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TRIP REPORT JAMSHORO POWER GENERATION COMPANY LIMITED (JPGCL)

SEPTEMBER 23 – 26, 2014

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TRIP REPORT

JAMSHORO POWER GENERATION COMPANY LIMITED (JPGCL)

SEPTEMBER 23 – 26, 2014

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FOCUS GROUP DISCUSSIONS

JAMSHORO POWER GENERATION COMPANY LIMITED (JPGCL) TRIP REPORT

DATED: SEPTEMBER 23 – 26, 2014

Energy Policy Program (EPP) successfully delivered the two-weeks Best Practices in Thermal Operations and Maintenance (O&M) training between March and June 2014 in Serena Hotel, Islamabad. Training primarily was focused on preventive maintenance, plant operation efficiency, protection, instrumentation, heat rate testing and safety, project management and financing, tariff strategies, reliability, and fuel management. The O&M training was designed to increase the Generation Companies (GENCOs) efficiency, ability and reinforce improved O&M practices which EPP introduced since the inception of government-to government (G2G) activities.

Furthermore, EPP's monitoring and evaluation team conducted a field visit to Jamshoro Power Generation Company Limited (JPGCL) on September 24th- 25th, 2014 to conduct the post training assessments via focus group discussions. All the training participants were given an equal opportunity to state their individual training experience, learnings, and challenges they have faced during the completion of their respective assignments. In JPGCL, EPP successfully met 16 of the 20 trainees to track the implementation and major accomplishments during the assignment completion phase.

FOCUS GROUP DISCUSSION

WEDNESDAY - SEPTEMBER 24TH, 2014

Venue: Chief Engineer Office, Jamshoro Power Generation Company Limited

Participants Details:

First Name	Last Name	Job Title	Gender
Rustam Ali	Ghouri	Senior Engineer	Male
Sajid	Ansari	Senior Engineer	Male
Ghulam Murtaza	Halepoto	Senior Engineer	Male
Ali Murad	Kandhro	Junior Engineer	Male
Abdul Ghani	Jamali	Senior Engineer	Male
Abdul Wajid	Mughal	Senior Engineer	Male
Zeeshan Muzammil	Khan	Senior Engineer	Male

Outcome/Summary Discussion:

Participants who participated in the first session of the O&M training focus group discussion on September 24th, 2014 had reported a number of considerable impacts that has brought a significantly positive change in their performance at the power plant including; Efficiency of Heat Rate (post O&M training, the shift engineers are taking the heat rate efficiency tests in every shift), timely reporting and

repairing of the steam leakages that causes huge losses, operational measures have been taken to report the drain valves, corrective usage of auxiliaries to minimize the damages, awareness about the HP heater and their quick shutdown facilitating the repairing and it's positive impact on the revenues, and leads to an overall reduction in the fuel consumption. The discussions has shown that the training course overall increased participants' knowledge and equipped them with the international best practices in operations and maintenance technology; which is being followed in all the recognized international thermal power generation power plants. The trainer helped all the participants answering their concerns and queries and further strengthened their existing operations and maintenance knowledge.

During the implementation period of the assignment, the participants have also mentioned some of the challenges they faced, such as; the implementation delays occurred due the slow procurement procedures, shutdowns are not granted by the National Power Control Centre (NPCC) which are required for overhauling of Unit (I and II) rehab work for the steam and oil leakages at the power plant. During the discussion, many of the participants have proposed the idea of conducting a similar training for the higher management in order to reinforce the implementation of the newly learned O&M best practices. They further remarked that the training course should also be organized on the power plants to give hands on practical experience along with the theory.

THURSDAY, SEPTEMBER 25, 2014

Venue: Conference Room, Jamshoro Power Generation Company Limited

Participants Details:

First Name	Last Name	Job Title	Gender
Shams-Ul	Arfeen	Senior Engineer	Male
Asadullah	Babar	Junior Engineer	Male
Muhib Ali	Rajpar	Junior Engineer	Male
Ghulam Shabir	Kakepoto	Deputy Manager Procurement	Male
Nek Mohammad	Shaikh	Senior Shift Engineer	Male
Ghulam Murtaza	Sirewal	Junior Engineer(I&C)	Male
Gul Munir	Abbasi	Junior Engineer	Male
Muhammad Bux	Soomro	Senior Shift Engineer	Male
Muhammad Murad	Sheikh	Deputy Manager (I & C)	Male

Outcome/Summary Discussion:

Participants who participated in the second session of the O&M training focus group discussion on September 25th, 2014 described the challenges and advantages to the power plant due to the O&M training. The training has enabled the participants in establishing a positive organizational culture based on the skills and techniques learned. Moreover, they have mentioned that the training course provided them with a refresher on all the theoretical knowledge from their academic years. Course has given them a sense of responsibility towards the job, improved overall communication between the departments regarding the activities needed to reduce the losses.

Like the first focus group discussion the second group people have also briefed about the challenges they have faced during the implementation period of the assignment, some of the challenges were; the implementation delays occurred due the slow procurement procedures, shutdowns are not granted by the National Power Control Centre (NPCC) which are required for overhauling of Unit, rehab work for

the steam and oil leakages at the power plant. During the discussion, many of the participants have proposed the idea of conducting a similar training for the higher management in order to reinforce the implementation of newly learned O&M best practices. They further remarked that the training course should also be organized on the power plants to have hands on practical experience along with the theory.

Focus Group Discussions at Jamshoro Power Generation Company Limited

This report summarizes the outcomes of the two focus group discussions conducted with the GENCOs Operations & Maintenance training participants' from Jamshoro Thermal Power Station. The focus group discussions were carried out in two sessions on September 24th & 25th, 2014 respectively at JPGCL. 16 participants in total have participated in the focus group discussions aimed to adequately measure the effects of the training on their organizational performance improvements as a result of the O&M training. The discussion was subjected to all the timely interventions made at the power plant for continuous improvement focusing primarily at the 'learning' and 'behavioral change' levels. EPP's M&E team followed up on the assignments, participants had received at the end of the training course to successfully track the implementation and all the major accomplishments made during the post-training phase.

At the start of the sessions, EPP's team asked the participant to bring their assignment's first draft that includes examples of potential changes occurred as a result of the training course seconding their assignment topic, and to share findings, lessons learned, and accomplished achievements while implementing the lesson learned.

Day wise proceedings of the discussions are outlined below:

Day I (24th September, 2014)

EPP Cross Cutting Activities Coordinator Ms. Asma Usmani and Cross Cutting Activities Assistant Ms. Mahak Ali Bajwa visited Jamshoro Power Generation Company Limited on September 24th, 2014 to lead the first session of the focus group discussion. 7 participants out of 10 have attended the first day discussion and below are the feedbacks given by the participants, for a better understanding of the discussion findings CCA team divided them into three different categories.

- 1) Skills learned and Implemented
- 2) Challenges faced
- 3) Suggestions

Skills learned and implemented:

Participants who participated in the O&M training focus group discussions have given a number of significant improvements that have contributed towards bringing positive changes. New learning has helped the participants in effectively using their experiences at the power plants, including; efficiency of the heat rate, timely repairing of the steam leakages which were causing huge losses, and reducing the overall fuel consumption.

Throughout the focus group discussion, three participants have specified that the training course provided them with a refresher on all the theoretical knowledge from their academic years, learning topics includes; minimizing the steam and oil leakages, conducting the heat rate tests, heat rate controls along with the fuel consumption. Participants have further commented positively on the training content.

"The training was very helpful from the operations and maintenance point of view; it was a great review of our theoretical engineering education. We've got the awareness regarding the heat rate tests and their respective efficiency impact, through this training we have made many prominent improvements at the power plant which were previously overlooked i.e. steam leakages."

"We have successfully gained a lot of new concepts during the O&M training and happily passed it to the other colleagues. At Jamshoro Power Plant, most of the engineers have working experience of

more than 20 years; this training has served as a refresher course on all the theoretical knowledge attained in the academic years at the engineering schools”

“O&M training was the training based on international standards and practices being followed at the international power plants. Furthermore, the revision sessions especially related to the efficiency of the power plants has enabled the participants in improving their performances. Helped us in learning new ways to improve the efficiency of steam power stations that mainly focused in reducing the fuel consumption and minimize the leakages and losses”

One of the participants has previously worked at a Hydel Power House and joined Jamshoro Power Plant with no experience; he stated that the training was very beneficial for him because it has given him the chance to learn about thermal power plant in much detail, he stated:

“His technical skills and technical knowledge has definitely enhanced through this training program. The training gave him an exposure to the internationally advanced techniques being used globally at the power plants. The training benefited him because he has an experience of working at the Hydel power house and had very little knowledge about the thermal power plant, he has recently joined and through this training he has learned very basics skills”

Three of the participants appreciated the overall O&M training program and gave their positive reviews about their experience stating they have learned to overcome the issues related to operation and maintenance.

“The course we have attended, was designed based on the international standard and systems letting us to gain advance technical knowledge of mechanical and operational field through the training manual and assignments”

“Throughout the training sessions we have learned to control the O&M issues like examining the steam leakages through thermographic machines and to take preventive timely actions to help reduce losses”

“We have personally polished our existing knowledge through the new concepts being taught during the training. All the engineers were lacking behind in some of the engineering fields/areas; through the O&M training we are overcoming our weakness and taking the corrective measures”

Two of the participants stated that after attending the training, they have started gauging the heat rate test after every shift to keep a record of all the expected fluctuations.

“Being an engineer, in the beginning our approach was that how the things going? But after attending the training we started thinking of innovations like we learned about heat rates so we are now noticing the heat rate and started calculating the heat rate in the beginning of shift and in the end too, Secondly, we have learned about heat balancing and proactive maintenance so we get attentive if there is some issue in heat rate or balancing and swiftly contact to concerned authority to overcome the problem as we are facing loss, Our mind sets have been changed after attending the training especially regarding the operations and we became more proactive”

“I am working in the instrumentations and control department since many years, I have learned meter calibration, use of advance technology and instruments, and laws of accuracy through the O&M training. My current responsibilities are with the operations departments where we calculate the heat rate in every shift to actively point out the leakages and reduce the future losses. My assignment was to increase the efficiency of coal plant, currently we do not have any coal plant in Jamshoro but there will one in the near future”

Challenges:

All the training participants have detailed a range of challenging experiences and practices that they have encountered at the Jamshoro Power Generation Company Limited.

Many of the participants highlighted the challenges they have faced during the implementation phase of their assignments; such as, lengthy and outdated procurement procedures, delays in the Plant shutdowns from National Power Control Centre (NPCC) for overhauling, cleaning and maintenance of the power plant. Furthermore, they have mentioned:

“If there are any leakages at the plant resulting in damages and it requires an immediate replacement of valves costing 500,000 to 600,000 PKR, it cannot be directly procured because of the lengthy procurement procedures. Shutdowns from National Power Control Centre (NPCC) are required for the maintenance of the power plants which are delayed causing long-term damages. If NPCC granted the shutdowns more periodically that can surely resolve the leakage issue and end up saving millions of rupees daily. The plant itself is outdated and requires over hauling more frequently. Moreover, the shutdowns can help in maintenance which will result in producing 220 Megawatts of power instead of 150 Megawatts. Nonetheless, we have received United States Government’s funding for over-hauling of plant but the bidding tender got cancelled three times as we did not get the shutdown for plant”

Other training participants’ added:

“If any of the engineers working in the maintenance department proposes to replace the damaged valve by the valves provided by any of the reputed company, the organizational procedure does not allow him to do certain procurement. Departments are bound to purchase the low priced valves, although they know that the low priced equipment does not last longer”

“We have to follow the system which PPRA (Public Procurement Regulatory Authority) has imposed on us since 2004, we have faced many problems e.g. replacements of the defected and damaged parts of plant by the best possible replacement brand available but due to certain obligations we cannot procure the best”

“We are trying to work hard and give a better percentage than the other shifts; also there is a competition going on within the department with other shift teams, because the Board of Directors decided in the meeting to provide work performance based incentives to the engineers”

One of the participants raised his concern regarding the completion of the assignment, He mentioned:

“We require more time for the completion of our assignments; achievable topics but difficult for us to manage the assignments along with the regular duties as we normally work on the weekends too”

Suggestions:

In order to further improve the future training initiatives and to determine the effectiveness in order to reach the stated objectives, participants were asked to give their suggestions. Participants have given their general suggestions and feedback for moving forward positively.

One respondent stated that Assignments should be given at the beginning of the training. This will help the participants to work on their respective assignments during the training days. He stated:

“The assignments should be given at the beginning of the training to carry out a proper planning as how and when to cover what aspect of the assignment. Many of us don’t get much time during our working hours to complete the assignments due to the field work”

Two of the participants stated that they would have appreciated to learn even more, as they complained about the duration of the training to be short. One and of the two participants was of the view that the

training program should be divided into three different groups based on the specific departments i.e. electrical, mechanical and operational. He detailed:

“According to the training duration, the training should have had divisions into three different groups of mechanical, electrical and operational. E.g. I work in the electrical department and I could have gained more if I was placed in the electrical group rather than learning the operational course. I could have strengthened my electrical and mechanical knowledge so I cannot contribute more effectively”

“Training duration should be increased in order to provide a more in-depth learning experience based on the training manual given. The current training contents required more time to develop a better understanding”

One of the training participants has stated that it could have been far better if the O&M training was delivered on-sites at their respective power plants. He has commented:

“If USAID facilitates Energy Policy Program in organizing an on-site training at the three GENCOs, EPP’s team should deliver a similar training for a better practical experience of the theoretical knowledge.”

Some of the major suggestions from the training participants were that they wanted more training sessions on specific topics e.g. steam plants. Furthermore, they have requested similar trainings for the higher authorities’ e.g. executive level staff, so that they understands the need for changing the outdated implementation procedures according to the international standards. They have elaborated:

“The training was mostly focused in detailing more about the latest power houses; there should have been more detailed sessions about the steam plants as well”

“There should be a at least a one week course of a similar training for the higher authorities’ i.e. chief engineers and executives, as their promotions are delayed and they are only left with one to two years of their job especially the C.E’s. Through the training they will be able to thoroughly understand about the current problems face by their subordinates”

Day 2 (25th September, 2014)

EPP Cross Cutting Activities Coordinator - Ms. Asma Usmani and Cross Cutting Activities Assistant Ms. Mahak Ali Bajwa visited Jamshoro Power Generation Company Limited on September 25th, 2014 to lead the focus group discussion with the remaining participants. A total of 9 participants have attended the second day focus group discussion. Similarly to Day I, the discussion findings are divided into three different categories.

- 1) Skills learned and Implementation
- 2) Challenges
- 3) Suggestions

Skills learned and Implementation:

Focus group participants have described a number of benefits of the O&M training that have predominantly helped them in bringing a positive organizational culture in the power plant. Some of the benefits included; learning new international techniques, increase in individual’s responsibility factor, learning parameters of the heat rate tests and minimizing the heat loss.

Throughout the focus group discussion, participants kept specifying that the training manual provided them with a refresher on all the theoretical knowledge from their academic years. Few of the participants detailed:

“With the learnings from the training course we have successfully pointed out the maximum causes of the low condenser that can be executed by minimum maintenance. The training was very beneficial and informative as we have learned a lot from the international practices. After the training, the plant culture has improved significantly resulting in better planning, less delays and timely remedy of minor faults increasing overall plant efficiency”

“Prior to the O&M training course, we have never measured the heat rate efficiency that frequently but now every shift engineer knows the previous shift’s efficiency calculations. We have become more vigilant in measuring the efficiency while detecting the small faults easily resulting in an improve in the plant performance”

“Before attending the O&M training we were not observing our work performance but right after the training course; we are now keenly observing every detail of our work which is linked to others department and affecting their performances. Training course was more of a refresher course for us; we were performing our duties practically at the plant but from this training we had a revision of all the theories learned during college years. During assignments we have learned different parameters like causes and minimizing the heat loss, measuring the heat rate efficiency and looking for leakages through a thermographic camera”

“Through this training, we have learned to do efficient planning leading to a better organizational performance in identifying minor issues promptly. Issues are now quickly being informed to the maintenance engineer to resolve timely and to avoid any future difficulty e.g. I have recently faced the fan tripping problem, which I quickly I reported to the concerned engineer to resolve the problem which was affecting the plant performance. I have also helped the concerned engineering department to rectify the issue as timely as possible”

“As a shift engineer, previously, we used to just highlight the changes in parameters but as we have learned; plant issues are interrelated with each other and are now being closely monitored. Once monitored it is promptly conveyed it to the concerned department to resolve the issue to avoid the generation losses”

“Being an instruments engineer, throughout the training; we have learned about the maintenance techniques on how to increase the efficiency due to which we are more focused on attending the faults during the shutdown phases. Our purpose is to improve the megawatts generation by taking precautionary measure to avoid technical glitches”

“We learned about the latest technology trends being followed internationally. The plant is controlled by the outdated DCS relay based control system which is 25 years old. Whereas, the world is going all computerized but we are still dealing with the delays in monitoring and plant controls causing machinery damages and needs shutdowns. Conversion from the DCS system is in process resulting in an increased ratio of identifying and minimizing the faults followed by proper monitoring and planning and increase efficiency and reliability of the power plant”

“I am mechanical engineer from maintenance department; we were using the river water with the help of in-take pumps from river for the purpose of cooling the plant. But it frequently damages the pumps during the process of self-lubrication. Furthermore, to avoid the damages we have got guidelines through training that we can also take the underground water (by drilling ground) for cooling the plant; so now we are in the process of drilling. We have also learned the techniques of alignments and swiftly responding to faults to stop further damages. E.g. the maximum cooling tower

efficiency is 58.5 which is currently measured at 25.29, this can easily be calculated at 40.1 with the replacement of original towers”

Challenges:

Few of the training participants have highlighted the challenges they have faced during the completion phase of their respective assignments. These challenges includes; lengthy procurement procedures, low consumption of fuel and permission from National Power Control Centre (NPCC) to shutdown easily for over-hauling of plant. Additionally, they have mentioned:

“One of the major issues that we have been facing at the plant is the lengthy procurement procedure causing delayed in the timely procurement of the equipment; regardless of the given equipment specifications. Metallurgy is one the major reason of the procurement delays, it takes time for the engineers to extracting metals from the ores, purifying and alloying metals; causing major losses in terms of machinery and money. Procurement procedures need to be changed for a better implementation of the learned best practices.”

“Certain residual elements deposited at the Gas control valves causing the leakages that need timely cleaning because if delayed; can cause explosions. The timely shutdown required for the valves is approximately 1-2 seconds which needs to account for before any major loss ensues”

“We required shutdown from National Power Control Center (NPCC) for completing our work on specific assignment topics, e.g. once the shutdown is permitted then we will be formally permitted to focus on the overhauling of the plant and the elements attached to the process. This may allow us to figure additional components of the assignment while studying different aspects during the implementation phase”

“My assignment was to “Identify and rectify the cause of failure in efficient cooling tower fan”. As far as my job as a Senior Shift Engineer, I have started identifying the causes of the failures in the cooling tower fans and efficiently communicated it to the mechanical department. The interruptions are caused at the rectify stage because of the procurement and shutdown delays”

“My assignment topic was “to identify the causes of low condenser vacuum on all units of JPGCL particularly, in summer season”. At JPGCL, we only carry out clear water treatments not raw water treatments; resulting in back pressure due to low condenser. The reason of the frequent efficiency loss is the less heat exchange because of the residual elements resulting in the less megawatt generation; and to avoid these losses, more fuel is consumed in order to maintain the load of 170 MW”

“Frequent choking is caused due the quality of the fuel used and the increase in choking is due to bad elements e.g. Sulphur. Moreover, extra use of the auxiliaries reduces the plant efficiency and to increase efficiency when there is no more bracket of air combustion; the load cannot be increased but if necessary, we use more fuel causing excess fuel consumption”

One of the participants while concluding the discussion on the challenges had openly admired the efforts and knowledge of the trainer Mr. Ken, he stated; there was massive opportunity for us to gain knowledge during the training but there was very less covered related to his work, he said:

“The training was great; Mr. Ken was a genius person and had huge operation and maintenance knowledge and I have gained a lot of knowledge from his experiences. Furthermore, topics related to

my specific work were not as such discussed in the training i.e. high deficiency of field water and exchanges of heat efficiency, so I personally have not gained much related to my work”

Suggestions:

In order to improve the future training initiatives and to determine the effectiveness in order to reach the stated objectives, participants were asked to give their suggestions. Participants have given their general suggestions and feedback for moving forward positively.

One of the respondent stated that there should be a similar training at the working plant giving the participants an opportunity to work on the training content in a more practical manner. He stated:

“I would suggest USAID to conduct a comparative study between the publically run power plants and independent power plants (IPPs) to measure the deficiency and identify potential ways to improve the overall performance of the publically owned power plant”

“I would suggest conducting the similar training course for the senior/top level managers working at the power plant in order to enhance their working knowledge. To improve their ability to know the underlying challenges faced by the junior level staff during the implementation of the learned-skills”

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