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## **Air Pollution Monitoring and Management**

**Taipei, Taiwan & Bangkok, Thailand  
June 19 to 30, 1993**

**Prepared for:**

**US - ASIA ENVIRONMENTAL PARTNERSHIP**



**WORLD ENVIRONMENT CENTER**

## DISCLAIMER

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## I. EXECUTIVE SUMMARY

In October 1992, an acute air pollution emergency occurred in Lampang Province. The Royal Thai Government (RTG) requested technical assistance from the U.S. Environmental Protection Agency (US EPA) to provide guidelines for air quality monitoring and recommendations for air pollution control technologies. From January 10-24, and April 26 - May 11, USEPA Action Teams were sent to Thailand to work with the Ministry of Science, Technology and Environment (MOSTE), the Electricity Generating Authority of Thailand (EGAT), and the Ministry of Public Health (MOPH). This mission was co-sponsored by EPA through the United States-Asia Environmental Partnership (US-AEP), the U.S. Agency for International Development (USAID), MOSTE and MOPH. As a result of the mission, RTG officials visited the U.S. from April 17-30, 1993, to learn about air pollution control technologies for the energy sector. This reverse mission was sponsored by the US-ASEAN Council.

During the April visit, Radian Corporation had the opportunity to host the Thai delegates on a tour of the Houston Regional Monitoring Network located on the Houston Ship Channel. Designed and operated by Radian, this network provides measurement data of criteria and toxic pollutants. During the time spent with the Thai delegation, Radian learned more about the Pollution Control Department (PCD) of MOSTE, plans to install a nationwide air quality monitoring network for Thailand. After discussions Radian was invited to Bangkok for two weeks to assist the PCD in planning their air quality monitoring network.

At the request of the PCD, Radian Corporation sent an air quality expert, Mr. Scott Jenkins, from its headquarters in Austin, Texas, to work with the Air Quality Division of the PCD. The purpose of the trip was to assist the PCD in planning their nationwide air quality monitoring network to be developed in 1994. Mr. Jenkins worked with the PCD, from June 19-30, 1993.

Mr. Jenkins concluded that, relative to air quality management, the PCD should consider implementing specific action plans in each of the four pollution control zones that they have established. These action plans should provide for the quantification of emissions (point, area, and mobile) and determine the need for and design of air quality measurement systems in each zone. The PCD is the logical agency to coordinate these plans and they should establish minimum requirements, practices, and quality measures relative to data collection and management and program development. The PCD should also establish guidelines and practices for implementing private air quality monitoring programs for individual facilities or industrial estates that can determine the impacts on the surrounding areas and populations.

## II. INTRODUCTION

This report describes the activities, findings, and conclusions and recommendations by Mr. Scott T. Jenkins, during a mission to Taipei, Taiwan and Bangkok, Thailand June 19-30, 1993. The purpose of this mission was to assist the Pollution Control Department (PCD) of the Ministry of Science, Technology and Environment (MOSTE) in planning the development of their nationwide air quality monitoring network. Mr. Jenkins' participation in this mission was through the U.S.-Asia Environmental Partnership (US-AEP) cooperative agreement with the World Environment Center.

In October 1992, an acute air pollution emergency occurred in Lampang Province due to excessive emissions of SO<sub>2</sub> at the Mae Moh power plants. The Royal Thai Government (RTG) requested technical assistance from the U.S. Environmental Protection Agency (US EPA) to provide guidelines for air quality monitoring in the Mae Moh vicinity and recommendations for air pollution control technologies for the Mae Moh Plants. From January 10-24, and April 26 - May 11, USEPA Action Teams were sent to Thailand to work with the Ministry of Science, Technology and Environment (MOSTE), the Electricity Generating Authority of Thailand (EGAT), and the Ministry of Public Health (MOPH). This mission was co-sponsored by EPA through the United States-Asia Environmental Partnership (US-AEP), the U.S. Agency for International Development (USAID), MOSTE and MOPH. As a result of the mission, RTG officials visited the U.S. from April 17-30, 1993, to learn about air pollution control technologies for the energy sector. This reverse mission was sponsored by the US-ASEAN Council.

During the April visit, Radian Corporation had the opportunity to host the Thai delegates on a tour of the Houston Regional Monitoring Network located on the Houston Ship Channel. This is a nine station network jointly owned by the 48 local industries throughout an industrial complex of chemical, petrochemical and refining facilities. Designed and operated by Radian, this network provides measurement data of criteria and toxic pollutants to the Texas Air Control Board and the USEPA. During the time spent with the Thai delegation, Radian learned more about the Pollution Control Department (PCD) of MOSTE, and their plans to install a nationwide air quality monitoring network for Thailand. After discussions with Dr. Pakit Kiravanich, Director General of the PCD and Dr. Supat Wongwangwatana, the Acting Director of the Air Quality and Noise Management Division, Radian was invited to Bangkok for two weeks to assist the PCD in planning their air quality monitoring network.

Mr. Scott Jenkins is one of Radian's top experts in air quality monitoring. He is the Program Manager of Radian's Corporate Operations Staff. During his thirteen years with Radian, he has been involved in the design, operation, quality

assurance and project management of numerous ambient air, air toxics, and meteorological evaluation programs.

The USAID Regional Mission in Thailand supported a US-AEP Environmental Partnership through the World Environment Center (WEC) that funded the travel and per diem expenses for Mr. Jenkin's to visit to Taiwan and Thailand. This WEC program also provided support for Dr. Pakit Kiravanich, Director General of the PCD and Dr. Supat Wongwangwatana, the Acting Director of the Air Quality and Noise Management Division, to travel to Taipei, Taiwan, where they were able to visit the Taiwan Air Quality Monitoring Network (TAQMN). Ms. Wanida Srichai of the WEC, Thailand, accompanied Mr. Jenkins throughout the trip. Designed by Radian for the Taiwan EPA, the TAQMN is the largest air quality monitoring network installation in Asia. The objective of this visit was to provide a design basis for PCD's network based on an operating example in Asia. Meetings with the Taiwan EPA were arranged so that the Thai delegates could learn about network design, procurement, installation, operation and maintenance.

### III. DISCUSSIONS AND FINDINGS

#### A. Introduction

Dr. Pakit, Dr. Wongwangwatana and Ms. Wanida Srichai joined Mr. Jenkins in Taipei from June 19-27, to become familiar with the technology of the TAQMN. The Thai delegates were accompanied by Mr. Jenkins and Mr. Endy Sun, an air quality expert from Radian's Taiwan office, to visit two real-time air quality monitoring stations, one in a high-traffic, congested area, and one at a more remote site. After the site visit, the group was received by representatives from the Taiwan EPA, Mr. Larry Chen, Deputy Administrator, Mr. Howard Chen, Director General, and Mr. Shuenn-Chin Chang, Director of the Bureau of Environmental Monitoring and Data Processing. During this meeting, the Taiwan EPA representatives shared their experience and detailed information regarding the TAQMN with the Thai delegates in order to give them a better understanding of its use for health and environmental control purposes.

The PCD representatives were able to gain much insight from this visit due to the fact that the TAQMN is the only air quality monitoring network of its magnitude located in Asia. The specification document prepared by Radian for the Taiwan EPA during the design phase of the TAQMN was given to the PCD for reference. Cost information for such a large-scale automated network was shared, for both capital investment for hardware, installation, and the subsequent operation and management of the network. Comments were made by Dr. Pakit that the capital investment for hardware per station in Thailand was much higher (by a factor of 2.5) than the investment the Taiwan EPA had made, concluding that the distributors in Thailand were operating on a substantial margin.

The Thai delegates were also given a tour of the TAQMN Environmental Monitoring Center, where they were able to see the data processing of the real-time air quality monitoring data and learn more about the use of modeling by the Taiwan EPA. The EPA uses both a statistical model and the daily air quality monitoring data from various stations to establish the Pollutant Standards Index Value (PSI), which is published in the daily paper.

After the Taiwan visit, the delegates returned to Thailand, accompanied by Mr. Jenkins. The objective of this part of the trip was to review the PCD's conceptual plan for their nationwide air quality monitoring network of 44 stations. In order to do this, it was necessary to gain a better understanding of the existing monitoring network. Mr. Jenkins met with several experts from the PCD to discuss the present data management system. He visited road-side stations and a station in Samutprakarn, an industrial area, to learn more about the necessities for technology upgrades in the system. Mr. Jenkins then reviewed Dr.

Wongwangwatana's draft conceptual plan and confirmed that it was technically acceptable.

In addition, Mr. Jenkins was introduced to the Swedish expert sponsored by the Swedish International Development Agency, who is writing the bid specifications for the upcoming tender for 22 air quality monitoring stations. Mr. Jenkins had a chance to learn more about the plans for the network and the software system that is being proposed by the Swedish.

As a follow-up to the discussions taking place in Houston in March, Mr. Jenkins visited Ms. Sasiphat Swetwatna, Deputy Budget Director, Bureau of the Budget regarding Geographical Information System (GIS) applications to manage air quality information and data. The Budget Bureau has received numerous budget requests from various ministries to support in-house GIS development for individual use. Mr. Jenkins explained that GIS systems could be designed for data sharing and management among several implementing agencies, and that this would have benefits in cost efficiency, not to mention that it could be instrumental in resolving conflicts among data generators and users. Shared information between ministries would lead to less redundancy in data gathering efforts, and could synchronize efforts in regional planning and development. Mr. Jenkins offered to arrange a GIS demonstration among the policy makers, to include the National Economic and Social Development Board, the Ministry of Industry, MOSTE and PCD.

Mr. Jenkins also visited the Environmental Health Department of the Ministry of Public Health on two separate occasions to get a more complete picture of their role in air quality monitoring and data collection. During the first meeting, Ms. Nantana Santatiwut, Director, EHD and Ms. Udomlak Sritusnee, Environmental Scientist, EHD, were present, along with Ms. Wanida Srichai, of the WEC. Discussions centered on the topic of the EHD's role in air quality monitoring and Mr. Jenkins provided an introduction of the application of GIS to air quality information and data management, whereby the PCD would be responsible for the air quality monitoring and management of the air quality database, and the EHD would be responsible for the input of statistics surrounding health risks and impacts to health caused by pollution.

At this meeting, it was mentioned that the EHD was in the procurement planning process of five mobile air quality monitoring stations. The EHD said that they would be very interested in having access to air quality data so that they could cut down on information gathering time due to their lack of staff.

In order to get a better understanding of the specific situation regarding air pollution in Thailand, Mr. Jenkins was escorted on a field visit to the EHD Region II Saraburi Province Health Clinic north of Bangkok. The visit included a tour of the local area impacted by the heavy particulate concentrations that result from

intensive rock quarry operations in the area, and a visit to a particulate monitoring site operated by the EHD at a local school. The tour was conducted by Ms. Nerin Wisitsakdiwasin of the Saraburi Clinic.

One other major site visit was made to the Mae Moh facilities of the Electricity Generating Authority of Thailand (EGAT) in Lampang Province, where Mr. Jenkins was able to tour the Mae Moh Power Plant and the surrounding air quality monitoring systems and network. This visit followed a meeting that Mr. Jenkins had with Mr. Kitti Kumpeera, Chief, Ecology and Environment Division, EGAT) and Mr. Prakit Ongkananantlert, Environmental Engineer, Ecology and Environment Division, EGAT regarding monitoring projects for Mae Moh electric generating plant.

## **B. General Findings**

- There is a heightened sense of awareness of the need to develop air quality management systems and programs to address the deteriorating air quality in Bangkok and to expand these programs to include other urban areas with similar problems as well as areas targeted for growth in the future. The Thai government has already established four (4) pollution control zones. These pollution control zones are areas where either/or existing/predicted environmental problems will adversely affect economic development in the area.
- There is a need and an interest to share information regarding air quality on the government ministerial level.
- The PCD anticipates issuing a specification for the implementation of a national ambient air quality monitoring program to begin operation in 1994. The specifications for the program are being prepared under a grant from the government of Sweden. PCD will operate the national monitoring network.
- The PCD is currently understaffed for the charter it has been given. Further, many of the current staff while well educated are new to the field of air quality management. The director of the PCD has implemented an on-going training program for the existing staff and has aggressive plans for the addition of 30 new staff for a total of 79.

## **C. Monitoring Networks**

- The first monitoring network of 8 stations was installed in Bangkok in 1983. In June 1993, only 4 of these monitoring stations were still in operation, however, PCD plans to retrofit and reinstall 3 of the original 8 stations by the

end of 1993. In general, the age of most equipment and the data collection methods (chart recorder) will make these systems difficult to integrate and operate as part of a new national monitoring network.

- A second air quality network was installed in 1985 in the heavily industrial area south of Bangkok. This original network of 5 stations now has 3 remaining in operation. The network was provided by the Japan International Cooperation Agency (JICA). The equipment is largely the EKK brand of Japan. Meteorological data are collected at 30-meters at one location and at 10-meters at two additional locations.
- The most recent monitoring systems were installed at 4 curbside locations in Bangkok. These systems measure real-time carbon monoxide, particulates (PM-10), and noise levels and transmit this information over a dedicated phone line to the PCD for display and recording. There is also a public display board associated with each installation.
- EGAT had already installed six stations of air quality monitoring instrumentation and was planning to install another six. EGAT would like to integrate the system and install an early warning system for the Mae Moh area and they invited Radian to bid on this work.
- The EHD and the PCD are, at times, duplicating efforts in air quality monitoring and data gathering. Both departments have plans to expand their air quality monitoring networks.
- Radian Corporation has responded to the PCD's request for a proposal to implement the network and is continuing to provide recommendations on network design. USAID has proposed two projects to assist the PCD develop strategies for air pollution control and mobile source air pollution management. In addition, the Bureau of Budget requested that Radian present its capabilities in Geographical Information System (GIS) applications to manage air quality information and data.

#### IV. Conclusions and Recommendations

Anyone who has been to Bangkok or near most industrial estates in Thailand can attest to the dire need for a system of air quality monitoring and management. The Thai government and private sector have begun to realize the negative effects of such pollution and are making significant steps towards developing a monitoring system and base lines which will eventually lead to the implementation of air quality standards. As of the writing of this report, the PCD has released a tender for bids to install 22 air monitoring stations. Eventually, the PCD plans to install 44 stations around the country and develop a network to effectively manage the information that these stations will be able to provide.

**Recommendation 1: The PCD should consider implementing specific action plans in each of the four pollution control zones.**

Relative to air quality management, the PCD should consider implementing specific action plans in each of the four pollution control zones that they have established. These action plans should provide for the quantification of emissions (point, area, and mobile) and determine the need for and design of air quality measurement systems in each zone. The PCD is the logical agency to coordinate these plans and they should establish minimum requirements, practices, and quality measures relative to data collection and management and program development.

**Recommendation 2: The PCD should have complete authority over the development of the national air quality monitoring program. EHD should be encouraged to participate in the program. Organizational charters should be established.**

The PCD should have complete authority over the development of the national air quality monitoring program and associated resources. This network will provide long-term air quality analysis and trends and provide the informational basis for air quality policy.

The EHD should be encouraged to participate in air quality monitoring activities directed toward the acquisition and implementation of monitoring resources that can qualitatively and quantitatively identify specific situations and problems known or suspected to result in adverse acute and/or chronic health effects. This type of effort will be of significant assistance to the PCD in formulating industry and locational specific air quality management policies.

The national monitoring program proposed must be sure to allocate resources in each of the four pollution control zones. The national monitoring program must also ensure that adequate new resources are available to replace existing aged systems in Bangkok. The cost burden of implementing regional and national level emissions inventories and air quality monitoring programs is significant. Clear, focused charters for each organization with a vested interest in air quality will ensure maximum benefits are returned with this investment.

**Recommendation 3: Procurement specifications for minimum equipment criteria should be developed.**

The specifications for the upcoming tender for the first phase procurement for the nationwide air quality monitoring network should provide minimum criteria for all equipment (e.g. should meet USEPA approval) and require all bidders to submit clear statements of work regarding each bidders approach to network design (i.e. how and where the monitoring resources will be deployed) and a detailed account of the bidders approach to network implementation and service.

The PCD should consider implementing the latest technologies including air quality ORS (optical remote sensing) systems based on the open path UV-DOAS (ultraviolet differential optical absorption spectroscopy) and FTIR (fourier transform infrared spectroscopy) methods. These measurement technologies, unlike traditional air quality measurement equipment that provide sampling for one pollutant with one discrete analyzer at one point in space, can provide resolution of a large number of pollutant compounds, simultaneously, using a single system. These open path systems transmit an optical beam over paths from a few hundred meters to kilometers in length. A signature spectrum resulting from the unique absorption lines of discrete compounds is correlated against known libraries of spectra to identify and quantitate pollutants of interest.

The FTIR systems are particularly well suited to measurement of Volatile Organic Carbon (VOC) species in air, pollutants that are of particular concern relative to ozone formation. The FTIR has the capability to speciate most all classes of VOC including the more reactive ozone forming groups such as alkenes, aromatics, and oxygenates. The UV-DOAS can speciate the aromatics, a subset of the oxygenates available with FTIR but is not well suited to the alkenes. However, the UV-DOAS is slightly better at detection (greater sensitivity) of the criteria pollutants (SO<sub>2</sub>, NO<sub>2</sub>, O<sub>3</sub>, CO) than is the FTIR. In combination, an FTIR and UV system would be particularly powerful tool that can provide a tremendous amount of valuable air quality data.

Although not completely accepted by USEPA at this time (although EPA is working toward equivalent measurement methods designations for these

systems), these technologies are expected to be widely implemented in the not to distant future alongside more traditional point sampling equipment. The Thai program can not only be one of the first to take full advantage of this potential but can even promote the acceptance of the same.

The design of the national network most certainly should include meteorological remote sensing systems. The final network design should be able to generate data sets that can support data intensive models such as the Urban Airshed Model. Utilizing acoustic sonar and radar systems can support a gridded meteorological data set for these models.

**Recommendation 4: The PCD will need to obtain an adequate number of personnel and provide training.**

Considering the projected growth of the PCD, Dr. Wongwangwatana will need well trained and experienced supervisory personnel to help manage the many different programs the PCD will undertake. It is advisable that, when implementing programs involving consultants/contractors, the PCD require them to supply adequate training, training follow-up, and support to the PCD staff.

**Recommendation 5: Consideration should be given to the siting and retrofit of the monitoring stations.**

The adequacy of the siting of these original 8 stations should be considered in the context of representativeness of measurement. The considerable growth of Bangkok since the stations were originally installed may make some installations unsuitable relative to the objective of defining representative levels of air quality in the city. The retrofit of any or all of these stations must consider compatibility with the types of equipment and data acquisition and telemetry proposed and accepted by the PCD for the implementation of the new national monitoring program. Finally, the retrofit should consider whether or not meteorological measurements should be collected at any or all of these sites to ensure sufficient data are collected to allow development of accurate wind fields for modeling applications.

As with the first network, serious consideration should be given to the wholesale retrofit of the existing equipment and consideration should be given to the viability of the siting of the operating stations relative to the objective of providing representative air quality measurements. The age of the equipment in general would dictate that replacement rather than repair would be prudent.

Arguments for and against integrating these systems into the new network can be made however it may be more prudent to continue to operate these systems separately from any new network and network data management systems. The reasoning considers the cost of integration relative to the long-term utility of the information collected. Such systems provide information that might be useful to studies of air pollution exposures of the population at one specific (albeit a typical) location or to perhaps help calibrate traffic models, yet these measurements will in no way be comparable to those collected at stations sited using a set of criteria designed to limit or eliminate impacts of discrete local sources. As such it would be advisable to either be very cautious or not co-mingle the results of these very different data sets.

**Recommendation 6: The PCD should establish guidelines for private air quality monitoring programs.**

The PCD should also establish guidelines and practices for implementing private air quality monitoring programs for individual facilities or industrial estates that can determine the impacts on the surrounding areas and populations.

**APPENDIX A**  
**TRIP ITINERARY**

## APPENDIX A

### TRIP ITINERARY

Friday, June 18, 1993

Meeting with Radian Taiwan office to finalize plans for the meetings with Taiwan EPA.

Saturday, June 19, 1993

Meeting with Taiwan EPA for tour of stations in the Taiwan Air Quality Monitoring Network (TAQMN). EPA officials in attendance were Mr. Larry Chen, Deputy Administrator, Mr. Howard Chen, Director General, and Mr. Shuenn-Chin Chang, Director of the Bureau of Environmental Monitoring and Data Processing.

Monday, June 21, 1993

Meeting with Taiwan EPA for tour and discussion of the TAQMN Environmental Monitoring Center. Travel to Bangkok.

Tuesday, June 22, 1993

Meeting with Mr. R. J. Gurley (USAID) at AID offices. Discussion of Taipei visit with Taiwan EPA and outline plans for the rest of the trip. Also in attendance were Ms. Wanida Srichai (WEC) and Mr. Chalot Sripicharn (WEC).

Meeting with Dr. Supat Wangwongwatana (PCD) at the PCD offices. Discussion of the existing air quality monitoring systems and schedule for the rest of the trip.

Wednesday, June 23, 1993

Meeting at the Ministry of Public Health, Environmental Health Division (EHD) with Ms. Nantana Santatiwut (Director-EHD) and Ms. Udomlak Sritusnee (Environmental Scientist-EHD) to discuss EHD interests in air quality monitoring. Ms. Wanida Srichai (WEC) in attendance.

EHD provided an afternoon field visit to the EHD Region II Saraburi Province Health Clinic north of Bangkok. The tour was conducted by Ms. Nerin Wisitsakdiwasin of the Saraburi Clinic.

Thursday, June 24, 1993

Tour of the PCD monitoring systems in Bangkok and Samat Prakan. Accompanied by Mr. Thalearnsak Petchsuwan (PCD), Mr. Chinoros Donpim (PCD), Ms. Wanida Srichai (WEC) and Mr. Chakthep Senivongs (WEC).

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Friday, June 25, 1993

Meeting with Ms. Sasiphat Swetwatna, (Deputy Budget Director, Bureau of the Budget), regarding GIS applications to manage air quality information and data.

Meetings at PCD with Dr. Supat and Dr. Oranut Paisarnuchapong (Environmental Scientist-PCD) and Ms. Patcharawadee Suwanathada (Environmental Scientist-PCD).

Meeting with Mr. Kitti Kumpeera (Ecology and Environment Division Chief-EGAT) and Mr. Prakrit Ongkananantlert (Environmental Engineer, Ecology and Environment Division-EGAT) regarding monitoring projects for Mae Moh electric generating plant in the Lampang Province.

Return to EHD for further discussion with Ms. Nantana and Ms. Udomlak and Ms. Chanika Haemapun (Environmental Engineer-EHD). Also present was Satja Janetumnugal, a local vendor of several manufacturers of air quality instrumentation.

Sunday, June 27, 1993

Travel to Lampang Province in preparation for Monday visit to the EGAT Mae Moh facilities. Accompanied by Ms. Patcharawadee Suwanathada (PCD).

Monday, June 28, 1993

Tour of the EGAT air quality monitoring systems and network surrounding the Mae Moh power plant. Return to Bangkok same evening.

Tuesday, June 29, 1993

Debriefing with Mr. R.J. Gurley (USAID).

Wrap-up meeting with Dr. Supat (PCD).

Wednesday, June 30, 1993

Return to U.S.

**APPENDIX B**  
**PERSONS AND ORGANIZATIONS VISITED**

**APPENDIX B**  
**PERSONS AND ORGANIZATIONS VISITED**

Taiwan Environmental Protection Administration

Mr. Larry Chen, Deputy Administrator  
Mr. Howard Chen, Director General  
Mr. Shuenn-Chin Chang, Director of the Bureau of Environmental Monitoring and Data Processing

The Pollution Control Department of the MOSTE

Dr. Pakit Kiravanich, Director General  
Dr. Supat Wongwangwatana, Acting Director, Air Quality and Noise Management Division  
Thalcarngsak Petchsuwan  
Mr. Chinoros Donpim  
Dr. Oranut Paisarnuchapong, Environmental Scientist  
Ms. Patcharawadee Suwanathada, Environmental Scientist

The World Environment Center - Thailand

Ms. Wanida Srichai  
Mr. Chalot Sripicharn  
Mr. Chakthep Senivongs

USAID Regional Mission in Thailand

Mr. R.J. Gurley, Business Advisor

Bureau of the Budget

Ms. Sasiphat Swetwatna, Deputy Budget Director

Ministry of Public Health, Environmental Health Division (EHD)

Ms. Nantana Santatiwut, Director-EHD  
Ms. Udomlak Sritusnee, Environmental Scientist-EHD  
Ms. Chanika Haemapun, Environmental Engineer

Electricity Generating Authority of Thailand (EGAT)

Mr. Kitti Kumpeera, Chief, Ecology and Environment Division  
Mr. Prakrit Ongkananantlert, Environmental Engineer, Ecology and Environment Division

**APPENDIX C**  
**BUSINESS CARDS OF PERSONS VISITED**



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**APPENDIX D**  
**CURRICULUM VITAE OF MISSION EXPERT**

UNIVERSITY OF CALIFORNIA



# **SCOTT T. JENKINS**

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## **Education**

B.S.. Botany/Chemistry, The University of Texas at Austin, 1976.

## **Experience**

Program Manager, Corporate Operations Staff, Radian Corporation, Austin, TX, 1990-Present.  
Group Leader, Aerometric Services, Radian Corporation, Austin, TX, 1986-1990.  
Group Leader, Quality Assurance for Air Monitoring, Radian Corporation, Austin, TX, 1984-1986.  
Staff Scientist, Radian Corporation, Austin, TX, 1981-1984.  
Senior Instrument Engineer, Radian Corporation, Austin, TX, 1978-1981.

## **Fields of Experience**

During his thirteen years with Radian, Mr. Jenkins has been involved in the design, operation, quality assurance and project management of numerous ambient air, air toxics, and meteorological evaluation programs. Specific examples of his work in these areas include:

- Project Manager for the expansion of the SEDUE Environmental Monitoring Network in Mexico City. Radian is expanding existing monitoring capabilities, implementing state-of-the-art atmospheric profiling systems, and developing an integrated database management system complete with all hardware systems for SEDUE.
- Project Manager for regional monitoring programs in southeast Texas and southwest Louisiana, conducted to provide input into state implementation plan development. Program designs provide measurements of ozone and ozone precursors including integrated sampling for selected species of volatile organic compounds.
- Project Director--Pre-Construction Monitoring in Support of PSD Permits. Projects include pre-construction monitoring for numerous clients in the electrical generation, chemical, and petroleum industries.

## **Scott T. Jenkins**

- **Project Manager for EPA sponsored development of an air toxics sampling manual. EPA received a comprehensive manual for the program design and sampling of air toxics including VOC, PCB, PAH, PCDD, PCDF, and heavy metals.**
- **Project Manager for the design and implementation of a baseline air toxics monitoring program to establish levels of selected volatile organic compounds, heavy metals, and polychlorinated biphenyls near a proposed hazardous waste incinerator.**
- **Project Manager for the implementation of an environmental monitoring network in the El Paso/Juarez airshed sponsored jointly by EPA and SEDUE. This network of air quality and meteorological systems is designed to characterize the unique meteorology of the airshed as well as the trans-boundary flux of pollutants. This is the first cooperative monitoring program between EPA and SEDUE.**
- **Project Manager for the establishment of a quality assurance and standards laboratory for SEDUE in Mexico City. The laboratory is to provide traceability and continuity of air quality and meteorological measurements throughout Mexico.**
- **Project Manager for the design of an in-plant safety monitoring network at a mercaptan production facility. Design objectives are to size the network of sensors to be cost effective yet provide plant management detailed information on worker exposure to hydrogen sulfide.**
- **Task Leader to develop a review of existing air quality measurement capabilities in Taiwan and to develop a specification for the implementation of an island-wide monitoring network under a contract with the Taiwan EPA.**
- **Project Director--Air Quality Assessments at Hazardous Wastes Site Remediations. Radian recently completed the clean-up of a petroleum products waste site in the western U.S. The project provided safety and perimeter air monitoring data for SO<sub>2</sub> and VOC to the PRP.**