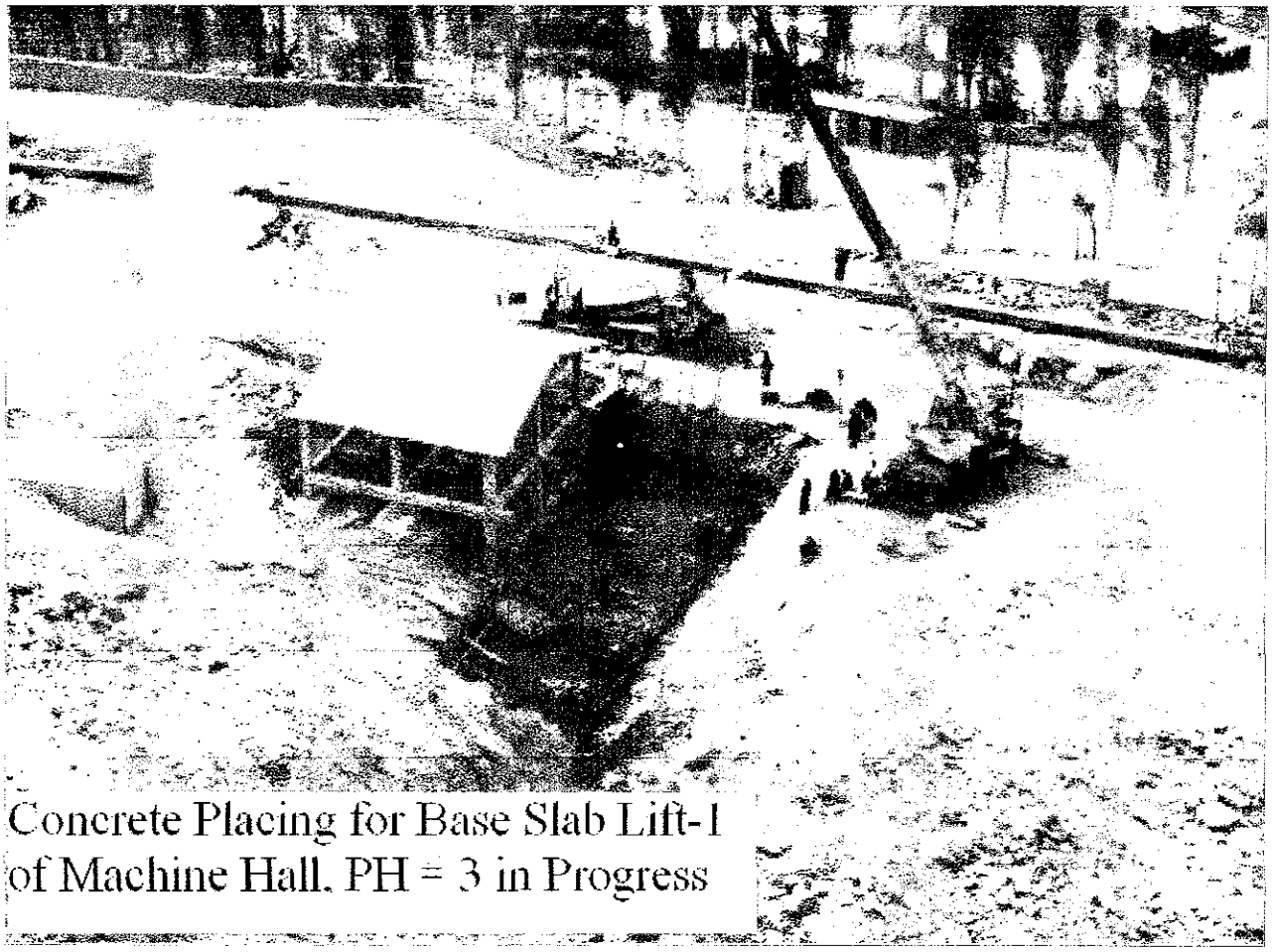
Date	Max	Min	General waether Condition
1-Apr-12	19 °C	07 °C	Partially Cloudy
2-Apr-12	20 °C	08 °C	Partially Cloudy
3-Apr-12	20 °C	09 °C	Partially Cloudy
4-Apr-12	20 °C	08 °C	Cloudy
5-Apr-12	22 °C	10 °C	Partially Cloudy
6-Apr-12	22 °C	05 °C	Partially Cloudy
7-Apr-12	22 °C	07 °C	Cloudy
8-Apr-12	22 °C	08 °C	Cloudy
9-Apr-12	17 °C	09 °C	Cloudy
10-Apr-12	17 °C	07 °C	Cloudy
11-Apr-12	14 °C	08 °C	Cloudy
12-Apr-12	15 °C	06 °C	Cloudy
13-Apr-12	14 °C	05 °C	Partially Cloudy
14-Apr-12	17 °C	04 °C	Partially Cloudy
15-Apr-12	18 °C	07 °C	Partially Cloudy
16-Apr-12	17 °C	05 °C	Cloudy
17-Apr-12	19 °C	03 °C	Partially Cloudy
18-Apr-12	22 °C	06 °C	Cloudy
19-Apr-12	23 °C	05 °C	Cloudy
20-Apr-12	23 °C	10 °C	Cloudy
21-Apr-12	23 °C	11 °C	Partially Cloudy
22-Apr-12	23 °C	07 °C	Partially Cloudy
23-Apr-12	22 °C	11 °C	Partially Cloudy
24-Apr-12	24 °C	09 °C	Partially Cloudy
25-Apr-12	23 °C	10 °C	Partially Cloudy
26-Apr-12	21 °C	07 °C	Cloudy
27-Apr-12	22 °C	07 °C	Partially Cloudy
28-Apr-12	22 °C	09 °C	Partially Cloudy
29-Apr-12	22 °C	08 °C	Cloudy
30-Apr-12	21 °C	06 °C	Partially Cloudy

PROGRESS PHOTOGRAPHS

Progress Photographs

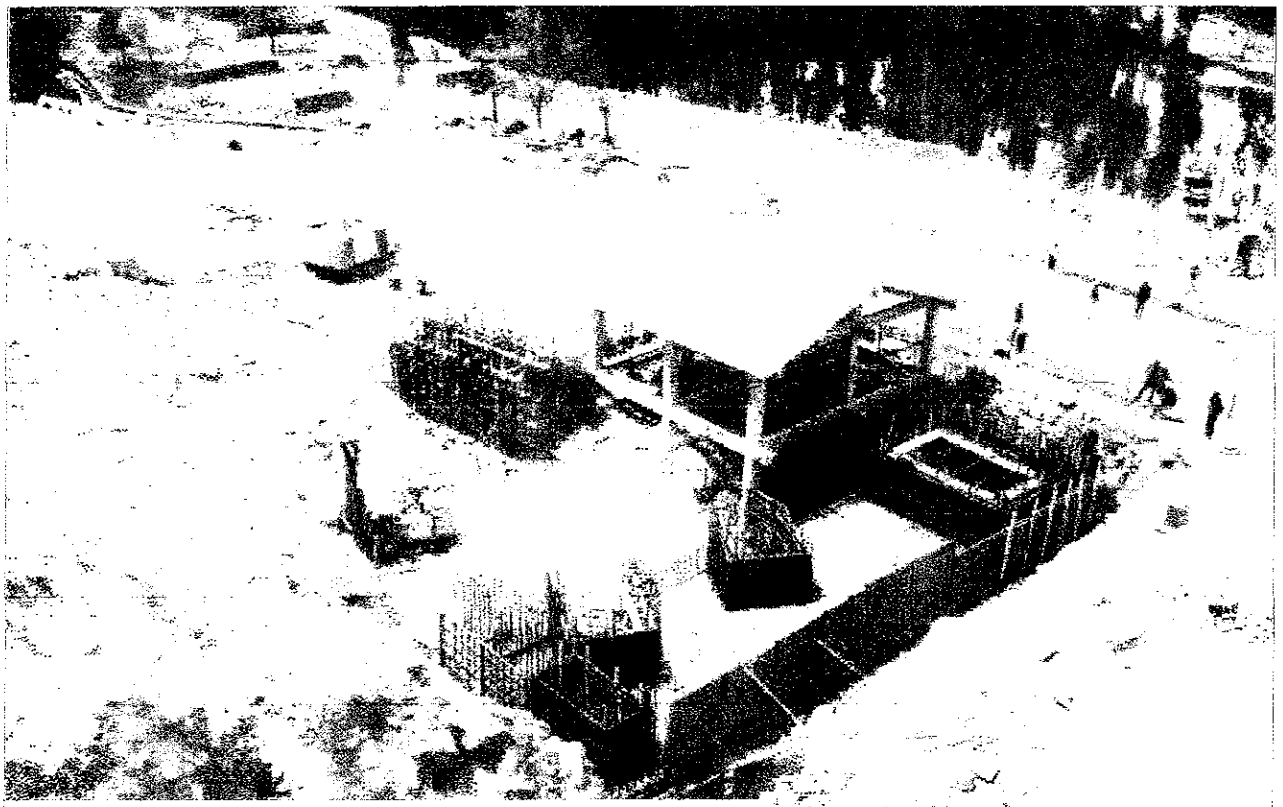


Rebar Fixing for Base Slab Lift-1 of Machine Hall, PH = 3 in Progress

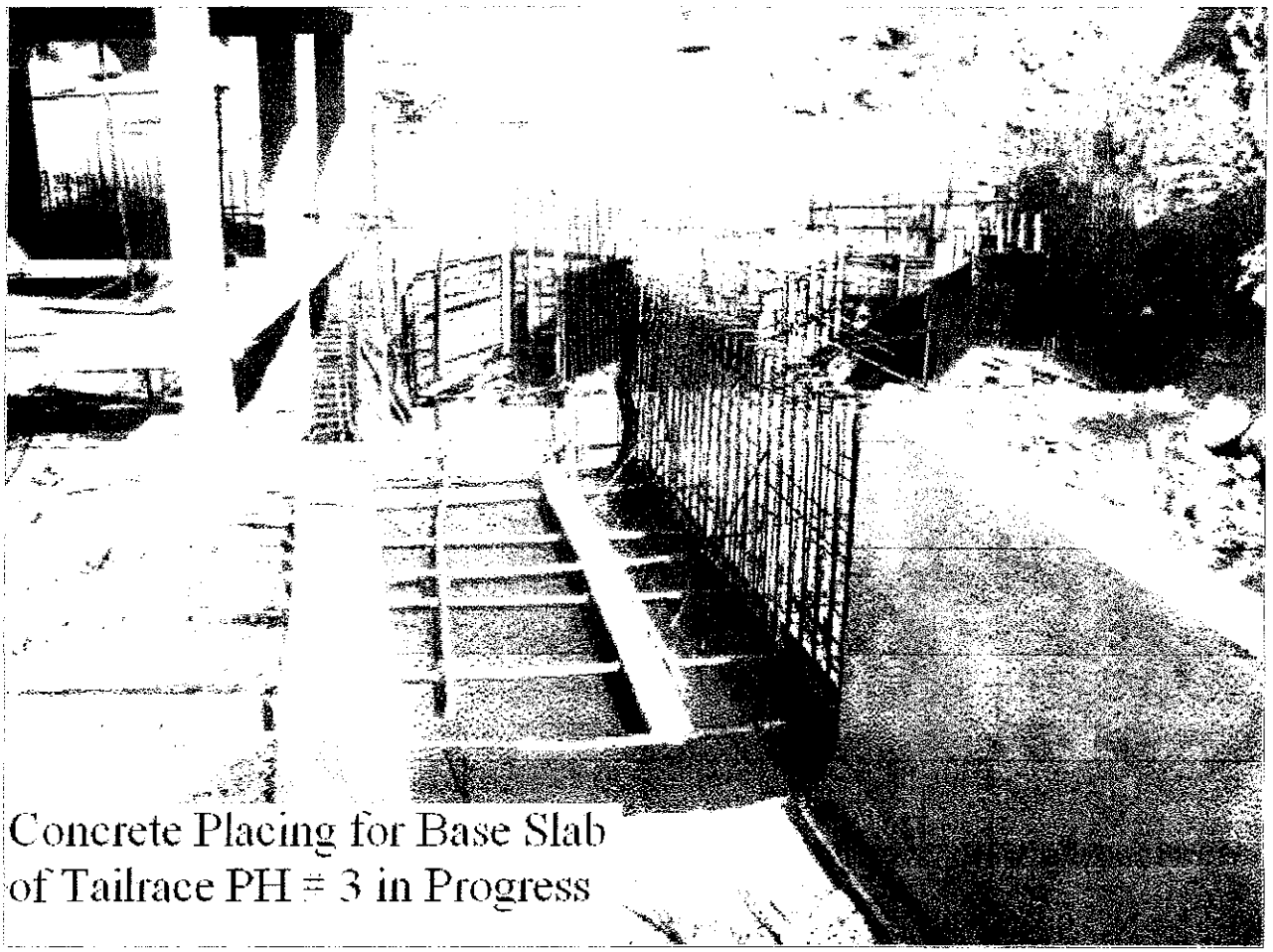


Concrete Placing for Base Slab Lift-1 of Machine Hall, PH = 3 in Progress

Progress Photographs

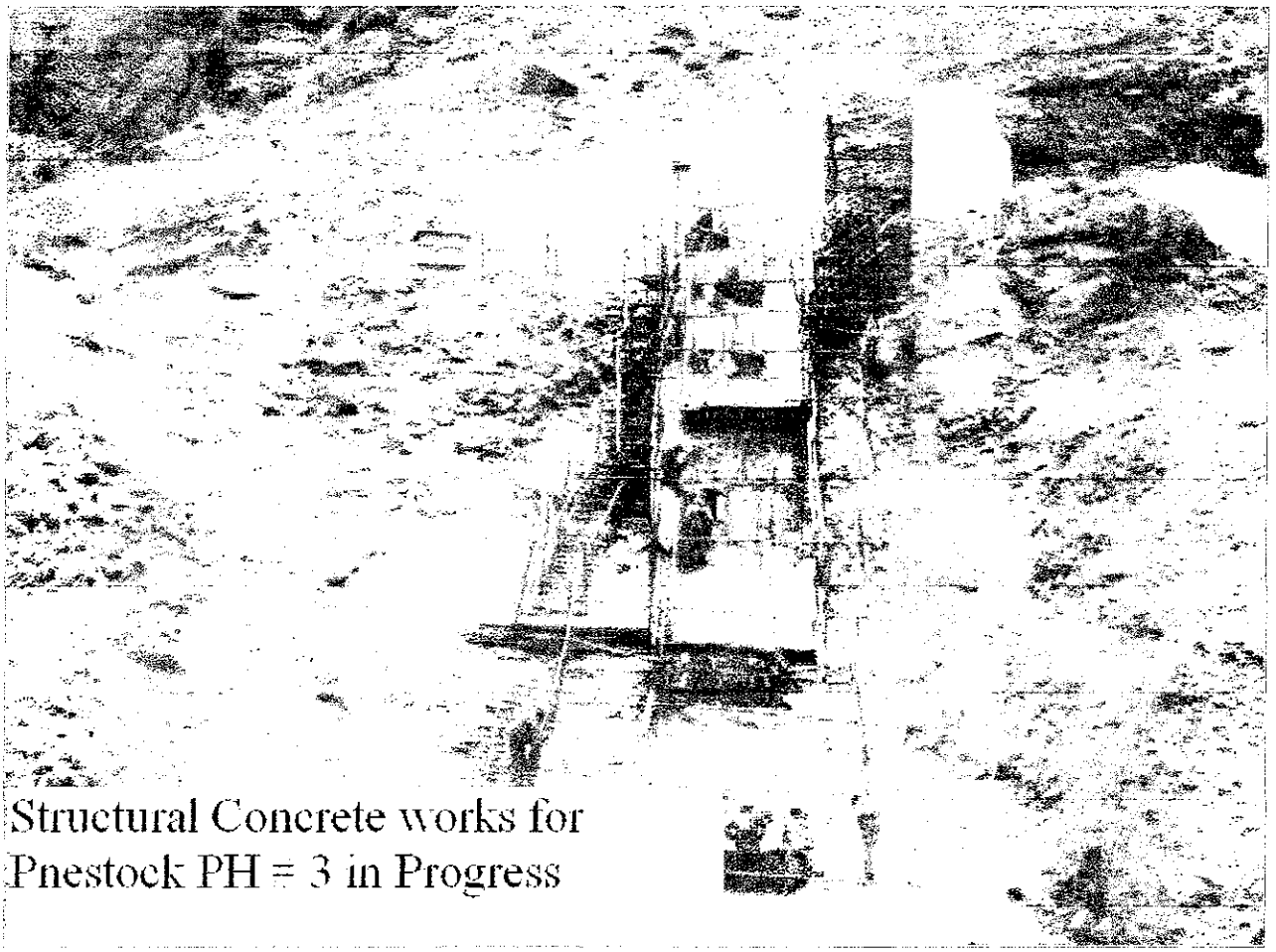


Formwork Fixing for Base Slab Lift-2
of Machine Hall, PH = 3 in Progress

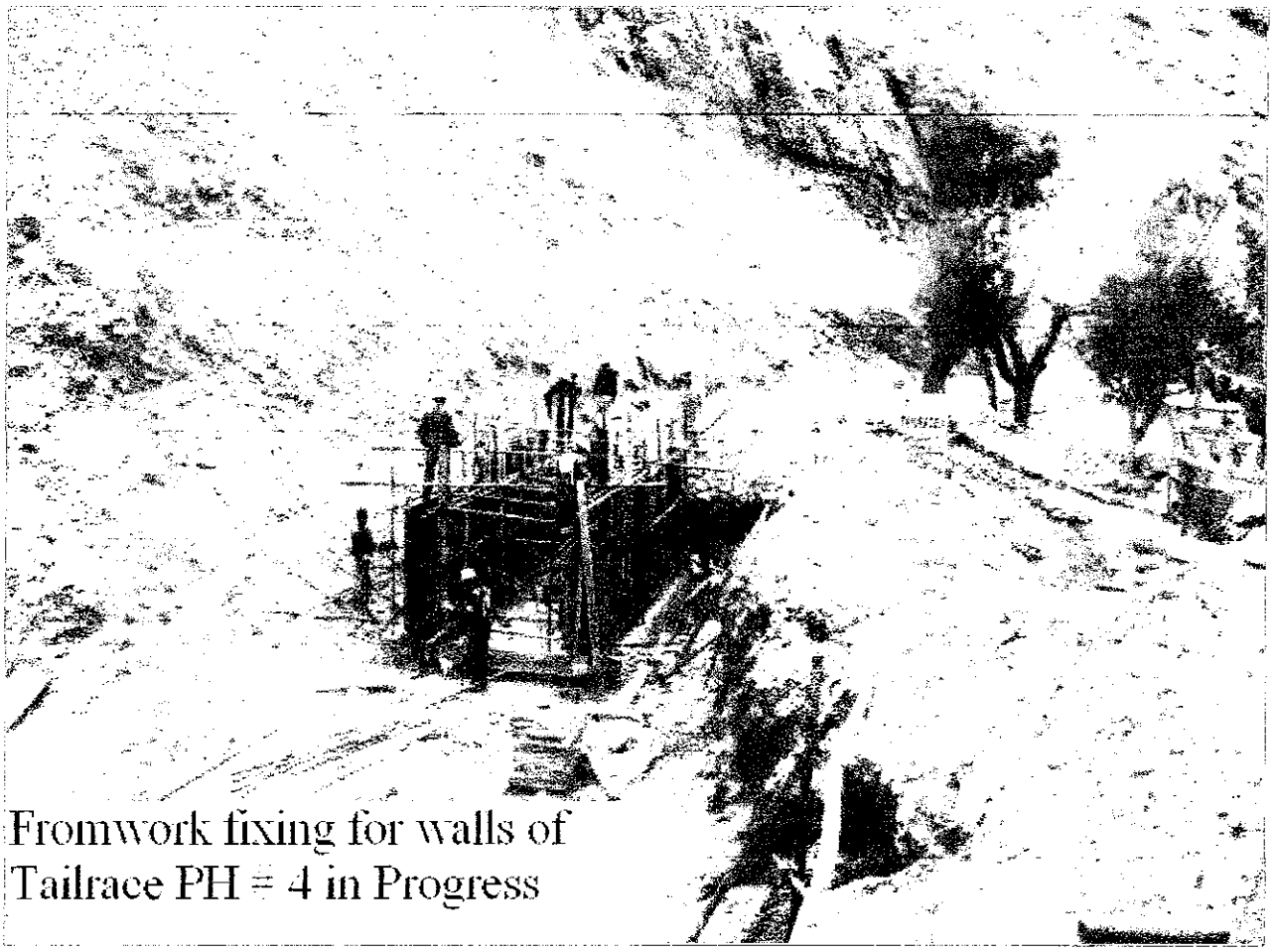


Concrete Placing for Base Slab
of Tailrace PH = 3 in Progress

Progress Photographs

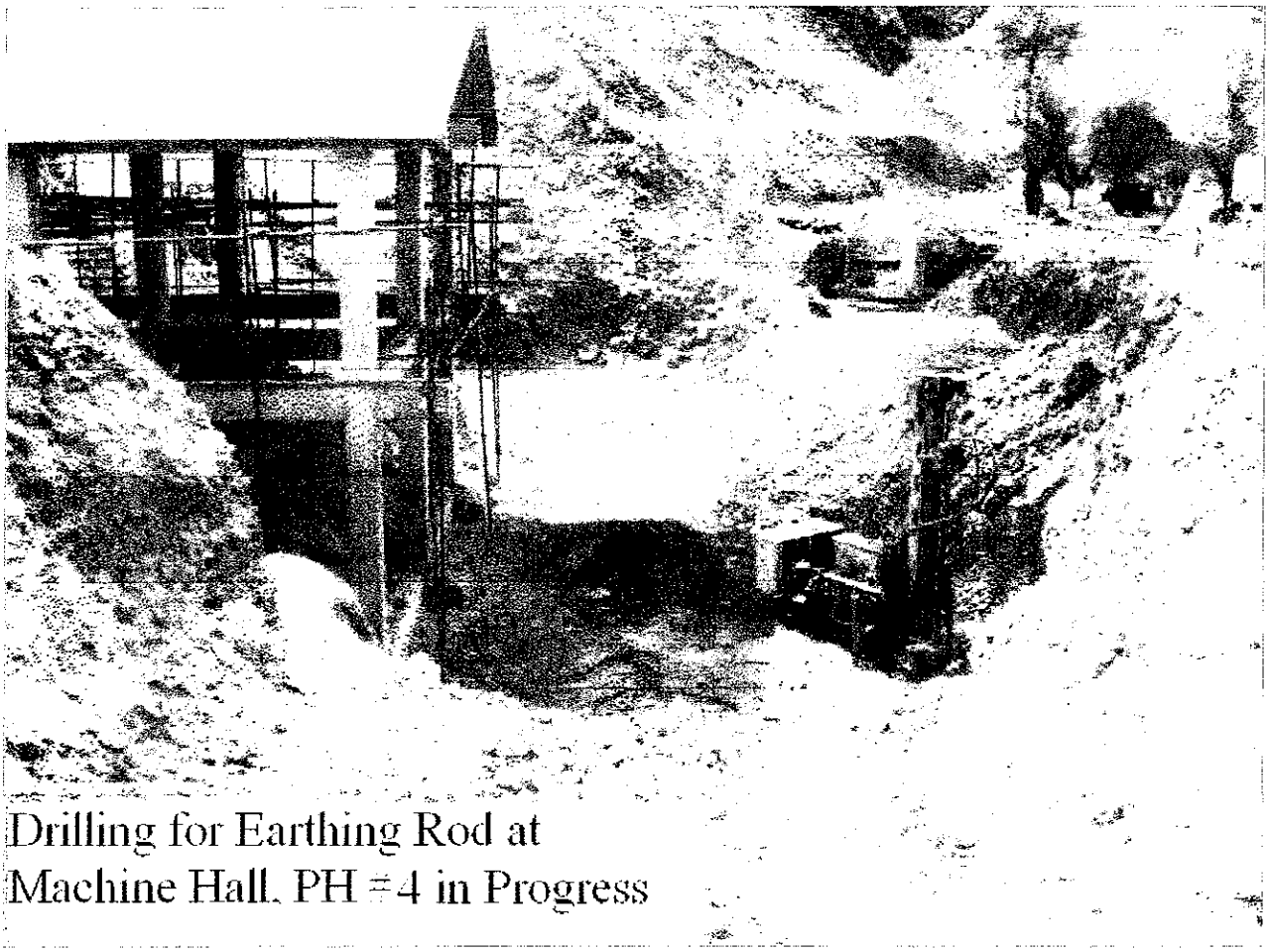


Structural Concrete works for Pnestock PH = 3 in Progress

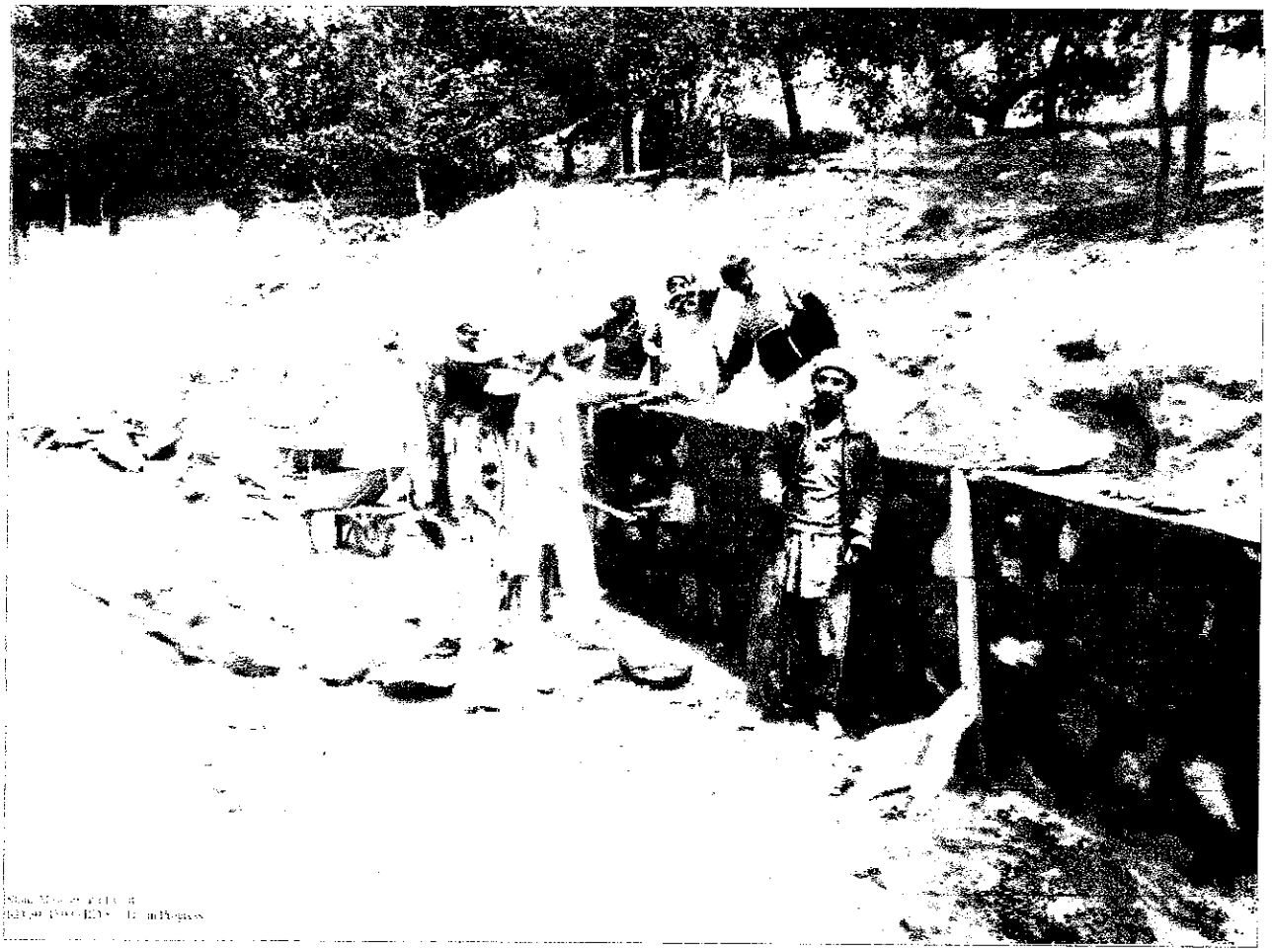
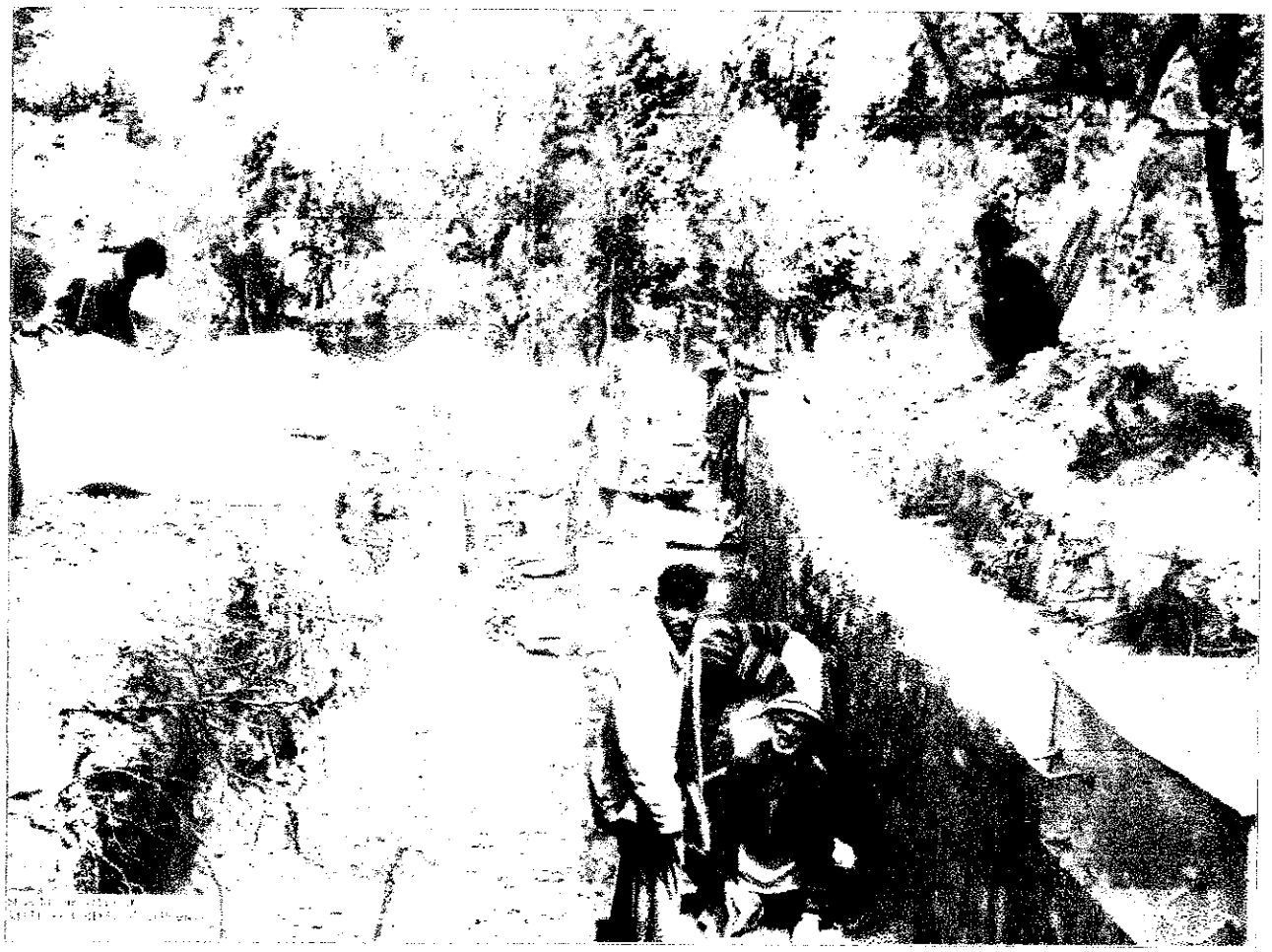


Fromwork fixing for walls of Tailrace PH = 4 in Progress

Progress Photographs



Drilling for Earthing Rod at
Machine Hall. PH #4 in Progress

Progress Photographs

Progress Photographs