

APPENDIX-1

LIST OF COUNTER PERSONNAEL

List of Steering Committee Members

| Institution | Name |
|-----------------|------------------------|
| EAAB-ESP | Ernesto Restrepo V. |
| | Oscar Garcia P. |
| | Gino Gonzalez R. |
| | Elsa Garcia Salazar |
| CAR | Sergio Gaviria |
| | Hernando Nino |
| | Alvaro Forero |
| | Oscar Villalba |
| | Francisco Castrillon |
| DAMA | Oscar Osorio |
| | Luis Antonio Jaramillo |
| ACCI | Valerie Jordan |
| INGEOMINAS | Matria Eugenia Sanchez |
| | German Ospina |
| | Mirian Rios S. |
| IDEAM | Omar Vargas |
| ASOCOLFLORES | Juan Carlos Isaza |
| JICA STUDY TEAM | Masatomo Watanabe |
| | Hiroshi Nakamura |

List of Counter Personnel

| No | Grupe | Institution | Name | Profession | Tel, Fax |
|----|---------|-----------------|-----------------------|--|----------------------------------|
| 1 | A,B,C | JICA Study Team | Masatomo Watanabe | Team Leader and G:W Development Plan | 3101186 Fax: 3134882 |
| 2 | A,B | | Hiroshi Nakamura | Hydrogeology | 3121556 |
| 3 | A,B | | Katsuya Kamisato | Hydrogeology | 3121556 |
| 4 | A,C | | Yuji Hatakeyama | Water Quality | 3121556 |
| 5 | A | | Keiichi Ikeda | Drilling | 3121556 |
| 6 | A | | Kurarei Iwake | Geophysic | 3121556 |
| 7 | A | | Kazumi Suwabe | Geographic Information System | 3121556 |
| 8 | B | | Junichi Usami | Design and Cost Estimate | 3121556 |
| 9 | A,B | | Makoto Honma | Groundwater Simulation | 3121556 |
| 10 | B,C | | Noboru Osakabe | Economic, Financial and Social Evaluation | 3121556 |
| 11 | B,C | | Naoki Hara | Institution/Human Resource Development | 3121556 |
| 12 | A,B,C | | | Akihiro Shimomura | Coordinator |
| 13 | B, C | EAAB | Ernesto Restrepo V. | Civil Engineer . | 3447086 |
| 14 | B, C | | Oscar Garcia | Civil Engineer . | 3447132 |
| 15 | A | | Mauricio Velástegui | Electric Engineer | 3447786 |
| 16 | A,B | | William Moreno | Civil Engineer | 3447793 |
| 17 | A | | Laura E. Rodriguez | Civil Engineer | 3447817 |
| 18 | A,B,C | | Nubia León | Chemical Engineer | 3447814 |
| 19 | A | | Hugo Ariza Forero | Proffesional | 3447000 ext 4287 |
| 20 | A | | Nestor Fonseca | Chemistry Engineer | 3447056 |
| 21 | A,B,C | | Elsa García Salazar | Chemistry Engineer | 3138810 ext 875 |
| 22 | A | | Maurico Vera | Environmental Engineer | 3447814 |
| 23 | A,C | | Juan Daniel Avila | Environmental Engineer | 3447814 |
| 24 | A,B | | Pedro Buitrago | Geographic Engineer | 3447810 |
| 25 | A,B,C | | Gustavo Herran | Hydrologist | 3447054 |
| 26 | C | | Diego Renteria | Economist | 3447873 |
| 27 | A,C | | Juan Jose Gonzalez | Electric Engineer | 3447042 |
| 28 | A | | Gino Gonzalez | Civil Engineer | 3447150 |
| 29 | B,C | | Reynaldo Pulido | Civil Engineer | 3444560 |
| 30 | A | CAR | Sergio Gaviria | Geologist | 3209000 |
| 31 | A,B,C | | Hernando Niño | Hydrologist | 3209000 |
| 32 | A,B | | Edith Alayón | Chemist | 3209000 |
| 33 | B,C | | Leonardo Niño | GIS ewngineer | 3209000 |
| 34 | A,B,C | | Jairo Pérez | Proffesional | 3209000 |
| 35 | A, B, C | | Oscar Villalba | Civil Engineer | 3209000 |
| 36 | B,C | | Rodrigo Vargas | Geologist | 3209000 |
| 37 | A,B,C | | DAMA | Luis Antonio Jaramillo | Geologist |
| 38 | A | Aurita Avello | | Environmental | 4441030 |
| 39 | A,B,C | Oscar Osorio | | Geologist | 4441030 ext 671 fax: 3362628 |
| 40 | A | Marcela Cañón | | Environmental | 4441030 |
| 41 | A | INGEOMINAS | Germán Ospina | Geologist | 2200168 fax: 2220824 |
| 42 | A,B,C | | Mauricio Muñoz | Geologist | 2200061 |
| 43 | B,C | | Mirian Rios S. | Geologist | 2200168 |
| 44 | A | | Maria Consuelo Vargas | Chemical Engineer | 2221811 |
| 45 | A | | Luis Alberto Moreno | Geographic Inf. System | 2221811 |
| 46 | A,B,C | | Olga Bermoudez | Hydrologist | 2221811 |
| 47 | A | | Mario Riveros | Drilling | 2221811 |
| 48 | A | | Eduardo Chilito | Environment | 2221811 |
| 49 | B,C | | Carlos Julio | Geologist | 2221811 |
| 50 | B, C | | Gloria Hincapie | Geologist | 2221811 |
| 51 | A | | Jairo Esquivel | Geophysics | 2221811 |
| 52 | A,B,C | ASOCOLFLORES | Juan Carlos Isaza | Environmental Matter | 2183693 ext 0115 fax: 2183693 |
| 53 | A,B,C | IDEAM | Omar Vargas | Hydrologist | 6356035 |

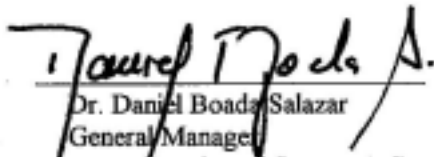
APPENDIX-2

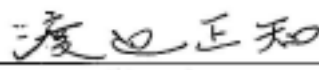
MINUTES OF MEETINGS

MINUTES OF MEETINGS
ON
INCEPTION REPORT
OF
THE STUDY ON
SUSTAINABLE GROUNDWATER DEVELOPMENT
FOR BOGOTA PLAIN
IN
THE REPUBLIC OF COLOMBIA

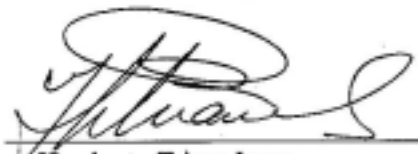
AGREED UPON BETWEEN
WATER SUPPLY AND SEWERAGE COMPANY OF BOGOTA
AND
THE STUDY TEAM OF
JAPAN INTERNATIONAL COOPERATION AGENCY

Bogotá, December 22, 2000


Dr. Daniel Boada Salazar
General Manager
Water Supply and Sewerage Company
of Bogotá


Masatomo Watanabe
Leader,
the Study Team,
Japan International Cooperation Agency

Witness


Humberto Triana Luna
Planning Manager
Water Supply and Sewerage Company
of Bogotá


Toshiaki Furuya
Resident Representative,
Colombia Office,
Japan International Cooperation Agency

In accordance with the Scope of Work for the Study on Sustainable Groundwater Development for the Bogotá Plain (hereinafter referred to as "the Study") agreed upon between the Government of the Republic of Colombia, Water Supply and Sewerage Company of Bogotá (hereinafter referred to as "EAAB") and Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA dispatched a Study Team for the Study (hereinafter referred to as "the JICA Study Team") to Colombia.

The JICA Study Team submitted 20 copies of Inception Report of the Study (English and Spanish version respectively) to EAAB on December 18, 2000. Series of meetings and discussions were held among EAAB, related authorities concerned and the JICA Study Team. The participants of the meetings are listed in Attachment-1. These Minutes of Meetings summarize the results of discussions on the Inception Report.

Colombian side agreed with the contents of the Inception Report which includes the policies, methodology and schedule for the Study implementation, and made comments as listed below.

- (1) According to the Scope of Work for the Study, the both side confirmed that the objectives of the Study are as follows.
 - 1) to evaluate potential of water resources, focusing on groundwater
 - 2) to investigate the current situation of the environment related to groundwater
 - 3) to formulate a development plan of groundwater
 - 4) to pursue technology transfer to counterpart personnel in the course of the Study
- (2) The purposes of sustainable groundwater development by EAAB are; 1) alternative water source in emergency cases, such as accidents in water facilities or extraordinary droughts, 2) additional water sources feasible from technical, economic and environmental points of view to correspond to future demand.
- (3) Results of the existing studies, such as those on well inventory, isotope measurement, satellite image analysis, and projection of future socio-economic framework and water demands, will be evaluated and fully used for the Study.
- (4) Water quality standards prevailing in Colombia and Bogotá will be primarily applied in the Study.
- (5) Colombian side requested the JICA Study Team for consultation and supervision for exploratory wells constructed by EAAB through the Study.
- (6) Well inventory surveys and groundwater contamination surveys will be conducted according to the format used by INGEOMINAS after examination of the format by the JICA Study Team.
- (7) Specification of drilling and well test will be determined by the JICA Study Team after examining results of past test drilling.

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- (8) As a result of discussion, the both side understand that depression of groundwater level, which may cause that of water level in Bogotá wetlands, might be resulted not from over pumping but from decrease in groundwater recharge caused by less infiltration of rainwater in urban areas or by other reasons.
- (9) Colombian side requested for simulation for forecasting future change in water levels, wetland behavior, and water quality in the Study Area. The simulation will be carried out after building a water balance model with parameters, such as river discharge, precipitation, groundwater level and flow, and pollution loads.
- (10) The pilot study for artificial groundwater recharge will include examination of water quality as well as water volume.
- (11) In simulation of groundwater contamination, movement and distribution of contaminants will be included.
- (12) Colombian side requested the JICA Study Team to conduct a riverbed survey on heavy metal and aromatic components and increase the samples to 8 locations in Phase-2 of the Study.
- (13) Survey on groundwater contamination should include recommendation of countermeasures for protection of aquifers.
- (14) Colombian side requested JICA Study team again to increase meteorological stations for the Study to 10 locations in Phase-2 of the Study.
- (15) The both side agreed that the results of the Study will be open to the Public at the end of the Study.
- (16) Members of the Steering Committee have already been determined as listed in Attachment-2. Counterpart team will be established and grouped as proposed by the JICA Study Team with the participation of the staff of EAAB and other organizations concerned.

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ATTENDANT LIST, DECEMBER 18, 2000, EAAB

JICA Study Team

| | |
|-------------------|--------------------------------|
| Masatomo WATANABE | Mission Leader |
| Akihiro SHIMOMURA | Coordinator |
| Hiroshi NAKAMURA | Hydrology, Hidrogeology. |
| Katsuya KAMISATO | Hydrology and Hydraulics |
| Yuji HATAKEYAMA | Environment |
| Kuraei IWAKI | Geophysics |
| Keiichi IKEDA | Drilling Wells |
| Makoto HOMMA | Simulation, Numerical Analysis |
| Naoki HARA | Institution. |

JICA COLOMBIA

| | |
|------------------|--------------------------------|
| Naoki KAMIJO | Deputy Resident Representative |
| Takahiro IKENOUE | Assistance and Coordinator |

EAAB

| | |
|----------------------|--|
| Daniel BOADA SALAZAR | General Manager |
| Humberto TRIANA LUNA | Planning Manager |
| Jairo RODRIGUEZ | Technical Manager |
| Santiago MONTEJO | Operation Manager |
| Hernando MEDELLIN | Environmental Unit Director |
| Daniel POSADA | Investigation Center Director |
| Nestor Raul Garcia | Sewerage and Water Supply Director |
| Gino GONZALEZ | Sewerage and Water Supply, Professional Ground |
| | Water Development Coordinator |
| Mauricio VELASTEGUI | Operation Professional |
| William MORENO | Operation Professional |
| Nestor FONSECA | Operation, Water treatment Professional |
| Laura RODRIGUEZ | Investigation Center, Soil Professional |
| Nubia LEÓN | Investigation Center, Chemistry Laboratory |
| | Professional |
| Gustavo HERRÁN | Investigation Center, Hydrology Professional |
| Mauricio VERA | Environmental Unit, Professional |
| Juan Daniel Avila | Environmental Unit, Professional. |
| Juan José GONZALEZ | Technical Professional |
| Hugo ARIZA | Technical Professional |
| Elsa GARCIA SALAZAR | Study Coordinator, Sewerage and Water Supply, |
| | Ground Water, Professional. |

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ATTENDANT LIST, DECEMBER 19 AND 20, 2000, EAAB

JICA Study Team

| | |
|-------------------|--------------------------------|
| Masatomo WATANABE | Mission Leader |
| Akihiro SHIMOMURA | Coordinator |
| Hiroshi NAKAMURA | Hydrology, Hidrogeology. |
| Katsuya KAMISATO | Hydrology and Hydraulics |
| Yuji HATAKEYAMA | Environment |
| Kuraei IWAKI | Geophysics |
| Keiichi IKEDA | Drilling Wells |
| Makoto HOMMA | Simulation, Numerical Analysis |
| Naoki HARA | Institution. |

EAAB

| | |
|---------------------|---|
| Gino GONZALEZ | Sewerage and Water Supply, Professional Ground Water Development Coordinator |
| Mauricio VELASTEGUI | Operation Professional |
| William MORENO | Operation Professional |
| Laura RODRIGUEZ | Investigation Center, Soil Professional |
| Nubia LEÓN | Investigation Center, Chemistry Laboratory Professional |
| Gustavo HERRÁN | Investigation Center, Hydrology Professional |
| Juan José GONZALEZ | Technical Professional |
| Hugo ARIZA | Technical Professional |
| Hernando MEDELLIN | Environmental Professional |
| Elsa GARCIA SALAZAR | Study Coordinator, Sewerage and Water Supply, Ground Water, Professional. |

DAMA

| | |
|---------------------|------------------------|
| José Manuel AMAYA | Planning Sub-director |
| Oscar OSORIO | Environmental Quality |
| Luis Alberto GARCIA | Environmental Quality. |

INGEOMINAS

| | |
|---------------|--------------------------------|
| Germán OSPINA | Ground Water Resource Director |
|---------------|--------------------------------|

CAR

| | |
|----------------------|-------------------------|
| Sergio GAVIRIA | Scientific Sub-director |
| Jairo PÉREZ | Environmental quality. |
| Hernando NIÑO | Scientific Unit |
| Francisco CASTRILLÓN | Hydrogeologist. |

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LIST OF STEERING COMMITTEE MEMBER

| | |
|----------------------|---------------------------|
| Ana MercedesMaturana | ACCI |
| Oscar Edmundo Díaz | Councillor for the Nation |
| Oscar Osorio | DAMA |
| Germán Ospina | INGEOMINAS |
| Sergio Gaviria | CAR |
| Gino Gonzalez | EAAB |

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THE STUDY ON SUSTAINABLE GROUNDWATER DEVELOPMENT
FOR BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA.

Record of Discussion of Steering Committee for
Committee Meeting No.1

Date: 5 of January of 2001
Time: 9:30 am.
Place: EAAB Office
Attendents:

| | |
|------------------|-------------------|
| EAAB - ESP: | Gino Gonzalez R. |
| DAMA: | Oscar Osorio |
| INGEOMINAS: | German Ospina |
| CAR: | Sergio Gaviria |
| JICA STUdT TEAM: | Masatono Watanabe |

- (1) EAAB informed that according to the Inception Report submitted for implementation of the Study to the related entities by JICA Study Team, on 18th of December of 2.000, Steering Committee for the Study will be established as follows:
 - Steering Committee, which consists of the representatives from EAAB, DAMA, INGEOMINAS, CAR, ACCI and Councilor for the Nation whose members have already been named by the respective entities. The representative of EAAB will chair this committee.
 - The meeting of Steering Committee will be held at least twice per month. The committee will discuss, determine, and give the guidelines for the implementation of the Study. The Committee will also analyze and evaluate the progress and results of the Study together with the JICA Study Team Leader.
 - Although establishment of a technical committee is proposed in the Inception Report, a technical committee will not be organized because Steering Committee will also discuss and settle technical matters.
- (2) Joint Study Team (JICA Study Team and Counterpart Team) will divided into three working groups as follows:

| | |
|----------|-----------------------------------|
| Group A: | Ground Waters Potential Analysis. |
| Group B: | Planning Groundwater Development. |
| Group C: | Evaluation of the Project. |
- (3) In the present meeting, a table of the groups has been handed out to the attendants. The table shows the targets and subjects that should be worked out by each group, and name of each group leader for JICA Study Team and Counterpart Team. The table presents in detail the specialties of the JICA Study Team members by working group.
- (4) EAAB requested the members of Steering Committee that each entity should nominate before day 11 of January 2001, the members or persons who will participate in each working group and in each subjects of work indicated in the table. The establishment of


these working groups is inevitable to follow the schedules of different phases of the Study, mainly for the Phase-1, which will end in the middle of March 2001.

- (5) EAAB informed that in the last two weeks EAAB has been working in such topics as geophysics and hydrogeology with the JICA Study Team and with persons from INGEOMINAS.
- (6) CAR expressed that CAR would like to participate in the development of the study and assign experts for the three working groups. CAR would concentrate the efforts on the environmental point of view. CAR hopes that the results given by the Study would be positive from the environmental point of view.
- (7) In addition, CAR afraid that according to the scope of Inception Report presented by JICA Study Team, an groundwater resources development program will be formulated without taking account of sustainable development from the environmental point of view
- (8) JICA Study Team explained that the scope of the Study is to improve and upgrade the existing information of all matters related to the groundwater, from all points of view including environmental ones. Since the entities that administer, manage and study the groundwater resources, at the moment do not have the precise and detailed information on groundwater resources, the Study is to carry out the necessary activities to know deeply the groundwater resources for the Bogotá Plain.
- (9) EAAB and the JICA Study Team indicate to CAR that CAR should actively participate in the whole course of the Study, as CAR expressed they will, in order to reflect their opinions on the Study.
- (10) EAAB repeated that in several occasions EAAB has explained CAR that there was a decision or an agreement on the basis of the results of the Hydrogeologic Investigation Study which EAAB and DAMA implemented for the Capital District during the years from 1999 to 2000. A decision was that the EAAB would not include groundwater as source of water supply for the future water supply projects, if the abundant and sustainable groundwater potential would not be confirmed in the current Study. The current EAAB water supply capacity of 25 m³/s will guarantee the water distribution to the Bogotá City areas and the neighboring municipalities approximately until the year of 2015, while the current demand is about 15 m³/s. After the year of 2015, the project called Chingaza II should be entered, which will prepare additional 6 m³/s for the City. In the future plan for years after 2025, Sumapaz Project of additional 18 m³/s is proposed.
- (11) JICA Study Team explained that if at the moment CAR or any other entity of the state has the detailed and deep knowledge on the groundwater resources of the Bogotá Plain, the knowledge would be the base to make administrative decisions for management of the resources. The CAR explained that they do not have this knowledge at the moment.
- (12) CAR showed, in the meeting, some sketch maps which show groundwater level and hydrogeological conditions of the Bogotá Plain.
- (13) DAMA and INGEOMINAS informed that for these entities the Study developed with JICA Study Team is very good and important since at the moment there is a lot of


ignorance regarding the resources of groundwater, and that they will participate actively in the whole development of the Study.

- (14) EAAB expressed thanks to INGEOMINAS collaboration that the Study Team has offered to this entity in the last two weeks, specifically for activities of geophysical survey. The Study Team had established already the localization of 70 points in the Bogotá Plain to carry out the geophysical investigation through the CSAMT method proposed by JICA Study Team.
- (15) INGEOMINAS expressed that this entity will submit by the end of February to EAAB the interpretation of the isotopic study, now being implemented by INGEOMINAS.
- (16) JICA Study Team informed that on January 9th, Tuesday, the Team presented the proposed locations for the six exploratory wells that will be drilled by a local consultant. EAAB requested CAR to grant the drilling permits in the possible shortest period for the reason that the drilling work should be completed at the end of February in the Phase-1 of the Study.

The first meeting of the Steering Committee was concluded at 11:00 am, and the chairman of the Committee and the Leader of the Study Team signed hereinafer:



Gino Gonzalez R.
Chairman of the Committee
EAAB - ESP



Masatomo Watanabe
Leader of
JICA Study Team

THE STUDY ON SUSTAINABLE GROUNDWATER DEVELOPMENT
FOR BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA.

Record of Discussion of Steering Committee for
Committee Meeting No.2

Date: March 8, 2001
Time: 9:30 am.
Place: EAAB Office
Attendants:

| | |
|------------------|--|
| EAAB - ESP: | Gino Gonzalez R. Elsa Garcia S. |
| INGEOMINAS: | German Ospina |
| CAR: | Sergio Gaviria Francisco Castrillon |
| JICA STUDY TEAM: | Masatono Watanabe Hiroshi Nakamura Keiichi Ikeda |

<Drilling Program in Phase-2>

- (1) The EAAB Representative states that, within the framework of the Underground Water Study Master Plan, it has a research program for these tasks, to be undertaken during years 2001, 2002, 2003 and 2004; therefore EAAB requested the Japanese Mission, currently conducting underground water research, to set the sites for exploratory wells and provide the relevant technical justification, in order to do its best with the budget it has allocated for this purpose.
- (2) The Study Team explained the well sites selected by the Team for the exploratory drilling to be implemented by EAAB in Phase-2, and other explanations are as follows: The selected sites are located in Ciudad Bolívar, Vitelma and in La Aguadora. The proposed depth of each well in these areas is around 500m. The site in Subachoque is also proposed. The proposed depth of this well is more than 200m. These sites, except for the site in Ciudad Bolívar have been visited and confirmed by the members of the Study Team. The technical justification of each exploratory well was presented to the attendants in the Workshop held in March 6, 2000.
- (3) CAR requested it to EAAB that EAAB shall make the hydrogeological justification documents of the new points selected for the exploratory drilling in the next phase, including the environmental considerations of each point. CAR said that at this time CAR does not make any decision whether the points are correct ones or not. CAR does not want to accept any points without knowing the hydrogeological conditions and analysis of the cost/benefit of the proposed points for the better improving of hydrological knowledge of the Bogotá Plain. CAR manifested that CAR would like to propose other points

<Pilot Study in Phase-2>

- (4) The Study Team explained the program of Pilot Study as follows: The Pilot Study in Phase-2 will be financed mainly by JICA. Although the budget for this Pilot Study is not fixed yet, the Team will propose finally one or two locations for the Pilot Study

according to the allocated budget. The proposed candidate locations are three (3) sites (Vitelma, Aguadora and Subachoque) proposed in the Exploratory Drilling Program in Phase-2, and one location at La Salle where the exploratory well drilling is now being carried out by EAAB. At three sites (Vitelma, Aguadora and La Salle) located at the eastern mountain foot, the Pilot Study will confirm the applicability of groundwater recharge into the Cretaceous aquifer namely Guadalupe Formation. At the site in Subachoque, the Quaternary aquifer namely Tilata formation can be recharged. The technical justification of methodology and locations were presented to the attendants in the Workshop held in March 6, 2000.

- (5) The Study Team states that they are preparing a document that shall contain the hydrogeological and environmental justification for the exploratory drilling projects to be undertaken under Phase II, as well as that for the Recharge Pilot Projects.
- (6) The Study Team wants to know whether CAR is interested in the Pilot Study in Subachoque because the area is legally managed by CAR from the viewpoint of environmental conservation.
- (7) CAR does not show any decision and intention on the Pilot Study at this moment in time, without having a hydrogeological and environmental support on the proposed sites in document. CAR is afraid that if CAR does not provide any money to the project, CAR's new proposal for other locations won't be taken into account.
- (8) INGEOMINAS said that INGEOMINAS supports the Pilot Study proposed by the Study Team totally and offers to collaborate a document endorsed by the institution in which the hydrogeological conditions of the locations are described in question by CAR.

The second meeting of the Steering Committee was concluded at 11:30 am, and the chairman of the Committee and the Leader of the Study Team signed hereinafer:



Gino Gonzalez R.
Chairman of the Committee
EAAB + ESP



Masatomo Watanabe
Leader of
JICA Study Team

THE STUDY
ON
SUSTAINABLE GROUNDWATER DEVELOPMENT
FOR
BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA.

*Record of Meeting on Progress Report jointed with
Steering Committee Meeting - No.3*

On March 15th 2001, Meeting on Progress Report jointed with the 3rd Steering Committee Meeting was held at the Auditorium, EAAB – ESP. Refer to Attachment: Attendant List

At 9:15 am, Mr. Gino GONZALEZ, the chairman of the Steering Committee for the Study opened the Meeting, and gave the opening address with thanks to JICA Study Team for the activities in Phase-1 and to the attendants from the related organizations for their cooperation to the Study, and introduced Mr. Masatomo Watanabe, the leader of the JICA Study Team.

Mr. Watanabe expressed his sincere appreciation to all the Counterparts for their positive participation to the Study and explained the outline of the Study progress as follows: The Study in Phase-1 has been well implemented almost on schedule except for the Exploratory Drilling which was behind schedule due the delay of the acquisition of drilling permission and would be finished at the end of this month. The Study in Phase-1 clarified the natural and socio-economic current situations of the Study Area on groundwater. The main issue on groundwater development and conservation in the Bogota Plain is those who manage the groundwater do not know exactly the potential in time and space distribution and eventually groundwater is not properly allocated to the users. In this sense, the Study is very important and useful to the entities responsible for the groundwater management and also to the groundwater users.

The team leader also explained the study programs and time schedule for the next phase (Phase-2) and requested the Counterpart the following matters to be done during the Team's absence (from the middle of March to middle of May, 2001):

- Preparation for Exploratory Wells and Pilot Study

For the proposed exploratory wells (to be implemented by EAAB and supervised by the Study Team) and for the proposed pilot study, the counterpart shall acquire the necessary lands from landowners and drilling permission from the related authority.

- Preparation for Installation of Proposed Meteorological Stations

For the installation of the meteorological stations proposed by EAAB, the counterpart shall secure necessary lands from the landowners. The contracts for the land acquisition between the landowner and EAAB will be concluded after the JICA Consultant will confirm finally the budget for these stations.

- Observation and Maintenance of Monitoring Wells Installed in Phase-1


The monitoring wells (6 wells installed by the Study Team and 3 wells installed by EAAB) will be monitored and maintained by EAAB.

Following the explanations from the team leader, the experts presented the progress of the Study including:

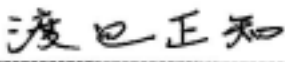
- Collection of Existing Data
- General Comprehension of the Study Area
- Land Use Analysis with Satellite Images
- Environmental Survey
- Geophysical Survey
- Exploratory Well Drilling
- Groundwater Level Observation
- Water Quality Survey
- Isotopic Analysis

After the explanations from the Study Team and questions & answers among all the attendants, the Counterpart and the Steering Committee accepted the Progress Report prepared by the Study Team.

The Meeting on Progress Report jointed with the 3rd Steering Committee Meeting was concluded at 11:30 am, and the chairman of the Committee and the Leader of the Study Team signed hereinafter:



Gino Gonzalez R.
Chairman of the Committee
EAAB - ESP



Masatomo Watanabe
Leader of
JICA Study Team

LISTA DE ASISTENTES , Marzo 15 de 2001.

JICA Study Team

| | |
|-------------------|-------------------------------------|
| Masatomo WATANABE | Mission Leader |
| Hiroshi NAKAMURA | Hydrology, Hidrogeology. |
| Katsuya KAMISATO | Hydrology and Hydraulics |
| Yuji HATAKEYAMA | Environment and Satellite |
| Keiichi IKEDA | Drilling Wells |
| Makoto HOMMA | Simulation, Numerical Analysis |
| Gustavo CALDERÓN | Advisor JICA study team. |
| Yukio CHIKU | Corporation Advisor (JICA Colombia) |

EAAB

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|---------------------|--|
| Gino GONZALEZ | Sewerage and Water Supply, Professional Ground, Water Development Coordinator |
| Laura RODRIGUEZ | Investigation Center, Soil Professional |
| Nubia LEÓN | Investigation Center, Chemistry Laboratory |
| Gustavo HERRÁN | Investigation Center, Hydrology |
| Juan José GONZALEZ | Technical Professional |
| Elsa GARCIA SALAZAR | Study Coordinator, GroundWater Supply. |
| Morelia ALVAREZ | Environmental Unit |
| Efrain GARCIA | Sewerage and Water Supply, Professional. |
| Carlos RODRIGUEZ | Hydrogeologist Consultant of EAAB |

DAMA

| | |
|---------------------|------------------------|
| Oscar OSORIO | Environmental Quality |
| Luis Alberto GARCIA | Environmental Quality. |

CAR

| | |
|----------------------|--|
| Francisco CASTRILLÓN | Subdireccion Scientist, Professional . |
|----------------------|--|

IDEAM

| | |
|-------------|--------------------------------------|
| Omar VARGAS | Hydrology Subdirection, Professional |
|-------------|--------------------------------------|

ASOCOLFLORES

Juan Carlos ISAZA

Manager of environmental Issues

JICA STUDY TEAM CONSULTANTS

| | |
|---------------------------------|-----------------------|
| Luis E. ESCOBAR (CIC) | Manager |
| José N. GOMEZ (CIC) | Technical submanager. |
| Omar TRUSINO (LAQMA) | Professional |
| Luis M. AVELLANEDA (TEC.QUIMIA) | Professional |
| Carlos CEDEÑO (LAQMA) | Advisor |
| Martha CARPINTERO (LAQMA) | Manager |

THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA

*Record of Discussion of Steering Committee for
Meeting No. 1 in Phase 2*

Date: 28 of June of 2001
Starting Time: 10:20 am
Place: EAAB Office
Attendants:
EAAB –ESP: Ernesto Restrepo V.
Elsa Garcia Salazar
DAMA: Oscar Osorio
INGEOMINAS: Miriam Ríos S.
CAR: Hernando Niño
ACCI: Valerie Jordan
IDEAM: Omar Vargas
ASOCOLFLORES: Juan Carlos Isaza.
JICA STUDY TEAM: Masatomo Watanabe
Hiroshi Nakamura

Discussions:

- (1) EAAB introduced formally the new members of the Committee from INGEOMINAS, CAR, ACCI and EAAB itself.
- (2) Mr. Watanabe, leader of JICA Study Team, requested to all the participants a more active participation for phase 2 of the study.
 - He pointed out the limitations related to the environmental management in Bogotá Plain responsible for CAR and DAMA, which would not allow the uniform distribution of the ground water resource.
 - He asked for a dynamic participation of ASOCOLFLORES and IDEAM.
 - Also he mentioned the three phases that compose this study: Phase for General Comprehension, Phase for Potential Assessment and Phase for Master Plan Formulation.
 - He talked about the importance of Workshops in this study, the more every institution participate on it, the more technological transfer will be given to the counterpart.
 - He said that some of activities to be implemented in this phase will be subcontracted by the Mission.
 - He believes that a coordinated work will reproduce well for every one.
 - Finally he explained that it is necessary to assess the process at each Committee meeting so that the technical transfer through discussions and joint work can be given to the institutions and remained in each institution.
- (3) Due to some misunderstandings at phase 1 about the roll of ACCI on this study, ACCI clarified that the institution is in charge to help smooth conversations between foreign institutions like JICA and some local diplomatic institutions, but ACCI do not solve the problems related to legal documentation required by the Colombian authorities to allow members of different Missions to stay in our country.
- (4) ASOCOLFLORES agreed to the monitoring net work established by this study, but they want to know who will give the guarantee of sustainability of the net work once the study finish. CAR said that there is an inter-institutional coordination about this matter

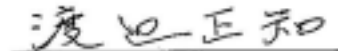
between CAR and EAAB in terms of surface water and that they expect in the near future this process will be extend to ground water monitoring network.

- (5) DAMA proposed a unified information management.
- (6) The JICA Study Team asked CAR a permission to review the monitoring network existing in this institution in order to suggest some modifications or adjustments if it is necessary for an improvement of its function.
- (7) The Committee planned to hold the Steering Committee Meeting on the last Thursday of each month. And the Workshops will start on July 6th.

This first meeting of phase 2 of the Steering Committee was concluded at 12 noon, and the chairman of the Committee and Leader of the JICA Study Team signed hereinafter:

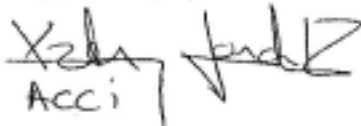


ERNESTO RESTREPO V.
Chairman of the Committee
EAAB - ESP



MASATOMO WATANABE
Leader of
JICA Study Team

Revisado por



VALERIE JORDAN
ACCI.

THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA
*Record of Discussion of Steering Committee for
Meeting No. 2 in Phase 2*

Date: 25 of July of 2001
Starting Time: 10:00 am
Place: EAAB Office
Attendants:
EAAB –ESP: Ernesto Restrepo V.
CAR: Hernando Nifio
ACCI: Valerie Jordan
IDEAM: Omar Vargas
CONSEJERIA: Juan Manuel Uribe
JICA STUDY TEAM: Masatomo Watanabe
Hiroshi Nakamura


Discussions:

- (1) EAAB promised to send copy of the Progress Report of this study and copy of the last Steering Committee Meeting to ACCI and CONSEJERIA.
- (2) IDEAM expressed their interest on the topic of GIS and requested EAAB a presentation of the project to the Director of IDEAM and Dra. Martha Garcia, chief of Hydrology Division of this Institution. There was an agreement in the way to be signed by CAR and IDEAM related to well data including record of well water level. This information is very important for the study, therefore JICA Mission should contact the personnel in charge of both institutions to know the aim of this agreement and its actual advance.
- (3) EAAB was requested to send, from now on, a copy of the record on previous Steering Committee Meeting and the related documents on the topics reviewed in the Committee, to the participants in order to have a better understanding and a complete preparation for those topics.
- (4) Workshops related to artificial recharge were held.
 - EAAB explained that this specific project aims to estimate the available groundwater and to obtain the techniques for recharging and exploiting the groundwater in Bogotá Plain. Vitelma was selected as the first place for pilot study that investigates some data, tests the effects of recharge on Cretaceous formation and also estimate volume of ground water at Bogotá Eastern hills.
 - EAAB is planning to make a second recharge project in the Quaternary formation in Subachoque and exploratory drilling at Ciudad Bolivar site. At this time there are problems of budget and the land ownership, but EAAB will trying to overcome these inconveniences.
 - CAR specifies that the recharge project will identify not only the amount of sustainable water available at the site of the Sabana but also the quality of water.
 - EAAB asked CAR about the signature of the agreement between these institutions for drilling works and use of San Cristobal River for the purpose of recharge. CAR answered that his Director would sign soon and emphasized that this agreement would not cover the permission for exploitation wells.
 - CAR said that different scenarios should be taken into account to consider the possible uses of ground water, keeping always the effects of the environmental impact to the study area in mind. Also CAR asked EAAB a copy of final results of exploratory drilling well in Suba site.

- (5) The participants of the Meeting requested EAAB from now on to record in detail comments and discussions generated by the institutions on each meeting. Also they wanted to have access to the whole information of the Japanese Mission. EAAB explained that so far this compilation work has been very much complicated more than expected, and so any question and request has to be done directly to the Mission or coordinator of the project.
- (6) JICA Study Team introduced a proposal (distributed in paper to every member) for the integrated management of groundwater resources in Bogotá Plain and expected to discuss this matter in the following meetings.
- (7) JICA Study Team proposed to establish a unified data base about the well inventory data owned by both CAR and DAMA and emphasized that also it would be necessary to crosscheck the information of relating organizations to avoid duplicity of functions related to groundwater in Bogotá Plain. CAR agreed to this proposal and had interest to know how it is managed in other countries and how they manage discrepancies between relating organizations. The Leader of the JICA Study Team explained that Japan for instance has a Ministry of Environment, the institutions related to it manage a very different topics one from another, and environmental matters are separated from water resources management to resolve the discrepancies in Japan
- (8) IDEAM agreed to the concept of JICA Study Team, but emphasized that from the actual situation of the inside of the state institutions in terms of modernization, it would be very difficult to reach the proposal. Also the institution wanted to review and update the actual laws including into them the users, not changing the laws.
- (9) ACCI offered a document prepared by the Ministry of Environment related to this matter.
- (10) So far JICA Study Team proposed a inter-institutional Committee to manage the groundwater in Bogotá Plain.
- (11) It was recommended by JICA Study Team to start discussions about the internal point of view related groundwater management in every institution in order to have a good general work in the next workshops related to this topic.
- (12) ACCI asked the Committee to include a check sign of ACCI inside every Record of the Steering Committee Meeting. It was approved by the members.

This second meeting of phase 2 of the Steering Committee was concluded at 12 noon, the chairman of the Committee and Leader of the JICA Study Team signed hereinafter, and ACCI checked hereinafter:


 ERNESTO RESTREPO V.
 Chairman of the Committee
 EAAB - ESP


 MASATOMO WATANABE
 Leader of
 JICA Study Team

Checked by


 VALERIE JORDAN
 ACCI.

THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA

Record of Discussion of Steering Committee for
Meeting No.3 in Phase 2

Date: 30 of August of 2001
Starting Time: 10:00 am
Place: EAAB Office
Attendants:
EAAB-ESP: Ernesto Restrepo V.
CAR: Oscar Villalba
DAMA: Oscar Osorio
ACCI: Valerie Jordan
INGEOMINAS: Adolfo Alarcón
ASOCOLFLORES: Juan Carlos Isaza.
IDEAM: Omar Vargas
CONSEJERIA: Juan Manuel Uribe
JICA STUDY TEAM: Hiroshi Nakamura
Naoki Hara

Discussions:

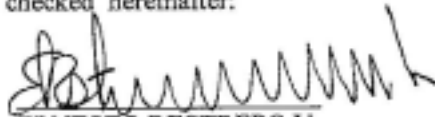
- (1) The JICA Study Team has started the Workshops related to Institutional Management of Ground Water Resource in Bogotá Plain.
 - In order to have a better picture of this topic, Mr. Hara from JICA Study Team, visited IDEAM, CAR, ASOCOLFLORES, EAAB, Ministry of Environment, ACCI, ONG (Al Verde Vivo) and INGEOMINAS. It will be good for the study that a member of the Ministry of Environment joins the Steering Committee.
 - In the workshops, some clarifications were made in order to promote the discussions, accumulate ideas and improve the mutual understanding among every institution mission.
 - The discussions were made from legal point of view and a different kind of discussions from technical and practical point of view is expected to start.
- (2) EAAB has identified 3 new points to install automatic level logger and to add this information to the monitoring network the Mission already has. The places are located at Detergentes S.A, Santa Mónica Flowers and Hacienda Guadarrama. Now EAAB is making the arrangement for the installation to start the monitoring process.
- (3) During phase 1, the Mission and EAAB selected 11 points to reinforce the actual network of meteorological stations in Bogotá Plain. Now it is the time to check by the related organizations if they agree with those points.
- (4) The Mission expects to start a environmental survey about the quality of river water and the riverbed materials at 8 rivers.
- (5) The Mission will start the compilation of well inventory through the subcontracted private company. The necessary data will be expected to come from CAR, IDEAM; DAMA, INGEOMINAS and ASOCOLFLORES. The Mission asked all related organizations for cooperation to this company about this matter.
- (6) The Mission will subcontract the preparation work of data base for 3 months period. For this, it is necessary to meet the members of each institution involved on GIS in order to get a system suitable for all the institutions. At the end of the study, this data base will

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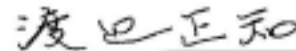
be common property and shared with all the organizations that have been working in this study .

- (7) The JICA Study Team will start the second survey on well water quality at 103 wells around Bogotá plain
- (8) The hydrogeological modeling for simulation work of Bogotá Plain will start in this phase using a program of Visual Modflow. At the first stage, a wide-area model will be developed in order to identify the groundwater flow direction and boundary conditions. After that a more detail model will be developed for the evaluation of the actual groundwater conditions in Bogotá Plain. Once the model is ready, an assessment of the potential groundwater in Bogotá Plain can be made. At the same time a water balance with the real information will help to find the amount of water available to recharge the aquifers of Bogotá Plain based on the balance made by INGEOMINAS in some years ago. The JICA Study Team expects that the process to generate the model and usage of the model could be explained and transferred step by step at each workshop.
- (9) The JICA Study team mentioned about the training courses that JICA promotes every year and many of the organizations members of the Steering Committee could be suitable for the course. From December to March, JICA will receive the application forms which should be submitted by ICETEX.
- (10) The members of the meeting requested that all the software used and developed in this study stay to remain in the counter part institutions.

This third meeting of phase 2 of the Steering Committee was concluded at 12 noon, the chairman of the Committee and Leader of the JICA Study Team signed hereinafter, and ACCI checked hereinafter:



ERNESTO RESTREPO V.
Chairman of the Committee
EAAB - ESP



MASATOMO WATANABE
Leader of
JICA Study Team

Checked by



VALERIE JORDAN
ACCI

THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA

Record of Discussion of Steering Committee for
Meeting No. 4 in Phase 2

Date: 27 of September of 2001
Starting Time: 10:00 am
Place: EAAB Office
Attendants:
EAAB-ESP: Ernesto Restrepo V.
CAR: Alvaro Forero
DAMA: Luis Antonio Jaramillo
ACCI: Valerie Jordan
INGEOMINAS: Maria Eugenia Sánchez
CONSEJERÍA/Alcaldía: Juan Manuel Uribe
IDEAM: Omar Vargas
JICA STUDY TEAM: Hiroshi Nakamura

Discussions:

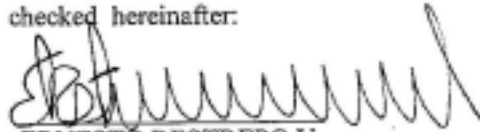
- (1) EAAB explained the delay of drilling work at Vitelma site for the pilot project of artificial recharge. The technical specifications were reviewed and the depth of drilling was changed from 500 to 300 m.
- (2) The JICA Study Team explained that HIDROGEOCOL already collected the information from DAMA and INGEOMINAS and the information collected by Mr. Nakamura in CAR would be very useful for the project.
- (3) EAAB have found some alternatives for the exploratory drilling at Subachoque site. It will be necessary to go to the field and check if the land, that was offered to implement this project, is suitable or not. EAAB is preparing the technical specifications of this drilling.
- (4) EAAB explained that the 11 meteorological locations were already fixed and the company for installation work was already contracted by the JICA Study Team. CAR asked whether it could be possible to stand one of those stations in Chocontá to observe other wells. The Mission answered that they were charged since the beginning of this project to select these places with the main target to improve the actual monitored data. Anyway, the Mission will study CAR's proposal if it does not delay the progress of the installation of the other stations.
- (5) The JICA Study Team has already started the simulation on visual Modflow using the model developed by DAMA and EAAB in year 2000. The model will include different methods according to the behavior of some parameters. Anyway, the model should be fed in the future by all the related organizations.
- (6) The workshops about simulation will start on the 4th of October 2001 and be held in every Thursday.
- (7) CAR asked HIDROGEOCOL for a good management of the well inventory information policy after the consultant sent this policy can start to review the all information of CAR.
- (8) INGEOMINAS explained that there would be no problem for them to provide the information requested by the JICA Study Team, but they have to sign a legal paper like a free use of the Hydro-geological information from CAR.
- (9) EAAB proposed to sign an agreement among all the related organizations. But still it is not clear how to manage to compile information after the study finishes. At this moment,

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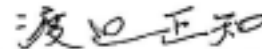
a record of a special meeting can be signed where every member allows the Mission to use the information and at the end of the study they will have access to the final result of the study.

- (10) DAMA explained the signature of this paper is very important for them because at the moment there are changes inside DAMA and it could be more trustable if every thing were written down.
- (11) The JICA Study Team mentioned that meteorological data owned by CAR would be necessary for water balance study and that also CAR is doing right now a water balance in Bogotá Plain which is very interesting for the balance analysis of this study.
- (12) HIDROGEOCOL has been delaying in compilation of the well inventory due to many processes to get approval inside the institutions. The JICA Study Team asked the members for their good cooperation to HIDROGEOCOL.
- (13) The isotopic analysis of the last year implemented by the Mission has not been published yet so far. INGEOMINAS will publish their isotopic data which will be more useful for the JICA Mission.

This fourth meeting of phase 2 of the Steering Committee was concluded at 11:45 am, the chairman of the Committee and Leader of the JICA Study Team signed hereinafter, and ACCI checked hereinafter:



ERNESTO RESTREPO V.
Chairman of the Committee
EAAB - ESP



MASATOMO WATANABE
Leader of
JICA Study Team

Checked by



VALERIE JORDAN
ACCI

THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA

Record of Discussion of Steering Committee for
Meeting No. 5 in Phase 2

Date: 25 of October of 2001
Starting Time: 9:00 am
Place: EAAB Office
Attendants:
EAAB –ESP: Ernesto Restrepo V.
Elsa Garcia Salazar
DAMA: Oscar Osorio
CAR: Oscar Villalba
ACCI: Valerie Jordan
INGEOMINAS: Maria Eugenia Sánchez
IDEAM: Omar Vargas
ASOCOLFLORES: Juan Carlos Isaza
JICA STUDY TEAM: Hiroshi Nakamura
Special Guest (HIDROGEOCOL Ltda)
Francisco Mosquera
Martha Cecilia Diaz.
Others (CONSEJERÍA) Lisa Guaqueta.

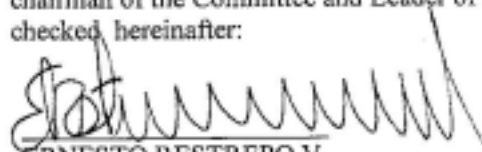
Discussions;

- (1) EAAB mentioned about the progress of drilling at Vitelma site. EAAB is now reviewing and evaluating the proposals. As it is possible to drill a new recharge well in Subachoque site, EAAB and JICA Study Team will visit the area to select the right place. EAAB will check the information about drilling machines for this work and the agreement with INGEOMINAS for a possible arrangement to do the drilling job.
- (2) EAAB presents the progress of the study to DAMA's Director Julia Miranda Londoño.
- (3) HIDROGEOCOL finished the collection of the all information from DAMA except 40 records that should be checked and added to the list.
- (4) IDEAM reviewed 11 meteorological stations proposed by the study and they agreed to all of them. The Mission will not consider the proposal of CAR to change the location of some stations to Chocontá because stations of IDEAM, EAAB and CAR already exist there. The actual information on this area available in every institution now is enough to attain the accuracy and the purpose of the study proposed by CAR.
- (5) The JICA Study Team explained the progress of simulation and water balance study. The work group is comparing and finding the weak points of the balance made by INGEOMINAS in 1990 and will improve it if necessary.
- (6) The Mission proposed to hold Workshops on simulations and water balance at least every Thursday and it would be postponed to the next week if enough materials for discussions could not be prepared. These discussions will help the counterpart team for a better understanding of the phase-2 report that will be submitted by the Mission on February of 2002.
- (7) It is expected to complete the construction of the meteorological stations by the end of November. The Mission is selecting the company that will install the stations.

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- (8) HIDROGEOCOL requested the institutions more support and cooperation for the wells inventory. The total inventory has to be given to the Mission by the end of November. It is necessary to advance the review works.
- (9) EAAB will sign the agreement with the National University in order to have the support of some students to finish the compilation work of inventory information on time, by the end of November.
- (10) The committee asked CAR for a detail explanation of their proposal study on natural recharge in Chocontá area.
- (11) The Committee asked DAMA for information about the treatment plant of sewerage in Bogotá and the water quality at the final process to assess its contamination level.

The fifth meeting of phase 2 of the Steering Committee was concluded at 10:45 am, the chairman of the Committee and Leader of the JICA Study Team signed hereinafter, and ACCI checked hereinafter:



ERNESTO RESTREPO V.
Chairman of the Committee
EAAB - ESP

渡辺 正和
MASATOMO WATANABE
Leader of
JICA Study Team

Check by



VALERIE JORDAN
ACCI.

THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA

Record of Discussion of Steering Committee for
Meeting No. 6 in Phase 2

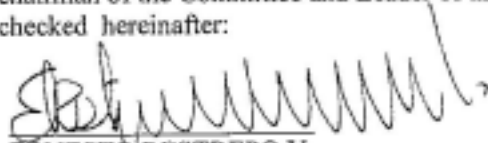
Date: 29 of November of 2001
Starting Time: 9:00 am
Place: EAAB Office
Attendants:
EAAB –ESP: Ernesto Restrepo V.
Elsa Garcia Salazar
DAMA: Oscar osorio
ACCI: Valeric Jordan
INGEOMINAS: Mirian Rios S.
IDEAM: Omar Vargas
JICA STUDY TEAM: Hiroshi Nakamura.
Others(EAAB – ESP): Reynaldo Pulido

Discussions:

- (1) EAAB mentioned about the progress of drilling at Vitelma site. EAAB already evaluated and selected the driller of the well.
- (2) EAAB and the JICA Study Team visited the properties selected by CAR to implement the pilot project of recharge at Subachoque site, but none of them is suitable for the study.
- (3) HIDROGEOCOL has included into the inventory of wells so far, 252 wells from DAMA and 736 wells from CAR, with a complete information. INGEOMINAS has an inventory of wells with a total 3700 points, not being filed, from a study carried out between 1988 and 1992. INGEOMINAS will provide with the inventory on the 30th of November.
- (4) The inventory owned by INGEOMINAS is not included in the data given by CAR and DAMA, and the information is very useful for the study.
- (5) The meteorological equipment will arrive at Colombia on the second week of December.
- (6) The level logger at Santa Mónica Flowers Farm was already installed.
- (7) CAR, as was programmed, made the presentation of Chocontá natural recharge project. The Mission suggested CAR to review the aims and the place for this project.
- (8) DAMA explained briefly their experience to get information from the illegal wells inside Bogotá D.C. in order to guide CAR which is now implementing this process in Bogotá Plain.
- (9) The members of the Committee promised to ask respectively inside their institution for the possibility of a joint work to compile an inventory of all wells in the study area of Bogotá Plain. The proposal is to be distributed to all related institutions: DAMA; CAR, INGEOMINAS, EAAAB and IDEAM, to work under the same parameters and to generate a real field data of the existing well, and to share the information when the study completed. EAAB will send every institution reference terms of this activity.
- (10) The participants of the meeting were satisfied with the right direction that the study has taken in the last months due to the way of EAAB managing the Study and the aptitude of all members to help as much as possible for the benefit of the study.
- (11) The Mission requested that the pilot recharge project should start at the beginning of February; therefore drilling work at Vitelma site should finish by the end of January.

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The sixth meeting of phase 2 of the Steering Committee was concluded at 10:45 am, the chairman of the Committee and Leader of the JICA Study Team signed hereinafter, and ACCL checked hereinafter:



ERNESTO RESTREPO V.
Chairman of the Committee
EAAB – ESP



MASATOMO WATANABE
Leader of
JICA Study Team

Checked by



VALERIE JORDAN
ACCL

THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTÁ PLAIN IN THE REPUBLIC OF COLOMBIA

Record of Discussion of Steering Committee for
Meeting No. 7 in Phase 2

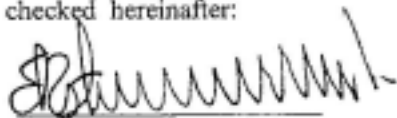
Date: 17 of January of 2002
Starting Time: 9:00 am
Place: EAAB Office
Attendants:
EAAB –ESP: Ernesto Restrepo V.
Elsa Garcia Salazar
DAMA: Oscar osorio
CAR: Oscar Villalba
ACCI: Valerie Jordan
INGEOMINAS: Mirian Rios S
IDEAM: Omar Vargas
ASOCOLFLORES: Juan Carlos Isaza.
JICA STUDY TEAM: Masatomo Watanabe
Hiroshi Nakamura
Others (DAMA) Luis Antonio Jaramillo

Discussions:

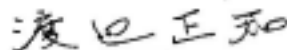
- (1) The JICA Study Team has already determined the amount of recharge in Bogotá Plain from the water balance results, that was estimated at 80 mm/year based on all the information from related organizations. The methodology was the same as applied in the study by INGEOMINAS with different values from Run off (the Mission assess it from the real values of the evaporation meter pan type - A from CAR), which gave a lower value than INGEOMINAS result. The evapo-transpiration was calculated by using Turc method. Also the field capacity in INGEOMINAS study was based on the texture map of IGAC and the Mission used the CROPWAT software.
- (2) From the simulation point of view the Mission generates a large-scale model of Bogotá Plain in order to identify the groundwater flow direction and the boundaries of the real model.
- (3) Database of the study is now under construction but it has been delaying about two months from the programmed schedule due to the several problems of the collecting information. The Mission will take the recommendations of INGEOMINAS into account about this matter.
- (4) The Mission offers class to explain in detail the functioning of the VISUAL MODFLOW.
- (5) EAAB requested CAR to give the result of the monitoring result of 400 wells in Bogotá Plain to the JICA Mission. CAR answered it would be given by 31st of January.
- (6) EAAB explained the progress of the drilling work at Vitelma Site. The drilling started on 8th of January and the observation well is expected to start by the end of January. A technical visit was programmed for all the members of the Committee on the 1st of February at 8 am, when the observations well would have started.
- (7) EAAB will send by email all the Committee members the technical specifications for the inventory of wells.
- (8) EAAB requested CAR to assign a person who recognizes and follows the drilling work, and advises the water quality sampling from the river, according to the environmental regulations. This matter will be done by Mr. Hernando Niño.
- (9) EAAB will get the information about Suba wells for DAMA.

(10) The inventory of wells will be distributed as follows: CAR; Tibitoc-Rio Frio-Bojacá, INEGOMINAS; Subachoque, Muña-Soacha-Tujuelito, IDEAM; western part of Rio Bogotá in Bogotá D.C.-Alto Bogotá, EAAB; Teusacá-Sisga, and DAMA; Bogotá D.C.

The seventh meeting of phase 2 of the Steering Committee was concluded at 11:00 am, the chairman of the Committee and Leader of the JICA Study Team signed hereinafter, and ACCI checked hereinafter:



ERNESTO RESTREPO V.
Chairman of the Committee
EAAB - ESP



MASATOMO WATANABE
Leader of
JICA Study Team

Checked by



VALERIE JORDAN
ACCI

THE STUDY
ON
SUSTAINABLE GROUNDWATER DEVELOPMENT
FOR
BOGOTA PLAIN IN THE REPUBLIC OF COLOMBIA

Record of Meeting on Interim Report jointed with
Steering Committee Meeting No.8 in Phase 2

On February 20th 2002, Meeting on Interim Report jointed with the 8th Steering Committee Meeting in Phase 2 was held at the EAAB Office. Refer to Attachment: Attendant List.

At 9:30 am, Mr. Ernesto Restrepo, the chairman of the Steering Committee for the Study, opened the Meeting and gave the opening address with thanks to JICA Colombia for the attendance, to JICA Study Team for their work and effort in phase 2 and to the attendants from all related organizations for their support and cooperation to the Study. And the chairman introduced Mr. Watanabe, the Leader of the JICA Mission, for presentation of the Interim Report.

The Colombian counterparts requested to the JICA Mission to hold workshops concerning the Visual Modflow operation method of a groundwater simulation program. The JICA Mission agreed with it at the time of Phase 3 when the groundwater simulation would be finalized.

CAR promised that they would give the results of their last well level monitoring campaign to EAAB and JICA Mission on March of 2002 in order to include those results into the Study of JICA – EAAB CAR.

EAAB explained drilling work in the Vitelma Site about its current advance and delays, and proposed all the members of the Steering Committee a technical visit to the site on Monday of March 4th at 8 am.

The JICA Mission will submit the list of necessary data and information to improve the accuracy of the analysis of the study. The Colombian counterparts shall prepare the data and information by the beginning of the Phase 3 according to the list.

EAAB agreed with the request for sending, by email, all Minutes of Steering Committee Meeting to all members of the Committee for the purpose of support to every organization.

EAAB shall distribute all relative organizations the Interim Report submitted on February 15, 2002 by the JICA Mission as a part of agreement.

Then, Mr. Watanabe made a brief explanation about the work of phase 2 and appointed Mr. Nakamura, Hydro-geologist of the Mission, for the presentation of the following topics: Landsat images, land use condition, environmental considerations of the study, water quality analysis of wells and rivers, drilling works by EAAB (Cretaceous Formation) and JICA (Quaternary Formation), geophysical results of work carried out in phase 1 by CSAMT method, well

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inventory advance, isotopic results, pilot project of recharge at Vitelma site, new meteorological stations installation, potential ground water assessment and proposals for phase 3.

CAR expressed anxiety about the yield capacity of La Salle well. The JICA Mission explained that reliable information about the matter could be generated through the pumping test.

CAR questioned what kind of water standard was adopted to compare the chemical results in the JICA Study. The JICA Mission answered that they used the potable water standard.

EAAB proposed the members of the Committee to establish a system to share information with entities and institutions other than the organizations involved in the Steering Committee. The Committee agreed to discuss in detail this matter on 14th of March at 8 am with a special guest from the Ministry of Environment. The Committee would consult with inside of every institution about their position to share the information of this study.

CAR and IDEAM requested the JICA Mission to treat the recharge considerations and values in a very careful manner because this would give a great influence in future regulations on ground water management.

EAAB proposed to discuss about which institution would manage the database and all the hydrogeological information generated by this study.

Agreements in the Committee:

The Colombian counterparts have accepted the interim report submitted by the Study Team after discussion listed below:

- EAAB shall finish the drilling work at Vitelma Site in order to have every thing ready for the Pilot Recharge Project.
- EAAB shall keep taking the information from the leveloggers and updating the actual results.
- EAAB shall continue the measurements at the 11 meteorological stations given by JICA.
- EAAB has a hope to do a pilot recharge project in Subachoque taking the water availability and quality of the river into consideration.
- EAAB shall program a specific meeting, among the relative organizations, regarding the improvement of well inventory through field survey in depth, based on the cross information from DAMA, CAR, INGEOMINAS made by JICA Study Team. The meeting shall be held on April 2002.
- JICA Mission shall report the full identification of analysis on quality of well water and surface water out of the Colombian Standard for potable water in the beginning of the Phase 3.

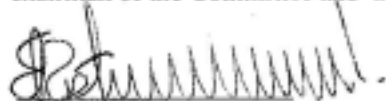
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- JICA Mission shall submit all supporting documents on the study at the end of the study given by these organizations of CAR, DAMA, INGEOMINAS, IDEAM, and ASOCOLFLORES and all additional information.

This eighth meeting of phase 2 of the Steering Committee was concluded at 1:20 pm, and the chairman of the Committee and the Leader of the Study Team signed hereinafter:



ERNESTO RESTREPO V.
Chairman of the Committee
EAAB – ESP



MASATOMO WATANABE
Leader of
JICA Study Team

Witness



VALERIE JORDAN
Representing
Colombian Agency of International
Cooperation

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ATTENDANT LIST, February 20, 2002

JICA Study Team

| | |
|-------------------|-------------------------------|
| Masatomo WATANABE | Mission Leader |
| Hiroshi NAKAMURA | Hydrology, Hydrogeology |
| Kazumi SUWABE | Geographic Information System |
| Akihiro SHIMOMURA | Coordinator |

EAAB

| | |
|---------------------|---------------------------|
| Ernesto Restrepo V | Chairman of the Committee |
| Elsa Garcia Salazar | Study Coordinator |

DAMA

| | |
|--------------|-----------|
| Oscar Osorio | Geologist |
|--------------|-----------|

CAR

| | |
|---------------|-------------|
| Hernando Niño | Hydrologist |
|---------------|-------------|

IDEAM

| | |
|-------------|-------------|
| Omar Vargas | Hydrologist |
|-------------|-------------|

ACCI

| | |
|----------------|---------|
| Valerie Jordan | Advisor |
|----------------|---------|

CONSEJERIA REPRESENTATIVIDAD

| | |
|-------------------|-----------------------|
| Juan Manuel Uribe | International Affairs |
|-------------------|-----------------------|

JICA BOGOTÁ

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| Oscar Emilio Angel | Cooperation Advisor |
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**THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTA PLAIN IN THE REPUBLIC OF COLOMBIA**

*Record of Discussion of Steering Committee for
Meeting No. 1 in Phase 3*

Date: 13 of June of 2002
Starting Time: 9:00 a.m.
Place: EAAB Office
Attendants:
EAAB_SAP: Ernesto Restrepo V.
Elsa García Salazar
Paola Spada
DAMA: Luis Antonio Jaramillo
CAR: Oscar Villalba
INGEOMINAS: Miriam Ríos
IDEAM: Omar Vargas
ASOCOLFLORES: Juan Carlos Isaza
GRUPO DE
ESTUDIO DE JICA: Masatomo Watanabe
Hiroshi Nakamura

First of all there is a welcome to the members of the Japanese Mission to Colombia from General Manager of EAAB advisor, Dra. Apola Spada and to the all active members of the Steering Committee for the third and last phase of the Study of Sustainable Development of Groundwater in the Sabana de Bogota.

Discussions:

- (1) The counter part entities made a Study Summary, which represents what has been done on this groundwater study. On Friday 14th of June, CAR and INGEOMINAS will submit to the Coordination of the study their observations to the document.
- (2) The installation of 11 meteorological stations given by the Mission of the Study was finished. A field trip with the Fluidis company and the Mission to review the installations will be carried out.
- (3) The leader of the Japanese Study Mission mentioned that on phase three, the Assessment of groundwater, water quality, levels, pilot recharge study, water balance, simulation development and monitoring plan will be included.
- (4) Also, it is necessary to create a special unit which manage the groundwater and guarantee the updating of information related to this topic. INGEOMINAS, propose

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to take in account the experience gained by Ministry of Environment through a study with the British Government support.

- (5) Workshops will keep going weekly, on Thursday and it will be a Seminar at the middle of January. Next workshops will be about land subsidence INGEOMINAS and progress of water balance from CAR.
- (6) Hidrogeocol Ltda, already submit the inventory of wells and the GIS. It has 5853 wells, and 600 additional files from CAR taken from EAAB from February to May. The inventory of wells on field, done by the counter part institutions, distributed by basins, will be carry out from July of 2002 to finished it on September. EAAB will work 3 basins that should be done by CAR.
- (7) The subject of Land Subsidence in Sabana of Bogota will have priority in the third phase. INGEOMINAS has made a study which will provide information and this will be complemented in this ground water study. It is needed to update the inventory of wells to get better picture of magnitude of ground water extraction and magnitude of real subsidence.
- (8) The report of this third phase will be finished for February of 2003.

The first meeting of phase 3 of the Steering Committee was finished at 11 a.m., then the chairman of the Steering Committee and Leader of the JICA Study Team, signed hereinafter, and ACCI checked hereinafter:


ERNESTO RESTREPO VERSYWELL
Chairman of the Committee
EAAB-ESP


MASATOMO WATANABE
Leader of
JICA Study Team

Checked by:


VALERIE JORDAN
ACCI

**THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTA PLAIN IN THE REPUBLIC OF COLOMBIA**

**Record of Discussion of Steering Committee for
Meeting No. 2 in Phase 3**

Date: 25 of July of 2002
Starting Time: 9:00 a.m.
Place: EAAB Office
Attendants:
EAAB_SAP: Ernesto Restrepo V.
Elsa García Salazar
DAMA: Luis Antonio Jaramillo
CAR: Hernando Niño
ALCALDIA: Luisa Guaqueta (instead of Mr. Juan Manuel Uribe).
IDEAM: Omar Vargas
ACCI: Valeric Jordan
JICA Oscar Emilio Angel
JICA STUDY
TEAM: Hiroshi Nakamura - Narita
GUESTS: Santiago Villegaz – Environmental Ministry (did not attend).
Carlos Herrera – Corpoica.

Discussions:

- (1) A welcome to the committee attendants and presentation of Mr. Carlos Herrera, representative of Corpoica, was made.
- (2) Reading of the previous record.
- (3) EAAB express the interest of the Steering Committee that Corpoica participates in this last phase of the study. Mr. Carlos Herrera, Director of Corpoica, comments the experiences of the institution with ground research in Bogota plain and advances on educative diffusion of technical subjects within agricultural people. EAAB commits to give of all the reports that have been delivered until the moment to the members of the Study Steering Committee.
- (4) EAAB presents the advances of the recharge project in Vitelma and manifests the necessity of a previous pumping work of the aquifer to lower the water levels and generate representative results of the Guadalupe formation recharge. CAR agrees because the operation is part of the investigation. Corpoica asks if is not better to use a simulator, EAAB answers that drilling is the best way to identify the reality of the aquifers and this results will be used for adjusting the values of the model.
- (5) EAAB presents a summary of progress regarding well inventory, including the DAMA, CAR and INGEOMINAS wells. It has been found that abandoned wells

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could be a contamination focus of ground water. DAMA has problems with the sampling recollection for chemical analysis because there is no pumping in some wells, EAAB offers their sampling equipment to make the work, how ever the sampling will come from stagnant water, which is not representative for the study. DAMA have at the moment their wells data base completely updated.


- (6) Regarding the inventory, CAR comments that have economical problems how ever they are waiting to begin their inventory in August. They will supply the access permissions to the places and companies that the entities of the Committee assigned. Corpoica suggests to deliver letters in the municipalities, and offers the existing communication network, by using radio programs of Corpoica explain the activities that will be made by the contractors.
- (7) IDEAM does not have the economical availability to contract the inventory of wells but since it is an acquired compromise with the Steering Committee, this work will be made with the personnel of the institution, they hope to begin in August. EAAB will give the complete data of the inventory, estate sheets 1:10.000 to IDEAM.
- (8) EAAB presents a proposal of conforming a Committee for managing the ground water. Corpoica presents for consideration of the Steering Committee their experience as provider of the Committee with sub-systems as: associations, costs and marketing, investigations centers, regional nodes that orientates all the information generated to Sinagua: Information Center for the managing of water. IDEAM express that at the moment is not clear the position of the institutions that manage the water.
- (9) CAR commits to maintain update the data base that has been achieved in the project of EAAB - JICA and informs about any progress of the ground water hydraulic resource in the Sabana de Bogotá. EAAB added that the system will be remind updated if inside each institution there is a person in charge of give the information. The committee agrees in generate a list of responsible people and to leave written in the commitment. Corpoica has some formats of this type of documents which will be delivered to the committee.
- (10) The Japanese Study Team shows the adjustments that will be done in the third phase like: water balance, Geo referenced Information System, water quality, approach to a sustainable development, simulation model, isotopes, recharge, phreatic levels. The study team hopes that in the hole recharge process all the counter part entities can assist as witness of the process.
- (11) The study team requests the conformation of two (2) groups for the evaluation of the technical and economical probability of two projects in the Sabana de Bogotá. One of ground water development in the Eastern Hills and the second one, for recovery levels in the Western side of the Plain. The professionals profile, should correspond to people that has been involved on environmental planning and/or hydraulic resource of Bogota and Sabana, lawyers, economists, engineers on distribution network, treatment plants and hydrologists.

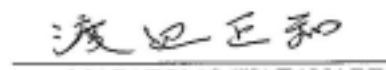
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- (12) CAR manifests that this is the time for tightening the previous phases work to a shared environmental work, water management with known and concrete information and with the users participation.
- (13) The Japanese Expert in water chemistry, mentions the progress on the evaluation regarding chemical quality of ground water in the Sabana de Bogota, which in this moment is used but is not cared. In whole Plain, there is high values of ammonium in the waters that seems to obey more to geological contamination. The crops analysis, agrochemical use, population, spatial analysis, flow velocity, uses, done by the study team will help to establish the contaminants charge in the aquifers and in union with Corpoica analyze the influence for future control politics. The simulation model will help to project in the future, with the actual rates of fertilizers and pesticides the aquifer behavior. EAAB says that it should begin a prioritization by basins taking in account the human consumption water use and after other uses.
- (14) CAR says that at this moment is finishing a contamination project with agrochemical coordinated by Scientific Sub direction of CAR, please to contact with the person in charge for detail information. In Corpoica there is Amparo Rojas, expert in this subject and she can help the Japanese expert.

The second meeting of phase 3 of the Steering Committee was finished at 12 a.m., then the chairman of the steering committee and Leader of the JICA Study Team, signed hereinafter, and ACCI checked hereinafter:


 ERNESTO RESTREPO VERSYWELL
 Chairman of the Committee
 EAAB-ESP


 MASATOMO WATANABE
 Leader of
 JICA Study Team

Checked by:


 VALERIE JORDAN
 ACCI

**THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTA PLAIN IN THE REPUBLIC OF COLOMBIA**

**Record of Discussion of Steering Committee for
Meeting No. 3 in Phase 3**

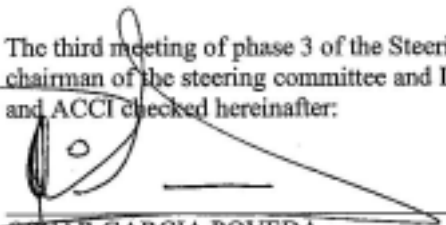
Date: 10 of October of 2002
Starting Time: 9:00 a.m.
Place: EAAB Office
Attendants:
EAAB_SAP: Oscar García Poveda
Elsa García Salazar
DAMA: Luis Antonio Jaramillo
CAR: Oscar Villalba
INGEOMINAS: Miriam Ríos
ASOCOLFLORES: Juan Carlos Isaza
CORPOICA: Cesar A. Terán
JICA: Oscar Emilio Angel
JICA STUDY
TEAM: Hiroshi Nakamura

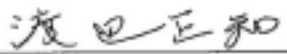
Discussions:

- (1) There is a proposal to make an integrated management of ground water, competence, responsibilities, knowledge of the resource and management in which there will be very useful to check the Integrated Management Project for Latin America. With this project, it can be achieved a structure for organizing the entities that participate in the study of Ground Water. A very important aspect that this project has is to evolving the social part. INGEOMINAS will coordinate with the Environmental Ministry to make a presentation of this project.
- (2) The managing of the information regarding the sub basins will be delivered by magnetic way or CDs to EAAB and it will be compiled in a single data base. This information will have Geology, Chemistry, contamination and Piezometric Levels, among others. It is requested to the entities to delegate a person in charge for handling the managing of the information. ASOCOLFLORES, delegates Mr. Germán Vaquero.
- (3) The counter part institutions, manifests the importance that all the hidrogeological and administrative information should be found in a single data base, which will be managed and feed with help of all the entities and will be updated permanently. A workshop will be handle in order to establish how the data base of every institution works and its compatibility to manage the macro base.
- (4) Corpoica counts with a data base of grounds, water and irrigation management and contamination. Amparo Rojas can be contacted or Ines Toro for a presentation of this information.

- (5) The main groundwater consumer from the agricultural point of view, seems to be the flowerculture production, not cattle breathing or potato farmers. How ever, it is important to use the field information that is being recollected by the entities to reach a right conclusion about the ground water use in the Sabana.
- (6) It is requested to CAR, to make a workshop by Edith Alayon about the mentioned project in numeral 14 of the previous record, about Sabana contamination.
- (7) The Japanese study team emphasize that the most delicate subject about the study of ground water, is the water balance. It is advised to make adequate maintenance to the climatological stations, since that data is the base for achieving a better approximation.
- (8) The adjustments to water balance will continue with the participation of INGEOMINAS and CAR.
- (9) The ground water simulation continues. It is hoped to include the information of well inventory.
- (10) Regarding the recharge project in the Eastern Hills of Bogotá City, it is hoped that very soon will start the injection to the exploratory well, as well as an additional pumping of the recharge well for lowering the phreatic levels. Part of the results of the Japanese Study Team will be to formulate a recharge development plan for the Bogota plain.
- (11) At the moment is not clear the recharge at the Occident of the plain, because of this, it will be handle a meeting with CAR and entities that use this resource for discussing the strategies and possibilities of the project.
- (12) It is requested to CAR, a presentation about the information of their progress in water balance.
- (13) There is a proposal to the members of the committee, to begin the meeting at 8:00 a.m. from next month.

The third meeting of phase 3 of the Steering Committee was finished at 11:40 a.m., then the chairman of the steering committee and Leader of the JICA Study Team, signed hereinafter, and ACCI checked hereinafter:


 OSCAR GARCIA POVEDA
 Chairman of the Committee
 EAAB-ESP


 MASATOMO WATANABE
 Leader of
 JICA Study Team

Checked by:


 VALERIE JORDAN
 ACCI

**THE STUDY ON THE SUSTAINABLE GROUND WATER DEVELOPMENT
FOR BOGOTA PLAIN IN THE REPUBLIC OF COLOMBIA**

**Record of Discussion of Steering Committee for
Meeting No. 4 in Phase 3**

Date: 28 of November of 2002
Starting Time: 8:00 a.m.
Place: EAAB Office
Attendants:
EAAB_SAP: Oscar García Poveda
Elsa García Salazar
ASOCOLFLORES: Juan Carlos Isaza
IDEAM: Omar Vargas
MIN. AMBIENTE: Juan Peña
JICA STUDY
TEAM: Masatomo Watanabe
Hiroshi Nakamura
Takichima Hara

Discussions:

- (1) The Study Team Leader, Mr Watanabe, presented to the assistants the progress of the Study until the date regarding water balances, well inventory and chemical behavior of the aquifers. He presented the clear expectations it can be observed in Sabana de Bogota regarding the management and sustainable development of the ground water resource. The results achieved until this moment about the behavior of the Guadalupe aquifer are promising, the recharge capacity of the Guadalupe aquifer is higher than its production using any artificial available water entrance to the underground system. Concludes with the water balance with a final value of the recharge for aquifers in the plain equal to 20 m³/s, from which 3.7 m³/s are pumped out from more that 6000 existing wells in the plain and analyzed in the study.
- (2) ASOCOLFLORES express the importance of having clear the differences between the balances made by the study of EAAB and the ones presented by CAR, for the calculation of the charge rate by use of water and this way extend this explanation to the members this Association his entity.
- (3) The Study Team Leader, Mr. Watanabe, explains the possible projects that could be advanced for developing the underground water resource in some sectors of the plain and guide the community in the recuperation of the water levels in some sectors where there is not planning and homogenous distribution of wells have generated severe level drawdown.

- (4) Additionally the Study Team Leader explains the possibility of developing excess water from EAAB systems or Bogotá River, to reduce contaminants concentration inside Bogota river.
- (5) The Ministry of Environment and IDEAM, considers important to involves the community in the recuperation processes of levels, it is important to includes this topic inside the urban problematic subject as is being done with many other processes in the country following the guidelines of the actual government.
- (6) It was considered by the committee the subjects that will be treated in the Seminar which will be carry out on January 2003, achieving to the conclusion that, the assistants to the seminar will be persons without much technical knowledge of ground water they will be more administrative management persons of municipalities, industries, flowercultures, processes or offices, that is why it is recommended to focus the seminar in two strategically subjects of regional interest and with an extension of the seminar no longer than half day.

The fourth meeting of phase 3 of the Steering Committee was finished at 10 a.m., then the chairman of the steering committee and Leader of the JICA Study Team, signed hereinafter, and ACCI checked hereinafter:



OSCAR GARCIA POVEDA
Chairman of the Committee
EAAB-ESP



MASATOMO WATANABE
Leader of
JICA Study Team

Checked by:



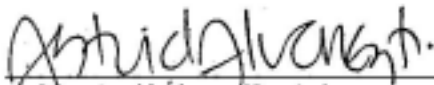
VALERIE JORDAN
ACCI

MINUTES OF MEETINGS
ON
DRAFT FINAL REPORT
OF
THE STUDY ON
SUSTAINABLE GROUNDWATER DEVELOPMENT
FOR BOGOTÁ PLAIN
IN
THE REPUBLIC OF COLOMBIA

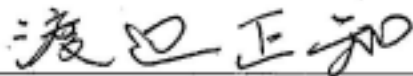
Agreed upon between

Water Supply and Sewerage Company of Bogotá
and
Japan International Cooperation Agency

Bogotá, January 16, 2003

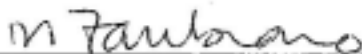


Mrs. Astrid Álvarez Hernández
General Manager,
Water Supply and Sewerage Company
of Bogotá



Mr. Masatomo Watanabe
Leader,
the JICA Study Team,
Japan International Cooperation Agency

Witnessed by



Ms. María Elisa Zambrano
Director,
Colombian International Cooperation
Agency



Mr. Kotaro Taniguchi
Staff in charge of Study Management,
Second Development Study Division,
Social Development Study Department,
Japan International Cooperation Agency

In accordance with the Scope of Work for the Study on Sustainable Groundwater Development for the Bogotá Plain (hereinafter referred to as "the Study") agreed upon between the Government of the Republic of Colombia, Water Supply and Sewerage Company of Bogotá (hereinafter referred to as "EAAB") and Japan International Cooperation Agency (hereinafter referred to as "JICA"), JICA dispatched a Study Team for the Study (hereinafter referred to as "the JICA Study Team") to Colombia and commenced the Study in December 2000. The Study has been well conducted through three phases in good collaboration with the JICA Study Team and the counterpart team, and reached to the final stage.

The JICA Study Team submitted 20 copies of Draft Final Report of the Study (English and Spanish version respectively) to EAAB in Bogotá on January 13, 2003. Series of meetings and discussions were held among EAAB, related authorities concerned and the JICA Study Team. The participants of the final Steering Committee meeting are listed in Attachment. These Minutes of Meetings have been prepared both in English and Spanish, summarizing the results of discussions on the Draft Final Report. In case of any divergence of interpretation, the English text shall prevail.

1. Acceptance of the Draft Final Report

Colombian side agreed and consented to the contents of the Draft Final Report, which includes all the results of the Study.

2. Utilization of the Master Plan

Colombian side confirmed that the Master Plan proposed by the Study should be taken as guidelines to contribute to sustainable and effective utilization of groundwater for more prosperous socio-economic development of the people living in Bogotá Plain, and that the organizations relevant to groundwater management should make the outmost of the Master Plan as principal guidelines.

3. Project Implementation

Colombian side intends to promote various projects for groundwater development and conservation in Bogotá Plain proposed in the Master Plan, such as, 1) Eastern Project and 2) Western Project, but explained that, before further decisions, it would be necessary, in each case, to conduct more profound studies or feasibility studies including Environmental Impact Assessments. As to the Eastern Project, the official request from the Government of Colombia for technical assistance has been made through Colombian International Cooperation Agency (ACCI) to the Government of Japan. Colombian side expects the consideration of the Government of Japan for the request.

4. Transfer of the Equipment

Colombian side wishes to request that the equipment used during the implementation of the Study be donated to EAAB for sustaining the results of the Study. EAAB has sent a request letter to JICA Headquarters through JICA Colombia office.

5. Submission of Comments from Colombian Side

Colombian side promised to submit the comments in writing on the Draft Final Report to Japanese side through JICA Colombia office by February 14, 2003. The Study Team will finalize the Final Report of the Study taking into account the comments. Any comments submitted after this date will not be taken account.

6. Disclosure of the Reports

Both sides confirmed that all the reports would be open to the public in order to achieve maximum use of the Study results. This has been discussed and agreed in the meetings on the Scope of Work for the Study.

Handwritten signature and initials

ATTENDANT LIST OF STEERING COMMITTEE, January 16, 2003, EAAB

<Japanese Side>

JICA Study Team

| | |
|-------------------|----------------|
| Masatomo WATANABE | Mission Leader |
| Hiroshi NAKAMURA | Hydrogeology |
| Naoki HARA | Institution |

JICA HEADQUARTERS

| | |
|------------------|-------------------------------------|
| Kotaro TANIGUCHI | Staff in charge of Study Management |
|------------------|-------------------------------------|

SEMINAR LECTURER

| | |
|-------------|--------------------------------|
| Kenji JINNO | Professor of Kyushu University |
|-------------|--------------------------------|

JICA COLOMBIA OFFICE

| | |
|------------------|--|
| Takahiro IKENOUE | Staff in charge of Technical Cooperation |
|------------------|--|

<Colombian Side>

WATER SUPPLY AND SEWERAGE COMPANY OF BOGOTÁ (EAAB)

| | |
|---------------------|--|
| Oscar GARCIA POVEDA | Water Supply Director |
| Ernesto RESTREPO V. | Water Supply and Sewerage Manager, Zone 1 |
| Gustavo HERRÁN S. | Director of Hydrology Office. |
| Elsa GARCIA SALAZAR | Study Coordinator, Water Supply, Ground Water, Professional |

ADMINISTRATIVE TECHNICAL DEPARTMENT OF ENVIRONMENT OF BOGOTÁ D.C. (DAMA)

| | |
|------------------------|-----------------------|
| Luis Antonio JARAMILLO | Environmental Quality |
|------------------------|-----------------------|

INSTITUTE OF GEO-SCIENTIFIC, MINING-ENVIRONMENTAL, NUCLEAR RESEARCH AND INFORMATION (INGEOMINAS)

| | |
|-------------|-----------------------------|
| Miriam RIOS | Ground Water Projects Chief |
|-------------|-----------------------------|

REGIONAL AUTONOMOUS CORPORATION OF CUNDINAMARCA (CAR)

| | |
|----------------|--------------|
| Oscar VILLALBA | Professional |
| Jairo PÉREZ | Professional |

INSTITUTE OF HYDROLOGY, METEOROLOGY AND ENVIRONMENTAL STUDY (IDEAM)

| | |
|-------------|------------------------------------|
| Omar VARGAS | Geologist, Hydrology Sub-direction |
|-------------|------------------------------------|

COLOMBIAN FLOWER EXPORTERS ASSOCIATION (ASOCOLFLORES)

| | |
|-------------------|-----------------------------------|
| Juan Carlos ISAZA | Environmental Issues, Sub-manager |
|-------------------|-----------------------------------|

COLOMBIAN INTERNATIONAL COOPERATION AGENCY (ACCI)

| | |
|----------------|---------|
| Valerie JORDAN | Advisor |
|----------------|---------|

ADVISORS' OFFICE OF REGION AND COMPETITIVENESS

| | |
|-------------------|---------------------------------|
| Juan Manuel URIBE | Majors Office of Bogotá Advisor |
|-------------------|---------------------------------|

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