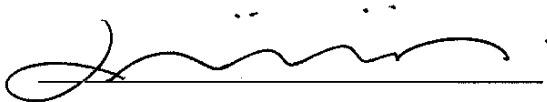



**MINUTES OF MEETING**  
**THE FIFTH JOINT COORDINATING COMMITTEE**  
**TECHNICAL COOPERATION FOR ESTABLISHMENT OF ENVIRONMENTAL MONITORING**  
**SYSTEM**  
**IN THE ISLAMIC REPUBLIC OF PAKISTAN**

Islamabad, December 14, 2011

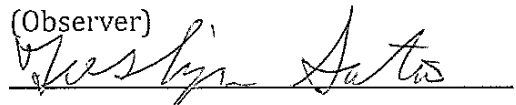


Mr. Hideo Noda  
Team Leader  
Japanese Terminal Evaluation Team  
Japan International Cooperation Agency (JICA)

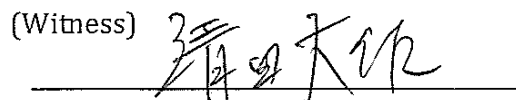


Dr. Muhammad Bashir Khan  
Director General  
Khyber Pakhtunkhwa-EPA  
Islamic Republic of Pakistan

for  
Mr. Abdullah Jan  
Director General  
Balochistan-EPA  
Islamic Republic of Pakistan

(Observer)  


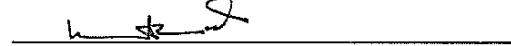
Mr. Toshiya Sato  
Senior Representative  
JICA Pakistan Office

(Witness)  


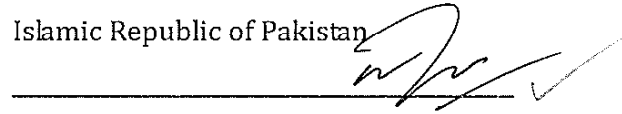
Mr. Daisaku Kiyota  
Team Leader  
JICA Expert Team




Mr. Asif S. Khan  
Director General  
Pak-EPA  
Islamic Republic of Pakistan



Mr. Mehr Maqsood Ahmad Lak  
Director General  
Punjab-EPA  
Islamic Republic of Pakistan



Mr. Muhammad Naseem Nawaz  
Director General  
Sindh-EPA  
Islamic Republic of Pakistan

(Observer)  


Mr. Waqar Hussain Abbasi  
Deputy Secretary (Japan)  
Economic Affairs Division

These are the agreed Minutes of Meeting (MM) of the 5<sup>th</sup> Joint Coordinating Committee (JCC) of the "Technical Cooperation for Establishment of Environmental Monitoring System" project (to be referred to as "the Project" in subsequent text) between the Government of Islamic Republic of Pakistan and the Government of Japan. The project, under which this JCC took place, was agreed in November 2008 and is scheduled to complete in February 2012.

The main agenda of the JCC was to share the results of Joint Terminal Evaluation Report of the Project with project counterparts (Federal and 4 provincial EPAs) and other key partners from EAD, Planning Commission and Ministry of Disaster Management (MoDM).

Mr. Asif S. Khan, Director General, Pak-EPA chaired the meeting.

Mr. Asif S. Khan highlighted the significance of Technical Cooperation Project and its activities. He also provided a brief description of the project and appreciated its flexibility to tailor the training contents to the varied level of technical background of the trainees, which has resulted into the enhanced technical capacities of the project staff including the regular staff of EPAs.

He also touched on the issue of the sustainability of the equipment installed under JICA's Grant Aid Project titled "Establishment of Environmental Monitoring System in Islamic Republic of Pakistan (EMS Grant Aid project) " as there was no provision for spare parts even in the first year after the equipment installation, which is contrary to the general procurement practices. He also underlined the time lag between EMS Grant Aid and TCP EMS on the part of JICA and gap between approved funds and actual funds releases made by government of Pakistan (GOP) as other important factors responsible for continuously challenging the equipment sustainability. The issues of non-cost effective nature of the consumables, continuous war against terrorism, floods, and subsequent PSDP cuts and power shortage were also identified as external factors with direct negative impact on the project sustainability.

He also availed this opportunity to formally request JICA, on behalf of Federal and Provincial EPAs through EAD, for JICA's future support for: a) strengthening of the ongoing EMS after its closing; and b) for control of vehicle emission causing continuous threat to the air quality in Pakistan.

He conveyed his gratitude to JICA Expert Team (JET) for facilitating EPAs in operation and maintenance of monitoring equipment along with the financial support that was necessary for conducting the trainings under the project. He also acknowledged with gratitude the support provided by JICA Pakistan office in overcoming the obstacles and challenges that were impeding the implementation of the project.

Mr. Daisaku Kiyota, Leader, JICA Expert Team expressed his gratitude towards all of the participants. Then he briefed the Committee about TCP-EMS. The implementation of the project commenced with dispatch of JET in February, 2009. The equipment at Federal and Provincial EPAs was repaired in 2009 and 2010; Project Design Matrix (PDM) was first modified in June, 2010, however, second modification was made in March, 2011. Furthermore, counterpart trainings were conducted from June, 2009 till November, 2011.

Then he briefed about the outputs, implementation schedule and PDM overview of TCP-EMS. He also shared the project strategy that relied primarily on Pakistani counterparts and trainees for the implementation of project activities with technical guidance and backstopping provided by JICA Expert Team. Therefore, Counterparts (Pak-EPA and Provincial EPA), supported by JICA Expert Team, are considered the driving force of the project.

He also highlighted the obstacles of the project as follows:

- The equipment provided to Federal and Provincial EPAs under the EMS Grant Aid Project was damaged due to load-shedding and lack of maintenances and, therefore, JICA decided to fix the equipment.

*Mr. A. S. Q<sup>2</sup>*

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27/11/11

- Because of unstable security conditions, GOJ decided not to dispatch JET to Peshawar and Quetta due to which, JET had no opportunity to directly visit these EPAs.

He said that the JICA Expert Team prioritized the project activities considering the conditions of equipment, technical skills of the staff involved and the term for this project. He informed that the activities conducted by JET included:

- a) Preparation of Monitoring Plans;
- b) Sampling & Analysis under the Plans;
- c) QA/QC Activities;
- d) Processing and Interpreting and
- e) Dissemination

He also explained the improvement plan for data communication. JET upgraded the data communication system at all EPAs in February, 2011. At the time of up-gradation of data communication system, KP-EPA conveyed that it does not require another line of DSL and, therefore, the line provided by JET was disconnected. Later on, KP-EPA requested for provision of DSL line which was provided. However, KP-EPA was informed that in order to perform the data collection from air monitoring station, the router and data logger at fixed station Peshawar have to be reprogrammed and settings of data collection system have to be changed at CLEAN Lab, Islamabad. This up-gradation has not been conducted by KP-EPA till now which has caused failure in central data collection at National Data Surveillance Centre, Pak-EPA.

He also explained in detail the SOPs prepared for air and water analysis and repair work at Federal and Provincial EPAs. He also informed about the outputs of data analysts. Then he flagged the key issues including continuous load shedding, non-availability of funds required for procurement of consumables necessary for running the equipment after the project closing; and the non-availability of funds required for contract extension and regularization of EMS staff.

*Imran Ali* *Ali* *Imran* *Q*

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Mr. Waqar Abbasi, Deputy Secretary (Japan), EAD appreciated the efforts of JICA Expert Team and asked EPAs to convey their plan for sustainability of EMS. He said that EAD is willing to provide the required support to EPAs in order to ensure the sustainability. Mr. Asif said that Terminal Evaluation Team has already collected information from all EPAs regarding their future strategy for sustainability for EMS Project and that the Evaluation Team would be in better position to convey the actual status of progress made by Provincial EPAs. EAD Also appreciated the effective coordination and consistent follow-up on EMS project related issues by JICA Pakistan office.

Mr. Zia Ul Islam, Director (EIA/Mont.) said that he had been out of contact with the project for two years and, therefore, he is concerned about whether all provinces are on-board regarding adoption of SOPs recommended by JET. It was conveyed by Mr. Kiyota that SOPs have been accepted by the provinces, however, in some cases, EPAs are still using the SOPs already in use. He recommended Pak-EPA to notify the SOPs so that all EPAs use uniform methods for air and water quality analysis.

Mr. S. M. Yahya, Director (Lab.), Sindh-EPA said that the consumables and chemicals are very expensive and it is difficult to purchase the consumables using the available budget. He requested JICA to suggest an alternative and more cost effective source for acquiring the consumables. Mr. Kiyota admitted the fact and said that there is a possibility to get consumables from other sources as practiced by India. Mr. Kiyota suggested EPAs to get information from Indian analytical companies about their process of procuring the spare parts and consumables.

Mr. Muhammad Khan, Deputy Director (Technical) conveyed his thanks to the JICA Expert Team and said that TCP-EMS has enabled all EPAs to implement Environmental Law appropriately. He said that SOPs and uniform methods should be notified by Pakistan Environmental Protection Council (PEPC) for EPAs and certified labs as well.

A series of handwritten signatures and initials at the bottom of the page. From left to right: a signature that appears to be 'Zia', a signature that appears to be 'Waqar', a signature that appears to be 'Asif', a signature that appears to be 'S.M. Yahya', a signature that appears to be 'Muhammad Khan', a signature that appears to be 'Kiyota', and a circular stamp containing the text 'JICA' and 'Pak-EPA'.

Mr. Zaheer Gillani appreciated the work done by JET. He said that as Terminal Evaluation has been conducted, it may highlight the grey and weak areas for future running of the project. Mr. Kiyota said that on technical side, EPAs' staff is very weak in mathematical skill. He further said that hiding someone's lack of understanding prevents to gain knowledge and to progress. He requested EPAs to always encourage EMS staff in order to make them confident enough to not to hide their weaknesses.

Mr. Noda gave a briefing on Terminal Evaluation, jointly conducted by JICA, Ministry of National Disaster Management, Planning Economic Affairs Division and Planning Commission from Government of Pakistan.

He said that the EMS Grant Aid project started in August, 2005 and was completed in March, 2007. Later on, a Technical Cooperation Project for EMS was initiated in February, 2009 and would be completed in February, 2012. He said that the implementation structure of TCP-EMS was modified in June, 2011 due to the devolution taken place with regards to Ministry of Environment. Then he mentioned five criteria used for evaluation, the results of which are given below:

Relevance (Basically High):

- Needs to urgently address environmental issues
- In line with the National Policy
- Project design was partly overstrained.

Effectiveness (High):

- Knowledge and skills of technical staff are improved.

Efficiency (High):

- Despite unexpected troubles, inputs were converted into outputs resulting that the project purpose was achieved.

Impact (Variable):

- Monitoring system continues to function in some EPAs.
- Other EPAs are still in process of budget confirmation.

*Mr. Zaheer Gillani*

*W*

*(Signature)*

Sustainability (Variable):

- Policy and technical contexts are favorable.
- The issue lies in financial sustainability.

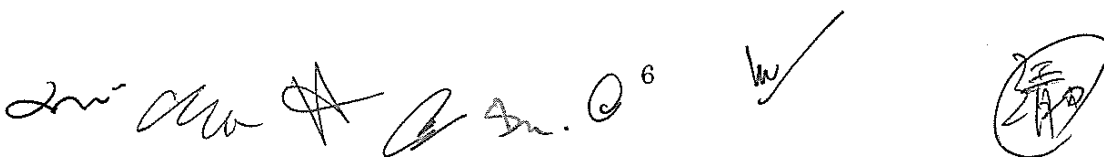
He said that the project can be closed as scheduled as it has achieved the project purpose in a sense that each EPA is now capable to draft environmental monitoring plans, collect samples from monitoring sites, analyze them by using the equipment, compile the data and prepare monitoring reports. He said that one critical concern is financial sustainability after the project. Punjab-EPA and KP-EPA have confirmed the budget under new PC-1 while other EPAs are still in the process of securing the operational budget for environmental monitoring.

Following recommendations have been made under the Joint Terminal Evaluation:

- Securing operational budget and regularization of the technical staff
- Follow-up monitoring
- Assessment of current capacity of each EPA for further improvement in terms of organizational capacity development
- Extension of the existing PC-1
- Data sharing among EPAs
- Promoting organizational culture for sharing technical information within each EPA

He said that it has been learnt through execution of the EMS Grant Aid project and TCP-EMS that there is a need of developing a practical implementation mechanism in case of umbrella PC-1 and also provision of spare parts and consumables that are not locally available.

He said that the recommendations of evaluation will be monitored as a future follow-up. Terminal Evaluation Team has followed the evaluation guideline of JICA for evaluation. The data has been collected through interviews and documentation

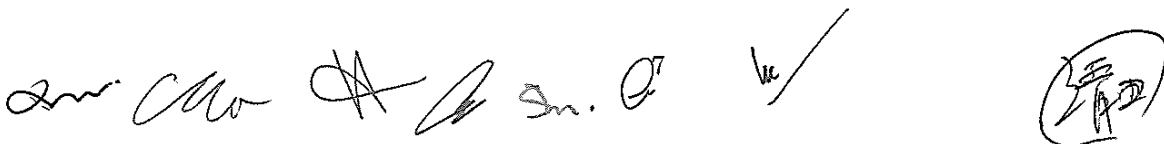
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review, which was then analyzed for incorporation into the evaluation report. He said that the conclusion of Terminal Evaluation is that the TCP-EMS can be closed as scheduled as it has achieved the project purpose.

Mr. Asif said that extra spare parts and consumables were not provided by JICA at the time of installation of equipment under the EMS Grant Aid project. And that was a flaw in the design of the project that affected the performance of equipment. However, JICA confirmed that several spare parts were given through the EMS Grant Aid project. The list of equipped spare parts provided under Grant Aid was given to Pak EPA.

It was informed by Mr. Kubo that there is a communication gap among the Director Generals and junior staff in EPAs particularly with reference to the matters pertaining to PC-1s and staff retention/regularization. Ms. Nazia explained that since she has been communicating with DGs on matters pertaining to the PC-I approvals and staff retention, therefore, she knows that all DGs have been making a committed effort to address these issues and some DGs have conducted some meetings with their staff to take them onboard regarding the developments. This communication gap identified by the evaluation team could possibly be due to the fact that some staff themselves may not be feeling very confident about approaching their DGs to discuss such matters. Mr. Asif also pointed out that it is important to maintain the management communication chain for smooth function of the official matters, which is an accepted norm and practice within offices all around the world. However, he encourages his staff to represent their case at all important level. He mentioned a recent example in which the most junior EPA staff had a meeting with Planning Commission with the consent of DG to expedite the matter of staff contract extension.

Mr. Kiyota also explained that if some request is forwarded by junior staff to DG through middle management, the request mostly does not reach to the Director Generals. This communication gap includes lack of sharing of technical information by senior officers to junior staff in all EPAs. Mr. Kubo said that the system of

The bottom of the page contains several handwritten signatures and initials. From left to right, there is a signature that appears to be 'Mr. Asif', followed by a signature that looks like 'Ms. Nazia', then a signature that could be 'Mr. Kubo', and finally a signature that might be 'Mr. Kiyota'. There are also some other initials and a checkmark-like mark scattered around these signatures.



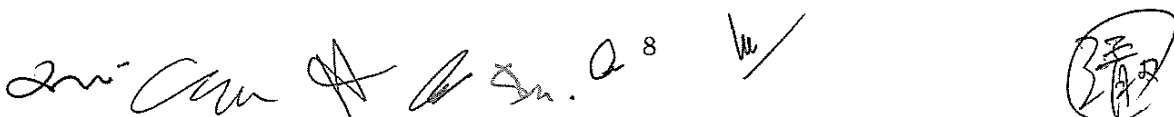
hierarchy at EPAs lacks persuading the issues. Furthermore, it was also conveyed by Mr. Kiyota that EPAs have been weak in follow-up of requests / issues as experienced through TCP-EMS. Mr. Zaheer Gillani requested EPAs to ensure sharing of information within the institution.

While discussing the number of staff hired for EMS, Mr. Zia Ul Islam said that the Ministry of Environment hired enough staff for Federal EPA and went slow for Provincial EPAs leading to incomplete recruitment. Mr. Kiyota said that some persons have been attending the trainings just once or twice. And so, about 55 persons have been fully trained in keeping with the criteria that require each of the trainees to attend more than ten trainings to be able to acquire sufficient knowledge and experience necessary for capacity development under the project. Mr. Kubo said that the capacity level varies from EPA to EPA depending upon the available human resource. However, the important fact is that the accumulative staff capacities have been enhanced in all EPAs.

It was mentioned by Mr. Kubo that there is shortage of water supply in laboratory of Sindh-EPA. Mr. Yahya conveyed that this shortage is due to construction work which may be completed by June 2012.

Mr. Waqar Abbasi, Deputy Secretary (Japan), EAD said that the impact of the project can realistically be assessed after the project closing and not so much during the project implementation. Therefore, EAD also agrees to the proposal of follow-up made by Joint Terminal Evaluation Team and would provide all necessary cooperation in this regard. EAD would also be interested in the results of post project evaluation that may be conducted by JICA after 3 to 5 years of project completion.

Dr. Muhammad Bashir, Director General, KP-EPA said that the system of regularization requires to initiate the process in the final year of the project which takes time. He also said that he cannot commit for the absorption of EMS staff in revised Provincial EMS project of KP-EPA due to the rules and regulation prescribed

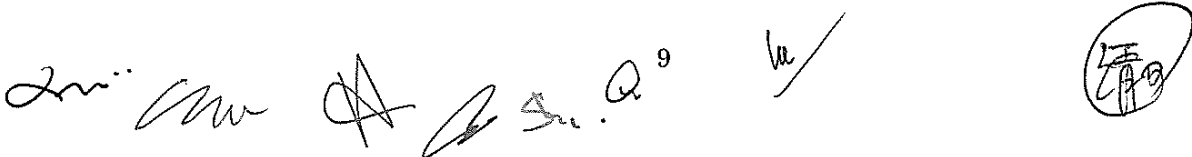
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by the provincial recruitment system. . However, it is also understood that the EMS staff has a fair advantage over other applicants once the recruitment process is announced. According to the present scenario KP-EPA has got sanctioned positions, however, appointment of EMS staff at these positions may not be ensured by KP-EPA due to the rules pertaining to the recruitment of regular staff.

Mr. Zia Ul Islam said that the issues related to devolution and financial crunch were not foreseen at the time of designing the project as these issues were totally unexpected. He informed that originally, the EMS Grant Aid project was designed to be executed in two phases. Mr. Kubo explained that Provincial EPAs were expected to double their budget after the responsibility of O&M cost of the project was transferred from Pak-EPA to the Provincial EPAs. Dr. Bashir said that he would discuss this matter with the Finance Department in Khyber Pakhtunkhwa.

Dr Aurangzeb Khan, Chief Environment Planning Commission opened his statement by acknowledging the JICA's support for EMS. He also appreciated the support provided by JICA Pakistan office which effectively persuaded Planning Commission and other project partners in mobilizing financial support for the project from GOP even under the most challenging scenario (PSDP cuts, financial crunch due to war on terrorism and floods, securing funds releases from limited block allocation etc.) .

Dr. Aurangzeb said that after devolution, it is the responsibility of the Provincial EPAs to provide funding to all devolved projects. And after completion of the project, Provincial EPAs could aim for regularization of respective EMS staff. He also said that there is a system for shifting of staff from development to non-development budget, however, the required time varies. He also mentioned that it would have been more appropriate if the staff was hired through Public Service Commission as it would have made the regularization process easier. Mr. Waqar said that a number of personnel have been hired by JET under TCP-EMS and regularization of staff should have been elaborated while designing the project. Mr. Kubo admitted that there were deficiencies in the project design. Mr. Gillani also suggested regularization of all these positions in order to retain the trained EMS staff.

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Dr. Bashir informed the forum that presently, sixteen development projects are being executed by KP-EPA which include 'Establishment of Environmental Monitoring System', Provision of Mobile Environmental Monitoring Laboratories for Regional offices of EPA in Khyber Pakhtunkhwa' and 'Monitoring of Soil and Groundwater near Industrial Areas and Suggestions for Various Mitigation Measures'. He informed that under another project 'Installation of Digital Data Display Boards and its Integration with PTV', KP-EPA has installed two digital display boards one each at EPA building and one in the Centre of city in order to display the air quality data on daily basis. He informed that only three out of twelve positions for KP-EPA were filled by the Federal Government at the time of start of EMS Project. He also informed that KP-EPA has revised its another on-going Provincial EMS Project with an additional cost of Rs. 2.8 Million and more positions in order to absorb EMS staff. After approval of the revised Provincial EMS Project, KP-EPA would try its best to accommodate EMS staff of KP Province only. He also informed that KP-EPA has got sanctioned positions under SNE and would also try to appoint EMS staff against these positions. However, KP EPA does not guarantee that the same staff would be recruited from EMS project as the competition will be open and the positions will be offered to the best suited candidates on merit. It is also possible that the present EMS staff may not apply for the advertised positions at all as they may have already got other jobs. Mr. Kubo requested him to keep JICA Pakistan office updated on the progress regarding the staff induction through open merit system. He also said that the main concern of JICA is the availability of funds and sustainability of EMS after devolution. Therefore, the update from KPK EPA would help JICA to better understand as to how these issues have been addressed at each of the EPA.

Ms. Nazia said that JCC forum should realistically assess whether the staff at all EPAs could be regularized or not. Dr. Aurangzeb was of the view that the ultimate goal of EMS is sustainability and to achieve this goal, we have to make all the efforts. Mr. Kubo said that if the process of regularization takes more time, then EPAs may absorb EMS staff under new PC-1s and meanwhile the process for regularization

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may go on parallel basis. Dr. Aurangzeb said that PC-Is should be an interim arrangement for sustainability of EMS Project.

Mr. Yahya said that JET has trained EMS staff to a level that they can give training to others. He was of the view that TCP-EMS has increased the capacity of EPAs in the field of air and water quality monitoring. He said that meetings may be held on monthly basis in order to monitor the progress made by all EPAs to work for sustainability of EMS Project. Mr. Noda asked about PC forms of Planning Commission. Dr Aurangzeb Khan informed that PC-III is used for monitoring during a project, however, PC-IV form is used to report progress/ performance at the completion of a project. Mr. Noda said that JICA wants to make sure that the EMS project activities conducted during TCP-EMS in last three years are continued in future as well. Mr. Noda said that JICA would invite views of JET about the most appropriate procedure for follow-up monitoring and it may be decided after consultation.

Mr. Asif proposed formulation of a Post-Project Monitoring Committee to monitor EMS project after completion of TCP-EMS. Mr. Waqar said that M/o NDM should play role in composing the Post-Project Monitoring Committee. However, Post-Project Monitoring would be an appropriate forum for coordination and monitoring the progress made on EMS. Dr. Bashir agreed to it and said that a coordination mechanism at the Federal level would be the best forum for post-project monitoring. Mr. Noda further said that after completion of TCP-EMS, JICA does not have any funds available for Post-Project Monitoring Committee. It is, therefore, necessary to decide about the responsible Agency for bearing the cost of this committee. He thanked all the participants for their valuable comments.

Mr. Kiyota said that the Draft Final Report has been delivered to all JCC members whose comments are invited till 19<sup>th</sup> December, 2011 which would be incorporated during finalization of the report.

While closing, Mr. Sato thanked all the participants. He said that EMS Project has two components; the EMS Grant Aid project and TCP-EMS, the cost of which was



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borne by the Japanese tax payers' money. And if the public of Japan see the equipment not utilized, they will be very much disappointed. He said that our main focus should be how to make equipment sustainable.

Others:

1. After a detailed discussion the Joint Evaluation report was endorsed by participants.
2. List of participants of JCC meeting is presented as Attachment 1.

*Mr. A B C* <sup>12</sup>

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*2/1/11*

**List of Participants**

**Pakistan side**

1. Mr. Asif Shuja Khan, Director General, Pak-EPA
2. Dr. Muhammad Bashir Khan, Director General, Khyber Pakhtunkhwa-EPA
3. Dr. Aurangzeb Khan, Chief Environment, Planning Commission
4. Mr. Waqar Hussain Abbasi, Deputy Secretary, Ministry of National Disaster Management
5. Mr. Zia Ul Islam, Director, Pak-EPA
6. Syed Muhammad Yahya, Director (Lab.), Sindh-EPA
7. Engr. Muhammad Khan, Deputy Director (Technical), Balochistan-EPA
8. Mr. Ali Abbas, Deputy Director (Lab.), Punjab-EPA
9. Mr. Zaheer Gillani, National Project Manager, MEA Secretariat, M/o NDM
10. Mr. Zaigham Abbas, Technical Officer (Chemicals), M/o NDM

**Japan Side**

**11. JICA Pakistan Office**

12. Mr. Toshiya Sato, Senior Representative
13. Ms. Nazia Sehar, Senior Programme Officer

**JICA Headquarter**

14. Mr. Hideo Noda, Director, Environmental Management Division
15. Mr. Shun Nesaki, Assistant Director, Environmental Management Division
16. Mr. Hideyuki Kubo, Natural Resources Specialist, Global Link Management Inc.

**JICA Expert Team**

17. Mr. Daisaku Kiyota, Team Leader
18. Mr. Toshiharu Ochi, Air Monitoring Expert
19. Mr. Kageyama Kozuyoshi, QA/QC Expert
20. Mr. Takashi Onuma, Water Monitoring Expert
21. Mr. Kenichi Kuramoto, Water Monitoring Expert
22. Mr. Michiaki Hosono, Water Monitoring Expert
23. Mr. Takahisa Sato, Air Monitoring Expert
24. Mr. Masato Motoki, Coordinator
25. Ms. Anjum Rasheed, Chief Coordinator



A-i





**MINUTES OF MEETING**  
**THE THIRD PROJECT STEERING COMMITTEE**  
**TECHNICAL COOPERATION FOR ESTABLISHMENT OF ENVIRONMENTAL MONITORING SYSTEM**  
**IN THE ISLAMIC REPUBLIC OF PAKISTAN**

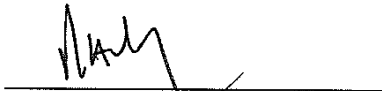
Islamabad, December 15, 2011



Mr. Hideo Noda  
Team Leader  
Japanese Terminal Evaluation Team  
Japan International Cooperation Agency (JICA)



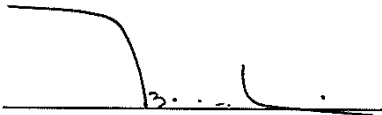
Mr. Muhammad Ashraf  
Joint Secretary  
Ministry of National Disaster Management



Mir Hussain Ali  
Secretary, Environment & Alternate Energy  
Government of Sindh



Mr. Asif S. Khan  
Director General  
Pak-EPA



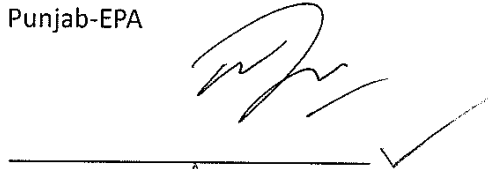
Dr. Muhammad Bashir Khan  
Director General  
Khyber Pakhtunkhwa-EPA



Mr. Mehr Maqsood Ahmad Lak  
Director General  
Punjab-EPA



Mr. Abdullah Jan  
Secretary/Director General  
Balochistan-EPA



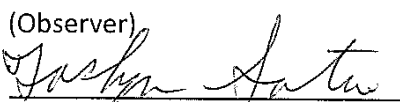
Mr. Muhammad Naseem Nawaz  
Director General  
Sindh-EPA



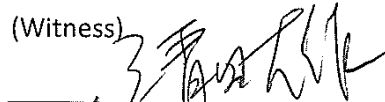
Dr. Aurangzeb Khan  
Chief Environment  
Planning Commission



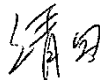
Mr. Waqar Hussain Abbasi  
Deputy Secretary (Japan)  
Economic Affairs Division

(Observer)  


Mr. Toshiya Sato  
Senior Representative  
JICA Pakistan Office

(Witness)  


Mr. Daisaku Kiyota  
Team Leader  
JICA Expert Team



These are Minutes of meeting of the 3<sup>rd</sup> Project Steering Committee (PSC) of the "Technical Cooperation for Establishment of Environmental Monitoring System" project (to be referred to as "the Project" in subsequent text) agreed between the Government of Islamic Republic of Pakistan and the Government of Japan in November 2008.

The meeting was chaired by Mr. Muhammad Ashraf, Joint Secretary of Ministry of National Disaster Management.

The main objective of the PSC was to share the results of Terminal Evaluation of the Project and arrive at consensus based recommendations for the follow-up on key issues (PC-1s approvals and staff retention/regularization where applicable) during the post project period.

The Joint Secretary opened the meeting with a positive reference to the Joint Terminal Evaluation Report that shows that the situation is quite encouraging. He also availed this opportunity to take into account the concerns shown in the Joint Terminal Evaluation Report particularly with reference to staff contract extension, retention and availability of funds necessary for sustainability of the project. He requested the provinces to put in their best efforts in managing the EMS project so that the main issues of funds and staff are adequately taken care of.

The brief summary of discussion and agreements made during the PSC meeting are provided in the subsequent text.

Mr. Asif S. Khan, Director General, Pak-EPA welcomed the Joint Secretary and other participants in the meeting. While acknowledging, that under the EMS Grant Aid project, water quality monitoring laboratories of Provincial EPAs were upgraded and air quality monitoring fixed stations as well as mobile stations were provided by Government of Japan to Pak EPA as well as provincial EPAs. In addition to this a Central Laboratory was also constructed in Islamabad under the administrative control

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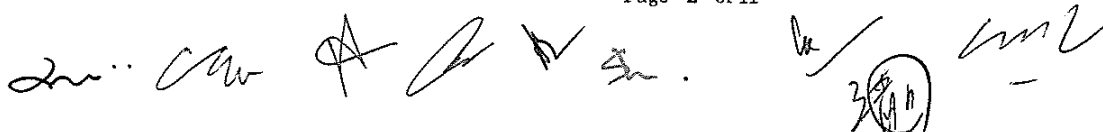
of Pak EPA. Later on, in the second phase, JICA provided its technical cooperation for capacity development of the staff with a uniquely designed training program. Today's meeting has been scheduled to share the results of the evaluation of the technical cooperation project supported by JICA.

Though the project has contributed significantly in capacity development of the EPA staff, however, there is a need for further capacity development of the staff as well as to ensure the sustainability of the project. JICA Expert Team has provided counterpart trainings to the EPAs staff including EMS project staff. He thanked the people of Japan and JICA Expert Team for conducting unique trainings starting from fundamentals and then taking them to the advance level in spite of the fact that the trainees academic background, knowledge and experience varied among EPAs. He said that he is greatly pleased to acknowledge JET who have made committed efforts and trained the staff of EPAs with all sincerity.

While briefly touching on the mandate of PSC, i.e., to oversee and resolve issues emerging from the implementation of the project attention was also drawn towards the issue of sustainability of project that lies in the availability of sufficient funds necessary for extending the contracts of the EMS staff and continuous utilization of the equipment after the project closing.

The D.G, Pak EPA also mentioned that the provinces have taken good initiatives to ensure the funds availability and to retain the trained EMS staff. It was mentioned that it was JICA's first project in Environment sector in Pakistan. He said that the terminal evaluation of the project is very important which may lead to future cooperation of JICA. It is for these two reasons alone the importance of ensuring project sustainability by federal and provincial governments of Pakistan after the project closing itself becomes extremely important.

Referring that Pakistan Environmental Protection Council (PEPC) had approved Pakistan

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Clean Air Programme (PCAP) to tackle the issues related to environmental pollution and EMS activities are a support to initiatives taken by PEPC. He said that later on, EPAs may move to vehicular monitoring system. The D.G, Pak EPA also said that the Terminal Evaluation is based on the agenda; i.e., achievements and the way forward.

The Team leader JET expressed his gratitude towards all of the participants. Then he briefed the Committee about TCP-EMS. The implementation of the project commenced with dispatch of JET in February, 2009. The equipment at Federal and Provincial EPAs was repaired in 2009 and 2010; Project Design Matrix (PDM) was first modified in June, 2010, however, second modification was made in March, 2011. Furthermore, counterpart trainings were conducted from June, 2009 till November, 2011.

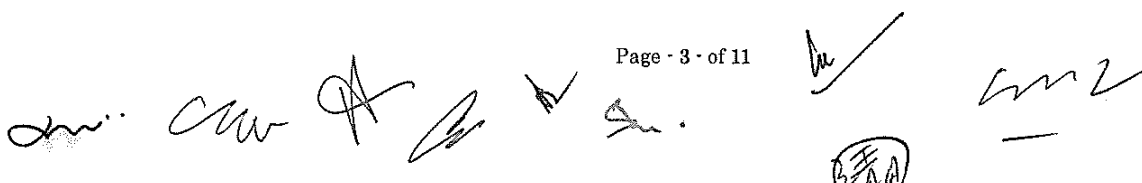
Then he briefed about the outputs, implementation schedule and PDM overview of TCP-EMS. Sharing the project strategy, it was mentioned that it relied primarily on Pakistani counterparts and trainees for the implementation of project activities with technical guidance and backstopping provided by JICA Expert Team. Therefore, Counterparts (Pak-EPA and Provincial EPA), supported by JICA Expert Team, are considered the driving force of the project.

He also highlighted the obstacles of the project as follows:

- The equipment provided to Federal and Provincial EPAs under the EMS Grant Aid Project was damaged due to load-shedding and lack of maintenances and, therefore, JICA decided to fix the equipment.
- Because of unstable security conditions, GOJ decided not to dispatch JET to Peshawar and Quetta due to which, JET had no opportunity to directly visit these EPAs.

He said that the JICA Expert Team prioritized the project activities considering the conditions of equipment, technical skills of the staff involved and the term for this project. He informed that the activities conducted by JET included:

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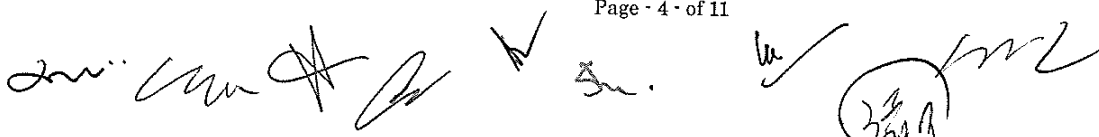
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- a) Preparation of Monitoring Plans;
- b) Sampling & Analysis under the Plans;
- c) QA/QC Activities;
- d) Processing and Interpreting and
- e) Dissemination

The improvement plan for data communication was explained. JET upgraded the data communication system at all EPAs in February, 2011. At the time of up-gradation of data communication system, KP-EPA conveyed that it does not require another line of DSL and, therefore, the line provided by JET was disconnected. Later on, KP-EPA requested for provision of DSL line which was provided. However, KP-EPA was informed that in order to perform the data collection from air monitoring station, the router and data logger at fixed station Peshawar have to be reprogrammed and settings of data collection system have to be changed at CLEAN Lab, Islamabad. This up-gradation has not been conducted by KP-EPA till now which has caused failure in central data collection at National Data Surveillance Centre, Pak-EPA.

The SOPs were prepared for air and water analysis and repair work at Federal and Provincial EPAs and data analysts was also undertaken. The key issues were flagged including continuous load shedding, non-availability of funds required for procurement of consumables necessary for running the equipment after the project closing; and the non-availability of funds required for contract extension and regularization of EMS staff.

Joint Secretary thanked Mr. Kiyota for sharing the details on the achievements of the project. He said that the volume of work done by JICA Expert Team is huge. The efforts of JET were appreciated and EPAs were advised to make the project sustainable without any compromise. It was assured that GOP will make this project sustainable and would not let the Japanese tax-payer money go waste. The Director Generals of all EPAs were also advised to put their efforts into it and to provide resources for the future sustainability of the project. It was also felt that the recruitment at Federal

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level and at respective EPAs should have been undertaken through respective implementing agencies. EPAs should have taken the lead role being the implementing agencies.

Mr. Noda gave a briefing on Terminal Evaluation, jointly conducted by JICA, Ministry of National Disaster Management, Economic Affairs Division and Planning Commission from Government of Pakistan.

It was mentioned that the EMS Grant Aid project started in August, 2005 and was completed in March, 2007. Later on, a Technical Cooperation Project for EMS was initiated in February, 2009 and would be completed in February, 2012. Accordingly the implementation structure of TCP-EMS was modified in June, 2011 due to the devolution taken place with regards to the Ministry of Environment. The five criteria used for evaluation was mentioned, the results of which are given below:

Relevance (Basically High):

- Needs to urgently address environmental issues
- In line with the National Policy
- Project design was partly overstrained.

Effectiveness (High):

- Knowledge and skills of technical staff are improved.

Efficiency (High):

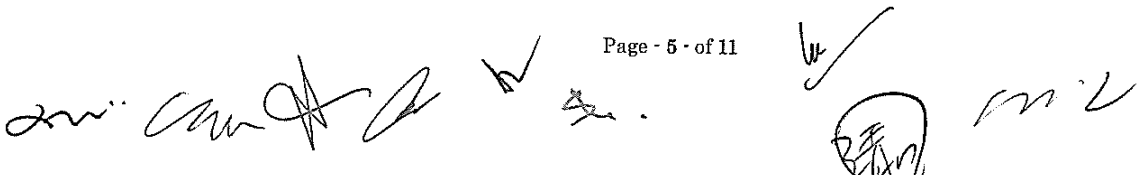
- Despite unexpected troubles, inputs were converted into outputs resulting that the project purpose was achieved.

Impact (Variable):

- Monitoring system continues to function in some EPAs.
- Other EPAs are still in process of budget confirmation.

Sustainability (Variable):

- Policy and technical contexts are favorable.
- The issue lies in financial sustainability.

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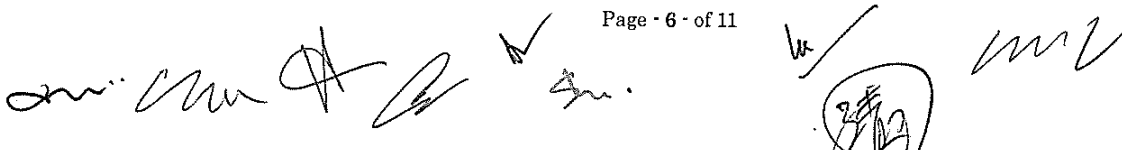
It was stated that the project can be closed as scheduled as it has achieved the project purpose in a sense that each EPA is now capable to draft environmental monitoring plans, collect samples from monitoring sites, analyze them by using the equipment, compile the data and prepare monitoring reports. He said that one critical concern is financial sustainability after the project. Punjab-EPA and KP-EPA have confirmed the budget under new PC-1 while other EPAs are still in the process of securing the operational budget for environmental monitoring.

Following recommendations have been made under the Joint Terminal Evaluation Report:

- i. Securing operational budget and regularization of the technical staff
- ii. Follow-up monitoring
- iii. Assessment of current capacity of each EPA for further improvement in terms of organizational capacity development
- iv. Extension of the existing PC-1
- v. Data sharing among EPAs
- vi. Promoting organizational culture for sharing technical information within each EPA

He said that it has been learnt through execution of the EMS Grant Aid project and TCP-EMS that there is a need of developing a practical implementation mechanism in case of umbrella PC-1 and also provision of spare parts and consumables that are not locally available.

It was stated that the recommendations of evaluation will be monitored as a future follow-up. He said that Terminal Evaluation Team has followed the evaluation guideline of JICA titled "New JICA Guidelines for Project Evaluation (First Edition)" for evaluation. He said that the data has been collected through interviews and documentation review, which was then analyzed for incorporation into the evaluation report. He said that the

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conclusion of Terminal Evaluation is that the TCP-EMS can be closed as scheduled as it has achieved the project purpose.

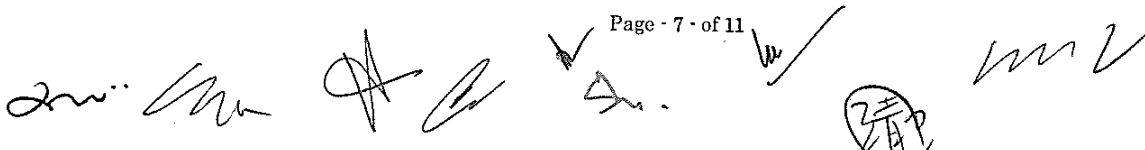
It was initially planned to hire 120 personnel under EMS project, but this number was later on reduced to 100 under revised PC-I. However, when TCP-EMS was initiated, a baseline survey was conducted by JET. Under the information collected through Baseline Survey, working groups were developed at each EPA comprising of personnel working in the field of air and water quality monitoring.

Director General, Punjab-EPA conveyed his thanks to the Japanese people and JET for donating very expensive equipment. It was assured that EMS staff would be absorbed in another project 'Establishment of Air Quality Monitoring System in Punjab' which has been approved by the Government of Punjab.

Dr. Muhammad Bashir Khan, Director General, KP-EPA conveyed his thanks for the support provided by People of Japan. It was pointed out that the efficiency of EPAs has been increased because of EMS project. It was informed that KP-EPA has got sanctioned staff positions on regular side and KP-EPA will try its best to hire the EMS staff for these positions have to be processed according to provincial recruitment procedure. It was informed to the forum that presently, sixteen development projects are being executed by KP-EPA which includes 'Establishment of Environmental Monitoring System', Provision of Mobile Environmental Monitoring Laboratories for Regional offices of EPA in Khyber Pakhtunkhwa' and 'Monitoring of Soil and Groundwater near Industrial Areas and Suggestions for Various Mitigation Measures'. He informed that under another project 'Installation of Digital Data Display Boards and its Integration with PTV', KP-EPA has installed two digital display boards one each at EPA building and one in the center of city in order to display the air quality data on daily basis.

Mr. S. M. Yahya, Director (Lab.), Sindh-EPA conveyed his thanks to JET for providing

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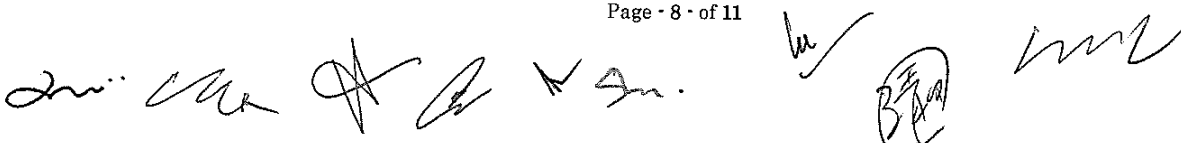
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technical support to Sindh-EPA enabling to implement the Pakistan Environmental Protection Act, 1997 in its real spirit. The Sindh-EPA is grateful to JET for providing the trainings to EPAs staff. It was informed that Sindh-EPA has initiated the approval process for PC-I of 3 years duration which has already been submitted to P&D Department, Government of Sindh. Sindh-EPA has got an allocation of Rs. 50 Million for this PC-I in the current financial year. He assured that these initiatives will be continued and staff will be retained in this PC-I following prescribed provincial rules.

Mr. Muhammad Khan, Deputy Director (Technical), Balochistan-EPA thanked all PSC members. It was mentioned that before this project, EPAs were unable to analyze all parameters of NEQS due to non-availability of required equipment. However, under TCP-EMS, uniform methods and guidelines have been developed. However, not a single person was hired for Balochistan-EPA under EMS project. It was conveyed that Balochistan-EPA has requested the provincial government to provide additional annual regular budget of Rs. 2.0 Million for sustainability of EMS.

Mr. Kiyota highlighted the issue that after devolution, EMS staff at provincial EPAs could not get extension of their contracts and, so there is no possibility of getting their salary from 1<sup>st</sup> July to 30<sup>th</sup> November, 2011. It was requested to the Ministry of National Disaster Management to put efforts in securing the contracts extension of EMS staff at Provincial EPAs and also their salaries till the completion of the project. The Joint Secretary assured that Ministry will undertake all necessary efforts to ensure the contract extension of the EMS staff.

Dr. Muhammad Bashir Khan, Director General, KP-EPA said that after devolution, Provincial EPAs could not get the funds of EMS project and that is the reason due to which the contracts of EMS staff have not been extended. Furthermore, he pointed out that it is not sure whether these EMS trained staff would be hired by KP-EPA under new PC-I. It was stated that there would be high chances to recruit two EMS personnel but KP-EPA cannot ensure their absorption. He further informed that Mr. Hassan

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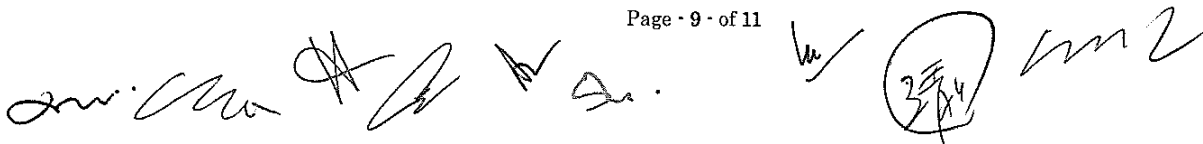
Adnan, Data Analyst at KP-EPA cannot be absorbed by KP-EPA because he has domicile of Punjab which is not acceptable to the Government of Khyber Pakhtunkhwa. On request of Mr. Kiyota, D.G, Pak EPA agreed to consider absorption of Mr. Hassan Adnan at Pak-EPA

Mr. Waqar Hussain Abbasi, Deputy Secretary (Japan), EAD said that Pak-EPA may provide funds to Provincial EPAs for salary of EMS staff. Dr. Aurangzeb Khan, Chief (Environment), Planning Commission said that Pak-EPA may request to Planning Commission through Ministry of National Disaster Management for provision of salary of EMS staff working with Provincial EPAs utilizing Pak-EPA's allocated funds.

Joint Secretary said that there are two issues related to sustainability: O&M cost and regularization of EMS staff. The provincial EPAs were appreciated for assuring absorption of EMS staff in other projects. It was proposed that a Coordination Committee may be composed to monitor the progress made by all EPAs with respect to sustainability of EMS.

Mr. Narn Otsubo, First Secretary, Embassy of Japan appreciated JET for providing extensive trainings to the EPAs' staff and also for achieving the objectives of the project. It was emphasized that EPAs to put efforts to make EMS sustainable.

Mr. Waqar Abbasi congratulated the JICA Expert Team on successful completion of TC-EMS project. It was mentioned that the level of commitment from JET is much more than Pakistan side which could easily be judged by the number of participants from both sides. Moreover, EAD receives several projects for JICA Grant. Then after consultation and long discussions with the Embassy of Japan and examination of the project proposals, projects are selected for JICA's support.. It usually takes 1-2 years for a project to be accepted by Japanese Government, which is a time consuming and lengthy process. In that sense there is an opportunity cost for each project. Thus there is a need to take advantage from expertise and technical transfer of Japan.

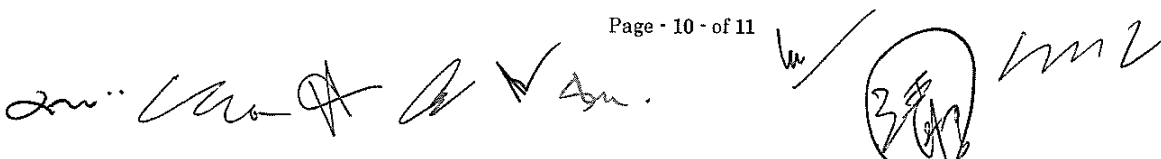
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The EAD is grateful to JET for understanding the importance of sustainability of this project which is a matter of mutual concern. Now it is up to the Government of Pakistan and EPAs to make this project sustainable which has been supported for several years by GoJ. The EAD cannot emphasize more than this. Now that the Ministry of NDM has been established, therefore, it may coordinate with the EPAs to ensure positive progress towards the future sustainability of EMS project. The politeness of Japanese was acknowledged who are always giving positive gesture. He said that M/o NDM has a key role towards sustainability and that EAD will provide full support. He also requested Mr. Kiyota to convey to Secretary, M/o NDM the commitment of EAD to continue to cooperate and follow-up on the sustainability of EMS.

Dr. Aurangzeb Khan conveyed his thanks to all the participants of PSC. He also mentioned that he learnt a lot professionally by dealing with this project. He appreciated the commitment shown by JET throughout the project and the way JET persuaded it especially because of being so much concerned about the people of Pakistan. He said that JET has brought Pakistani side to such a level where commitment from provinces is forthcoming. He said that it is only because of JET that EPAs capacity has been enhanced. He said that it is fortunate to have people like Mr. Asif and Mr. Zia Ul Islam to work on this project. He assured that the issues related to sustainability of EMS would be resolved. The assurance of Planning Commission was reiterated for this project.

Mr. Toshiya Sato, Senior Representative, JICA Pakistan Office showed his concern regarding sustainability of EMS. It was mentioned that the funding for the EMS Grant Aid project and TCP-EMS have been provided using Japanese tax-payers' money. It was conveyed that People of Japan are very much concerned about the sustainability of EMS as otherwise all their money is wasted. Now, it is the responsibility of Government of Pakistan to get benefit from EMS project by maintaining and utilizing

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the equipment provided under the EMS Grant Aid project and to retain the EMS staff trained by JET under the TCP-EMS. It was requested to the Government of Pakistan to make this project sustainable.

Mr. Nesaki acknowledged Mr. Zia Ul Islam, Director (EIA /Mont.), Pak-EPA for his efforts and cooperation with JET for EMS throughout TCP-EMS.

**Recommendation:**

- Salary of EMS staff deployed in Provincial EPAs, for the period from 1<sup>st</sup> July to 30<sup>th</sup> November, 2011, may be paid from the balance amount available in the approved PC-I of Pak EPA. This is necessary as no funds have been earmarked for this period in the provincial ADPs and/or PC-Is under approval process.
- EPAs should put in their best efforts aiming at the retention as well as regularization of trained EMS staff as it is necessary for the overall continued institutional development of EPAs and sustainability of EMS. It is also recognized that EPAs can deliver better with the skills and experiences of the trained human resource than without them.
- Provision of adequate funds to Federal and Provincial EPAs for sustainability of EMS project should be ensured by expediting the approval processes currently under process in EPAs.
- A post project follow-up coordination group shall be constituted to monitor and coordinate the efforts aiming at successful completion of PC-Is approval and subsequent EMS staff retention/regularization.

**Other:**

1. List of participants of PSC meeting is presented as Attachment 1.
2. The Joint Evaluation Report (JER) was endorsed by PSC. The endorsed JER is enclosed as Attachment 2 with Minutes of PSC.



**List of Participants**

**Pakistan side**

- 1) Mr. Muhammad Ashraf, Joint Secretary, Ministry of National Disaster Management
- 2) Dr. Aurangzeb Khan, Chief Environment, Planning Commission
- 3) Mr. Waqar Hussain Abbasi, Deputy Secretary (Japan), Economic Affairs Division
- 4) Mr. Asif Shuja Khan, Director General, Pak-EPA
- 5) Dr. Muhammad Bashir Khan, Director General, KP-EPA
- 6) Mr. Mehr Maqsoor Ahmad Lak, Director General, Punjab-EPA
- 7) Mr. Zia Ul Islam, Director (EIA/Mont.), Pak-EPA
- 8) Syed Muhammad Yahya, Director (Lab.), Sindh-EPA
- 9) Mr. Muhammad Khan, Deputy Director (Technical), Balochistan-EPA
- 10) Mr. Ali Abbas, Deputy Director (Lab.), Punjab-EPA
- 11) Syed Zaheer Gillani, National Project Manager, MEA Secretariat, M/o NDM

**Japan Side**

**12) JICA Pakistan Office**

- 13) Mr. Toshiya Sato, Senior Representative
- 14) Mr. Kozono Tomohiro, Representative
- 15) Ms. Nazia Sehar, Senior Programme Officer

**JICA Headquarter**

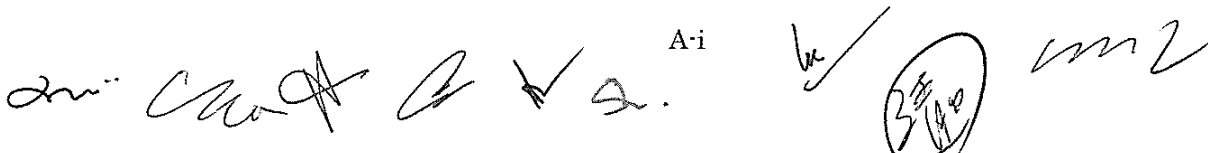
- 16) Mr. Hideo Noda, Director, Environment Management Division1, Global Environment Department
- 17) Mr. Shun Nesaki, Assistant Director, Environment Management Division1, Global Environment Department

**Embassy of Japan**



- 18) Mr. Narn Otsubo, First Secretary, Embassy of Japan

**JICA Expert Team**

- 19) Mr. Daisaku Kiyota, Team Leader
- 20) Mr. Toshiharu Ochi, Air Monitoring Expert

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- 21) Mr. Kageyama Kozuyoshi, QA/QC Expert
- 22) Mr. Takashi Onuma, Water Monitoring Expert
- 23) Mr. Kenichi Kuramoto, Water Monitoring Expert
- 24) Mr. Michiaki Hosono, Water Monitoring Expert
- 25) Mr. Takahisa Sato, Air Monitoring Expert
- 26) Mr. Masato Motoki, Coordinator
- 27) Ms. Anjum Rasheed, Chief Coordinator

Dr. Cho  

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**THE JOINT TERMINAL EVALUATION REPORT**  
**on**  
**Technical Cooperation for Establishment of Environmental Monitoring System**  
**[TCP EMS]**  
**in the Islamic Republic of Pakistan**

**Islamabad**  
**December 15<sup>th</sup>, 2011**

**Joint Terminal Evaluation Team**

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- 7. Recommendations and Lessons Learned
- 7.1 Recommendations
- 7.2 Lessons Learned

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## ANNEX

1. Schedule of the Terminal Evaluation
2. List of Personnel Consulted
3. Current Project Design Matrix (PDM Ver.2)
4. Current Plan of Operation (PO Ver.2)
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7. (Water) Environmental Monitoring Reports
8. (Air) Technical Guideline of environmental monitoring
9. (Water) Technical Guideline of environmental monitoring
10. (Air) Environmental Monitoring Plans
11. (Water) Environmental Monitoring Plans
12. (Water) Standard Operating Procedures (SOP) for 30 parameters of National Environmental Quality Standard (NEQS)
13. (Air-Ambient) SOP for 8 parameters
14. (Air-Emission) SOP for 15 parameters in NEQS
15. Maintenance plans and manuals for the equipment
16. Laboratory Management Manuals
17. Quality Assurance / Quality Control (QA/QC) activity plans
18. Result of Evaluation Grid
19. Working Group Seminar held on 30th November, 2011 – Program

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## ABBREVIATIONS

AAS	Atomic absorption spectrophotometer/ Atomic absorption spectrophotometry
BOD	Biochemical Oxygen Demand
CLEAN	Central Laboratory for Environmental Analysis and Networking
C/P	Counterpart Personnel
COD	Chemical Oxygen Demand
DG	Director General
EMS	Environmental Monitoring System
EMS Staff	Staff recruited for the EMS grant aid project and technical cooperation project
EPA	Environmental Protection Agency
GC	Gas Chromatography
JCC	Joint Coordinating Committee
JICA	Japan International Cooperation Agency
KP	Khyber Pakhtunkhwa
NEQS	National Environmental Quality Standards
ODA	Official Development Assistance
PC-1	Planning Commission Proforma-1
PDM	Project Design Matrix
PSC	Project Steering Committee
QA/QC	Quality Assurance / Quality Control
R/D	Record of Discussions
SOP	Standard Operating Procedures
WHO	World Health Organization

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## 1. Introduction

This report is to describe the result of the terminal evaluation for the “Technical Cooperation for Establishment of Environmental Monitoring System in the Islamic Republic of Pakistan” (hereinafter referred to as the “the project”) that was organized by JICA in November/December 2011.

### 1.1 Objective of the Terminal Evaluation

The followings are the main objectives of the terminal evaluation;

- ◆ To assess progress and achievements of the project;
- ◆ To identify obstacles and favoring factors that have affected the implementation process;
- ◆ To analyze the project in terms of the five evaluation criteria (i.e. Relevance, Effectiveness, Efficiency, Impact, and Sustainability);
- ◆ To make recommendations to concerned actors regarding the measures to be taken for the remaining period and after the termination of the project; and
- ◆ To draw the lessons learned from the project implementation.

### 1.2 Members of the Terminal Evaluation Team

Aiming at contribution to harmonization, alignment and an efficient division of labor, JICA and the Government of Pakistan took a joint evaluation as written in Record of Discussions (R/D) which addresses questions of common interest to all stakeholders concerned for the project. The Joint Evaluation Team members are as follows:

#### <Pakistan Side>

Mr. Muhammad Ashraf	Joint Secretary, Ministry of Disaster Management
Mr. Raja Aurangzeb Khan, PhD	Chief, Planning & Development Division, Planning Commission
Mr. Waqar Hussain Abbasi	Deputy Secretary, Economic Affairs Division, Ministry of Economic Affairs and Statistics

#### <Japanese Side>

Mr. Hideo Noda (Leader)	Director, Environmental Management Division 1 Global Environment Department, JICA
Mr. Shun Nesaki (Cooperation Planning / Minutes Discussion)	Assistant Director, Environmental Management Division 1 Global Environment Department, JICA
Mr. Hideyuki Kubo (Evaluation Analysis)	Social Development Department Global Link Management Inc.

### 1.3 Schedule of the Terminal Evaluation

The evaluation was conducted from November 29 to December 15, 2011. The detailed schedule is attached (Annex 1).

### 1.4 Method of the Terminal Evaluation

The terminal evaluation was conducted in the following manner:

- (1) Collected relevant documents from the project and concerned organizations;
- (2) Conducted key informant interviews of counterparts from Pak-EPA and Punjab-EPA and some counterparts from KP-EPA and Balochistan-EPA who had attended the project workshop held in Islamabad on November 30<sup>th</sup>;
- (3) Conducted telephone interviews of counterparts from Sindh-EPA, KP-EPA and Balochistan-EPA (due to the flight cancellation as well as security reasons, the team could not visit these three EPAs)
- (4) Visited laboratories (CLEAN at Islamabad & Punjab EPA's Laboratory located in Lahore).
- (5) Analyzed the information and data collected in the above manner by referring to the PDM attached in Annex 3;
- (6) Compiled the result of the analysis in terms of the achievements, implementation process and the five criteria evaluation of the project with recommendations and lessons learned; and
- (7) Held a series of discussions with senior EPA officials to share the result of the evaluation.
- (8) Shared the result of the evaluation with the mission members of the Pakistan side.
- (9) Shared the result of the evaluation with concerned personnel at each EPA at JCC and PSC.

The following table is the description about the five criteria applied as principal framework for the analysis and assessment of JICA-supported cooperation projects. JICA applies the DAC criteria for evaluating development assistance for value judgment of its project evaluation. The criteria were proposed in the Development Assistance Committee (DAC) at the Organization for Economic Cooperation and Development (OECD) in 1991.

Relevance	Relevance is assessed by the validity of the project purpose and overall goal in connection with the policy framework of the Government of Pakistan and Japanese aid policy and the needs of beneficiaries.
Effectiveness	Effectiveness is assessed by analyzing the probability to accomplish the project purpose by the end of the project term and the extent to which outputs contribute to the achievement of the project purpose.
Efficiency	Efficiency is assessed by analyzing productivity on how inputs are converted into outputs in terms of timing, quality and quantity.
Impact	Impact is any intended/unintended, direct/indirect and positive/negative changes that have been brought about as a result of the project.
Sustainability	Sustainability is assessed by analyzing the extent to which the achievement of the project will be sustained or expanded after the project ends. The analysis is made from organizational, financial, technical, social and environmental viewpoints.

## 2. Outline of the Project

### 2.1 Background

Air and water pollution is on the rise in Pakistan due to automobile emissions as well as wastewater discharged from domestic and industrial sources. According to the Pollution Conditions Survey conducted by JICA in 2000, concentrations of pollutants exceed Japanese or WHO environmental standards by 20-90%. A concern is growing over the emission of particulate matter in the atmosphere, wastewater seepage into aquifers and adverse health effects on the population. However, the country

has not established fully functional environmental monitoring network and trained personnel fit for this circumstances.

Given this situation, the establishment of an environmental monitoring system is urgently required to conduct appropriate environmental administration. With the aim of establishing the basis of a permanent nationwide environmental monitoring system in Pakistan, under the "Establishment of Environmental Monitoring System" grant aid project of 2005 (hereinafter referred to as the EMS grant aid project), the Japanese government has built a central environmental analysis laboratory (Islamabad), and completed the implementation of air and water quality monitoring systems and the analysis equipment in April 2007. This Technical cooperation project started in February 2009 aiming at enhancing the technical capacity of EPAs in air & water quality monitoring in Pakistan with the utilization of facilities and equipment's provided under the EMS grant aid project.

## 2.2 Project Summary

(1) Duration: February 16, 2009 – February 15, 2012 (3 years)

(2) Counterpart personnel:

- |                  |  |
|------------------|--|
| Federal level    | -Director General and various technical staff (Pak-EPA)  |
| Provincial level | -Director General and various technical staff<br>(Punjab-EPA / Sindh-EPA / KP-EPA / Balochistan-EPA) |

(3) Framework:

The expected Overall Goal, Project Purpose and Outputs written in the current PDM (PDM2) are as follows;

Overall Goal	Environmental monitoring systems are place at the Federal and Provincial EPAs.
Project Purpose	The federal and Provincial EPA's capacity of environmental monitoring on air and water is enhanced.
Output	1 Pak-EPA and Provincial EPAs are capable of formulating Environmental monitoring plans.
	2 Pak-EPA and Provincial EPAs are capable of measuring the major parameters of National Environmental Quality Standards (NEQS) based on uniform methodologies of sampling measurements and analysis.
	3 Laboratory management system is improved and Quality Assurance /Quality Control (QA/QC) system is established in Pak-EPA and Provincial EPAs.
	4 Pak-EPA and Provincial EPAs are capable of interpreting and evaluating monitoring data based on the internationally recognized environmental standards/ NEQS.
	5 Based on the Environmental Monitoring Information System, Pak-EPA and Provincial EPAs are capable of compiling monitoring data and disseminating to the public.

(4) Implementation structure

The following figures show the institutional structure of the project implementation. Since devolution of government authorities took place in June 2011 and then Ministry of Environment was devolved, the implementation structure was changed. Figure 1 shows the previous structure from the beginning of the project up to the end of June 2011 and Figure 2 is for the current from July 2011 to date. The original design of the implementation structure was developed by the grant aid project in 2006 titled

“The Project for Establishment of Environmental Monitoring System” in which (a) 120 project staff were to be newly recruited by the federal government and assigned to provincial EPAs for the implementation of the EMS grant aid project and the project; (b) budget for these personnel, maintenance of equipment and consumable items including reagents was to be borne by the federal government under PC-1 (project finance by development budget) for the initial two years; and (c) after two years, project staff were expected to be employed by provincial EPAs and budget source was to be shifted to provincial governments. It was estimated that provincial governments were required to increase their budget around 1.8 – 2.3 times compared to the level of the fiscal year 2003/04 if the condition of transferring funding sources of staff employment and operational costs from the federal to provincial governments was realized.

Figure 1: Implementation Structure before Devolution (2009 – June 2011)

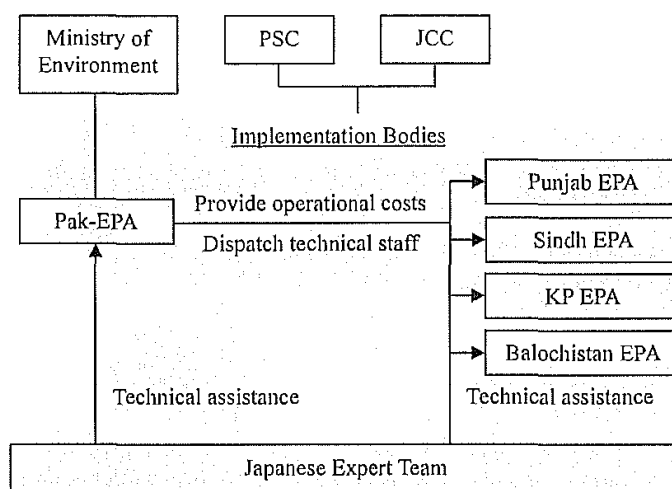
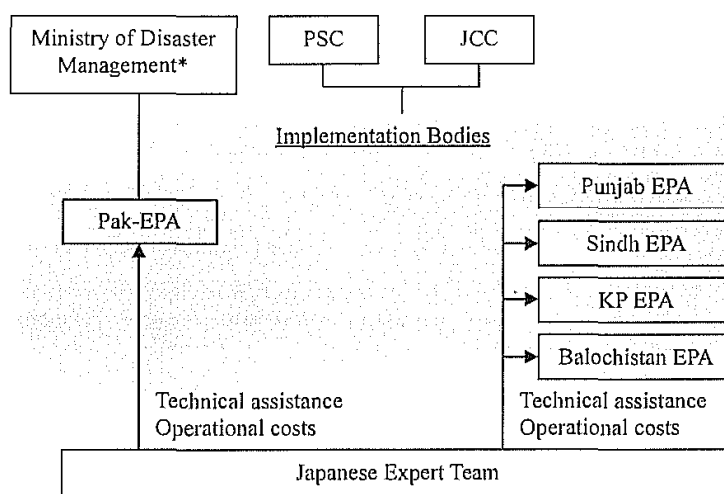


Figure 2: Implementation Structure after Devolution (July 2011 – To Date)



\* Note: Initially, the line Ministry was Capital Administration & Development Division (CA&DD).

### 3. Achievements of the Project

Achievements of the project are measured in terms of inputs, outputs, project purpose and overall goals, all of which are in accordance with the PDM2 (see Annex 3).

#### 3.1 Inputs

The following is the list of inputs provided for the project implementation. More detail information is described in Annex 5.

##### (1) Japanese Side

Most of the inputs from the Japanese side, such as dispatch of experts, training of C/Ps, and operational cost support are executed as planned. Repair of provided equipment under the EMS grant aid project was mainly carried out during the first year of the project.

Experts	The Japanese side dispatched thirteen experts in five fields (Team Leader/Monitoring Planning, Water Monitoring, Air Monitoring, QC/QA and Data Communication). Total Man-Month is 104.63 MM.
Training of C/P in Japan	Total of twelve counterparts were trained in Japan.
Provision of Equipment	Since equipment was provided by the EMS grant aid project, this technical cooperation project provided only the replacement of spare parts and other consumable items. The total maintenance cost for equipment supported by the Japanese side is Rs.18,378,525 as of September 2011.
Operational Cost	The total local cost other than for maintenance of equipment is about 76,838,168 Japanese Yen.

##### (2) Pakistan Side

Assignment of C/P	As of October, 2011, a total of 19 personnel are assigned as project counterparts.
Budgetary allocation	The Pakistan side partly provided the cost for maintenance of equipment and consumable items for laboratory analysis. The total cost including counterparts' salary is Rs.47,695,000.
Provision of Land, Buildings and Facilities	Office spaces with basic equipment have been provided by Pak-EPA as well as other EPAs at their headquarters. CLEAN laboratory and other laboratories in each EPA are also used for the project operation.

#### 3.2 Achievement of Outputs

Findings regarding the achievement of the expected outputs as of the time of the terminal evaluation are as follows:

3.2.1 Output 1

Output 1: Pak-EPA and Provincial EPAs are capable of formulating environmental monitoring plans.					
General findings on achievements	<ul style="list-style-type: none"> <li>Output 1 is already achieved.</li> <li>All EPAs developed environmental monitoring plans for pilot sites of both water and air quality monitoring. Persons in charge of the plans are now confident on their capacity of formulating monitoring plans by themselves.</li> </ul>				
	Pak-EPA	Punjab-EPA	Sindh-EPA	KP-EPA	Balochistan-EPA
Indicator 1-1: Responsible person(s) for formulating environmental monitoring plan (air/water) are properly selected by Each Provincial EPA.	<p>Personnel in the following positions are the ones who were in charge of the formulation of monitoring plans for the pilot sites. It is not necessarily indicate that they are responsible for the future planning as well. Actual assignment for the formulation of monitoring plans will be flexible</p> <ul style="list-style-type: none"> <li>(Water) Inspector is in charge.</li> <li>(Air) Assistant Laboratory is in charge.</li> <li>(Water) Research Officer is in charge.</li> <li>(Air) Deputy Director is in charge.</li> <li>(Water) Chemist is in charge.</li> <li>(Air) Chemist is in charge.</li> <li>(Water) Chemist and Monitoring Inspector are in charge.</li> <li>(Air) Senior Chemist is in charge.</li> <li>Deputy Director is in charge and two technicians for air and water respectively drafted the plans.</li> </ul>				
Indicator 1-2: A guideline of overall environmental monitoring is prepared by Pak-EPA.	<ul style="list-style-type: none"> <li>"Guideline for Water Quality Monitoring (Ver.2)" and "Environmental Monitoring Guideline for Air (Draft) v2" are already prepared.</li> </ul>				

<p>Indicator 1-3: Environmental monitoring plans in pilot areas are formulated as follows; (Ambient Air) Pak-EPA, Punjab-EPA and Sindh-EPA. (Emission (Air)) Pak-EPA, Punjab-EPA and Sindh-EPA. (Ambient Water) Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA and Balochistan-EPA. (Effluent (water)) Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA and Balochistan-EPA.</p>	<p>The following monitoring plans are formulated: ♦ (Ambient Water) "Ambient Water Quality Monitoring Plan in the Pilot Area" ♦ (Effluent Water) "Effluent Monitoring Plan in Pilot Area under Project" ♦ (Air) "Pak-EAP Air Monitoring Plan" that includes both ambient and emission air monitoring</p>	<p>The following monitoring plans are formulated: ♦ (Ambient Water) "Ambient Water Quality Monitoring Plan in Pilot Area under Project" ♦ (Effluent Water) "Effluent Monitoring Plan in Pilot Area under Project" ♦ (Air) "Punjab-EAP Air Monitoring Plan" that includes both ambient and emission air monitoring</p>	<p>The following monitoring plans are formulated: ♦ (Ambient Water) "Ambient Water Pilot Monitoring Area Project for Keenjhar Lake" ♦ (Effluent Water) "Effluent Monitoring Plan in Pilot Area Under Project" ♦ (Ambient Air) "Ambient Air Monitoring in Karachi" ♦ (Emission Air) "Monitoring Plan for Cement Industries in Sindh"</p>	<p>The following monitoring plans are formulated: ♦ (Ambient Water) "Water Quality Monitoring Plan for Warsak Canal Peshawar" ♦ (Effluent Water) "Effluent Monitoring Plan in Pilot Area Under Project" ♦ (Ambient Air) "Environmental Monitoring plan for Ambient Air" ♦ (Emission Air) A plan for a cement factory was submitted.</p>	<p>The following monitoring plans are formulated: ♦ (Ambient Water) "Water Quality Monitoring Plan in Pilot Area of Hub Balochistan" ♦ (Effluent Water) "Effluent Water Quality Monitoring Plan in Pilot Area of Hub Balochistan" ♦ (Ambient Air) "Plan of Ambient Air Quality Monitoring for Balochistan-EPA"</p>
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**3.2.2 Output 2**

Output 2: Pak-EPA and Provincial EPAs are capable of measuring the major parameters of National Environmental Quality Standards (NEQS) based on uniform methodologies of sampling measurements and analysis.

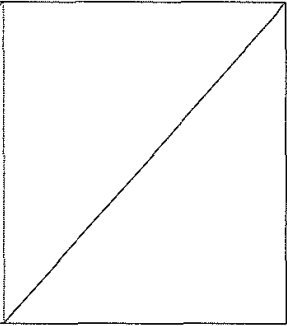
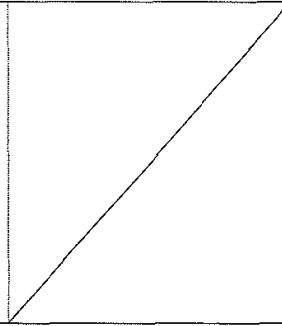
<p>General findings on achievements</p>	<ul style="list-style-type: none"> <li>♦ Output 2 is already achieved.</li> <li>♦ In all EPAs, there is at least one technical expert for each of water and air monitoring who can collect samples and analyze them by referring to NEQS.</li> </ul>				
	Pak-EPA	Punjab-EPA	Sindh-EPA	KP-EPA	Balochistan-EPA
<p>Indicator 2-1: Following parameters are prepared in association with Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA and Balochistan EPA; (Water) SOP for 30 parameters of NEQS (Air-Ambient) SOP for 8 parameters (Air-Emission) SOP for 15 particular parameters in NEQS defined by the Expert is developed</p>	<ul style="list-style-type: none"> <li>♦ (Water) "Standard Operational Procedure For Environmental Water Quality Monitoring in Pakistan Under EMS Project Version – 2" is prepared by Pak-EPA in collaboration with Punjab-EPD, Sindh-EPA, KP-EPA and Balochistan-EPA. This volume involves the description about field survey methods for both natural and effluent water monitoring and SOP for all the thirty-two (32) parameters in NEQS.</li> <li>♦ (Ambient Air) "Standard Operating Procedures for Measurement of Ambient Air" is produced for eight (8) parameters.</li> <li>♦ (Emission Air) "Standard Operating Procedures for Measurement of Stationary Emission Gases" is produced for fifteen (15) parameters in NEQS.</li> </ul>				
<p>Indicator 2-2: Maintenance plans and manuals of the equipment are formulated and in place in association with Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA and Balochistan EPA.</p>	<ul style="list-style-type: none"> <li>♦ The first version of maintenance manual/plan is formulated which describes (a) maintenance/inspection procedures, (b) maintenance plans and (c) counter action and correction for fourteen (14) equipment (pH Meter, DO Meter, Spectrophotometry, AAS (incl. Mercury analyzer), IC, GC, Pure Water Maker, Waste Water Treatment Apparatus, Incubator, Draft Chamber, Micro Wave Digester, Rotary Evaporator, Muffle, Auto Clave).</li> <li>♦ One good example on the capacity of maintenance is that when equipment had troubled in Balochistan EPA, technical staff from Pak-EPA and KP-EPA were dispatched and they could identify the cause of the trouble.</li> <li>♦ Maintenance plans and manuals of the equipment for air monitoring are also a part of SOPs.</li> </ul>				

Indicator 2-3: Quality control records and log books of analysis are kept as follows;  
 (Air Monitoring Stations)  
 Pak-EPA and Punjab-EPA  
 (Analytical Equipment)  
 Pak-EPA, Punjab-EPA and Singh-EPA2-4.

- ♦ Quality control records are maintained in the Air Monitoring Stations.
- ♦ Log books are kept for several major equipment.
- ♦ A format for recording the use of equipment ("Daily Record of Equipment") is also prepared in accordance with the maintenance manual/plan.

- ♦ Quality control records are maintained in the Air Monitoring Stations.
- ♦ Log books are kept for several major equipment.

- ♦ Use of log book started in 2008 but was not actively maintained. But now record keeping is done for several major equipment.



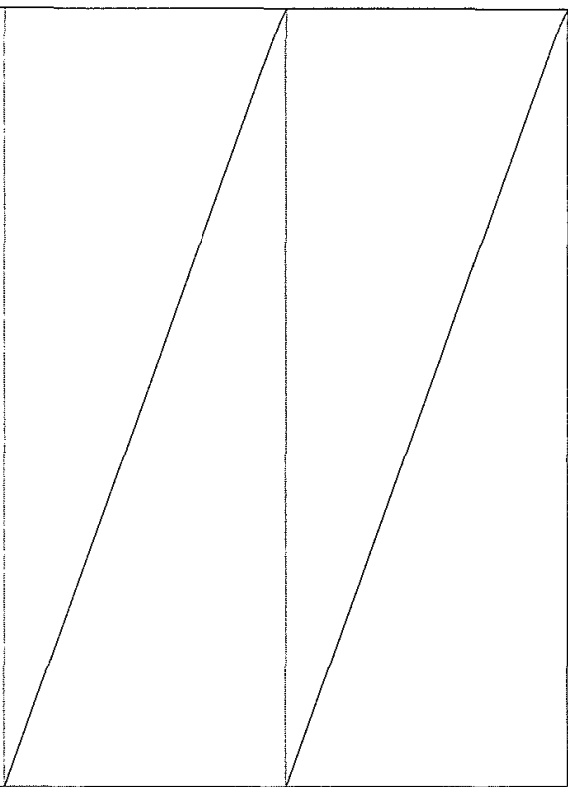
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Indicator 2-4:  
 (Water) The analytical results of QC samples are put into 20% range of QC sample in Pak-EPA, Punjab-EPA and Sindh-EPA while target parameters will be differently defined in each EPA.  
 (Air -Ambient) The difference of calibration factors of each air analyzer is less than 4 % at every calibration in Pak-EPA, Punjab-EPA and Sindh-EPA.  
 (Air-Emission) The difference of calibration factors of PG250 is less than 4 % in every measurement in Pak-EPA, Punjab-EPA and Sindh-EPA.

- ♦ (Water) Certain accuracy of analysis is secured as demonstrated by the result of the proficiency test as follows: The average of variance for the analytical results of QC samples is less than 20% for Ni, Ag and Fe.
- ♦ (Ambient Air) Certain accuracy of analysis is secured as demonstrated by the result of the calibration test as follows: 70% of air analyzers reached less than 4% in the difference of calibration factors.
- ♦ (Emission Air) Certain accuracy of analysis is secured as demonstrated by the result of the calibration test as follows: 60% of analyzers reached less than 4% in the difference of calibration factors.

- ♦ (Water) Certain accuracy of analysis is secured as demonstrated by the result of the proficiency test as follows: The average of variance for the analytical results of QC samples is less than 20% for COD, TSS and TDS.
- ♦ (Ambient Air) Certain accuracy of analysis is secured as demonstrated by the result of the calibration test as follows: 40% of air analyzers reached less than 4% in the difference of calibration factors.
- ♦ (Emission Air) Certain accuracy of analysis is secured as demonstrated by the result of the calibration test as follows: 80% of analyzers reached less than 4% in the difference of calibration factors.

- ♦ (Water) Certain accuracy of analysis is secured as demonstrated by the result of the proficiency test as follows: The average of variance for the analytical results of QC samples is less than 20% for TSS and TDS.
- ♦ (Ambient Air) Certain accuracy of analysis is secured as demonstrated by the result of the calibration test as follows: 50% of air analyzers reached less than 4% in the difference of calibration factors.
- ♦ (Emission Air) Certain accuracy of analysis is secured as demonstrated by the result of the proficiency test as follows: 60% of analyzers reached less than 4% in the difference of calibration factors.



3.2.3 Output 3

Output 3: Laboratory management system is improved and Quality Assurance /Quality Control (QA/QC) system is established in Pak-EPA and Provincial EPAs.					
General findings on achievements	<ul style="list-style-type: none"> <li>♦ Output 3 is already achieved.</li> <li>♦ Laboratory management systems have been improved in a sense that responsible persons are identified and management manuals are developed.</li> </ul>				
	Pak-EPA	Punjab-EPA	Sindh-EPA	KP-EPA	Balochistan-EPA
Indicator 3-1: Laboratory management manual is prepared in each EPA.	♦ A laboratory management manual is prepared.	♦ A laboratory management manual is prepared.	♦ A laboratory management manual is prepared.	♦ A manual is prepared for record sheets.	♦ The second version of laboratory management manual is already prepared.
Indicator 3-2: Responsible person(s) for QA/QC is (are) properly selected on the work process chart by each EPA.	♦ Senior Chemist is responsible for QA/QC.	<ul style="list-style-type: none"> <li>♦ Strong initiative was taken by Director General.</li> <li>♦ Deputy Director is responsible for QA/QC.</li> </ul>	♦ Deputy Director is responsible for QA/QC.	♦ Chief Analyst and Senior Chemist are responsible for QA/QC.	♦ Deputy Director is responsible for QA/QC.
Indicator 3-3: QA/QC activity plans are prepared in each EPA.	♦ QA/QC activity plan is prepared for 2011-2012.	♦ QA/QC activity plan is prepared for 2011.	♦ QA/QC activity plan is prepared for 2011-2012.	♦ QA/QC activity plan is prepared for 2011.	♦ QA/QC activity plan is prepared for 2011.

**3.2.4 Output 4**

Output 4: Pak-EPA and Provincial EPAs are capable of interpreting and evaluating monitoring data based on the internationally recognized environmental standards/NEQS.

General findings on achievements	<ul style="list-style-type: none"> <li>♦ Output 4 is substantially achieved.</li> <li>♦ The environmental quality standard for ambient water is not finalized in Pakistan, though the draft is available, so that the result of the analysis is referred to the Japanese standard.</li> <li>♦ All EPAs already conducted the interpretation and evaluation of monitoring data by referring to NEQS.</li> <li>♦ There are a few technical personnel who are credibly capable of interpreting and evaluating monitoring data by themselves. Most of others, however, still require technical assistance for pertinent interpretation and evaluation of monitoring data.</li> <li>♦ The result of the capacity assessment before and after training courses on the interpretation and evaluation of water monitoring data indicates that the rating of staff's capacity is increased from 2.3 to 3.9 in average (0 – 5 rating).</li> </ul>
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	Pak-EPA	Punjab-EPA	Sindh-EPA	KP-EPA	Balochistan-EPA
Indicator 4-1: Qualities of river waters and ambient air are evaluated based on the internationally recognized standards as follows; (Air Quality at Air Monitoring Station) Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA, Balochistan-EPA (Water Quality at Pollution Source) Pak-EPA, Punjab-EPA, Sindh-EPA (Water Quality) Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA, Balochistan-EPA	<ul style="list-style-type: none"> <li>♦ (Ambient Water) Data obtained from the pilot monitoring site are analyzed in terms of the monthly trend and the difference among sampling sites. The data are evaluated based on Japanese Environmental Water Quality Standard.</li> <li>♦ (Effluent Water) Data obtained from the pilot monitoring sites are evaluated based on NEQS.</li> <li>♦ (Air) Monitoring data on ambient air are evaluated based on NEQS.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Ambient Water) Data obtained from the pilot monitoring site are analyzed in terms of the monthly trend and the difference among sampling sites. The data are evaluated based on Japanese Environmental Water Quality Standard.</li> <li>♦ (Effluent Water) Data obtained from the pilot monitoring sites are evaluated based on NEQS.</li> <li>♦ (Air) Monitoring data on ambient air are evaluated based on NEQS.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Ambient Water) Data obtained from the pilot monitoring site are analyzed in terms of the difference among sampling sites. The data are evaluated based on Japanese Environmental Water Quality Standard.</li> <li>♦ (Effluent Water) Data obtained from the pilot monitoring sites are evaluated based on NEQS.</li> <li>♦ (Air) Monitoring data on ambient air are evaluated based on NEQS.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Ambient Water) Data obtained from the pilot monitoring site are analyzed in terms of the seasonal difference and the difference among sampling sites. The data are evaluated based on Japanese Environmental Water Quality Standard.</li> <li>♦ (Air) Monitoring data on ambient and emission air are evaluated based on NEQS.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Ambient Water) Data obtained from the pilot monitoring site are analyzed for two time periods. The data are evaluated based on Japanese Environmental Water Quality Standard.</li> <li>♦ (Air) Monitoring data on ambient air are evaluated based on NEQS.</li> </ul>

<p>Indicator 4-2: Pollution sources and pollution loadings are presumed based on the environmental monitoring data as follows; (Air Quality at Air Monitoring Station) Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA, Balochistan-EPA (Water Quality) Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA, Balochistan-EPA</p>	<ul style="list-style-type: none"> <li>♦ (Water) Pollution source inventory is prepared which identifies thirty-four (34) industries as possible contamination sources of the ambient water monitoring site.</li> <li>♦ (Water) Pollution load is calculated for the pilot sites of both ambient and effluent water monitoring.</li> <li>♦ (Air) Pollution sources are being identified and simulation is also conducted to explore causal mechanism. Pollution loadings are presumed.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Water) Pollution source inventory is prepared which identifies twenty-four (24) industries and agricultural lands that use chemical fertilizer as possible contamination sources of the ambient water monitoring site.</li> <li>♦ (Water) Pollution load is calculated for the pilot sites of both ambient and effluent water monitoring.</li> <li>♦ (Air) Pollution sources are being identified and simulation is also conducted to explore causal mechanism. Pollution loadings are presumed.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Water) Pollution source inventory is prepared which identifies huge number of industries (such as textile, glass, cotton and others) and agricultural lands as possible contamination sources of the ambient water monitoring site.</li> <li>♦ (Water) Pollution load is calculated for the pilot sites of both ambient and effluent water monitoring.</li> <li>♦ (Air) Pollution sources are being identified and simulation is also conducted to explore causal mechanism. Pollution loadings are presumed.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Water) Thirty-five (35) sources are identified that are likely to contribute to the contamination of the ambient water monitoring site.</li> <li>♦ (Water) Pollution load is calculated for the ambient water pilot monitoring site.</li> <li>♦ (Air) Pollution sources are being identified and simulation is also conducted to explore causal mechanism. Pollution loadings are presumed.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Water) Pollution load is calculated for the ambient water pilot monitoring site.</li> <li>♦ (Air) Pollution sources are being identified and simulation is also conducted to explore causal mechanism. Pollution loadings are presumed.</li> </ul>
<p>Indicator 4-3: Conceptual environmental management plan(s) are proposed as follows; (Air Quality at Air Monitoring Station) Pak-EPA, Punjab-EPA, Sindh-EPA (Water Quality) Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA, Balochistan-EPA</p>	<ul style="list-style-type: none"> <li>♦ (Water) "Report on water quality monitoring and management plan" is developed. It describes monitoring results as well as proposals on countermeasures.</li> <li>♦ (Air) "Air Quality Monitoring Report: Pilot Area in Islamabad" is developed. It describes monitoring results as well as proposals on countermeasures.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Water) "Report on Water Quality Monitoring and Management Plan for the Pilot Area" is developed. It describes monitoring results as well as proposals on countermeasures.</li> <li>♦ (Air) "Air Quality Monitoring Report: Pilot Area in Lahore" is developed. It describes monitoring results as well as proposals on countermeasures.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Water) "Report on Water Quality Monitoring and Environmental Management Plan of the Keenjhar Lake" is developed. It describes monitoring results as well as proposals on countermeasures.</li> <li>♦ (Air) "Air Quality Monitoring Report: Pilot Area in Karachi" is developed. It describes monitoring results as well as proposals on countermeasures.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Water) "Report on Ambient Water Monitoring and Environmental Management Plan of Warsak Canal Peshawar" is developed. It describes monitoring results as well as proposals on countermeasures.</li> <li>♦ (Air) "Air Quality Monitoring Report: Pilot Area in Peshawar" is developed. It describes monitoring results as well as proposals on countermeasures.</li> </ul>	<ul style="list-style-type: none"> <li>♦ (Water) A report is developed that describes monitoring results as well as proposals on countermeasures.</li> <li>♦ (Air) "Air Quality Monitoring Report: Pilot Area in Quetta" is developed. It describes monitoring results as well as proposals on countermeasures.</li> </ul>

3.2.5 Output 5

Output 5: Based on the Environmental Monitoring Information System, Pak-EPA and Provincial EPAs are capable of compiling monitoring data and disseminating to the public.

General findings on achievements	<ul style="list-style-type: none"> <li>• Output 5 is partly achieved in terms of data compilation and still in progress for data dissemination to the public.</li> <li>• At least one technical personnel for each of water and air monitoring in all EPAs is capable of compiling data.</li> <li>• Data are already disclosed to the public on demand basis although the arrangement of regular publication is not realized due to the constraint on equipment and connectivity,</li> <li>• However, websites are not regularly updated in Pak-EPA and Punjab-EPA because of power shortage..</li> </ul>
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	Pak-EPA	Punjab-EPA	Sindh-EPA	KP-EPA	Balochistan-EPA
Indicator 5-1: Environmental Monitoring Information System is in place in Pak-EPA.	<p>The document of "Establishing EMIS: Environmental Monitoring Information System" is developed in which the following points are referred to:</p> <ul style="list-style-type: none"> <li>• The objective of EMIS is to share information among all EPAs, not to consolidate data from Provincial EPA.</li> <li>• Target information includes Air (Ambient Air and "Source" Emission) and Water (Ambient Water and "Source" Effluent).</li> </ul>	/	/	/	/
Indicator 5-2: Websites are properly updated in Pak-EPA and Punjab-EPA.	<ul style="list-style-type: none"> <li>• On December 8, 2011, the authorization was made to upload the monitoring data at the website of Pak-EPA. Since contents are already drafted, the upload will be arranged shortly.</li> </ul>	<ul style="list-style-type: none"> <li>• Content of the website is already drafted. The project is currently waiting for the authorization from Punjab government.</li> </ul>	/	<ul style="list-style-type: none"> <li>• KP-EPA where regular dissemination of data through electronic and print media is arranged.</li> </ul>	/

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<p>Indicator 5-3: Environmental monitoring report in at least one of the pilot areas is published at least once during project period.</p>	<ul style="list-style-type: none"> <li>• (Water) "Report on water quality monitoring and management plan" is developed. It will be published through the website shortly.</li> <li>• (Air) Data are reported to concerned authorities on the daily basis and will be published through website shortly. Environmental monitoring report is also developed and will be published.</li> </ul>	<ul style="list-style-type: none"> <li>• (Water) "Report on Water Quality Monitoring and Management Plan for the Pilot Area" is developed. It will be published through the website.</li> <li>• (Air) Monitoring data used to be published at three signboards in Lahore city but they are out of work at the moment. It will be repaired once the budget is secured. Environmental monitoring report is also developed and will be published through the website.</li> </ul>	<ul style="list-style-type: none"> <li>• (Water) "Report on Water Quality Monitoring and Environmental Management Plan of the Keenjhar Lake" is developed.</li> <li>• (Air) Environmental monitoring report is developed.</li> </ul>	<ul style="list-style-type: none"> <li>• (Water) "Report on Ambient Water Monitoring and Environmental Management Plan of Warsak Canal Peshawar" is developed.</li> <li>• (Air) Environmental monitoring report is developed.</li> </ul>	<ul style="list-style-type: none"> <li>• A report is developed that describes monitoring results as well as proposals on countermeasures.</li> <li>• (Air) Environmental monitoring report is developed.</li> </ul>
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**3.3 Achievement of Project Purpose**

Project Purpose: The federal and Provincial EPA's capacity of environmental monitoring on air and water is enhanced.

<p>General findings on achievements</p>	<ul style="list-style-type: none"> <li>Project purpose is substantially achieved.</li> <li>The result of the proficiency test for the participants that has been conducted at the occasion of a series of ambient and emission air monitoring trainings demonstrates that their proficiency rate has increased from 18% (at their first participation) to 40% (at their latest participation) for ambient air monitoring (n=23) and from 9% (at their first participation) to 34% (at their latest participation) for emission air monitoring (n=20).</li> <li>All the senior officials of each EPA interviewed during the terminal evaluation articulated that capacity of their technical staff has been largely improved and they expressed their appreciation to the Japanese Expert Team for this achievement.</li> <li>All the trained technicians interviewed during the terminal evaluation expressed their confidence in environmental monitoring work as most of them did not have knowledge and skills on the monitoring when they were initially involved in the project.</li> </ul>				
<p>Indicator 1: Environmental monitoring reports including the interpretation and evaluation of the water and ambient air quality in the pilot areas are published by Pak-EPA and at least one of the provincial EPAs</p>	<p><b>Pak-EPA</b></p> <ul style="list-style-type: none"> <li>(Water) "Report on water quality monitoring and management plan" is developed in which the interpretation and evaluation of the water quality in the pilot areas are described. It will be published through the website shortly.</li> <li>(Air) Monitoring data are submitted to concerned agencies on the daily basis. "Air Quality Monitoring Report: Pilot Area in Islamabad" is also developed in which the interpretation and evaluation of the air quality in the pilot areas are described. It will be published through the website shortly.</li> </ul>	<p><b>Punjab-EPA</b></p> <ul style="list-style-type: none"> <li>(Water: Punjab) "Report on Water Quality Monitoring and Management Plan for the Pilot Area" is developed in which the interpretation and evaluation of the water quality in the pilot areas are described. But the report is not published for public.</li> <li>(Water: Sindh) "Report on Water Quality Monitoring and Environmental Management Plan of the Keenjhar Lake" is developed in which the interpretation and evaluation of the water quality in the pilot areas are described. But the report is not published for public.</li> <li>(Water: KP) "Report on Ambient Water Monitoring and Environmental Management Plan of Warsak Canal Peshawar" is developed in which the interpretation and evaluation of the water quality in the pilot areas are described. But the report is not published for public.</li> <li>(Water: Balochistan) A report is developed in which the interpretation and evaluation of the water quality in the pilot areas are described. But the report is not published for public.</li> <li>(Air) Monitoring data are submitted to senior officials on the regular basis and environmental monitoring reports including the interpretation and evaluation of ambient air and emission air qualities in the pilot areas are developed in all the EPAs. But they are not published for public yet.</li> </ul>	<p><b>Sindh-EPA</b></p>	<p><b>KP-EPA</b></p>	<p><b>Balochistan-EPA</b></p>

Indicator 2: The monitoring results with appropriated significant digits required for NEQS are obtained by Pak-EPA.

- ♦ (Water) The average of error for the analytical results of QC samples is less than 20% for Ni, Ag and Fe.
- ♦ (Ambient Air) 70% of air analyzers reached less than 4% in the difference of calibration factors.
- ♦ (Emission Air) 60% of analyzers reached less than 4% in the difference of calibration factors.

Indicator 3: QA/QC system in Pak-EPA and at least one of the provincial EPAs are initiated through development of regulation(s) and manual(s).

- ♦ QA/QC system is already developed – A manual is prepared; Institution is developed; Work flow is elaborated; and Responsible personnel are identified.

- ♦ QA/QC system is already developed – A manual is prepared; Institution is developed; Work flow is elaborated; and Responsible personnel are identified.

- ♦ QA/QC system is already developed – A manual is prepared; Institution is developed; Work flow is elaborated; and Responsible personnel are identified.

- ♦ QA/QC system is developed – A manual is prepared; Institution is developed; and Responsible personnel are identified.

- ♦ QA/QC system is already developed – A manual is prepared; Institution is developed; and Responsible personnel are identified.

### 3.4 Achievement of Overall Goal

Overall Goal: Environmental monitoring systems are place at the Federal and Provincial EPAs.

<p>General findings on achievements</p>	<ul style="list-style-type: none"> <li>The achievement of overall goal is subject to the availability of securing of operational budget and technical personnel by each EPA after the project is closed.</li> <li>Currently, Punjab-EPA and KP-EPA are most likely to achieve as they already confirm a new PC-1 while other EPAs are in the process of securing budget and technical positions so that they also have high possibility to achieve.</li> <li>Institutional settings for environmental monitoring are being developed in all EPAs (i.e. planning, sampling, analyzing, compiling and reporting) while their progress differs among EPAs.</li> <li>Budget for technical personnel is already confirmed after the termination of the project in Punjab and Balochistan EPAs. The maintenance cost for equipment is also confirmed in Punjab EPA.</li> <li>Budget plans are already developed but confirmation is not made in some EPAs.</li> </ul>				
<p>Indicator 1: Each EPA can secure the budget for environmental monitoring.</p>	<p><b>Pak-EPA</b></p> <ul style="list-style-type: none"> <li>Pak-EPA plans to go through the process of PC-4 (i.e. project assessment) upon the termination of the project. Once the positive decision is made by the government, regular budget is then secured. During the transition period, temporary budget arrangement is to be made.</li> </ul>	<p><b>Punjab-EPA</b></p> <ul style="list-style-type: none"> <li>A new three-year PC-1 is already approved that includes both technical personnel and maintenance cost for equipment. The budget amount will be Around Rs.82 million.</li> </ul>	<p><b>Sindh-EPA</b></p> <ul style="list-style-type: none"> <li>Rs.5 million budget of PC-1 was confirmed to cover the cost of environmental monitoring activities from July 2011 to June 2012.</li> <li>Rs.200 million budget of PC-1 is planned in which the component of environmental monitoring activities after July 2012 is expected to be included.</li> </ul>	<p><b>KP-EPA</b></p> <ul style="list-style-type: none"> <li>No salary has been paid to EMS staff since July 2011 when Ministry of Environment was dissolved and thus PC-1 (i.e. project budget) was cancelled.</li> <li>A new PC-1 with the budget of Rs.3.2 million is under the consideration by the provincial government.</li> </ul>	<p><b>Balochistan-EPA</b></p> <ul style="list-style-type: none"> <li>Staff salary for environmental monitoring is provided from regular budget, not by PC-1.</li> <li>Rp.2 million budget was submitted to Planning &amp; Development Dep. to cover maintenance cost of equipment from Dec. 2011 to Jul. 2012. It is very likely to be confirmed.</li> </ul>
<p>Indicator 2: Each EPA formulates environmental monitoring plans by themselves.</p>	<ul style="list-style-type: none"> <li>They have not developed a new plan for other than pilot sites but it will be feasible to draft it as described in Output 1.</li> </ul>	<ul style="list-style-type: none"> <li>Water monitoring plans are developed for new sites. It will be feasible to draft it for air monitoring as described in Output 1.</li> </ul>	<ul style="list-style-type: none"> <li>They have not developed a new plan for other than pilot sites but it will be feasible to draft it as described in Output 1.</li> </ul>	<ul style="list-style-type: none"> <li>They have not developed a new plan for other than pilot sites but it will be feasible to draft it as described in Output 1.</li> </ul>	<ul style="list-style-type: none"> <li>They have not developed a new plan for other than pilot sites but it will be feasible to draft it as described in Output 1.</li> </ul>

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<p>Indicator 3: Pak-EPA and the provincial EPAs publish environmental monitoring reports in a regular basis.</p>	<ul style="list-style-type: none"><li>◆ Both water and air monitoring reports for pilot sites are already in place. Reports can be regularly developed and published if the EPA adopts policy to do so.</li></ul>	<ul style="list-style-type: none"><li>◆ Both water and air monitoring reports for pilot sites are already in place. Reports can be regularly developed and published if the EPA adopts policy to do so.</li><li>◆ Air monitoring data will be published at the public signboard if repairing budget is secured.</li></ul>	<ul style="list-style-type: none"><li>◆ Both water and air monitoring reports for pilot sites are already in place. Reports can be regularly developed and published if the EPA adopts policy to do so.</li></ul>	<ul style="list-style-type: none"><li>◆ Both water and air monitoring reports for pilot sites are already in place. Reports can be regularly developed and published if the EPA adopts policy to do so.</li></ul>	<ul style="list-style-type: none"><li>◆ Both water and air monitoring reports for pilot sites are already in place. Reports can be regularly developed and published if the EPA adopts policy to do so.</li></ul>
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#### 4. Implementation Process

##### 4.1 Progress of activities

This technical cooperation project is designed to utilize the equipment provided by the EMS grant aid project. When the project started in February 2009, however, it was found out that some equipment was not properly installed by the EMS grant aid project and some went out of order due to frequent power cuts, voltage fluctuations and power surge. Hence, the project was required to repair them first before planned project activities were carried out since the equipment was necessary for the project activities. The first year was mostly spent for the repairing work. Aside from this issue, planned activities have been implemented in due course.

##### 4.2 Management and communication

###### (1) Formal management bodies

As formal communication, monitoring and decision-making bodies, Joint Coordination Committee (JCC) and Project Steering Committee (PSC) were established. JCC consists of senior officials from each EPA and aims to (a) formulate the annual operational work plan of the project based on the tentative schedule of implementation within framework of the R/D, (b) review the overall process and achievements of the project, (c) examine major issues arising from or in connection with the project, and (d) work out the modification of activities depending on the necessity. PSC consists of DGs of each EPA and representatives from concerned government organizations and aims to (a) ensure smooth implementation of the project and secure ministerial coordination, guidance and supervision, and (b) draw expertise from other Ministries/Departments/Organizations as and when required. So far four JCC and two PSC meetings were held as follows:

	Date	Main Agenda
1 <sup>st</sup> JCC	April 8, 2009	<ul style="list-style-type: none"><li>♦ Inception report</li><li>♦ Cost sharing between EPA side and JICA side</li><li>♦ Planned activities and budget</li></ul>
2 <sup>nd</sup> JCC / 1 <sup>st</sup> PSC	February 16, 2010 (Feb. 17 for PSC)	<ul style="list-style-type: none"><li>♦ Employment of EMS staff</li><li>♦ Planned activities</li></ul>
3 <sup>rd</sup> JCC	July 2, 2010	<ul style="list-style-type: none"><li>♦ Mid-term review report</li><li>♦ Revision of PDM (Ver.1)</li><li>♦ Extension of PC-1</li></ul>
4 <sup>th</sup> JCC / 2 <sup>nd</sup> PSC	March 2, 2011 (Mar. 3 for PSC)	<ul style="list-style-type: none"><li>♦ Issues in the implementation process</li><li>♦ Revision of PDM (Ver.2)</li><li>♦ Budget and employment after the dissolution of Ministry of Environment</li></ul>

Even though important issues were discussed and their solutions were suggested at JCC and PSC and they were recorded and signed in minutes of meetings, some of them were not carried out after the meetings in some EPA, including the case of the extension of EMS staff contract and of holding of bi-monthly meetings.

###### (2) Communication

On the issue of communication among concerned project personnel including senior officials of EPA,

laboratory staff and Japanese experts, there are not much difficulty in exchanging views and sharing ideas except the following cases: (a) communication between Japanese experts and EPA staff of KP and Balochistan because the former is prohibited to visit the latter due to security concern, and (b) communication among EPA staff in the context of sharing technical information as they are not properly disseminated. However, less difficulty in communication does not lead to smooth project implementation since there are various impeding factors as described in 4.5 below, which are often beyond the capacity of concerned personnel to address.

#### 4.3 Recommendations made at the Mid-term review

The following table describes the recommendations that were made at the Mid-term review in July 2010 and actions that were taken so far.

Recommendations	Actions taken so far
Additional assignment of counterparts	No action has been taken due to budget limitation.
Enhancement of equipment maintenance	This has been addressed through the implementation of project activities.
Selection of cost-effective consumable materials	No action has been taken. Since most of materials are foreign-made, there is not much scope to find out cost-effective manner.
Dispatch of highly skillful C/Ps to KP and Balochistan	This has been realized. There is a case that Pak-EPA and KP staff were dispatched to Balochistan to check equipment problems and he could identify the causes of the problem. Then, they called a company and solved the problem.
Tentative payment of public expenses by responsible persons	No action has been taken. It is not easy, however, to request EPA staff to make tentative payment for the cost with their own fund.

#### 4.4 Amendment of PDM

During the course of the project implementation, PDM has been revised twice. The main points of the revisions are as follows:

First revision At 3 <sup>rd</sup> JCC held on July 2, 2010	<ul style="list-style-type: none"> <li>♦ There were vague parameters in NEQS (i.e. Total Toxic Metal and Pesticide) so that they were suggested to omit from the scope. However, these parameters were also addressed in training in the end (i.e. Training for "Total Toxic Metal" was covered by the trainings for other heavy metals and for the pesticide, trainings for twelve types of organic chloride pesticides have been conducted.</li> <li>♦ Scope of work on SOP was clarified.</li> <li>♦ Targets of the level of quality control were identified for respective EPAs.</li> <li>♦ Scope of environmental monitoring reports was limited to the pilot site level (not at the national or provincial level).</li> <li>♦ Requirement of identifying responsible personnel for each activity was added.</li> <li>♦ Target of environmental management plans was changed from legally bound to voluntary basis.</li> </ul>
Second revision At 4 <sup>th</sup> JCC held on March 2, 2011	<ul style="list-style-type: none"> <li>♦ Some of the indicators for two provinces (KP and Balochistan) were revised since Japanese experts could not visit these provinces at all.</li> </ul>

#### 4.5 Factors that affected the implementation process

- (1) Unstable budget allocation by the federal government

The following table demonstrates the instability of budget allocation to the EMS grant aid project as

well as this technical cooperation project in the past. Rescue work from the large scale earthquake that occurred in October 2005 as well as actions for the War on Terrorism forced the federal government to divert existing PC-1 budgets of various Ministries to these activities.

Table 1: Budget in PC-1 and actual disbursement of Pak-EPA for the EMS grant aid project and the project (Unit: million Rupees)

Fiscal Year	Approved PC-1	Annual Budget	Disbursement	Actual Expenditure (against PC-1)	
2004/05	13.7	15.0	15.0	13.7	100%
2005/06	0.7	112.3	62.3	0.7	100%
2006/07	533.7	580.0	663.0	637.8	120%
2007/08	10.7	203.8	10.8	10.7	100%
2008/09	147.0	147.0	43.6	10.1	7%
2009/10	527.1	110.0	20.4	20.3	4%

Source: PW-Proforma-002, Pak-EPA

This budget condition further deteriorated for the fiscal year of 2010/11 due to the severe flood that hit the country in August 2010. Emergency relief work was financed by diverting existing PC-1 budgets as the case before. Hence, securing the budget for project activities has become further difficult.

Since the procurement of consumable materials such as reagent and materials for equipment is the duty of the Pakistan side, reduction of budget allocation for the project has directly caused the operational difficulties of the project.

(2) Devolution of Ministry of Environment

The government of Pakistan made decision that Ministry of Environment shall cease to exist with effect from 1<sup>st</sup> July 2011 following the Eighteenth Amendment of the Constitution that stipulated the devolution under Article 270AA. Since the project budget of PC-1 was authorized by the government through Ministry of Environment, the provincial portion of the PC-1 was also devolved to provincial governments. This required respective EPAs to formulate a new PC-1 and submit to their provincial government to secure the project budget while Pak-EPA continues to receive the budget of the federal portion.

(3) Shortage and delay of counterpart assignment

Initially, the EMS grant aid project was supposed to recruit 120 new staff at the federal level and assign them to provincial EPAs for the implementation of the EMS grant aid project and the project. The actual recruitment, however, was 28 staff as of March 2007 (the planned number was dropped to 100 staff at this stage). This is because (a) new recruitment was periodically banned by the federal government, (b) operational difficulty due to the centralized recruitment system followed by Ministry of Environment for absorbing project staff as regular staff in the provincial government system.

In addition, each EPA attempted to employ their own permanent staff for environment monitoring activities who were then involved in the project. However, the total number was not increased up to the planned level and the insufficient number of assigned counterparts naturally caused the limitation

of the project implementation.

(4) Persistence of load-shedding and shortage of water supply

Due to load-shedding that frequently occurs in the country, many of sophisticated equipment provided by the EMS grant aid project have been subject to the risk of damages that are caused by voltage fluctuations and power surge. With the instability of the maintenance budget for the equipment, timely repair has not been (and will not be) feasible and monitoring activities are (and will be) hampered although some EPAs procured Uninterruptible Power Supply (UPS) and Automatic Voltage Regulator to minimize damages against equipment. Aside from the load-shedding problem, serious shortage of water supply in Sindh-EPA caused difficulties in laboratory operations. The water supply problem, however, will end in June 2012 when the construction work of EPA office is completed.

(5) Restriction of access to project sites by Japanese experts

The visit of Japanese experts to both KP and Balochistan has been prohibited due to security reasons though it was not prohibited at the time of the EMS grant aid project in 2005. This condition has seriously constrained communication between EPA personnel and Japanese experts and also opportunities of capacity building for the personnel in two EPAs.

## 5. Evaluation Results

The summary of five criteria evaluation of the project is described below.

### 5.1 Relevance

Relevance of the project is basically high. The government of Pakistan really needs to take bold actions to address air and water pollution problems and environmental monitoring should be the initial step of such actions.

In Pakistan, rapid urbanization, industrialization and development without proper planning in large cities have raised serious concern on water and air pollution. It is estimated that only one percent of both household and industrial effluents is treated before they are discharged into rivers, and the number of vehicles has become three times in the past two decades and many of them are without adequate maintenance. These issues need to be urgently addressed; however, the first step for tackling such environmental problems is to monitor and assess the current situation of water and air environment without which actions for countermeasures cannot be planned and pertinently identified. As there is no regular environmental monitoring system in the country, the establishment of the system is the priority.

At the policy and legal level, the government of Pakistan has developed various policy documents and legal framework that involve the issue on environmental pollution and monitoring. National Conservation Strategy (NCS) of 1993 described the issue of pollution as one of 14 core theme areas;



National Environmental Quality Standards of 1993 (revised in 2000) provided regulatory standards for effluent and emission levels; Pakistan Environmental Protection Act (PEPA) of 1997 created Pak-EPA and Provincial EPAs; National Environmental Action Plan (NEAP) of 2001 had sub-program on clean air and clean water which was followed by NEAP Support Program (NEAP-SP) for the operationalization of the NEAP with budget allocation by UNDP; and National Environmental Policy of 2005 provided guidelines on environmental management for different sectors including water and air. Although operationalization of these policies and legal frameworks has not really been carried out, it is fair to say that the government has addressed environmental problems at the policy level.

According to "Country Assistance Program for the Islamic Republic of Pakistan" developed in February 2005, one of priority areas of Japan's ODA is on the environment, as a cross-cutting issue, and it states that "Pakistan has recently been faced with the rapid deterioration of the environment, with ongoing pollution of air and drinking water in cities, land degradation, and alarming depletion of natural resources such as ground water and forests. Thus the improvement of the urban environment is an urgent issue." According to the Japan's ODA Rolling Plan for Pakistan, the project can be classified under the priority areas of "Ensuring Human Security and Human Development", "Encouragement of Efforts in the Environment Improvement" and "Environment Improvement Program".

In terms of the project design, it was overstrained that all the five EPAs were the target of direct technical transfer and outputs included a broader scope of environmental monitoring including management planning. In environmental monitoring, continuous practices of sampling, laboratory analysis and data processing/interpretation are indispensable for capacity building of technical staff and the project needs to ensure that EPA technicians actually do the work on the regular basis. However, five EPAs are located in the different region of the country and it is not easy for Japanese experts to frequently visit all the EPAs for on-site coaching purposes including the limitation to visit KP and Balochistan due to security concern. In addition, environmental conditions are different from provinces to provinces and experiences and capacity of each EPA are also diverse, as pointed out by the First Preparatory Study Mission in 2006. Hence, "one size fits all" approach is unlikely to work well in this project but a customized approach for respective EPAs is required for their effective capacity building. If these conditions are considered, it should be stated that the original project design of targeting all the five EPAs to fully transfer environmental monitoring techniques and of addressing a broad range of monitoring issues is overstrained.

In addition to it, the original design of the implementation structure that was developed by the EMS grant aid project involved the issue of feasibility. As indicated in 2.2 (4) above, it was designed in the originally approved PC-1 that 120 project personnel were to be newly recruited by the federal government. However, the PC-1 was revised and the project's staff was reduced to 100 staff in EPAs in 2008. Though the recruitment was not persuaded as was planned, as only 28 personnel were newly recruited, but EPAs coped with the situation by providing around 30 personnel from regular

staff. This situation increased the number of actually trained personnel from 28 to around 60.

The cost of these personnel as well as operational expenses was expected to be borne by Pak-EPA for the first two years and by provincial EPAs after two years, which required the provincial government to double their annual budget. In general, the assumption of doubling the organizational budget can be considered as impractical under the ordinary situation, even though concerned government agencies including financial authority confirmed to provide, and furthermore, it is not easy for provincial EPAs to simply accept the transfer of staff recruited by Ministry of Environment since they have their own staff recruitment systems that are rather independent under the federal system of the government. Although such design was developed by the grant aid (not by the technical cooperation project), it was not appropriate that the R/D of this project simply followed the original design.

### 5.2 Effectiveness

Effectiveness of the project is high based on PDM(ver.2). Knowledge and skills of technical staff in each EPA are significantly improved (i.e. project purpose is basically achieved) and five outputs effectively contributed to the enhancement of organizational capacity of EPAs. It should be noted, however, that the enhancement of EPA's capacity is only in the relative term (while they satisfy indicators) and the level of staff's knowledge and skills should be further enhanced in order to effectively conduct environmental monitoring by themselves. One weakness is on the publication of results to the public. Although EPAs often provide the analytical results of monitoring data to Environmental Tribunal, systematic provision of data to the public on the regular basis is not realized at the time of the terminal evaluation except KP-EPA where data dissemination is arranged through electronic and printed media every day.

For Pak-EPA, Punjab-EPA and Sindh-EPA, their technical staff have benefited to have direct opportunities of technical coaching by Japanese experts at their own workplace in Islamabad, Lahore and Karachi. This condition has enabled technicians of both for water and air monitoring to be skillful on various aspects including operation and maintenance of equipment, laboratory analysis, data processing/interpretation and even quality control in laboratory management.

Although there was disadvantage for KP-EPA and Balochistan-EPA that Japanese experts could not visit their laboratory for coaching, the improvement of knowledge and skills on operation of equipment, laboratory analysis and data analysis/interpretation is remarkable in a sense that at least one technical staff for each of water and air monitoring is now able to operate AAS, GC, Air Monitoring Station and High Volume Sampler and to check BOD/COD and the pollution level of emission sources, as the case of other three EPAs.

### 5.3 Efficiency

Efficiency of the project is high. Throughout the project implementation period, various unexpected troubles occurred that were beyond the control of the project. Despite such difficulties, the project

could have managed to produce outputs and achieve project purpose at the satisfactory level.

While inputs were planned rationally by both Japanese and Pakistan sides, actual utilization of the inputs was affected by unexpected causes such as budget diversion to rescue operation on flood in 2010, rehabilitation from earthquake damages and devolution of Ministry of Environment in 2011 that led to the devolution of the Umbrella PC-1. This is, indeed, equivalent to the nullification of pre-condition that is "Financial and human resources are allocated each EPA to implement the project during the project period." Due to the devolution and slow progress of new PC-1 processes, the allocation of maintenance cost for equipment and salary to EMS staff stopped after July 2011. The following describes how each EPA dealt with the situation after the devolution of Ministry of Environment.

(1) Pak-EPA

The budget of PC-1 that was secured for the project in 2011/12 was maintained at the federal level (although the allocation to provincial EPA was not approved) and used as Pak-EPA budget. The contracts of the EMS staff had been extended up to November 2011 and further extension of the staff contracts up to June 2012 is under process.

(2) Punjab-EPA

Provincial government provided maintenance cost for equipment with the amount of Rs.50 million; however, the contracts of the EMS staff have not been extended.

(3) Sindh-EPA

Sindh-EPA developed a new PC-1 with the cost of Rs.200 million from July 2011 to June 2014, out of which Rs.50 million have been allocated from July 2011 to June 2012. This PC-1 is under the approval process and therefore the contracts of the EMS staff have not yet been extended.

(4) KP-EPA

There are nine (9) existing PC-1 in the environmental monitoring sector. KP-EPA revised one of them and added the budget of Rs.2.8 million for environmental monitoring activities and staff salary of this project. However, the contracts of EMS staff have not been extended since July 2011 due to non-availability of funds.

(5) Balochistan-EPA

Since technical personnel are permanent, there is no issue of EMS staff contract / regularization.

In addition, frequent load-shedding has hampered laboratory work and often caused damages on equipment. Since major monitoring equipment is sophisticated, repairing cost is expensive in terms of spare parts (imported one) and repairing fee. This condition of high-cost operation could not be improved due to the characteristics of equipment and persistence of load-shedding which is beyond the project's control.

#### 5.4 Impact

In general, all EPAs are now able to formulate monitoring plans, collect samples and analyze them, compile data and report to concerned agencies. Hence, it can be recognized that environmental monitoring systems are to some extent institutionalized, even though they are not sufficient, and these systems will function (i.e. the overall goal will be achieved) if financial arrangement is made and current technical capacity is maintained in each EPA. Considering the situation, impact of the project

can be assessed as high in Punjab-EPA and will be positive for other EPAs.

In Punjab-EPA, the budget for the next three years is already confirmed and also for the case of KP-EPA so that it is mostly likely that the overall goal is achieved. For other EPAs, financial arrangement is not confirmed yet at the time of the terminal evaluation although there are prospects that they can secure budget for monitoring personnel and activities and will thus achieve the overall goal.

While the capacity of technical staff is enhanced, it is still unclear whether the EMS staff, the main target personnel who participated in capacity building activities, are employed by provincial EPAs after the termination of the project. Unless the existing capacity of technical personnel is maintained, it is very unlikely that the overall goal will be achieved. The following is the status of budget security and employment of the EMS staff at the time of the terminal evaluation.

(1) Pak-EPA

Pak-EPA aims to assign environmental monitoring activities under the scope of non-development budget after the termination of the project and the EMS staff are expected to be regularized through the due process. Its feasibility, however, depends on the result of project evaluation (PC-4) by Planning Commission.

(2) Punjab-EPA

The overall goal is likely to be achieved. A new PC-1 titled Establishment of Air Quality Monitoring System in the Punjab, which includes water quality component as well, was approved and written on Annual Development Programme 2011-12. Hence, the budget is confirmed for the next three years. The EMS staff are expected to be regularized through the due process of the province.

(3) Sindh-EPA

A new PC-1 is being developed in which budget allocation to the EMS staff employment and operational cost of environmental monitoring activities is expected to be incorporated.

(4) KP-EPA

KP-EPA is executing 6 development projects related to environmental monitoring together with using non-development budget, that would partly cover the cost of maintenance and utilization of existing equipment and secure certain number of positions for air and monitoring staff through provincial government recruitment process.

(5) Balochistan-EPA

The technicians in charge of water and air monitoring are permanent staff. Request of the regular budget of Rs.2 million for the maintenance of equipment is already submitted but the confirmation has not yet been made.

In addition to the contribution to the achievement of the overall goal, the project has largely facilitated the provision of more precise and reliable environmental data to Environmental Tribunals when pollution claims are raised in respective provinces. Before the project started, the capacity of EPAs was limited to the acquisition of a handful of environmental monitoring data but they are now capable of providing full set of NEQS parameters to the Tribunals if required. Furthermore, it led to the formulation of Pakistan Clean Air Program and contributed to the development of Drinking Water Quality Standard.

There is no negative impact that has been caused by the project. It needs to pay attention to, however, the issue on the disposal of heavy metals and organic solvent in the future. This issue should be addressed properly under the QC/QA system when EPAs face the requirement of disposal of these materials.

### 5.5 Sustainability

Sustainability of the project also differs among EPAs. It is very high for Punjab-EPA where around Rs.82 million PC-1 was already approved for the next three years and that technical positions and operational costs are secured. It is high for KP-EPA where daily data dissemination is in place and related PC-1 projects were already approved. It is also high for Balochistan-EPA where technical personnel are permanent although budget for monitoring activities are not secured yet. For other three EPAs, sustainability is still unclear at the time of the terminal evaluation since the status on budget and technical positions for monitoring activities are not confirmed yet.

At the national policy level, environmental management and monitoring policy has been consistent during the last two decades and its transformation will not be expected in the near future. However, there is a priority issue among policies of different sectors. Although environmental monitoring gained high priority within the environment sector, this would not be the case in general. Hence, policy consistency does not necessarily lead to consistent budget allocation to environmental monitoring activities.

At the organizational level, the main project counterparts who enhanced their knowledge and skills are those recruited as a result of the EMS grant aid project. Since they are time-bound employees, there is no guarantee that they can remain at respective EPAs. This is particularly the case for the staff dispatched to provincial EPAs because they were recruited at the federal level and not integrated within the provincial human resource management system.

From the financial viewpoint, EPAs are still in the process of securing budget for environmental monitoring except the case of Punjab-EPA (where a new PC-1 is already confirmed) and KP-EPA (where several related PC-1 are confirmed, and securing staff positions of Air and Water Monitoring are secured through non-development budget), and partly the case of Balochistan-EPA (where technical staff are permanent). In addition, maintenance of equipment is questionable due to the nature of high maintenance cost for equipment. In Pakistan, spare parts are required to be imported and repairing services can be provided only by handful of monopolized local agents (thus service fee is quite high). Furthermore, the risk of trouble occurrences is constantly high as load-shedding continues to take place, which is obviously beyond EPAs' control. Since financial provision to maintenance is limited, it is likely that some equipment may not be repaired once it is damaged.

Technical sustainability is basically high as technical staff of EPAs demonstrated significant improvement in their knowledge and skills for environmental monitoring and they are now capable of

implementing many of activities without external assistance in due course. This achievement, however, faces a risk. Although their capacity has been enhanced to a great extent, they need further improvement for effective implementation of monitoring activities. What needs to be done for that purpose is to let them continuously implement monitoring work. However, due to multiple factors including financial constraint and equipment trouble, continuous operation of monitoring work might become difficult to realize. If this happens, their technical capacity would deteriorate as time goes by.

## 6. Conclusion

The terminal evaluation team concludes that the project can be closed as scheduled as it has achieved the project purpose in a sense that each EPA is now able to draft environmental monitoring plans, collect samples from monitoring sites, analyze them by using equipment, compile the data and prepare a report. While this is the significant achievement, it can be recognized that the level of progress is diverse among EPAs as well as among technical personnel and there are some technical areas that can be improved for some personnel, including the capacity of data analysis and interpretation, and also some areas in which they are encouraged to further enhance their skills such as quality control of laboratory operations.

One critical concern is sustainability of the achievement of the project. So far Punjab-EPA has confirmed the budget under a new PC-1 and KP-EPA confirmed the budget under several PC-1 and non-development budget over the next several years, while other EPAs are still in the process of securing the operational budget for environmental monitoring. Without operational budget, opportunities of using knowledge and skills of technical staff and further enhancement of their capacity are not provided. Hence, there is a risk that the capacity that has been accumulated through the implementation of the project may not be sustained or may not be further enhanced. It should be noted that the ultimate goal to secure sustainability is to provide all the cost from non-development fund of each province as well as federal government. However, the regularization of the EMS staff from PC-1 budget to non-development budget may take some time. In such a case, continuous adoption of PC-1 is an alternative scenario of sustainability.

## 7. Recommendations and Lessons Learned

### 7.1 Recommendations

#### (1) Securing operational budget and regularization of the technical staff

The EPAs (except Punjab-EPA) are requested to go through the process for the confirmation of the budget that should cover maintenance cost of equipment, salary for technical staff and other operational costs for water and air monitoring. At the same time, the EPAs (except Balochistan where monitoring staff are already permanent) are also requested to regularize the existing temporal technical staff (i.e. the EMS staff) through the due process of each province in order to utilize human resource capacity that has been developed by the project. This is essential for the overall institutional strengthening of each EPA and their capacity to act as technically sound government organizations to monitor and suggest collective measures for air and water quality improvement and their respective

areas of jurisdiction.

(2) Follow-up monitoring

As expressed by EPA senior officials, EPAs are expected to continue the periodical follow-up monitoring meetings on the progress of securing the budget as well as regularization of the EMS staff for environmental monitoring in order for the technical capacity of the EPAs to be sustained and further enhanced.

(3) Assessment of current capacity of each EPA for further improvement in terms of organizational capacity development

Japanese expert team is requested to conduct a capacity assessment of each EPA in order to identify areas of technical capacity for further improvement. The result of the assessment is expected to provide clear picture for senior officials of each EPA about the strength and weakness of their existing capacity and the way forward for further enhancement of their environmental monitoring capacity. In addition, if there are some personnel who hold particular strength that is scarce in other EPAs, they can function as resource persons and provide their knowledge and skills for the capacity development of technical staff.

(4) Extension of the existing PC-1

Pak-EPA is requested to consider the extension of existing PC-1 that was terminated at the end of November 2011 in order to provide continuous financial arrangement for the operational and EMS staff cost. During the extension period, that is considered as "transition period," other EPAs except Punjab-EPA and KP-EPA are requested to confirm new PC-1 for accommodating the cost.

(5) Data sharing among EPAs and dissemination of the information

EPAs are recommended to coordinate themselves to develop a system in which monitoring data are shared among all of them. At the moment, the data of air monitoring is sent to Pak-EPA so that they can understand the situation of the environment in all the major cities. As stated on Output 5 of the project, information / data should be disclosed to the public on the regular basis.

(6) Sharing of technical information within each EPA

Respective EPAs are requested to develop a system to share technical information among their staff in order to encourage them to actively share the information they have.

**7.2 Lessons Learned**

(1) Needs of careful implementation structure in case of umbrella PC-1

Although umbrella PC-1 is a better option in some cases (e.g. when a new program is introduced at the nation-wide scale), the system of umbrella PC-1 is found to be difficult to manage from the operational viewpoint. First, major decision-making on the project design and implementation was

made at the central level including budget allocation and staff assignment. This caused various problems in terms of the implementation and sustainability of the project; namely, (a) upon the devolution of Ministry of Environment and umbrella PC-1, provincial EPA suddenly lost operational budget and (b) the technical staff employed under the EMS grant aid project cannot be automatically regularized by provincial EPAs because human resource management systems of provincial government are independent from the federal government. Second, the situation of environmental monitoring capacity is diverse from province to province. Centralized project coordination does not really meet the needs of respective EPAs that have different level of requirement. In such a case, careful thought is required in developing implementation structure. For example, it would be more accommodative if provincial PC-1 is elaborated in line with umbrella PC-1 because local needs are duly reflected in the provincial scheme while new concept and approach can be introduced through the federal scheme.

(2) Needs of identification of available agents including a third country's agents for spare parts and consumable goods that are not locally available

Insufficient spare parts and consumable of the equipment affected the smooth implementation of the project. Since some of the spare parts and consumable are not locally available, EPAs faced difficulties in operating monitoring activities properly when they exhausted consumable goods and equipment was damaged. It is better at the initial stage that locally unavailable spare parts and consumable goods are listed and also a list for agents including a third country's agents who can procure spare parts and consumable goods is prepared in order to ensure equipment to be maintained and repaired in case of damages. This experience will help them to cope with the procurement of these materials in a proper manner.



Schedule of the Terminal Evaluation Team

Date	Activités		
	Leader	Cooperation Planning / Minutes Discussion	Evaluation Analysis (Consultant)
Nov. 29 Tue			AM Meeting at JICA Pakistan Office PM Interview to DG of Pak-EPA Interview to staff of KP-EPA
30 Mon			AM Interview to staff of KP-EPA PM Attending 3rd Work Shop Interview to staff of Sindh-EPA
Dec. 1 Thu			AM Interview to staff of Balochistan-EPA PM Interview to staff of Pak-EPA
2 Fri			AM Interview to staff of Pak-EPA PM Meeting with JICA Experts Meeting at JICA Pakistan Office
3 Sat			Meeting with JICA Experts
4 Sun			Preparation of evaluation report
5 Mon			Preparation of evaluation report
6 Tue			Preparation of evaluation report
7 Wed			Telephone interview to staff of Sindh, KP and Balochistan EPA
8 Thu			Telephone interview to staff of Sindh, KP and Balochistan EPA
9 Fri			Islamabad → Lahore
10 Sat			Interview to staff of Punjab-EPA
11 Sun			Lahore → Islamabad
12 Mon	AM Meeting at JICA Pakistan Office PM Meeting with Embassy of Japan in Pakistan		
13 Tue	AM Meeting with Pak-EPA PM Meeting with Planning Commission Meeting with Economic Affairs Division Meeting with Pak-EPA		
14 Wed	AM JCC meeting		
15 Thu	AM PSC meeting PM Report to JICA Pakistan Office Report to Embassy of Japan		

List of Personnel Consulted

## 1. Ministry of Disaster Management

Name	Position
Mr. Zaisham Abbas	Technical Officer
Mr. Zaheer Gillani	National Project Management, Multilateral Environmental Agreement

## 2. Economic Affairs Department

Name	Position
Mr. Waqar Hussain Abbasi	Deputy Secretary

## 3. Pak-EPA

Name	Position
Mr. Asif S. Khan	Director General
Mr. Ziaul Islam	Director EIA / Monitoring
Mr. Imtiaz Ahmed	Assistant Inspector (Water)
Mr. Sajid Mahmood	Laboratory Assistant (Air)
Mr. Zaigham Abbas Baloch	Senior Chemist, EMS
Mr. Khurram Shafique	Data Analyst, EMS

## 4. Punjab Provincial Government

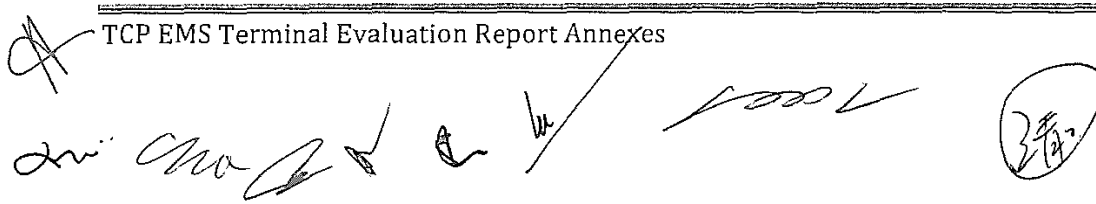
Name	Position
Mr. Gulam Sagir Baboch	Deputy Secretary of Environmental Protection Department
Mr. Mehr Maqsood Ahmad Lak	Director General, Punjab-EPA
Mr. Ali Abbas	Deputy Director (Laboratory), Punjab-EPA
Mr. Amir Farooq, PhD	Deputy Director (Technology Transfer), Punjab-EPA
Mr. Waseem Ahsan Cheema	Deputy Director (Implementation), Punjab-EPA
Ms. Firdaus Kausar, PhD	Chemist (Water), Punjab-EPA
Mr. Farooq Alam	Former Research Officer (Air)

## 5. Sindh-EPA (Telephone interview only except Mr. Mureed)

Name	Position
Mr. Syed Muhammad Yahya	Director (Laboratory)
Mr. Ashique Ali Langha	Deputy Director (Laboratory)
Mr. Jahangeer Asad	Chemist (Air)
Mr. Mureed Ali Talpur	Chemist (Water)

## 6. KP-EPA

Name	Position
Mr. M. Bashi Wea, PhD	Director General
Mr. Hussain Ahmad, PhD	Director
Mr. Shams Ullah	Chief Analyst
Mr. Naseer khattak Ullah	Senior Chemist (Air), EMS
Mr. Rooh Ullah	Chemist (Water), EMS
Mr. Hassan Adnan Ali	Data Analyst, EMS



7. Balochistan-EPA

Name	Position
Mr. Muhammad Khan	Deputy Director
Mr. Javaid Hussain	Technician (Water)
Mr. Muhammad Dawood	Technician (Air)

8. JICA Pakistan Office

Name	Position
Mr. Toshiya Sato	Senior Representative
Mr. Tomohiro Kozono	Representative
Ms. Nazia Seher	Senior Programme Officer

9. JICA Expert Team

Name	Position
Mr. Daisaku Kiyota	Team Leader/Monitoring
Mr. Michiaki Hosono	Water Monitoring
Mr. Takashi Onuma	Water Monitoring
Mr. Kenichi Kuramoto	Water Monitoring
Mr. Toshiharu Ochi	Air Monitoring
Mr. Takahisa Sato	Air Monitoring
Mr. Kazuyoshi Kageyama	QA/QC

*[Handwritten signatures and initials]*

Current PDM

Name of Project: Technical Cooperation for Establishment of Environmental Monitoring System in the Islamic Republic of Pakistan

Terms of Project: Three years

Project Area: Whole Pakistan, mainly Islamabad and Punjab, Sindh, NWFP and Balochistan Province.

Target Group: Pak-EPA and four Provincial EPAs.

As of March 2, 2011

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
<p><b>Overall Goal</b> Environmental monitoring systems are place at the Federal and Provincial EPAs.</p>	<ol style="list-style-type: none"> <li>1 Each EPA can secure the budget for environmental monitoring.</li> <li>2 Each EPA formulates environmental monitoring plans by themselves</li> <li>3 Pak-EPA and the provincial EPAs publish environmental monitoring reports in a regular basis.</li> </ol>	<ol style="list-style-type: none"> <li>1 Budget plan</li> <li>2 EPA's monitoring pan</li> <li>3 EPA's web-sites and brochures</li> </ol>	<ul style="list-style-type: none"> <li>· Environmental commitment of the government of Pakistan will not be changed</li> <li>· Government laws / regulations/ standards related to environmental monitoring are formulated.</li> </ul>
<p><b>Project Purpose</b> The federal and Provincial EPA's capacity of environmental monitoring on air and water is enhanced.</p>	<ol style="list-style-type: none"> <li>1 Environmental monitoring reports including the interpretation and evaluation of the water and ambient air quality in the pilot areas are published by Pak-EPA and at least one of the provincial EPAs</li> <li>2 The monitoring results with appropriated significant digits required for NEQS are obtained by Pak-EPA.</li> <li>3 QA/QC system in Pak-EPA and at least one of the provincial EPAs are initiated through development of regulation(s) and manual(s).</li> </ol>	<ol style="list-style-type: none"> <li>1 Environment reports</li> <li>2 Record of Accuracy control Activities</li> <li>3 Maintenance records</li> </ol>	<ul style="list-style-type: none"> <li>· Duties and responsibilities of Pak-EPA and provincial EPAs will not be changed</li> <li>· Budget for post PC-1 period is secured by the Government of Pakistan</li> <li>· Budget for post PC-1 period is secured by all Provincial EPA</li> </ul>





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<p><b>Output 1</b> Pak-EPA and Provincial EPAs are capable of formulating Environmental monitoring plans.</p>	<p>1-1 Responsible person(s) for formulating environmental monitoring plan (air/water) are properly selected by Each Provincial EPA.</p> <p>1-2 A guideline of overall environmental monitoring is prepared by Pak-EPA.</p> <p>1-3 Environmental monitoring plans in pilot areas are formulated as follows; (Ambient Air) Pak-EPA, Punjab-EPA and Sindh-EPA. (Emission (Air)) Pak-EPA, Punjab-EPA and Sindh-EPA. (Ambient Water) Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA and Balochistan EPA. (Effluent (water)) Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA and Balochistan EPA.</p>	<p>1 Organization Chart with the responsible persons (formulation/ authorization) in each EPA.</p> <p>2 Technical guideline of environmental monitoring</p> <p>3 Environmental monitoring plans</p>	<p>Transfer or resignation of assigned stuff(s) is(are) not occurred.</p>
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<p><b>Output 2</b>                  Pak-EPA and Provincial EPAs are capable of measuring the major parameters of National Environmental Quality Standards (NEQS) based on uniform methodologies of sampling measurements and analysis.</p>	<p>2-1 Following parameters are prepared in association with Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA and Balochistan EPA , ;                  (water) SOP for 30 parameters of NEQS                  (Air-Ambient) SOP for 8 parameters                  (Air-Emission) SOP for 15 particular parameters in NEQS defined by the Expert is developed</p> <p>2-2 Maintenance plans and manuals of the equipment are formulated and in place in association with Pak-EPA, Punjab-EPA, Sindh-EPA, KP-EPA and Balochistan EPA .</p> <p>2-3 Quality control records and log books of analysis are kept as follows;                  (Air Monitoring Stations) Pak-EPA and Punjab-EPA                  (Analytical Equipments) Pak-EPA, Punjab-EPA and Singh-EPA</p> <p>2-4 (Water) The analytical results of QC samples are put into 20% range of QC sample in Pak-EPA, Punjab-EPA and Sindh-EPA while target parameters will be differently defined in each EPA.                  (Air -Ambient) The difference of calibration factors of each air analyzer is less than 4 % at every calibration in Pak-EPA, Punjab-EPA and Sindh-EPA.                  (Air-Emission) The difference of calibration factors of PG250 is less than 4 % in every measurement in Pak-EPA, Punjab-EPA and Sindh-EPA.</p>	<p>1 SOPs for defined parameters</p> <p>2 Maintenance plans and manuals for the equipment</p> <p>3 Quality control records and log books of analysts</p> <p>4 (Water) Analytical results of standard solutions or QC samples prepared by expert. Since the nature of the method of analyzing target parameters of Air pollution in this project, calibration and maintenance of the equipment shall be served as this objective, thus, no particular activities will be carried out.</p>	
<p><b>Output 3</b>                  Laboratory management system is improved and Quality Assurance /Quality Control (QA/QC) system is established in Pak-EPA and Provincial EPAs.</p>	<p>3-1 Laboratory management manual is prepared in each EPA.</p> <p>3-2 Responsible person(s) for QA/QC is (are) properly selected on the work process chart by each EPA</p> <p>3-3 QA/QC activity plans are prepared in each EPA.</p>	<p>1 Laboratory management manuals</p> <p>2 QA/QC organization charts and assignment chart on the work process flow.</p> <p>3 QA/QC activity plans.</p>	<p>Transfer or resignation of assigned stuff(s) is(are) not occurred.</p>



<p>           1-5 Selection of pilot areas.            1-6 Collection of relevant information required for the development of the monitoring plan such as meteorological data and those on pollution sources in the pilot areas.            1-7 Development of environmental monitoring plans in pilot areas.            1-8 Implementations of environmental monitoring plans in pilot areas.            1-9 Revision of environmental monitoring plans and technical guideline based on the actually obtained monitoring data.         </p>	<p>           1) Counterpart personnel            2) Building and facilities            3) Project operation and maintenance cost         </p>		
<p>           2-1 Capacity assessment of EPAs            2-2 Selection of appropriate methodologies for sampling, measurements and physical, chemical and bacteriological analysis of each parameter.            2-3 Training on sampling, measurements and analysis of effluents and flue gas in point and non-point emission sources.            2-4 Training on sampling, measurements and analysis of natural water and ambient air.            2-5 Development/Modification of the standard operation procedures (SOP) for some principal parameters.            2-6 Introduction of quality control methods for sampling, measurements and analysis.            2-7 Preparation and utilization of maintenance plans and manuals of the equipment and setting up of laboratory management system.            2-8 Revision of maintenance plans and manuals of the equipment, and laboratory management systems.         </p>			



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3-1 Capacity assessment of the EPAs. 3-2 Training on laboratory management based on the ISO17025. 3-3 Preparation of a laboratory management manual, establishment of QA/QC organization and development of QA/QC activity plan in each EPA. 3-4 Auditing of laboratory management system based on the activity 3-3.			
4-1 Capacity assessment of EPAs. 4-2 Training on data processing and interpreting methods. 4-3 Training on interpretation and evaluation of the monitoring data obtained in the pilot areas by the internationally recognized standards/ NEQS. 4-4 Preparation of (an) environmental management plan(s) for pilot Area in Islamabad.			
5-1 Capacity assessment of EPAs. 5-2 Training on data processing with accumulated monitoring data. 5-3 Establishment of a Environmental Monitoring Information System in Pak-EPA. 5-4 Data input by Pak-EPA based on the activity 5-3. 5-5 Upload of the ambient air and water quality monitoring data on EPA's websites in Pak-EPA and Punjab-EPA. 5.6 Preparation of environmental monitoring report in at least one of the pilot area(s).			

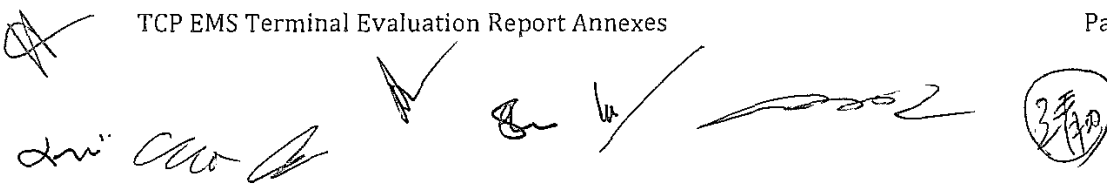
Plan of Operation (PO)

PO for Output 1

PO for Output 1 is shown with original schedule. Revised schedule is described in upper part of the table while the actual implementation conducted is shown in lower part of it.

Table 1. PO for Output 1

Activities	Fiscal year	Month	Task	Expecting Results	Alternation	2008/ 2009												2010												2011											
						1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Output1. Pak-EPA and Provincial EPAs are capable of formulating Environmental monitoring plans.																																									
1-1	Capacity assessment of EPAs			Results of Capacity assessment	Plan																																				
						Actual																																			
1-2	Organization setup for environmental monitoring			appropriate organization for environmental monitoring	Plan																																				
						Actual																																			
1-3	Training of a developing process of an environmental monitoring plan		1-3-1 Holding seminar	Knowledge on procedure for prepare of technical guideline	Plan																																				
						Actual																																			
1-4	Development of a technical guideline for developing environmental monitoring plans.	Water	1-4-1 Development of a draft technical guideline for water monitoring	Draft technical guideline for water monitoring	Plan																																				
			Actual																																						
		Air	1-4-2 Development of a draft technical guideline for air monitoring	Draft technical guideline for air monitoring	Plan																																				
			Actual																																						
1-5	Selection of pilot areas.	Water	1-5-1 Selection of water monitoring pilot area	Establishment of pilot area in each province	Plan																																				
			Actual																																						
		Air	1-5-2 Selection of air monitoring pilot area	Establishment of pilot area in each province	Plan																																				
			Actual																																						
1-6	Collection of relevant information required for the development of the monitoring plan such as meteorological data and those on pollution sources in the pilot			Relevant data	Plan																																				
						Actual																																			
1-7	Development of environmental monitoring plans in pilot areas			Monitoring plan for pilot area	Plan																																				
						Actual																																			
1-8	Implementation of environmental monitoring plans in pilot areas			Monitoring data in pilot area	Plan																																				
						Actual																																			
1-9	Revision of environmental monitoring plans and technical guideline based on the actually obtained monitoring data			Revised technical guideline	Plan																																				
						Actual																																			











Performance of Inputs

## I. Inputs from the Japanese Side

## (a) Dispatch of Japanese experts to Pakistan

#	Names	Field of Expertise	Total Man Month for assignment (By the end of the project)
1	Daisaku Kiyota	Team Leader / Monitoring Planning	17.77
2	Nobuyuki Sato	Water Monitoring A	8.13
3	Michiaki Hosono		
4	Takashi Onuma	Water Monitoring B	14.80
5	Kenichi Kuramoto	Water Monitoring C	13.97
6	Toshiharu Ochi	Air Monitoring A	15.50
7	Mitsuru Fujimura	Air Monitoring B	14.07
8	Takahisa Sato		
9	Kazuyoshi Kageyama	QA/QC	9.39
10	Tatsuya Akimoto	Data Communication	4.00
11	Takuya Harada	Coordinator	7.00
12	Daniel Neagari		
13	Masato Motoki		
Total			104.63

## (b) Counterpart training in Japan

Names of C/P	Organization	Position
August 25 – September 12, 2009		
Mr. Usman-UI-Haq	Punjab-EPA	Research Officer
Mr. Naeem Ahmed Mughal	Sindh-EPA	Director General
Mr. Shams Ur Rehman	KP-EPA	Chief Analyst
Mr. Ghulam Rasool Jamali	Balochistan-EPA	Director General
August 30 – September 16, 2010		
Mr. Imtiaz Hussain	Pak-EPA	Assistant Inspector
Mr. Sajid Mehmood	Pak-EPA	Laboratory Assistant
Ms. Firdaus Kausar	Punjab-EPA	Chemist (Water)
Mr. Farooq Alam	Punjab-EPA	Research Officer (Air)
Mir Mureed Ali Talpur	Sindh-EPA	Chemist (Water)
Mr. Jahangeer Asad	Sindh-EPA	Chemist (Air)
Mr. Wajid Ali	KP-EPA	Junior Analyst
Mr. Noor Ayaz Khan	KP-EPA	Monitoring Inspector

## (c) Local cost for maintenance of equipment

Year*	Amount (Rupee)
Feb. 2009 – Mar. 2010	Rp. 10,961,279
Apr. 2010 – Mar. 2011	Rp. 7,388,346
Apr. 2011 – Sep. 2011	Rp. 28,900

(d) Local cost other than for maintenance of equipment

Year*	Amount (Japanese Yen)
Feb. 2009 – Mar. 2010	JY. 31,671,837
Apr. 2010 – Mar. 2011	JY. 40,919,869
Apr. 2011 – Sep. 2011	JY. 4,246,462

2. Inputs from the Pakistan Side

(a) Appointment of counterpart personnel

National Project Director - Director General from Pakistan EPA	
Mr. Asif S. Khan	Director General, Pak-EPA
Provincial Project Director - Director General from Provincial EPA	
Mr. Mehr Maqsood Ahmad Lak	Director General, Punjab-EPA
Captain Haq Nawaz (Rtd.).	Director General, Sindh-EPA
Dr. Muhammad Bashir Khan	Director General, KP-EPA
Mr. Abdullah Jan	Director General, Balochistan-EPA
Environmental Monitoring Plan - from each EPA	
Mr. Shahid Hassan	Director (ML&I) Punjab-EPA
Mr. Ali Abbas (Acting Charge)	Deputy Director(Lab), Punjab-EPA
Syed Muhammad Yahya	Director (Lab.) Sindh-EPA
Dr. Hussain Ahmed	Director, KP-EPA
Mr. Muhammad Khan	Deputy Director (Technical/Lab.) Balochistan-EPA
Water Quality Monitoring from each EPA	
Mr. Zaigham Abbas	Senior Chemist, EMS Project
Mr. Manzer Ullah	Chemist (Water), EMS Project
Mr. Imtiaz Ahmed	Laboratory Inspector, Pak-EPA
Mr. Usman-ul-Haq	Research Officer (Water / Waste), Punjab-EPA
Mr. Syed Muhammad Yahya	Director (Lab.) Sindh-EPA
Mr. Shams-Ur-Rehman	Chief Analyst, KP-EPA
(Mr. Muhammad Khan)	Deputy Director (Technical/Lab.) Balochistan-EPA
Air Quality Monitoring from each EPA	
(Mr. Zaigham Abbas)	Senior Chemist, EMS Project
Mr. Murad Khan	Chemist (Air), EMS Project, Pak-EPA
Mr. Sajid Mahmood	Laboratory Assistant, Pak-EPA
(Mr. Syed Muhammad Yahya)	Director (Lab.) Sindh-EPA
Mr. Naseer Ullah Khan Khattak	Senior Chemist, EMS Project
(Mr. Muhammad Khan)	Assistant Director (Technical/Lab.) Balochistan-EPA

\*Names in ( ) play multiple roles for the project.



# Air Quality Monitoring Report

## Pilot Area in Quetta



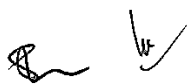
September 2011

**Study conducted by:** Environmental Protection Agency (EPA), Labs.  
Government of Balochistan, Quetta

Under the EMS project



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# Air Quality Monitoring Report

## Pilot Area in Peshawar



September 2011

**Study conducted by:** Environmental Protection Agency (EPA), Labs.  
Government of Khyber Pakhtunkhwa,  
Peshawar

Under the EMS project

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# Air Quality Monitoring Report

## Pilot Area in Islamabad (I9, I10 Industrial Area)

### Part 1 Air Monitoring Station, Stationary Source Monitoring



September 2011

**Study conducted by:** Environmental Protection Agency (EPA), Labs.  
Government of Pakistan, Islamabad

Under the EMS project

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# Air Quality Monitoring Report

## Pilot Area in Islamabad (I9, I10 Industrial Area)

### Part 2 Suspended Particulate Matter in Ambient Air



February 2011

**Study conducted by:** Environmental Protection Agency (EPA), Labs.  
Government of Pakistan, Islamabad

Under the EMS project

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*[Handwritten signatures and initials]*

# Air Quality Monitoring Report

## Pilot Area in Lahore

Part 1  
Air Monitoring Station,  
Stationary Source Monitoring



September 2011

**Study conducted by:** Environmental Protection Agency (EPA), Labs.  
Government of Punjab, Lahore

Under the EMS project

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*[Handwritten signatures and initials]*

# Air Quality Monitoring Report

## Pilot Area in Lahore

Part 2

Suspended Particulate Matter in Ambient Air



September 2011

**Study conducted by:** Environmental Protection Agency (EPA), Labs.  
Government of Punjab, Lahore

Under the EMS project

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# Air Quality Monitoring Report

## Pilot Area in Karachi

### Part 1 Air Monitoring Station



September 2011

**Study conducted by:** Environmental Protection Agency (EPA), Labs.  
Government of Sindh, Karachi

Under the EMS project

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# Air Quality Monitoring Report

## Pilot Area in Karachi




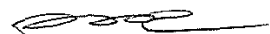

### Part 2 Suspended Particulate Matter in Ambient Air



September 2011

**Study conducted by:** Environmental Protection Agency (EPA), Labs.  
Government of Sindh, Karachi

Under the EMS project

  ✓  60/h ✓  



# Air Quality Monitoring Report

## Pilot Area in Karachi

### Part 3 Stationary Source Monitoring



May 2010

**Study conducted by:** Environmental Protection Agency (EPA), Labs.  
Government of Sindh, Karachi

Under the EMS project

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SUBMITTED BY ENVIRONMENTAL PROTECTION AGENCY.  
GOVERNMENT OF BALUCHISTAN

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REPORT ON  
AMBIENT WATER MONITORING  
AND  
ENVIRONMENTAL MANEGEMENT PLAN  
OF WARSAK CANAL PESHAWAR



**Study conducted by:** Environmental Protection Agency (EPA) Government of the Khyber Pakhtunkhwa- Peshawar.

Under the EMS project

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**REPORT ON  
WATER QUALITY MONITORING  
AND  
MANAGEMENT PLAN**

October 2011

By: PAK-EPA

Manzarullah (Chemist)

Imtiaz Hussain ( Inspector)

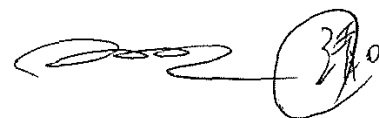
**Pakistan Environmental Protection Agency  
Government of Pakistan**



Manzarullah

Imtiaz Hussain

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REPORT ON  
WATER QUALITY MONITORING  
AND  
MANAGEMENT PLAN  
FOR THE PILOT AREA

BY  
PUNJAB ENVIRONMENT PROTECTION AGENCY UNDER SUPERVISSION OF JICA



Prepare by Mr. Usman Ullhaq, Mr. Tariq Javed, MS Firdaus Kausar.

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REPORT  
ON  
WATER QUALITY MONITORING  
AND  
ENVIRONMENTAL MANAGEMENT PLAN  
OF THE KEENJHAR LAKE  
(PILOT AREA-SINDH)



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(October 2011)

ENVIRONMENTAL PROTECTION AGENCY  
GOVERNMENT OF SINDH  
PLOT #ST2/1 SECTOR 23 KORANGI INDUSTRIAL AREA KARACHI

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### 1. Objectives of the Guideline

In the Project, “Technical Cooperation Project for Establishing Environmental Monitoring System”, trainees learn and enhance their monitoring related capacity through the activities of preparing environmental monitoring plans, conducting sampling, analyzing and utilizing the result while caring its quality. Through those activities, trainees shall generate outputs for each target, and this guideline is prepared for help preparing environmental monitoring plans as one of the output for the Project.

The design of the Project, as principle, is aiming for enhancing the capacity of monitoring items defined in Pakistan’s National Environmental Quality Standard. However, legally defined NEQS is only cover the standard for Effluent and Emission. On the other hand, draft version of NEQS for Ambient Air Quality have been proposed, and therefore, it is proper to referring the proposed standard for considering the purpose of the monitoring.

In addition to this, Automated Air Monitoring Stations were donated by the Grant Aid Project of Government of Japan in 2007 and those donated stations have been utilized since them with high volume sampler another donated equipment. Thus, in this guideline, monitoring items of donated equipment are prioritized.

### 2. Important Reminder

This guideline is expected to utilized for help establishing environmental monitoring for air, both “Source” and “Ambient”, and describes general rules supposed to be comply as selecting monitoring item, site and time for the plan.

As preparing the Guideline, general surrounding environment like geography, climate and living conditions were assumed within the target of the Project.

Therefore, as in real establishing actual plan, the planner has to consider the actual and specific conditions of target area while utilize this guideline in principle. Also, note that it might be requested to modify the contents of this guideline as actual conditions differ from the assumption, such as adding some possible hazardous substances.

### 3. Objectives of Environmental Monitoring

Ultimately, the objective of environmental monitoring is to help protecting human health and living conditions for both present and future generations by utilizing the results and establishing various

policies directly connect to above purposes.

Therefore, Air quality monitoring shall cover, A. monitoring the environment which surround human and human living condition and B. monitor the pollutants which is emitted to above environment.

The first one called "Ambient Monitoring" and the other is called "Source Monitoring"

**A. Ambient Air Monitoring**

Objective of the "Ambient" Air Monitoring is

- 1) Monitor the current condition of environment which is surrounding living condition.
- 2) Monitor the fluctuation or transition of the condition of environment which is surrounding living condition.
- 3) Monitor the condition and compare with proposed standard whether the value exceeds or not.
- 4) Monitor the effects of launched environmental policy.

**B. Emission "Source" Monitoring**

Objective of the Emission "Source" Monitoring is

- 1) Monitor and comprehend the current status of emission concentration and its load to the surrounding environment.
- 2) Monitor and comprehend whether the acquired value meets referenced standard or not.
- 3) Utilize the acquired values for help preparing antipollution policy

**4. Monitoring Items**

**A. Ambient Air Monitoring**

While considering utilization of proposed Ambient Air NEQS, we need to consider the available resource. Preceded by this technical cooperation project, grant aid project had been launched and various equipment such as Air monitoring stations High volume samplers and had been donated to 5 EPAs. Hence, in the Guideline, the items shall be the one which is aimed to monitor by donated equipments.

**Table 4.1 Monitoring Items for Ambient Air (1) by Automated Air Monitoring Station**

No.	Parameter	Reference method	Reference standards
1	SO <sub>2</sub> (Sulfur dioxide)	UV fluorescence	US.EPA 40CFR, Part 53
2	NO <sub>x</sub> (Nitrogen oxides) (NO, NO <sub>2</sub> )	Chemi-luminescence	
3	CO (Carbon monoxide)	Non-disperse IR absorption	
4	O <sub>3</sub> (Ozone)	UV absorption	
5	PM10 (Particulate matters less than 10µm) PM2.5 (Fine particulate matters)	Beta attenuation	



**Table 4.2 Monitoring Items for Ambient Air (2) by High Volume Sampler**

o.	Parameter	Reference method	Reference standards
1	SPM (Suspended particulate matters)	High volume air sampler method (TSP method)	US.EPA 40 CFR, Part 50 Appendix B
2	Pb (Lead)	Pb-TSP method Acid extraction - AAS analysis	US.EPA 40CFR, Part 50 Appendix G Environment Agency of Japan (former): Guideline for Measurements of Air Pollutants (1980)"

**B. Emission Source Monitoring**

NEQS for Source Monitoring prepared and legally viable and therefore, monitoring items shall be the defined NEQS items. Target items for the Project are listed on the following table

**Table 4.3 Monitoring Items for Emission Source Monitoring**

No.	Parameter	Reference method	Reference standards
1	Dust	Filtration - gravimetric	JIS Z 8808
2	HCl (Hydrogen chloride)	Solution - spectrophotometry	JIS K 0107
3	Cl <sub>2</sub> (Chlorine)	Solution - spectrophotometry	JIS K 0106
4	HF (Hydrogen fluoride)	Solution - IC	US. EPA Method 26
5	H <sub>2</sub> S (Hydrogen sulfide)	Solution - spectrophotometry	JIS K 0108
6	SO <sub>x</sub> (Sulfur oxides)	Solution - spectrophotometry	JIS K 0103
7	CO (Carbon monoxide)	NDIR	US.EPA Method 10
8	NO <sub>x</sub> (Nitrogen oxides)	Chemi-luminescence	US.EPA Method 7E
9	SO <sub>2</sub> (Sulfur dioxide)	UV fluorescence	US.EPA Method 6C
10	Pb (Lead)	Filtration - AAS	US.EPA Method 29
11	Hg (Mercury)	Filtration - AAS	
12	Cd (Cadmium)	Filtration - AAS	
13	As (Arsenic)	Filtration - AAS	
14	Cu (Copper)	Filtration - AAS	
15	Sb (Antimony)	Filtration - AAS	
16	Zn (Zinc)	Filtration - AAS	

**5. Monitoring Point and Timing**

**A. Ambient Air Monitoring**

**1) Monitoring Point**

Proper understanding of current conditions of pollution in surrounding area is essential, hence, point where represents the general condition of target area shall be selected. In principle, monitoring point shall be within the area where is not susceptible to any extreme events both natural and artificial.

Basically, quality influenced by load of the pollutant from its source as well as disturbance of the solvent. For conducting ambient air, disturbance of the air is very important.

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There for, we have to consider climatic condition as well as geographic conditions which cause any disturbance.

The factors are

- a. Wind (Wind Speed, Wind Direction)
- b. Turbulence caused by geographic object like buildings or mountain.
- c. Climatic condition, especially precipitation and stability of surface air layer

Therefore, monitoring point shall be

- a. Area there is little effects of any particular source of pollution expected.
- b. Area where little extreme events or effects by surrounding landscape or buildings is expected.
- c. Avoid any places where occurrence of downstream and turbulence such as river bank or lee behind tall building.
- d. Avoid any places in drift of wind affected by surrounding buildings and trees, also effects of decay of pollutants by vegetation shall be considered.
- e. Area where there is residential district, hospital, school and any facility requires sensitivity to pollution.
- f. Area where has typical patterns of traffic, climatic conditions, landscape and other can be expected.
- g. Height in which human activities are conducted, so, 1.5m to 2.0m is proper.
- h. For allocating mobile station for monitoring vehicle emission, select the point where most strong effects of exhaust gas at the end of road with in living area. As this case, inside within 10m from end of road is preferable, or if having any difficulty, inside 20m.

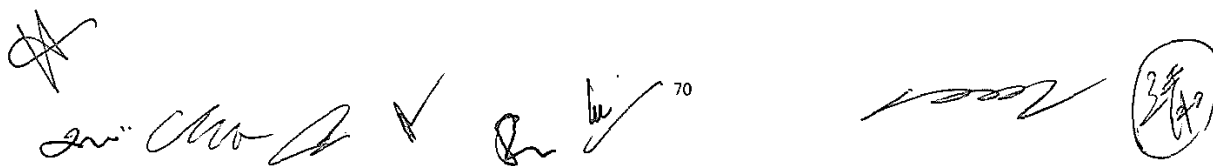
## 2) Monitoring timing and frequency

Comparing water which in a mean eccentrically-located, air exists in all surrounding space of human and fluctuate continuously and quickly. Therefore, in most of the country, Ambient air has been constantly monitored. As per speaking of major pollutant, constant monitoring is preferable.

As if, there is any difficulties for conducting constant monitoring, usage of "Passive Sampler" shall be considered for identifying high concentration area while accuracy of the values can not expected as monitoring station can. Considering passive sampler, monitoring timing shall be follow the pattern of industry as well as traffic pattern.

## B. Source Monitoring (Emission)

### 1) Monitoring Point

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Monitoring point shall be, gas exhaust or stack.

**2) Monitoring timing and frequency**

For conducting source monitoring, pattern of the industrial activities shall be considered. The factor which causes the pattern could be daily operational condition, monthly or seasonal changes according to harvest season, business conditions or any.

In addition to this, Pak-EPA launched SMART program in which categorized industry and required frequency of monitoring defined to attain control over industrial pollution in Pakistan. Therefore, this guideline follows SMART program.

**Table 5.1 Category of Industry and monitoring frequency**

Name_Industry	Category	Frequency
Cement.	A	Monthly
Glass manufacturing	A	Monthly
Iron and steel.	A	Monthly
Nitrogenous fertilizer.	A	Monthly
Phosphate fertilizer.	A	Monthly
Oil and Gas production.	A	Monthly
Petroleum refining.	A	Monthly
Pulp and paper.	A	Monthly
Thermal Power Plants (coal and oil based)	A	Monthly
Boilers, ovens, furnaces and kilns (coal and oil fired)	A	Monthly
Brick-Kilns (firewood and bagasse based)	A	Monthly
Any other industry to be specified by Federal or Provincial Agency.	A	Monthly
Sugar.	B	Quarterly
Textile.	B	Quarterly
Choloralkali plants.	B	Quarterly
Dairy industry.	B	Quarterly
Fruits and vegetables.	B	Quarterly
Metal finishing and electroplating.	B	Quarterly
Boilers, ovens, furnaces and kilns (gas-fired)	B	Quarterly
Any other industry to be specified by Federal or Provincial Agency.	B	Quarterly

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## Guideline for Water Quality Monitoring vol2

### 1. Objective of this Guideline

In the Project “Technical Cooperation Project for Establishing Environmental Monitoring System”, trainees learn and enhance their monitoring related capacity through the activities of preparing environmental monitoring plans, conducting sampling, analyzing and utilizing the result while caring its quality. Through those activities, trainees shall generate outputs for each target, and this guideline is prepared for help designing environmental monitoring plans as one of the output for the Project.

The design of the Project, as principle, is aiming for enhancing the capacity of monitoring the items defined in Pakistan’s National Environmental Quality Standard. However, legally defined NEQS is only cover the standard for Effluent and Effluent, and thus, it is not enough to cover sufficient items while considering the purpose of environmental monitoring and conditions in Pakistan.

Therefore, it is proper to present ambient monitoring items referring other countries standards because having those items is essential for considering the purpose of the monitoring.

Within above, some part of the guideline have information of items which is not covered by the project activities and therefore, resources like SOP of USEPA shall be utilized to conducted for further monitoring activities.

### 2. Important Reminder

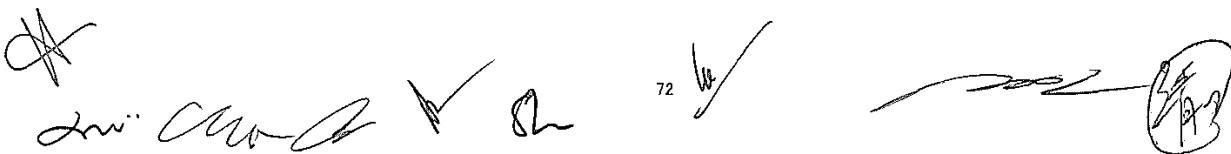
This guideline is expected to utilized for help establishing environmental monitoring for water, both “Source” and “Ambient”, and describes general rules supposed to be comply as selecting monitoring item, site and time for the plan.

Therefore, as in real establishing actual plan, the planner has to consider the actual and specific conditions of target area while utilize this guideline in principle. Also, note that it might be requested to modify the contents of this guideline as actual conditions differ from the assumption, such as adding some possible hazardous substances.

In addition to above, for the selection of monitoring item for ambient water, items which defined by various organizations, and thus, there might be possibility that referred items can not cover the actual condition of pollution in Pakistan. Also, no particular pesticide identified in this guideline, in stead only used as collective-term, because the condition of usage of pesticide varies in countries.

Therefore, it is essential for each EPA to examine the contents and reassemble this guideline by them selves.

Also, above process is out of scope of this project, and thus, further works by Pakistan side are

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required.

### 3. Objectives of Environmental Monitoring

Ultimately, the objective of environmental monitoring is for help protecting human health and living conditions for both present and future generations by utilizing the results and establishing various policies directly connect to above purposes.

Therefore, Water quality monitoring shall cover, 1) monitoring the environment which surround human and human living condition and 2) monitor the pollutants which is emitted to above environment.

The first one called "Ambient Monitoring" and the other is called "Source Monitoring"

#### A. Ambient Water Monitoring

Objective of the Ambient Water Monitoring is

- 1) Monitor the current condition of environment which is surrounding living condition.
- 2) Monitor the fluctuation or transition of the condition of environment which is surrounding living condition.
- 3) Monitor the condition and compare with proposed standard whether the value exceeds or not.
- 4) Monitor the effects of launched environmental policy.

#### B. Effluent "Source" Monitoring

- 1) Monitor and comprehend the current status of effluent concentration and its load to the surrounding environment.
- 2) Monitor and comprehend whether the acquired value meets referenced standard or not.
- 3) Utilize the acquired values for help preparing antipollution policy

### 4. Monitoring Items

#### A. Ambient Water Quality Monitoring

In the Project, in principle, items defined in NEQS are the target for all Project activities. However, in this current condition, September 2011, Ambient Water Quality has not been prepared.

On the other hand, while considering the objectives of environmental monitoring which is for observing water quality and its variation in living condition, above defined items does not cover and fulfill this objective. Therefore, items for Ambient Monitoring shall be treated in this guideline.

Because there is no item defined legally, we have to utilize related items as reference and those

shall be select and defined by Pakistan side later.

Therefore, as it nature, the guideline shall be utilized only after modification process conducted for better suitable for local condition.

Due to the non availability of legal definition, first step shall be referring the exiting internationally recognized monitoring items while considering risks to human health using the drinking water standard.

**Refer Table in Appendix 1, Internationally Defined Drinking Water Quality Standards**

This Table shows the defined items of drinking water standard by WHO, USEPA, EU and Japan. Various items are listed for possible adverse effect for drinking water. It shall be point out that those standards are defined for the water at tap, not for source water, or ambient water. Therefore, these are utilized only for reference for this moment considering the potential risks.

**Refer Table Drinking Water Quality items**

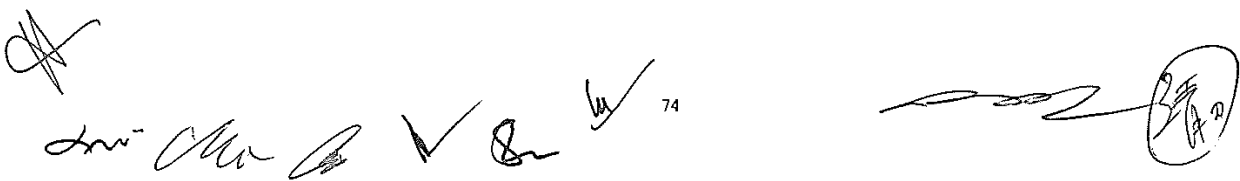
Second, the referring table shows the defined items of drinking water standard by Government of Japan with description for the major characteristics of substances. By this, for drinking water, not only of health concerned items have been selected, but also, odor, taste, hardness and color have been selected for the quality of drinking water. Although, the above are also very important, health related items shall be prioritized for ambient water quality.

**Refer Table Japanese Ambient Water Quality Standard**

This Table shows the defined items of ambient water standard by Government of Japan for health related substances. In principle, those items listed on health in Ambient Water Quality is almost same as those listed in Drinking Water Quality Standard in Japan.

**Refer Table WWF proposed Water Quality Standard and items**

In the same time, from its character, differ from Air, water is utilized in various ways like, drinking, irrigation, recreational and for fishery. Thus, it is not proper to apply unified standard value to water bodies utilized in various ways. Therefore, as fundamental strategy, all the items shall be prioritized with certain category, like utilization condition of target water body, and monitor from prioritized items to relatively light one till cover all target items while as little to insignificant lever detected, the items shall lower the priority.

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## B. Effluent "Source" Monitoring

For Effluent "Source" Monitoring, items defined by NEQS shall be monitored. For conducting the monitoring, it is noted that the standard value of the Ambient Water Quality is 1/10 value of Effluent Quality standard in principle with the premises of the concentration goes this values as well diffused in natural water body.

Table 4.1 NEQS for Effluent Water

S.No	Parameter	Existing Standards	Revised Standards		
			Into Inland Water	Info Sewage Treatment	Info Sea
1	Temperature or Temperature Increase	40°C	≤3 °C	≤3 °C	≤3 °C
2	pH value	6-10 pH	6 - 9	6 - 9	6 - 9
3	5-days Biochemical Oxygen Demand (BOD <sub>5</sub> ) at 20°C	80 mg/l.	80	250	80**
4	Chemical Oxygen Demand (COD) <sup>1</sup>	150 mg/l.	150	400	400
5	Total suspended solids	150 mg/l.	200	400	200
6	Total dissolved solids	3500 mg/l.	3500	3500	3500
7	Grease and oil	10 mg/l.	10	10	10
8	Phenolic compounds (as phenol)	0.1 mg/l.	0.1	0.3	0.3
9	Chloride (as Cl)	1000 mg/l.	1000	1000	SC
10	Fluoride (as F)	20 mg/l.	10	10	10
11	Cyanide (as CN) total	2 mg/l.	1.0	1.0	1.0
12	An-ionic detergents <sup>2</sup> (as MBAS)	20 mg/l.	20	20	20
13	Sulphate (SO <sub>4</sub> )	600 mg/l.	600	600	SC
14	Sulphide (S)	1.0 mg/l.	1.0	1.0	1.0
15	Ammonia (NH <sub>3</sub> )	40 mg/l.	40	40	40
16	Pesticides, herbicides, fungicides and insecticides <sup>3</sup>	0.15 mg/l.	0.15	0.15	0.15
17	Cadmium <sup>4</sup>	0.1 mg/l.	0.1	0.1	0.1
18	Chromium <sup>4</sup> (trivalent and hexavalent).	1.0 mg/l.	1.0	1.0	1.0
19	Copper <sup>4</sup>	1.0 mg/l.	1.0	1.0	1.0
20	Lead <sup>4</sup>	0.5 mg/l.	0.5	0.5	0.5
21	Mercury <sup>4</sup>	0.01 mg/l.	0.01	0.01	0.01
22	Selenium <sup>4</sup>	0.5 mg/l.	0.5	0.5	0.5
23	Nickel <sup>4</sup>	1.0 mg/l.	1.0	1.0	1.0
24	Silver <sup>4</sup>	1.0 mg/l.	1.0	1.0	1.0
25	Total toxic metals	2.0 mg/l.	2.0	2.0	2.0
26	Zinc	5.0 mg/l.	5.0	5.0	5.0
27	Arsenic	1.0 mg/l.	1.0	1.0	1.0
28	Barium	1.5 mg/l.	1.5	1.5	1.5
29	Iron	2.0 mg/l.	8.0	8.0	8.0
30	Manganese	1.5 mg/l.	1.5	1.5	1.5
31	Boron	6.0 mg/l.	6.0	6.0	6.0
32	Chlorine	1.0 mg/l.	1.0	1.0	1.0

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## 5. Monitoring Point and Period

### A. Monitoring for Ambient Water

#### 1) Monitoring Point

##### a. For River

For selecting monitoring point, the following factors shall be considered.

(1) Point where utilization of water by any human such as drinking, industrial usage, irrigation and etc is conducted.

(a) Intake point.

(2) Point where changes of flow or water quality occur.

(a) Discharging Point

Note; Sampling shall be conducted both Upstream and downstream of discharged point.

(b) Confluence of river

Note; Sampling shall be conducted both Upstream and downstream of confluence point.

(c) Separation point of river

Note ; Sampling shall be conducted both Upstream and downstream of separation point of river

(3) Representativeness of water quality

As selecting actual sampling Point, Select point where water quality represents surrounding area such as

(a) The point where there is no significant difference of water quality & flow with surrounding water body.

(b) The point where the pollutants is "enough disturbed, properly diffused and having consistent quality of water with that of surrounding water after discharged into the area

(4) Safety: The point where safety can secured.

As if there is any risk exist at the selected site, avoid the point and select better point regarding safety..

##### b. For Lake.

(1) Point where utilization of water by any human such as drinking, industrial usage, irrigation and etc is conducted.

(a) Intake point.

(2) Point where changes of flow or water quality occur.

(a) Discharging Point

Note; Sampling shall be conducted both Upstream and downstream of discharged point.

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(b) River flows into the lake

Note; Sampling shall be conducted both Upstream of the river and inlet of the lake.

(c) Outlet point of the lake

(3) Representativeness of Water Quality

As selecting actual sampling Point, select point where water quality represents surrounding area such as

(a) The point where there is no significant difference of water quality & flow with surrounding water body.

(b) The point where the pollutants is “enough disturbed, properly diffused and having consistent quality of water with that of surrounding water after discharged into the area

(4) Safety: The point where safety can secured.

As if there is any risk exist at the selected site, avoid the point and select better point regarding safety..

2) Monitoring period

For determining the monitoring period, in principle, tracing fluctuation of natural phenomenon and any human activities which causing water quality variation is essential. The period shall be determined according to the above fluctuation.

The following are the list of the any natural phenomenon or factors which could affect water quality.

Table 5.1 Natural Processes influence Water Quality

Process Type	Major process	Fluctuation Period of influence
Hydrological	Dilution	daily, seasonally
	Evaporation	daily, seasonally
	Suspension and settling	daily, seasonally
Physical	Gas exchange with atmosphere	daily, seasonally
	Volatilization	daily, seasonally
	Adsorption/ desorption	daily, seasonally
	Heating and cooling	daily, seasonally
	Diffusion	daily, seasonally
Chemical	Photodegradation	daily, seasonally
	Acid base reactions	daily, seasonally
	Redox reactions	daily, seasonally
	Dissolution of particles	daily, seasonally
Biological	Precipitation of mineral	daily, seasonally
	Primary production	daily, seasonally
	Microbial die-off and growth	daily, seasonally
	Decomposition of organic matter	daily, seasonally
	Bioaccumulation	daily, seasonally

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It is also very important to comprehend the fluctuation or patterns of daily living activities, like utilization and discharge of domestic water, industrial operation. Ideally, the frequency shall cover every above fluctuations and thus, monitoring shall be conducted as many as the fluctuation occurs.

**Table 5.2 Human Activities which influence Water Quality**

Process Type	Major process	Fluctuation Period of influence
Human Life	Domestic Use	Daily, Monthly
	Recreational (bathing, or any)	Seasonally
Industrial Activities	Factory operation	Daily, Monthly, Seasonally (according to business condition)
	Agriculture, Irrigation	Seasonally
	Fishery	Seasonally

By considering above factor, they can be roughly classified into 1) caused by natural phenomenon like, meteorological phenomenon, geography and etc, and 2). caused by human activities like, industry and daily living activity. The fluctuation of Natural phenomenon mainly occur daily, and seasonally, on the other hand, human activities fluctuate daily, seasonally also monthly or yearly as we considered business condition.

Therefore, the preferable period of sampling is described as follows.

**Table 5.3 Monitoring Period (Duration)**

Objective	Monitoring Period
<b>A. Ambient Water Monitoring</b>	
1) Monitor the current condition of environment which is surrounding living condition.	At least one high concentration season. One year or more is desirable.
2) Monitor the fluctuation or transition of the condition of environment which is surrounding living condition.	At least one year. Multiple years monitoring is desirable
3) Monitor the condition and compare with proposed standard whether the value exceeds or not.	At least one high concentration season. One year or more is desirable.
4) Monitor the effects of launched environmental policy.	At least one year. Multiple years monitoring is desirable

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Also, as selecting actual sampling date, the following shall be considered.

a. For River

- (1) The period shall be include the term of water utilization and term of low-water.
- (2) Sampling date shall be the day which there is no any natural disturbances such as storms, precipitation or any in last several days in upstream area.

b. For Lake

- (1) Both stagnant period and circulation period shall be monitored as considering stratification of water body of lake.
- (2) The period shall be included the term when the degradation of water quality expected.
- (3) Sampling date shall be the day without any natural disturbances such as storms, precipitation or any in last several days in upstream area.

**3) Monitoring Frequency**

There fore, it is proper to conduct monitoring according to the following

a. Full-year Monitoring

Year-round monitoring, once in a month, 4 times in a day is preferable in principle. For the items not included in above, monitoring shall be conducted as if any problems regarding the pollutant rise.

b. All-day Monitoring

In above monitoring schedule, 2 times monitoring which is all-day, 13times and 2 hour interval shall be conducted at the point where the degree of fluctuation is significantly big.

c. Rolling Survey and its strategy.

As in ideal condition, all target items shall be monitored in every occasion as the items fluctuate. However it is not realistic and not feasible as we established monitoring plans by considering ideal condition.

Above method can only apply as available resources, like human resource, equipment and financial resources are supplied sufficiently and stably. However, in real occasion, the above conditions are rarely secured and thus, we shall also consider the strategy while available resources are limited or not sufficiently supplied.

As with any constrains, Prioritizing method proposed as follows.

- (1) As referring above tables and industry exists upstream, decide the items that shall be monitored.
- (2) Monitoring shall be conducted on above decided items through out one year.
- (3).1 If monthly monitoring is not feasible, then, seasonal monitoring shall be conducted.
- (3).2 Monthly monitoring for the items with high priority shall be conducted biannually or

once in every possible year considering financial resources.

- (4) The item which value was not detected or show very low value while comparing above mentioned standard, the item shall be put low priority and will be replace for other possible items.
- (5) The item which value was detected and showed significant values while comparing above mentioned standard, the item shall be put high priority
- (6) The item which value was detected but showed non significant values while comparing above mentioned standard, the item shall be put medium priority.
- (7) For the second year monitoring, the items with low priority shall be replaced with the items which was not covered during 1st year activities.
- (8) For the third year monitoring, the items with medium priority shall be replaced with the items which was not covered during 1st and 2nd year.
- (9) (6) and (7) shall be conducted according to actual conditions, and this shall be conducted until all the listed items will be covered.
- (10) The item with low priority shall be monitored eventually as per confirm the same condition continues.
- (11) As any unpredicted pollution related incident regarding the item(s) which is not listed, monitoring shall be conducted as following above strategy.

*Note; As Pakistan has long and wide river, to decide target items is not so easy, because there might be many possibility of effluent of various hazardous substances upstream.*

#### **A. Monitoring for Effluent "Source" Water**

##### **1) Monitoring Point**

Monitoring point shall be very last drain outlet. As if this can not be applied, outlet of any final treatment facility where same value can be expected as above,

##### **2) Monitoring period**

For conducting source monitoring, type of industry, pattern of the industrial activities shall be considered. The factor which causes the pattern could be daily operational conditions of industry, harvest season, business conditions monthly and seasonally or any in principle.

Therefore, the preferable period of sampling is described as follows.

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**Table 5.4 Monitoring Period (Duration)**

Objective	Monitoring Period
<b>B. Effluent "Source" Monitoring</b>	
1) Monitor and comprehend the current status of effluent concentration and its load to the surrounding environment.	Due to its nature, no particular duration or period can be fixed. Therefore, Select the term of high concentration expected. At least, once in a year is desirable.
2) Monitor and comprehend whether the acquired value meets referenced standard or not.	ditto
3) Utilize the acquired values for help preparing antipollution policy	ditto

**3) Monitoring frequency**

As conditions allow, frequent monitoring is desirable in principle, however, it is more realistic to consider the actual condition which is with various constrains, such as insufficient financial and human resource. Therefore, in principle, one on site monitoring per factory or facility shall be applied in normal condition.

As if the result value exceeds the NEQS, then same rules of SMART program shall be applied until the value satisfies NEQS.

Pak-EPA launched SMART program in which categorized industry and required frequency of monitoring defined to attain control over industrial pollution in Pakistan. According to the program, industries are categorized into three, A, B &C, for water section, and two, A & B for air section. In the program, sampling frequency is defined according this category. Monthly report of monitoring result is required for the industry which is categorized "A", quarterly report of monitoring result is required for the industry categorized "B" and biannual report of monitoring result is required for the industry categorized "C".

Because this program is on going program and authorized by Government of Pakistan, the category and its setting can be utilized as one tool for deciding monitoring frequency. Therefore, this guideline follows SMART program for effluent monitoring frequency. Also, in the day, 3 times monitoring shall be conducted during operation time.

Table 5.5 Category of Industry and monitoring frequency

Name_Industry	Category	Frequency
Chlor-Alkali (Mercury Cell).	A	Monthly
Chlor-Alkali (Diaphragm Cell).	A	Monthly
Metal finishing and electroplating.	A	Monthly
Nitrogenous fertilizer.	A	Monthly
Phosphate fertilizer.	A	Monthly
Pulp and paper.	A	Monthly
Pesticides formulation.	A	Monthly
Petroleum refining.	A	Monthly
Steel industry.	A	Monthly
Synthetic fiber.	A	Monthly
Tanning and leather finishing.	A	Monthly
Textile processing.	A	Monthly
Pigments and dyes.	A	Monthly
Thermal Power Plants (Oil Fired and Coal Fired).	A	Monthly
Rubber products.	A	Monthly
Paints, Varnishes and Lacquers.	A	Monthly
Pesticides.	A	Monthly
Printing.	A	Monthly
Industrial chemicals.	A	Monthly
Oil and Gas production.	A	Monthly
Petrochemicals.	A	Monthly
Combined effluent treatment.	A	Monthly
Any other industry to be specified by Federal or Provincial Agency	A	Monthly
Dairy industry.	B	Quarterly
Fruit and vegetable processing.	B	Quarterly
Glass manufacturing.	B	Quarterly
Sugar.	B	Quarterly
Detergent.	B	Quarterly
Photographic.	B	Quarterly
Glue manufacture.	B	Quarterly
Oil and Gas exploration.	B	Quarterly
Thermal Power Plants (Gas Fired)	B	Quarterly
Vegetable oil and ghee mills.	B	Quarterly
Woolen mills.	B	Quarterly
Plastic materials and products.	B	Quarterly
Wood and cork products.	B	Quarterly
Any other industry to be specified by federal or Provincial Agency.	B	Quarterly
Pharmaceutical (Formulation) Industry.	C	Semiannual
Marble Crushing.	C	Semiannual
Cement.	C	Semiannual
Any other industry to be specified by Federal or Provincial Agency	C	Semiannual

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PLAN  
OF  
AMBIENT AIR QUALITY MONITORING  
FOR  
EPA BALOCHISTAN

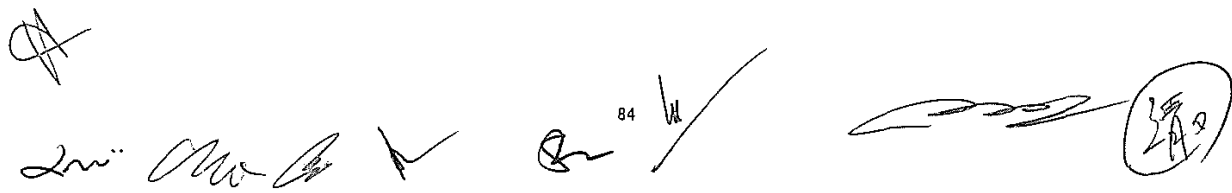


Prepared by:      Engr. Muhammad Khan Uthmankhail  
Deputy Director (Tech / Lab)  
EPA Balochistan

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### Environmental Monitoring plan for Ambient Air

1.Purpose	To assess the current conditions of Air pollution and use the results for policy making and as help to improve the current conditions
Name of investigation	Ambient Air Quality Monitoring in the Distt; Kohat, Karak, DI Khan, Bannu, Dir, Abbottabad. Mansehra
Date	June 2010- June 2011 When the each monitoring is carried out
Place	Distts: of KPK 1. Abbottabad 2. Kohat 3. Karak
Person In charge	Naseer Khattak, Arif Afridy, Farid Ullah
Measurement tem	NOx, CO,PM10
Equipment to use	Analyzers of the above parameters NOx Analyzer: working principle chemilumenance CO Analyzer: sensor is fitted PM10: with the help of high volume air sampler
2. Preliminary Survey (i)Description of the site	Main junctions of the distt; where traffic density is very high. There may be are some educational institutes/ universities in these junctions also.
3. Monitoring Site Land se	Map attached of various Distts:





## Pak-EAP Air Monitoring Plan

### 1. Name of Investigation

Stack gas monitoring for the major air pollution source in Industrial Area (I-9, I-10) of Islamabad City, and ambient air monitoring survey in the vicinity of pollution source above.

### 2. Objectives

- 1) To find the characteristics of ambient air pollution in Islamabad city by evaluating the collected data from automated air monitoring stations and particulate matter sampling.
- 2) To investigate the influence of major factories in industrial area by means of stack gas monitoring.
- 3) To make future strategy or plan to improve ambient air quality.

### 3. Monitoring Plan

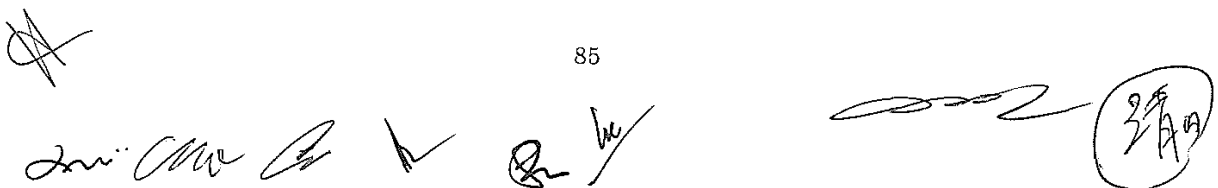
#### 3.1 Outline of Monitoring

In I-9, I-10 industrial area of Islamabad, a lot of complaints were made against black smokes which have been observed by inhabitants live in vicinity of iron refinery factories. We plans to select this industrial area as the target of air monitoring, attempting to verify the characteristics of air pollution in this district and influence from stationary sources. Using the up-to-date analyzers and samplers, we plans to conduct the measurement survey against the ambient air and stationary source that the black smokes have being spewed.

Two automated air monitoring stations, fixed type and mobile type, and two sets of high volume air samplers are planned to use for ambient air monitoring. The mobile station will be set near the target factories in I-10 industrial area, and continuous ambient air monitoring will conduct during one month along with the fixed station situated in site of CLEAN laboratory in H-8 ward. Measured data will be automatically transferred to data center in laboratory above by wireless transmission. We attempt to get detail information from the difference of concentration changing derived from the distance difference of 2 air monitoring stations. As another ambient monitoring for particulate matters, we plans to set two high volume air samplers near the monitoring station or on its roof top. After sampling, the filter samples will be retrieved and served for weighing and metal analysis in the laboratory to know the component of particulate matters.

For the stationary source monitoring, we will conduct the stack monitoring at the chimneys in iron factories.

Industrial area lies on southern side of Capital City and a few kilometers northwest away from administrative division and most of residential area. We have attempted to figure out the mechanism of advection current of pollutants flew from south neighboring area.

The bottom of the page contains several handwritten signatures and initials. On the left, there is a large, stylized signature. Below it, there are several smaller signatures and initials, including one that appears to be 'J.M.' and another that looks like 'R. M.'. On the right side, there is a signature followed by a circular stamp containing the letters 'EAP'.

## Punjab-EAP Air Monitoring Plan

### 1. Name of Investigation

Ambient air monitoring survey and stack gas monitoring in Lahore City

### 2. Objectives

- 1) To find the characteristics of ambient air pollution in Lahore city by evaluating the collected data from automated air monitoring stations and particulate matter sampling.
- 2) To investigate the influence of major factories in industrial area by means of stack gas monitoring.
- 3) To make future strategy or plan to improve ambient air quality.

### 3. Monitoring Plan

#### 3.1 Outline of Monitoring

District Lahore is the second largest city in Pakistan and spread over an area of 1,772 square kilometers comprising nine towns. Major portion of the Lahore city (center city) lies towards east of Ravi River, namely 'Data Gunj Bakhsh Town' where the three automated air monitoring stations (AMSs) are working.

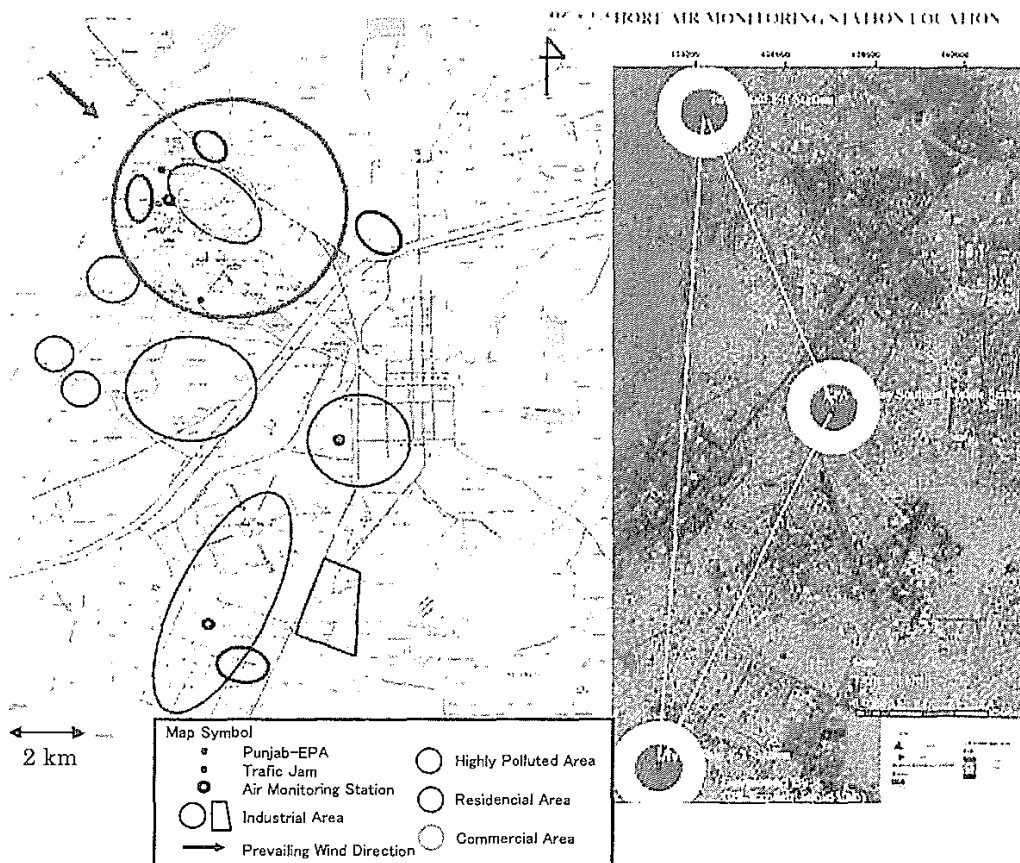
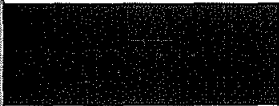


Figure 1 Ambient Air Monitoring Area and Location of AMSs in Lahore City

3/9/2011



Gaseous and toxic metal analysis in pilot areas

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Figure 1

*[Handwritten signatures and initials]*

**MONITORING PLAN FOR CEMENT INDUSTRIES IN SINDH**

**15<sup>th</sup> to 27<sup>th</sup> March 2010**



**Prepared by:**

**(J. Asad)  
Chemist-Air/ Incharge  
IE&AA Monitoring Cell**

**Approved by:**

**(Naeem A. Mughal)  
Director General  
EPA-Sindh, Karachi.**

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# Water Quality Monitoring Plan in Pilot Area Of Hub Balochistan



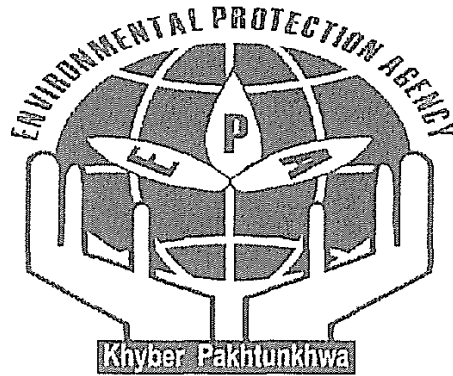
10th October, 2011

Revised

EPA Balochistan

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# Water Quality Monitoring Plan for Warsak Canal Peshawar



(Revised)  
October 2011

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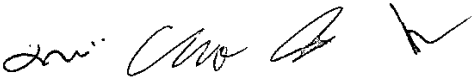

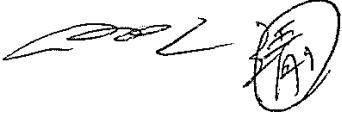
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AMBIENT WATER QUALITY  
MONITORING PLAN  
IN THE PILOT AREA

Revised  
October 2011

Pakistan Environmental Protection Agency  
Government of Pakistan

  
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# Ambient Water Quality Monitoring Plan in Pilot Area

under EMS Project

Revised

October 2010



EPA Punjab  
Cooperated with JICA Expert Team

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**AMBIANT WATER PILOT MONITORING AREA  
PROJECT FOR KEENJHAR LAKE**

**Revised October 2011**

**Prepared By: Mir Mureed Ali,  
Chemist EMS**



**Environmental Protection Agency  
Government Of Sindh**

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# Effluent Water Quality Monitoring Plan in Pilot Area Of Hub Balochistan



Revised

11th Oct: 2011

EPA Balochistan

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# Effluent Monitoring Plan in Pilot Area Under EMS Project

Revised  
October 2011

**Prepared By:**

Bilal Ahmad Sajid  
Monitoring Inspector  
EPA Khyber Pakhtunkhwa

ENVIRONMENTAL PROTECTION AGENCY  
GOVERNMENT OF KHYBER PAKHTUNKHWA

  
2011/10/10

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Effluent Monitoring Plan in Pilot Area

Under EMS Project

Revised

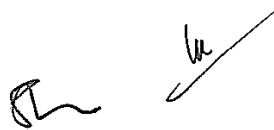
October 2011

Pakistan Environmental Protection Agency  
Government of Pakistan

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Signature



Signature



Signature

Effluent Monitoring Plan  
in Pilot Area  
under EMS Project

Revised

October 2010



EPA Punjab  
Cooperated with JICA Expert Team

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# Effluent Monitoring Plan in Pilot Area

Under EMS Project

Revised  
October 2011

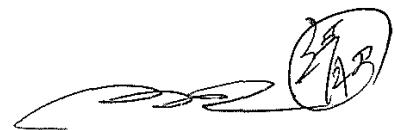
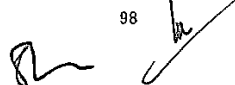
**Prepared By:**

**Mir Mureed Ali Talpur**

**Chemist (water)**

**EMS (P)**

Sindh Environmental Protection Agency  
Government of Sindh



**Standard Operational Procedure**  
**For**  
**Environmental Water Quality Monitoring in Pakistan**  
**Under EMS Project**

Version - 2

November 2011

**Pakistan Environmental Protection Agency**  
**with Punjab-EPD, Sindh-EPA, KP-EPA and Balochistan-EPA**  
**corroborate to JICA Expert Team.**



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TCP EMS Terminal Evaluation Report Annexes

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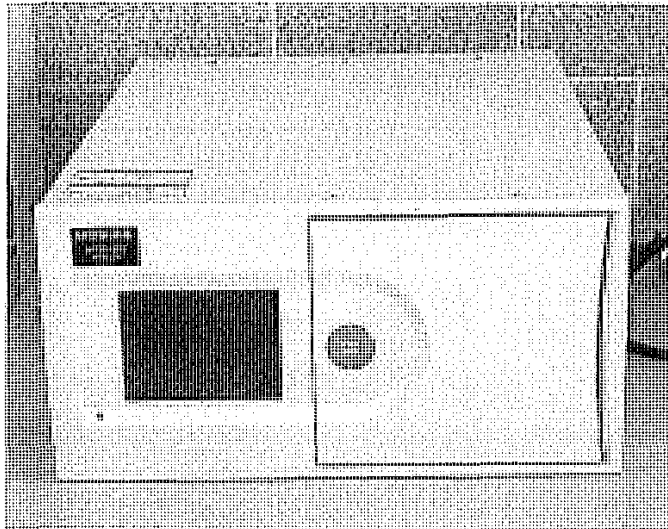


# Standard Operation Procedure

## SO<sub>2</sub> Analyzer for Air Monitoring

HORIBA APSA 370

Version 2



Prepared by

Sadia Riaz

*[Handwritten signatures and initials]*



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  - 7.3 Safety Rules

# Standard Operation Procedure

## CO Analyzer for Air Monitoring

HORIBA APMA 370

Version 2



Prepared by

Zafar Abbas

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Ami Cho

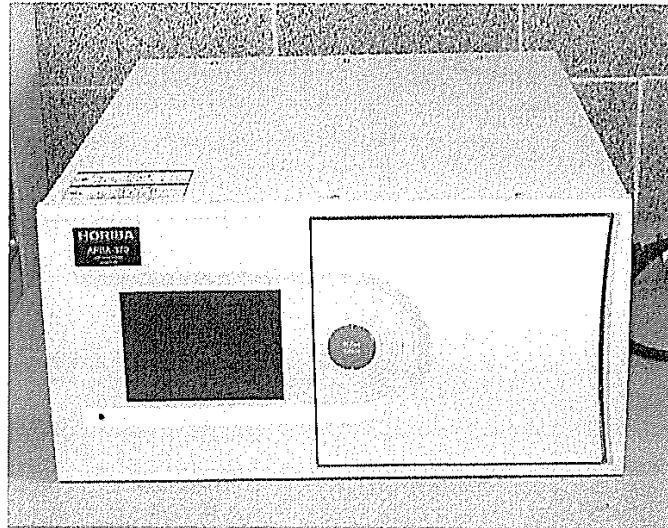
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# Standard Operation Procedure

## 03 Analyzer for Air Monitoring

HORIBA APOA 370

Version 2



Prepared by

Zafar Abbas

*[Handwritten signatures and initials]*

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STANDARD OPERATING PROCEDURE  
FOR PARTICULATE MONITOR  
APDA-370  
FOR PM 2.5 MICROGRAM PER METER  
CUBE

Version 2



Prepared by

M. Dawood

Amir Chohan

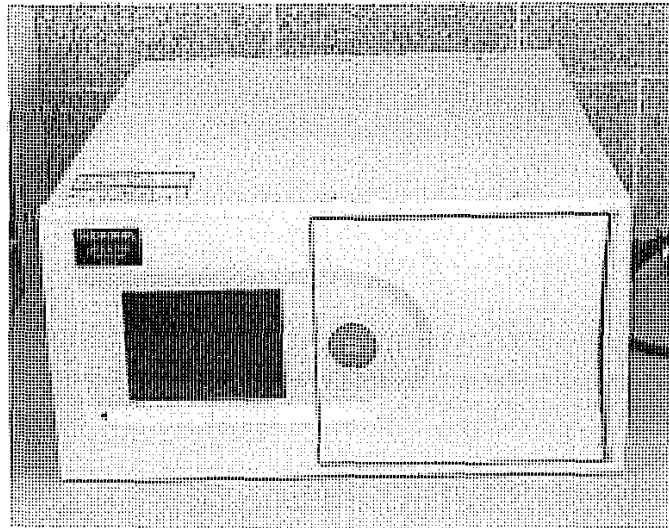
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# Standard Operation Procedure

H C Analyzer for Air Monitoring

HORIBA APHA 370

Version 2



Prepared by

Sajid Mahmood

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2nd Clc

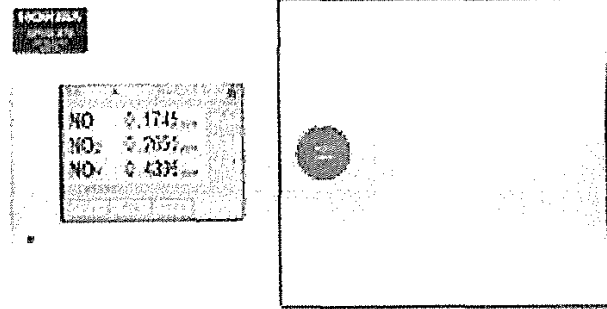
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(Version-3)

Standard Operation Procedure  
NOx Analyzer for Air Monitoring  
NO and NO2 measurement

APNA 370



Prepared By.

J. Asad

Date: 27/9/2010

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SOP of SPM Sampling by HV

Prepared by

- (i) Mr. Farooq Alam
- (ii) Mr. Rizwan Haider

Responsible person:

Mr. Muhammad Farooq Alam (Research Officer Air Pollution.)

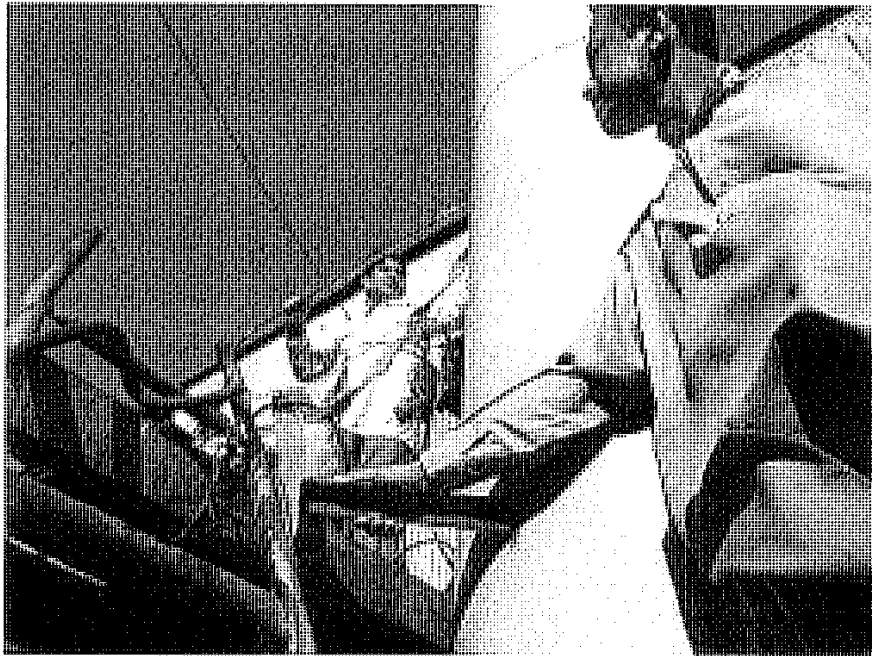
Date of revision: 07-11-2009

Date of 2<sup>nd</sup> revision:

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Standard Operation Procedure  
for  
Dust Isokinetic Sampling  
Version 3



Prepared by  
Sajid Mehmood

## Contents for Dust Sampling

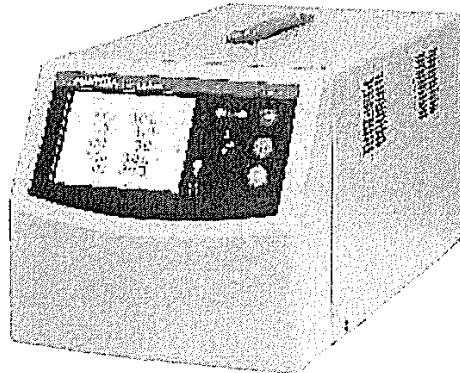
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# Standard Operation Procedure

## PG-250 (HORIBA)

for SO<sub>2</sub>, NO<sub>x</sub>, CO, CO<sub>2</sub>, O<sub>2</sub> Measurement in Flue Gas

Version 2



Prpeared by: J.Asad

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# Standard Operation Procedure for Cl<sub>2</sub> in Flue Gas

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# Standard Operation Procedure for H<sub>2</sub>S in Flue Gas

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FA

Ami Chow

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# Standard Operation Procedure for SOx in Flue Gas

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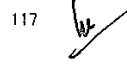



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# Standard Operation Procedure for HCl in Flue Gas

Version 2

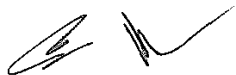
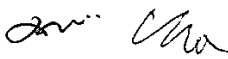
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# Standard Operation Procedure for HF in Flue Gas

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*Standard Operation Procedure*

*For*

*Arsenic (As) Analysis*

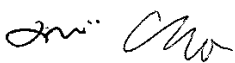
*In*

*Flue Gas Samples*

*Pak-EPA, Punjab-EPA, Sindh-EPA, KPK-EPA, Balochistan- EPA*

*Version: 2*

*December, 2011*



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**Standard Operation Procedure  
For  
Determination of Mercury  
In**

**Flue Gas**

Pak-EPA, Punjab-EPA, Sindh-EPA, KPK-EPA, Balochistan-EPA

**Version: 2**

**December, 2011**



Amir Chohan



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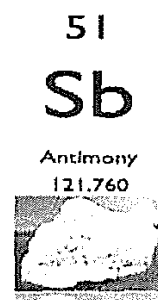
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*For*

*Antimony (Sb) Analysis*

*In*

*Flue Gas Samples*



Pak-EPA, Punjab-EPA, Sindh-EPA, KPK-EPA, Balochistan-EPA

*Version: 2*

*December, 2011*

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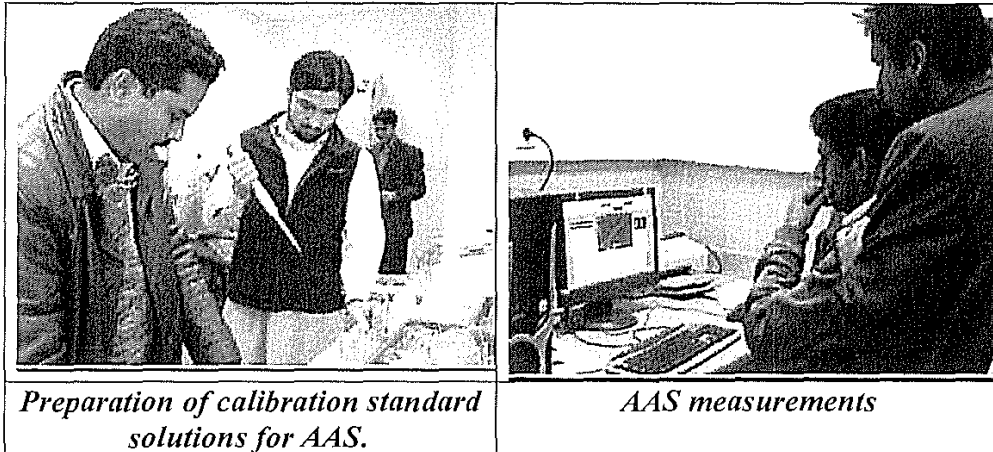
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dr. Umar B ✓ <sup>124</sup>



**STANDARD OPERATING PROCEDURE  
FOR  
METAL ANALYSIS OF EMISSION DUST SAMPLES BY ISOKINETIC  
SAMPLING TECHNIQUES (Pb)**



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**DATE OF ISSUE: ,Dec. 2010**

**PREPARED BY:**

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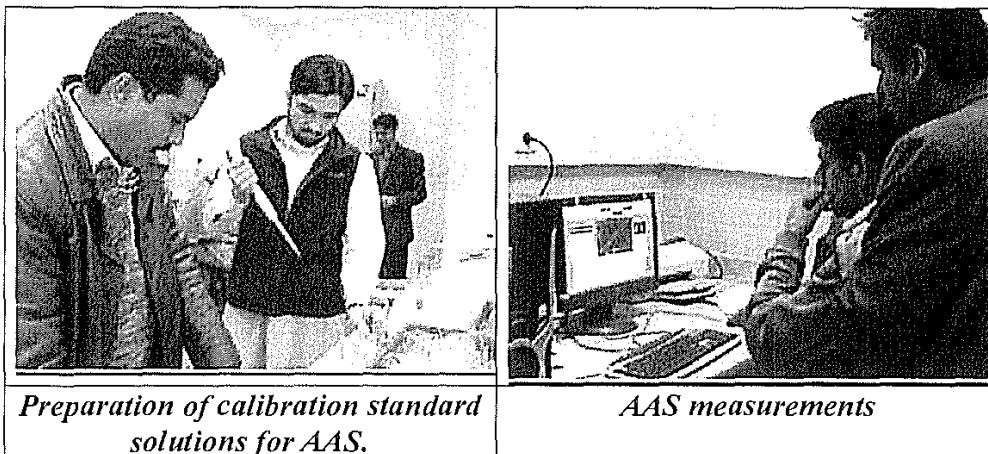
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  - 3.2 Necessary items
  - 3.3 Reagents
- 4. Analysis**
- 5. Data Calculation**

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**STANDARD OPERATING PROCEDURE  
FOR  
METAL ANALYSIS OF EMISSION DUST SAMPLES BY ISOKINETIC  
SAMPLING TECHNIQUES (Cd)**



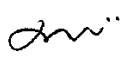
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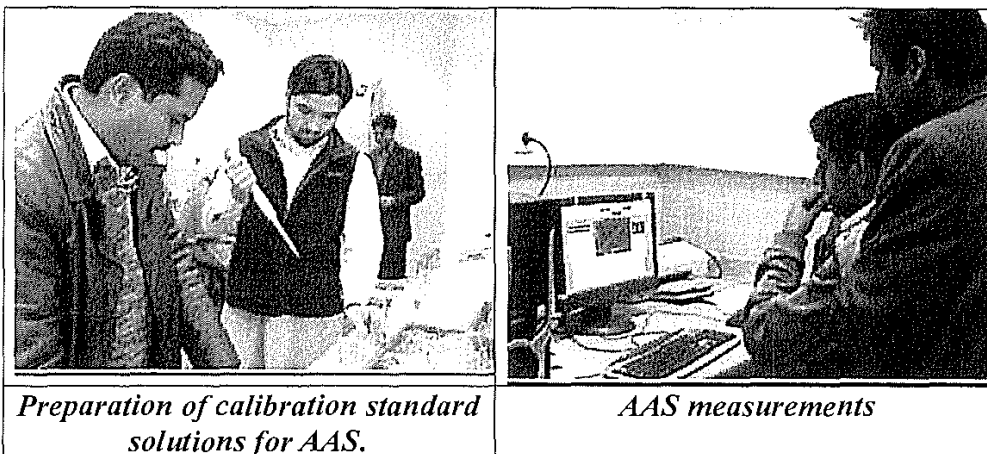
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**STANDARD OPERATING PROCEDURE  
FOR  
METAL ANALYSIS OF EMISSION DUST SAMPLES BY ISOKINETIC  
SAMPLING TECHNIQUES (Cu)**



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PREPARED BY:

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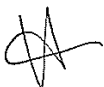



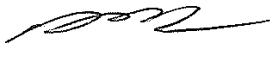

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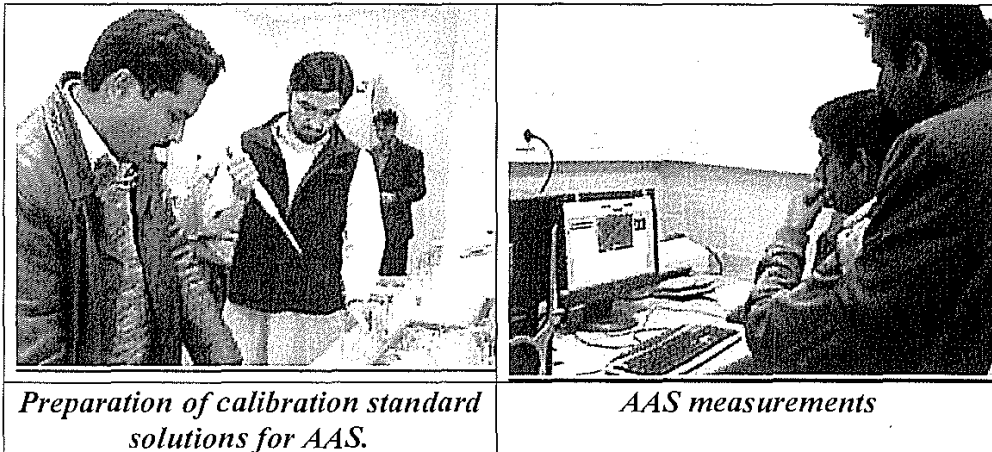
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- 4. Analysis**
- 5. Data Calculation**

  
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**STANDARD OPERATING PROCEDURE  
FOR  
METAL ANALYSIS OF EMISSION DUST SAMPLES BY ISOKINETIC  
SAMPLING TECHNIQUES (Zit)**



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**PREPARED BY:**





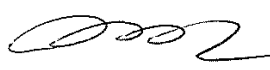

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**APPROVED BY: DG, Punjab,**

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2011/01/13   <sup>132</sup>   



# Maintenance Manual

Draft 1

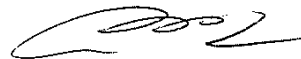
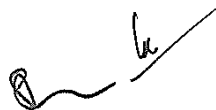
February 2011



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TCP EMS Terminal Evaluation Report Annexes

Page 133



**DRAFT**  
**OF**  
**LABORATORY MANAGEMENT MANUAL**  
**FOR**  
**BALUCHISTAN – EPA**



**VERSION 2**

**8<sup>th</sup> OCTOBER, 2011**

**Prepared by:** Engr. Muhammad Khan Uthmankhail  
Deputy Director (Tech / Lab)

**Checked by:** Mr. Muhammad Tahir Durrani  
Director (Implementation)

**Approved by:** Mr. Abdullah Jan  
Secretary / Director General  
EPA Balochistan

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OF  
LABORATORY MANAGEMENT MANUAL  
FOR  
KHYBER PUKHTUN KHWA-EPA**

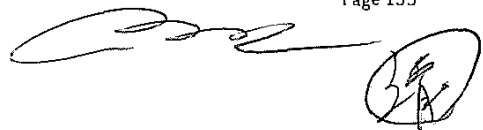
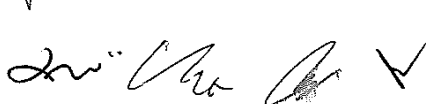
**VERSION 1c**

**February 2011**

**Prepared by KP-EPA**

**Confirmed by Director, KP-EPA**

**Approved by Director General, KP-EPA**



GOVERNMENT OF PAKISTAN  
CABINET SECRETARIAT  
CAPITAL ADMINISTRATION & DEVELOPMENT DIVISION  
PAKISTAN ENVIRONMENTAL PROTECTION AGENCY  
311-MARGALLA ROAD, F-11/3  
ISLAMABAD

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OF  
LABORATORY MANAGEMENT MANUAL  
FOR  
CLEAN, PAK-EPA

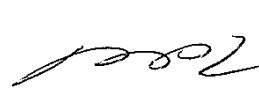
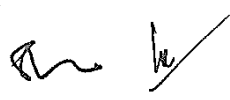
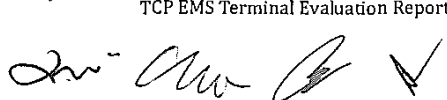
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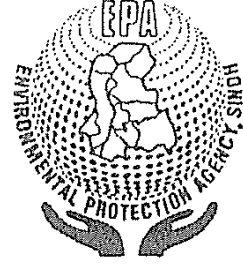
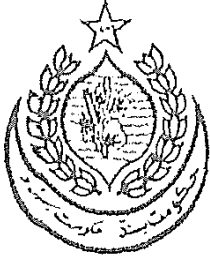
SEPTEMBER, 2011

Prepared by: Central Laboratory for Environmental Analysis  
and Networking (CLEAN), Pak-EPA, Islamabad

Approved by: Director General, Pak-EPA, Islamabad.

Verified by: Project Director (EMS), Pak-EPA, Islamabad.





# LABORATORY MANAGEMENT MANUAL

PREPARED BY

SINDH ENVIRONMENTAL PROTECTION AGENCY

GOVERNMENT OF SINDH,

KARACHI

DATE: October 2011

Prepared by:

Ashique Ali Langah  
(Deputy Director-Lab)

Confirmed by:

S.M. Yahya  
(Director Lab)

Approved by:

Naeem Ahmed Mughal  
(Director General)

**DRAFT**  
**OF**  
**LABORATORY MANAGEMENT MANUAL**  
**FOR**  
**PUNJAB-EPA**

**VERSION 2**

**SEPTEMBER 2011**

**Prepared by : EPA Laboratory staff**

**Confirmed by : Deputy Director (Lab)**

**Approved by : Director General**

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Sr No	Item	ANNUAL QA/QC ACTIVITY PLAN (2011-12) OF CLEAN											
		2011						2012					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	Establishment of Management System												
1	Preparation of Lab Management Manual (3rd Version)												
2	Implementation of Lab Management plan												
4	Maintainance of Working condition of lab (25C, vibration free, dust free)												
5	Disposal of Biological and Non Biological Waste												
6	Preparation of log book for each equipment												
7	Maintenance of Test and Analysis register												
8	Establisment of Sample storage facilities												
	<b>Routine Activities for QC</b>												
1	Maintenance of Laboratory												
2	Maintenance of air monitoring station *												
3	Calibration of air monitoring station												
4	Labeling of Equipment												
5	Preparation of balance sheets of chemicals and segregation of chemicals.												
6	Preparation of balance of glass wares												
7	Arrangment for proper storage of Liquid/solid Waste												
8	Agreement with external company for the waste disposal												
9	Sample disposal record sheets preparation												
10	Evaluation of competence of laboratory staff												
11	Internal auditing												

Prepared By

Zaigham Abbas (Senior Chemist)

\* Regular maintenance is conducted according to SOP

Approved By

Project Director (EMS)

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QA/QC ACTIVITY PLAN for 2011(KPK-EPA)

Item	2011											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Establishment of management system												
Completion of making the Lab. Management Manual (1st version)												
Issuing and Implementation (Operation according to the manual)												
Meeting for review of the Manual												
Making of necessary record format												
Make of technical competency table												
System auditing												
Routine activities for QC												
Maintenance of main laboratory equipment												
Maintenance and calibration of air monitoring stations *												
QC event												
QC test for water analysis												
Inter-laboratory comparison)												

\*Note: Maitenance is conducted once every two weeks.  
Calibration is conducte once every two month.

Naseer Khattlak  
Senior Chemist  
Page 141

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QA/QC ACTIVITY PLAN for 2011-2012 (SINDH-EPA)

Item	2011				1012							
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	July	Aug
Establishment of management system												
Completion of making the Lab. Management Manual (1st version)		█										
Issuing and Implementation (Operation according to the manual)					█							
Meeting for review of the Manual										█		
Making of necessary record format		█										
Evaluation of competence of lab. staff					█							
System auditing										█		
Routine activities for QC												
Maintenance of main laboratory equipment (only for operational)					█						█	█
Maintenance and calibration of air monitoring stations *		█	█	█	█	█	█	█	█	█	█	█
QC event												
QC test for water analysis												
Inter-laboratory comparison)												

\*Note: Maintenance is conducted weekly basis.  
Calibration is conducted once every month.

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*AS*

Sr No	Item	ANNUAL QA/QC ACTIVITY PLAN (2011-12) OF CLEAN											
		2011						2012					
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
	<b>Establishment of Management System</b>												
1	Preparation of Lab Management Manual (3rd Version)												
2	Implementation of Lab Management plan												
4	Maintainace of Working condition of lab (25C , vibration free, dust free)												
5	Disposal of Biological and Non Biological Waste												
6	Preparation of log book for each equipment												
7	Maintenance of Test and Analysis register												
8	Establishment of Sample storage facilities												
	<b>Routine Activities for QC</b>												
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2	Maintenance of air monitoring station *												
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9	Sample disposal record sheets preparation												
10	Evaluation of competence of laboratory staff												
11	Internal auditing												

Prepared By

Zaigham Abbas (Senior Chemist)

\* Regular maintenance is conducted according to SOP

Approved By

Project Director (EM5)

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ANNUAL QA/QC ACTIVITY PLAN (2011) OF PUNJAB-EPA													
Sr No	Item	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	Establishment of Management System												
1	Preparation of Lab Management Manual (2nd Version)												
2	Implementation Plan of Lab Management plan												
3	Yearly Training Record												
4	Maintainace of Working condition of lab (25C , vibration free, dust free)												
5	Disposal of Biological and Non Biological Waste												
6	Preparation of log book for each equipment												
7	Maintenance of Test and Analysis register												
8	Establishment of Sample storage facilities												
9	capacity evaluation of persons												
	<b>Routine Activities for QC</b>												
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8	Sample disposal record sheets preparation												
9	I nternal audit												

Prepared By

- Usman-ul-Haq
- Firdaus Kaousar
- Tariq Javed
- Farooq Alam
- Fatima
- Ajmal Nadeem

Approved By  
DD (lab)

Result of Evaluation Grid on

Technical Cooperation for Establishment of Environmental Monitoring System in the Islamic Republic of Pakistan

Evaluation Criteria / Items of Investigation		Evaluation Questions	Evaluation Result
Achievement	Inputs	Have Inputs from the Japanese side been provided as planned?	<ul style="list-style-type: none"> <li>Almost all the inputs have been provided accordingly.</li> <li>During the first year, Japanese side provided large contribution for the repairing of equipment that was beyond the original scope of work.</li> <li>Since the Pakistan side could not provide necessary inputs after the dissolution of Ministry of Environment, Japanese side covered local operational costs including maintenance of equipment as well.</li> </ul>
		Have Inputs from the Pakistan side been provided as planned?	<ul style="list-style-type: none"> <li>Although the Pakistan side was to bear all the local costs including maintenance of equipment and reagent, this was not the case after the dissolution of Ministry of Environment due to the cancellation of the umbrella PC-1.</li> </ul>
	Achievement of outputs		<ul style="list-style-type: none"> <li>Achievements are described in details in the tables inserted in the main text.</li> </ul>
	Achievement of project purpose		
Projection on achievement of overall goal			
Implementation process	Progress of activities	Were there any issues or problems in the implementation of planned activities?	<ul style="list-style-type: none"> <li>Other than the delay of the first year activities due to the equipment problems, all the activities have been basically implemented as scheduled.</li> </ul>
	Monitoring	What was the activity monitoring plan and how was it implemented?	<ul style="list-style-type: none"> <li>JCC was held every year (four times) for the assessment of the project progress.</li> </ul>
	Communication	Was communication among project personnel satisfactory?	<ul style="list-style-type: none"> <li>There are not much difficulty in exchanging views and sharing ideas except the following cases: (a) communication between Japanese experts and EPA staff of KP and Balochistan because the former is prohibited to visit the latter due to security concern, and (b) communication between technical staff and senior EPA officials in some cases because the hierarchy in government organizations is tight.</li> <li>However, less difficulty in communication does not lead to smooth project implementation since there are various impeding factors, which are often beyond the capacity of concerned personnel to address.</li> </ul>
	Decision-making	Was the decision making process of project planning and implementation satisfactory?	<ul style="list-style-type: none"> <li>There were some claims in some EPAs that organizational decisions were not tenable and unsatisfactory.</li> <li>Issue on management is often referred to. In particular, there is almost no policy making processes that utilize the result of the monitoring results in most of EPAs.</li> </ul>
	Ownership	Was the level of interest and involvement by C/P organizations satisfactory?	<ul style="list-style-type: none"> <li>This is variable. There are committed EPAs (i.e. senior officials) but there are also less committed ones.</li> </ul>
	Technology transfer	What techniques have been transferred to C/P?	<ul style="list-style-type: none"> <li>Technical staff as well as senior officials expressed that all the concerned knowledge and skills were provided to trainees although the level of acceptance is different among staff.</li> <li>Training courses have been organized for a broader range of topics from planning to sample collection, laboratory analysis, quality assurance and quality control, data analysis, report writing and others.</li> </ul>
Was the method of technology transfer appropriate?		<ul style="list-style-type: none"> <li>All the interviewees including technical staff and senior officials expressed their satisfaction on the method of technical transfer.</li> </ul>	

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Evaluation Criteria / Items of Investigation		Evaluation Questions	Evaluation Result
	Management	Was the assignment of C/Ps appropriate to carry out project activities?	<ul style="list-style-type: none"> <li>The number is less than required.</li> <li>Commitment by senior officials was not sufficient at some EPAs.</li> <li>Some technical staff did not have basic skills on mathematics and logical thinking.</li> </ul>
Relevance	Consistency	Is the project consistent with national and state policies in Pakistan?	<ul style="list-style-type: none"> <li>Yes, all the relevant policies and legal framework support environmental monitoring.</li> </ul>
		Is the project consistent with Japan's ODA policies?	<ul style="list-style-type: none"> <li>Yes, country assistance program for Pakistan stipulates the environment sector as one of priority areas.</li> </ul>
		Is the project in line with the needs of target groups?	<ul style="list-style-type: none"> <li>Yes, EPA definitely requires to enhance their monitoring capacity and people and concerned organizations of Pakistan need environmental monitoring data to address water and air pollution.</li> </ul>
	Strategy and approach	Are project approach and strategy appropriate to realize Overall Goal and Project Purpose?	<ul style="list-style-type: none"> <li>No. The project design was not appropriate in a sense that (a) covering five EPAs and five outputs are overstrained, (b) the assumption of hiring additional 120 staff is not practical, (c) the assumption of doubling EPA budget after two years of operations is almost impossible, and (d) the idea of hiring technical staff at Islamabad and dispatch to provinces misses the fact that Pakistan adopts the federal system of the government and their human resources systems are rather independent at the provincial level.</li> </ul>
		Is the selection of target groups appropriate?	<ul style="list-style-type: none"> <li>Yes, EPA staff are the right C/P for environmental monitoring.</li> </ul>
		Is the identification of C/P organization appropriate?	<ul style="list-style-type: none"> <li>Yes, as the case above.</li> </ul>
Effectiveness	Projection on the achievement of Project Purpose	Will Project Purpose be achieved by the end of the Project? (Are indicators really feasible to achieve?)	<ul style="list-style-type: none"> <li>Yes, the project achieved the project purpose in a sense that each EPA is now able to draft environmental monitoring plans, collect samples from monitoring sites, analyze them by using equipment, compile the data and prepare a report.</li> </ul>
		Are there any factors that may facilitate or inhibit the achievement of the Project Purpose?	<ul style="list-style-type: none"> <li>There are many factors that have hampered the implementation process of the project but it could achieve the project purpose primarily thanks to the commitment of Japanese experts as well as earnest personnel at EPAs.</li> </ul>
	Causal relationships	Are the five (5) outputs sufficient to achieve Project Purpose?	<ul style="list-style-type: none"> <li>Yes, it was sufficient. However, accommodating five outputs was overstrained that put heavy loads on the project team.</li> </ul>
		Are the important assumptions that exist between Outputs and Project Purpose correct at the present point of time?	<ul style="list-style-type: none"> <li>Assumption is not correct at the present time. Due to dissolution of Ministry of Environment, PC-1 was cancelled and EPAs lost funding sources for their operations.</li> </ul>
Efficiency	Achievement of Outputs	Is the achievement of each Output adequate?	<ul style="list-style-type: none"> <li>All the outputs are achieved more or less at the adequate level.</li> </ul>
		Are there any factors that facilitated or inhibited the achievement of Outputs?	<ul style="list-style-type: none"> <li>Throughout the project implementation period, various unexpected troubles occurred that were beyond the control of the project. Despite such difficulties, the project could have managed to produce outputs and achieve project purpose at the satisfactory level.</li> </ul>

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Evaluation Criteria / Items of Investigation		Evaluation Questions	Evaluation Result
Causal relationships	Are the important assumptions that exist between Activities and Outputs correct at the present point of time?	<ul style="list-style-type: none"> <li>It is partially correct as they are still engaged in the same work but partially incorrect because their status (i.e. the EMS staff) is unstable and their contracts may not be renewed.</li> <li>Dissolution of Ministry of Environment in June 2011 led to the cancellation of the Umbrella PC-I. This is equivalent to the nullification of pre-condition that is "Financial and human resources are allocated each EPA to implement the project during the project period."</li> </ul>	
	Were Inputs appropriate to produce Outputs (in terms of timing, quantity and quality)?	<ul style="list-style-type: none"> <li>Even though there were many difficulties during the implementation process, inputs have been utilized to produce adequate outputs.</li> </ul>	
Impact	Is there prospect that Overall Goal is achieved?	<ul style="list-style-type: none"> <li>All EPAs are now able to formulate monitoring plans, collect samples and analyze them, compile data and report to concerned agencies. Hence, it can be recognized that environmental monitoring systems are to some extent institutionalized and these systems will function (i.e. the overall goal will be achieved) if financial arrangement is made and current technical capacity is maintained in each EPA.</li> </ul>	
	Projection on the achievement of Overall Goal	<ul style="list-style-type: none"> <li>Can the achievement of Overall Goal be attributed as a result of achieving Project Purpose?</li> <li>Yes, institutions for environmental monitoring are created through the achievement of the project purpose.</li> </ul>	
	Are there any factors that facilitate or inhibit the achievement of Overall Goal?	<ul style="list-style-type: none"> <li>In Punjab-EPA, the budget for the next three years is already confirmed so that it is mostly likely that the overall goal is achieved. For other EPAs, financial arrangement is not confirmed yet at the time of the terminal evaluation although there are prospects that they can secure budget for monitoring personnel and activities and will thus achieve the overall goal.</li> </ul>	
	Spreading effects	<ul style="list-style-type: none"> <li>Are there any project impacts on policy, economy, society or environment?</li> <li>The project has largely facilitated the provision of more precise and reliable environmental data to Environmental Tribunals when pollution claims are raised in respective provinces.</li> <li>The project led to the formulation of Pakistan Clean Air Program and contributed to the development of Drinking Water Quality Standard.</li> </ul>	
	Are there any negative impacts that are brought about by the project? Did the project take any counter-measures against them?	<ul style="list-style-type: none"> <li>There is no negative impact that has been caused by the project. It needs to pay attention to the issue on the disposal of heavy metals and organic solvent in the future. This issue should be addressed properly under the QC/QA system when EPAs face the requirement of disposal of these materials.</li> </ul>	
Causal relationships	Are the important assumptions that exist between Project Purpose and Overall Goal correct at the present point of time?	<ul style="list-style-type: none"> <li>Yes, environmental policies and legal framework are consistent.</li> </ul>	
Sustainability	Policy aspect	Will the current policy framework be maintained after the termination of the project?	<ul style="list-style-type: none"> <li>At the national policy level, environmental management and monitoring policy has been consistent during the last two decades and its transformation will not be expected in the near future.</li> </ul>
	Organizational aspect	What is the organizational arrangement in relation to environmental monitoring after Ministry of Environment was dissolved?	<ul style="list-style-type: none"> <li>The main project counterparts who enhanced their knowledge and skills are those recruited by the EMS grant aid project. Since they are time-bound employees, there is no guarantee that they can remain at respective EPAs. This is particularly the case for the staff dispatched to provincial EPAs because they were recruited at the federal level and not integrated within the provincial personnel system.</li> </ul>
		Will necessary actions be taken to ensure pertinent organizational arrangement, human resource allocation and provision of budget?	<ul style="list-style-type: none"> <li>EPAs are still in the process of securing budget for environmental monitoring except the case of Punjab-EPA (where a new PC-I is already confirmed) and partly the case of Balochistan-EPA (where technical staff are permanent).</li> </ul>

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Evaluation Criteria / Items of Investigation		Evaluation Questions	Evaluation Result
Technology aspect	Will the facilities and equipment provided by the grant aid project be maintained appropriately?	♦ Maintenance of equipment is questionable due to the nature of high maintenance cost for equipment. In Pakistan, spare parts need to import and repairing services can be provided only by handful of monopolized local agents (thus service fee is quite high).	
	What skills have C/P already acquired?	♦ Each EPA is now able to draft environmental monitoring plans, collect samples from monitoring sites, analyze them by using equipment, compile the data and prepare a report.	
Other factors	Are there any factors that may inhibit sustainability of the project?	♦ Basically, it depends on the security of financial arrangement.	

Remark: Pro. Doc (Project Document), JapExp (Japanese Expert), Gov. Doc. (Government Document), Doc. review (Document review)



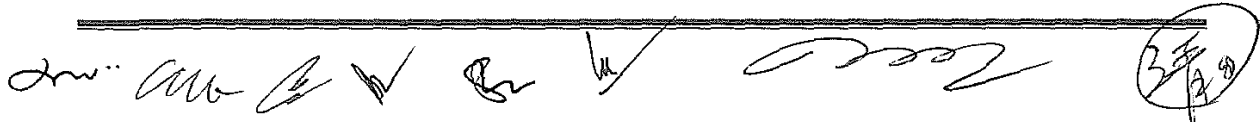
**Working Group Seminar**  
**for**  
**Technical Cooperation for the Establishment of**  
**Environmental Monitoring System**

**30<sup>th</sup> November, 2011**

**Islamabad**



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## PROGRAM

**Date:** 30<sup>th</sup> November, 2011

**Time:** 10:00 – 17:45

**Location:** Islamabad

**Venue:** Sangam Hall, Hotel Margala,  
M-2, Near Convention Centre, Islamabad

**Participants:** Pak-EPA, Punjab-EPA, Sindh-EPA, Khyber Pakhtunkhwa-EPA, Balochistan-EPA, Gilgit Baltistan-EPA, Planning Commission, Economic Affairs Division, FJWU, JICA Expert Team, JICA Pakistan Office

## OBJECTIVE

Sharing the acquired knowledge, skills and experiences through the project activities and providing opportunity for exchanging useful information and promoting mutual understanding among participants

## EXPECTED OUTCOMES

The outcomes of this seminar will be as follows:

1. *Promoting better understanding of Implementation of Environmental Monitoring*
2. *Promoting better understanding and skills of Maintenance method for Air monitoring station*
3. *Promoting better understanding of future strategy of database networking*
4. *Promoting better understanding of QA/QC system*

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## Agenda

Time	Theme	Speaker/ Presenter
9:30 – 10:00	Reception	
10:00 – 10:05	Recitation of the Holy Quran	Mr. Muhammad Khan
10:05 – 10:15	Welcome and Opening Remarks / Evaluation of the Project and Working Group	Mr. Daisaku KIYOTA Team Leader of the Project
10:15 – 10:20	Opening Remarks	Mr. Asif S. Khan Director General, Pak-EPA
10:20 – 10:40	Monitoring Activities for Ambient Air at Sindh-EPA - Automatic Air Monitoring Station -	Mr. Jahangeer Asad Chemist(Air), Sindh-EPA
10:40 – 10:45	Discussion on above theme	
10:45 – 11:15	Monitoring Results and Environmental Management (Air) -In case of pilot area-	Mr. Sajid Mahmood Laboratory Assistant, Pak-EPA
11:15 – 11:20	Discussion on above theme	
11:20 – 11:40	Tea Break	
11:40 – 12:10	Behavior of Toxic Substances in Environment - Production and usage of pesticides -	Dr. Uzaira Rafique Associate Professor, Fatima Jinnah Women University, Rawalpindi
12:10 – 12:20	Discussion on above theme	
12:20 – 12:40	Monitoring Guidelines - The propose and How to -	Mr. Ashique Ali Deputy Director (Lab), Sindh-EPA
12:40 – 12:45	Discussion on above theme	
12:45 – 13:05	Monitoring Results and Environmental Management (Water) -In case of pilot area-	Mr. Tariq Javaid Research Assistant, Punjab-EPA
13:05 – 13:10	Discussion on above theme	
13:10 – 13:30	Laboratory Management System -Implement and efficient activity in Laboratory works-	Mr. Nizad Ali Chemist (Soil), EMS Project, Pak-EPA
13:30 – 13:35	Discussion on above theme	
13:35 - 13:55	Actual Measurement of GC & IC - The evaluation and the results -	Ms. Firdaus Kausar Chemist (Water), EMS, Punjab -EPA Ms. Umme Kalsoom Research Assistant, Punjab -EPA
13:55 – 14:00	Discussion on above theme	
14:00 – 14:55	Lunch	

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14:55 – 15:15	<b>Implementation of QA/QC</b> -Rule in laboratory and implementation of QA/QC system-	<b>Mr. Zaigham Abbas</b> Senior Chemist, EMS, Pak -EPA
15:15 – 15:20	Discussion on above theme	
15:20 – 15:40	<b>Running of Database</b> - Data form and up-load -	<b>Mr. Farhan Muqeem Khan</b> Data Analyst, EMS Project, Pak-EPA
15:40 – 15:45	Discussion on above theme	
15:45 – 16:05	<b>Report from JET</b> Summary of Issues related to Environmental Monitoring by EPAs	<b>Mr. Daisaku KIYOTA</b> Team Leader of the Project
16:05 – 16:20	<b>Tea Break</b>	
16:20 – 16:35	<b>Achievement of Punjab-EPA</b> - Achievement and Improvement -	<b>Mr. Mehr Maqsood Ahmad Lak,</b> Director General, Punjab-EPA
16:35 – 16:50	<b>Achievement of Sindh-EPA</b> - Achievement and Improvement -	<b>Mr. S. M. Yahya</b> Director (Lab.), Sindh-EPA
16:50 – 17:05	<b>Achievement of Khyber Pakhtunkhwa-EPA</b> - Achievement and Improvement -	<b>Mr. Shams Ur Rehman</b> Chief Analyst, KP-EPA
17:05 – 17:20	<b>Achievement of Balochistan-EPA</b> - Achievement and Improvement -	<b>Mr. Muhammad Khan</b> Deputy Director (Technical), Balochistan-EPA
17:20 – 17:40	<b>Concluding Remarks</b>	<b>Mr. Zia Ul Islam</b> Director (EIA/Mont.), Pak-EPA
17:40 – 17:45	<b>Concluding Remarks</b>	<b>Mr. Daisaku KIYOTA</b> Team Leader of the Project

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Attendance Sheet for Working Group Seminar  
30th of November, 2011

S. No.	Name	Designation	Organization	Mobile No.	E-mail Address	Signature
1.	Munir Akbar	Chemist	Pak-SPC	034-558222	munir@spc.gov.pk	
2.	Muhammad Ali	Chemist	Pak-SPC	034-975144	muhammad@spc.gov.pk	
3.	Fahim Ahmad	Chemist	SPC-PK	034-557724	fahim@spc.gov.pk	
4.	Engr. M. Iqbal	Director	EPA, Govt.	0333-751353	iqbal@epa.gov.pk	
5.	Nizad Shilpya	Chemist	Pak-EPA	03023043392	nizad@shilpya.com	
6.	Talib Ahmad	Senior Chemist	CLEP-V	0333532036	talib@clep.gov.pk	
7.	Sajid Mahmood	Chemist	CLEP-V	030-5066011	sajid@clep.gov.pk	
8.	S.M. Yaqub	Director	EPA Govt.			
9.	Mubajid Ali	Director	EPA Govt.	03023-254		
10.	Abdul Razaq	Assistant Director	EPA Govt.	0303-200200		
11.	Muhammad Ali	Chemist	EPA Govt.	03023425793		
12.	Niaz Ali	Director	EPA Govt.	0314-7701555		
13.	Hassan Ahsan	Deputy Director	EPA - PAK	0345-520052	hassan@epa.gov.pk	
14.	Muhammad Latif	Photographer	EPA Govt.	0345-520052	latif@epa.gov.pk	





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S. No.	Name	Designation	Organization	Mobile No.	E-mail Address	Signature
47.	[Handwritten Name]	Chief Engineer	ETN KP	0355796111	[Handwritten Email]	[Signature]
48.	[Handwritten Name]	Chemist	ETN KP	0334-964530	[Handwritten Email]	[Signature]
49.	[Handwritten Name]	[Handwritten Designation]	[Handwritten Organization]	[Handwritten Mobile No.]	[Handwritten Email]	[Signature]
50.	[Handwritten Name]	A Prop	[Handwritten Organization]	03451839...	[Handwritten Email]	[Signature]
51.	[Handwritten Name]	E/I	EPA GMDA	0353-2961315	[Handwritten Email]	[Signature]
52.	[Handwritten Name]	E/I	Pakistan Rice	0333-541953	[Handwritten Email]	[Signature]
53.	M. Alamgir	Free-Lance	Writers	0300-5006138	[Handwritten Email]	[Signature]
54.	[Handwritten Name]	[Handwritten Designation]	[Handwritten Organization]	[Handwritten Mobile No.]	[Handwritten Email]	[Signature]
55.	[Handwritten Name]	[Handwritten Designation]	[Handwritten Organization]	[Handwritten Mobile No.]	[Handwritten Email]	[Signature]
56.	Dr. Uzma Parvaiz	Associate Prof.	FJU	0300-5195982	[Handwritten Email]	[Signature]
57.	[Handwritten Name]	[Handwritten Designation]	JICA/CTU	0322555213	[Handwritten Email]	[Signature]
58.	WAGYAMA K	SP/IC	JICA expert team	[Handwritten Mobile No.]	[Handwritten Email]	[Signature]
59.	OCHI TOSHIHITO	JICA Expert	JET	0215/26118	[Handwritten Email]	[Signature]
60.	[Handwritten Name]	JICA Expert	JET	[Handwritten Mobile No.]	[Handwritten Email]	[Signature]
61.	[Handwritten Name]	JICA Expert	JET	[Handwritten Mobile No.]	[Handwritten Email]	[Signature]
62.	Takhiwa SITO	JICA Expert	JET	[Handwritten Mobile No.]	[Handwritten Email]	[Signature]

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S. No.	Name	Designation	Organization	Mobile No.	E-mail Address	Signature
63.	Motoki Muro	Director General EPA	PA - EPA	030-3331114	motokimuro@epa.go.jp	<i>(Signature)</i>
64.	Onuma Shigeo	Expert	PA	034-2591111	onuma@epa.go.jp	<i>(Signature)</i>
65.	MOTOKI Muro	JICA Expert	Expert	0521-5157800	motoki@edii.co.jp	<i>(Signature)</i>
66.	KUNAHOTO Kenichi	JICA Expert	Expert	01725-110843	kunahotok@epa.go.jp	<i>(Signature)</i>
67.	Asif S. Khan	Director General	PA - EPA	03335192556	asi_9712	<i>(Signature)</i>
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