GOVERNMENT OF TELANGANA  
IRRIGATION AND CAD DEPARTMENT

From
K.Penta Reddy,
Advisor, Lift Irrigation Schemes,
Irrigation & CAD Dept,
Govt. of Telangana,
Jalasoudha, Errummanzil,
Hyderabad.

To
All the CE’S,
I&CAD Department,

Lr.No. ADV/LIS/ 142  
Dt: 25.07.2017

Sir,

Sub: Operation and Maintenance guide lines of pumping stations – reg.

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As per the instructions of Minister for Irrigation, Marketing, Operation and Maintenance guide lines to be followed in pumping-stations in his jurisdiction is here with enclosed.

Chief Engineer’s are requested to instruct the concerned to follow these guide lines for operation and in maintenance activities in their pump-houses. In addition to the activities specified in the guide lines given, if any other activities specified by the manufacturers or required in view of specific futures of pump-house in their area are to be got to be done regularly.

Yours faithfully,

(K.Penta Reddy)  
Advisor,
Lift Irrigation Schemes,
I&CAD Department,
Govt.of Telangana.

Copy to ENC (Irrigation), for information and further necessary action.

Copy to ENC(AW), for information and further necessary action.
OPERATION AND MAINTENANCE OF LIFT IRRIGATION SCHEMES

By
SRI K. PENTA REDDY,
ADVISOR LIFT SCHEMES,
GOVT. OF TELANGANA

Pumping stations are to be designed taking care of power grid conditions like voltage, frequency and in take and cistern reservoir levels variation into consideration, so that there will not be any problem in running of pumps. In present days properly designed pumping station, there will not be much maintenance works, except routine type maintenance.

Present days routine maintenance works will be cleaning of dust, greasing, checking the oil levels of bearings and check power grid system parameters like voltage and frequency and adjust the pump operation requirements.

Operation and Maintenance activities of pumping stations vary from one pumping station to other pumping station and depends on type and design of pumping station.

I. MAIN COMPONENTS OF LIS SCHEMES

A). Main Equipment

- Pump with Pump Controller and associated equipment
- Motor with Excitation System
- Discharge Valve
- Power Transformers
- Station Transformers
- Unit auxiliary transformers
- SFC transformers
- Pumps starting equipment(SFC system or FCMA system)
- Substation Equipment 33KV/132KV/220KV/400KV
- Power Transmission Lines (33KV/132KV/220KV/400KV)
- H.T and L.T Switchgear Panels(11KV and 415V system)
- D.C Supply.110V or 220V system and 24V Sytem
- UPS supply 100V or 250V system
- Pump and Motor's A.C auxiliaries (OPU system, Compressor system, Cooing water system).
- Capacitor units for Power factor improvement in particular during shutdown periods of pumps.
- Control and Instrumentation Cables.
- Brake & Jack System.
- D.G Set for Emergency Supply.
- Meters (Voltage, Current, Power and Energy).
B. Associated equipment of major Lift Irrigation Schemes

- E.O.T Crane
- Mobile Crane.
- Other miscellaneous items like Air Conditioning equipment of control room, ventilation, fire fighting system pump house etc.
- Intake Gates (Draft Tube Gates).
- Pressure Mains (Delivery Lines).
- Civil Structures like intake canal/ Tunnels tunnel, intake Gates, Cistern, etc.

If the pumping stations are properly designed by taking care of ratings in respect of pumps, motors, switchgear, starting equipment, cables, all aspects of grid conditions, fault levels of pumping station area, pumps running conditions and also site conditions, the scope of failure of any equipment will be minimum.

Normally in present day major pumping stations Like AMRP, KLI-1,2,3 and NL-1 & 2 e.t.c LI schemes, there are not be any specific maintenance activities except routine type.

II. Operation of Pumping Stations:

a) General

i) To run the pumps, as per requirement of ayacut and drinking water needs in the area.

ii) Maintenance of records, for pumps running hours, record of breakdowns of major components and details of repair works carried out.

iii) Preparation and maintenance of records (Registers in addition to SCADA data) for discharge of pumps, input power and Energy consumption of pumps on daily, monthly and yearly basis.

iv) Programming of maintenance/ repairing works to be taken up during shut down periods.

v). Recording of maintenance/ repair works of equipment carried out in a year.

b) Technical:

The operation engineer should have idea of plant layout i.e. location of various equipment in the pumping station. The important knowledge required for operation engineer is, to have good idea of the location and operation of D.G set, dewatering pumps and lighting system, to act quickly in case of failure of power supply during pumps running or in shut down periods.

Following activities are to be done daily.

a). Functional check of D.G set is to be done once in a day in the morning.

b). Maintenance of Diesel oil and lubricant oil stock records.
c). Observation of battery system voltage and checking of specific gravity of batteries once in a week, in case of lead acid batteries and once in a month in case Maintenance free batteries as per manuals of battery supplier.

d). Checking of UPS system out-put voltage

e). Inspection of various areas for cleanliness and observation of abnormalities, water leakages in pump house, arranging replacement of fused lights and observation of external failures of pump motors, or any equipment of pump house.

f). Greasing and functional check of E.O.T Crane Mobile Crane once in a month.

g). Functional check of dewatering pumps, air compressors, OPU motors and cooling water motors when pumps are not running.

h). Functional check of emergency lighting system once in a day.

i). Observation of operation of auxiliaries during starting and stopping of pump and recoding of any abnormalities for studying the reasons for the same when pumps are not running.

j). During Starting of pumps observation of input parameters Voltage, Speed, Current, Power e.t.c. on unit control panels/ Mimic board or on MMI system and action to be taken immediately if any deviations if possible.

   If not possible recording the same during starting and running, and to attend during pumps not running periods.

k). Observation of alarms and annunciation system in case of faults, mechanical vibrations and progress of starting/ stopping, starting stopping time and recording the same for study and rectification of the deviation if any during pumps not running periods.

III. MAINTENANCE OF LIFT IRRIGATION SCHEMES

Maintenance works of pumping station shall be carried out during shut down periods of pumps, particularly in summer, when pumping requirements for irrigation are not much. In case of pumping stations which are formulated for irrigation as well as drinking water requirements, it is always better to take shut down of pumps one after other. In general the maintenance works are to done yearly during summer and the works include.

a) Pumps & Motors as per the manufacturer's standards.

b) Starting equipment
c) H.T & L.T switchgear
d) Power Transformers and auxiliary power transformers
e) Substation equipment
f) Power supply lines,
g) Control and Protection equipment and all other auxiliaries, as per recommendations of the manufacturers.

h) Programming of maintenance / repair works if any in advance
Maintenance works to be carried out on

A). Pumps and Motors and associated equipment

i) Checking bearing oil levels, checking of oil purity and filtering of oil if required.

ii) Cleaning of cooling water strainers, Meggering and functional check of cooling water Pump and Motors.

iii) Cleaning and bearing’s lubrication oil checks, oil sample tests and functional checks of lubrication system (Start /stop checks)

iv) Functional check of excitation system and starting equipment

v) Functional check of valves pump in Discharge line.

vi) Checking and tightening of power cables (Once in six months) or before starting of pumps after long shutdowns.

vii) Cleaning of motor slip rings,

viii) Testing of bus duct C.Ts, P.Ts and all bus duct components (once in a year)

ix) Meggering of stator and rotor windings of Motor before starting after long shutdowns if any, i.e. before pumps starting period i.e June/July.

x) Greasing of E.O.T crane rails, Meggering motors functional check of E.O.T. Crane, etc. (Functional check means operation check)

xi) Starting of pumps one by one for 10 minutes during long shut downs.

xii) Any other item which is specific in the pump-house other than mentioned above.

B). Power Transformers

i) Meggering of transformer & Pump-motor transformers, station transformers unit Auxiliary transformers, starting equipment transformers in case of SFC, SFC System start of pumping stations.

ii). Conduct BDV test on transformer oil

iii). filtering and filling of oil if required,

iv). OLTC operational check,

v). Cooling system Pumps/ Fans functional checks before starting of pumps after long shut down.

C). Switchyard Equipment

i). Meggering of all equipment of C.Ts, P.Ts and CVTs, Breaker and Isolators e.t.c.,

ii). Functional check of Breakers, Isolators

iii). Measurement of earth resistance.

D). Power Lines (To be got it done by TS TRANSCO staff only)

i). Conducting pre monsoon inspection, tree cutting and meggering of power lines etc.

E). Civil and Hydro mechanical

i) Cleaning of silt in intake canals, tunnels if any surge pool/or forebay
ii) lubrication and operational Check of all gates

iii). Checking of air release valves in case of lengthy pressure mains in the pumping station for proper position and arrest leakages if any.

vi) Operational check of draft tube gates for proper functioning.

v) Operational check of cross regulators for proper functioning

vi) Attending patch works of civil structures of pump house, surge pool, Cistern, office and residential buildings.

vii) Functional check of water and power supply system of colony and pump house

viii) Cleanliness of pump house area, colony areas and maintenance of garden.

xi) White washing of pump house, office and colony buildings and cleaning of water and drainage system of office and residential buildings

x) Any specific works applicable for the pumping station which are not covered above.