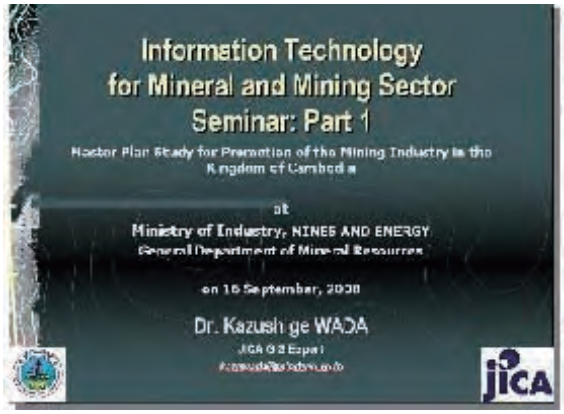
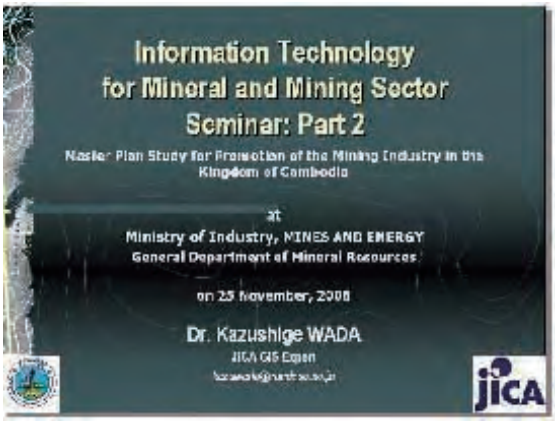
# Appendix I-9 Seminar on Information Technology for Minerals and the Mining Sector



Seminar, Part I: Backdrop and Applications of GIS

Seminar Participants (Part I, on 16th September)

| Name | Department | Position | Name | Department | Position |
|---|---|---|---|---|---|
| Sieng Sotham | DoG | Director | Hong Bona | DMR | Chief Officer |
| Touch Menglay | DMRD | Chief Officer | Eam Seakbo | DoG | Chief Officer |
| Huon Rasy | DMRD | Officer | Sok Sophon | DoG | Officer |
| Ou Narath | DMRD | Officer | Bin Thet | DoG | Officer |
| Loeung Vanmonyrak | DMRD | Officer | Shigeki Miyake | DMR | Officer |



Seminar, Part II: GIS and GPS

Seminar Participants (Part II, on 25th November)

| Name | Department | Position | Name | Department | Position |
|---|---|---|---|---|---|
| Peng Navuth | GDMR | Deputy Director General | Huon Rasy | DMRD | Officer |
| | | | Hong Bona | DMR | Chief Officer |
| Sieng Sotham | DoG | Director | Loeung Vanmonyrak | | Officer |
| Touch Menglay | DMRD | Chief Officer | Keo Sopharith | | Officer |
| Keo Munyratana | | Officer | Sok Sokha | | Officer |
| Long Sobonrithy | | Officer | Eam Seakbo | DoG | Chief Officer |
| Cheng Ngak | | Officer | Sok Sophon | | Officer |
| Ou Narath | | Officer | Bin Thet | | Officer |

# Appendix I-8 Satellite Image Analysis Training

## (1) Training Program

### Satellite Image Analysis Training Course (TNTmips)

Place: Department of Geology GDMR
Period: 2008/10/13 ～ 10/15
Instructor: Mr.Hidehiro ISHIKAWA Senior Satellite Images analyst of JICA study team
Participants: Mr. Sien SOTHAM Director of Department of Geology
Mr. Sok SOPHORN Officer of Department of Geology
Mr. Eam SEAKBO Officer of Department of Geology

Session :

| Schedule | Contents |
|---|---|
| 2008/10/13 10:00 ～17:00 | 1_Navigating |
| | 2_Geospatial Data |
| | 3_Acquiring Geodata |
| | 4_Importing Geodata |
| | 5_Georeferencing |
| | 6_Practice of Raster data processing |
| 2008/10/14 10:00 ～17:00 | 7_Sharing Geodata with Other Popular Products |
| | 8_Practice of DEM data processing |
| 2008/10/15 10:00 ～17:00 | 9_Introduction to Remote Sensing of Environment |
| | 10_Practice of Satellite image processing |

Text :

1) TNTmips manual
2) Overview of ASTER

Training data:

Cambodia geological map (Raster image data)
DEM data (TNTmips sample data set)
ASTER data (4 seines around Tnlesap Lake)

## Satellite Image Analysis Training Course (TNTmips)

Place: Department of Geology GDMR

Period: 2008/10/27

Instructor: Mr.Hidehiro ISHIKAWA Senior Satellite Images analyst of JICA study team

Participants: Mr. Sien SOTHAM Director of Department of Geology

Mr. Sok SOPHORN Officer of Department of Geology

Mr. Eam SEAKBO Officer of Department of Geology

Session :

| Schedule | Contents |
|---|---|
| 2008/10/27 10:00 ~17:00 | 1 The purpose of satellite image analysis |
| | 2 Overview of satellite image data |
| | 3 Interpretation of images |
| | 4 Spectral analysis |

Text :

1) TNTmips manual
2) Satellite Image Analysis , Interpretation

Training data:

ASTER data (Imported data sets)

## (2) Photos of the Trainings

### Satellite Image Analysis Training No.1


Training at DoG

List of Participants

| Name | Department | Position |
|---|---|---|
| Sieng SOTHAM | Department of Geology | Director |
| Eam SEAKBO | Department of Geology | Officer |
| Sok SOPHORN | Department of Geology | Officer |

DoG Director's room

### Satellite Image Analysis Training No.2


List of Participants

| Name | Department | Position |
|---|---|---|
| Sieng SOTHAM | Department of Geology | Director |
| Eam SEAKBO | Department of Geology | Officer |
| Sok SOPHORN | Department of Geology | Officer |

DoG Director's room and DoG Mapping Office

# Appendix I-11 Mining Investment Promotion Seminar

## Mining Investment Promotion System in Argentina

The list of Participants

| No. | Name | Position | Organization | Remark |
|---|---|---|---|---|
| 1 | H.E. Mr. Sok Leng | Director General, GDMR | MIME | |
| 2 | Mr. Sim Sisokhaly | Director, DMRD | MIME | |
| 3 | Mr. Yos Monyrath | Director, DMR | MIME | |
| 4 | Mr. Peng Navuth | Deputy Director General, GDMR | MIME | |
| 5 | Mr. Chrea Vichett | Deputy Director, DMRD | MIME | |
| 6 | Mr. Mean Thay | DMR | MIME | |
| 7 | Mr. Mak Sopheaktra | Deputy Director, DMR | MIME | |
| 8 | Mr. Sieng Sotham | Director, DoG | MIME | |
| 9 | Mr. Kong Makara | Chief, DMR | MIME | |


Photo of the Investment Seminar

# Appendix I-12 Safety Management Seminar


The List of Participants

| No. | Full Name | Organization | Position |
|---|---|---|---|
| 2 | Mr. PENG NAVUTH | GDMR | Deputy Director General |
| 3 | Mr. YOS MONY RATH | DMR | Director |
| 4 | Mr. SIENG SOTHAM | DoG | Director |
| 5 | Mr. MAK SOPHEAKTRA | DCMR | Director |
| 12 | Ms. MAK BOLY | DoG | Depty Dierector |
| 7 | Mr. Seng Laing | DMR | Chief Officer |
| 8 | Mr. Hing Savoeun | DMR | Chief Officer |
| 11 | Mr. Van Socheat | DMR | Chief Officer |
| 13 | Mr.Hong Bona | DCMR | Chief Officer |
| 20 | Mr. Kong Makara | DMRD | Chief Officer |
| 23 | Mr. Touch Menglay | DMRD | Chief Officer |
| 24 | Mr. Seng Laing | DMR | Chief Officer |
| 14 | Mr.Suon Bunse | DCMR | Vice Chife |
| 10 | Mr. Sok Vun | DMR | Deputy Officer |
| 6 | Mr. Ou Narath | DMRD | Officer |
| 9 | Mr. Bin Khoeun | DMRD | Officer |
| 12 | Mr. Loeung Vanmonyrak | DMR | Officer |
| 15 | Mr. Lim Chumneanh | DCMR | Officer |
| 16 | Mr. Bin Thet | DoG | Officer |
| 17 | Mr. Suong Ky | DoG | Officer |
| 18 | Mr. Phok Sothea | DoG | Officer |
| 19 | Mr.Cheng Ngak | DoG | Officer |
| 21 | Mr. Hok Bunny | DoG | Officer |
| 22 | Mr. Pov Benleng | DoG | Officer |
| 25 | Mr. Kazuki Shingu | JICA Studty Team | Expert |
| 26 | Mr. Vang Randy | JICA Studty Team | Interpriter |

# Appendix I-13 EITI Seminar

## EITI Seminar

Facilitator Mr. Richard Thompson

Senior officers of MIME and GDMR

| The List of Participants on the EITI Seminar on 11th June, 2009 | | | |
|---|---|---|---|
| No. | Name | Title | Organization |
| 1 | H.E Mr. TAN KIM VINN | Secretary of State, MIME | MIME |
| 2 | H.E Mr. UNG PONNARA | Under secretary of state, MIME | MIME |
| 3 | Mr. PENG NAVUTH | Deputy Director General, General Department of Mineral Resources | MIME |
| 4 | Mr. UCH BORA | Deputy Director General, General Department of Mineral Resources | MIME |
| 5 | Mr. YOS MONY RATH | Director, Department of Mineral Resources | MIME |
| 6 | Mr. SIENG SOTHAM | Director, Department of Geology | MIME |
| 7 | Mr. SIM SISOKHALY | Director, Department of Mineral Resources Development | MIME |
| 8 | Mr. MAK SOPHEAKTRA | Director, Department of Construction Material Resources | MIME |
| 9 | Mr. CHREA VICHETT | Deputy Director, Department of Mineral Resources Development | MIME |
| 10 | Mr. KONG MAKARA | Office Chief , Mineral Resources Development | MIME |
| 11 | Mr. Loeung Vanmonyrak | Officer, DMR | MIME |
| 12 | Mr. BEN BUNNARIN | Office Chief, Department of Geology | MIME |
| 13 | Mr. Masaharu Marutani | Team Leader | JICA Study Team |
| 14 | Mr. Richard T. Thompson | Senior Mining Expert, Facilitator | JICA Study Team |
| 15 | Mr. Reaksa Rous | Interpreter (English-Khmer from comp.) | JICA Study Team |
| 16 | Mr. Randy Vang | Interpreter (Khmer - English) | JICA Study Team |
| 17 | Ms. Mou Som Vina | Typist | JICA Study Team |

# Appendix I-14 Mining Methods Seminar


The List of Participants

**06th November, 2009, Conference room in MIME**

| No. | Name | Organization | Position |
|---|---|---|---|
| 1 | Peng Navuth | GDMR | Deputy Diector General |
| 2 | Mak Sochettra | DCMR | Officer |
| 3 | Phok Saloan | DMR | Chief officer |
| 4 | Nuon Norin | DMR | Deputy Director of Department |
| 5 | Ben Bunnarin | DoG | Chief officer |
| 6 | Cheng Ngak | DoG | Chief officer |
| 7 | Seng Laing | DMR | Chief officer |
| 8 | Suon Bunse | DCMR | Chief officer |
| 9 | Yin Rotha | DMR | Chief officer |
| 10 | Bin Thet | DoG | Staff |
| 11 | Long Sobonrithy | DMRD | Vice Chief officer |
| 12 | Touch Bunly | DCMR | Office |
| 13 | Sok Kiriroath | DCMR | Office |
| 14 | Ou Chak | DMRD | Vice Chief |
| 15 | Ben Savuth | DMRD | Chief |
| 16 | Keo Mony Ratana | DMRD | Vice Chief officer |
| 17 | Phok Sothae | DoG | Chief officer |

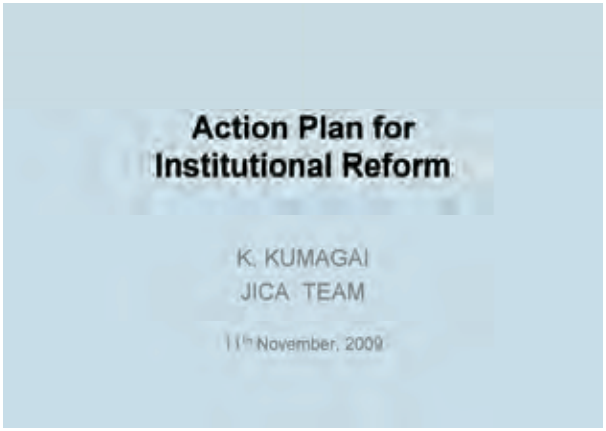
# Appendix I-15 New Website Seminar


## The List of Participants

**10th November, 2009, Conference room in MIME**

| No. | Name | Organization | Position |
|---|---|---|---|
| 1 | Uch Bra | GDMR | Deputy Director General |
| 2 | Sieng Sotham | DoG | Director |
| 3 | Kong Makara | DMRD | Chief officer |
| 4 | Phok Salorn | DMR | Chief officer |
| 5 | Nuon Norin | DMR | Deputy Director of Department |
| 6 | Chrea Vichett | DMR | Deputy Director of Department |
| 7 | Sim Sisokhaly | DMRD | Director |
| 8 | Mak Sopheaktra | DCMR | Director |
| 9 | Bou Vannarit | DCMR | Officer |
| 10 | Sok Ly | DCMR | Officer |
| 11 | Sok Sokha | DCMR | Officer |
| 12 | Loeung Vanmonyrak | DMR | Officer |

# Appendix I-16 Seminar on Action Plan for Institutional Reform




The List of Participants

**11th November, 2009, Conference room in MIME**

| No. | Name | Organization | Position |
|---|---|---|---|
| 1 | H.E. Mr. Tan Kim Vinn | MIME | Secretary of State |
| 2 | H.E. Mr. Sok Leng | MIME | General Director |
| 3 | Mr. Peng Navuth | MIME | Deputy Director General |
| 4 | Mr. Uch Bora | MIME | Deputy Director General |
| 5 | Mr. Sieng Sotham | DoG | Director |
| 6 | Mr. Mak Sopheaktra | DCMR | Director |
| 7 | Mr. Sim Sisokhaly | DMRD | Director |
| 8 | Mr. Nuon Norin | DMR | Deputy Director |
| 9 | Mr. Chrea Vichett | DMRD | Deputy Director |

# Appendix I-17 Seminar on Mine Accidents and Countermeasures


The List of Participants

**11th November, 2009, Conference room in MIME**

| No. | Name | Organization | Position |
|---|---|---|---|
| 1 | Peng Navuth | MIME | Deputy Director General |
| 2 | Cheng Ngak | DoG | Staff |
| 3 | Ben Bunnarin | DoG | Chief Officer |
| 4 | Phok Sothae | DoG | Staff |
| 5 | Phok Salorn | DMR | Chief Officer |
| 6 | Mak Sochettra | DCMR | Officer |
| 7 | Seng Laing | DMR | Chief Officer |
| 8 | Suon Bunse | DCMR | Chief Officer |
| 9 | Touch Bunly | DCMR | Officer |
| 10 | Ou Chak | DMRD | Vice Chief |
| 11 | Ben Savuth | DMRD | Officer |
| 12 | Keo Muny Ratha | DMRD | Vice Chief Officer |
| 13 | Sok Kiriroath | DCMR | Staff |
| 14 | Yin Rotha | DMR | Chief Officer |
| 15 | Bou Vannarit | DCMR | Staff |
| 16 | Long Sobonrithy | DMRD | Vice Chief Officer |

# Appendix I-18 Seminar on Mine Pollutions and Countermeasures


List of participants

**10th February, 2010, Conference room in MIME**

| No. | Name | Organization | Position |
|---|---|---|---|
| 1 | Chrea Vichett | DMRD | Deputy Director |
| 2 | Yen Rotha | DMR | Chief Officer |
| 3 | Seng Laing | DMR | Chief Officer |
| 4 | Long Sobonrithy | DMRD | Vice Chief Officer |
| 5 | Uon Ieng | DMRD | Officer |
| 6 | Vann Socheat | DMRD | Officer |
| 7 | Bon Vannarith | DMRD | Officer |
| 8 | Loeung Vanmonyrath | DMR | Officer |
| 9 | Pov Bunleng | DMRD | Staff |
| 10 | Ben Khoeun | DMRD | Staff |
| 11 | Suong Ky | DoG | Staff |
| 12 | Phok Sothea | DoG | Staff |
| 13 | Khem Borin | DoG | Staff |

# Appendix I-19 Mine Management in Private Company

## Mine Management in Private companies

**Kazuki Shingu**

**JICA Mining Expert**

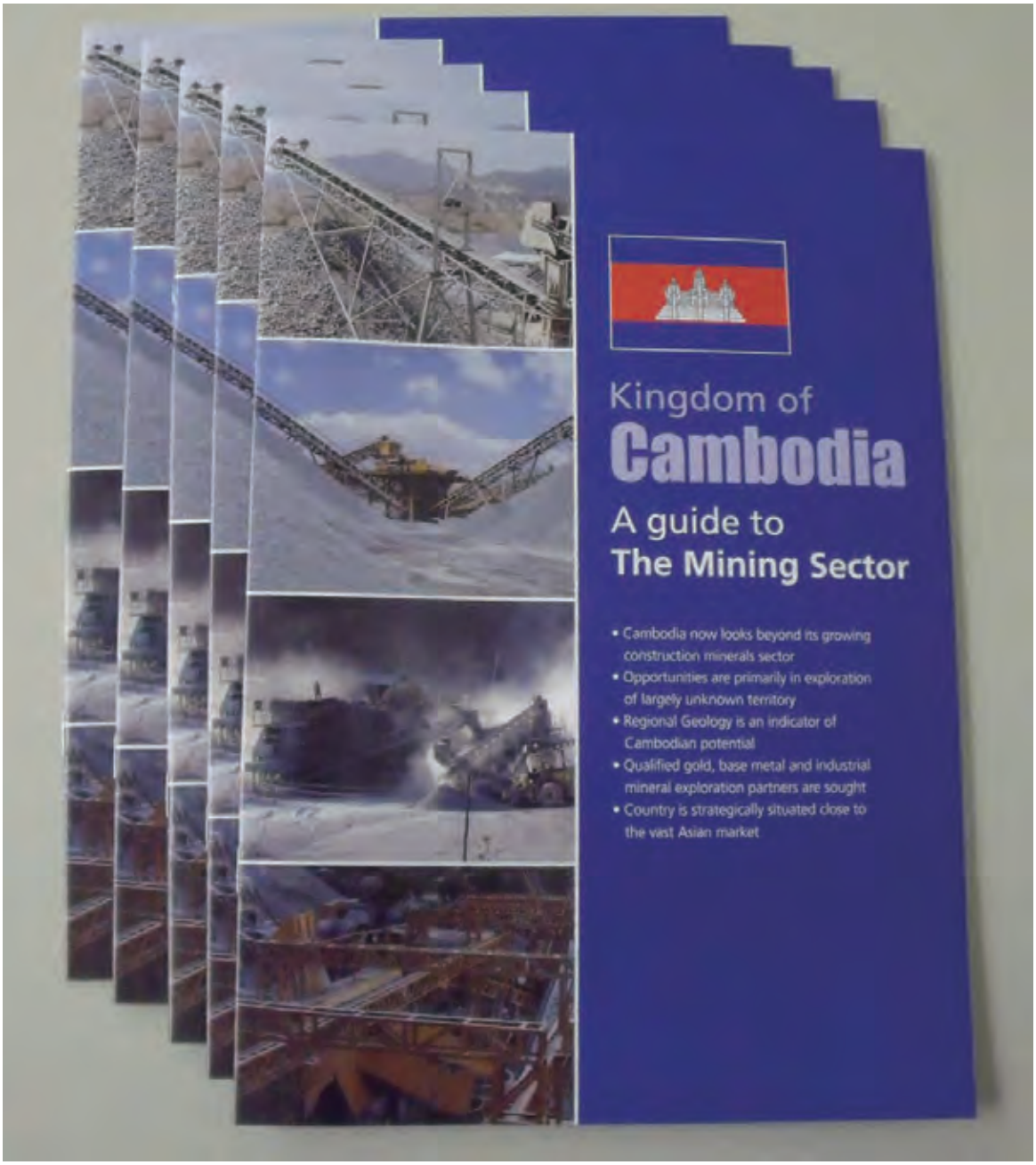
**June 1, 2010**

The List of Participants

**1st June 2010, Conference Room of MIME**

| No. | Name | Organization | Position |
|---|---|---|---|
| 1 | Chrea Vichett | GDMR | Deputy Director |
| 2 | Nuon Cha Nam | GDMR | Deputy Director |
| 3 | Nuon Noren | DMR | Deputy Director |
| 4 | Som Chamroeun | GDMR | Chief of Metalic Office |
| 5 | Phok Salorn | DoG | Chief of Coal and Gemstone Office |
| 6 | Kong Makara | DMRD | Office Chief |
| 7 | Yin Rotha | DMR | Chief of Officer |
| 8 | Van Socheat | DMR | Chief of Officer |
| 9 | Keo Muny Ratana | DMRD | Deputy Chief Ofiicer |
| 10 | Sou Phea | GDMR | Officer |
| 11 | Cheng Ngak | DoG | Officer |
| 12 | Binn Thet | DoG | Officer |
| 13 | Uon Ieng | DMRD | Officer |
| 14 | Bin Khoeun | DMRD | Officer |
| 15 | Ou Narath | DMRD | Officer |
| 16 | Chey Polack | DMRD | Officer |
| 17 | Huon Rasy | DMRD | Officer |
| 18 | Sok Sokha | DCMR | Officer |
| 19 | Lim Chumneanh | DCMR | Officer |
| 20 | Khun Samnang | DCMR | Officer |
| 21 | Kao Channdara | DCMR | Officer |
| 22 | Sok Kiriroath | DCMR | Vice Officer |
| 23 | Phok Sothea | DoG | Stuff |

# Appendix I-20 Guidbook



# Appendix I-21　Cambodian Mining Industry Seminar in Tokyo

## 【Cambodian Mining Industry Seminar】

### Providing Information on the Cambodia's Mining Industry and Mineral Resources Potential

To promote investment in the mining industry in the Kingdom of Cambodia, The Japan International Cooperation Agency (JICA) has created a "Master Plan to Promote the Cambodian Mining Industry" which contains detailed recommendations for the creation of an action plan that encompasses issues such as provision of information on Cambodian geology and mineral resources potential, investment promotion, systematic and organizational reforms, and development of human resources.

Deputy Director General, General Department of Mineral Resources, and Director of Department of Geology, General Department of Mineral Resources of Ministry of Industry Mines & Energy (MIME), who graciously joined this seminar in Japan to speak about the Cambodian mining industry and mineral resources potential, as well as explaining about the study underway.

Cambodia is believed to be rich with mineral resources potential. The Cambodian government recognizes mining as a key to the country's economic growth, and looks forward to future development in this industry. This seminar gave us an opportunity to speak about the latest developments in Cambodian mining.

We welcomed a large turnout for this event.

Date:

January 22nd (Fri) 2010, 14:00-16:30

Location:

JICA Headquarters, Conference room 113, Nibancho Center Building 5-25, Niban-cho, Chiyoda-ku, Tokyo 102-8102, Japan

Program:

| | |
|---|---|
| 13:30～ | Doors open |
| 14:00～14:10 | Opening address by Mr. Toshinobu Kato (Deputy Director General, and Group Director for Natural Resources and Energy Industrial Development Department, JICA) |
| 14:10～14:50 | "The Cambodian Mining Sector" by Mr. Peng Navuth (Deputy Director General, General Department of Mineral Resources, Ministry of Industry, Mines and Energy) |
| 14:50～15:30 | "Cambodia's Mineral Resources Potential" by Mr. Sieng Sotham (Director of Department of Geology General Department of Mineral Resources, Ministry of Industry, Mines and Energy) |

| | |
|---|---|
| 15:30～16:00 | "The Master Plan for Promotion of the Cambodian Mining Industry" by Mr. Masaharu Marutani (JICA "Master Plan to Promote the Cambodian Mining Industry" Team Leader) |
| 16:10～16:25 | Questions & answer session |
| 16:25～16:30 | Closing address |

Note: Presentations from the Cambodian participants were given in English with simultaneous Japanese interpretation.

Sponsored by: The Japan International Cooperation Agency (JICA)

## List of Participants on the Seminar

| | 所属 | 部署名 | 氏名 |
|---|---|---|---|
| 1 | ARUN,LLC. | 代表取締役 | 功能　聡子 |
| 2 | ARUN,LLC. | ディレクター | 伴場　賢一 |
| 3 | JACSTEEL INC. | 鉱物資源開発部 | 福田　日出男 |
| 4 | JACSTEEL INC. | 鉱物資源開発部 | 秀島　義信 |
| 5 | 飛鳥コンサルティング株式会社 | 代表取締役 | 畔上　尚也 |
| 6 | アセットデザイン株式会社 | 代表取締役 | 篠原　洋一 |
| 7 | アセットデザイン株式会社 | 企画部 管理部マネージャー | 杉本　宏 |
| 8 | アドバンストマテリアルジャパン株式会社 | 営業企画部長 | 倉片　正 |
| 9 | 出光興産株式会社 | 資源部事業推進課 | 山本　典保 |
| 10 | 岩井証券株式会社 | 国際部　主任 | 河内　直樹 |
| 11 | 岩井証券株式会社 | 国際部 | 田中　利昭 |
| 12 | エフエーストック株式会社 | 取締役 | 植田　学 |
| 13 | エフエーストック株式会社 | | 広瀬　圭子 |
| 14 | 株式会社　アイレット | 営業課長 | 松岡　健一 |
| 15 | 株式会社　いいビジネス創造 | 代表取締役 | 簡　亮博 |
| 16 | 株式会社　重化学工業通信社 | 編集部記者 | 藤田　真吾 |
| 17 | 株式会社　フォーバル | コンサル | 須藤　理夫 |
| 18 | 株式会社　三菱東京UFJ銀行 | CIB審査部 | 広田　泰行 |
| 19 | 株式会社　三菱東京UFJ銀行 | CIB審査部　審査第3グループ　調査役 | 谷村　仁康 |
| 20 | 株式会社　大和総研 | アジア事業調査室　主任研究員・次長 | 中村　昌宏 |
| 21 | 株式会社　大和総研 | アジア事業調査室 | 中川　葉子 |
| 22 | グローバルエデュケーション | 代表取締役 | 高橋　守 |
| 23 | 国際航業株式会社 | 海外事業企画室 | 閑林　亨平 |
| 24 | 国際投信投資顧問株式会社 | 株式運用部 | 石井　宏 |
| 25 | 財団法人　国際開発センター | 調査部 | 建部　直也 |
| 26 | 財団法人　国際鉱物資源開発協力協会(JMEC) | 上級参事 | 横山　勝雄 |
| 27 | 財団法人　国際鉱物資源開発協力協会(JMEC) | 調査員 | 田中　隆之 |
| 28 | 深海資源開発株式会社(秋田大学) | 資源調査部長(客員教授) | 細井　義孝 |
| 29 | 住友商事株式会社 | 無機原料部　硫黄硫酸チーム主任 | 笹野　晶裕 |
| 30 | 住友商事株式会社 | 建設機械第一部建機アジア事業チーム部長付 | 川田　知生 |
| 31 | 住友商事株式会社 | 建設機械第一部建機アジア事業チーム　チーム長代理 | 美坂　眞 |
| 32 | 住友商事株式会社 | サンクリストパル・プロジェクト部部長代理 | 上﨑　雅也 |
| 33 | 東京外国語大学 | カンボジア語専攻 | 中畠　亮 |
| 34 | 東京大学 | 工学系研究科 | 村松　正彦 |
| 35 | 独立行政法人　石油天然ガス・金属鉱物資源機構 | 理事・金属資源開発本部長 | 森脇　久光 |
| 36 | 独立行政法人　石油天然ガス・金属鉱物資源機構 | 希少金属備蓄部　企画課長 | 北　良行 |
| 37 | 独立行政法人　石油天然ガス・金属鉱物資源機構 | 資源探査部探査第2課 課長 | 久保田 博志 |
| 38 | 独立行政法人　石油天然ガス・金属鉱物資源機構 | 資源探査部探査第2課　課長代理 | 石川　信明 |
| 39 | 独立行政法人　石油天然ガス・金属鉱物資源機構 | 鉱害防止支援部 部長 | 納　篤 |
| 40 | 豊田通商株式会社 | 海外事業企画部豪亜グループ | 君島　徹 |
| 41 | 豊田通商株式会社 | 金属資源部レアアースグループ所属 業務委託コンサルタ | 中島　清治 |
| 42 | 日揮株式会社 | 国内エネルギー・非鉄営業部 | 若林　浩毅 |
| 43 | 日鉄鉱業株式会社 | 執行役員・資源開発部長 | 松永　潤 |
| 44 | 日鉄鉱業株式会社 | 資源開発部資源開発課 | 酒井　敏光 |
| 45 | 日鉄鉱コンサルタント株式会社 | 地質部 | 高橋　修 |
| 46 | 日本空港コンサルタンツ | 顧問 | 松屋　隆 |
| 47 | 日本鉱業協会 | 理事　企画調査部長 | 増田　勝彦 |
| 48 | 日本貿易振興機構(ジェトロ)　アジア経済研究所 | 地域研究センター東南アジアⅡ研究グループ研究員 | 初鹿野 直美 |
| 49 | 日本ポリグル株式会社 | カンボジア総代理店代表 | 加納　銑一 |
| 50 | 古河メタルリース株式会社 | 原料部 | 大谷　友也 |
| 51 | 三井物産株式会社 | 非鉄原料第二部 | 立石　昭久 |
| 52 | 三井物産株式会社 | 非鉄原料第二部 | 須田　健介 |
| 53 | 三菱商事株式会社 | 非鉄金属本部ベースメタル事業ユニット | 中山　浩 |
| 54 | 三菱商事株式会社 | 非鉄金属本部ベースメタル事業ユニット | 大西　太郎 |
| 55 | 三菱マテリアル株式会社 銅事業カンパニー | 海外鉱山プロジェクト部技術室　室長補佐 | 加藤　久遠 |
| 56 | 三菱マテリアルテクノ株式会社 | 資源・エネルギー事業部　資源調査部 | 根岸　義光 |
| 57 | 木材開発株式会社 | 東京営業所　取締役 | 谷　賢太 |
| 58 | 有限会社　ヴォーグ | | 木村　良明 |
| 59 | 有限会社インターナショナル・コンサルティング・サービス | 代表取締役 | 熊谷　研一 |
| 60 | (個人) | | 中橋　碧 |
| 61 | 三井金属資源開発株式会社 | 資源事業部　資源調査部　環境事業部　環境調査部　部 | 原田　陽夫 |
| 62 | 三井金属資源開発株式会社 | | 宮内　啓 |
| 63 | 松永ジオサーベイ株式会社 | 取締役 | 和田　一成 |

## Photos of the Seminar

Opening of the Seminar

Mr. Toshinobu Kato
Deputy Director General, JICA

Mr. Peng Navuth
Deputy Director General of
General Department of Mineral Resources

Mr. Sieng Sotham
Director of Department of Geology

Mr. Masaharu Marutani
JICA Team Leader

Questions & Answers

# Appendix I-22 PDAC2010

1. PDAC 2010

Dates: March 7th – 10th 2010

Location: Metro Toronto Convention Centre, Toronto Canada

2. About PDAC 2010

With a history of over 70 years, the Prospectors & Developers Association of Canada (PDAC) is an annual international mining exhibition held in early March in Toronto, Canada. More than 20,000 people from over 100 countries attend during the four days.

The event space is primarily divided into a trade show section and an investor exchange section.

In the trade show section, mining-related governmental organizations from around the world present information on their mining industries, investment climates, and active mining projects. Mining-related companies display their products for geological and satellite surveys, boring, and analysis software.

In the investor exchange section, both major (for example, Tech, Rio Tinto) and "junior" mining companies present the results of their most recent exploration and development, and seek investors. "Junior" mining companies means concession-holders that seek investment for mining operations through listings on stock exchanges (for example in Canada or Australia).

Over 300 other businesses vigorously exchange industry-related information through lectures and workshops, and project overviews by small mining businesses (Core Shack and 59 others).

These exhibitions are visited by a huge number of general investors, mining companies, trading companies, banks, and investment consultants looking for promising development prospects.

The JICA Cambodian Mining booth was located in the trade show section. This year there were 354 exhibitors in the trade show section and 583 exhibitors in the investor exchange section.

3. Cambodian Mining Booth

3.1 Participants

1) Penh Navuth (Deputy Director General, General Department of Mineral Resources)
2) Chrea Vichett (Deputy Director, Department of Mineral Resources Development)
3) Masaharu Marutani (JICA Team Leader)
4) Haruo Harada (Senior Geologist, JICA Team)

3.2 Displays & Distributed Materials

(1) Displays

Location Map of Cambodia and Trade Routes

Map of Cambodian Electrical and Transportation Infrastructure

Geological Map of Cambodia

Map of  Mineral Deposits and Occurrences in Cambodia

Table of Cambodian Stratigraphy & List of Major Metallogenic Epochs

Diagram of Latest Results of Exploration & Photographs Showing Mineral Prospects

Flow Chart for Mineral License Acquisition & List of Mineral License Categories

(2) Distributed Materials

Kingdom of Cambodia: A Guide to the Mining Sector (guidebook)

The Mining Sector in Cambodia (Print-out of Tokyo seminar presentation)

The Mineral Potential of Cambodia (Print-out of Tokyo seminar presentation)

Invest in Cambodia (Print-out of Web Site)

**Report on the Participation in PDAC, Toronto, Canada**

**7 – 10 March 2010**

It is a great opportunity for us representing the General Department of Mineral Resources of the Ministry of Industry, Mines and Energy of the Kingdom of Cambodia to attend the Mining Conference of the Prospectors and Developers Association of Canada (PDAC) which is held from 7 – 10 March 2010 in Toronto, Canada. This is the first time for Cambodia to present by ourselves to promote our young mining sector in the great international event.

During the three days and a half, many international investors, visitors, service providers and mining companies came to visit our booth, and we were asked about what kind of mineral potential exist, the current mining activities, legislations, laws and regulations related to mineral investment, the process to obtain mineral licenses, and tax regime etc.... The Guide book which is one of the outcomes of JICA project on the Master Plan for Promotion the Mining Industry in Cambodia was distributed. So participants are able to get more information about Cambodia geology, situation of mineral exploration, process and documents to apply for mineral license and some key terms of mineral agreement. We also confirmed them that foreign investors have the right to invest 100% ownership and all investments are protected by the Law on Investment of Cambodia.

We also informed visitors about the new website of the General Department of Mineral Resources (GDMR) developed by JICA Master Plan Study Team. We plan to launch it in April 2010 after updating the existing information. So visitors can access to this new website to get general information about Cambodia' s mining sector and if they want to get more information about any interested concession area where they want to invest, they are required to register. It is a good way that we can screen the potential guest before we allow them to download any needed information.

As the questions from visitors we acknowledge that our information is very limited. We need to improve our geological/mineral deposit information and release this information to the potential investors. The registration system should be improved that allow investors to download

application form from the website and can apply for the mineral license though the internet. Tax policy is the key point for Cambodia that we should have a special tax regime for mining industry. As well as tax is the main revenue to our national budged but reasonable tax rate is also the main factor to attract direct foreign investment.

We noticed that our royalty rate make investors satisfy. As in the other countries, royalty rates vary from year to year that it is the cause making investors hesitate to place investment. Cambodia's royalty rates are fixed since investors signed agreement with the Ministry.

In conclusion, PDAC 2010 in Toronto is very useful for us to introduce our mining sector to the world. We do hope that all activities we have done in the Mining Conference, with the strong support of Mr. Masaharu Marutani and his colleague Mr. Harada, will attract mining investors to get nearer to Cambodia and their decision to invest in this sector will be made.

Taking this opportunity, we would like to express our sincere thanks to JICA for providing its technical assistance to MIME as well as GDMR to develop the Master Plan for Promotion the Mining Industry in Cambodia and providing us a good opportunity to participate in this important Mining Conference, PDAC 2010.

We also would like to thanks JICA Master Plan Study Team led by Mr. Masaharu Marutani for their effort and cooperation with GDMR to set up this Master Plan.

Toronto, 10 March 2010

| | |
|---|---|
| Peng Navuth | Chrea Vichett |
| Deputy Director General | Deputy Director |


Metro Toronto Convention Centre


Displays at the Cambodian Mining Booth


Materials for distribution


Canadian Cable TV Network BNN broadcasting from the PDAC venue.


Four staffers at the Cambodian Mining Booth

Mr. Harada, Mr. Chrea, Mr. Peng, and Mr. Marutani (from left to right)


Materials from other booths

The PDAC program is on the right.

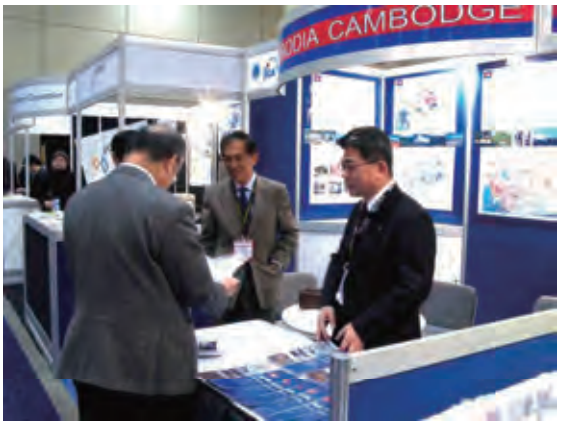

Mr. Penh Navuth explaining to an investment consultant

Mr. Penh Navuth explaining to an exploration company


Mr. Penh Navuth explaining to a major Japanese company


Mr. Chrea Vichett explaining to an exploration company


Mr. Chrea Vichett explaining to a mining company




Mr. Masaharu Marutani explaining to an investment consultant

# Appendix II-1 Sub-degrees and Prakas related to the Mining Sector

**No.2**

**KINGDOM OF CAMBODIA**
Nation Religion King

**ROYAL GOVERNMENT OF CAMBODIA**

**Sub-Decree**
**on**
**the Principles for Investment in Mineral Resources**

**The Royal Government of Cambodia**
Decides

**Article 1-**

All application for mineral exploration and exploitation shall be submitted to the one stop service of the Council for the Development of Cambodia after the recommendation made by the Ministry of Industry, Mines and Energy.

**Article 2-**

All kind of mineral types are not permitted for export and shall be retained to supply local industries to manufacture final products. Only the final products are allowed for export.

**Art. 3-**

Any decision contrary to the provisions of the Sub-degree shall be null and void.

**Art.4-**

Co-Chairmen of Council for the Development of Cambodia, Minister in charge of the Council of Ministers, Co-Ministers of Interior, Minister of Economic and Finance, Minister of Industry, Mines and Energy, Ministers, Governors of Provinces/ Municipalities and Directors of Concerned Institutions shall effectively implement this Sub-degree after the date of signature.

Phnom Penh, January 31, 2005
Prime Minister
HUN SEN

Informed
Prime Minister
Senior Minister, Minister of Commerce
Vice-Chairman of the Council for the Development of Cambodia

CHAM PRASETH

**No.3**

**KINGDOM OF CAMBODIA**
Nation Religion King
**ROYAL GOVERNMENT OF CAMBODIA**
Ref. No 113

**Sub-decree on**
**the Amendment of Article 1 of the Sub-degree Ref. No 08 Dated January 31, 2005 on the Determination of Principles for Investment in Mineral Resources**

**The Royal Government of Cambodia**
Decides

**Article1-**

The article 1 of Sub-degree Ref. No 08 dated January 31, 2005 on the Determination of Principles for Investment in Mineral Resources is amended as follows:

**Article1 (new):**

Any application for preliminary survey (pre-survey) of any scale shall be applied under the provisions of the Law on Mineral Management and Exploitation. For application for mineral exploitation, except for construction materials (such as stone, gravel, sand, laterite, soil, etc.) shall be submitted to the one stop service of the Council for the Development of Cambodia after the completion of preliminary survey (pre-survey) and mineral exploration with the recommendation from the Ministry of Industry, Mines and Energy.

After the application for mineral exploitation is principally approved by the Council for the Development of Cambodia, the Ministry of Industry, Mines and Energy shall issue industrial mining license in accordance with the Law on Management and Exploitation of Mineral Resources

**Article 2:**

Any provision contrary to the provisions of this Sub-degree shall be null and void.

**Article 3:**

The Minister in charge of the Council of Ministers, Co-Chairmen of the Council for the Development of Cambodia, Co-Ministers of Interior, Minister of Economic and Finance, Minister of Industry, Mines and Energy, Minister of Commerce, Minister of Environment, Minister of Agriculture, Forestry and Fishery, Secretary of State of all ministries, Institutions, Provincial/ Municipal Governors concerned shall implement this Sub-degree effectively after the date of signature of this Sub-decree.

Phnom Penh, September 29, 2005

Prime Minister

HUN SEN

**No.4**

**KINGDOM OF CAMBODIA**
Nation Religion King

**ROYAL GOVERNMENT OF CAMBODIA**
Ref. No 20

**Decision**
**on**
**the Establishment of a Sand Management Committee**

The Royal Government of Cambodia
Decides

Article 1:
The Commission of Sand Resource Management is established with the following composition:

| | | |
|---|---|---|
| 1. | Representative of Ministry of Water Resource and Meteorology | Chairman |
| 2. | Representative of Ministry of Public Work and Transport | Vice-Chairman |
| 3. | Representative of Ministry of Industry, Mines and Energy, | Member |
| 4. | Representative of Ministry of Environment | Member |
| 5. | Representative of Ministry of Land Management, Urbanization and Construction | Member |

Article 2:
The Commission of Sand Resource Management shall have the following duties:

- Control and Monitor the pumping of sand for export and for local demand;
- Study and determine (sand) areas to be licensed to (companies) to pumps and in order to facilitate the navigation routes and ensure the current of the river not to be affected, causing the falling down of the river bank;
- Study the feasibility of pumping mud sand from Mekong River land to fill the lakes for Phnom Penh Development permitted by the Royal Government to facilitate the process of pumping mud sand operated under a common aspect;
- Control and propose recommendation to the Head of the Royal Government to nullify business license hold by companies who violate (fail to implement) the decision of Commission of Sand Resource;
- Report on the outcomes of work done (by the Commission of Sand Resource Management) to the Head of the Royal Government (for review and approval).

Article 3:
The Commission of Sand Resource Management shall be convened by the Chairman.

Article 4:
The Commission of Sand Resource Management has its own Secretariat as Assistance at the Ministry of Water Resource and Meteorology and has the rights to use the stamp of Ministry of Water Resource and Meteorology.

Article 5:

Minister in charge of the Council of Ministers, Minister of Water Resource and Meteorology, Minister of Public Work and Transportation, Minister of Industry, Mines and Energy, Minister of Environment, Minister of Land Management, Urbanization and Construction, Secretary of States of all Ministries-Institutions concerned, and the representatives from the Ministries s as stated in Article 1 shall implement the Decision after the date of signing.

Phnom Penh, May 23, 2006

Prime Minister
HUN SEN

**No.5**

**KINGDOM OF CAMBODIA**
NATION RELIGION KING
**ROYAL GOVERNMENT OF CAMBODIA**

**Decision on**
**the Establishment of an Inter-Ministerial Commission to Control and Solve the Soil Excavating Issues around the Areas of Phnom Penh City**

The Royal Government of Cambodia
Decides

Article 1:

The Inter-Ministerial Commission is established to control and solve the excavation of the ground around the areas of Phnom Penh city, and the composition of which is as follow:

| | | |
|---|---|---|
| 1. | Ministry of Industry Mine and Energy | Chairman |
| 2. | The Governor of Phnom Penh | Vice Chairman |
| 3. | Representative of Ministry of Interior | Member |
| 4. | Representative of Council of Ministers | Member |
| 5. | Representative of Ministry of Defense | Member |
| 6. | Representative of Ministry of Land Management, Urban Planning and Construction | Member |
| 7. | Representative of Ministry of Economic and Finance | Member |
| 8. | General Director of General Department of Mineral Resources | Permanent Member |
| 9. | Governor of Dangkor district | Member |
| 10. | Governor of Russey Keo district | Member |
| 11. | Governor of Meanchey district | Member |
| 12. | Director of Municipal Department of Industry Mines and Energy | Permanent Secretary |

All of the members shall be convened for meeting by Chairman and in the case of the absence of the Chairman it is convened by Vice-Chairman.

Article 2:

The Inter-Ministerial Commission to control and solve the excavation of the ground around the areas of Phnom Penh City shall hold the following duties:

- Inspect soil pits (shut down) in order to study and set up measures to be taken effectively in accordance with the Notification Letter Ref. No 964, dated June 21 2005, issued by the Council of Ministers;
- Inform all concerned companies about the Notification Letter Ref. No 964, date June 21 2005 issued by the Council of Ministers;
- Invite land owners or concerned companies excavating the ground in excess of technical limitation to restore and refill their soil pits in order to protect the environmental impact and ensure the safety for people living and traveling in the areas;

- Determine new ground areas for excavation to be replaced with the old soil pits that shall be refilled up (with the soil) or confiscated as the State Property in accordance with the prevailing laws and regulations;
- Set the schedule for soil transportation out of the excavated sites for social safety;
- The land owners and concerned companies doing the business of excavating the ground are required to pay the soil royalty to the Government in compliance with the prevailing laws and regulations;
- Report the Royal Government the result of inspection and solutions to restore all soil pits located in each district of Phnom Penh City.

Article 3-

The Inter-Ministerial Commission to inspect and solve the soil pits (shut down) around the areas of Phnom Penh City shall have the rights to ask for the intervention from the Armed Forces in case of necessary.

Article 4-

The Inter-ministerial Commission to control and solve the excavation of the ground in the areas around Phnom Penh City shall have its Secretariat permanent in the General Department of Mineral Resources and the right to use the official stamp of the Ministry of Industry, Mines, and Energy.

Article 5-

The Minister in charge of Council Minister, Minister of Industry, Mines, and Energy, Minister of Interior Ministry, Minister of Land Management, Urban Planning and Construction, Minister of Economic and Finance, Ministers, Secretary of State of all concerned Ministries-Institutions, Governor of Phnom Penh, Governors of Districts concerned and Officials as stipulated in the Article 1 shall implement this Decision from the date of signing of the Decision.

Phnom Penh, February 27, 2007

Prime Minister

HUN SEN

**No.6**

**KINGDOM OF CAMBODIA**
Nation Religion King

**ROYAL GOVERNMENT OF CAMBODIA**
Ref No 43

**Decision**
**on**
**the Establishment of an Inter- Ministerial Inspection to Inspect Results of Mineral Exploration done by Companies Approved by the Concerned Ministries-Competent Institutions**

The Royal Government of Cambodia
Decides

Article 1.-
The Inter-Ministerial Inspection Group is established to control the results of mineral exploration done by companies licensed by the concerned ministries-institutions, and the composition of which is as follows:

| | | |
|---|---|---|
| 1. H.E Mr. Prak Ham | Secretary of State of Ministry of National Assembly and Senate Relation and Inspection | Chairman |
| 2. H.E Mr. Chea Sieng Hong | Secretary of State of Ministry of Industry, Mines and Energy | Vice-Chairman |
| 3. H.E Mr.Suon Sithy | Secretary General of the Cambodian Investment Committee | Member |
| 4. H.E Mr. Ngean Leng | Under Secretary of State of the Ministry of Finance and Economic | Member |
| 5. H.E Mr. Tea Choup | Under Secretary of State of the Ministry of Environment | |
| 6. H.E Mr. Hing Thoraksy | Representative of the Council of Ministers | Member |
| 7. H.E Mr. Muong Sao Khan | Under Secretary of State of Ministry of Water Resource and Meteorology | Member |
| 8. H.E Mr. Ith Nody | Under Secretary of State of Ministry of Agriculture, Forestry and Fishery | Member |
| 9. H.E Mr. Kruoch Bunly | Director General of Ministry of National Assembly and Senate Relations and Inspection | Member |
| 10. H.E Mr. Sok Leng | Director General of Mineral Resources, Ministry of Industry, Mines and Energy | Member |
| 11. H.E Governors of concerned provinces/municipalities | | Member |
| 12. Mr. Yun Heng, | Deputy Director of Project Analysis and Promotion Department of the Council for the Development of Cambodia | Member |
| 13. Mr. Seng SoChenda | Deputy Director of Investment Project Verification and Monitoring of Council Development for Cambodia/ Cambodian Investment Committee | Member |

All members of the Inspection Group shall be convened by the Chairman or Deputy Chairman in case the Chairman is absent.

Article 2

The Inter-Ministerial Inspection Group has the following duties:

- Go to visit the sites (concession areas) to understand the mineral exploration activities done by all companies obtaining the principle from (licensed by) the concerned Ministries-Institutions by starting (to control) the companies holding mineral concession areas in Rovieng District, Preah Vihear Province.
- Find out the causes of delaying in retuning concession areas where no mineral exploration activities or less activities to Cambodia Iron and Steel Mining Industry Group Company according to the previous decision made by Samdech Co-Chairmen of the Council for the Development of Cambodia to take measures to enhance the implementation (this decision) in order to facilitate the company to promote its package investment (steel smelting factory, electric plant, rail way construction, port construction, etc…).
- Report (and submit) the results of actual inspections done in the mineral concession areas (held by) of each company to the one-stop-service of CDC for review and comments to the Royal Government for decision.

Article 3

During the mission, all of the members of the Inter-Ministerial Inspection Group are entitled to be accompanied with their own technical officials holding only a mission letter issued by their respective ministries.

Article 4

The Inter-Ministerial Inspection Group has the rights to use the stamp and the budget package of the Council for Development of Cambodia to fulfill the assignments.

Article 5

Minister in charge of the Council of Ministers, Co-Ministers of Interior, Minister of Economic and Finance, Minister of National Assembly and Senate Relations and Inspection, Minister of Environment, Minister of Water Resource and Meteorology, Minister of Agriculture, Forestry and Fishery, Co-chairmen of CDC, all ministers- all directors of institutions, all provincial-municipal governors, and members whose names are as stated in Article 1, shall carry out their duties in compliance with the Decision after the date of signing.

Phnom Penh, October 24, 2005
Prime Minister
HUN SEN

**No.7**

**KINGDOM OF CAMBODIA**
Nation Religion and King

**ROYAL GOVERNMENT OF CAMBODIA**
Ref No 01

**Order on**
**the Prevention and Elimination of Forestry Cutting**
**and Illegal Occupation of the Forested Land**

Forest is natural asset invaluable for human being and creature living on the Earth. By seeing the advantage of the forest, the Royal Government of Cambodia have paid more attentions to conserving and managing the forest with sustainability in order to serve the social, economic, and environmental benefits for the current generation as well as for the next one (generation).

Starting from the point of view above, the Royal Government of Cambodia has imposed the Order No. 02 dated January 6, 1999, Prakas No. 01 dated January 25, 1999 and Prakas No. 06 dated September 27, 1999 to manage and eliminate illegal activities in forestry sector and land occupation and implemented the comprehensive forestry reform with effective way and got successive successes, highly appreciation and strongly support from the national and international communities. At the same time, the activities of clearing (reclaiming), burning, bulldozing, occupying forested land, forest- planted land and natural protected areas for own properties happened in the past are successively increased in almost all provinces/municipalities. These are criminal against the Law on Forestry and other regulations (legal documents), which is the activity leading into the disaster, forest destruction and lost of the State-own-forest property, and can cause the sustainable forestry management goal to be failure if the measures of protection and suppression (of clearing [reclaiming], burning, bulldozing, occupying forested land) have not bee taken strictly and effectively on time.

In order to prevent, suppress and eliminate the clearing, burning and occupying the forested land, the Royal Government has set out the urgent orders as follows:

1- Nullify all land occupying permits and land title deeds, which are obtained with reclaiming the forest land and tree-planted land in the past as well as in the present, in accordance with the Law on Forestry and the Land Law. The Ministry of Land Management, Urbanization and Construction shall advise (instruct) its departments to stop issuing immediately all occupying permits and land title deeds, the sources of which are from reclaiming the forested land and the State-own-tree planted land. All the issuances of permits and land title deeds involved in the forested land boundaries shall be approved by the competence of local forestry administration.
2- The Ministry of National Defense and the Headquarter of the Royal Cambodian Armed Forces shall set a plan to locate the permanent military bases by avoiding the impact on the forested areas. In case that the permanent military bases affected (invaded into) the forested areas boundaries, (The Ministry of National Defense and the Headquarter of the Royal Cambodian Armed Forces) shall consult with and get the approval from the Ministry of Agriculture, Forestry and Fishery;
3- Absolutely prohibit new settlements a long public roads or paths in the permanently preserved forest land unless the Ministry of Agriculture, Forestry and Fishery approve and the Royal Government of Cambodia give a permit in advance. Local authorities at all levels shall well administer the statistic of their

local population and shall cooperate with the (local) forestry administration to take measures on time to prevent from and suppress people traveling (to go in the forest) to reclaim, burn, bulldoze and occupy the forested land in order to settle their dwellings in the boundaries of the permanent preserved forest under the forms of farm (forest) travelers or other purposes;

4- Bulldozing the forested land to build public road construction in the permanent preserved forestry land shall be decided by the Royal Government of Cambodia at the request of the Ministry of Public Work and Transport or other competent institutions with the consultation with and the approval from the Ministry of Agriculture, Forestry and Fishery.

5- The farm (forest) travelers shall be prohibited from the jungle and semi-jungle in the boundaries of the permanent preserved forest. The farm (forest) travelers are allowed only for the original ethic people living in the communities under the control and approval from the local competent authorities.

6- Quarrying stone, soil, sand, minerals and other natural resources in the boundaries of the permanent preserved forest shall be evaluated by the Ministry of Agriculture, Forestry and Fishery and permitted by the Royal Government of Cambodia;

7- No individual, legal entity, association, organization or authority have any rights to permit even directly or indirectly to reclaim, burn, bulldoze and occupy the forested land in the boundaries of permanent preserved forest and State-own tree planted areas absolutely;

8- All of the forested areas confiscated in compliance with the Law on Forestry shall be kept as the State property, and the Forestry Administration shall plant more trees to be recreated as the forest as it was before.

9- Import of all kinds of chainsaws can only be allowed by the Forestry Administration. The Forestry Administration shall arrest and seize all kinds of chainsaws, that are not permitted to use at any time and any place. The seized chainsaws shall be destroyed under a ceremony as the same as the case of destroying illegal fishing tools done.

10- All issuances of land occupying permits or land title deeds, the reclaiming, burning, bulldozing and occupying of the forested land, the military base, the bulldozing of the forest for public road construction, new settlement a long the public road, the farm (forest) travelers, the quarrying of stone, soil, sand, minerals and other natural resource involved in the natural protected areas shall be consulted with and approved by the Ministry of Environment in advance.

11- Local authorities at all levels, the Royal Cambodian Armed Forces, the National Police, the Royal Military Armed Force and other relevant authorities shall facilitate and provide their respective forces to cooperate with the Forestry Administration upon its request to take measures to prevent and suppress all kinds of reclaiming, burning, bulldozing and occupying the forested land.

12- Any person violate this Order shall be punished as stipulated in the Law on Forestry and other prevailing Laws.

Receiving this Order, all ministries, relevant institutions, Forestry Administration, General Headquarter of Royal Cambodian Armed Forces, General Commission of National Police, Headquarter of Military Armed Forces over the Country, and local authorities at all levels shall widely disseminate and implement this Order high effectively

Phnom Penh, 09 June 2004
Prime Minister
HUN SEN

**No.8**

**KINGDOM OF CAMBODIA**
Nation Religion and King

**ROYAL GOVERNMENT OF CAMBODIA**
Ref No

**Sub- Decree (Draft)**
**on**
**the Suspension and Revocation of Mineral Resource Licenses**

The Royal Government
Decides

Article 1

All kind of mineral resources licenses under the Law on Management and Exploitation of Mineral Resources can be suspended or revoked, if any concessionaire offenses against (violates) the provisions of the Law on Management and Exploitation of Mineral Resources.

Article 2

The mineral resource license shall be suspended or revoked with the level of offence [violation] (against the Law) done by the concessionaire holding the mineral resources license. The level of offence [violation] (against the Law) done by the concessionaire shall be divided and determined as follows:

(1) Explore and mine (for) minerals in the private-owned land without any written agreement with the land owner;
(2) Explore and mine (for) minerals the State-owned land without any written permission from the competent authorities or inter-ministries whose duties is to administer the areas;
(3) Prospect, explore and mine (for) minerals in the State-owned land determined as cultural site, historical site, and patrimonial site;
(4) Deposit, transfer the right of or inherit the mineral licenses without written approval from the Minister of Industry, Mines and Energy;
(5) Not keep the recording books , accounting books and related documents and not provide reports or books related to the information to Minister of Industry, Mines and Energy in due course;
(6) Not conduct the exploration and exploitation of mineral resources properly and technically as detailed in the work programmes and budget for exploration and exploitation of mineral resources;
(7) Not take suitable measures to protect the environment, restore the shut down mines sites, protect health and safety for workers and people living around the mines sites;
(8) Not compensate the land owners for their land damage caused by the mineral operations (conducted by the concessionaire);
(9) Not pay royalty for minerals mined (in their concession areas), annual land rental, profit tax, other relevant taxes and other financial obligations.
(10) Not allow the competent authorities to inspect all his/her work and activities in their mineral operation sites or mineral resources license areas.

Article 3

The period of the suspension of mineral resources license shall not be over six (6) months.

Article 4

According to the level of offence (violation) (against the Law) done by the concessionaire as stated in Article 2 above, the Ministry of Industry, Mines and Energy shall issue a letter of advice or specific orders which require the concerned concessionaire to abide by the letter of advice or specific orders within thirty (30) days after the concessionaire received the letter of advice or specific orders from the Ministry of Industry, Mines and Energy.

Article 5

When the period of thirty (30) days is expired, if the concessionaire failed to do anything as stated in the letter of advice or specific orders, the Ministry of Industry, Mines and Energy shall issue a Prakas to suspend the mineral resources license from the concessionaire and temporary stop all his/her work and activities of mineral exploration and/or exploitation or mineral processing.

*(Note: Mr. Peng Navuth added a clause concerning the power of provincial departments, local authorities and institutions concerned and the administrative procedure for sending the letter of advice and specific orders on fault correction.)*

Article 6

During the mineral resources license is suspended, the concessionaire shall be given a last opportunity to abide by the letter of advice or orders issued by the Ministry of Industry, Mines and Energy or to correct his/her faults.

After correcting his/her faults as advised by the Ministry of Industry, Mines and Energy, the concessionaire can submit his/her request to lift the suspended mineral resources license and a report on his/her implementation of advice or orders with evidence showing his/her fault correction to the Ministry of Industry, Mines and Energy for review and approval prior to thirty (30) days before the deadline of suspension of mineral resources license is expired as stated in Article 3 above.

Article 7

The Ministry of Industry, Mines and Energy shall respond in written its approval or disapproval on the request for lifting the suspended mineral resources license within thirty (30) days from the receipt of his/her request for lifting the suspended mineral resources license and report on fault correction.

Article 8

If the concessionaire obtains the approval from the Minister of Industry, Mines and Energy and the valid mineral resources license under the suspension period is nearly expired or expired, the concessionaire can apply for the extension to the validity of the mineral resources license in compliance with the regulations issued by the Ministry of Industry, Mines and Energy.

Article 9

When the period of suspension of mineral resources license is over and the concessionaire has still failed to fulfill the requirements as stated in the Article 6 above, the Ministry of Industry, Mines and Energy shall issue a Prakas to revoke the mineral resources license from the concessionaire, and send it to the concerned provincial/ municipal authorities, where the mineral resources license is located, to take measures to revoke the mineral resources license from the concessionaire and stop permanently all his/her work and activities of mineral exploration and/ or mining or mineral processing.

Article 10

All relevant provincial/municipal authorities shall report to the Ministry of Industry, Mines and Energy the result of taking measures to revoke the mineral resources license. In

case of necessary, the Ministry of Industry, Mines and Energy shall establish a commission to suspend or revoke mineral resources license from the concessionaire and also temporary stop all work and activities of the mineral explorations and/or mining or mineral processing.

Article 11

*(Mr. Peng Navuth is requested to revise this article.)*

In case of the revocation of the mineral resources license from the concessionaire [who is] under the mineral agreement, additional to the mineral resources license, with the Ministry of Industry, Mines and Energy, such the mineral agreement shall be terminated (accordingly) automatically.

Article 12

Concessionaire, whose mineral resources license is suspended or revoked, even under or not under the mineral agreement, additional to the mineral resources license, with the Ministry of Industry, Mines and Energy, shall be responsible for paying the debt to the Government, including payment of tax, annual land rental, profit tax, relevant taxes, and other debt outstanding and also for restoring the shut down mines sites and environment inside the areas of mineral resources license reasonably.

If the concessionaire failed to do it within a timeframe limited, the Ministry of Industry, Mines and Energy shall take suitable measures by preparing the papers concerned to the concessionaire to be sent to the Court to take legal action.

Article 13

*(Mr. Peng Navuth is requested to revise this article.)*

The provisions of the suspension or revocation of the mineral resources licenses, stipulated in the agreements of mineral exploration and/or exploitation between the Ministry of Industry, Mines and Energy and mining companies (concessionaires), contrary to the Sub-degree shall be null and void.

Article 14

The procedure of suspension or revocation of the mineral resources license as stated in the Sub-decree is not included the fine and penalty that the concessionaire shall be under.

Article 15

The Minister in charge of Council of Ministers, Minister of Industry, Mines and Energy, involved ministries/institutions, provincial/ municipal Governors and involved concessionaire shall implement the Sub-degree with high effectively after the date of signature.

Phnom Penh, Date-Month-Year

Prime Minister
Samdech Akak Moha Seina Padei Techo HUN SEN

Have informed
Samdech Akak Moha Seina Padei Techo HUN SEN
Prime Minister of the Kingdom of Cambodia

Minister of Industry, Mines and Energy
SUY SEM

**No.9**

**KINGDOM OF CAMBODIA**
Nation Religion King

**Royal Government of Cambodia**
N$^0$

**Sub Degree (Draft)**
**on**
**the Power and Roles of Officials Appointed to Control, to Inspect and Report Activities of Mineral Exploration, Mining**

The Royal Government of Cambodia
Decides

Article 1:
Minister of Industry, Mines and Energy shall appoint Officials of the General Department of Mineral Resource to control, inspect and report the activities of mineral explorations, mining, researches, and analysis concerned related to (mining) management with high effectiveness.

Article 2:
Officials of the General Department of Mineral Resources shall be appointed as Mining Inspector.

Article 3:
The assigned Officials of the General Department of Mineral Resources shall have the following duties:

1. Be responsible to the Minister in charge of mineral sector for the management (of mineral resources) under the provisions of the Law on Management and Exploitation of Mineral Resources;
2. Prepare annual reports on activities of mineral exploration and mining to be submitted to the Minister in charge of Mineral Sector (for review and approval);
3. Collect information and file all reports on the operations of mineral exploration, mining, transportation, processing, marketing, and export of mineral products;
4. Follow up and control the implementation of all provisions of the Law;
5. Control of the implementation of orders (regulations) on the health and safety of workers and people and environmental protection;
6. Hold other duties determined by the Minister in charge of mine.

Article 4:
The Power the assigned officials of the General Department of Mineral Resources shall be determined as follows:

- Have the rights to inspect at any time all activities of mineral exploration and/or mining or mineral processing in areas under and not under the mineral licenses;
- Have the rights to bring equipment and technical tools necessary to inspect activities of mineral operation in areas under or not under the mineral licenses;
- Have the rights to check reports or results related to the operations of mineral exploration and/or mining or mineral processing, restoration of mines sites, environmental protection, evaluation of mined mineral product quantity, and royalty and concerned taxes payments;
- Control and investigate all violation activities against the Law on Management and Exploitation of Mineral Resources.

Article 5:

The assigned Officials of the General Department of Mineral Resources shall report (and submit) all activities of mineral explorations, mining, researches and analysis concerned to (mining) management to the Minister of Industry, Mines and Energy for review and approval within fifteen (15) days after the inspection is completed each time.

Article 6:

Under the duties time, the assigned officials of the General Department of Mineral Resources GDMR shall wear the uniform to be known as mining inspector, and the uniform of the assigned officials is attached herewith as annex to the Sub-Decree.

Article 7:

When fulfilling their duties at the sites of mineral exploration and/or mining, the assigned officials of the General Department of Mineral Resources shall hold their identification cards and mission letter issued by the Ministry of Industry, Mines and Energy.

Article 8:

Minister in charge of the Council of Ministers, Minister of Industry, Mines and Energy, Ministries/Institutions concerned and Provincial/ Municipal Governors, shall effectively implement this Sub-degree after the day of signing.

Phnom Penh, Date-Month-Year

Prime Minister
Samdach Akak Moha Seina Padei Techo HUN SEN

Have informed
Samdach Akak Moha Seina Padei Techo HUN SEN
Prime Minister of the Kingdom of Cambodia

Minister of Industry, Mines and Energy
SUY SEM

**No.10**

**KINGDOM OF CAMBODIA**
Nation Religion King

**Royal Government of Cambodia**
Ref. No.

**Sub-decree (Draft)**
**on**
**the Determination of Mineral Resources Areas**

The Royal Government of Cambodia
Decides

Article 1:

Mineral resources areas are mineral deposits or occurrences where were discovered or areas where geological structures shown the possibility of present of mineral resources.

Mineral resources areas shall be determined for protection and preservation for mineral resources operations as indicated in a map attached herewith the Sub-Decree.

Article 2:

Protected [mineral resources] areas are mineral occurrences where were discovered or areas where geological structures shown the possibility of present of mineral resources.

Preserved [mineral resources] areas are mineral deposits where were discovered and the geological information and data are shown the potential of mineral resources.

Article 3:

All proposal projects for development and construction of historical and patrimonial properties, cemetery sites or for other constructions in the protected [mineral resources] areas shall be submitted to the Ministry of Industry, Mines and Energy for approval in advance. The Ministry of Industry, Mines and Energy shall study and evaluate the areas as requested above, and shall respond in written the approval or disapproval of the development project proposal with reasonable reason within at least forty five (45) days from the date of submission of the sufficient application form.

Article 4:

The development and construction of historical and patrimonial properties, cemetery sites or other constructions in the preserved [mineral resources] areas shall be absolutely prohibited.

Preserved [mineral resources] areas shall be for the purpose of mineral exploration or mining only.

Article 5:

No individual or legal entity can occupy the mineral resources areas, which are the State public land other than the [mineral] concession areas under the [mineral] agreement signed by the Ministry of Industry, Mines and Energy [and concessionaire] or under mineral resources licenses, to conduct mineral exploration and /or mining.

Article 6:

Mineral resources areas can be added in or removed from the map annexed to the Sub-Degree in the case of the discovery of new mineral occurrences or deposits or the previous discovery of mineral occurrences or deposits shown no economic value, respectively.

Article 7:

If mineral resources were found in new areas which are not indicated in the map annexed to the Sub-Degree, and which are legal private land properties, the Minister of Industry, Mines and Energy shall negotiate with the land owners by providing them with reasonable and fair compensation. The compensation shall be born by the operators who are conducting the mineral operations in those areas.

In case that the new mineral resource areas were discovered in the forest areas, forest concession areas, forest for communities, religious believed forest, social concession land, land for development, natural resources protected area and other areas protected by the laws of the Kingdom of Cambodia, the Minister of Industry, Mines and Energy shall coordinate with related institutions in advance before declaring the mineral resources areas protected or preserved.

In case of disapproval from the related institutions, the Minister of Industry, Mines and Energy shall submit its request to the Royal Government for review and decision.

Article8:

Any provision contrary to the Sub-Degree shall be considered as void and null.

Article 9:

Minister in charge of Council of Ministers, Minister of Industry, Mines and Energy, related Ministries/Institutions and Provincial/ Municipal Governors shall implement this Sub-Degree effectively after the date of signature.

Phnom Penh, Date – Month- Year
PrimeMinister
Samdech Akka Moha Sena Padei Techo HUN SEN

**No.11**

**KINGDOM OF CAMBODIA**
Nation Religion King

**Royal Government of Cambodia**
Ref. No.

**Draft of Sub-Decree (Draft)**
**on**
**Conditions for Issuing and Extending Mining Licenses and Transferring Mining License Rights**

The Royal Government of Cambodia
Decides

Article1:
The industrial mining license shall be issued to only the concessionaire holding [mineral] exploration license in order to explore and mine for minerals found in commercial deposits located within the boundaries of the area of land granted under the [mineral] exploration license.

Article 2:
Concessionaire holding [mineral] exploration license may apply for the industrial mining license at any time during the validity of [mineral] exploration license to the Ministry of Industry, Mines and Energy as follows:

1. Application for industrial mining license (with stamp 2,000 Riel) 1 set
2. Map and location of mining area to be applied for 1 set
3. Work programme and budget for the mining period; in which the concessionaire is required to submit the following plans and reports for review and approval: 1 set
    a. Mining plan and techniques, mines design and processing plan
    b. Mining machinery and equipments
    c. Report on environmental impact assessment and environmental protection;
    d. Restoration plan for mined sites and reserved fund for mined sites restoration;
    e. Plan for marketing mineral products
    f. Report on financial analysis, mining cost, and mineral sale prices;
    g. Program for recruitment, education and training of Cambodian citizens;
    h. Program for the commitment of procurement of goods and services obtainable within the Kingdom of Cambodia.

Article 3:
The industrial mining license issued each time to the concessionaire shall be valid for five years.

Article 4:

Concessionaire holding the industrial mining license may apply for the extension of [the validity of] industrial mining license until the mineral deposit is no longer economic to the Ministry of Industry, Mines and Energy to review and approval at least ninety (90) days prior to the expiry date of the industrial mining license, attached with the following required reports:

1. Application form for extension of [validity of] industrial mining license — 1 set
2. Reports on mining output, mines restoration, payment of royalties, annual land rental, profit tax and other taxes concerned, attached with original invoices; — 1 set
3. [Annual] Financial statements and restoration fund statements — 1 set
4. Reports on Training programmes carried out during the previous mining period; — 1 set
5. Mining plan and techniques, mineral production, restoration plan for mined sites, attached with detailed reports for the next mining period; — 1 set
6. Program for education and training of Cambodian citizens and commitment of procurement of goods and services obtainable within the Kingdom of Cambodia for the next mining period; — 1 set

Article 5

Concessionaire holding industrial mining license, willing to transfer its all right and obligations under industrial mining license to other party shall submit the application for right transfer to the Ministry of Industry, Mines and Energy for review and approval with the attachment of the following required documents/papers:

1. Application for right transfer of industrial mining license with indication of reasons submitted by the transferor [concessionaire] — 1 set
2. Request Letter of acceptance of all rights, obligations and responsibilities from the transferee — 1 set
3. Reports of clearing debts involved, royalties, annual land rental, profit tax and other taxes, attached with original invoices — 1 set
4. Copy of Registration Certification for transferee issued by the General Department of Mineral Resources — 1 set
5. Report on financial capability or annual financial statements for the last 3 year period of the transferee, certified by a financial institution or an auditing firm recognized in the Kingdom of Cambodia — 1 set
6. Work experience of transferee in the mining or industrial sector — 1 set
7. Work programme and budget for the mining period; in which the transferee is required to submit the following plans and reports for review and approval:
    a. Mining plan and techniques, mines design and processing plan
    b. Mining machinery and equipments
    c. Report on environmental impact assessment and environmental protection;
    d. Restoration plan for mined sites and reserved fund for mined sites restoration;
    e. Plan for marketing mineral products
    f. Report on financial analysis, mining cost, and minerals sale prices;
    g. Program for recruitment, education and training of Cambodian

citizens;

h. Program for the commitment of procurement of goods and services obtainable within the Kingdom of Cambodia.

Article 6:

The conditions of issuance, extension, and right transfer of industrial mining license previously determined under the [existing] agreement on mineral exploration and exploitation between the Ministry of Industry, Mines and Energy and companies, contrary to this sub-decree shall be null and void.

Article 7:

Minister in charge of the Council of Ministers, Minister of Industry, Mines and Energy, involved Ministries/ Institutions, and Provincial/ Municipal Governors shall implement the Sub-degree effectively after the date of signature.

Phnom Penh, Date- Month- Year
Prime Minister
Samdech Akka Moha Sena Padei Techo HUN SEN

No.12

KINGDOM OF CAMBODIA

Nation Religion King

MINISTRY OF ECONOMY AND FINANCE

MINISTRY OF INDUSTRY, MINES AND ENERGY

Ref. No. 172

No. 291

Phnom Penh, 27 March, 2009

# Inter-Ministrial Prakas

# on

# Fees for Registration, Issuance, Renewal and Right Transfer of Mineral Licenses, Annual Land Rental for Concession for Mineral Exploration and/or Mining and Royalty Rates of Mineral Resources

Deputy Prime Minister, Minister of Economy and Finance and

Minister of Industry, Mines and Energy

- Considering the Constitution of the Kingdom of Cambodia;
- Considering the Royal Decree NS/RKT/ 0704/001 dated 13 July 2004 promulgating the supplemented Constitution to ensure the normal functioning of national institutions;
- Considering the Royal Decree NS/RKT/ 0908/055 dated 25 July 2004 on the Nomination of the Royal Government of Cambodia;
- Considering the Royal Kram 02/NS/94 dated 20 July 1994 promulgating the Law on the Organization and the Functioning of the Council of Ministers;
- Considering the Royal Kram NS/RKT/0196/18 dated 24 January 1996 promulgating the Law on the Establishment of Ministry of Economy and Finance;
- Considering the Royal Kram NS/RKT/0196/05 dated 24 January 1996 promulgating the Law on the Establishment of Ministry of Industry, Mines and Energy;
- Considering the Royal Kram NS/RKT/0701/09 dated 13 July 2001 promulgating the Law on the Management and Exploitation of Mineral Resources;

- Considering the Sub-Decree 04.ANKBK dated 20 January 2000 on the Organization and the Functioning of the Ministry of Economy and Finance;
- Considering the Sub-Decree 35.ANKBK dated 26 April 1999 on the Organization and the Functioning of the Ministry of Industry, Mines and Energy;
- Considering the Sub-Decree 78 ANK.BK dated 18 November 2004 on the Supplementing and Reforming of a number of departments under the Ministry of Economy and Finance;

Decides

Article 1

Individual or legal entity who has applied for mineral license or concessionaire holding mineral license shall pay the State for the following fees:

1.- Fees for Registration

| | |
|---|---|
| 1. Artisanal Mining License | 40,000 riel |
| 2. Pits and Quarries Mining License | |
| a. For construction sand, laterite and clay | 400,000 riel |
| b. For crushed stone, block stone, gravel, and other stone used for the same purposes | 800,000 riel |
| 3. Gem Mining License | 2,000,000 riel |
| 4. Mineral (Gemstone) Cutting License | 400,000 riel |
| 5. Mineral Exploration License | 800,000 riel |
| 6. Industrial Mining License | 1,200,000 riel |

2.- Fees for Mineral licenses

| | |
|---|---|
| 1. Artisanal Mining License | 50,000 riel |
| 2. Pits and Quarries Mining License | |
| a. For construction sand, laterite and clay | 600,000 riel |
| b. For Crushed stone, block stone, gravel, and other stone used for the same purpose | 1,600,000 riel |
| 3. Gem Mining License | 8,000,000 riel |
| 4. Mineral (Gemstone) Cutting License | |
| a. With Labor less than 7 people | 800,000 riel |
| b. With Labor from 7-14 people | 1,600,000 riel |
| c. With Labor over 14 people | 3,200,000 riel |
| 5. Mineral Exploration License | 6,000,000 riel |
| 6. Industrial Mining License | 12,000,000 riel |

3.- Fees for Renewal [Extension] of Mineral License

| | |
|---|---|
| 1. Pits and Quarries Mining License | |
| a. For construction sand, laterite and clay | 420,000 riel |
| b. For Crushed stone, block stone, gravel, and other stone used for the same purpose | 1,120,000 riel |
| 2. Gem Mining License | 5,600,000 riel |
| 3. Mineral (Gemstone) Cutting License | |
| a. With Labor less than 7 people | 560,000 riel |
| b. With Labor from 7-14 people | 1,120,000 riel |
| c. With Labor over 14 people | 2,240,000 riel |
| 4. Mineral Exploration License | 4,200,000 riel |
| 5. Industrial Mining License | 8,400,000 riel |

4.- Fees for Rights Transfer of Mineral Licenses

| | |
|---|---|
| 1. Pits and Quarries Mining License | |
| a. For construction sand, laterite and clay | 2,000,000 riel |
| b. For Crushed stone, block stone, gravel, and other stone used for the same purpose | 8,000,000 riel |
| 2. Gem Mining License | 16,000,000 riel |
| 3. Mineral (Gemstone) Cutting License | |
| a. With Labor less than 7 people | 2,000,000 riel |
| b. With Labor from 7-14 people | 4,000,000 riel |
| c. With Labor over 14 people | 6,000,000 riel |
| 4. Mineral Exploration License | 20,000,000 riel |
| 5. Industrial Mining License | 24,000,000 riel |

5.- Rates of annual land rental of concession areas for mineral exploring and/or mining:

| Type of Mineral Licenses | Annual Land Rental |
|---|---|
| 1- Artisanal Mining License | |
| - Type A (sand, gravel, laterite) | 10 ( ten) USD/ha/year |
| - Type B (alluvial gold ores) | 15 ( fifteen) USD/ha/year |
| - Type C (precious and semi-precious gemstone) | 30 ( thirty) USD/ha/year |
| 2- Pits and quarries mining license | |
| - Type A ( cutting stone and crushed stone) | 40 (forty) USD/ha/year |
| - Type B ( sand, gravel, laterite) | 20 (twenty) USD/ha/year |
| - Type C ( limestone) | 10 (ten) USD/ha/year |
| 3- Gemstone Mining License | |
| - Type A ( precious and semi precious gemstone) | 12 ( twelve) USD/ha/year |
| - Type B (decorated stone) | 40 (forty) USD/ha/year |
| 4- Mineral [Gemstone] cutting license | Annual land or store rental shall be determined under the law on taxation. |
| 5- Mineral Exploration License | |
| - Year 1 – Year 2 | 0.15 ( fifteen cent) USD/ha/year |
| - Year 3 – Year 4 | 0.30 (thirty cent) USD/ha/year |
| - Year 5 and Over | 0.50 ( fifty cent) USD/ha/year |
| 6- Industrial Mining License | |
| - Year 1 – Year 3 | 4 (four) USD/ha/year |

| | |
|---|---|
| - Year 4 – Year 5 | 8 ( eight) USD/ha/year |
| - Year 6 and Over | 10 (ten) USD/ha/year |

6.- Royalty Rates of Mineral Resources:

| 1. | Metallic Minerals | Royalty Rates | |
|---|---|---|---|
| | | For supplying industries [refineries], whose industries [refineries] are managed by the concessionaires holding mineral licenses | For trading purpose only |
| | Sb | 2.5%-3.5% of sale price based on the international markets' prices. | 4%-5% |
| | Cr | | |
| | Fe | | |
| | Mn | | |
| | Mo | | |
| | W | | |
| | Al | | |
| | Cu | | |
| | Zn | 2.5%-3.5% of sale price based on the international markets' prices. | 4%-5% |
| | Sn | | |
| | Pb | | |
| | Au | | |
| | Pt | | |
| | Ag | | |
| | Ti | | |
| | And other metallic minerals which are in the same characteristics | | |
| 2 | Non-Metallic ( Industrial) minerals | | |
| | Clay for cement | 0.10 USD/ton of cement produced | 0.10 USD/ton |
| | Kaolin | 1.20 USD/ton of final product | 1.20 USD/ton |
| | Limestone | 0.20 USD/ ton of produced cement | 1.50 USD/ton |
| | Phosphate | 1.20 USD/ton of phosphate fertilizer produced | 1.20 USD/ton |
| | Silica Sand | 1.50 USD/ton of sand | 1.50 USD/ton |
| | Salt | 0.50 USD/ton of salt | 0.50 USD/ton |
| 3 | Precious and Semi-precious gemstone and decorated stone | | |
| A. | Precious stone | 15% of sale price of gem product at the international markets | |
| | - Diamond | | |
| | - Garnet | | |
| | - Sapphire | | |
| | - Emerald | | |
| | - And other precious gems which are similar quality. | | |
| B. | Semi-precious gemstone | 15% of sale price of gem product at the international | |
| | - Zircon | | |

| | | | |
|---|---|---|---|
| | - Amethyst | markets | |
| | - Topas | | |
| | - And other gems which have the similar quality. | | |
| C. | **Decorative Stone** | | |
| | Jet, Pagodite, Chalcedony, Azurite, Normal Opal, Granite, Opal, Agate, Malachite, Silicified Wood and other stones which are similar quality | 15% of sale price of the product at the international markets. | |
| 4. | **Solid fuel minerals** | 7% of sale price of solid fuel products at the international markets. | |
| | Coal | | |
| | Lignite | | |

Article 2

General Departments and Departments under Ministry of Economy and Finance and under Ministry of Industry, Mines and Energy and involved natural person legal entity or concessionaires as stated in Article 1 holding mineral resource licenses shall be in charge of implementing this Prakas.

Article 3

The Prakas comes into effect after the date of signatures.

Deputy Prime Minister
Minister of Economy and Finance
KEAT CHHUN

Minister of Industry, Mines and Energy
SUY SEM

**No.13**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF ECONOMY AND FINANCE**
**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref. No. 006

Phnom Penh, January 04, 2001

**Prakas**
**on**
**Royalties for Construction Materials**

Minister of Economy and Finance and Minister of Industry, Mines and Energy
Decide

Article 1:
For all exploitation of construction materials concessionaires shall pay the State for the royalties of raw construction materials including crashed stone, gravel, [construction] sand, soil, red soil [laterite] and clay.

Article 2:
All concessionaires exploiting construction materials shall be responsible for paying the royalties of raw construction materials mined [in concessionaire areas] or traded.

Article 3:
The royalty rates of construction materials shall be determined as follows:

1.- 0.6 USD/$m^3$ - For all kinds of crashed stones with 1cm x 2 cm or over;
2.- 0.4 USD $m^3$ - For gravel;
3.- 0.2 USD $m^3$ - For all kinds of crashed stones less than 1cm x 2cm, construction sand and red soil [laterite];
4.- 0.1 USD/$m^3$ - For all finished products made of clay, such as brick, roof tile and other clay products except porcelain products;
5.- 0.1 USD/$m^3$ - For soil excavated for trade purpose other than for manufacturing as stated in point 4 of Article 3 above.

Article 4:
The revenue from royalty payment of construction materials shall be allocated and paid 80% [of the total State revenue] to the State budget account, 20% to provinces/municipalities account, and 10% [of 80% budget revenue] to the account of Ministry of Industry, Mines and Energy to expend on geological and mineral surveys.

Article 5:
Concessionaire shall pay royalties of construction materials to the provincial/ municipal treasury where his/her sites is located and operated, based on the revenue advice issued by Provincial/Municipal Department of Industry, Mines and Energy.

Article 6:

At each annual budget hearing session, Ministry of Industry, Mines and Energy in cooperating with the Ministry of Economy and Finance shall determine [the next] annual revenue by recoding as follows:

- 80% of total [state] revenue from royalty payment of construction materials shall be recorded in the revenue account of the Ministry of Industry, Mines and Energy for provincial/municipal level (state budget) in chapter 20, article 4, paragraph 2 (mineral concessions) and the revenue account shall be detailed in the budget book of each Provincial/Municipal Department of Industry, Mines and Energy;
- 10% of the [80%] state revenue shall be recorded in the budget expense account for projects of the Ministry of Industry, Mines and Energy, central level, in chapter 11, article 1, paragraph 12, sentence 1 (study and analysis);
- 20% of the total [state] revenue from royalty payment of construction materials shall be recorded in the budget revenue account of provinces/municipalities (provincial/municipal budget) in chapter 11, article 1, paragraph 2 (mineral concessions), and the budget revenue account shall be detailed in the budget book of each province/municipality;

Article 7:

Based on the revenue plan recorded in the budget book of Provincial Departments of Industry, Mines and Energy, the Joint-Commission consisting of a representative from the Ministry of Industry, Mines and Energy as Chairman, and a representative from the Ministry of Economy and Finance as member shall go to inspect the activities of construction materials exploitation in each mining site to calculate the amount of royalties to be paid by concessionaires.

Article 8:

Within the first week of the following month, Provincial/Municipal Departments of Industry, Mines and Energy, based on the actual revenue to be paid [by concessionaires], shall issue 2 copies of revenue advices to concessionaires, one copy recorded 80% [of total actual revenue] to be paid to the State budget account and another one recorded 20% [of total actual revenue] to be paid to provincial/municipal budget account.

Article 9:

Provincial departments of Industry, Mines and Energy shall make a monthly report on royalty revenue of construction materials to be submitted to Ministry of Industry, Mines and Energy and Ministry of Economy and Finance (State Properties Department), enclosed with copies of credit advices.

Article 10:

Ministry of Industry, Mines and Energy shall make mandates to cash money for the expense of geological and mineral survey equal to the total credit advices declared by the Provincial/Municipal Departments of Industry, Mines and Energy, and the credit advices shall be attached with the relevant papers [documents in proof] when visaed by financial inspectors.

Article 11:

Concessionaires obligated to pay the State for the royalty of construction materials shall pay other taxes under the prevailing Law on Taxation.

Article 12:

The [financial] obligations determined in the agreement on exploitation of construction materials signed by and between the Ministry of Industry, Mines and Energy and concessionaires, which are contrary to this Prakas shall be null and void.

Article 13:

General Departments and Departments under Ministry of Economy and Finance and under Ministry of Industry, Mines and Energy and involved concessionaires holding mineral resource licenses shall be in charge of implementing this Prakas.

Article 14:

The Prakas comes into effect after the date of signatures.

Senior Minister
Minister of Economy and Finance
KEAT CHHUN

Minister of Industry, Mines and Energy
SUY SEM

**No.14**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
N$^0$ 340

Phnom Penh, May 25, 2004

# Prakas
# on
# Registration and Conditions for Issuing, Renew and Extending Mineral Licenses and Transferring Mineral License Rights

Minister of Industry, Mines and Energy
Decides

Article 1:
Cambodian citizen or individual or legal entity, who is willing to apply for mineral licenses including:

1- Artisanal mining license;
2- Pits and quarries mining license;
3- Gem mining license;
4- Mineral[Gemstone] cutting license;
5- Mineral exploration; and
6- Industrial mining license.

to explore for and/or exploitation of mineral resources or cut minerals or be transferred by concessionaire holding mineral license, shall register at the following offices:

a. For artisanal mining license – [concessionaire] shall register at Provincial/Municipal Department of Industry, Mines and Energy where the concession area for mineral exploration and exploitation is located, except for registration to apply for artisanal mining license determined in Prakas on Delegating Power of Works of Industry, Mines and Energy to a number of districts of some provinces issued by Ministry of Industry, Mines and Energy.

b. For other mineral licenses – [concessionaire] shall register at the General Department of Mineral Resources, Ministry of Industry, Mines and Energy.

The General Department of Mineral Resources and Provincial/Municipal Department of Industry, Mines and Energy shall issue a certification of registration within seven (7) days of working day after the receipt of complete application for registration as stated in this Prakas.

Article 2:
Application for registration to apply for mineral licenses shall be determined as follows:
2.1- For artisanal mining license and mineral cutting license – Documents to be submitted for registration shall include:

1. Application for registration with a stamp of 1,000 riel — 1 set
2. Curriculum Vitae of applicant with a photo (4cm X 6cm) certified by commune where he/she is living — 1 set
3. A Copy of Identification Card/ Family Record certified by provincial/municipal authority — 1 set

2.2- For other mineral licenses - Documents to be submitted for registration of a mining company include:

1. Application for Registration with a stamp of 1,000 riel — 1 set
2. Curriculum Vitae of applicant (director) with a photo (4cm X 6cm) of director certified by commune where he/she is living — 1 set
3. A Copy of Identification Card/ Valid passport certified — 1 set
4. Letter certifying the company's current address issued by a commune where it is located — 1 set
5. A copy of Memorandum and Articles of Association — 1 set
6. A copy of Business Registration Certification issued by the Ministry of Commerce — 1 set

Article 3:

Cambodian citizen or individual or legal entity, which was registered, is eligible to apply for mineral licenses at the following offices:

a. For artisanal mining license – [concessionaire] shall submit application for artisanal mining license to Provincial/Municipal Department of Industry, Mines and Energy where the concession area for mineral exploration and exploitation is located, except for application for artisanal mining license determined in Prakas on Delegating Power of Works of Industry, Mines and Energy to a number of districts of some provinces issued by Ministry of Industry, Mines and Energy.

c. For other mineral licenses – [concessionaire] shall submit application for other mineral licenses to the General Department of Mineral Resources, Ministry of Industry, Mines and Energy.

After the receipt of complete application for mineral licenses, General Department of Mineral Resources and Provincial/Municipal Department of Industry, Mines and Energy shall submit the application proposals to Minister of Industry, Mines and Energy for review and approval.

Article 4:

Documents for application of mineral licenses shall be determined as follows:

4.1- Documents to be submitted for application for artisanal mining license and mineral cutting license shall include:

a. Application for artisanal mining license or mineral cutting license with a stamp of 1,000 riel — 1 set
b. Copy of Registration Certificate issued by Provincial/Municipal Department of Industry, Mines and Energy or by General Department of Mineral Resources — 1 set

c. A proposed area(s) and location to be applied for 1 set
d. Report on financial capability (for mineral cutting license) 1 set
e. Report on labors and equipment 1 set

4.2- Documents to be submitted for application for other mineral licenses shall include:

a. Application for exploration license with a stamp of 1,000 riel 1 set
b. Copy of Registration Certificate issued by Ministry of Industry, Mines and Energy; 1 set
c. A proposed area(s) and location to be applied for; 1 set
d. Report on financial capability or annual financial statement for the last 3 years, certified by an auditor firm recognized by the Royal Government of Cambodia; 1 set
e. Plans for mineral exploration and/or mining and budget during mineral operations; 1 set
f. Documents of evidences showing company's technical experience, in mining or involved industrial sector; 1 set
g. Reports on environmental impact assessment, restoration plan for mined sites and management; and 1 set
h. Plan for recruitment of Cambodians and programme for education and training; 1 set

Article 5:

The valid of each category of mineral license shall be determined as follows:

| | | | |
|---|---|---|---|
| 1- | Artisanal mining license | - | One (01) year |
| 2- | Pits and quarries mining license | - | One (01) year |
| 3- | Gem mining license | - | One (01) year |
| 4- | Mineral[Gemstone] cutting license | - | One (01)year |
| 5- | Mineral exploration | - | Two (02) years |

Article 6:

Conditions to renew mineral licenses shall be determined as follows:

6.1 Concessionaire holding artisanal mining license can re-apply for artisanal mining license, until mineral deposit is exhausted economically, to Ministry of Industry, Mines and Energy for review and approval through Provincial/Municipal Department of Industry, Mines and Energy at least thirty (30) day prior to expiry of artisanal mining license under the paragraph 4.1 of article 4 above.

6.2 Concessionaire holding mineral cutting mining license can apply for renewal of mineral cutting license to Ministry of Industry, Mines and Energy for review and approval at least thirty (30) day prior to expiry of mineral cutting license under the paragraph 4.1 of article 4 above.

6.3 Concessionaire holding pits and quarries mining license or gem mining license can apply for renewal of the said two license, until mineral deposit is exhausted economically, to Ministry of Industry, Mines and Energy for review and approval at least thirty (30) day prior to expiry date of the current pits and quarries mining license or gem mining license by submitting the following papers:

a. Request letter for renewal of pits and quarries mining license 1 set

or gem mining license;

b. Reports of the results of mineral exploration and exploitation carried out during the period of previous license; 1 set
c. Reports on environmental protection and restoration during the period of previous license certified by provincial department of environment; 1 set
d. Balance of Restoration Fund and Training budget statements 1 set
e. Financial reports on payment of royalty, land rental and other taxes, attached with copies of receipts; 1 set
f. Plan for mineral exploration and exploitation, mines restoration, recruitment, training, and procurement of goods to be carried out for the next period of license. 1 set

6.4 Concessionaire holding mineral exploration license can apply for renewal of mineral exploration license up to twice with a period of 2 years each time. Concessionaire shall submit the application for renewal of mineral exploration license to the Ministry of Industry, Mines and Energy for review and approval at least ninety (90) days prior to the expiry date of the current valid exploration license by submitting the following documents:

a. Application for renewal of exploration license; 1 set
b. Reports of the results of mineral exploration done during the previous period of mineral exploration license; 1 set
c. Reports on environmental protection and restoration during the such period 1 set
d. Financial Statements (payment of annual land rental and other tax payments attached with the copies of invoices; 1 set
e. Plan for mineral exploration and training programmes to be carried out for the next period. 1 set

At the end of the sixth year of the exploration period, the Ministry of Industry, Mines and Energy may approve an extension of such license for an additional limited period where he/she need it to study economic feasibilities of this mineral deposit or to proceed to apply for industrial mining license.

Article 7:

When mineral licenses is expired and if any concessionaire failed to apply for artisanal mining license or other mineral licenses as determined in Article 6 above, the Ministry of Industry, Mines and Energy shall take back the whole concession areas [from the said concessionaire] [terminate the agreement of mineral exploration and exploitation]. In this case the concessionaire shall be responsible for clearing all debts involved, including the payment of royalties, land rental, profit tax and other taxes and duties, and restoration fund, outstanding prior to the expiry date of the said mineral licenses and shall be responsible for restoring mined areas under the said mineral licenses.

Article 8:

In the case of [temporary] absence of sub-decree on conditions to issue industrial mining license, concessionaire holding mineral exploration license can apply for industrial mining license or for renewal under the conditions of agreement on mineral exploration

and exploitation signed by and between the Ministry of Industry, Mines and Energy and concessionaire.

Article 9:

Except artisanal mining license, concessionaire holding other mineral license and willing to transfer all rights [and obligations] under mineral license to other [third] party, shall submit a request letter for its whole right transfer, attached with the following papers, to the Ministry of Industry, Mines and Energy for review and approval.

| | | |
|---|---|---|
| a. | Request letter for whole right transfer [and obligations] under mineral license made by transferor [concessionaire] with clear reasons; | 1 set |
| b. | Request letter for taking over whole rights [and obligations] under mineral license made by transferee [third party] with clear reasons; | |
| c. | Financial reports on the clearing of debt: payment of royalty, land rental and other taxes, attached with copies of invoices; | 1 set |
| d. | A copy of registration made by transferee at the General Department of Mineral Resources; | 1 set |
| e. | Report on financial capability or financial statements for the last three years made by transferee [third party],certified by a financial institution or auditing firm recognized by the Royal Government of Cambodia; | 1 set |
| f. | Transferee's [third [arty] experience in mining or involved industrial sector; | 1 set |
| g. | Work programmes for mineral exploration and/or mining and budget proposed by transferee [third [party] to be carried out during the period of mineral operations; | 1 set |
| h. | Report on Environmental Impact Assessment, management and mined areas restoration plan and restoration fund made [and proposed] by transferee. | 1 set |
| i. | Plan for recruitment and training of Cambodians to be committed by transferee [third party] | 1 set |

Article 10:

In the case of mineral license suspended or revoked, concessionaire holding mineral exploration license shall be responsible for clearing all debts involved, including royalties, land rental, profit tax and other taxes or duties, and restoration fund, outstanding the prior the suspension and revocation of mineral license, and shall be responsible for restoring mined areas under mineral license.

Article 11:

General Departments and Departments and Provincial/Municipal Departments of Industry, Mines and Energy involved shall be in charge of implementing this Prakas.

Article 12:

The Prakas comes into effect after the date of signature.

Minister of Industry, Mines and Energy
SUY SEM

**No.15**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref. No. 942

Phnom Penh, December 13, 2005

**Prakas**
**on**
**Uniforms for Officials of General Department of Mineral Resources and Provincial/Municipal Department of Industry, Mines and Energy**

Minister of Industry, Mines and Energy
Decides

Article 1:
The uniform and logo for officials General Department of Mineral Resources and Provincial/Municipal Department of Industry, Mines and Energy are designed and determined for officials to use when they perform their work in offices and inspect the implementation of the Law on Management and Exploitation of Mineral Resources and in mining sites.

Article 2:
Uniform for officials of the General Department of Mineral Resources and Provincial/Municipal Department of Industry, Mines and Energy are determined as follows:

A. Male Uniform:
   - Shirt: short slave, one seam and color, dark yellow, front button which is similar color of the shirt, . This shirt has two breast pockets with Por leaf pockets cover having similar color of the shirt and having 3 Cm layer in the middle of pocket.
   - Trouser: long slave with dark blue color, seam, continue waist ban, ? have three pockets, back pocket and have Por leaf pockets, one buttonhole and two sides pocket.
   - Shoe: leather oxfords or loafers, black.
   - Belt made of leather

B. Female Uniform:
   - Shirt: short sleeve, normal seam and opened collar, dark yellow, front button which is similar color with the shirt color, ? . This shirt has two breast pockets and two waist pockets, Por leaf cover pockets and button color_ the same color of the shirt and having 3 cm layer in the middle of the pocket.
   - Skirt: short skirt over knee, dark blue color.
   - Shoe: dark leather low heels

Article 3:
Logo and Identification Card of mineral resource official and DIME official shall be determined as follows:

A. Logo and Identification Card of GDMR official
   - logo on right hand side of the sleeve:

The logo on the right hand side of the sleeve is a logo of Ministry of Indsutry, Mines and Energy made of sick fabric, round shape with a diameter of 8.00 cm and dark blue background. In the top of logo the white background of logo has blue Khmer characters written following the round shape meaning that "KINGDOM OF CAMBODIA" and below it written in English characters smaller than the Khmer one with the same meaning. Below the logo is written in blue Khmer and English (smaller than the Khmer) meaning that "Ministry of Industry, Mines and Energy" in the around shape. On the mid-logo, there is another round shape, dark blue color with a diameter of 6.00 cm and a picture of industry colored grey and black, black lamp pole, yellow and black mineral tool and yellow toothed wheal.

- Logo on the collar:
  This logo has one hammer and shovel cross on each other form a multiply sign and has gold color.
- Identification Card:
  The Identification Card on the right side of pocket is rectangular with 9.50 cm by 2.00 cm, made of copper, gold color and covered by transparent plastic, dark blue color, and surrounded by gold color with a line of 0.15 cm. On the right side of Identification Card, there is a logo representing Provincial/Municipal Department of Industry, Mines and Energy which has 1.7 Cm diameter. On the left side of Provincial/Municipal Department of Industry, Mines and Energy, there are two capital letter lines, one indicating the name of official and the other one showing Identification Card number of the official.

Article 4:

General Department of Mineral Resources and Provincial/Municipal Department of Industry, Mines and Energy are provided with two sets of clothes a year to use during their performance both in offices and inspection of the implementation of Law on Management and Exploitation of Mineral Resources and in mining sites.

Article 5:

Any person who falsifies the uniform and logo of officials of General Department of Mineral Resources and Provincial/Municipal Department of Industry, Mines and Energy as stated in Article 2 and Article 3 above shall be punished by the prevailing laws.

Article 6:

General Director of Mineral Resources, Director of Accounting and Finance and Provincial/Municipal Directors of Industry, Mines and Energy shall implement this Prakas effectively after the date of signature.

Minister of Industry, Mines and Energy
SUY SEM

**No.16**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref. No. 011

Phnom Penh, October 25, 2005

**Prakas**
**on**
**Gemstone Management Mechanism**

According to the Law on Management and Exploitation of Mineral Resources and in order to manage precious stone exploitation with high economic effectiveness, aiming at ensuring maximum revenue collected and properly [transparency] from precious stone exploitation, the Ministry of Industry, Mines and Energy has set up the guideline to manage precious stone exploitation as follows:

**I.** The management of precious stone products (raw precious stone unprocessed) mined from concession areas:

- Precious stone products mined [from concession areas] shall be kept in the safe gem box under the supervision by a joint working group, consisting of the following representatives:

  - A representative from Ministry of Industry, Mines and Energy — Chairman
  - A representative from concessionaire holding gem mining license — member
  - A representative from Ministry of Economy and Finance — member
  - Representatives from concerned provincial/ municipal local authorities — member
  - Representative from Provincial/Municipal Department of Industry, Mines and Energy — member

- The members of joint working group shall close the safe gem box by a signed seal after opening the safe gem box each time. The safe gem box shall be locked by two (2) locks, one is held by the representative of Ministry of Industry, Mines and Energy and the other one by the representative of concessionaire holding gem mining license.

- The opening of safe gem box shall be made before the presence of the members of joint working group assigned by the Ministry of Industry, Mines and Energy to inspect the safe gem box.

- The place used to open the safe gem box shall be agreed by all members of the joint working group and shall be located in the Kingdom of Cambodia, ensured the security of both transportation and opening of the safe gem box. In case the security conditions not ensured, the members of joint working group can determine another place to open the safe gem box with the approval from the Minister of Industry, Mines and Energy.

**II.** Setting [sale] prices of mined precious stone products

The [sale] prices of mined precious stone products shall be set and agreed by the Ministry of Industry, Mines and Energy and concessionaire holding gem mining license, based on the international market price (or on market price in Bangkok). In case the [sale] price set by the Ministry of Industry, Mines and Energy is higher than one set by the concessionaire holding gem mining license disagree to buy those mined gem stone, the Ministry of Industry, Mines and Energy shall declare for bid within thirty (30) days the latest after the evaluation of mined gem stone. The base [sale] price for bid shall be higher than one proposed by the concessionaire [holding gem license] and lower than one set by the Ministry of Industry, Mines and Energy during the evaluation of mined gem stone.

**III.** Financial obligations

In compliance with Law on Management and Exploitation of Mineral Resources, the concessionaire holding gem mining license shall pay the Government for annual land rental, royalty of precious stone mined, annual mining fee, and other relevant taxes under the agreement [on gem exploitation] signed with the Ministry of Industry, Mines and Energy and under other related prevailing laws of the Kingdom of Cambodia (as detailed in the agreement [on gem exploitation]).

**IV.** Environmental restoration

Concessionaire holding gem mining license shall restore mined sites based on the environmental restoration plan approved by the Ministry of Industry, Mines and Energy. The deposit of environmental restoration fund shall be made under the conditions of the agreement [on gem exploitation] signed with the Ministry of Industry, Mines and Energy (as detailed in the agreement [on gem exploitation]).

**V.** Sale or exporting precious stone products

Concessionaire [holding gem mining license] shall apply for other concerned licenses to relevant competent institutions of the Royal Government of Cambodia to sell or export all precious stone products or partial of the products mined from concession areas according to the prevailing laws of the Kingdom of Cambodia (as detailed in the agreement [on gem exploitation]).

Concessionaire holding gem mining license shall implement this guideline after the date of signature.

Minister of Industry, Mines and Energy
SUY SEM

**No.17**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref, No 893

Phnom Penh, November 30, 2004

**Prakas**
**on**
**the Establishment of Competent Officials to Enforce the Mining Law**

Minister of Industry, Mines and Energy
Decides

Article 1-

The competent official team of the General Department of Mineral and Resources is established to have a mission to do the tasks in provinces/municipalities of Kingdom of Cambodia in order to inspect the effectiveness of the enforcement of the Law on Management and Exploitation of Mineral Resources.

Article 2-

The composition of competent official team is as follows:

| | |
|---|---|
| 1.- Mr. Chuor Chettivoin | Deputy Director General, General Department of Mineral and Resources |
| 2.- Mr. Nuon Chanan | Deputy Director, Department of Mineral and Resources |
| 3.- Mr. Hing Saveurn | Deputy Chief of Non-Metallic Minerals Office |
| 4.- Mr. Som Sivanna | Deputy Chief of Mineral Development Office |
| 5.- Mr. Ben Thet | Official, Department of Geology |

Article 3-

During the mission, all the competent official team shall wear the uniform presenting the competent officials from the General Department of Mineral Resources and from Provincial/Municipal Departments of Industry, Mines, and Energy, and shall hold the mission letter issued by the Ministry of Industry, Mines and Energy.

Article 4-

The competent official team shall have the following duties:

- Control and give technical skills on the management of mineral operations, aiming at enhancing technical operations, economic, labor safety and environmental protection to be more effective;
- Control the implementation of agreements, including financial and work obligations to be fulfilled by the companies or concessionaires who have been conducting their mineral operations in the Kingdom of Cambodia;

- Accelerate the payment of debt to be made companies or concessionaires who have failed to pay the debt to the Government under their mineral operation. In case they have still failed to pay the debt, the legal actions shall be taken;
- Solve all disputes occurred eventually in mineral operations;
- Propose other measures to be taken for both administrative and technical measures to be submitted to the Ministry of Industry, Mines and Energy for review and approval in compliance with the Chapter 8 on Penalties of Law on Management and Exploitation of Mineral Resources in order to protect from the violation of the Law and abnormal activities in the conducting and managing of mineral operations;
- Collect data and information and make monthly, semester and annual reports on the outcome of mission and submit it to the Minister of Industry, Mines and Energy for review and recommendations.

Article 5.-

The Prakas comes into effect from the date of signature.

SUY SEM

**No.18**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref. No 002

Phnom Penh, May 25, 2004

**Circular**
**on**
**Prevention of Illegal Mining Activities**
**in Provinces in the Kingdom of Cambodia**

Recently, the Ministry of Industry, Mines and Energy have seen that in some provinces/ municipalities, illegal mining activities have occurred, causing serious destruction of natural resources, which the Constitutional Law stipulated as the State Property, and it is a factor causing the great loses of State income and bad impact on the natural environment. The using of explosives and chemical substances without permission has caused serious impact on safety and human and animal health living in and surrounding the areas.

Therefore, in order to stop all illegal mining activities occurred in some provinces/municipalities, the Ministry of Industry, Mines and Energy advise Provincial/ Municipal Departments of Industry, Mines and Energy to take the following actions:

**I- <u>For Illegal Mining Activities:</u>**

1- Inspect and locate illegal mining sites in their own provinces/municipalities by cooperating with the local authorities to take strict measures to stop (eliminate) all illegal mining activities effectively;

2- Cooperate with local authorities to inspect the illegal mining activities as follows:

- Prevent explosive and chemical substance prohibited by the Law from transporting, used for illegal mining activities;
- Administer and prevent new coming people from doing illegal mining activities in their areas.
- Administer enterprises repairing heavy machinery used for illegal mining.
- Control enterprises manufacturing equipments ( iron tools, baskets) used for illegal mining;
- Prevent mineral exploration or mining from using powerful men backing their illegal actions in local areas without mineral exploration or mining licenses issued by the Ministry of Industry, Mines and Energy;
- Report to Ministry of Industry, Mines and Energy on the result of inspection and shutdown of illegal mining areas and environmental impact assessment and set up necessary measures to be submitted to the Ministry of Industry, Mines and Energy for review and approval.

**II- <u>For Companies holding mineral licensed issued by the Ministry of Industry, Mine and Energy:</u>**

- Control concessionaires holding mineral licenses issued by the Ministry of Industry, Mines and Energy to explore for and exploitation of mineral resources in their contract areas and follow up all their activities of mineral operations under the term and conditions of mineral licenses issued by the Ministry of Industry, Mines Energy and under the valid agreements.

  After acknowledging the Circular, Directors of Provincial/Municipal Department of Industry, Mines and Energy shall implement it effectively.

SUY SEM

**No.19**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref. No. 001

Phnom Penh, 25 May, 2004

**Circulation**
**on**
**the Suspension and Revocation of Mineral Licenses**

According to the Law on Management and Exploitation of Mineral Resources, the Ministry of Industry, Mines and Energy would like to advice companies, who are holding mineral licenses issued under the conditions of agreement on mineral exploration and/or exploitation in the Kingdom of Cambodia, to be known that their mineral licenses shall be suspended or revoked in the following violation cases:

I. Mineral Licenses

Six categories of mineral license [as shown below] to be issued [under the Law on Management and Exploitation of Mineral Resources] is to effectively administer the activities of mineral exploration and mining in the Kingdom of Cambodia.

a. Artisanal mining license
b. Pits and quarries mining license
c. Gem mining license
d. Mineral ( gemstone) cutting license
e. Mineral Exploration license
f. Industrial mining license

According to the Law on Management and Exploitation of Mineral Resource, the mineral license is a written permit issued by the Ministry of Industry, Mines and Energy to give a concessionaire the right to conduct mineral exploration and mining. The Ministry of Industry, Mines and Energy shall appoint its officials to inspect the work [exploration and mining] performance done companies holding mineral licenses or agreements issued by [signed with] the Ministry of Industry, Mines and Energy, based on [following] each category of the mineral license.

II. Suspension or Revocation of Mineral License

Mineral licenses under the Law on Management and Exploitation of Mineral Resource can be suspended to any company who has violated the provisions of the Law on Management and Exploitation of Mineral Resource.

The suspension of mineral license shall be made under the violation levels done by a company holding such mineral license. The cases [levels] of violation made by a company holding mineral license, which caused his/her mineral license to be suspended or revoked, shall be determined as follows:

1- Not commence his/her mineral operations within six (6) months after the date of issuance of mineral license comes into effect;

2- Conduct his/her mining activities in different location (not under the approved coordinates [set by General Department of Mineral Resources]) not determined under the mineral license;
3- Conduct mineral exploration or mining in private owned land without written agreement with the land owner;
4- Conduct mineral exploration or mining in the State owned land without written permit from competent authorities or inter-ministerial institutions administering those areas;
5- Conduct mineral prospecting, exploration or mining in the State owed land determined as cultural, historical, and patrimonial sites;
6- Conduct mineral exploration or mining not under technical and financial [requirement] as detailed in the work programmes of mineral exploration and mining;
7- Conduct mineral exploration or mining without contacting with competent provincial/municipal departments and authorities, where his/her concession areas are located;
8- Not cooperate or provide [submit] reports (work program of mineral exploration and mining) to the Ministry of Industry, Mines and Energy [for review and approval] regularly for quarter, semester and yearly;
9- Not conduct [mineral exploration and mining] following techniques requirement, spilling chemical substances not prohibited by the Royal Government [the laws], which caused the impact on [natural] environment (petroleum etc.);
10- Company [concessionaire] obtaining mineral exploration license from the Ministry of Industry, Mines and Energy has mined for minerals under the camouflage of mineral exploration license;
11- Use chemical substances prohibited by the Royal Government [the laws];
12- Not permit the use of explosives, except the approval from the Ministry of Industry, Mines and Energy [concessionaire used explosives without the permit/ approval from the Ministry of Industry, Mines and Energy];
13- Not reported other mineral types found during the exploration or mining other than minerals determined in the agreement [on mineral exploration and mining];
14- Not take appropriate measurements to protect the environment ( the wrong use of cyanide , mercury, all kinds of acid, boric powder, etc.), polluting the environment on land surface, underground and water;
15- Not allow the competent authorities to inspect all works and activities in his/her mineral operation sites or mineral license areas;
16- Not keep recording and accounting books and other related documents and not submit reports or other documents related to the information to the Minister of Industry, Mines and Energy [for review and approval];
17- No fulfill financial obligations, including payment of mineral royalties, annual land rental, profit tax and related taxes and other financial obligations;
18- Conduct mineral exploitation with the invalid mineral license;
19- Not compensate land owners for both inside and outside license area for damages resulting from his/her mineral exploration and exploitation;
20- Mortgage or transfer or inherit his/her mineral license [to the third party] without a written approval from the Minister of Industry, Mines and Energy;
21- Not prevent health and safety for workers and people living around mining sites, not restore mined sites or disturb people living around the mining sites.

III. The period of suspension and revocation of mineral licenses

1- The period of suspension of mineral license shall not be over (6) months.
2- Company or concessionaire did not implement the guidelines or orders as stated in the point II above, the Ministry of Industry, Mines and Energy shall issue a Prakas on suspension of mineral license from the company or concessionaire and send it to the concerned provincial/municipal authorities, where the mining areas are located, to suspend the mineral license or stop temporarily all works and activities of mineral exploration and/or mining in order for them to correct his/her faults as advised by the Ministry of Industry, Mines and Energy.
3- Company or concessionaire can submit his/her request for the release of suspended mineral license, enclosed with reports on completed work requirement correcting his/her faults as advised by the Ministry or other evidences (if any) to the Minister of Industry, Mines and Energy for review and approval prior to thirty 30 days before the expiry period of suspension of mineral license.
4- When the period of suspension of mineral license is expired and the company or concessionaire has still not implemented the conditions as stated in the point 2 and 3 above, the Ministry of Industry, Mines and Energy shall issue a Prakas on revocation of the mineral license and send it to provincial/ municipal authorities, where the mineral license areas are located, to take measures revoking the mineral license and stop permanently all [works and] activities of mineral exploration and exploitation.
5- In case that the mineral license under the agreement [on mineral exploration and exploitation] between the Ministry of Industry, Mines and Energy and company or concessionaire is revoked, the said agreement shall be terminated automatically.
6- Company or concessionaire, whose mineral license was revoked, shall pay off the debts to the Royal Government, including royalties, annual land rental, profit tax and other related taxes and other outstanding debts, and shall be responsible for restoration and environment in the mined areas. In case the company or concessionaire did not implemented within a limited period, the Ministry of Industry, Mines and Energy will take measures and submit documents related to the company or concessionaire to the Court for legal resolution;
7- Any provision on the suspension or revocation of mineral license, determined in the agreement on mineral exploration and exploitation or on construction material exploitation between the Ministry of Industry, Mines and Energy and company or concessionaire before [the effective date of Circulation] and contrary to the Circulation, shall be null and void.
8- Company or concessionaire conducting mineral exploration and/or exploitation, whose mineral license was expired, shall be fined in compliance with the Chapter 8 of the Law on Management and Exploitation of Mineral Resources;

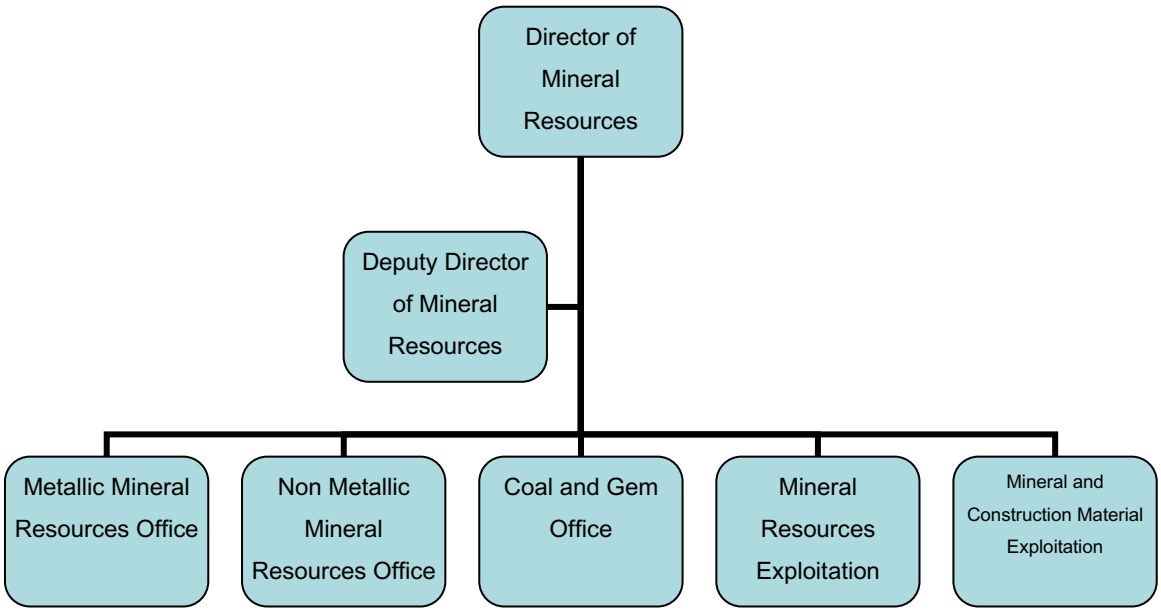
Having received the Circulation, the Provincial/Municipal Departments of Industry, Mines and Energy and companies/concessionaire shall effectively implement this Circulation

Minister
SUY SEM

**No.20**

**Annex to the Prakas Ref. No 836 dated August 03, 2006**

## Organizational Chart for General Department of Mineral Resources




**Have Seen and Approved**

Phnom Penh, August 01, 2006
Minister of Industry, Mines and Energy

SUY SEM

**Have Seen and Reviewed**

Phnom Penh, June 28, 2006
Director General of Mineral Resources

SOK LENG

Phnom Penh, June 22, 2006
Director of Mineral Resources

YOS MONY RATH

**No.21**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref. No. 354

Phnom Penh, May 05, 2000

**Prakas**
**on**
**the Function of**
**the Department of Mineral Resources**

Minister of Industry, Mines and Energy
Decides

Article1:

Department of Mineral Resources is under the supervision and management of General Department of Mineral Resources and has its roles and duties as follows:

- Control and manage mineral exploration and evaluation, mining, processing, finery, marketing of mineral resources, gravel, sand and construction materials with effectiveness both technique, economic, safety for workers and environmental protection;
- Implement laws, sub-degrees, regulations and other legal framework related to mineral exploration and evaluation and exploitation of mineral resources, gravel, sand and construction materials;
- Set up projects and conduct mineral exploration and evaluation to determine the quantity, quality of mineral resources, gravel, sand and construction materials;
- Inventory mineral resources and construction materials;
- Make statistics of exploitation and production of mineral resources and construction materials;
- Study and make comments on technical exploitation or mining for investment projects in the exploration and exploitation of mineral resources, gravel, sand, and construction materials;
- Manage, instruct, control and inspect the implementation of laws, sub-decrees, regulations, legal framework and agreements on investment in mineral resources and construction materials.

Article 2:

Department of Mineral Resources is directed by a Director accompanied by a number of Deputy Directors as assistants.

Article 3:

Department of Mineral Resources has its organizational structure is as follows:

1. Metallic Minerals Office
2. None-Metallic Minerals Office
3. Coal and Gemstone Office
4. Mining and Construction Material Office.

Each office is led by an Office Chief accompanied by a number of Deputy Office Chiefs as assistants.

Article 4:

Roles and duties of each [specializing] office:

1. Metallic Minerals Office:
   - Role:

     Metallic Minerals Office is an assistant of leader of the Department [of Mineral Resources] to metallic mineral exploration and evaluation
   - Duties:
     - Study, analyze and interpret metallic mineral occurrences based on the data obtained from Department of Geology;
     - Evaluate mineral potential and calculate the quantity and quality of metallic mineral resources at mineral deposits in order to exploit those metallic mineral resources
     - Cooperate with Department of Geology and Department of Mineral Resources Development to prepare documents and evaluated data to operate metallic mineral exploitation;
     - Make detailed reports on metallic mineral deposits and evaluate its economic effectiveness and feasibility study to be forwarded to Mining [and Construction Materials] Office to further study and implement it;
     - Cooperate with involved departments to study the environmental impact when mining is stated;
     - Prepare and compile documents for metallic mineral samples by putting their coordinate in the [mineral resources] map.

2. Non-Metallic Minerals Office:
   - Role:

     None-Metallic Minerals Office is an assistant to the leader of the Department [of Mineral Resources] to non-metallic mineral resources exploration and evaluation.
   - Duties:
     - Study, analyze and interpret non-metallic mineral occurrences based on the data obtained from Department of Geology;
     - Evaluate mineral potential and calculate the quantity and quality of non-metallic mineral resources at mineral deposits in order to exploit those non-metallic mineral resources
     - Cooperate with Department of Geology and Department of Mineral Resources Development to prepare documents and evaluated data to operate non-metallic mineral exploitation;
     - Make detailed reports on non-metallic mineral deposits and evaluate its economic effectiveness and feasibility study to be forwarded to Mining [and Construction Material] Office to further study and implement it;
     - Cooperate with involved departments to study the environmental impact when mining is stated;
     - Prepare and compile documents for non-metallic mineral samples by putting their coordinate in the [mineral resources] map.

3. Coal and Gem Stone Office:
   - Role:

     Coal and Gemstone Office is an assistant to leader of the Department [of Mineral Resources] to coal and gemstone exploration and evaluation.
   - Duties:

- Study, analyze and interpret coal and gemstone occurrences based on the data obtained from Department of Geology;
- Evaluate mineral potential and calculate the quantity and quality of coal and gemstone resources at mineral deposits in order to exploit those coal and gemstone resources
- Cooperate with Department of Geology and Department of Mineral Resources Development to prepare documents and evaluated data to operate coal and gemstone exploitation;
- Make detailed reports on coal and gemstone deposits and evaluate its economic effectiveness and feasibility study to be forwarded to Mining [and Construction Material] Office to further study and implement it;
- Cooperate with involved departments to study the environmental impact when mining is stated;
- Prepare and compile documents for coal and gem samples by putting their coordinate in the [mineral resources] map.

4- Mining and Construction Material Office:

- Role:

  Mining and Construction Material Office is an assistant to leader of the Department [of Mineral Resources] to exploitation and evaluation of construction material.

- Duties:
  - Study and analyze a master plan to operate the exploitation of mineral resources and construction materials;
  - Re-study the evaluation, quantity and quality of mineral resources deposits evaluated by the offices of Department of Mineral Resources as mineral deposits with economic effectives to ensure the operation of exploitation of mineral resources and construction materials;
  - Make detailed reports on exploitation of mineral resources and evaluate their economic effectiveness and feasibility of the mineral resources deposits;
  - Examine construction development plan for mining [exploitation of mineral resources], machinery, explosives, storage and disposal sites and road for transportation, etc.;
  - Cooperate with involved departments to study the environmental impact [when mining is stated];
  - Prepare statistics of exploitation of mineral resources and construction materials;
  - Prepare and compile documents for mineral samples by putting their coordinate in the [mineral resources] map.
  - Identify each type of construction materials for suitable technical use;
  - Follow up and inspect mining, processing, refinery and marketing of mineral resources, gravel, sand, and construction materials.
  - Cooperate with relevant departments to follow up the implementation of the signed agreements or mineral resource licenses;
  - Cooperate with Department of Mineral Resources Development to inspect and control [mineral] permits and instruct people to apply for permit to exploit mineral resources and construction material;
  - Cooperate in resolving and reconciling all disputes related to exploitation of mineral resources and construction materials;
  - Manage administrative and personnel affairs and tangible and intangible assets of the Department of Mineral Resources

Article 5:

Any provision and decision contrary to this Prakas shall be null and void.

Article 6:

Director General of Mineral Resources, Director General of Inspection, Director of Minister's Chief, Director of Personnel Department, Director of Mineral Resources Department, shall have their respective duties and capacities to fulfill their tasks in compliance with this Prakas.

Article 7:

This Prakas is effective and shall be implemented after the date of signature.

Minister of Industry, Mines and Energy
SUY SEM

**No.22**

**KINGDOM OF CAMBODIA**
NATION RELIGION KING

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref. No. 355

Phnom Penh, May 05, 2000

**Prakas**
**on**
**the Function of Department of Geology**

Minister of Industry, Mines and Energy
Decides

Article1:

Department of Geology is under the supervision and management of General Department of Mineral Resources and has its roles and duties as follows:

- Propose projects and cooperate with other national and international institutions in geological field;
- Cooperate in compiling and implementing laws, sub-decrees, orders and legal frameworks related to geological and mineral researches;
- Conduct geological research by using geophysics, geochemistry and satellite image interpretation methods;
- Conduct preliminary exploration for mineral resources and develop geosciences and mineral resources maps;
- Collect, compile and maintain, manage, utilize, exchange and sale document data and geological books
- Synthesize geological data based on the areas of Cambodia and appropriate mineral potentials to meet benefits of tourist and urbanization and construction sectors;
- Disseminate and uphold the use of geological data for the social-economic development, environmental protection and natural hazard;
- Manage and provide services for geological and mineral sector;
- Arrange and manage transportation means, equipments and machinery used for geological research and mineral exploration conducted by concerned departments under the General Department of Mineral Resources;
- Cooperate in reviewing and evaluating investment proposal for mineral exploration and exploitation of mineral resources.

Article 2:

Department of Geology is directed by a Director accompanied by a number of Deputy Directors as assistants.

Article 3:

The structure of Department of Geology is as follows:

1. Mapping Office
2. Geological Research Office
3. Geo-Environment Office
4. Laboratory Office.

Each office is led by an Office Chief accompanied by a number of Deputy Office Chiefs as assistants.

Article 4:

Roles and duties of each [specializing] office:

1. Mapping Office:
   - Roles:

     Mapping Office is an assistant to the leaders of Department [of Geology] to collect geological-mineral resources data and develop geosciences and mineral resources maps.
   - Duties:
     - Collect, compile, manage and develop geosciences and mineral resources maps;
     - Collect, compile, develop and manage geological and mineral resources base data;
     - Utilize the geographic information system to analyze and compile other maps to meet the need [demands] of offices, departments and other institutions;
     - Collect, compile and manage all kind of satellite image data and documents;
     - Manage and compile the inventory of mineral resources.

2. Geological Research Office:
   - Roles:

     Geological Research Office is an assistant to the leader of the Department [of Geology] to conduct geological research and preliminary mineral exploration.
   - Duties:
     - Cooperate in geological field with national and international institutions;
     - Conduct geological research by using methods for onshore and offshore, aiming at understanding geological structure, tectonic and lithology to determine the geological evolution in and outside the country and areas with mineral resources potential;
     - Study current geological status to foresee and evaluate natural calamities, caused by geological phenomena actions onshore and offshore [sea bed] to determine their impacts on economic-social life, aiming at protecting and reducing natural disaster effectively;
     - Promote the use of geological information to contribute to the management of land use and urbanization, environmental conservation, archaeology and other economic-social activities;
     - Study the impact on the activities of land use and land development to contribute to setting up land use policies;
     - Determine [Locate] priority areas for mineral exploration based on data acquired from geological study and other resources and mineral economic data and national policy.
     - Use data acquired from geological study and other resources to explore for other new mineral occurrences.
     - Conduct preliminary explorations to find other mineral occurrences and overview mineral form and occurrences and ore quality and quantity, aiming at determining preliminary economic effectiveness of mineral occurrences to be used for next mineral exploration and setting up policies on mineral management and mineral utilization.

3. Geo-Environment Office:
   - Roles:

     Geological Research Office is an assistant to the leader of the Department [of Geology] to conduct geo-environment works.
   - Duties:

- Study and evaluate hydro-geological conditions to be used for mineral development and environmental protection;
- Cooperate with other institutions to set up policies on groundwater management and utilization to ensure sustainable groundwater use, protect water resource pollution or deformation of layer [strata] and groundwater system;
- Study environmental impact assessment caused by the activities of mineral development;
- Study and evaluate geological conditions to be used for urbanization development.

4. Laboratory Office:
    - Roles:

      Laboratory Office is an assistant to the leader of the Department [of Geology] to manage administration, laboratory and machinery equipment.
    - Duties:
        - Manage laboratory works;
        - Provide services for geological and mineral resources researches, environmental conservation and land use;
        - Manage and maintain documents, samples of rock, mineral, fossils or other geological evidences, used for better understanding natural resources and history and evolution of geology;
        - Operate administration works, personnel [staff] an manage all tangible and intangible assets of the Department [of Geology];
        - Arrange and manage transportation means and machinery equipment used for geological study and mineral exploration of other Departments under the General Department of Mineral Resources.

Article 5:

Any provision and decision contrary to this Prakas shall be null and void.

Article 6:

Director General of Mineral Resources, Director General of Inspection, Director of Minister's Cabinet and Director of Geology shall have their respective duties and capacities to fulfill their tasks in compliance with this Prakas.

Article 7:

This Prakas is effective and shall be implemented after the date of signature.

Minister of Industry, Mines and Energy
SUY SEM

**No.23**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref. No 354

Phnom Penh, May 5, 2000

**Prakas**
**on**
**the Function of**
**Department of Mineral Resources Development**

Minister of Industry, Mines and Energy
Decides

Article 1:

Department of Mineral Resources Development is under the direct supervision and management of the General Department of Mineral Resources and shall be in charges of following duties:

- Prepare [draft] strategy and plans for developing mineral resources and geology throughout the country;
- Draft laws, sub-decrees, orders, regulations and [mineral] investment agreements related to geological research and exploration, evaluation and exploitation of mineral resources, gravel, sand and construction materials throughout the country;
- Set up projects of cooperation with international organizations, institutions and communities on field of mineral resources and facilitate cooperation work between Departments under the supervision of the General Department of Mineral Resources and other institutions;
- Cooperate with involved departments to organize training programs for human resource on the skills necessary for serving the work of geology and mineral resources.

Article 2:

Department of Mineral Resources Development is led by a Director and accompanied a number of Deputy Directors as an assistant [to the Director]

Article 3:

Department of Mineral Resources Development has its organizational structure as follows:

- Office of Mineral Resources Development
- Office of Cooperation
- Office of Data Management

Each office is led by an office chief and accompanied by a number of deputy-office chiefs as an assistant [to the office chief]

Article 4:

Role and duties of each [specializing] office are determined as follows:

1. Office of Mineral Resources Development
    - Role:

Office of Mineral Resources Development is an assistant to the leader of the Department of Mineral Resources Development for geological and mineral resources developments.

- Duties:
  a. Prepare [set up] policy, strategy and plans for developing mineral resources throughout the country:
     - Prepare [set up] plans for geological and mineral resources researches;
     - Prepare documents and determine locations for mineral concessions to be invested by companies by cooperating with Department of Mineral Resources and Department of Geology;
     - Prepare, compile and disseminate information on mineral resources to attract investors by cooperating with Department of Mineral Resources and Department of Geology;
     - Receive document requests for investment in mineral resource to submit to the relevant Departments [for review and consideration].
     - Cooperate with relevant Departments to inspect the implementation of agreements or mineral licenses;
     - Give comments on proposal projects on mineral exploration and geological research to Director General;
  b. Prepare and draft legal framework, agreements and [mineral] licenses related to development of mineral resources and geology.

2. Office of Cooperation
   - Role:

     Officer of Cooperation is an assistant to the leader of the Department of Mineral Resources Development for the work of cooperation related to development of mineral resources and geology.
   - Duties:
     - Cooperate with relevant Departments to set up training program for human resources for the skills necessary to serve the work of mineral resources and geology;
     - Set up projects to cooperate with international organizations, institutions and other communities on mineral resources development and facilitate the cooperation with the Departments under the supervision of the General Department of Mineral Resources and other institutions,

3. Office of Data Management
   - Role:

     Office of Data Management is an assistant to the leader of the Department of Mineral Resources Development for data management of mineral resources and geology.

   - Duties:
     - Study, make data entry and manage data, technical books, documents involved in staff information and work and financial obligations to be fulfilled [by concessionaires under the agreements [on mineral exploration and exploitation]
     - Compile geological and mineral resources data by cooperating with other Departments of the General Department of Mineral Resources;

- Manage and control the tangible and intangible inventory [in the Department of Mineral Resources Development]
- Perform administrative and personnel affairs for the Department [of Mineral Resources Development] and General Department [of Mineral Resources].

Article 5:

Any provision and other decision contrary to this Prakas shall be as null and void.

Article 6:

Director General of Mineral Resources, Director General of Inspection, Director of Minister's Cabinet, Director of Personnel and Director of Mineral Resources Development have its duties in their competencies to implement this Prakas.

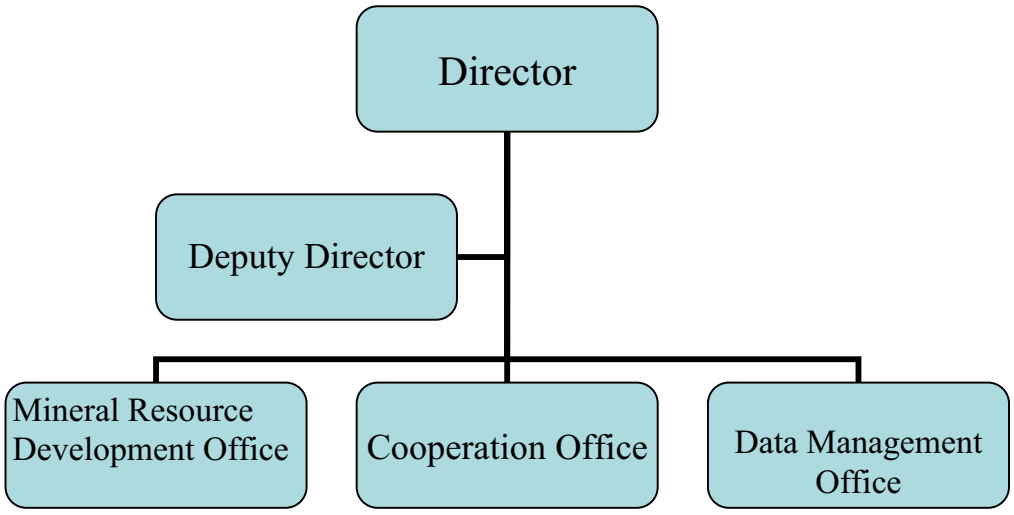
Article 7:

This Prakas is come into effective after the date of signature.

Minister of Industry, Mines and Energy
SUY SEM

Annex 1
Prakas N 354
Date: May 5, 2000

Organization Chart of Mineral Resource Development Department




| | | |
|---|---|---|
| Have seen | Have reviewed | |
| Phnom Penh, May 5, 2008 | PP, April 21, 2000 | PP, April 21, 2000 |
| Minister of MIME Development | GDMR | Director of Mineral Resource |
| Suy Seam | Suy Chiev Kun | Khun Panhaseth |

**No.24**

**KINGDOM OF CAMBODIA**
Nation Religion King

**Ministry of Industry, Mines and Energy**
Ref. No

**Prakas**
**on**
**the Establishment of an Inspection Office under the DMR**

The Minister of Industry, Mines and Energy
Decides

Article 1:

The Mining Inspection Office shall be under the Department of Mineral Resources established by the Prakas Ref. No 353 dated May 05, 2000 and holds the following duties and responsibilities:

Duties:

The Mining Inspection Office shall assist the Director of Mineral Resources to inspect all activities of mining operations and illegal mining.

The Mining Inspection Office shall have the following responsibilities:

1. Study and analyze master plan for all process of mineral operations;
2. Environmental impact assessment on all kinds of mineral operations;
3. Inspect mining sites, mineral development plan, type of machinery and explosive devices, waste disposal sites and roads for transportation...etc;
4. Cooperate with the involved departments to study the environmental impact assessment;
5. Study and reevaluate quantity and quality of mineral deposits (reserves), and also evaluate the economic effectiveness of the mineral deposits (reserves) to ensure the mineral operations;
6. Cooperate with the related departments to inspect and check mineral licenses and instruct the concessionaires to ask permission to set up mineral resources exploitation;
7. Cooperate with the related departments and local competent authorities to suppress (crack down) all kinds of illegal mining.

Article 2:

Any provision and decision contrary to the Prakas shall be void and null.

Article 3:

Director General of Mineral Resources, Director of Minister's Cabinet, Director of Administrative Department, Directors of Personnel Department, Accounting and Finance Department; the Mineral Resources Department shall fulfill its duties with its competency in accordance with the Prakas.

Article 4:

The Prakas is come into effect from the date of signing of this Prakas.

Phnom Penh, August 01, 2006
Minister
SUY SEM

**No.25**

**KINGDOM OF CAMBODIA**
Nation Religion King

**MINISTRY OF INDUSTRY, MINES AND ENERGY**
Ref. No. 359

**Prakas**
**on**
**the Establishment of a Revenue Office Under the DMRD**

Minister of Industry, Mines and Energy
Decides

Article 1:

Mineral Revenue Office is established to supplement to the structure of Department of Mineral Resource Development established by the Prakas, Ref. No. 354, dated May 5, 2000, and has its roles and duties as follows:

- Roles:
  Mineral Revenue Office is an assistant to leader of the Department [of Mineral Resources Development] to manage all revenue from mineral resources [exploration and exploitation].
- Duties:
  - Collect and manage mineral revenue, including the payment of mineral royalties, land rental, fees for registration, mineral license, renewal of mineral license and right transfer of mineral license, and fine [penalty] money under the Law on Management and Exploitation of Mineral Resources;
  - Make [Write] letters for debts, including mineral royalties, annual land rental and other debts owed by concessionaires holding mineral licenses under the conditions of agreements on mineral exploration and exploitation and other permits;
  - Manage data [payments] of mineral royalties, land rental and other relevant revenues under the conditions of agreement on mineral exploration and exploitation;
  - Manage bank guarantees for performance security and other permits for mineral exploration [provided by concessionaires under the conditions of agreement on mineral exploration and exploitation] and withdraw the amounts approved by the leader of Ministry [of Industry, Mines and Energy] from the bank guarantees for performance security;
  - Make quarterly reports on mineral revenue to be submitted to the leader of Ministry [of Industry, Mines and Energy] for review and approval;
  - Study and analyze the collected mineral revenue [from concessionaires] to propose necessary measures to be taken to the leader of Ministry [of Industry, Mines and energy] for review and approval in order to strengthen the mineral revenue effectively;

Article 2:

Any provision and decision contrary to this Prakas shall be null and void.

Article 3:

Director General of Inspection, Director General of Mineral Resources, Director of Minister's Cabinet, Director of Administration, Director of Personnel, Director of Accounting and Finance and Director of Mineral Resource Development have its respective duties and capacities to implement this Prakas.

Article 4:

The Prakas is come into effective from the date of signature.

Phnom Penh, April 29, 2008
Minister of Industry, Mines and Energy
SUY SEM

# Appendix III-1 Results of Company Interview

## Questionnaire to company

1. Name of the company
2. Main content of the company's business
3. Nationality of the company
4. Capital of the company
5. How many concessions do you have?
6. Location of each concession
7. Access to each concession (how many hours is necessary to access to each concession from the nearest town by car?)
8. Areas of each concession (are these concessions held fully by the company, or held by JV? What company of JV, and how much % of concessions the interviewee hold?)
9. What kind of permission for each concession do you have?
10. Current state of each concession
11. What are kind of minerals, ore reserve and grade of ore which are identified currently?
12. How much was ore output and ore grade produced in the last year in each concession?
13. What is the mining method adopted in each concession?
14. How meter deep are the underground working places from the surface?
15. What are main mining machines?
16. What is the processing method adopted? Do you use mercury or cyanide?
17. What are main processing machines and facilities?
18. How much was sales amount in the last year?
19. How much was the total production cost in the last year?
20. How much was the profit in the last year?
21. Organization chart in your company
22. How many workers do you employ now?
23. How much is their average salary?
24. What kind of training system do you have for new workers in your company?
25. Do you permit artisanal miners to mine ore in your concession areas, receiving some fee? How many artisanal miners are working in your concessions, if you permit them?
26. How many accidents did you have last year and what kind of accidents were they?
27. Do you have any environmental issues caused by your operation?
28. In your operation, what kind of measures are you currently taking for safety and environment?
29. If you are currently implementing exploration, how many years later and in which production scale do you intend to exploit it?
30. What are major issues in the current mining (or exploring) management, if you have?
31. What are requests for the government (or GDMR), if you have?
32. Other relevant questions

## 1. Angkor Wath Cement

Interviewee: President
Interviewer: K. Shingu, an official of DMR, Samphor (Interpreter)
Date: 14:00 to 15:30 in Sep. 23 (Tue.), 2008
Place: President's office in Angkor Wath Cement

1. Angkor Wath Cement Ltd.
2. gold mining
3. nationality: Thailand (80%), Cambodia (20%)
4. capital: US$ 1million
5. holding concession: 1
6. location of the concession: Banteay Ampil District, Oddar Mean Chey Province
7. Srisorphon City → mine site (2.5h)
8. concession area: 32km$^2$ (exploration license), 2km$^2$ (exploitation license)
9. type of license: exploration and exploitation
10. current state of the concession: drilling (total length:300m)
11. estimated reserve: 2 to 3 million tons with average grade of Au2.5g/t
12. last production: none
13. mining method: underground
14. underground structure: 3 horizontal levels with depth of 20m to 50m from the surface
15. mining machines: 6 jack-drills, 4 mine-cars (1.5t), 1 hoisting machine (1.5t)
16. processing method: gravity method and cyanide process
17. processing machines: jaw crusher, cone crusher, vibrating screen, ball mill, leaching tank and zinc precipitation plant
18. last sale: none
19. last production cost: no data
20. last profit: none
21. organization: Dept. of administration (accounting, purchasing, personnel, financial) and production (analyzing, mining, processing plant, construction, depository, guards)
22. current workers: 80
23. average salary: 7,000 Thai Baht(US$ 200) /month
24. training system: OJT
25. no illegal artisanal miner
26. last accident: none
27. current environmental issue: none
28. special consideration for environment and safety: systematic analyses of tailings and no accident
29. production schedule: to open the mine in Nov. 29, 2008 with production of 2,000 to 3,000t/m
30. current issue: none
31. request for GDMR: troublesome in monthly report and official training
32. others: clearance of UXBs is being done by CMAC, but it demands a lot of money.

## 2. Angkor Wat Minerals

Interviewees: Barry Lucas (Director of Elray Resources), Cham Borey, Director
Interviewer: K. Shingu, Kong Bun Huk (Itanslator), an official of DMR
Date & Time: 9:30 to 10:30 in Oct. 30, 2008
Place: Reception room of Angkor Wat Minerals

1. Ankor Wat Minerals Ltd. (a subsidiary company of Elray Resources Inc. which is an Australian Junior Company registered in USA)
2. exploration
3. nationality: Australia
4. capital: US$ 10 million
5. holding concession: 1
6. as shown in table
7. Phnom Penh → (2.5h) Kampong Thom → (3h) Tbaeng Meanch
8. concession area: 90km$^2$
9. type of license: another company attained MOU from GDMR, and then Ankor Wat Minerals attained exploration license (Jan., 2007).
10. current state of the concession: surface survey by 4 geologists (2 Cambodians and 2 Kiwis). Survey is conducted during 5 months (Dec. to Apr.). During rainy season, survey cannot be conducted due to many flood and malaria. From Dec., 2008, full geological survey will be began by joining of an Australian geologist.
11. target metal: gold and nonferrous metal
12. last production: none
13. mining method: not studied yet
14. exploitation depth: unknown
15. mining machines: not studied yet
16. processing method: not studied yet
17. processing machines: not studied yet
18. last sales: none
19. last production cost: no data
20. last profit: none
21. organization: none
22. working staff: 2 directors, 4 geologists, other 4 staff (accountant, driver, guards, cook)
23. average monthly salary: Cambodian geologist: US$1,000, accountant: US$300, driver:US$150, guard: US$120
24. training system: none
25. mining activities by illegal miners: none
26. existence of illegal miners: none
27. accidents of last year: none
28. current environmental issues: none
29. special measures for environment: none because exploration has not began yet.
30. production schedule: perspective will be determined within 2 years.
31. current problems: there are many issues such as insufficient geological infrastructure, etc. (ex. Indonesia gives necessary geological data.) information given by GDMR is inaccurate. The investment climate is insufficient.
32. Request for GDMR: to improve the current state.

## 3. BHP Billiton

Interviewee: Dave McCracken (Project Manager), Leonard Kaminski (ERW manager)
Interviewer: K. Shingu, K. Kumagai
Date: 9:00 to 10:15 in Nov. 1st, 2008
Place: Work office in BHP

1. BHP Billiton which is directly managed by Australian head office, and is not registered in Cambodia
2. mining
3. nationality: Australia
4. capital: Australian capital in head office
5. holding concession: 1 (BHP holds an oil concession in the offshore.)
6. as shown in Table
7. Phnom Penh → (6h) Snoul → (4h) Sen Monoron
8. concession area: 996km$^2$
9. type of license: exploration license given by the government after mineral agreement. This area has bauxite mineralization found in 1950s, and afterwards Russian and French teams used to conduct exploration activities.
10. current state of concession: exploration began since last year, conducting surface survey, sampling and drilling (500m). Works are done during only dry season (Dec. to May). In the rainy season, preparation for exploration is done.
11. target: bauxite
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machines: not studied yet
16. processing method: not studied yet
17. processing machines: not studied yet
18. last sale: none
19. last production cost: no data
20. last profit: none
21. organization: A geological team conducting exploration works. Total employees are 126 including geologists from 7 countries. The company has a contract with CMAC which dispatches workers.
22. current workers: 126
23. average salary of workers: Salary is paid by CMAC.
24. training system: Training for sampling, drilling, etc. is conducted for 3 months during the dry season. Workers' levels are satisfactory.
25. exploitation by illegal miners: none
26. last accident: none
27. current environmental issue: none
28. special consideration for environment: EIA was submitted before exploration.
29. production schedule: not studied yet
30. current problem: none
31. request for GDMR: specially none. They satisfied with the agreement. They had 4 trainees from GDMR last year, 2 trainees in this year.

## 4. Cambo Cana Kiri Development

Interviewee: Sor Hak, Representativ
Interviewer: K. Shingu, Randy (interpreter)
Date: 15:00 to 16:00 in June 3 (Wed.), 2009
Place: A meeting room in Cambo Cana Kiri Development

1. Cambo Cana Kiri Development Co., Ltd.
2. exploration of iron (in Rottanakiri) and gold (in Mondulkiri)
3. Cambodia
4. US$1 million
5. 2 concessions (in provinces of Rottanakiri (R) and Mondulkiri (M))
6. location: Ta Lav district Andoung Meas, Rottanakiri province and Phnom Gnot, Pichreda, Mondulkiri province
7. Phom Penh → Stung Treng (5h by Route No.7) → Ban Lung (2h by Route 78) → 5h (by walk to Rottanakiri)
8. (R)230km$^2$ and (M)160km$^2$
9. exploration license was attained in Nov. 2007
10. (R) Site operation is possible during Jan. to May. Contracted with 2 Vietnamese geologists for geological survey. Survey of about 30% of the concession was completed. Some outcrops were discovered. Currently 17 trenches (2mL×1mW×1mD) are excavated. (M) Geological survey of about 30% of the concession was completed. Currently 13 trenches are excavated. Vietnamese geologists stay about 2 weeks at the sites every visit, and they visit 4 times a year.
11. ore reserve: unknown
12. last production: none
13. mining method: unknown
14. development depth: unknown
15. mining machines: unknown
16. processing method: unknown
17. processing machines: unknown
18. last sales: none
19. last cost: none
20. last profit: none
21. organization: president, deputy presidents, 8 staff for administration, accounting, engineering, advisor, drivers. 10 employees in (R) and 13 employees in (M).
22. current employees: 31
23. average salary: US$600/month for Vietnamese, US$250 for people in Phnom Penh, and US$100 for minority people in the sites
24. training system for new comers: under consideration
25. illegal miners: (R) none, (M) neighboring villagers are mining, but it is not serious.
26. accidents in the last year: none
27. current environmental issues: none
28. some consideration for safety and environment: none
29. production scale: no idea
30. current issues: bad access to the sites and malaria
31. request to GDMR: none

## 5. Cambodia Hai Lan Mineral

Interviewees: Xing Wan Yi (President), Luo Hong Ming (Geologist), other 5 persons
Interviewer: K. Shingu, Samphors (interpreter), an official of DMR
Date: 9:30 to 11:30 in Oct. 22 (Tue.), 2008
Place: President's office in Cambodia Hai Lan Mineral

1. Cambodia Hai Lan Mineral Co. Ltd. (subsidiary of a mining company)
2. exploration including mineral analyses
3. nationality: China
4. capital: US$ 8million
5. holding concession: 1
6. as shown in Table
7. Phnom Penh → 400km (10h) Kaev Seima → 6km(2h by walk) exploration site
8. concession area: 80km$^2$
9. type of license: exploration
10. current state of the concession: 40 shafts(4m x 4m, 8-10m deep) were driven, 12 trenches (8-12m long x 2m deep x 1.5m wide) were driven.
11. target: gold, ore reserve is unknown, but average grade is 8.5g/t.
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machines: Current tools are hand-picks. Electrical pumps are used to dewater the underground, using a generator.
16. processing method & machines: not studied yet
17. last sale: none
18. last production cost: no data
19. last profit: none
20. organization: 4 departments (engineering, finance, transportation, administration) under the president
21. current workers: 27 (11 Chinese and 16 Cambodians)
22. average monthly salary: Chinese (US$500-800) and Cambodian (US$100-150)
23. training system: desk training for 2days, and OJT in the field. Few employees leave the company.
24. exploitation by illegal artisanal miners: currently none (but about 20 miners before acquired the concession).
25. last accidents: none
26. current environmental issue: none
27. special consideration for safety: wearing protective equipment
28. production schedule: exploration will be continued by 2010.
29. current issue: very hard to access the site due to bad road condition.
30. request for GDMR: even if they say something, it is impossible to realize it.

## 6. Cambodian International Mining Group

Interviewee: Li Paul (President), his wife, Ly Tong Heng (Adviser), and an interpreter (Chinese-Cambodian)
Interviewer: K. Shingu, Kong Bun Huk (interpreter)
Date: 9:30 to 11:30 in Oct. 27, 2008
Place: Cafeteria in the Phnom Penh Hotel

1. Cambodian International Mining Group
2. exploration
3. nationality: France (president is Chinese French.)
4. capital: US$5million
5. holding concession: 1
6. as shown in Table
7. Phnom Penh → (5h) Kratie → (0.5h) Sambor → boating in the Mekong (3h) Kampong Damrei → (1h walking) site
8. concession area: 133km$^2$
9. type of license: MOU → exploration license (attained in Feb. 2008)
10. current state of the concession: surface survey was done in April to July in 2008, and collected 1,000 samples. 86% of samples were sent to China, but the rest cannot be sent due to no permission of analyses.
11. targets: Au(0.38-0.8g/t), Cu, Pb, Zn
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machines: not studies yet
16. processing method: not studied yet
17. processing machines: not studied yet
18. last sale: none
19. last production cost: none
20. last profit: none
21. organization: none
22. current employees: 18 including 3 Chinese engineers.
23. average monthly salary: US$2,000 for Chinese who are fired in the rainy season, and rehired in the dry season. US$ 200 for Cambodians who come from the nearest village.
24. training system: Chinese instruct Cambodians how to sample.
25. illegal artisanal miners: There used to 2,000 miners 20 years ago. But they ran out under pressure of the local soldiers. Currently no miner.
26. last accident: none
27. current environmental issue: none
28. special consideration for environment: none
29. production schedule: within 3 to 4 years.
30. current issue: GDMR is asking money to permit samples analyses.
31. request for GDMR: They do not want to pay any permission fee for analyses.

## 7. Cambodia Metal Work

Interviewee: Ry Bunheng Director, Director's assistant
Interviewer: K. Shingu, Kong Bun Huk (Interpreter)
Date: 14:30 to 15:30 IN Oct. 30(Thu.), 2008
Place: Reception room in Combodia Metal Work

1. Cambodia Metal Work Co. Ltd. (Interviewee was a same person of Angkor Wath Cement, but it's another company.)
2. Exploration
3. Nationality: Joint venture with Cambodia and a JV (Thailand/China)
4. Capital: US$ 1 million (Cambodia owns 20%, foreign investor owns 80%)
5. Holding concession: 1
6. As shown in Table.
7. Phnom Penh → (4h) Battambang → (2h) Pailin
8. Concession area: 196km$^2$
9. type of license: MOU→Exploration (March 2008)
10. current state of the concession: Site operation is possible all the year. Surface survey, sampling and trenching are conducted. 2 drilling machines were purchased to start drilling survey in November 2008.
11. target: iron, analyzed result is58 to 63% Fe.
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machines: not studied yet
16. processing method: not studied yet
17. processing machines: not studied yet
18. last sales: none
19. last production cost: none
20. last profit: none
21. organization: three departments (administration, accounting, geology) under the directors.
22. employees: 22 (permanent) and 6 (subcontractors) breakdown: 3 directors (2 Thai and 1 Cambodian), administration (1 Thai) , accounting (1 Thai and 1 Chinese), geology (16 Cambodian workers). Exploration survey is conducted by 6 expert contractors (2 Chinese and 4 Thai). 16 Cambodian workers consist of 1driver, 2 guards, 1 electric technician, clearing UXBs (3 CIMAC people) and 8 exploration workers.
23. average monthly salary: administration/accounting (Thai and Chinese) US$300, 6 geological subcontractors US$ 500 to 1,500, driver US$120, guard US$ 100, electrician US$120, clearing UXBs US$150 and workers US$120.
24. training system: OJT (by geological subcontractors)
25. illegal miners: none
26. existence of illegal miners: none
27. last accidents: none
28. current environmental issues: none
29. special consideration for environment and safety: none
30. production schedule: Exploration will be expected to be completed within 2 years.
31. current problem: Neighboring farmers cultivate crops within the concession.
32. request for GDMR: to solve above problem.

## 8. Cambodia Tonle Sap International

Interviewee: H.E.Chea Thory Advisor (no company persons because they returned to China.)
Interviewer: K. Shingu, Randy (interpreter)
Date: 15:30 to 16:30 in June 1 (Mon.), 2009
Place: A meeting room in Cambodia Tonle Sap International

1. Cambodia Tonle Sap International Co., Ltd.
2. exploration of gold
3. China
4. capital: unknown
5. holding concession: 1
6. Kangchase, Changpleas commune, Keo Seima county, Mondlkiri province
7. Phom Penh → Kangpong Cham → Snoul → inter to the bad road 24km before Kratie
8. 208km$^2$
9. exploration license was attained in June 2008.
10. Site operation is possible during Dec, to Apr. Impossible to access to the site during May to Nov. Constructed 2 building for office and lodgment. Improved the road to the site, but not surveyed yet.
11. ore reserve: unknown
12. last production: none
13. mining method: unknown
14. development depth: unknown
15. mining machine: unknown
16. processing method: unknown
17. processing machine: unknown
18. last sale: none
19. last production cost: none
20. last profit: none
21. organization: unknown, but 9 employees in the site
22. current employees: 14 for 2 staff, 7 workers and 5 guards (province soldiers)
23. average salary: unknown
24. training system: unknown
25. illegal miners: 1,000 miners working in the dry season around the concession.
26. last accident: none
27. current environmental issues: none
28. consideration for safety and environment: none
29. production scale: no idea
30. current issues: the concession is partially overlapped with the agriculture concession, and there is some inconvenience for exploration.
31. request to GDMR: to help above-mentioned issue

## 9. Future Environment

Interviewee: Taing Theng Sea (President)
Interviewer: K. Shingu, Kong Bun Huk (interpreter), an official of DMRD
Date: 14:30 to 16:00 in Oct. 27 (Tue.), 2008
Place: President's office

1. Future Environment American Group
2. exploration, manufacturing bricks, show business (JV)
3. nationality: Cambodia
4. capital: US$ 1.5 million
5. holding concession: 1
6. as shown as Table.
7. access to the concession: Phnom Penh → (1h) Kanpong Speu → (4h) Phum Samraong
8. concession area: 262km$^2$
9. type of license: MOU → exploration
10. current state of the concession: 3 years past after exploration started. Currently drilling (30 to 60m long) is being conducted after surface survey (no data on number and total length).
    Operation is done for 6 months during the dry season.
11. target: analyzed results of sample: Au(0.04-1.3g/t), Cu(0.1%), Pb(2-14%), Ag(45-329g/t) and Zn(3-14%)
12. last production: none
13. mining method: shallow part by open pit and deep part by underground method
14. development depth: unknown
15. mining machines: not studied yet (using 3 leased Chinese drilling machines for exploration)
16. processing method: not studied yet
17. processing method: not studied yet
18. last sales: none
19. past operation cost: totally A$200,000
20. last profit: none
21. organization: 2 departments (engineering and office work ) under the president
22. current employees: 30 including 10 Chinese geological engineers and 4 employees for office work jointly for brocks and show business. Geological survey is conducted by Chinese who submits sometimes geological report.
23. monthly salary: US$ 300 for Chinese and US$ 70 to 100 for Cambodians.
24. training for employees: by OJT for sampling and geological survey by Chinese.
25. exploitation by illegal miners: none (historically no illegal miners)
26. last accidents: none
27. current environmental issues: none
28. special consideration for environment: already submitted EIA to MOE
29. production schedule: It is expected to start within 2 years.
30. current issues: the remote place, and 5km far from the nearest village. It takes time for analyzing samples (7 to 10 days are necessary for analysis in Vietnam). Hard financially.
31. request for GDMR: They need a laboratory in Cambodia to save time and money. GDMR must help to construct a national laboratory.

## 10. Gold Metal Group

Interviewee: Jean Fellipe (President)
Interviewer: K. Shingu, Samphors (interpreter), two officials of DMRD
Date: 14:30 to 16:00 in Oct. 23 (Thu.), 2008
Place: President's office in GMG

1. Gold Metal Group Co. Ltd.
2. exploration
3. nationality: Cambodia
4. capital: US$ 5 million
5. holding concessions: 2
6. a s shown in Table
7. Phnom Penh → Kanpong Chang → Snoul → (3h) sites
8. Concession areas: 158km$^2$ and 204km$^2$
9. type of license: MOU → exploration
10. current state of the concession: Currently exploration is conducted in 2 concessions jointly with Bateman, Australian company. Both companies paid US$ 5 million for exploration. Surface surveys in both concessions were begun in 2006, and drilling was started in 2008 (plan: 300 holes and 200 holes completed). Exploration is conducted during the dry season (Dec. to May) due to malaria in the rainy season.
11. target: gold (analyzed grade: 15 to 20g/tAu )
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machines: not studied yet
16. processing method: not studied yet
17. processing machines: not studied yet
18. last sales: none
19. last production cost: none
20. last profit: none
21. organization: department (office work and engineering) under the president, and supporting staff of Bateman helps them.
22. current employees: 7 (5 Cambodians and 2 Vietnamese). 10 to 30 temporary employees (Cambodians and Vietnamese) in engineering dept. Full time staff are only 5 Cambodians. Vietnamese are employed only in the dry season.
23. average salary: US$ 200/month for Vietnamese, and US$10/day for Cambodians.
24. training system: none
25. illegal miners: about 400 in #28 before license, no miners in #27 by control of MOE.
26. last accidents: none
27. current environmental issues and special consideration to environment: none
28. production schedule: not studied yet, and it is consulted with Bateman after exploration.
29. current problem: transportation
30. request for GDMR: speedy procedures, because each procedure takes a lot of time.

## 11. Indochine Resources

Interviewee: David Evans Managing, Director and Jeremy Snaith, Executive Director
Interviewer: K. Shingu and K. Kumagai
Date: 14:30 to 15:40 in Oct. 24 (Fri.), 2008
Place: Reception room in Indochine Resources

1. Indochine Resources (Cambodia) Ltd. (a 100% subsidiary of Indochine Resources, Australian junior company)
2. exploration
3. nationality: Australia
4. capital: US$50,000
5. holding concession: 14
6. as shown in Fig. (Exploration offices are located in Phnom Penh, Kratie and Bang Lung.)
7. access to the concession: Phnom Penh → (4h) Kratie → (4h) Bang Lung → sites
8. concession area: each concession have 200km$^2$.
9. type of license: MOU → exploration
10. current state of the concession: first stage geological survey to make geological maps. Samples were collected more than 10,000. Two to three drilling machines are purchased in the near future to start drilling surveys.
11. targets: gold and base metals. Analyzed sample are Au50g/t, Cu10%, Pb20%, Zn7% and Fe65%.
12. last production: none
13. mining method: maybe by open pit in shallow part and by underground in deep part
14. development depth: unknown
15. mining machines: not studied yet
16. processing method: not studied yet
17. processing machines: not studied yet
18. last sales: none
19. last production cost: none
20. last profit: none
21. organization data: not given
22. current employees data: not given
23. average salary data: not given
24. training: 1 day training in the office and then OJT at the fields
25. exploitation by illegal miners: none in the northern areas, but about 50 illegal miners are exploiting gold and gems in Kampong Thom and Kratie provinces.
26. last accidents: none
27. current environmental issues: Inspection by MOE is very severe because it is located in the national park. 70 guardians of the protected area work always in the site. Operation is conducted by indication of MOE. Salaries of guardians are paid by the company.
28. special consideration to safety: implemented by Australian safety regulation.
29. production schedule: Production is expected to start within 2 years.
30. current issues: There is technical problems in sampling.
31. request for GDMR: Custom clearance procedure for importing exploration machines takes a lot of time. They hope GDMR to help speedy clearance.

## 12. Kenertec

Interviewee: Choi Jeoung Ho, Director, Kang In-Wook, Advisor, Choup Sokuntheara, Manager of geology, and Choi Go Ho, Engineer
Interviewer: K. Shingu, an official of DOG (Choup Sokuntheare)
Date: 14:30 to 15:30 in Sep. 19 (Fri.), 2008
Place: President office in Kenertec Resources

1. Kenertec Resources Co., Ltd.
2. mineral exploration, mining, biomass, generator
3. Nationality: Korea
4. capital: US$3million
5. holding concession: 8 and 4 under application
6. Thalabairivat Districtn in Stung Treng Province, Chhaeb District in Preah Vihear Province, and others
7. Kampong Thom City → Phnum Deik → Rovieng Cheung
8. concession areas: 55km$^2$, 160km$^2$, 214m$^2$, 93km$^2$, 168km$^2$, 212km$^2$, 96km$^2$ and 398km$^2$
9. type of license: exploration and exploitation
10. current state of the concessions: A, C and E (reconnaissance), B, D, E, F and G(nothing)
11. target: iron, copper, gold (as by-product)
12. last production: none
13. mining method: open pit
14. development depth: 40m to 50m beneath the surface
15. mining machines: they bought used Chinese generator, dump-trucks (10t), drill machines
16. processing methods: not studied yet
17. processing machines: not studied yet
18. last sales: invested US$ 1mln. in biomass and generator
19. last cost: US$ 100,000
20. none
21. organization: mineral development, biomass and generator
22. current employees: 129 (5 Koreans and 120 Cambodians), but only 4 geologists and 16 workers in mineral development, and others in biomass and other.
23. average monthly salary: US$100
24. training system: they have 3 month training system.
25. there is no illegal miner.
26. last accident: none
27. current environmental issues: none
28. special consideration to safety: provision of protective equipment
29. production schedule: within 5 years
30. current issues: no experienced mining engineers, workers, no road, UXBs and landmines
31. request for GDMR: construction of roads, clearance of UXBs and landmines

## 13. Kingdom Resources

Interviewee: Stephen J. Brideges, President
Interviwer: K.Shingu, Kong Bun Huk (interpreter)
Date: 14:30 to 15:30 in Nov. 5 (Wed.) in 2008
Place: President's office in Kingdom Resources

1. Kingdom Resources Co. Ltd. (a subsidiary of Singaporean junior, QRP' JV, they have a coal company called Kingdom Mining)
2. exploration
3. nationality: Singapore (English company 50％ and Australian company 50％)
4. capital: US$ 500,000 (invested by Singapore 60% and Cambodia 40%)
5. holding concession: 2 (1 attained in Mar, 2008, and another in stage of MOU)
6. location: EL as shown in Table, MOU is locate din its north
7. access: Phnom Penh → (3.5h) Kampong Tong → (4h) site
8. concession area: 200$km^2$, 200$km^2$
9. type of license: MOU → exploration, another is under MOU.
10. current state of the concession: surface survey, 1,000 samples, 15$m^2$ trenches,10 pits (6m)
11. target: iron (40%Fe), copper (0.5%Cu) and bauxite (25%)
12. last production: none
13. mining method; not studied yet
14. development depth: unknown
15. mining machines: not studied yet
16. processing method: not studies yet
17. processing machines: not studied yet
18. last sales: none
19. past cost: no answer
20. last profit: none
21. organization: 3 directors under a president, a Cambodian manager under director, and workers. 7 managers' assisting subcontractors (geologist, mining engineer, mine accountant, etc.)
22. current employee: 7 (1 Englishman and 6 Cambodians), subcontractors (4 Filipinos, 1 English, 1 American, 1 Australian)
23. average monthly salary: US$ 900 for manager, and US$ 350 for local staff
24. training system: OJT (trained by subcontracted engineers)
25. illegal miners: none
26. last accident: none
27. current environment: none
28. special consideration: relationship with neighbors of the concession providing food, fuel, medicines, water, and houses.
29. production schedule: within 2 to 3 years
30. current issue: none except cash management
31. request for GDMR: 1) speedy procedures for permission, MOU, etc. 2) no transparency in agreement

## 14. Liang Heng Investment

Interviewee: Theang Chhoeurng Deputy President, Saphun Sothea Administration Manager
Interviewer: K. Shingu, Randy (interpreter)
Date: 15:00 to 16:30 in June 2 (Wed.), 2009
Place: Meeting room in Liang Heng Invetment

1. Liang Heng Investment Co., Ltd.
2. exploration of iron ore and also managing exporting seafood and property companies.
3. Cambodia
4. US$ 1 million
5. 1 concession
6. Lum Chor area Borkeo and Oyada county Rottanakiri province
7. Phom Penh → Stung Treng (5h by Route 7) → Ban Lung (2h by Route 78) → 4km (by walk)
8. 154km$^2$
9. attained license of exploration in 2008 June.
10. The Vietnamese survey company implemented reconnaissance and geophysical exploration for a week in 2008 August under cooperation with the Vietnamese steel company, Ha Tinh to estimate potential ore reserve and ore grade for pre-feasibility study. Site operation is possible during Nov. to March. Hard to access to the site during Apr. to Oct. Constructed a cottage for site operation.
11. potential ore reserve (main mineral: magnetite): 1,430,000 t (probable grade: 60%Fe)
12. last production: none
13. mining method: open pit
14. development depth: unknown
15. mining machines: 14 dump trucks, 4 excavators, 4 tyre-loaders, 5 cars, 5 vibrators, 2 pumps and 3 generators
16. processing method: magnetic separation
17. processing machines: crushers, ball mills, magnetic separators, hydro-extractors
18. last sale: none
19. last cost: none
20. last profit: none
21. organization: currently managed only by the deputy president. 10 supporting staff in the site.
22. number of employees: 11
23. average salary of employees: monthly US$ 100 for Cambodian employees, and paid by contract to the Vietnamese survey company
24. training system for the new employees: none
25. illegal miners: 10 to 20 miners in the rainy season and 2 to 3 miners in the dry season for gem around the concession
26. last accident: none
27. current environmental issues: none
28. consideration to safety and environment: none
29. probable production scale: yearly 500,000 t
30. current issues: The company prepared a pre-feasibility study with the Vietnamese steel company to export the intermediate product of $Fe_2O_3$ (possibly magnetite concentrates), but the GDMR didn't permit it due to the exploration agreement. Therefore, the project is pending.
31. request to GDMR: The company asks the GDMR to permit to export the intermediate product.

## 15. Liberty Mining International

Interviewee: Richard Stanger (President) and Lim Sokharasmey (Manager)
Interviewer: K. Shingu, K. Kumagai, an official of DMR
Date: 14:30 to 16:00 in Oct. 21 (Tue.), 2008
Place: President's office in Liberty Mining

1. Liberty Mining International Pty (a subsidiary of Australian junior, Transol Corporation)
2. exploration
3. nationality: Australia
4. capital: A$ 5 million
5. holding concession: 7 (18 & 20 were attained in 2004, 52 in 2007 and 83, 84, 89, 90 in 2008)
6. as shown in Table
7. 20: Ban Lung → site (10h from Phnom Penh)
   84, 83 and 90: Phnom Penh → (2h) Kongpong Thom → (5h) Chhaeb → (0.5h by bike) site
   18 & 86: Ban Lung → (0.5h) site (7h from Phnom Penh)
   89: 1.5h by helicopter
   52: Phnom Penh → (7h) Oddar Mean Chey → (1h) site
8. Concessions area: 300$km^2$, 215$km^2$, 240$m^2$, 364$km^2$, 227$m^2$, 328$m^2$, 62$m^2$, 210$m^2$
9. type of license: MOU → exploration
10. current state of the concession: 20: air-bone, soil and rock sampling, trenching, auger drilling (6m deep), diamond drilling (150m deep). 83, 84 and 90: surface survey, sampling. 18 and 86: same as 20. 89: geological mapping. 52: satellite analyses, soil/soil sampling, trenching and auger drilling
11. target: 20: mainly gold and Cu, Zn and Pb as by products. 83, 84 and 90: Mn, Fe and Cu. 18 & 86: mainly gold and Cu and Zn as by products. 89: gold. 52: mainly gold with Cu
12. last production, sale & profit: none
13. mining & processing method: not studies yet
14. development depth: unknown
15. mining $ processing machines: not studied yet
16. total cost for last 3.5 years: A$ 5 million
17. organization: departments of geology and operation (transportation and office)
18. current employees: 30 (4 Australians and 26 Cambodians) and also 15 full-timers, 15 temporary workers. Additionally subcontracted with geographical exploration, drilling and clearance of UXBs and landmines with large variety of salaries
19. training system: they have special training for sampling and geological survey.
20. illegal miners: 20: more than 1,000 (10 guardians). 82: unknown (20 guardians). 52: more than 1,000. 18 & 86: more than 1,000.
21. last accident: none for 3.5 years
22. current environmental issue: none
23. special consideration to environment: avoiding cutting large trees for geological survey.
24. production schedule: within 3 to 5 years
25. current issues and request for GDMR: nothing special

## 16. Maxum Metals

Interviewee: Richard Stanger (President), Lim Sokharasmey (Manager)
Interviewer: K. Shingu, K. Kumagai, an official of DMR
Date: 14:30 to 16:00 in Oct. 21 (Tue.), 2008
Pace: President office in Liberty Mining

1. Maxum Metals Pty Ltd. (a subsidiary of Australian junior, Transol Corporation. Same as Liberty Mining)
2. exploration
3. nationality: Australia
4. capital: A$ 200,000
5. holding concession: 3 (attained in 2008)
6. same as Table
7. Phnom Penh → (10h) Mondulkiri → (1h) site
8. Concession area: 295km$^2$, 253km$^2$, 275m$^2$
9. type of license: MOU → exploration
10. current state of the concession: satellite images analysis and basic geological survey
11. target: bauxite
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machines: not studied yet
16. processing method: not studied yet
17. processing machine: not studied yet
18. last sale: none
19. last cost: A$ 200,000
20. last profit: none
21. organization: same stuff (geology and operation) as the Liberty Mining
22. current employee: 30 ( same as Liberty Mining)
23. average salary: large varieties
24. training system: same as Liberty Mining
25. illegal miners: none
26. last accident: none
27. current environmental issues: none
28. special consideration for environment: none special
29. production schedule: not studied yet
30. current issues: none except financial problems
31. request for GDMR: none special

## 17. OZ Minerals (former Oxiana)

Interviewee: Mick Sharry geological manager, Graham Moir transportation manager
Interviewer: K. Shingu, an official of DMR (Sam Sidara)
Date: 9:30 to 11:00 in Sep. 22 (Mon.), 2008
Place: Office in ZO Minerals

1. OZ Minerals Ltd.
2. exploration
3. nationality: Australia
4. capital: A$ 5,000, and OZ 80% and Shin Ha 20% for JV of OZ and Shin Ha
5. holding concession: 4
6. as shown in picture
7. Snuol City → site (4 to 12 h in the dry season because there is no road.)
8. concession area: 55$km^2$, 55$km^2$, 55$m^2$, 55$km^2$
9. type of license: MOU → exploration
10. current state of the concession: A, C and E: reconnaissance. B, D, E, F and G: none
11. target: mainly gold with Cu
12. last production: none
13. mining method: not studied yet
14. development depth: 15m to 20m beneath the surface
15. mining machine: not studied yet
16. processing method: not studied yet
17. processing machine: not studied yet
18. last sale: none
19. total cost for past 2.5 years: A$ 6 million
20. none
21. organization: geology, administration and transportation
22. employee: 36 (4 Australians, 26 Cambodians, a Indonesian, 4 Laotians, 2 Thais) additionally 25 fulltime employees at site, and 10 to 40 temporary employees.
23. monthly average salary: A$ 100 to 1,000(2 人) for Cambodian
24. training system: they have 2 to 3 days training system according to necessity.
25. illegal miner: none
26. last accidents: 1 man sick leave
27. current environmental issue: none
28. special consideration to safety and environment: they are taught in training.
29. production schedule: not studied yet
30. current issue: 1) no geological data, 2) bad access to the sites, 3) expensive for clearance of UXBs (more than A$ 100,000), 4) health problem (malaria in the rainy season), 5) easy thinking on mines
31. request for GDMR: they need some assistances for problem mentioned above. They need some investor's incentives. Exploration contract is not global standard. There id no security for concession tenure.

## 18. Ratanak Kenertec

Interviewee: Choi Jeoung Ho (Director), Kang In-Wook (Adviser), Choup Sokuntheara (Geological manager), Choi Go Ho (Engineer)
Interviewer: K. Shingu, an official of DOG (Choup Sokuntheare)
Date: 14:30 to 15:30 in Sep. 19 (Thu.), 2008
Place: President's office of Kenertec Resources

1. Ratanak Kenertec Resources Co., Ltd.
2. mineral exploration, mining, biomass, generator
3. nationality: Korea (85%) and Cambodia (15%)
4. capital: US$200,000
5. holding concession: 1 (2 different concessions)
6. Thmar District, Preah Vihear Province
7. Kampong Thom City → Phnum Deik → Rovieng Cheung
8. concession area: 34km$^2$
9. type of license: exploration and exploitation
10. current state of the concession: total length of drilling is 1,700m.
11. target: iron (70%Fe)
12. none
13. mining method: open pit
14. development depth: 40m to 50m beneath the surface
15. mining machine: none
16. processing method: not studied yet
17. processing machine: not studied yet
18. last sale: none
19. cost in the last year: IS$ 200,000
20. none
21. organization: exploration for iron mine
22. current employee: 20 ( Cambodians)
23. average monthly salary: US$ 100
24. training system: they have a 3 month training course.
25. illegal miners: none
26. last accident: none
27. current environmental issues: none
28. special consideration for safety: provision with protection equipment
29. production schedule: within 5 years
30. current issues: experienced mining engineers, workers, no road, many UXBs/landmines
31. request for GDMR: construction of roads, clearance of UXBs/landmines

## 19. Sinh Yi

Interviewee: H.E.Chea Thory Advisor (The team couldn't meet the key person of the company because he went to China.)
Interviewer: K. Shingu, Randy (interpreter)
Date: 15:30 to 16:30 in June 1 (Mon.) 2009
Place: A meeting room in Cambodia Tonle Sap International

1. Sinh Yi Co., Ltd.
2. exploration of gold ore
3. Cambodia, but currently under negotiation with the Cambodia Tonle Sap (China) on its transfer
4. capital: unknown
5. 1 concession
6. Tangyou area in Chung Plas commune, Keo Seima county, Mondlkiri province
7. Phom Penh → Kangpong Cham → Snoul → enter into the bad road 24km before Kratie
8. 56.53km$^2$
9. attained license of exploration in 2008 March
10. The site operation is possible during Dec. to Apr. No exploration activity yet owing to transfer negotiation with Cambodia Tonle Sap
11. ore reserve: unknown
12. last production: none
13. mining method: unknown
14. development depth: unknown
15. mining machines: unknown
16. processing method: unknown
17. processing machines: unknown
18. last sale: none
19. last cost: none
20. last profit: none
21. organization: unknown
22. No. of employees: 2 staff and 7 workers belonged to Cambodia Tonle Sap and 5 guards (province soldiers)
23. average salary: unknown
24. training system: unknown
25. illegal miners: max. 1,000 miners working around the concession in the dry season.
26. last accident: none
27. current environmental issues: none
28. consideration to safety and environment: none
29. probable production scale: unknown
30. current issue: the concession is partially overlapped with the agricultural concession of other company.
31. request to GDMR: they want GDMR to help to solve the above-mentioned problem.

## 20. Sino Sun

Interviewee: San A. Ourum deputy president, Zhang Yong local representative assistant
Interviewer: K. Shingu, Samphors (interpreter), an official of DOG
Date: 14:00 to 15:20 in Sep.18 (Thu.), 2008
Place: Reception room in Sino Sun

1. Sino Sun Mineral Resources Co., Ltd.
2. natural mineral resources, including gold, silver and copper in particular.
3. nationality: China (75%), Cambodia (25%)
4. capital: US$ 2million
5. holding concession: 1
6. Memot District, Kampong Cham Province
7. 0.5h from Kampong Cham City (3.5h from Phnom Penh)
8. concession area: 112km$^2$
9. type of license: After procedures was finished in 2007 July, they have license of exploitation.
10. current state of the concession: Development work has been in progress, but stopped in the rainy season.
11. ore reserve: 12 million tons with average grade of 15g/t Au
12. Production: They produced 30 to 50,000t during preparation work, and stored them.
13. mining method: 3 open pits and 2 underground mines (inclines drifts with rails to transport mined ore).
14. development depth: 65m to 200m beneath the surface
15. mining machines: bulldozers, dump trucks, hand drills for open pit, unknown for U/G
16. processing method: magnetic cyclone method (gravity separation?)
17. processing machines: They do not use mercury nor cyan. They will buy a crusher next year.
18. last sale: US$ 40 million in China
19. total cost for development: US$10million including the last year and this year
20. none
21. organization: Wei Changhui president, Sam A. Ourm deputy president, Yong D. Wethington (Korean American: former Sun Trading president)
22. current employee: 130 (110 Chinese, 20 Cambodians) Cambodian workers will be increased in the future if they have skills. 13 technicians. No subcontractor except preparation of FS.
23. average monthly salary: US$ 1,000 to 2,000 for Chinese, US$100 to 250 for Cambodians
24. training system: currently no, but they will prepare it.
25. illegal miners: none
26. last accident: none
27. current environmental issue: none
28. special consideration to safety: provision of protective equipment
29. production scale: 300t/day → 500t/day in the future
30. current issue: none
31. request for GDMR: none
32. others: no problem for site visiting

## 21. Sophorn Theary Peanich

Interviewee: Siek Sopheak, President
Interviewer: K. Shingu, Kong Bun Hak (interpreter)
Date: 9:30 to 10:15 in Oct. 27 (Mon.), 2008
Palace: JICA team office in GDMR

1. Sophorn Theary Peanich
2. rubber, exploration
3. nationality: Cambodia
4. capital: US$ 2 million
5. holding concession: 1
6. as shown in Table
7. access to the concession
8. Phnom Penh → (3.5h) Dam Daek → (1.5h) Svay Leu → site
9. concession area: 57km$^2$
10. type of license: the company has agreement with GDMR to have exploration right.
11. current state of the concession: They conducted 7 drilling holes (70m long) based on an Australian geologist. Currently, they stop operation owing to international conflict with Thailand for the World Heritage Issue.
12. target: gold, they found gold with grade of 13g/t by drilling.
13. last production: none
14. mining method: not studied yet
15. development depth: unknown
16. mining machine: not studied yet
17. processing method: not studied yet
18. processing machine: not studied yet
19. last sale: none
20. total past cost: A$200,000
21. last profit: none
22. organization of the company: 2 departments (rubber and mine)
23. current employees: 30 employees who work for rubber production. They have a subcontractor (5 workers) for drilling.
24. average salary for mining workers: unknown because they are subcontractors.
25. training system: unknown because they are subcontractors.
26. illegal miners: none
27. last accident: none
28. current environmental issues: none
29. special consideration to safety and environment: none
30. production schedule: they start production within this year if they grasp ore deposit.
31. current issue: they don't have no mining expert
32. request for GDMR: none

## 22. Sorn Vatanak

Interviewee: Lim Tang, President and his secretary
Interviewer: K. Shingu, Kong Bun Huk (interpreter)
Date: 14:30 to 15:30 in Nov. 7 (Fri.), 2008
Place: Office in Sorn Vatanak

1. Sorn Vatanak Co. Ltd.
2. exploration
3. nationality: Australia and Cambodia
4. capital: US$ 1 million (share: Australia 80% and Cambodia 20%)
5. holding concession: 1
6. as shown in Table
7. Phnom Penh → (5h) Siem Reap → (3h) Anlong Veang → (1h) site
8. concession area: 164km$^2$
9. type of license: They attained exploration directly after agreement in June, 2008.
10. current state of the concession: There is no exploration activities yet. 2 Australian geologists will come to Cambodia in the dry season. Currently, they prepare it. Their budgey for exploration is US$ 2 million for 2 years.
11. targets: Fe and Pb according to analyses of samples.
12. last sale: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machine: not studied yet
16. processing method: not studied yet
17. processing machine: not studied yet
18. last sale: none
19. past cost: none
20. last profit: none
21. organization: none except a president and a secretary. They employ 5 villagers for mowing grass. If they found some potential after first exploration, they make an organization.
22. employee: 2 (president and secretary)
23. average wage: US$10/ day for mowing grass
24. training system: none
25. illegal miner: none
26. last accident: none
27. current environmental issue: none
28. special consideration to safety and environment: none
29. production schedule: they determine to continue exploration or not within 2 years.
30. current issue: none
31. request for GDMR: none

## 23. Southern Gold (Cambodia)

Interviewee: Brendan Rasmussen president
Interviewer: K. Shingu, an official of DMR (Chhuon Sambo)
Date: 14:30 to 16:15 in Sep. 22 (Mon.月), 2008
Place: president's office in Southern Gold (Cambodia)

1. Southern Gold (Cambodia) Ltd.
2. mineral exploration and exploitation
3. nationality: Australia (100%), but 3 concessions are supported financially by JOGMEC (Japanese governmental organization).
4. capital: 4 million Cambodian Riel (US$ 1 million)
5. holding concession: 7
6. location of concessions: 2 (in Mondulkiri), 4 (in Kratie) and 1 (in Rottanakiri)
7. access to the concession: 4: 45 minutes to 4 hours from Snoul, 3: 1 to 8 hours from Kratie
8. total area: 1,638km$^2$
9. type of license: 4 licenses for exploration, 3 licenses for exploration and exploitation
10. current state of the concessions: under exploration, budget for 1$^{st}$ year: US$ 2.3 million, 2$^{nd}$ year: US$ 2.8 million. content : surface survey → trenching → drilling
11. target: Au and nonferrous metals
12. production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machines: not studied yet
16. processing method: not studied yet
17. processing machines: not studied yet
18. last sale: none
19. past cost for exploration: US$ 2.284 million for 1$^{st}$ year and US$ 2.8 million for 2$^{nd}$ year
20. profit: none
21. organization: 2 departments (exploration and administration)
22. employees: (exploration) 2 Australians, 2 Filipinos, 1 English and 1 Canadian (administration) 1 Australian and 9 Cambodians
    temporary employees 27 to 30 geological assistants (in the dry season), 40 employees for this year
23. average salary: US$ 200 to 3,500 for Cambodians, US$ 5 to 15/d for temporary employees
24. training system: first aid training for local staff, basic exploration training for temporary employees
25. illegal miners: There are 10 miners in the concessions. They are allowed to exploit without permission fees.
26. last accident: 1 accident 1 year ago
27. current environmental issue: none
28. special consideration to safety and environment; (safety) All workers are insured. They are provided by safety tools according to necessity. They use helicopter for emergency. (environment) They use rails when possible. They don't cut large trees. They move bulldozers lifting bladders.
29. production schedule: within 5 to 10 years.
30. current issues: 1) potential danger of UXBs and landmines, 2) no standard price table for foreigners, 3) no mining engineers, experienced workers, qualified persons, trading staff, and low rate of literacy in temporary employees, 4) no road to the concession, 5) no drilling subcontractors, 6) it needs mush time to explain the operation to central, provincial, district, commune and villages, 7) no mutual coordination between MIME, MOE, MAFF and Custom, 8) it takes much time to clear custom, 9) complicate

procedures for concession application, 10) not clear in holding period of the concession, 11) limited cost for tax, 12) no exact procedures for license of exploration and exploitation from MOU, 13) shortage of mining experience in MIME staff who support minister, management and exploration companies, and 14) overlapped mineral concession with other concessions.

31. request for GDMR: They should realize that exploration is a driver of mining activities.
32. recommend: The company hope GDMR to study examples of other developing countries which succeeded in promoting mining.

## 24. Southern Mining

Interviewee: Tran Van Thanh director, Ouk Hoeun Pisey director and other 3 persons
Interviewer: K. Shingu, Kong Bun Huk (interpreter), an official of GMRD
Date: 14:30 to 16:00 in Oct. 28 (Tue.), 2008
Place: Reception office in Southern Mining

1. Southern Mining Co.
2. exploration
3. nationality: Vietnam and Cambodia
4. capital: US$ 4 million (share V: 72.8％ and C: 27.2%), A Vietnamese mother company has a mine which produces annually 200,000t with 40%Cr in Vietnam.
5. holding concession: 1
6. as shown in Table
7. Phnom Penh → (2h) Pursat → (2.5h) site
8. area: 100km$^2$
9. type of license: MOU → exploration (2008 Feb.)
10. current state of the concession: The Cambodian company attained exploration license in 2006, and they made JV with the Vietnamese company in 2007. They started the surface survey and sampling from this year. They didn't receive analyses results of samples. Exploration work will be conducted in the dry season only (Nov. to June).
11. target: chromite (only one Cr mine in Cambodia).
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machine: not studied yet
16. processing method: not studied yet
17. processing machine: not studied yet
18. last sale: none
19. past cost: none
20. past profit: none
21. organization: 4 departments (administration, accounting & finance, engineering and mechanic) under 3 directors.
22. employees: 13 (10 Vietnamese, 3 Cambodians) and 17 Vietnamese subcontractors for surface survey
23. average salary: US$500 for Vietnamese, US$200 for Cambodians
24. training system: they don't need training, because they employ Vietnamese subcontractors.
25. illegal miners: none
26. last accident: none
27. current environmental issues: none
28. special consideration to safety and environment: none
29. production schedule: They intend to start produce in 2009 Dec.
30. current issue: finance, but they don't have debt.
31. request for GDMR: slow procedures for office routine.

## 25. Steung Treng Mineral

Interviewee: Vu Minth Thanh, President and an interpreter
Interviewer: K. Shingu, Samphors (interpreter), an official of DMRD (Sobonrithy)
Date: 9:30 to 11:00 in Oct. 23 (Thu.), 2008
Place: President's office in Steung Treng Mineral

1. Steung Treng Mineral Joint Venture Co. Ltd. (JV of Vietnamese coal company (Vinacomin): 70% and 2 Cambodian companies: 30%)
2. exploration: (they intend to exploit and process in the future)
3. nationality: Vietnam
4. capital: US$ 5 million
5. holding concessions: 2 (in 3 locations)
6. code 618：Anlong Chrey, Thalaborivatt District, Stung.Treng Province
   code 619：Anlong Sei, Thalaborivatt District, Stung Treng Province
7. Phnom Penh → (2h) Kanpoing Cham → (3h) Kratie → (1.5h) Stung Treng → (0.5h) by Boat → (5h) by bike to the site
8. area: 90km$^2$ plus 42km$^2$ (619), and 18km$^2$ (618)
9. type of concession: MOU → exploration
10. current state of the concession: 100 trenches (5-7m long, 0.8-1.0m wide, 6-8m deep) and they will buy 10 to 15 drilling machines to start drilling in 1 month later.
11. target: Fe
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machine: they use easy hand tools for trenching.
16. processing method: not studied yet
17. processing machine: not studied yet
18. last sale: none
19. last production cost: none
20. last profit: none
21. organization: 5 Vietnamese directors, and 3 departments (administration, finance and engineering) under them.
22. current employees: 19 (13 Vietnamese and 6 Cambodians), and 30 to 300 Vietnamese workers in an exploration subcontractor beneath the engineering department
23. average monthly salary: US$ 120 for Cambodians
24. training system: They instruct office and safety regulations. They give some instruction for exploration employees, but Vietnamese are experienced workers.
25. illegal miners: none
26. last accident: none
27. current environmental issues: none
28. special consideration to safety: they adopt Vietnamese safety regulation for Vietnamese workers.
29. production schedule: it depends on exploration results, and they will comply with the Cambodian permission.
30. current issue: none
31. request to GDMR: slow procedures such as changing company name

## 26. Summer Gold

Interviewee: Jonathan Remta, President, and Chea Chenda, Secretary
Interviewer: K.Shingu, Kong Bun Huk (interpreter)
Date: 14:30 to 15:30 in Nov. 4 (Tue.), 2008
Place: President's office in Summer Gold

1. Summer Gold Investment Private Co.
2. exploration for gold and nonferrous metals
3. nationality: Australia
4. capital: US$ 1 million
5. holding concession: 2
6. location: one as shown in Table, and another is located inKang Rolang, Bor Koe District, Mondulkiri province
7. access: Phnom Penh → (7h) Ou Pont Noan → (1.5h) Ban Lung → (1.5h) site
   Phnom Penh → (5h) Kratie → (2h) site
8. area: 133km$^2$
9. type of license: MOU → exploration (Nov. 2006), another exploration license was attained in Mar. 2008
10. current state of the concession: one: rock and soil sampling, 25 trenches (1,500m) and physical exploration will be done in end of 2008. another: surface survey will be done from end of 2008, and in next year trenching and drilling will be done.
11. target: gold (soil: 0.1-0.7g/t and rock: 9g/t to 38g/t)
12. last production: none
13. mining (processing) method & machine : not studied yet
14. development depth: unknown
15. last sale: none
16. past cost: no data
17. last profit: none
18. organization: 2 departments (administration and geology) under 2 directors. Dep. of Geology employs 2 geologists, 2 mining engineers and 12 to 14 temporary workers, as well as an Australian consultant.
19. current employees: 9 full-timers (4 Australians) and 12 to 14 temporary workers
20. average monthly salary: US$150 to 1,200 for Cambodians (more expensive in dry season).
21. training system: They have a 3-month training course (for GPS, PC, sampling, mapping, trenching, gridlines).
22. illegal miners: About 250 miners used to exploit and process ore with cyanidation and mercury before attaining license. Currently number decreased to 80 to 120, operating without dangerous materials. Another: 10 to 20 miners in the rainy season, but it may increase to 50 miners in the dry season.
23. last accident: none
24. current environmental issues: none
25. special consideration to environment: none
26. production schedule: one: within 2 years, another: within 3 to 4 years.
27. current issues: currently none, but they had problem of qualified workers.
28. request to GDMR: late procedures in agreement and license. Corruptions are sometimes are demanded. There are no qualified workers in Cambodia. There are sometimes misunderstands caused by difference of culture and language.

## 27. Sun International Investment

Interviewee: Zhang Ling Feng president and interpreter (Chinese to Cambodian)
Interviewer: K. Shingu, Randy (Cambodian to English)
Date: 15:00 to 17:00 in May 21 (Thu.) 2009
Place: A meeting room in Sun International Investment

1. Sun International Investment Co., Ltd.
2. gold exploration
3. China
4. US$ 2 million
5. 3 concessions (A, B and C)
6. Prek Kaeng and Antrang areas, Pechtr county, Mondulkiri province
7. Phom Penh → Kratie (5h) → site by no road (8h, but full day when lost way in the dry season, 2 to 3 days in the rainy season)
8. areas: 146km$^2$(A), 58.5km$^2$(B), 11km$^2$(C)
9. attained exploration license in 2008 Feb.
10. A: excavated 1 exploration well (1.2mφ, 6m deep) and discovered 1 vein with of less than 2g/t, B: excavated 32 wells (1.2-1.5mφ, max. depth 12m), discovered 3 veins with 1.5 to 50 g/t and analyzed 58 samples in China, C: not explored yet. Exploration work implementing during Jan. to Mar.
11. ore reserve: unknown
12. last production: none
13. mining method: unknown
14. development depth: less than 12m in A and 6m in B from the surface due to ground water.
15. mining machine: unknown
16. processing method: unknown
17. processing machines: unknown
18. last sale: none
19. last cost: none
20. last profit: none
21. organization: president, deputy president, accounting and administration mangers in Phnom Penh, and 6 Chinese geologists (stayed for 2 weeks) and 50 Chinese workers in exploration period (Jan to Mar.).
22. No. of employees: 4 staff (all the year) and max. 60 people in the exploration period.
23. average salary: US$ 500 to 800 for Chinese geologists
24. training system for new comers: none
25. illegal miners: some illegal miners are working all the year with gun around the concession.
26. last accident: none
27. current environmental issues: none
28. consideration to safety and environment: none
29. probable production scale: unknown
30. current issues: a) Chinese geologists' salary is very high, but they are old. b) there is no road to transport machines and materials, c) procedures to import machines are complicated and take much time. d) procedures to send samples to China are complicated.
31. request to GDMR: none especially

## 28. Titan Mineral Group

Interviewee: Khoun Phala Representative
Interviewer: K. Shingu, Randy (interpreter)
Date: 17:00 to 17:30 in June 3 (Wed.) 2009
Place: A meeting room in Cambo Cana Kiri Development

1. Titan Mineral Group Co., Ltd.
2. exploration of iron and copper ore
3. Cambodia
4. US$ 12,500
5. 1 concession
6. Anlung Phe area, Thalabarivat county, Stung Treng province
7. Phom Penh → Stung Treng(8h by Route 47) → Anlung Chrey(1h by provincial road) → 2h by motorbike
8. 204km$^2$
9. attained exploration license in 2008 August
10. Site operation is possible during Jan. to May. Contracted with 2 Vietnamese geologists who visit the site 3 times a year and stay 10 days per visit. They completed geological survey about 20% of the concession. Currently excavated 11 trenches (2mL×1mW×1mD).
11. ore reserve: unknown
12. last production: none
13. mining method: unknown
14. development depth: unknown
15. mining machines: unknown
16. processing method: unknown
17. processing machines: unknown
18. last sale: none
19. last cost: none
20. last profit: none
21. organization: president, deputy president and 8 staff for administration, accounting, engineering, advisors, drivers. And also 12 employees in the site.
22. current no. of employees: 20
23. average monthly salary of employees: US$ 600 for Vietnamese geologists, US$250 for Cambodians in Phnom Penh and US$100 for Cambodians in the site.
24. training system for freshmen: none
25. illegal miners: none
26. last accident: none
27. current environmental issues: none
28. consideration to safety and environment: none
29. production scale: unknown
30. current issues: malaria (so far 4 patients)
31. request to GDMR: none

## 29. Transol Mining

Interviewee: Richard Stanger, President, and Lim Sokharasmey, Operation manager
Interviewer: K.Shingu, K. Kumagai, an official of DMR
Data: 14:30 to 16:00 in Oct. 21 (Tue.), 2008
Place: president's office in Liberty Mining

1. Transol Mining and Exploration Co. Pty Ltd. (a 100% subsidiary of Australian junior, Transol Corporation, and it's a same company as Liberty Mining)
2. exploration
3. nationality: Australia
4. capital: A$ 200,000
5. holding concession: 2 (66 was attained in 2006, and 86 was attained in 2008.)
6. as shown in Table
7. Phnom Penh → (7h) Ban Lung → (3h) site
8. area: 208km$^2$, 247km$^2$
9. type of license: MOU → exploration
10. current state of the concession: 66: airborne, IP exploration, sampling, geological mapping,
    85: geological mapping, geological survey
11. target: gold
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machine: not studied yet
16. processing method: not studied yet
17. processing machine: not studied yet
18. last sale: none
19. past cost: A$ 200,000
20. last profit: none
21. organization: 2 department (geology and operation) with same staff as Liberty Mining.
22. current employee: 30 (4 Australians and 26 Cambodians). They employ 15 full-timer, and 15 temporary workers in the site. Also, they employ subcontractors for physical exploration, drilling and clearing UXBs which are same as Liberty Mining.
23. average salary: large deviation
24. training system: training for sampling and basic geological survey
25. illegal miner: none
26. last accident: none
27. current environmental issue: none
28. special environmental consideration: no cutting large trees during the geological survey.
29. production schedule: not studied yet
30. current issue: no problem except financial issues
31. request for GDMR: none

## 30. TSSM Group

Interviewee: Dach Chani Representative
Interviewer: K. Shingu, Randy (interpreter)
Date: 16:00 to 17:00 in June 3 (Wed.) 2009
Place: A meeting room in Cambo Cana Kiri Development

1. TSSM Group Co., Ltd.
2. exploration of lead ore
3. Cambodia
4. US$ 5,000
5. 1 concession
6. Prek Kring and Antrong areas, Pechreada county, Mondulkiri province
7. Phnom Penh → Kampong Speu(1.5h by Route 47) → Phnom Bangkieb(1.5h by Route 44)
8. 252km$^2$
9. attained exploration license in 2008 August.
10. Operation is possible during Jan. to May. Constructed a exploration cottage in the site. Contracted 3 Vietnamese geologists who visit the site 5 times a year, and stay a week a visit. Completed geological survey about 15% of the concession. Currently excavated 8 trenches (2mL×1mW×1mD).
11. ore reserve: unknown
12. last production: none
13. mining method: unknown
14. development depth: unknown
15. mining machines: unknown
16. processing method: unknown
17. processing machines: unknown
18. last sale: none
19. last cost: none
20. last profit: none
21. organization: president, deputy president and 8 staff for administration, accounting, engineering, advisors and drivers. And also 12 employees in the site.
22. total no. employees: 20
23. average monthly salary of employees: US$ 600 for Vietnamese geologists, US$ 250 for Cambodians in Phnom Penh and US$ 100 for Cambodians in the site
24. training system: none
25. illegal miners: none
26. last accident: none
27. current environmental issues: none
28. consideration to safety and environment: none
29. probable production scale: unknown
30. current issues: none
31. request to GDMR: none

**31. Xing Yuan Kanng Yeak**

Interviewee: Ungkungkea Deputy President
Interviewer: K. Shingu, Randy (interpreter)
Date: 9:00 to 10:30 in May 23 (Sat.) 2009
Place: JICA office in GDMR

1. Xing Yuan Kanng Yeak Co., Ltd.
2. exploration of gold ore
3. China
4. US$ 1.9 million
5. 1 concession
6. Ou Klea Khlok area, SamborOu Klea county, Kratie province
7. Phnom Penh → Kratie (5h) → vehicle road (1h) → bad road (1.5h by motorbike)
8. 28km$^2$
9. attained exploration license in 2008 August
10. Site operation is possible during Dec. to Apr. impossible to access to the site during May to Nov. Constructed 2 cottages for exploration, but not explored yet.
11. ore reserve: unknown
12. last production: none
13. mining method: unknown
14. development depth: unknown
15. mining machines: unknown
16. processing method: unknown
17. processing machines: unknown
18. last sale: none
19. last cost: none
20. last profit: none
21. organization: CEO, president, 2 deputy presidents, 4 supporting staff, driver and interpreter
22. current no. employees: 10 (7 Chinese and 3 Cambodians for deputy president, driver and interpreter)
23. average monthly salary of employee: US$ 300 to 500 for Chinese, US$ 50 to 150 for Cambodians
24. training system: by OJT
25. illegal miners: 90 illegal miners used to work around the concession before, but currently only 10 illegal miners remain after forced exclusion of the government.
26. last accident: none
27. current environmental issues: none. Illegal miners used to use toxic materials which damaged the environment in the past. However, there is no problem now.
28. consideration to safety and environment: none
29. probable production scale: unknown
30. current issues: a) the company must pass the ELC of the Green Island (Honk Kong), and they asked the expensive toll. Currently the company submitted application to construct the new road to the local government. b) there are still operating illegal miners.
31. request to GDMR: the company asked GDMR to solve the above-mentioned problems.

## 32. Zhongxin Industrial Investment

Interviewee: Guo Haifeng deputy president, an interpreter
Interviewer: K. Shingu, Samphors (interpreter), an official of DOG
Date: 14:30 to 15:45 in Oct. 22 (Wed.), 2008
Place: a meeting room in Zhongxin Industrial Investment

1. Zhongxin Industrial Investment (Camabodia) (a subsidiary of a Chinese mining company)
2. exploration
3. nationality: China (JV by 4 Chinese companies)
4. capital: US$ 10 million
5. holding concession: 1
6. as shown in Table
7. Phnom Penh → 260km (4h) Snoul → 120km (4h) Mondulkiri → 45km (8h by auto-bike) site
8. concession area: 20km$^2$
9. type of license: exploration
10. current state of the concession: 2 large shafts (180m deep with face of 2.5m x 2.5m) were driven, and a horizontal drift (500m) was driven to connect them.
11. target: gold (average grade: 5 to 7g/t, width of veins: 10 to 50cm )
12. last production: none
13. mining method: not studied yet
14. development depth: unknown
15. mining machine: they use blasting for shafts and drift, using small machines.
16. processing method: not studied yet
17. processing machine: not studied yet
18. last sale: none
19. past cost: no data
20. last profit: none
21. organization:
22. current employee: 40 (28 Chinese and 12 Cambodians)
23. average monthly salary: US$500 for Chinese and US$100 for Cambodians
24. training system: by OJT
25. illegal miner: currently none, but there used to be 4,000 miners before attaining license.
26. last accident: A Chinese worker fall down in the shaft and was sent to the a Chinese hospital.
27. current environmental issue: none
28. special consideration for safety: none, but they don't use dangerous chemical materials.
29. production schedule: more than 2 years
30. current issue: very hard to access to the site, and expensive fuel
31. request to GDMR: help to solve the current issue mentioned above.

# Appendix III-2 Principles of EITI

## The Principles of EITI

The EITI Principles, agreed at the Lancaster House Conference in June 2003, provide the cornerstone of the initiative. They are:

1. We share a belief that the prudent use of natural resource wealth should be an important engine for sustainable economic growth that contributes to sustainable development and poverty reduction, but if not managed properly, can create negative economic and social impacts.

2. We affirm that management of natural resource wealth for the benefit of a country's citizens is in the domain of sovereign governments to be exercised in the interests of their national development.

3. We recognise that the benefits of resource extraction occur as revenue streams over many years and can be highly price dependent.

4. We recognise that a public understanding of government revenues and expenditure over time could help public debate and inform choice of appropriate and realistic options for sustainable development.

5. We underline the importance of transparency by governments and companies in the extractive industries and the need to enhance public financial management and accountability.

6. We recognise that achievement of greater transparency must be set in the context of respect for contracts and laws.

7. We recognise the enhanced environment for domestic and foreign direct investment that financial transparency may bring.

8. We believe in the principle and practice of accountability by government to all citizens for the stewardship of revenue streams and public expenditure.

9. We are committed to encouraging high standards of transparency and accountability in public life, government operations and in business,

10. We believe that a broadly consistent and workable approach to the disclosure of payments and revenues is required, which is simple to undertake and to use.

11. We believe that payments' disclosure in a given country should involve all extractive industry companies operating in that country.

12. In seeking solutions, we believe that all stakeholders have important and relevant contributions to make – including governments and their agencies, extractive industry companies, service companies, multilateral organisations, financial organisations, investors, and non-governmental organisations.

# Appendix V-1

## Summary of Mineral Deposits/ Occurrences in Cambodia

**1- Metallic Minerals**

| Primary Minerals | Deposit Name | Deposit No. | UNIFC | Province | Longitude | Latitude |
|---|---|---|---|---|---|---|
| **1-1 Iron and Ferro-Alloy Metals - 26 deposits** | | | | | | |
| **Antimony (Sb)** | Sre Peang | D-002 | 334 | Pursat | E103 15 | N12 21 |
| **Chromium (Cr)** | Sre Peang | D-001 | 334 | Pursat | E103 14 | N12 22 |
| **Iron (Fe)** | Phnom Penh | D-019 | 334 | Battambang | E102 52 | N12 46 |
| | Tani | D-025 | 334 | Kampot | E104 40 | N10 44 |
| | Chhep-1 | D-027 | 334 | Preah Vihear | E105 23 | N13 33 |
| | Chhep-2 | D-028 | 334 | Preah Vihear | E105 22 | N13 47 |
| | Phnom Prolean | D-029 | 334 | Preah Vihear | E105 03 | N13 19 |
| | Koh Keo | D-030 | 334 | Preah Vihear | E105 11 | N13 28 |
| | Authmor Sreal | D-031 | 334 | Preah Vihear | E105 03 | N13 23 |
| | Phnom Kbol | D-032 | 334 | Preah Vihear | E105 14 | N13 35 |
| | Phnom Deck-1 | D-033 | 333 | Preah Vihear | E105 03 | N13 14 |
| | Phnom Deck-2 | D-034 | 334 | Preah Vihear | E105 03 | N13 19 |
| | Phnom Rumdek | D-020 | 334 | Odar Mean Chey | E103 50 | N14 05 |
| | Phnom Kbal Stung | D-021 | 334 | Siem Reap | E104 19 | N13 35 |
| | Phnom Pours | D-116 | 334 | Siem Reap | E104 36 | N13 30 |
| | Stung Treng | D-022 | 334 | Stung Treng | E105 54 | N13 31 |
| | Anlong Chey | D-023 | 334 | Stung Treng | E105 40 | N13 38 |
| | Sam Ang | D-024 | 334 | Stung Treng | E105 53 | N13 38 |
| | Chrang | D-026 | 334 | Stung Treng | E105 49 | N13 43 |
| **Manganese (Mn)** | Chhep-1 | D-035 | 333 | Preah Vihear | E105 21 | N13 46 |
| | Chhep-2 | D-036 | 334 | Preah Vihear | E105 28 | N13 47 |
| | Chhep-3 | D-037 | 334 | Preah Vihear | E105 22 | N13 45 |
| **Molybdenum (Mo)** | Phnom Basset | D-038 | 334 | Kandal | E104 45 | N11 41 |
| | Phnom Thong | D-039 | 334 | Preah Vihear | E105 00 | N13 20 |
| | Phnom Den | D-040 | 334 | Takeo | E104 53 | N10 36 |
| **Tungsten (W)** | Khnong Ay | D-005 | 334 | Kompong Speu | E104 06 | N11 35 |
| **1-2 Base Metals- 16 deposits** | | | | | | |
| **Bauxite (Al)** | Battambang | D-052 | 333 | Battambang | E103 02 | N13 04 |
| | Haut Chhlong | D-053 | 334 | Mondulkiri | E107 12 | N12 23 |
| **Copper (Cu)** | Kroch Chhmar | D-047 | 334 | Kratie | E105 46 | N12 31 |
| | Phnom Sekahom | D-042 | 334 | Preah Vihear | E105 22 | N13 44 |
| | Phnom Pel | D-046 | 334 | Preah Vihear | E104 42 | N13 26 |
| | Phnom Ke | D-050 | 334 | Preah Vihear | E105 10 | N13 20 |
| | Lomphat | D-048 | 334 | Rattanakiri | E106 58 | N13 34 |
| | Chamkar Keu | D-045 | 334 | Stung Treng | E105 49 | N13 32 |
| | Saom | 138 | 334 | Takeo | E104 50 | N10 33 |
| **Cooper-Lead-Zinc** | Sam Rong | D-003 | 334 | Kompong Speu | E103 55 | N11 50 |
| | Khnong Ay | D-049 | 334 | Kompong Speu | E104 05 | N11 30 |
| | O Chhung | D-043 | 334 | Mondulkiri | E106 36 | N12 42 |
| | Phum Pring | D-044 | 334 | Preah Vihear | E105 04 | N13 24 |
| | Ban Chai | D-041 | 334 | Rattanakiri | E107 15 | N14 09 |
| **Tin (Sn)** | Khnong Ay | D-004 | 334 | Kompong Speu | E104 07 | N11 33 |
| | Angkor Borei | D-051 | 334 | Kompong Speu | E14 58 | N10 57 |

# Appendix V-1

| Primary Minerals | Deposit Name | Deposit No. | UNIFC | Province | Longitude | Latitude |
|---|---|---|---|---|---|---|
| **1-3 Precious Metals 24 deposits** | | | | | | |
| **Native Gold (Au)** | Pailin | D-058 | 334 | Battambang | E102 35 | N12 52 |
| | Phnom Thmar Meas | D-059 | 334 | Battambang | E102 21 | N13 18 |
| | Romchek (Memut) | D-055 | 333 | Kompong Cham | E106 11 | N11 54 |
| | Phnom Chi | D-057 | 334 | Kompong Thom | E105 39 | N12 45 |
| | Krava | D-111 | 334 | Kompong Thom | E105 16 | N12 28 |
| | Phnom Lok | D-117 | 334 | Kampot | E104 25 | N10 27 |
| | Kep | D-118 | 334 | Kampot | E104 23 | N10 28 |
| | Memung | D-056 | 334 | Mondulkiri | E106 55 | N12 35 |
| | PuChu Leu | D109 | 334 | Mondulkiri | E106 52 | N13 06 |
| | Phnom Deck | D-062 | 334 | Preah Vihear | E105 01 | N13 19 |
| | Rom Dey | D-063 | 333 | Preah Vihear | E104 59 | N13 21 |
| | Phnom Lung | D-064 | 334 | Preah Vihear | E104 57 | N13 22 |
| | Bokham | D-060 | 334 | Rattanakiri | E107 21 | N13 51 |
| | Oyadav | D-061 | 334 | Rattanakiri | E107 27.38 | N13 45.92 |
| | Oyadav Leu | D-107 | 334 | Rattanakiri | E107 27.25 | N13 45.90 |
| | Oyadav Krom | D-108 | 334 | Rattanakiri | E107 27.39 | N13 45.88 |
| | Banlung | D-110 | 334 | Rattanakiri | E106 58.93 | N13 37.85 |
| | O Kanchanh | D-132 | 334 | Rattanakiri | E107 01 | N13 37.65 |
| | Phnom Kambor | D-065 | 334 | Odar Mean Chey | E103 45 | N14 04 |
| | Bo Sup Trup | D-066 | 333 | Odar Mean Chey | E103 06 | N14 04 |
| | Phum Kampin | D-133 | 334 | Stung Treng | E106 45 | N14 05 |
| | Bu Chri | 135 | 334 | Mondulkiri | E107 11 | N12 54 |
| | Romtom | 136 | 334 | Preah Vihear | E104 59 | N13 20 |
| | Phnom Kong | 137 | 334 | Kampot | E104 40 | N10 46 |

# Appendix V-1

**2- Non Metallic Minerals**

| Primary Minerals | Deposit Name | Deposit No. | UNIFC | Province | Longitude | Latitude |
|---|---|---|---|---|---|---|
| **Industrial Minerals - 51 deposits** | | | | | | |
| **Clay minerals** | Prek Kak | D-102 | 334 | Kompong Cham | E105 32 | N12 15 |
| | Phnom Traok | D-100 | 334 | Kompong chhnang | E104 39 | N12 13 |
| | An Dong Srey | D-103 | 334 | Kompong chhnang | E104 39 | N12 09 |
| | Phnom Sar | D-099 | 111 | Kampot | E104 16 | N10 39 |
| | Phnom Krom | D-054 | 334 | Siem Reap | E103 49 | N13 17 |
| **Dolomite** | Chvang | D-089 | 334 | Stung Treng | E105 46 | N13 44 |
| **Fluorite** | Ba Phnom | D-086 | 334 | Prey Veng | E105 22 | N11 14 |
| **Graphite** | Koahsla | D-087 | 334 | Kampot | E104 15 | N10 54 |
| | Phnom Chak Khley | D-088 | 334 | Kampot | E104 30 | N10 40 |
| **Limestone** | Sisophon | D-134 | 334 | Banteay MeanChey | E102 50 | N13 45 |
| | Battambang | D-092 | 334 | Battambang | E103 00 | N13 00 |
| | Bos Dambang | D-090 | 111 | Kampot | E104 16 | N10 39 |
| | Phnom Loang | D-104 | 211 | Kampot | E104 32 | N10 40 |
| | Tuk Meas - East | D-113 | 211 | Kampot | E104 33 | N11 40 |
| | Tuk Meas - West | D-114 | 211 | Kampot | E104 31 | N11 38 |
| | Kompong Trach | D-115 | 211 | Kampot | E104 29 | N11 35 |
| | Stung Treng | D-091 | 334 | Stung Treng | E105 58 | N13 44 |
| **Phosphate minerals** | Phnom Toch | D-076 | 333 | Banteay MeanChey | E103 01 | N13 24 |
| | Ph. Thom-Prasat | D-077 | 333 | Banteay MeanChey | E103 01 | N13 28 |
| | Ph. Banteay Neang | D-078 | 333 | Banteay MeanChey | E103 01 | N13 30 |
| | Ph. Bak-ChungChaing | D-080 | 333 | Banteay MeanChey | E102 57 | N13 35 |
| | Phnom Tean | D-127 | 333 | Banteay MeanChey | E102 57 | N13 35 |
| | Phnom Kangva | D-128 | 333 | Banteay MeanChey | E102 57 | N13 38 |
| | Phnom Dong Preah | D-129 | 333 | Banteay MeanChey | E102 57 | N13 36 |
| | Phnom Sampeou | D-079 | 333 | Battambang | E103 02 | N13 04 |
| | Phnom Khong | D-081 | 334 | Battambang | E102 51 | N12 56 |
| | Phnom Krapeu | D-082 | 333 | Battambang | E103 05 | N13 01 |
| | Phnom Banan | D-083 | 333 | Battambang | E103 08 | N12 57 |
| | Phnom Kdaong | D-084 | 333 | Battambang | E103 06 | N13 01 |
| | Phnom Banteay | D-085 | 334 | Battambang | E102 59 | N13 03 |
| | Phnom Toch | D-124 | 333 | Battambang | E103 08 | N13 01 |
| | Phnom Takream | D-125 | 333 | Battambang | N103 03 | N13 04 |
| | Phnom Theapadey | D-126 | 333 | Battambang | E103 15 | N12 51 |
| | Phnom Totung | D-074 | 211 | Kampot | E104 32 | N10 41 |
| | Phnom Kanlang | D-075 | 332 | Kampot | E104 34 | N10 38 |
| | Phnom Cheam | D-073 | 334 | Kampong Speu | E103 54 | N11 41 |
| **Silica sands** | O Chrous | D-094 | 333 | Koh Kong | N/A | N/A |
| | Phum Sralau | D-095 | 333 | Koh Kong | E103 42 | N11 05 |
| | Tuk Sap | D-097 | 333 | Koh Kong | N/A | N/A |
| | Phum Nesath | D-098 | 333 | Koh Kong | E103 40 | N11 00 |
| | Taman-Peam Raing | D-105 | 211 | Koh Kong | E103 00 | N11 37 |
| | Keo Phos | D-106 | 211 | Koh Kong | E103 43 | N10 51 |
| | Prek Krapeu | D-122 | 333 | Koh Kong | E103 42 | N10 56 |
| | Stoeung Thma | D-130 | 333 | Koh Kong | E103 43 | N10 53 |
| | Thma Rong | D-131 | 333 | Koh Kong | N/A | N/A |
| | O Chheteal-O Tres | D-093 | 333 | Kompong Som | E103 37 | N10 32 |
| | Tumnop Rolok | D-119 | 333 | Kompong Som | E103 39 | N10 44 |
| | Poy Rong Raing | D-120 | 333 | Kompong Som | E103 40 | N10 44 |
| | Aye San | D-121 | 333 | Kompong Som | E103 42 | N10 44 |
| | Tram Khnar | D-096 | 333 | Takeo | E104 45 | N11 17 |
| **Zirconia** | Bokeo | D-123 | 334 | Rattanakiri | E107 10 | N13 40 |

# Appendix V-1

| 3- Gemstones and Ornamental Stones | | | | | | |
|---|---|---|---|---|---|---|
| **Primary Minerals** | **Deposit Name** | **Deposit No.** | **UNIFC** | **Province** | **Longitude** | **Latitude** |
| **Gemstones and Ornamental Stones 14 deposits** | | | | | | |
| | **1- Sapphire-ruby-zircon-spinel associations** | | | | | |
| **Ruby** | Samlot | D-017 | 111 | Battambang | E102 41 | N12 40 |
| **Supphire** | Chamnop | D-006 | 333 | Koh Kong | E103 51 | N11 50 |
| | Phnom Thmei | D-014 | 334 | Preah Vihear | E105 15 | N13 39 |
| **Sapphire, Ruby** | Pailin | D-013 | 111 | Battambang | E102 36 | N12 50 |
| **Zircon gems** | Phnom Chhnoun | D-015 | 334 | Preah Vihear | E105 15 | N13 26 |
| | Bokeo | D-016 | 334 | Rattanakiri | E107 10 | N13 40 |
| | **2- Quartz-amethyst-associations** | | | | | |
| **Amethyst** | Phnom Chi | D-018 | 334 | Kompong Thom | E105 39 | N12 54 |
| | Khone | D-012 | 334 | Stung Treng | E105 57 | N13 56 |
| | **3- Ornamental stones** | | | | | |
| **Jet** | Kompong Smach | D-010 | 334 | Koh Kong | E102 58 | N11 41 |
| | Don Ton | D-011 | 334 | Preah Vihear | E105 17 | N14 02 |
| **Marble** | Phnom Cheam | D-007 | 334 | Kompong Speu | E103 54 | N11 41 |
| | Stung Kleach | D-008 | 334 | Kompong Speu | E104 05 | N11 36 |
| | Chvang-2 site | D-009 | 334 | Stung Treng | E105 45 | N13 43 |
| **Pagodite** | Trasey | D-101 | 334 | Pursat | E103 45 | N12 00 |

# Appendix V-1

## 4- Solid Fuel Minerals

| Primary Minerals | Deposit Name | Deposit No. | UNIFC | Province | Longitude | Latitude |
|---|---|---|---|---|---|---|
| **Solid Fuel Minerals- 6 deposits** | | | | | | |
| **Coal** | Phum Talat | D-067 | 333 | Stung Treng | E106 36 | N13 47 |
| | Voeune Nhung | D-068 | 334 | Stung Treng | E106 18 | N13 54 |
| **Lignite** | Kompong Som | D-069 | 334 | Kompong Som | E103 34 | N10 34 |
| | Tuk Meas | D-070 | 334 | Kampot | E104 30 | N10 40 |
| | Phnom Puck | D-071 | 334 | Kratie | E106 16 | N12 12 |
| | Rovieng | D-072 | 334 | Preah Vihear | E105 10 | N13 20 |

**The United Nations International Framework Classification Reserves/ Resources (UNIFC):**

| | |
|---|---|
| (111) Proved Mineral Reserves | 4 deposits |
| (211) Feasibility Mineral Resource | 7 deposits |
| (332) Indicated Mineral Resource | 1 deposits |
| (333) Inferred Mineral Resource | 52 deposits |
| (334) Reconnaissance Mineral Resources | 69 deposits |

## 5- Construction Materials

| Primary Minerals | Deposit Name | Deposit No. | UNIFC | Province | Longitude | Latitude |
|---|---|---|---|---|---|---|
| | **a) Crushed stone** | | | | | |
| **Basalt** | | Kompong Cham and Rattanakiri | | | | |
| **Granites** | | Kandal, Kompong Chhnang, Prey Veng and Takeo | | | | |
| **Jaspers** | Tram Khnar | Takeo | | | | |
| **Laterite** | Kirivong | Takeo | | | | |
| **Limestone (Used as ballast)** | | Banteay MeanChey, Battambong and Kampot | | | | |
| **Quartzite** | Kep | Kampot | | | | |
| **Rhyolites** | Choeung Chhnok | Kompong Cham | | | | |
| **Sandstone** | | Koh Kong and Kompong Speu | | | | |
| | **b) Sand, gravel and clay for brick and tile manufacturing** | | | | | |
| **Gravel** | | Kompong Cham, Kratie and Stung Treng | | | | |
| **Sand** | | Kandal, Kompong Chhnang | | | | |
| **Clay for brick and tile manufacturing** | | Everywhere in Cambodia | | | | |

# Appendix V-2
# List of ASTER Images of Cambodia

| No | Granul ID | Upper Left | | Upper Right | | Lower Right | | Lower LeftL | | Remark (band) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | |
| 1 | ASTL1A 0701100330530701130197 | 13.30110 | 105.38424 | 13.21933 | 105.96281 | 12.66119 | 105.84147 | 12.74287 | 105.26417 | V,S,T and DEM |
| 2 | ASTL1A 0701100330440701130196 | 13.83604 | 105.49953 | 13.75418 | 106.07938 | 13.19608 | 105.95775 | 13.27784 | 105.37923 | V,S,T and DEM |
| 3 | ASTL1A 0701100330360701130195 | 14.37096 | 105.61506 | 14.28900 | 106.19626 | 13.73092 | 106.07431 | 13.81277 | 105.49451 | V,S,T and DEM |
| 4 | ASTL1A 0803170330510803200068 | 12.61028 | 106.36313 | 12.52872 | 106.92479 | 11.97080 | 106.80183 | 12.05218 | 106.24132 | V,S,T and DEM |
| 5 | ASTL1A 0803170330420803200067 | 13.14521 | 106.48023 | 13.06349 | 107.04305 | 12.50561 | 106.91969 | 12.58715 | 106.35808 | V,S,T and DEM |
| 6 | ASTL1A 0803170330330803200066 | 13.67997 | 106.59761 | 13.59808 | 107.16165 | 13.04024 | 107.03790 | 13.12195 | 106.47514 | V,S,T and DEM |
| 7 | ASTL1A 0803170330240803200065 | 14.21468 | 106.71533 | 14.13260 | 107.28064 | 13.57483 | 107.15648 | 13.65671 | 106.59250 | V,S,T and DEM |
| 8 | ASTL1A 0803170330150803200064 | 14.74936 | 106.83341 | 14.66709 | 107.40003 | 14.10935 | 107.27545 | 14.19143 | 106.71021 | V,S,T and DEM |
| 9 | ASTL1A 0802070324590802110307 | 12.67000 | 107.49349 | 12.58898 | 108.05675 | 12.03088 | 107.93447 | 12.11176 | 107.37237 | V,S,T and DEM |
| 10 | ASTL1A 0802070324500802110306 | 13.20492 | 107.60984 | 13.12376 | 108.17427 | 12.56572 | 108.05165 | 12.64673 | 107.48844 | V,S,T and DEM |
| 11 | ASTL1A 0801290331110802010481 | 12.67148 | 105.93791 | 12.59047 | 106.50118 | 12.03238 | 106.37893 | 12.11326 | 105.81683 | V,S,T and DEM |
| 12 | ASTL1A 0801290331020802010480 | 13.20642 | 106.05426 | 13.12527 | 106.61871 | 12.56721 | 106.49608 | 12.64822 | 105.93286 | V,S,T and DEM |
| 13 | ASTL1A 0801290330530802010479 | 13.74119 | 106.17087 | 13.65989 | 106.73654 | 13.10188 | 106.61356 | 13.18303 | 106.04917 | V,S,T and DEM |
| 14 | ASTL1A 0801290330440802010478 | 14.27605 | 106.28781 | 14.19460 | 106.85477 | 13.63663 | 106.73141 | 13.71793 | 106.16579 | V,S,T and DEM |
| 15 | ASTL1A 0801290330360802010477 | 14.81087 | 106.40508 | 14.72925 | 106.97338 | 14.17134 | 106.84962 | 14.25279 | 106.28272 | V,S,T and DEM |
| 16 | ASTL1A 0701240343160701270073 | 13.79214 | 102.72249 | 13.71077 | 103.29356 | 13.15272 | 103.17121 | 13.23398 | 102.60145 | V,S,T and DEM |
| 17 | ASTL1A 0701240343070701270072 | 14.32704 | 102.83877 | 14.24553 | 103.41115 | 13.68751 | 103.28845 | 13.76888 | 102.71744 | V,S,T and DEM |
| 18 | ASTL1A 0701240342580701270071 | 14.86176 | 102.95531 | 14.78011 | 103.52905 | 14.22214 | 103.40600 | 14.30364 | 102.83368 | V,S,T and DEM |
| 19 | ASTL1A 0707120337270707160509 | 12.67567 | 104.36297 | 12.59469 | 104.92633 | 12.03661 | 104.80409 | 12.11745 | 104.24190 | V,S,T and DEM |
| 20 | ASTL1A 0707120337180707160508 | 13.21059 | 104.47927 | 13.12947 | 105.04381 | 12.57143 | 104.92123 | 12.65241 | 104.35792 | V,S,T and DEM |
| 21 | ASTL1A 0703220337360703260115 | 12.63178 | 104.66983 | 12.55030 | 105.23142 | 11.99234 | 105.10850 | 12.07365 | 104.54805 | V,S,T and DEM |
| 22 | ASTL1A 0703220337270703260114 | 13.16661 | 104.78683 | 13.08497 | 105.34959 | 12.52705 | 105.22629 | 12.60852 | 104.66474 | V,S,T and DEM |
| 23 | ASTL1A 0703220337180703260116 | 13.70141 | 104.90413 | 13.61959 | 105.46811 | 13.06171 | 105.34444 | 13.14335 | 104.78174 | V,S,T and DEM |
| 24 | ASTL1A 0703220337090703260112 | 14.23615 | 105.02180 | 14.15415 | 105.58704 | 13.59634 | 105.46294 | 13.67815 | 104.89902 | V,S,T and DEM |
| 25 | ASTL1A 0703220337010703260111 | 14.77085 | 105.13985 | 14.68866 | 105.70642 | 14.13090 | 105.58186 | 14.21290 | 105.01667 | V,S,T and DEM |
| 26 | ASTL1A 0702270331420703030356 | 11.60876 | 105.65621 | 11.52795 | 106.21731 | 10.96978 | 106.09562 | 11.05046 | 105.53558 | V,S,T and DEM |
| 27 | ASTL1A 0702270331330703030355 | 12.14375 | 105.77204 | 12.06283 | 106.33420 | 11.50469 | 106.21223 | 11.58549 | 105.65118 | V,S,T and DEM |
| 28 | ASTL1A 0403290337440404120772 | 10.98144 | 104.63498 | 10.90004 | 105.19390 | 10.34198 | 105.07173 | 10.42322 | 104.51379 | V,S,T and DEM |
| 29 | ASTL1A 0403290337350404120771 | 11.51638 | 104.75141 | 11.43481 | 105.31133 | 10.87679 | 105.18880 | 10.95818 | 104.62993 | V,S,T and DEM |
| 30 | ASTL1A 0403290337260404120770 | 12.05127 | 104.86814 | 11.96953 | 105.42910 | 11.41155 | 105.30621 | 11.49311 | 104.74634 | V,S,T and DEM |
| 31 | ASTL1A 0402170343480403060905 | 13.65953 | 103.64932 | 13.57674 | 104.21483 | 13.01901 | 104.09043 | 13.10159 | 103.52619 | V,S,T and DEM |
| 32 | ASTL1A 0402170343390403060904 | 14.19417 | 103.76770 | 14.11116 | 104.33448 | 13.55349 | 104.20963 | 13.63627 | 103.64418 | V,S,T and DEM |
| 33 | ASTL1A 0402170343300403060903 | 14.72875 | 103.88647 | 14.64551 | 104.45456 | 14.08792 | 104.32926 | 14.17091 | 103.76255 | V,S,T and DEM |
| 34 | ASTL1A 0401180332240403250026 | 11.13048 | 105.14190 | 11.04970 | 105.70696 | 10.49143 | 105.58613 | 10.57213 | 105.02209 | V,S,T and DEM |

# Appendix V-2
# List of ASTER Images of Cambodia

| No | Granul ID | Upper Left | | Upper Right | | Lower Right | | Lower LeftL | | Remark (band) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | |
| 35 | ASTL1A 0401180332150403250025 | 11.66553 | 105.25692 | 11.58466 | 105.82302 | 11.02643 | 105.70191 | 11.10720 | 105.13689 | V,S,T and DEM |
| 36 | ASTL1A 0311150331370311260897 | 12.54592 | 106.80802 | 12.46196 | 107.37611 | 11.90432 | 107.25173 | 11.98804 | 106.68479 | V,S,T and DEM |
| 37 | ASTL1A 0311150331280311260896 | 13.08051 | 106.92646 | 12.99632 | 107.49571 | 12.43872 | 107.37092 | 12.52267 | 106.80288 | V,S,T and DEM |
| 38 | ASTL1A 0311150331200311260895 | 13.61505 | 107.04529 | 13.53062 | 107.61575 | 12.97308 | 107.49050 | 13.05726 | 106.92130 | V,S,T and DEM |
| 39 | ASTL1A 0311150331110311260894 | 14.14954 | 107.16451 | 14.06486 | 107.73624 | 13.50738 | 107.61052 | 13.59181 | 107.04011 | V,S,T and DEM |
| 40 | ASTL1A 0302090326000303060290 | 12.72341 | 107.11721 | 12.64245 | 107.68583 | 12.08428 | 107.56430 | 12.16514 | 106.99687 | V,S,T and DEM |
| 41 | ASTL1A 0302090325510303060289 | 13.25838 | 107.23277 | 13.17730 | 107.80259 | 12.61918 | 107.68076 | 12.70015 | 107.11219 | V,S,T and DEM |
| 42 | ASTL1A 0302090325420303060288 | 13.79331 | 107.34859 | 13.71212 | 107.91966 | 13.15404 | 107.79750 | 13.23512 | 107.22774 | V,S,T and DEM |
| 43 | ASTL1A 0301290344420302130967 | 12.14052 | 102.70356 | 12.05967 | 103.26590 | 11.50157 | 103.14401 | 11.58229 | 102.58278 | V,S,T and DEM |
| 44 | ASTL1A 0301290344330302130966 | 12.67545 | 102.81958 | 12.59446 | 103.38304 | 12.03641 | 103.26082 | 12.11726 | 102.69853 | V,S,T and DEM |
| 45 | ASTL1A 0301290344240302130965 | 13.21034 | 102.93587 | 13.12921 | 103.50050 | 12.57120 | 103.37794 | 12.65218 | 102.81453 | V,S,T and DEM |
| 46 | ASTL1A 0301290344150302130964 | 13.74521 | 103.05245 | 13.66393 | 103.61831 | 13.10596 | 103.49539 | 13.18708 | 102.93080 | V,S,T and DEM |
| 47 | ASTL1A 0301290344070302130963 | 14.28001 | 103.16933 | 14.19859 | 103.73648 | 13.64067 | 103.61318 | 13.72195 | 103.04737 | V,S,T and DEM |
| 48 | ASTL1A 0301290343580302130962 | 14.81481 | 103.28654 | 14.73321 | 103.85504 | 14.17534 | 103.73134 | 14.25676 | 103.16424 | V,S,T and DEM |
| 49 | ASTL1A 0503070342340503120477 | 13.05876 | 103.98371 | 12.97466 | 104.55275 | 12.41701 | 104.42803 | 12.50088 | 103.86020 | V,S,T and DEM |
| 50 | ASTL1A 0503070342250503120476 | 13.59332 | 104.10246 | 13.50897 | 104.67270 | 12.95142 | 104.54754 | 13.03550 | 103.97856 | V,S,T and DEM |
| 51 | ASTL1A 0503070342160503120475 | 14.12783 | 104.22162 | 14.04324 | 104.79312 | 13.48574 | 104.66748 | 13.57007 | 104.09729 | V,S,T and DEM |
| 52 | ASTL1A 0503070342070503120474 | 14.66216 | 104.34116 | 14.57732 | 104.91399 | 14.01988 | 104.78785 | 14.10445 | 104.21640 | V,S,T and DEM |
| 53 | ASTL1A 0602060342280602090024 | 11.44988 | 103.66258 | 11.36632 | 104.22831 | 10.80859 | 104.10475 | 10.89192 | 103.54006 | V,S,T and DEM |
| 54 | ASTL1A 0602060342190602090023 | 11.98454 | 103.78031 | 11.90077 | 104.34708 | 11.34308 | 104.22315 | 11.42662 | 103.65747 | V,S,T and DEM |
| 55 | ASTL1A 0602060342100602090022 | 12.51928 | 103.89845 | 12.43530 | 104.46632 | 11.87767 | 104.34195 | 11.96143 | 103.77522 | V,S,T and DEM |
| 56 | ASTL1A 0602060342020602090021 | 13.05382 | 104.01689 | 12.96960 | 104.58592 | 12.41206 | 104.46113 | 12.49603 | 103.89330 | V,S,T and DEM |
| 57 | ASTL1A 0601140335270601190473 | 13.77374 | 104.39706 | 13.69222 | 104.96829 | 13.13426 | 104.84588 | 13.21565 | 104.27595 | V,S,T and DEM |
| 58 | ASTL1A 0601140335180601190472 | 14.30854 | 104.51340 | 14.22690 | 105.08594 | 13.66897 | 104.96318 | 13.75048 | 104.39201 | V,S,T and DEM |
| 59 | ASTL1A 0612250330570612290306 | 12.04085 | 106.48517 | 11.95845 | 107.04730 | 11.40063 | 106.92396 | 11.48283 | 106.36292 | V,S,T and DEM |
| 60 | ASTL1A 0612250330480612290305 | 12.57571 | 106.60269 | 12.49313 | 107.16591 | 11.93534 | 107.04218 | 12.01773 | 106.48010 | V,S,T and DEM |
| 61 | ASTL1A 0612250330390612290304 | 13.11040 | 106.72051 | 13.02762 | 107.28489 | 12.46988 | 107.16075 | 12.55246 | 106.59757 | V,S,T and DEM |
| 62 | ASTL1A 0612250330210612290302 | 14.17963 | 106.95723 | 14.09642 | 107.52409 | 13.53880 | 107.39907 | 13.62178 | 106.83353 | V,S,T and DEM |
| 63 | ASTL1A 0612250330130612290301 | 14.71417 | 107.07616 | 14.63074 | 107.64434 | 14.07319 | 107.51887 | 14.15638 | 106.95206 | V,S,T and DEM |
| 64 | ASTL1A 0611300336400612040107 | 12.57222 | 105.08171 | 12.48966 | 105.64465 | 11.93184 | 105.52089 | 12.01420 | 104.95909 | V,S,T and DEM |
| 65 | ASTL1A 0611300336310612040106 | 13.10694 | 105.19955 | 13.02419 | 105.76365 | 12.46641 | 105.63948 | 12.54897 | 105.07659 | V,S,T and DEM |
| 66 | ASTL1A 0611230330040611260575 | 14.13140 | 107.28789 | 14.04668 | 107.85923 | 13.48919 | 107.73342 | 13.57364 | 107.16340 | V,S,T and DEM |
| 67 | ASTL1A 0608100336250608130078 | 14.81194 | 104.85158 | 14.73029 | 105.42001 | 14.17243 | 105.29628 | 14.25389 | 104.72925 | V,S,T and DEM |
| 68 | ASTL1A 0412170342280412290364 | 12.76368 | 102.19671 | 12.68196 | 102.77410 | 12.12378 | 102.65301 | 12.20542 | 102.07684 | V,S,T and DEM |

# Appendix V-2
# List of ASTER Images of Cambodia

| No | Granul ID | Upper Left | | Upper Right | | Lower Right | | Lower LeftL | | Remark (band) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | |
| 69 | ASTL1A 0412170342200412290363 | 13.29862 | 102.31180 | 13.21683 | 102.89042 | 12.65869 | 102.76904 | 12.74040 | 102.19170 | V,S,T and DEM |
| 70 | ASTL1A 0412170342110412290362 | 13.83353 | 102.42715 | 13.75166 | 103.00705 | 13.19356 | 102.88535 | 13.27536 | 102.30679 | V,S,T and DEM |
| 71 | ASTL1A 0310280343420311120379 | 11.55172 | 102.96325 | 11.47046 | 103.52250 | 10.91240 | 103.40015 | 10.99351 | 102.84195 | V,S,T and DEM |
| 72 | ASTL1A 0310280343330311120378 | 12.08664 | 103.07978 | 12.00524 | 103.64008 | 11.44721 | 103.51739 | 11.52846 | 102.95819 | V,S,T and DEM |
| 73 | ASTL1A 0310280343240311120377 | 12.62139 | 103.19657 | 12.53982 | 103.75797 | 11.98185 | 103.63493 | 12.06325 | 103.07468 | V,S,T and DEM |
| 74 | ASTL1A 0310280343150311120376 | 13.15623 | 103.31370 | 13.07450 | 103.87626 | 12.51657 | 103.75284 | 12.59812 | 103.19149 | V,S,T and DEM |
| 75 | ASTL1A 0310280343060311120375 | 13.69103 | 103.43115 | 13.60912 | 103.99493 | 13.05124 | 103.87111 | 13.13297 | 103.30860 | V,S,T and DEM |
| 76 | ASTL1A 0310280342580311120374 | 14.22579 | 103.54894 | 14.14369 | 104.11398 | 13.58587 | 103.98976 | 13.66778 | 103.42603 | V,S,T and DEM |
| 77 | ASTL1A 0310280342490311120373 | 14.76038 | 103.66705 | 14.67809 | 104.23343 | 14.12031 | 104.10877 | 14.20240 | 103.54378 | V,S,T and DEM |
| 78 | ASTL1A 0503090330230503150769 | 12.71132 | 105.65761 | 12.63023 | 106.22625 | 12.07210 | 106.10461 | 12.15308 | 105.53716 | V,S,T and DEM |
| 79 | ASTL1A 0503090330140503150768 | 13.24627 | 105.77329 | 13.16507 | 106.34312 | 12.60697 | 106.22117 | 12.68806 | 105.65258 | V,S,T and DEM |
| 80 | ASTL1A 0503070343090503120481 | 10.91987 | 103.51232 | 10.83664 | 104.07707 | 10.27879 | 103.95405 | 10.36181 | 103.39028 | V,S,T and DEM |
| 81 | ASTL1A 0402170343570403060906 | 13.12484 | 103.53131 | 13.04226 | 104.09560 | 12.48448 | 103.97163 | 12.56686 | 103.40854 | V,S,T and DEM |
| 82 | ASTL1A 0301130344470301280545 | 10.96954 | 103.17219 | 10.88771 | 103.73221 | 10.32973 | 103.60979 | 10.41139 | 103.05075 | V,S,T and DEM |
| 83 | ASTL1A 0301130344380301280544 | 11.50439 | 103.28886 | 11.42239 | 103.84988 | 10.86445 | 103.72710 | 10.94628 | 103.16712 | V,S,T and DEM |
| 84 | ASTL1A 0301130344290301280543 | 12.03920 | 103.40584 | 11.95701 | 103.96790 | 11.39914 | 103.84475 | 11.48113 | 103.28378 | V,S,T and DEM |
| 85 | ASTL1A 0301130344200301280542 | 12.57412 | 103.52317 | 12.49174 | 104.08633 | 11.93389 | 103.96279 | 12.01608 | 103.40077 | V,S,T and DEM |
| 86 | ASTL1A 0702270331510703030357 | 11.07373 | 105.54060 | 10.99305 | 106.10068 | 10.43484 | 105.97929 | 10.51541 | 105.42021 | V,S,T and DEM |
| 87 | ASTL1A 0703220338030703260118 | 11.02707 | 104.32058 | 10.94606 | 104.87902 | 10.38796 | 104.75712 | 10.46883 | 104.19967 | V,S,T and DEM |
| 88 | ASTL1A 0803170331170803200071 | 11.00553 | 106.01371 | 10.92444 | 106.57221 | 10.36637 | 106.45026 | 10.44733 | 105.89274 | V,S,T and DEM |
| 89 | ASTL1A 0803170331080803200070 | 11.54056 | 106.12993 | 11.45933 | 106.68943 | 10.90131 | 106.56715 | 10.98240 | 106.00869 | V,S,T and DEM |
| 90 | ASTL1A 0803170331000803200069 | 12.07544 | 106.24639 | 11.99406 | 106.80694 | 11.43607 | 106.68432 | 11.51730 | 106.12487 | V,T and DEM |
| 91 | ASTL1A 0901220337590901250102 | 13.11623 | 105.13538 | 13.03358 | 105.69936 | 12.47575 | 105.57528 | 12.55819 | 105.01250 | V,T and DEM |
| 92 | ASTL1A 0901220337500901250101 | 13.65095 | 105.25349 | 13.56810 | 105.81868 | 13.01033 | 105.69418 | 13.09297 | 105.13025 | V,T and DEM |
| 93 | ASTL1A 0901220337410901250100 | 14.18551 | 105.37195 | 14.10243 | 105.93840 | 13.54472 | 105.81345 | 13.62756 | 105.24832 | V,T and DEM |
| 94 | ASTL1A 0901200350290901230095 | 12.48775 | 102.56807 | 12.40194 | 103.14389 | 11.84437 | 103.01892 | 11.92991 | 102.44425 | V,T and DEM |
| 95 | ASTL1A 0901200350200901230094 | 13.02217 | 102.68711 | 12.93611 | 103.26409 | 12.37857 | 103.13864 | 12.46437 | 102.56287 | V,T and DEM |
| 96 | ASTL1A 0901200350110901230093 | 13.55665 | 102.80660 | 13.47031 | 103.38479 | 12.91286 | 103.25885 | 12.99892 | 102.68193 | V,T and DEM |
| 97 | ASTL1A 0901150332130901180075 | 11.65070 | 105.36110 | 11.56981 | 105.92720 | 11.01153 | 105.80608 | 11.09232 | 105.24105 | V,T and DEM |
| 98 | ASTL1A 0901150332040901180074 | 12.18573 | 105.47636 | 12.10476 | 106.04355 | 11.54654 | 105.92215 | 11.62742 | 105.35609 | V,T and DEM |
| 99 | ASTL1A 0901150331470901180072 | 13.25565 | 105.70756 | 13.17446 | 106.27708 | 12.61630 | 106.15507 | 12.69739 | 105.58679 | V,T and DEM |
| 100 | ASTL1A 0901150331380901180071 | 13.79063 | 105.82355 | 13.70931 | 106.39432 | 13.15120 | 106.27199 | 13.23239 | 105.70252 | V,T and DEM |
| 101 | ASTL1A 0901150331290901180070 | 14.32545 | 105.93979 | 14.24400 | 106.51187 | 13.68592 | 106.38919 | 13.76723 | 105.81847 | V,T and DEM |
| 102 | ASTL1A 0901060338210901090765 | 11.55771 | 104.46658 | 11.47648 | 105.02572 | 10.91839 | 104.90338 | 10.99946 | 104.34528 | V,T and DEM |

# Appendix V-2
# List of ASTER Images of Cambodia

| No | Granul ID | Upper Left | | Upper Right | | Lower Right | | Lower LeftL | | Remark (band) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | |
| 103 | ASTL1A 0901060338120901090764 | 12.09265 | 104.58310 | 12.01127 | 105.14330 | 11.45322 | 105.02062 | 11.53444 | 104.46152 | V,T and DEM |
| 104 | ASTL1A 0901060337280901090759 | 14.76650 | 105.17033 | 14.68424 | 105.73661 | 14.12645 | 105.61197 | 14.20851 | 105.04707 | V,T and DEM |
| 105 | ASTL1A 0812140331510812170133 | 12.22953 | 105.16566 | 12.14794 | 105.74172 | 11.58970 | 105.62092 | 11.67122 | 105.04601 | V,T and DEM |
| 106 | ASTL1A 0812120344290812150066 | 10.88049 | 103.78117 | 10.79531 | 104.35409 | 10.23764 | 104.23037 | 10.32256 | 103.65843 | V,T and DEM |
| 107 | ASTL1A 0812120344200812150065 | 11.41513 | 103.89915 | 11.32973 | 104.47307 | 10.77207 | 104.34892 | 10.85723 | 103.77605 | V,T and DEM |
| 108 | ASTL1A 0812120344110812150064 | 11.94970 | 104.01750 | 11.86404 | 104.59246 | 11.30649 | 104.46788 | 11.39189 | 103.89401 | V,T and DEM |
| 109 | ASTL1A 0812120344020812150063 | 12.48425 | 104.13623 | 12.39833 | 104.71230 | 11.84080 | 104.58726 | 11.92645 | 104.01234 | V,T and DEM |

# Appendix V-3
# List of ALOS PALSAR Images of Cambodia

| No | Granul ID | Upper Left | | Upper Right | | Lower Right | | Lower Left | | Pololized | Resolusion |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | Lat. | Lon. | wave | (m) |
| 1 | ALPSRP123853370 | 12.66422 | 103.46861 | 12.54166 | 104.10078 | 12.02061 | 103.99559 | 12.14305 | 103.36468 | HH/HV | 12.5 |
| 2 | ALPSRP123853380 | 12.17021 | 103.37010 | 12.04737 | 104.00099 | 11.52636 | 103.89577 | 11.64910 | 103.26608 | HH/HV | 12.5 |
| 3 | ALPSRP123853390 | 11.67683 | 103.27162 | 11.55369 | 103.90130 | 11.03273 | 103.79603 | 11.15578 | 103.16751 | HH/HV | 12.5 |
| 4 | ALPSRP123853400 | 11.18008 | 103.17012 | 11.05666 | 103.79862 | 10.53574 | 103.69331 | 10.65910 | 103.06591 | HH/HV | 12.5 |
| 5 | ALPSRP123853410 | 10.67797 | 103.06968 | 10.55425 | 103.69704 | 10.03339 | 103.59166 | 10.15707 | 102.96536 | HH/HV | 12.5 |
| 6 | ALPSRP124583340 | 14.15718 | 102.15391 | 14.03568 | 102.78972 | 13.51488 | 102.68464 | 13.63635 | 102.05030 | HH/HV | 12.5 |
| 7 | ALPSRP124583350 | 13.66179 | 102.05536 | 13.54001 | 102.68971 | 13.01926 | 102.58464 | 13.14103 | 101.95170 | HH/HV | 12.5 |
| 8 | ALPSRP124583360 | 12.17021 | 103.37010 | 11.67683 | 103.27162 | 11.18008 | 103.17012 | 10.67797 | 103.06968 | HH/HV | 12.5 |
| 9 | ALPSRP124873330 | 14.65497 | 106.54676 | 14.53349 | 107.18425 | 14.01261 | 107.07920 | 14.13365 | 106.44305 | HH/HV | 12.5 |
| 10 | ALPSRP124873340 | 14.15641 | 106.44758 | 14.03464 | 107.08364 | 13.51375 | 106.97858 | 13.63511 | 106.34382 | HH/HV | 12.5 |
| 11 | ALPSRP124873350 | 13.65865 | 106.34851 | 13.53658 | 106.98319 | 13.01569 | 106.87812 | 13.13735 | 106.24468 | HH/HV | 12.5 |
| 12 | ALPSRP124873360 | 13.16363 | 106.24992 | 13.04127 | 106.88328 | 12.52037 | 106.77819 | 12.64235 | 106.14603 | HH/HV | 12.5 |
| 13 | ALPSRP124873370 | 12.66838 | 106.15122 | 12.54571 | 106.78330 | 12.02482 | 106.67818 | 12.14711 | 106.04724 | HH/HV | 12.5 |
| 14 | ALPSRP124873380 | 12.17261 | 106.05233 | 12.04965 | 106.68319 | 11.52876 | 106.57802 | 11.65137 | 105.94826 | HH/HV | 12.5 |
| 15 | ALPSRP124873390 | 14.65497 | 106.54676 | 14.15641 | 106.44758 | 13.65865 | 106.34851 | 13.16363 | 106.24992 | HH/HV | 12.5 |
| 16 | ALPSRP124873400 | 11.18005 | 105.85182 | 11.05649 | 106.48038 | 10.53560 | 106.37510 | 10.65885 | 105.74754 | HH/HV | 12.5 |
| 17 | ALPSRP126333370 | 12.66519 | 102.93671 | 12.54270 | 103.56873 | 12.02175 | 103.46357 | 12.14417 | 102.83281 | HH/HV | 12.5 |
| 18 | ALPSRP126333380 | 12.17310 | 102.83859 | 12.05033 | 103.46935 | 11.52943 | 103.36415 | 11.65215 | 102.73462 | HH/HV | 12.5 |
| 19 | ALPSRP126333390 | 11.69054 | 102.74234 | 11.56748 | 103.37189 | 11.04663 | 103.26665 | 11.16965 | 102.63828 | HH/HV | 12.5 |
| 20 | ALPSRP126333400 | 11.19260 | 102.64061 | 11.06925 | 103.26897 | 10.54846 | 103.16368 | 10.67179 | 102.53645 | HH/HV | 12.5 |
| 21 | ALPSRS140773300 | 17.70903 | 105.57477 | 17.65547 | 109.62455 | 13.60021 | 109.53421 | 13.64094 | 105.56349 | HH | 100 |
| 22 | ALPSRS140773350 | 15.22135 | 105.08074 | 15.18432 | 109.08090 | 11.12536 | 109.01417 | 11.15220 | 105.07942 | HH | 100 |
| 23 | ALPSRS141503300 | 17.69228 | 103.94556 | 17.67224 | 107.99895 | 13.60942 | 107.94028 | 13.62466 | 103.96622 | HH | 100 |
| 24 | ALPSRS141503350 | 15.20709 | 103.45488 | 15.19897 | 107.45757 | 11.13352 | 107.41733 | 11.13940 | 103.48020 | HH | 100 |
| 25 | ALPSRS141503400 | 12.71169 | 102.95888 | 12.71261 | 106.91892 | 8.64500 | 106.89355 | 8.64438 | 102.98587 | HH | 100 |
| 26 | ALPSRS142233300 | 17.67781 | 102.32188 | 17.69123 | 106.37564 | 13.62409 | 106.34869 | 13.61388 | 102.37429 | HH | 100 |
| 27 | ALPSRS142233350 | 15.18894 | 101.78472 | 15.21020 | 105.87967 | 11.14152 | 105.86525 | 11.12612 | 101.83732 | HH | 100 |
| 28 | ALPSRS142233400 | 12.70271 | 101.29369 | 12.72840 | 105.34410 | 8.65861 | 105.33954 | 8.64128 | 101.34265 | HH | 100 |

# Appendix V-4 Photos of Geological Survey

Photo 1 (Map 1)

Silicified andesite or shale with sporadic metallic minerals occurs on this hill.

Photo 2 (Map 2)

White altered rock with limonite gossan.. The site is a working quarry.

Photo 3 (Map 2)

Silicification and argillization occur along fissures with limonite gossan.

Photo 4 (Map 7)

Limonite gossan and white argillization occur in a pit beside a road.

Photo 5 (Map 9)

Quartz-limonite parallel veinlets occur in conglomerate. Granites and rhyolites occur nearby.

Photo 6 (Map 10)

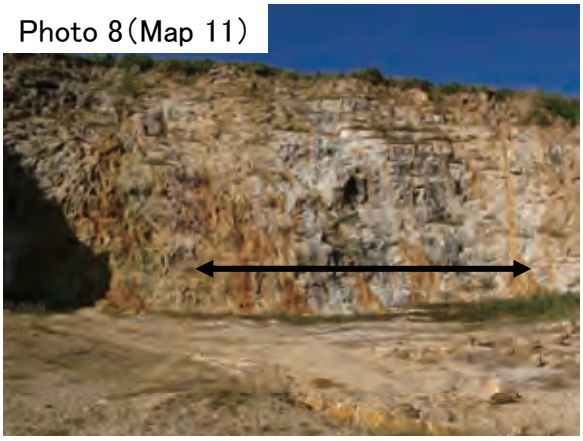
Fe-Mn rich vein accompanied by quartz, 0.5m in width x 15m in length, filled a fissure in shale.

# Appendix V-4 Photos of Geological Survey

Photo 7(Map 10)

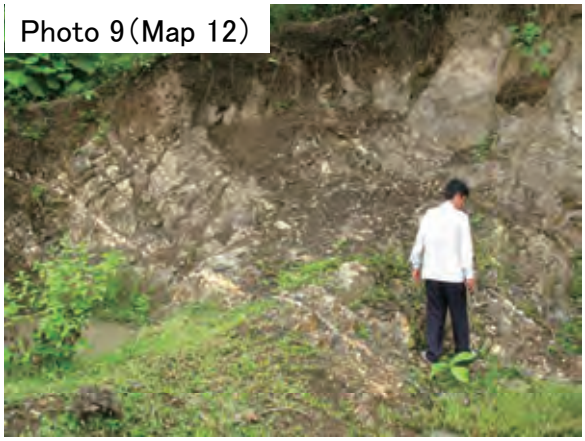
Fe-Mn rich nodules. The black cores are heavier than the brown rims.

Photo 8(Map 11)



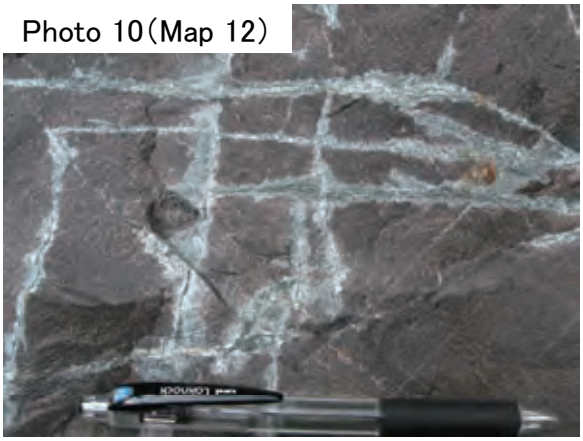
Molybdenite disseminated granite. Black bar shows the disseminated area.

Photo 9(Map 12)



Hornfels of shale at the contact with granite batholith. Skarnized veinlets with arsenopyrite occur.

Photo 10(Map 12)

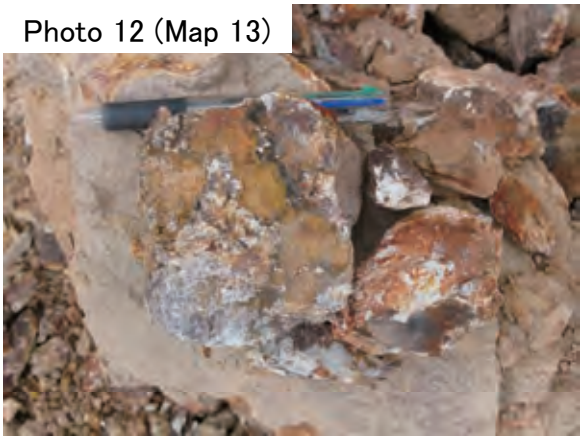


Yellow white skarn nets with amphibole needles and arsenopyrite at the center.

Photo 11(Map 13)

This hill of quartz porphyry is a gold occurrence. There is a similar gold occurrence 6.5 km away to the east.

Photo 12 (Map 13)



Limonite nets in quartz porphyry.

# Appendix V-5

SAMPLE LIST OF LABOATORY TESTS FOR ROCKS

| Nos. | Sample ID | Rock Name | T | PT | XRD | WRC | MMC | Latitude N | Longitude E | Elev. | Province |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9060403 | Grey argillized shale | | | | | ● | 11 06.015 | 104 13.835 | 99 m | KS |
| 2 | 9060404 | White argillized porphyry | | | | | ● | 11 06.021 | 104 13.831 | 99 m | KS |
| 3 | 9060405 | Grey argillized sandstone | | | | | ● | 11 06.024 | 104 13.830 | 99 m | KS |
| 4 | 9060501 | Brown conglomerate with QV | | | | | ● | 10 38.913 | 104 16.514 | 32 m | Kam |
| 5 | 9060502 | Grey conglomerate with QV | | | | | ● | 10 38.913 | 104 16.514 | 32 m | Kam |
| 6 | 9060506 | White argillized porphyry | | | | | ● | 10 27.774 | 104 23.407 | 12 m | Keb |
| 7 | 9060507 | Red argillized porphyry along fault | | | | | ● | 10 27.697 | 104 23.204 | 16 m | Keb |
| 8 | 9060508 | White argillized porphyry with QV | | | | | ● | 10 27.697 | 104 23.204 | 16 m | Keb |
| 9 | 9060509 | Rhyolite | ● | | | ● | | 10 27.229 | 104 23.290 | 7 m | Keb |
| 10 | 9060802 | Granite | ● | | | ● | | 12 02.760 | 104 19.185 | 103 m | KChhn |
| 11 | 9060905 | Serpentinite | ● | | ● | | | 12 21.618 | 103 12.743 | 223 m | Pur |
| 12 | 9060909 | Red shale with limestone lens | | | | | ● | 10 27.229 | 104 23.290 | 7 m | Pur |
| 13 | 9061002 | Carbonate rock | ● | | ● | | ● | 13 24.510 | 103 00.798 | 41 m | BMC |
| 14 | 9061101 | Basic hornfels ( or green schist) | ● | | | | | 13 49.789 | 103 08.921 | 27 m | BMC |
| 15 | 9061204A | Granule conglomerate | ● | | | | ● | 14 08.371 | 103 55.963 | 41 m | OMC |
| 16 | 9061204B | Rhyolite | | ● | | | ● | 14 08.371 | 103 55.963 | 41 m | OMC |
| 17 | 9061204C | Hematite ore ( taken by local people) | | | ● | | | 14 08.371 | 103 55.963 | 41 m | OMC |
| 18 | 9061405 | Dacite | ● | | | ● | | 13 25.364 | 104 31.273 | 45 m | SR |
| 19 | 9061406 | Silicified rock (volcanoclastic) | | ● | | | ● | 13 34.032 | 104 19.412 | 72 m | SR |
| 20 | 9061407 | Augite-hypersthene andesite | ● | | | ● | | 13 38.174 | 104 26.729 | 82 m | PV |
| 21 | 9061408 | Picritic basalt | ● | | | ● | | 13 40.336 | 104 31.212 | 129 m | PV |
| 22 | 9061503 | Silicified tuff | ● | | | | ● | 12 39.572 | 105 27.854 | 92 m | KT |
| 23 | 9061507 | Reddish brown silicified rock | | | | | ● | 12 40.341 | 105 30.315 | 104 m | KT |
| 24 | 9061702A | Granite | ● | | | ● | | 10 35.952 | 104 52.398 | 21 m | Tak |
| 25 | 9061702B | Black hornfels (shale) | | | | | ● | 10 35.952 | 104 52.398 | 21 m | Tak |
| 26 | 9061703 | Vein quartz with black shale | | | | | ● | 10 35.952 | 104 52.398 | 21 m | Tak |
| 27 | 9061704 | Granite ( or granite porphyry) | ● | | | ● | | 10 36.025 | 104 54.323 | 28 m | Tak |
| 28 | 9061705A | Mineralized granite | | ● | | ● | ● | 10 35.999 | 104 54.297 | 51 m | Tak |
| 29 | 9061705B | Granitic cataclasite | | ● | ● | | ● | 10 35.999 | 104 54.297 | 51 m | Tak |
| 30 | 9061706 | Silicic vein in hornfels | | ● | ● | | ● | 10 34.976 | 104 52.648 | 11 m | Tak |
| 31 | 9061709 | Weathered shale along fault | | | | | ● | 10 37.171 | 104 45.621 | 18 m | Tak |
| 32 | 9061710 | Iron ore vein in sandstone | | ● | ● | | ● | 10 37.473 | 104 43.758 | 15 m | Tak |

# Appendix V-5

SAMPLE LIST OF LABOATORY TESTS FOR ROCKS

| Nos. | Sample ID | Rock Name | T | PT | XRD | WRC | MMC | Latitude N | Longitude E | Elev. | Province |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 33 | 9080703 | Granite | ● | | | ● | | 13 32.297 | 106 41.052 | 118 m | RK |
| 34 | 9080704 | Granite porphyry | ● | | | ● | | 13 33.708 | 106 42.864 | 131 m | RK |
| 35 | 9080705 | Granite porphyry | ● | | | ● | | 13 33.989 | 106 43.145 | 131 m | RK |
| 36 | 9080706 | Granite (adamellite) | ● | | | ● | | 13 36.465 | 106 50.872 | 154 m | RK |
| 37 | 9080707 | Basalt dyke | ● | | | ● | | 13 39.384 | 106 56.176 | 185 m | RK |
| 38 | 9080801 | Welded tuff | ● | | | ● | | 13 53.070 | 106 54.149 | 118 m | RK |
| 39 | 9081002 | Sheared sandstone with QV | | | | | ● | 12 53.672 | 107 10.536 | 270 m | MK |
| 40 | 9081003 | Silicified sandstone | | | | | ● | 12 54.234 | 107 10.552 | 270 m | MK |
| 41 | 9081006 | Porphyrite | ● | | | ● | | 13 01.782 | 107 03.276 | 146 m | MK |
| 42 | 9081008 | Red sandy shale | | | | | ● | 13 04.257 | 107 01.174 | 170 m | MK |
| 43 | 9081104 | Grey hornfels (sandstone) | | | | | ● | 12 17.778 | 106 24.095 | 100 m | Kra |
| 44 | 9081201 | Skarnized fine-grained sandstone | | ● | | | ● | 13 19.657 | 104 59.350 | 99 m | PV |
| 45 | 9082201 | Brown altered shale with QV | | | | | ● | 10 26.890 | 104 26.705 | 27 m | Kam |
| 46 | 9082202 | Limonitized porphyry along fault | | | ● | | ● | 10 46.339 | 104 39.504 | 29 m | Kam |
| 47 | 9082203 | Limonite ore with quartz | | | | | ● | 10 34.842 | 104 45.746 | 9 m | Tak |
| 48 | 9082204 | Limonite ore with quartz | | | | | ● | 10 34.538 | 104 46.318 | 11 m | Tak |
| 49 | 9082302A | Pink granite with QV (adamellite) | ● | | | ● | | 10 57.837 | 104 59.025 | 17 m | Tak |
| 50 | 9082302B | Vein quartz in granite | | | | | ● | 10 57.837 | 104 59.025 | 17 m | Tak |
| 51 | 9111301 | Basalt | ● | | | ● | | 13 29.238 | 104 59.529 | 92 m | PV |
| 52 | 9111501 | Coarse-grained silicified tuff | | ● | | | ● | 13 34.107 | 104 19.376 | 60 m | SR |
| 53 | 9111502 | Altered rock (red, fine grain) | | | | | ● | 13 34.107 | 104 19.376 | 60 m | SR |
| 54 | 9111503 | Altered rock (white) | | | | | ● | 13 34.107 | 104 19.376 | 60 m | SR |
| 55 | 9111504 | Altered rock (brown, limonite) | | | | | ● | 13 34.107 | 104 19.376 | 60 m | SR |
| 56 | 9111505 | Altered rock (grey, white dots) | | | | | ● | 13 34.107 | 104 19.376 | 60 m | SR |
| 57 | 9111601 | Silicified tuff | ● | | | | | 13 17.166 | 103 49.121 | 36 m | SR |
| 58 | 9111602 | Dark grey rhyolite | | | | | ● | 13 50.167 | 103 11.061 | 28 m | BMC |
| 59 | 9111603 | Dark grey rhyolite | | | | | ● | 13 50.231 | 103 10.606 | 30 m | BMC |
| 60 | 9111604 | Lapilli tuff | | ● | | | ● | 13 49.461 | 103 08.623 | 24 m | BMC |
| 61 | 9111701 | Welded tuff | ● | | | ● | | 12 19.200 | 104 42.162 | 30 m | KChhn |
| 62 | 9111702 | Andesite | ● | | | ● | | 12 19.195 | 104 42.082 | 18 m | KChhn |
| 63 | 9111703 | Granodiorite | ● | | | ● | | 12 15.908 | 104 44.783 | 9 m | KChhn |
| 64 | 9111801 | Grey quartz rock (sedimentary?) | | | | | ● | 11 06.019 | 104 13.834 | 95 m | KS |

# Appendix V-5

SAMPLE LIST OF LABOATORY TESTS FOR ROCKS

| Nos. | Sample ID | Rock Name | T | PT | XRD | WRC | MMC | Latitude N | Longitude E | Elev. | Province |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 65 | 9111802 | White argillized rock | | | ● | | ● | 11 06.022 | 104 13.831 | 96 m | KS |
| 66 | 9111803 | Grey argillized rock | | | ● | | ● | 11 06.022 | 104 13.830 | 96 m | KS |
| 67 | 9111804 | Reddish brown vein in porphyry | | | | | ● | 10 27.779 | 104 23.396 | 7 m | Keb |
| 68 | 9111901 | Quartz porphyry (brecciated) | | ● | | | ● | 10 26.876 | 104 26.712 | 34 m | Kam |
| 69 | 9111902 | Quartz porphyry | ● | | | | ● | 10 26.878 | 104 26.722 | 35 m | Kam |
| 70 | 9111903 | Black Fe-Mn rock in coluvial | | | | | ● | 10 40.830 | 104 42.117 | 24 m | Tak |
| 71 | 9111904 | Brecciated brown and white rock | | | | | ● | 10 42.040 | 104 43.180 | 60 m | Tak |
| 72 | 9111905 | Fe-Mn nodule | | ● | | | ● | 10 36.720 | 104 45.013 | 14 m | Tak |
| 73 | 9111906 | Quartz-Hematite vein along nodule | | ● | | | ● | 10 36.720 | 104 45.013 | 14 m | Tak |
| 74 | 9112001 | Fine-grained skarnized sandstone | | ● | | | ● | 10 32.965 | 104 49.972 | 14 m | Tak |

**LEGEND**

T: Thin section PT: Polished thin section XRD: X-ray diffraction analysis WRC: Whole rock chemical analysis MMC: Multi-metal-elements chemical analysis

QV: Quartz vein

KS: Kampon Speu Kam: Kampot Keb: Keb Pur: Pursat KChhn: Kampong Chhnang
BMC: Banteay Mean Chey OMC: Odar Mean Chey SR: Siem Reap PV: Preah Vihear
KT: Kampong Thom Tak: Takeo RK: Rattanakiri MK: Modulkiri Kra: Kratie

# Appendix V-6 Results of X-ray Diffraction Analysis

| | Sample ID | | Qz | Pl | Kf | Am | Cpx | Cal | Hm | Op | Chr | Liz | Mc | Chl | Dra | Mc | Kao | Hal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| No.1 | 9060905 | Serpentinite | | | | | | | | | ○ | ○ | | | | | | |
| No.2 | 9061002 | Alterd limestone | + | | | | | ◎ | | | | | | | | | | |
| No.3 | 9061204C | Hematite ore | ◎ | | | | | | ○ | | | | | | | | | |
| No.4 | 9061705B | Silicified vein in granite | ◎ | | + | | | | | + | | | △ | | | | | |
| No.5 | 9061706 | Silicified vein in shale hornfels | ◎ | ○ | | − | + | | | | | | △ | − | | | | |
| No.6 | 9061710 | Silicified vein in sandstone | ◎ | △ | + | + | | + | | | | | − | − | | | | |
| No.7 | 9082202 | Limonitized porphyry | ◎ | | | | | | | | | | | | ○ | + | | |
| No.8 | 9111802 | White argillized rock | ◎ | | | | | | | | | | | | | △ | △ | |
| No.9 | 9111803 | Grey argillized rock | ◎ | | | | | | | | | | | | | △ | | + |

Legend

◎: very abundant ○: abundant △: moderate +: little -: rare

Qz: quartz Pl: plagioclase Kf: potasium feldspar Am: amphibole Cpx: clinopyroxene Cal: calcite

Hm: hematite Op: opal Chr: chrysotile Liz: lizardite Mc: mica Chl: chlorite

Dra: dravite Kao: kaolinite Hal: halloysite

# Appendix V-7 Results of Whole Rock Chemical Analysis

| | No. 1 | No. 2 | No. 3 | No. 4 | No. 5 | No. 6 | No. 7 | No. 8 | No. 9 | No. 10 | No. 11 | No. 12 | No. 13 | No. 14 | No. 15 | No. 16 | No. 17 | No. 18 | No. 19 | No. 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | 9060509 | 9060802 | 9061405 | 9061407 | 9061408 | 9061702A | 9061704 | 9061705A | 9080703 | 9080704 | 9080705 | 9080706 | 9080707 | 9080801 | 9081006 | 9082302A | 9111301 | 9111701 | 9111702 | 9111703 |
| Rock name | Rhyolite | Granite | Dacite | Augite-hypersthene andesite | Picritic basalt | Granite | Granite (or granite porphyry) | Mineralized granite | Granite | Granite porphyry | Granite porphyry | Granite (adamellite) | Basalt dyke | Welded tuff | Porphyrite | Pink granite with QV (adamellite) | Basalt | Welded tuff | Andesite | Granodiorite |
| $SiO_2$ | 71.55 | 73.69 | 74.31 | 61.27 | 46.07 | 75.16 | 74.05 | 73.44 | 60.82 | 57.61 | 60.81 | 57.54 | 54.57 | 73.03 | 46.76 | 77.21 | 49.39 | 70.56 | 60.71 | 65.31 |
| $TiO_2$ | 0.26 | 0.13 | 0.54 | 0.44 | 1.84 | 0.01 | 0.13 | 0.07 | 0.59 | 0.85 | 0.75 | 1.07 | 1.04 | 0.35 | 1.34 | 0.02 | 1.23 | 0.24 | 0.72 | 0.60 |
| $Al_2O_3$ | 13.74 | 13.64 | 13.09 | 17.31 | 14.53 | 13.34 | 13.81 | 13.29 | 17.83 | 17.63 | 18.00 | 17.17 | 17.63 | 15.42 | 15.94 | 12.80 | 15.61 | 14.25 | 18.14 | 14.90 |
| $Fe_2O_3$※ | 3.03 | 2.11 | 5.11 | 5.41 | 12.35 | 1.16 | 1.87 | 3.50 | 3.43 | 6.05 | 4.06 | 6.50 | 8.13 | 1.72 | 11.26 | 0.70 | 8.93 | 2.43 | 4.58 | 5.00 |
| MnO | 0.15 | 0.04 | 0.02 | 0.10 | 0.17 | 0.01 | 0.06 | 0.03 | 0.15 | 0.24 | 0.22 | 0.13 | 0.17 | 0.00 | 0.18 | 0.03 | 0.16 | 0.10 | 0.09 | 0.09 |
| MgO | 0.77 | 0.27 | 0.29 | 1.69 | 7.07 | 0.16 | 0.21 | 0.19 | 0.51 | 1.70 | 0.80 | 2.17 | 3.43 | 0.34 | 6.52 | 0.01 | 7.41 | 0.47 | 1.41 | 1.18 |
| CaO | 0.67 | 1.22 | 0.22 | 4.90 | 8.35 | 0.53 | 0.68 | 0.11 | 1.91 | 4.06 | 2.14 | 4.85 | 4.78 | 0.02 | 10.59 | 0.46 | 9.94 | 1.69 | 5.93 | 4.24 |
| $Na_2O$ | 5.22 | 3.45 | 0.14 | 3.75 | 2.57 | 4.48 | 3.87 | 3.64 | 4.51 | 4.64 | 5.20 | 3.92 | 5.07 | 0.15 | 3.13 | 3.96 | 4.24 | 3.90 | 3.48 | 2.89 |
| $K_2O$ | 2.41 | 4.36 | 0.16 | 0.42 | 1.82 | 4.27 | 4.37 | 3.18 | 8.12 | 5.26 | 6.06 | 5.10 | 1.56 | 6.63 | 1.40 | 4.63 | 0.38 | 4.48 | 2.81 | 4.17 |
| $P_2O_5$ | 0.073 | 0.041 | 0.152 | 0.154 | 0.674 | 0.033 | 0.043 | 0.041 | 0.22 | 0.36 | 0.22 | 0.38 | 0.49 | 0.07 | 0.31 | — | 0.17 | 0.05 | 0.22 | 0.13 |
| LOI | 1.30 | 0.35 | 5.29 | 3.99 | 3.57 | 0.44 | 0.50 | 2.20 | 1.89 | 0.75 | 0.68 | 0.15 | 3.39 | 2.74 | 2.35 | 0.54 | 2.38 | 1.05 | 1.65 | 0.78 |
| Total | 99.17 | 99.30 | 99.32 | 99.43 | 99.01 | 99.59 | 99.59 | 99.69 | 99.98 | 99.15 | 98.94 | 99.00 | 100.26 | 100.48 | 99.79 | 100.35 | 99.85 | 99.22 | 99.74 | 99.29 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SrO | 0.02 | 0.01 | 0.02 | 0.06 | 0.09 | 0.01 | 0.02 | 0.01 |
| BaO | 0.09 | 0.02 | 0.02 | 0.02 | 0.02 | 0.02 | 0.05 | 0.03 |
| $Cr_2O_3$ | <0.01 | <0.01 | 0.01 | <0.01 | 0.02 | <0.01 | <0.01 | <0.01 |

*: total Fe as Fe2O3 LOI: loss on ignition at 1,000 degree Celsius

analysis by X-ray fluorescence analyser

# Appendix V-8 Results of Multi-Metal-Elements Analysis for Rock Samples

| | SAMPLE ID | Rock name | Province | GPS Latitude N | GPS Longitude E | GPS Elev. | Legend of Area |
|---|---|---|---|---|---|---|---|
| 1 | 9060403 | Grey argillized shale | KS | 11 06.015 | 104 13.835 | 99 m | KS |
| 2 | 9060404 | White argillized porphyry | KS | 11 06.021 | 104 13.831 | 99 m | Kampon Speu |
| 3 | 9060405 | Grey argillized sandstone | KS | 11 06.024 | 104 13.830 | 99 m | |
| 4 | 9060501 | Brown conglomerate with QV | Kam | 10 38.913 | 104 16.514 | 32 m | Kam |
| 5 | 9060502 | Grey conglomerate with QV | Kam | 10 38.913 | 104 16.514 | 32 m | Kampot |
| 6 | 9060506 | White argillized porphyry | Keb | 10 27.774 | 104 23.407 | 12 m | |
| 7 | 9060507 | Red argillized porphyry along fau | Keb | 10 27.697 | 104 23.204 | 16 m | Pur |
| 8 | 9060508 | White argillized porphyry with QV | Keb | 10 27.697 | 104 23.204 | 16 m | Pursat |
| 9 | 9060909 | Red shale with limestone len: | Pur | 10 27.229 | 104 23.290 | 7 m | |
| 10 | 9061002 | Carbonate rock | BMC | 12 02.760 | 104 19.185 | 103 m | BMC |
| 11 | 9061204A | Granule conglomerate | OMC | 14 08.371 | 103 55.963 | 41 m | Banteay Mean Chey |
| 12 | 9061204B | Rhyolite | OMC | 14 08.371 | 103 55.963 | 41 m | |
| 13 | 9061406 | Silicified rock (volcanoclastic) | SR | 13 34.032 | 104 19.412 | 72 m | OMC |
| 14 | 9061503 | Silicified tuff | KT | 12 39.572 | 105 27.854 | 92 m | Odar Mean Chey |
| 15 | 9061507 | Reddish brown silicified rock | KT | 12 40.341 | 105 30.315 | 104 m | |
| 16 | 9061702B | Black hornfels (shale) | Tak | 10 35.952 | 104 52.398 | 21 m | SR |
| 17 | 9061703 | Vein quartz with black shale | Tak | 10 35.952 | 104 52.398 | 21 m | Siem Reap |
| 18 | 9061705A | Mineralized granite | Tak | 10 35.999 | 104 54.297 | 51 m | |
| 19 | 9061705B | Granitic cataclasite | Tak | 10 35.999 | 104 54.297 | 51 m | KT |
| 20 | 9061706 | Silicic vein in hornfels | Tak | 10 34.976 | 104 52.648 | 11 m | Kampong Thom |
| 21 | 9061709 | Weathered shale along fault | Tak | 10 37.171 | 104 45.621 | 18 m | |
| 22 | 9061710 | Iron ore vein in sandstone | Tak | 10 37.473 | 104 43.758 | 15 m | Tak |
| 23 | 9081002 | Sheared sandstone with QV | MK | 12 53.672 | 107 10.536 | 270 m | Takeo |
| 24 | 9081003 | Silicified sandstone | MK | 12 54.234 | 107 10.552 | 270 m | |
| 25 | 9081008 | Red sandy shale | MK | 13 04.257 | 107 01.174 | 170 m | MK |
| 26 | 9081104 | Grey hornfels (sandstone) | Kra | 12 17.778 | 106 24.095 | 100 m | Mondulkiri |
| 27 | 9081201 | Skarnized fine-grained sandstone | PV | 13 19.657 | 104 59.350 | 99 m | |
| 28 | 9082201 | Brown altered shale with QV | Kam | 10 26.890 | 104 26.705 | 27 m | Kra |
| 29 | 9082202 | Limonitezed porphyry anlong faul | Kam | 10 46.339 | 104 39.504 | 29 m | Kratie |
| 30 | 9082203 | Limonite ore with quartz | Tak | 10 34.842 | 104 45.746 | 9 m | |
| 31 | 9082204 | Limonite ore with quartz | Tak | 10 34.538 | 104 46.318 | 11 m | PV |
| 32 | 9082302B | Vein quartz in granite | Tak | 10 57.837 | 104 59.025 | 17 m | Preah Vihear |
| 33 | 9111501 | Coarse-grained silicified tuff | SR | 13 34.107 | 104 19.376 | 60 m | |
| 34 | 9111502 | Altered rock (red, fine grain) | SR | 13 34.107 | 104 19.376 | 60 m | |
| 35 | 9111503 | Altered rock (white) | SR | 13 34.107 | 104 19.376 | 60 m | |
| 36 | 9111504 | Altered rock (brown, limonite | SR | 13 34.107 | 104 19.376 | 60 m | |
| 37 | 9111505 | Altered rock (grey, white dots) | SR | 13 34.107 | 104 19.376 | 60 m | |
| 38 | 9111602 | Dark grey rhyolite | BMC | 13 50.167 | 103 11.061 | 28 m | |
| 39 | 9111603 | Dark grey rhyolite | BMC | 13 50.231 | 103 10.606 | 30 m | |
| 40 | 9111604 | Lapilli tuff | BMC | 13 49.461 | 103 08.623 | 24 m | |
| 41 | 9111801 | Grey quartz rock (sedimentary?) | KS | 11 06.019 | 104 13.834 | 95 m | |
| 42 | 9111802 | White argillized rock | KS | 11 06.022 | 104 13.831 | 96 m | |
| 43 | 9111803 | Grey argillized rock | KS | 11 06.022 | 104 13.830 | 96 m | |
| 44 | 9111804 | Reddish brown vein in porphry | Keb | 10 27.779 | 104 23.396 | 7 m | |
| 45 | 9111901 | Quartz porpyry (brecciated) | Kam | 10 26.876 | 104 26.712 | 34 m | |
| 46 | 9111902 | Quartz porpyry | Kam | 10 26.878 | 104 26.722 | 35 m | |
| 47 | 9111903 | Black Fe-Mn rock in coluvia | Tak | 10 40.830 | 104 42.117 | 24 m | |
| 48 | 9111904 | Brecciated brown and white rock | Tak | 10 42.040 | 104 43.180 | 60 m | |
| 49 | 9111905 | Fe-Mn nodule | Tak | 10 36.720 | 104 45.013 | 14 m | |
| 50 | 9111906 | Quartz-Hematite vein along | Tak | 10 36.720 | 104 45.013 | 14 m | |
| 51 | 9112001 | Fine-grained skarnized sandstone | Tak | 10 32.965 | 104 49.972 | 14 m | |

QV=quartz vein

# Appendix V-8 Results of Multi-Metal-Elements Analysis for Rock Samples

| | SAMPLE ID | Au ppm | Ag ppm | Al % | As ppm | B ppm | Ba ppm | Be ppm | Bi ppm | Ca % | Cd ppm | Co ppm | Cr ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9060403 | 0.022 | <0.2 | 1.66 | 170 | <10 | 10 | 2.5 | <2 | 0.02 | <0.5 | 5 | 161 |
| 2 | 9060404 | 0.014 | <0.2 | 0.71 | 20 | <10 | 50 | 0.5 | <2 | 0.05 | <0.5 | 2 | 23 |
| 3 | 9060405 | 0.009 | <0.2 | 1.03 | 119 | <10 | 50 | 1.4 | <2 | 0.07 | <0.5 | 3 | 24 |
| 4 | 9060501 | 0.001 | <0.2 | 0.31 | 18 | <10 | 40 | <0.5 | <2 | 0.02 | <0.5 | 1 | 5 |
| 5 | 9060502 | 0.022 | 0.3 | 0.27 | 241 | <10 | 50 | 0.5 | 4 | 0.03 | <0.5 | 7 | 2 |
| 6 | 9060506 | 0.025 | <0.2 | 0.35 | 108 | <10 | 20 | <0.5 | <2 | 0.01 | <0.5 | <1 | 3 |
| 7 | 9060507 | 0.005 | 0.2 | 0.52 | 517 | <10 | 40 | <0.5 | <2 | 0.01 | <0.5 | <1 | <1 |
| 8 | 9060508 | 0.003 | <0.2 | 0.38 | 223 | <10 | 40 | <0.5 | <2 | <0.01 | <0.5 | <1 | 1 |
| 9 | 9060909 | 0.003 | 0.3 | 0.75 | 40 | <10 | 130 | <0.5 | <2 | 0.21 | <0.5 | 3 | 11 |
| 10 | 9061002 | 0.003 | 0.2 | 0.49 | 43 | <10 | 30 | <0.5 | <2 | >25.0 | 2.2 | 4 | 62 |
| 11 | 9061204A | <0.001 | <0.2 | 1.29 | 6 | <10 | 240 | <0.5 | <2 | 1.85 | <0.5 | 4 | 14 |
| 12 | 9061204B | 0.001 | <0.2 | 0.71 | 6 | <10 | 110 | <0.5 | <2 | 0.2 | <0.5 | 2 | 17 |
| 13 | 9061406 | 0.038 | <0.2 | 0.64 | 3 | <10 | 10 | <0.5 | <2 | 0.02 | <0.5 | <1 | 6 |
| 14 | 9061503 | <0.001 | <0.2 | 0.1 | 2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | <1 | 24 |
| 15 | 9061507 | <0.001 | <0.2 | 0.08 | 6 | <10 | <10 | <0.5 | <2 | 0.01 | <0.5 | 2 | 78 |
| 16 | 9061702B | 0.002 | <0.2 | 2.42 | 15 | <10 | 100 | 0.5 | <2 | 1.68 | <0.5 | 2 | 16 |
| 17 | 9061703 | 0.002 | 0.4 | 1.05 | 22 | <10 | 140 | 0.7 | <2 | 1.23 | <0.5 | 2 | 10 |
| 18 | 9061705A | 0.004 | 8.6 | 0.31 | 289 | <10 | 20 | <0.5 | 30 | 0.06 | 1.2 | 1 | 3 |
| 19 | 9061705B | 0.011 | 2.2 | 0.25 | 50 | <10 | 10 | 1 | 16 | 0.07 | <0.5 | <1 | 2 |
| 20 | 9061706 | 0.002 | <0.2 | 3.4 | 27 | <10 | 80 | 0.5 | <2 | 1.05 | <0.5 | 11 | 43 |
| 21 | 9061709 | <0.001 | <0.2 | 0.37 | 10 | <10 | 30 | 0.5 | <2 | 0.01 | <0.5 | <1 | 7 |
| 22 | 9061710 | 0.015 | 0.9 | 0.77 | 274 | <10 | 1070 | 5.3 | 4 | 0.02 | 1.7 | 85 | 3 |
| 23 | 9081002 | 0.314 | 0.3 | 0.44 | 149 | <10 | 220 | 0.5 | <2 | 0.11 | <0.5 | 15 | 7 |
| 24 | 9081003 | 0.003 | <0.2 | 0.25 | 5 | <10 | 200 | <0.5 | <2 | <0.01 | <0.5 | 1 | 6 |
| 25 | 9081008 | 0.028 | <0.2 | 1.43 | 5 | <10 | 80 | 2.1 | <2 | 0.02 | <0.5 | 41 | 19 |
| 26 | 9081104 | <0.001 | <0.2 | 0.27 | 2 | <10 | 20 | <0.5 | <2 | 0.01 | <0.5 | <1 | 4 |
| 27 | 9081201 | 0.277 | 0.5 | 2.26 | 20 | <10 | 20 | <0.5 | <2 | 1.11 | <0.5 | 238 | 30 |
| 28 | 9082201 | 0.004 | <0.2 | 0.45 | 338 | <10 | 20 | 0.6 | <2 | 0.01 | <0.5 | 5 | 11 |
| 29 | 9082202 | 0.196 | 0.2 | 0.23 | 18 | 30 | 320 | <0.5 | 26 | 0.03 | <0.5 | 1 | 2 |
| 30 | 9082203 | 0.007 | <0.2 | 0.66 | 73 | <10 | 420 | 1.9 | <2 | 0.01 | <0.5 | 38 | 7 |
| 31 | 9082204 | 0.07 | <0.2 | 0.97 | 39 | <10 | 3210 | 2.4 | <2 | <0.01 | 0.7 | 81 | 35 |
| 32 | 9082302B | 0.004 | 1.5 | 0.12 | 3 | <10 | 20 | 1 | 4 | 0.04 | 1 | 1 | 8 |
| 33 | 9111501 | 0.048 | <0.2 | 0.45 | 4 | <10 | 10 | <0.5 | <2 | <0.01 | <0.5 | <1 | 6 |
| 34 | 9111502 | 0.009 | <0.2 | 0.43 | 6 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | <1 | 6 |
| 35 | 9111503 | 0.04 | <0.2 | 0.33 | 6 | <10 | <10 | <0.5 | <2 | <0.01 | <0.5 | <1 | 9 |
| 36 | 9111504 | 0.013 | <0.2 | 0.21 | 11 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | <1 | 10 |
| 37 | 9111505 | 0.009 | <0.2 | 0.52 | 6 | <10 | 10 | <0.5 | <2 | 0.02 | <0.5 | <1 | 7 |
| 38 | 9111602 | 0.007 | <0.2 | 6.5 | 3 | <10 | 50 | <0.5 | <2 | 3.57 | <0.5 | 22 | 54 |
| 39 | 9111603 | 0.059 | <0.2 | 8.95 | <2 | <10 | 10 | <0.5 | <2 | 5.84 | <0.5 | 11 | 16 |
| 40 | 9111604 | 0.01 | <0.2 | 5.84 | 2 | <10 | 20 | <0.5 | <2 | 3.44 | <0.5 | 8 | 40 |
| 41 | 9111801 | 0.058 | <0.2 | 0.23 | 42 | <10 | 20 | <0.5 | <2 | 0.03 | <0.5 | 1 | 12 |
| 42 | 9111802 | 0.027 | <0.2 | 0.53 | 42 | <10 | 30 | 0.6 | <2 | 0.04 | <0.5 | 2 | 26 |
| 43 | 9111803 | 0.028 | <0.2 | 0.56 | 58 | <10 | 50 | 0.7 | <2 | 0.06 | <0.5 | 2 | 23 |
| 44 | 9111804 | 0.053 | 0.3 | 0.25 | 51 | <10 | 30 | <0.5 | <2 | <0.01 | <0.5 | <1 | 6 |
| 45 | 9111901 | 0.008 | 0.3 | 0.75 | 104 | <10 | 40 | 1 | <2 | 0.01 | <0.5 | 2 | 2 |
| 46 | 9111902 | 0.017 | <0.2 | 0.62 | 35 | <10 | 50 | 0.6 | <2 | <0.01 | <0.5 | 1 | 2 |
| 47 | 9111903 | 0.006 | <0.2 | 0.98 | 146 | <10 | 560 | 4 | 3 | 0.03 | 0.5 | 98 | 9 |
| 48 | 9111904 | 0.01 | <0.2 | 0.93 | 57 | <10 | 560 | 0.9 | <2 | <0.01 | <0.5 | 24 | 51 |
| 49 | 9111905 | <0.001 | 2 | 1.76 | 28 | <10 | 1450 | 0.9 | 5 | 0.02 | 1.4 | 335 | 114 |
| 50 | 9111906 | 0.009 | 5.4 | 0.64 | 22 | <10 | 710 | 0.9 | 3 | 0.01 | 0.8 | 364 | 49 |
| 51 | 9112001 | 0.032 | 0.2 | 4.12 | 2,780 | <10 | 20 | 6.9 | 28 | 2.98 | <0.5 | 16 | 44 |

# Appendix V-8 Results of Multi-Metal-Elements Analysis for Rock Samples

| | SAMPLE ID | Cu ppm | Fe % | Ga ppm | Hg ppm | K % | La ppm | Mg % | Mn ppm | Mo ppm | Na % | Ni ppm | P ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9060403 | 71 | 13.4 | 10 | <1 | 0.03 | 30 | 0.02 | 165 | 8 | 0.01 | 38 | 360 |
| 2 | 9060404 | 22 | 1.32 | <10 | <1 | 0.18 | 20 | 0.03 | 26 | <1 | 0.01 | 7 | 30 |
| 3 | 9060405 | 383 | 7.04 | 10 | <1 | 0.08 | 20 | 0.02 | 160 | 2 | 0.01 | 17 | 150 |
| 4 | 9060501 | 8 | 0.88 | <10 | <1 | 0.13 | 10 | 0.02 | 137 | 1 | <0.01 | 2 | 50 |
| 5 | 9060502 | 22 | 4.16 | <10 | <1 | 0.12 | 10 | 0.03 | 497 | 1 | 0.01 | 4 | 110 |
| 6 | 9060506 | 4 | 2.97 | <10 | <1 | 0.13 | 10 | 0.01 | 13 | 5 | 0.01 | <1 | 240 |
| 7 | 9060507 | 3 | 6.07 | <10 | <1 | 0.19 | <10 | 0.01 | 11 | 8 | 0.01 | <1 | 460 |
| 8 | 9060508 | 4 | 3.44 | <10 | <1 | 0.19 | <10 | 0.01 | 15 | 3 | 0.01 | <1 | 260 |
| 9 | 9060909 | 14 | 2.05 | <10 | <1 | 0.03 | <10 | 0.45 | 440 | 1 | 0.11 | 4 | 260 |
| 10 | 9061002 | 19 | 0.91 | <10 | <1 | 0.01 | <10 | 0.08 | 404 | 1 | 0.01 | 30 | 1,200 |
| 11 | 9061204A | 11 | 2.42 | 10 | <1 | 0.04 | <10 | 0.94 | 724 | <1 | 0.05 | 5 | 370 |
| 12 | 9061204B | 4 | 1.66 | <10 | <1 | 0.05 | <10 | 0.43 | 426 | 1 | 0.07 | 3 | 160 |
| 13 | 9061406 | 2 | 0.99 | <10 | <1 | 0.1 | <10 | <0.01 | 12 | 2 | 0.07 | 1 | 30 |
| 14 | 9061503 | 6 | 0.84 | <10 | <1 | 0.01 | <10 | <0.01 | 67 | 1 | 0.01 | 3 | 40 |
| 15 | 9061507 | 8 | 0.79 | <10 | <1 | <0.01 | <10 | <0.01 | 59 | 1 | <0.01 | 6 | 20 |
| 16 | 9061702B | 19 | 0.69 | <10 | <1 | 0.05 | 20 | 0.11 | 138 | <1 | 0.38 | 6 | 570 |
| 17 | 9061703 | 5 | 1.41 | <10 | <1 | 0.15 | <10 | 0.1 | 92 | 1 | 0.04 | 3 | 50 |
| 18 | 9061705A | 4 | 1.55 | <10 | <1 | 0.21 | 10 | 0.01 | 155 | 1,410 | 0.04 | 1 | 100 |
| 19 | 9061705B | 2 | 0.88 | <10 | <1 | 0.22 | 20 | 0.01 | 37 | 412 | 0.01 | 1 | 260 |
| 20 | 9061706 | 26 | 3.42 | 10 | <1 | 1.39 | 10 | 1.2 | 438 | 2 | 0.27 | 17 | 620 |
| 21 | 9061709 | 51 | 3.58 | <10 | <1 | 0.13 | <10 | 0.02 | 60 | 3 | 0.01 | 3 | 240 |
| 22 | 9061710 | 350 | 21.4 | 20 | 1 | 0.25 | <10 | <0.01 | 35,700 | 27 | 0.02 | 40 | 4,360 |
| 23 | 9081002 | 80 | 2.31 | <10 | <1 | 0.11 | 20 | 0.05 | 1,090 | <1 | 0.03 | 15 | 60 |
| 24 | 9081003 | 2 | 0.82 | <10 | <1 | 0.08 | 10 | 0.01 | 111 | <1 | 0.02 | <1 | 40 |
| 25 | 9081008 | 16 | 5.86 | <10 | <1 | 0.2 | 30 | 0.12 | 737 | <1 | 0.02 | 19 | 390 |
| 26 | 9081104 | 2 | 0.46 | <10 | <1 | 0.15 | 20 | 0.01 | 25 | <1 | 0.01 | <1 | 20 |
| 27 | 9081201 | 633 | 6.5 | 10 | <1 | 0.08 | 10 | 0.53 | 527 | <1 | 0.21 | 58 | 640 |
| 28 | 9082201 | 11 | 3.52 | <10 | <1 | 0.09 | <10 | <0.01 | 41 | 1 | 0.02 | 12 | 240 |
| 29 | 9082202 | 42 | 0.93 | <10 | <1 | 0.11 | 10 | 0.01 | 25 | 2 | 0.02 | <1 | 480 |
| 30 | 9082203 | 103 | 17.7 | <10 | <1 | 0.11 | <10 | <0.01 | 8,220 | 1 | 0.02 | 38 | 4,660 |
| 31 | 9082204 | 268 | 10.8 | 10 | <1 | 0.12 | 10 | <0.01 | 21,500 | 3 | 0.04 | 46 | 1,980 |
| 32 | 9082302B | 137 | 0.7 | <10 | <1 | 0.09 | <10 | 0.01 | 177 | 6 | 0.01 | <1 | 30 |
| 33 | 9111501 | 9 | 0.52 | <10 | <1 | 0.08 | <10 | <0.01 | 34 | <1 | 0.06 | <1 | 30 |
| 34 | 9111502 | 3 | 1.71 | <10 | <1 | 0.03 | <10 | <0.01 | 25 | 3 | 0.05 | <1 | 40 |
| 35 | 9111503 | 7 | 0.95 | <10 | <1 | 0.04 | <10 | <0.01 | 18 | <1 | 0.04 | <1 | 40 |
| 36 | 9111504 | 6 | 1.48 | <10 | <1 | 0.01 | <10 | <0.01 | 24 | 1 | 0.01 | <1 | 80 |
| 37 | 9111505 | 7 | 5.78 | <10 | <1 | <0.01 | <10 | <0.01 | 30 | 1 | 0.01 | <1 | 60 |
| 38 | 9111602 | 57 | 2.91 | 10 | 1 | 0.24 | <10 | 0.69 | 148 | <1 | 0.89 | 38 | 270 |
| 39 | 9111603 | 41 | 1.4 | 20 | 1 | 0.02 | <10 | 0.14 | 89 | <1 | 0.57 | 26 | 280 |
| 40 | 9111604 | 80 | 1.02 | 10 | 1 | 0.04 | <10 | 0.27 | 104 | <1 | 0.82 | 12 | 290 |
| 41 | 9111801 | 18 | 0.83 | <10 | <1 | 0.12 | 10 | 0.01 | 54 | <1 | 0.01 | 2 | 40 |
| 42 | 9111802 | 87 | 2.51 | <10 | <1 | 0.08 | 20 | 0.02 | 92 | 1 | 0.01 | 7 | 60 |
| 43 | 9111803 | 79 | 2.35 | <10 | <1 | 0.2 | 30 | 0.02 | 43 | 1 | 0.01 | 6 | 70 |
| 44 | 9111804 | 11 | 1.73 | <10 | <1 | 0.11 | <10 | 0.01 | 18 | 7 | 0.01 | <1 | 100 |
| 45 | 9111901 | 6 | 8.38 | <10 | <1 | 0.17 | 10 | 0.01 | 72 | 3 | 0.03 | <1 | 490 |
| 46 | 9111902 | 8 | 3.4 | <10 | <1 | 0.26 | 20 | 0.01 | 41 | 1 | 0.03 | <1 | 170 |
| 47 | 9111903 | 130 | 25.6 | 10 | <1 | 0.37 | <10 | <0.01 | 46,400 | 1 | 0.03 | 67 | 6,760 |
| 48 | 9111904 | 126 | 9.54 | 10 | <1 | 0.16 | 10 | 0.01 | 4,630 | 1 | 0.02 | 12 | 320 |
| 49 | 9111905 | 115 | 28.4 | <10 | 5 | 0.88 | <10 | 0.01 | >50,000 | 2 | 0.1 | 117 | 940 |
| 50 | 9111906 | 138 | 5.33 | <10 | 3 | 0.86 | <10 | 0.01 | >50,000 | <1 | 0.05 | 104 | 560 |
| 51 | 9112001 | 412 | 4.07 | 10 | 1 | 0.09 | 10 | 0.55 | 1,385 | <1 | 0.45 | 23 | 510 |

## Appendix V-8 Results of Multi-Metal-Elements Analysis for Rock Samples

| | SAMPLE ID | Pb ppm | S % | Sb ppm | Sc ppm | Sr ppm | Th ppm | Ti % | Tl ppm | U ppm | V ppm | W ppm | Zn ppm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9060403 | 63 | 0.01 | 4 | 13 | 2 | <20 | 0.04 | <10 | 10 | 212 | <10 | 120 |
| 2 | 9060404 | 12 | 0.01 | 2 | 4 | 4 | <20 | 0.01 | <10 | <10 | 35 | <10 | 15 |
| 3 | 9060405 | 18 | <0.01 | 3 | 16 | 4 | 20 | 0.02 | <10 | 10 | 86 | <10 | 23 |
| 4 | 9060501 | 15 | <0.01 | 2 | 1 | 2 | <20 | <0.01 | <10 | <10 | 3 | <10 | 11 |
| 5 | 9060502 | 29 | 0.01 | 5 | 2 | 7 | <20 | <0.01 | <10 | <10 | 3 | <10 | 57 |
| 6 | 9060506 | 2 | 0.01 | 7 | 1 | 3 | <20 | <0.01 | <10 | <10 | 3 | <10 | <2 |
| 7 | 9060507 | 2 | 0.04 | 7 | 1 | 9 | <20 | <0.01 | <10 | <10 | 5 | <10 | 6 |
| 8 | 9060508 | 2 | 0.02 | 4 | 1 | 4 | <20 | <0.01 | <10 | <10 | 3 | <10 | 9 |
| 9 | 9060909 | 10 | 0.5 | 2 | 4 | 19 | <20 | 0.09 | <10 | <10 | 16 | <10 | 34 |
| 10 | 9061002 | 5 | <0.01 | 2 | 4 | 124 | <20 | <0.01 | <10 | <10 | 39 | <10 | 45 |
| 11 | 9061204A | 3 | 0.05 | 2 | 5 | 42 | <20 | 0.13 | <10 | <10 | 22 | <10 | 62 |
| 12 | 9061204B | 3 | 0.14 | 2 | 3 | 22 | <20 | 0.09 | <10 | <10 | 9 | <10 | 31 |
| 13 | 9061406 | 5 | 0.36 | 4 | <1 | 48 | <20 | <0.01 | <10 | <10 | 14 | <10 | <2 |
| 14 | 9061503 | 4 | 0.01 | 3 | 1 | 9 | <20 | <0.01 | <10 | <10 | 15 | <10 | <2 |
| 15 | 9061507 | <2 | <0.01 | 2 | 1 | 2 | <20 | <0.01 | <10 | <10 | 8 | <10 | 3 |
| 16 | 9061702B | 5 | 0.04 | 3 | 1 | 128 | <20 | 0.1 | <10 | <10 | 13 | <10 | 19 |
| 17 | 9061703 | 6 | 0.26 | 2 | 1 | 60 | <20 | 0.03 | <10 | <10 | 11 | <10 | 13 |
| 18 | 9061705A | 79 | 1.35 | <2 | <1 | 4 | <20 | <0.01 | <10 | <10 | 1 | <10 | 282 |
| 19 | 9061705B | 74 | 0.75 | 2 | <1 | 5 | <20 | <0.01 | <10 | <10 | 1 | <10 | 95 |
| 20 | 9061706 | 5 | 0.13 | 3 | 11 | 111 | <20 | 0.24 | <10 | <10 | 88 | <10 | 79 |
| 21 | 9061709 | 5 | 0.01 | 5 | 2 | 5 | <20 | <0.01 | <10 | <10 | 7 | <10 | 17 |
| 22 | 9061710 | 23 | 0.03 | 2 | 12 | 159 | <20 | <0.01 | <10 | <10 | 35 | <10 | 251 |
| 23 | 9081002 | 23 | <0.01 | <2 | 4 | 8 | <20 | <0.01 | <10 | <10 | 7 | <10 | 21 |
| 24 | 9081003 | 16 | 0.01 | <2 | <1 | 7 | <20 | <0.01 | <10 | <10 | 2 | <10 | <2 |
| 25 | 9081008 | 19 | <0.01 | <2 | 3 | 12 | <20 | 0.01 | <10 | <10 | 26 | <10 | 36 |
| 26 | 9081104 | 4 | <0.01 | <2 | <1 | 2 | <20 | <0.01 | <10 | <10 | 2 | <10 | <2 |
| 27 | 9081201 | 16 | 2.83 | <2 | 7 | 70 | <20 | 0.14 | <10 | <10 | 64 | <10 | 68 |
| 28 | 9082201 | 11 | 0.01 | 3 | 2 | 9 | <20 | <0.01 | <10 | <10 | 12 | <10 | 38 |
| 29 | 9082202 | 158 | 0.06 | 18 | <1 | 36 | <20 | <0.01 | <10 | <10 | 11 | <10 | 6 |
| 30 | 9082203 | 7 | 0.01 | <2 | 2 | 15 | <20 | 0.01 | <10 | <10 | 10 | <10 | 181 |
| 31 | 9082204 | 15 | 0.02 | <2 | 8 | 13 | <20 | <0.01 | 10 | 10 | 43 | <10 | 199 |
| 32 | 9082302B | 117 | 0.04 | <2 | <1 | 3 | <20 | <0.01 | <10 | <10 | 1 | <10 | 67 |
| 33 | 9111501 | 4 | 0.31 | <2 | <1 | 40 | <20 | <0.01 | <10 | <10 | 12 | <10 | <2 |
| 34 | 9111502 | 5 | 0.17 | 3 | 1 | 42 | <20 | 0.01 | <10 | <10 | 25 | <10 | <2 |
| 35 | 9111503 | 7 | 0.15 | 4 | <1 | 42 | <20 | <0.01 | <10 | <10 | 24 | <10 | <2 |
| 36 | 9111504 | 6 | 0.05 | <2 | 1 | 48 | <20 | <0.01 | <10 | <10 | 27 | <10 | <2 |
| 37 | 9111505 | 19 | 0.01 | 4 | 6 | 7 | <20 | 0.05 | <10 | <10 | 87 | <10 | 4 |
| 38 | 9111602 | 3 | 1.2 | <2 | 3 | 279 | <20 | 0.1 | <10 | <10 | 93 | <10 | 24 |
| 39 | 9111603 | 2 | 0.64 | <2 | 1 | 192 | <20 | 0.15 | <10 | <10 | 20 | <10 | 4 |
| 40 | 9111604 | <2 | 0.13 | <2 | 3 | 106 | <20 | 0.09 | <10 | <10 | 46 | <10 | 11 |
| 41 | 9111801 | 32 | 0.01 | <2 | 1 | 3 | <20 | <0.01 | <10 | <10 | 8 | <10 | 30 |
| 42 | 9111802 | 19 | 0.01 | <2 | 5 | 4 | 20 | 0.01 | <10 | <10 | 48 | <10 | 22 |
| 43 | 9111803 | 30 | 0.01 | <2 | 6 | 9 | 20 | 0.01 | <10 | <10 | 44 | <10 | 20 |
| 44 | 9111804 | 4 | 0.01 | 2 | <1 | 5 | <20 | <0.01 | <10 | <10 | 3 | <10 | <2 |
| 45 | 9111901 | 12 | 0.03 | <2 | 3 | 4 | <20 | <0.01 | <10 | <10 | 13 | <10 | 42 |
| 46 | 9111902 | 9 | 0.01 | <2 | 4 | 3 | <20 | <0.01 | <10 | <10 | 7 | <10 | 33 |
| 47 | 9111903 | 9 | 0.01 | <2 | 3 | 195 | <20 | <0.01 | 20 | <10 | 15 | <10 | 385 |
| 48 | 9111904 | 12 | 0.01 | <2 | 4 | 9 | <20 | <0.01 | <10 | <10 | 71 | <10 | 28 |
| 49 | 9111905 | 27 | 0.03 | <2 | 20 | 197 | <20 | 0.05 | <10 | <10 | 99 | <10 | 362 |
| 50 | 9111906 | 21 | 0.02 | <2 | 5 | 81 | <20 | <0.01 | 50 | 20 | 42 | <10 | 406 |
| 51 | 9112001 | 10 | 1.35 | <2 | 4 | 109 | <20 | 0.13 | <10 | <10 | 45 | 130 | 68 |

# Appendix V-9 Sample List of Geochemical Analysis

| Sample ID | Province | Latitude N | Longitude E | Elev. | Sand properties | Description |
|---|---|---|---|---|---|---|
| 9060401 | KS | 11 12.869 | 104 14.416 | 83 m | br-yl fng S | 1;sand & mud, 2;10m, 3;10m, 4;slow, 5;RB, 6;flat, far |
| 9060402 | KS | 11 11.646 | 104 14.38 | 87 m | rd-br md-csg S | 1;sand & mud, 2;10m, 3;4m, 4;slow, 5;LB, 6;flat, mod |
| 9060406 | Kam | 11 2.178 | 104 14.8 | 59 m | br mdg S | 1;sand, mud & soil, 2;12m, 3;12m, 4;slow, 5;LB, 6;flat, mod |
| 9060407 | Kam | 10 51.452 | 104 14.175 | 17 m | br fng S | 1;sand & mud, 2;20m, 3;20m, 4;slow, 5;LB, 6;flat, mod |
| 9060408 | Kam | 10 52.902 | 104 9.237 | 41 m | br csg S & G | 1;basement rock (silicic and gr csg St), 2;30m, 3;30m, 4.rapid, 5;holm near LB 6;mod, close |
| 9060409 | Kam | 10 55.868 | 104 25.618 | 48 m | l-rd-br fng S | 1;sand, 2;15m, 3;2m, 4;mod, 5;LB, 6;flat, very far |
| 9060410 | Kam | 11 0.668 | 104 27.363 | 57 m | rd-br csg S | 1;sand, 2;20m, 3;5m, 4;mod, 5;LB, 6;flat, very far |
| 9060503 | Kam | 10 42.783 | 104 10.58 | 8 m | br-yl v-fng S | 1;fng sand & mud, 2;50m, 3;50m, 4;slow, 5;LB, 6;flat, far |
| 9060504 | Keb | 10 33.928 | 104 16.339 | 3 m | l-br-gy v-fng S | 1;v-fng sand & blk organic mud, 2;5m, 3;3m, 4;stagnant, 5;RB, 6;flat, far |
| 9060505 | Keb | 10 30.223 | 104 17.268 | 1 m | d-br-gy mdg S | 1;mdg sand & pebble, 2;3m, 5;water's edge, 6;mod, near |
| 9060510 | Keb | 10 27.397 | 104 23.222 | 5 m | l-gy mdg S | 1;mdg sand, 2;10m, 5;water's edge, 6;mod, 200m |
| 9060801 | KChhn | 12 2.726 | 104 19.052 | 104 m | l-br csg S | 1;Csg sand, 2;20m, 3;20m, 4;mod, 5;flow centre, 6;Flat-mod, near |
| 9060803 | KChhn | 12 3.695 | 104 20.554 | 91 m | gy fng & wt csg S | 1;fng-csg sand, 2;22m, 3;4m, 4;mod, 5;LB, 6;mod, near |
| 9060804 | KChhn | 12 3.5 | 104 22.146 | 84 m | p-br-wt csg S | 1;csg sand, 2;7m, 3;5m, 4;mod, 5;holm, 6;mod, near |
| 9060805 | KChhn | 12 3.502 | 104 22.17 | 82 m | brn csg S | 1;csg sand, 2;5-20m, 3;2-5m, 4;mod, 5;RB, 6;mod, near |
| 9060806 | KChhn | 12 14.154 | 104 16.948 | 54 m | p-br csg S & G | 1;sand, 2;20m, 3;6m, 4;mod, 5;RB, 6;mod, mod |
| 9060807 | Pur | 12 18.151 | 104 10.675 | 61 m | br csg S | 1;fng-csg sand, 2;15m, 3;8m, 4;slow, 5;LB, 6;flat, far |
| 9060808 | Pur | 12 18.884 | 104 10.625 | 58 m | br fng-csg S | 1;fng-csg sand, 2;12-30m, 3;12-30m, 4;mod, 5;flow centre, 6;flat, far |
| 9060901 | Pur | 12 18.376 | 103 33.757 | 37 m | br-gy fng S | 1;fng sand, 2;35m, 3;18m, 4;fast, 5;LB, 6;mod, near |
| 9060902 | Pur | 12 19.444 | 103 30.638 | 49 m | br fng-mdg S | 1;sandstone, 2;15m, 3;2m, 4;rapid, 5;flow centre, 6;mod, on the outcrop |
| 9060904 | Pur | 12 19.083 | 103 30.318 | 46 m | gy muddy fng S | 1;fng sand & mud, 2;51m, 3;51m, 4;slow, 5;LB, 6;flat, close |
| 9060906 | Pur | 12 19.662 | 103 8.8 | 206 m | br csg S & G | 1;csg sand-boulder, 2;10m, 3;10m, 4;fast, 5;RB, 6;mod, close |
| 9060907 | Pur | 12 18.512 | 103 6.601 | 214 m | br-gy mdg-csg S | 1;mdg sand-granule, 2;10m, 3;10m, 4;mod, 5;LB, 6;mod, close |
| 9060908 | Pur | 12 17.582 | 103 4.513 | 226 m | br-gy mdg-csg S | 1;csg sand-pebble & basement rock, 2;8m, 3;5m, 4;fast, 5;LB, 6;steep, on the outcrop |
| 9061003 | BMC | 13 35.425 | 103 24.222 | 11 m | l-gy fng S | 1;fng sand, 2;46m, 3;38m, 4;slow, 5;RB, 6;flat, far |
| 9061004 | BMC | 13 36.378 | 103 18.899 | 11 m | l-gy fng S | 1;fng sand-mud, 2;51m, 3;51m, 4;stag, 5;LB, 6;flat, far |
| 9061102 | SR | 13 51.261 | 103 48.016 | 38 m | l-br sandy Mud | 1;mud, 2;30m, 3;10m, 4;slow, 5;LB, 6;flat, far |
| 9061103 | SR | 13 50.895 | 103 49.213 | 42 m | l-br muddy v-fng S | 1;v-fng sand & mud, 2;8m, 3;8m, 4;slow, 5;RB, 6;flat, mod |

# Appendix V-9 Sample List of Geochemical Analysis

| Sample ID | Province | Latitude N | Longitude E | Elev. | Sand properties | Description |
|---|---|---|---|---|---|---|
| 9061104 | SR | 13 50.427 | 103 54.387 | 49 m | l-br fng S | 1;fng sand & mud, 2;11m, 3;11m, 4;stugnant, 5;LB, 6;flat, mod |
| 9061105 | SR | 13 47.889 | 104 0.513 | 59 m | rd-br v-fng S | 1;fng sand, 2;110m, 3;2m, 4;no water, 5;RB, 6;mod, near |
| 9061203 | OMC | 14 8.368 | 103 55.964 | 41 m | br rhyolite S | 1;Ry Br brechhv-fng sand & mud, 2;8m, 3;8m, 4;slow, 5;RB, 6;flat, mod |
| 9061205 | OMC | 14 10.735 | 103 58.672 | 39 m | l-br fng S | 1;sand & gravel, 2;10m, 3;4m, 4;pool, 5;LB, 6;mod, near |
| 9061401 | SR | 13 25.295 | 104 24.41 | 33 m | l-gy fng-mdg S | 1;fng sand & mud, 2;20.5m, 3;20.5m, 4;mod, 5;LB, 6;flat, far |
| 9061402 | SR | 13 25.193 | 104 29.115 | 44 m | gy fng S & sdy Mud | 1;fng sand, mud & leterite pebble, 2;7m, 3;7m, 4;slow, 5;LB, 6;flat, far |
| 9061403 | SR | 13 25.314 | 104 30.504 | 44 m | gy mudy fng S | 1;mud & v-fng sand, 2;10m, 3;10m, 4;stagnant, 5;LB, 6;flat, far |
| 9061404 | SR | 13 25.376 | 104 31.276 | 44 m | rd-br fng S | 1;angular gravel,mud & sand, 2;7m, 3;0-7m, 4;pool, 5;LB, 6;mod, mod |
| 9061501 | KT | 12 32.142 | 105 17.51 | 20 m | yl-bn fng S | 1;sand & mud, 2;50m, 3;50m, 4;slow, 5;RB, 6;flat, mod |
| 9061502 | KT | 12 36.928 | 105 28.138 | 46 m | gy v-fng S | 1;sand & mud, 2;7m, 3;7m, 4;mod, 5;LB, 6;mod, near |
| 9061504 | KT | 12 39.752 | 105 27.447 | 70 m | p-rd-bn-wt fng S | 1;sand, 2;1m, 3;dry, 4;-, 5;centre, 6;mod, close |
| 9061505 | KT | 12 39.904 | 105 27.049 | 55 m | p-bn-wt fng-mod S | 1;sand, 2;8m, 3;8m, 4;mod, 5;RB, 6;mod, close |
| 9061506 | KT | 12 39.091 | 105 28.611 | 50 m | p-bn-wt csg S | 1;gravel & sand, 2;8m, 3;2m, 4;flat, 5;LB, 6;mod, near |
| 9061508 | KT | 12 40.521 | 105 30.757 | 97 m | gy mdg S w/breccia | soil on a trail |
| 9061601 | KS | 11 43.024 | 103 52.171 | 132 m | br csg S | 1;gravel & sand, 2;7m, 3;3m, 4;mod, 5;RB, 6;mod, close |
| 9061602 | KS | 11 42.721 | 103 53.938 | 129 m | br mdg S | 1;gravel, 2;10m, 3;5m, 4;mod, 5;centre, 6;mod, close, sample sieved 1.15mm |
| 9061603 | KS | 11 42.505 | 103 54.874 | 124 m | br fng S | 1;gravel & sand, 2;15m, 3;10m, 4;mod, 5;centre, 6;mod, close |
| 9061604 | KS | 11 42.173 | 103 56.592 | 115 m | br csg S | 1;boulder & sand, 2;8m, 3;8m, 4;stagnant, 5;centre, 6;mod, close |
| 9061605 | KS | 11 43.196 | 104 0.038 | 95 m | br-l-gy csg S | 1;gravel & sand, 2;10m, 3;10m, 4;slow, 5;centre, 6;mod, close |
| 9061606 | KS | 11 42.466 | 104 5.912 | 74 m | br-wt csg S | 1;granule & sand, 2;20m, 3;5m, 4;mod, 5;centre, 6;mod, near |
| 9061607 | KS | 11 41.266 | 104 7.96 | 76 m | yl-br-wt csg S & G | 1;granule & sand, 2;30m, 3;10m, 4;mod, 5;RB, 6;mod, near |
| 9061608 | KS | 11 38.95 | 104 11.798 | 71 m | br S | 1;gravel & sand, 2;14.5m, 3;2m, 4;slow, 5;centre, 6;mod, near, sample sieve( 1.15mm |
| 9061609 | KS | 11 37.597 | 104 14.847 | 92 m | br S | 1;gravel & sand, 2;7m, 3;0.5m, 4;slow, 5;LB, 6;mod, near, sample sieved 1.15mm |
| 9061701 | Tak | 10 39.385 | 104 52.113 | 3 m | l-br fng S | lake sediment, 1;sandy mud, 5;lake side, 6;flat, near |
| 9061707 | Tak | 10 33.934 | 104 51.151 | 12 m | l-gy mdg-csg S | 1;granule & csg sand, 2;6m, 3;6m, 4;mod, 5;RB, 6;mod, close |
| 9061708 | Tak | 10 34.643 | 104 47.967 | 6 m | l-br-wt fng S | 1;fng-csg sand, 2;6m, 3;6m, 4;slow, 5;centre, 6;mod, near |
| 9080601 | Kra | 13 2.426 | 106 10.919 | 43 m | br fng S | 1;fng sand, 2;71.5m, 3;71.5m, 4;slow, 5;RB, 6;flat, far |
| 9080602 | Kra | 13 9.08 | 106 8.765 | 45 m | l-br fng S | 1;fng sand, 2;54m, 3;52m, 4;mod, 5;LB, 6;flat, far |

# Appendix V-9 Sample List of Geochemical Analysis

| Sample ID | Province | Latitude N | Longitude E | Elev. | Sand properties | Description |
|---|---|---|---|---|---|---|
| 9080701 | ST | 13 30.05 | 106 21.177 | 60 m | br fng S | 1;fng sand, 2;227m, 3;227m, 4;fast, 5;LB, 6;flat, far |
| 9080702 | RK | 13 27.75 | 106 38.566 | 81 m | br v-fng S | 1;v-fng sand, 2;281m, 3;281m, 4;mod, 5;LB, 6;flat, far |
| 9080708 | RK | 13 28.508 | 106 59.798 | 97 m | bn-gy v-fng S | 1;v-fng sand, 2;236m, 3;236m, 4;mod, 5;RB, 6;flat, far |
| 9080802 | RK | 13 58.447 | 106 48.883 | 92 m | br fng S | 1;fng-csg sand, 2;340m, 3;340m, 4;mod, 5;LB, 6;flat, far |
| 9080804 | RK | 13 35.47 | 106 48.506 | 124 m | bn csg S & G | 1;pebble & csg sand, 2;4m, 3;4m, 4;fast, 5;LB, 6;mod, near |
| 9080901 | Kra | 12 27.211 | 106 10.588 | 23 m | l-br fng S | 1;fng sand & mud, 2;7m, 3;7m, 4;slow, 5;RB, 6;flat, far |
| 9080902 | Kra | 12 28.516 | 106 12.954 | 27 m | l-br fng S | 1;fng sand, 2;5m, 3;5m, 4;slow, 5;LB, 6;flat, far |
| 9080903 | Kra | 12 30.208 | 106 15.527 | 39 m | l-gy fng-mdg S | 1;fng sand & pebble, 2;8m, 3;4m, 4;mod, 5;RB, 6;flat, far |
| 9080904 | Kra | 12 24.847 | 106 13.824 | 28 m | br mdg S | 1;mdg sand & boulder, 2;10m, 3;9m, 4;slow, 5;LB, 6;flat, far |
| 9080905 | Kra | 12 23.597 | 106 14.434 | 27 m | br fng S | 1;sand & gravel, 2;65m, 3;64m, 4;fast, 5;LB, 6;flat, far |
| 9081004 | MK | 12 59.994 | 107 8.031 | 165 m | br fng S | 1;fng sand, 2;15m, 3;15m, 4;mod, 5;LB, 6;mod, mod |
| 9081005 | MK | 13 1.76 | 107 3.261 | 141 m | br fng S | 1;sand, 2;20m, 3;20m, 4;fast, 5;LB, 6;mod, close |
| 9081007 | MK | 13 3.679 | 107 2.606 | 138 m | br fng S | 1;sand, 2;41m, 3;41m, 4;fast, 5;LB, 6;mod, close |
| 9081102 | Kra | 12 24.699 | 106 16.955 | 36 m | br S | 1;sand & boulder, 2;5m, 3;3m, 4;fast, 5;LB, 6;mod, close, sample sieved 0.6mm a the site |
| 9081103 | Kra | 12 24.697 | 106 16.959 | 37 m | br S | 1;sand & boulder, 2;7m, 3;7m, 4;fast, 5;centre, 6;mod, close, sample sieved 0.6mr at the site |
| 9081301 | PV | 13 50.333 | 104 41.735 | 43 m | l-br fng S | 1;fng sand, 2;5m, 3;5m, 4;mod, 5;LB, 6;flat, far |
| 9081302 | PV | 13 45.779 | 104 44.283 | 57 m | l-br fng S | 1;fng sand, 2;20m, 3;20m, 4;mod, 5;LB, 6;flat, near |
| 9081303 | PV | 13 46.697 | 104 39.298 | 61 m | l-br fng S | 1;fng sand, 2;5m, 3;4m, 4;slow, 5;LB, 6;flat, mod |
| 9081304 | PV | 13 45.611 | 104 37.778 | 64 m | l-br fng S | 1;fng sand, 2;5m, 3;4m, 4;mod, 5;RB, 6;mod, close |
| 9081701 | SR | 13 53.912 | 103 32.158 | 16 m | l-br fng S | 1;sand, 2;36m, 3;36m, 4;mod, 5;LB, 6;flat, far |
| 9081702 | OMC | 14 10.406 | 103 29.267 | 41 m | br mdg S | 1;laterite gravel & sand, 2;4mx2, 3;4mx2, 4;slow, 5;centre, 6;flat, far, sample sieved 0.6mm at the site |
| 9081703 | OMC | 14 10.519 | 103 24.012 | 39 m | br fng S | 1;fng sand & mud, 2;5m, 3;5m, 4;slow, 5;LB, 6;flat, far |
| 9081704 | OMC | 14 9.814 | 103 16.017 | 46 m | br fng S | 1;fng sand & mud, 2;5m, 3;5m, 4;stangnant, 5;RB, 6;flat, far |
| 9081705 | BMC | 13 57.071 | 103 2.912 | 43 m | br mdg S | 1;fng sand, mud & laterite gravel, 2;5m, 3;5m, 4;stangnant, 5;RB, 6;flat, far |
| 9081801 | Bat | 12 49.723 | 102 54.628 | 38 m | br v-fng S | 1;sand, mud & gravel, 2;50m, 3;50m, 4;mod, 5;LB, 6;mod, near |
| 9081802 | Bat | 12 42.752 | 102 57.428 | 58 m | br mdg-fng S | 1;mud & sand, 2;44m, 3;44m, 4;slow, 5;RB, 6;mod, close |
| 9081803 | Bat | 12 43.355 | 102 48.54 | 84 m | g-gy csg S | 1;sand & boulder, 2;10m, 3;10m, 4;mod, 5;LB, 6;mod, near |

# Appendix V-9 Sample List of Geochemical Analysis

| Sample ID | Province | Latitude N | Longitude E | Elev. | Sand properties | Description |
|---|---|---|---|---|---|---|
| 9081804 | Bat | 12 42.945 | 102 46.177 | 101 m | br-gy csg S | 1;sand & boulder, 2;30m, 3;30m, 4;mod-fast, 5;RB, 6;mod, close |
| 9081805 | Pai | 12 52.606 | 102 36.179 | 150 m | br fng S | 1;sand & gravel, 2;8m, 3;4m, 4;fast, 5;RB, 6;mod, on the outcrop |
| 9081806 | Pai | 12 53.279 | 102 35.41 | 145 m | l-br fng S | 1;sand & gravel, 2;25m, 3;25m, 4;fast, 5;RB, 6;mod, close |
| 9081807 | Pai | 13 1.282 | 102 35.106 | 68 m | l-br v-fng S | 1;mud & boulder, 2;32m, 3;32m, 4;rapid, 5;RB, 6;mod, near |
| 9082001 | KK | 11 8.311 | 103 46.257 | 2 m | wt v-fng S | 1;mud, 2;274m, 3;274m, 4;stagnant, 5;RB, 6;flat, close |
| 9082002 | KK | 11 23.023 | 103 15.375 | 6 m | wt csg S | 1;snd & mud, 2;185m, 3;185m, 4;stagnant, 5;LB, 6;flat, near |
| 9082003 | KK | 11 33.91 | 103 7.672 | 18 m | wt csg S & G | 1;snd, 2;210m, 3;210m, 4;slow, 5;centre, 6;mod, near, sample sieved 0.6mm at th site |
| 9082004 | KK | 11 41.249 | 103 25.653 | 390 m | br-wt mdg S | 1;gravel & boulder, 2;40m, 3;40m, 4;fast, 5;LB, 6;mod, close |
| 9082101 | KK | 11 43.894 | 103 4.618 | 0 m | l-br fng S | 1;sand & mud, 2;171m, 3;171m, 4;slow, 5;LB, 6;flat, on the outcrop |
| 9082102 | KK | 11 43.21 | 103 0.121 | 0 m | wt mdg S | 1;sand, 2;1km, 3;1km, 4;slow, 5;left centre, 6;flat, close |
| 9082103 | KK | 11 42.898 | 102 58.115 | 2 m | wt mdg S | 1;sand, 2;600m, 3;600m, 4;stagnant, 5;holm, 6;flat, close |
| 9082301 | Tak | 10 59.628 | 104 58.606 | 5 m | l-br fng S | 1;sand & mud, 2;89m, 3;89m, 4;slow, 5;RB, 6;flat, far |
| 9111101 | ST | 13 36.096 | 105 55.247 | 46 m | br csg S | 1;laterite gravel, 2;10m, 3;8m, 4;mod, 5;RB, 6;mod, far |
| 9111102 | ST | 13 37.946 | 105 45.256 | 75 m | l-br fng S | 1;sand & gravel, 2;8m, 3;4m, 4;mod, 5;LB, 6;mod, far |
| 9111103 | ST | 13 38.368 | 105 42.685 | 93 m | br csg S | 1;sand & gravel, 2;10m, 3;6m, 4;mod, 5;RB, 6;mod, far |
| 9111104 | ST | 13 37.095 | 105 50.283 | 68 m | gy-br mdg S | 1;sand & mud, 2;15m, 3;15m, 4;slow, 5;centre, 6;flat, far |

1; river/beach bed material, 2; width of river bed/beach, 3; width of river flow, 4; flow speed, 5; sample point, 6; slope of the river/beach, distance to an outcrop in upper reaches

**Abbreviations**

**color**
d: dark
l: light
p: pale
gr: green
gy: gray
bk: black
wt: white
rd: red
br: brown
pk: pink

**size**
fng: fine grain
csg: corse grain
mdg: medium grain
sdy: sandy

**geology**
S: sand
G: granule
M: mud
R: rock
Gv: gravel
Cg: conglomerate
Qz: quartz

**others**
RB: right bank
LB: left bank
w: width
mod: moderate
av: average

**province**
KS: Kampong Speu
Kam: Kampot
Keb: Keb
KChhn: Kampong Chhnang
Pur: Pursat
BMC: Banteay Mean Chey
SR: Siem Reap
OMC: Odar Mean Chey
KT: Kampong Thom
Tak: Takeo
RK: Rattanakiri
MK: Modulkiri
PV: Preah Vihear
Bat: Battambang
Pai: Pailin
KK: Koh Kong

# Appendix V-9 Sample List of Geochemical Analysis

| Sample ID | Province | Latitude N | Longitude E | Elev. | Sand properties | Description |
|---|---|---|---|---|---|---|
| pp: purple | | | | | | Kra: Kratie |
| yl: yellow | | | | | | ST: Stung Treng |

# Appendix V-10 Results of Geochemical Analysis

| | | | GPS | | | |
|---|---|---|---|---|---|---|
| | SAMPLE ID | Province | Latitude N | Longitude E | Elev. | Legend of Area |
| 1 | 9060401 | KS | 11 12.869 | 104 14.416 | 83 m | KS |
| 2 | 9060402 | KS | 11 11.646 | 104 14.38 | 87 m | Kampon Speu |
| 3 | 9060406 | Kam | 11 2.178 | 104 14.8 | 59 m | |
| 4 | 9060407 | Kam | 10 51.452 | 104 14.175 | 17 m | Kam |
| 5 | 09060408A | Kam | 10 52.902 | 104 9.237 | 41 m | Kampot |
| 6 | 09060408B | | | | | |
| 7 | 9060409 | Kam | 10 55.868 | 104 25.618 | 48 m | Keb |
| 8 | 9060410 | Kam | 11 0.668 | 104 27.363 | 57 m | Keb |
| 9 | 9060503 | Kam | 10 42.783 | 104 10.58 | 8 m | |
| 10 | 9060504 | Keb | 10 33.928 | 104 16.339 | 3 m | KChhn |
| 11 | 9060505 | Keb | 10 30.223 | 104 17.268 | 1 m | Kampong Chhnang |
| 12 | 9060510 | Keb | 10 27.397 | 104 23.222 | 5 m | |
| 13 | 9060801 | KChhn | 12 2.726 | 104 19.052 | 104 m | Pur |
| 14 | 9060803 | KChhn | 12 3.695 | 104 20.554 | 91 m | Pursat |
| 15 | 9060804 | KChhn | 12 3.5 | 104 22.146 | 84 m | |
| 16 | 9060805 | KChhn | 12 3.502 | 104 22.17 | 82 m | BMC |
| 17 | 9060806 | KChhn | 12 14.154 | 104 16.948 | 54 m | Banteay Mean Chey |
| 18 | 09060807A | Pur | 12 18.151 | 104 10.675 | 61 m | |
| 19 | 09060807B | | | | | SR |
| 20 | 9060808 | Pur | 12 18.884 | 104 10.625 | 58 m | Siem Reap |
| 21 | 9060901 | Pur | 12 18.376 | 103 33.757 | 37 m | |
| 22 | 9060902 | Pur | 12 19.444 | 103 30.638 | 49 m | OMC |
| 23 | 9060904 | Pur | 12 19.083 | 103 30.318 | 46 m | Odar Mean Chey |
| 24 | 9060906 | Pur | 12 19.662 | 103 8.8 | 206 m | |
| 25 | 9060907 | Pur | 12 18.512 | 103 6.601 | 214 m | KT |
| 26 | 09060908A | Pur | 12 17.582 | 103 4.513 | 226 m | Kampong Thom |
| 27 | 09060908B | | | | | |
| 28 | 9061003 | BMC | 13 35.425 | 103 24.222 | 11 m | Tak |
| 29 | 9061004 | BMC | 13 36.378 | 103 18.899 | 11 m | Takeo |
| 30 | 9061102 | SR | 13 51.261 | 103 48.016 | 38 m | |
| 31 | 9061103 | SR | 13 50.895 | 103 49.213 | 42 m | Kra |
| 32 | 9061104 | SR | 13 50.427 | 103 54.387 | 49 m | Kratie |
| 33 | 9061105 | SR | 13 47.889 | 104 0.513 | 59 m | |
| 34 | 9061203 | OMC | 14 8.368 | 103 55.964 | 41 m | ST |
| 35 | 9061205 | OMC | 14 10.735 | 103 58.672 | 39 m | Stung Treng |
| 36 | 9061401 | SR | 13 25.295 | 104 24.41 | 33 m | |
| 37 | 9061402 | SR | 13 25.193 | 104 29.115 | 44 m | RK |
| 38 | 9061403 | SR | 13 25.314 | 104 30.504 | 44 m | Rattanakiri |
| 39 | 9061404 | SR | 13 25.376 | 104 31.276 | 44 m | |
| 40 | 9061501 | KT | 12 32.142 | 105 17.51 | 20 m | MK |
| 41 | 9061502 | KT | 12 36.928 | 105 28.138 | 46 m | Mondulkiri |
| 42 | 9061504 | KT | 12 39.752 | 105 27.447 | 70 m | |
| 43 | 9061505 | KT | 12 39.904 | 105 27.049 | 55 m | PV |
| 44 | 9061506 | KT | 12 39.091 | 105 28.611 | 50 m | Preah Vihear |
| 45 | 9061508 | KT | 12 40.521 | 105 30.757 | 97 m | |
| 46 | 9061601 | KS | 11 43.024 | 103 52.171 | 132 m | |
| 47 | 9061602 | KS | 11 42.721 | 103 53.938 | 129 m | |
| 48 | 9061603 | KS | 11 42.505 | 103 54.874 | 124 m | |
| 49 | 9061604 | KS | 11 42.173 | 103 56.592 | 115 m | |
| 50 | 9061605 | KS | 11 43.196 | 104 0.038 | 95 m | |
| 51 | 9061606 | KS | 11 42.466 | 104 5.912 | 74 m | |

# Appendix V-10 Results of Geochemical Analysis

| | | Au | Ag | Al | As | B | Ba | Be | Bi | Ca | Cd | Co | Cr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE ID | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm |
| 1 | 9060401 | <0.001 | 0.2 | 0.23 | <2 | <10 | 40 | <0.5 | <2 | 0.05 | <0.5 | 2 | 6 |
| 2 | 9060402 | 0.001 | <0.2 | 0.2 | 17 | <10 | 40 | <0.5 | <2 | 0.08 | <0.5 | 1 | 7 |
| 3 | 9060406 | 0.001 | <0.2 | 0.56 | 21 | <10 | 60 | <0.5 | 3 | 0.06 | <0.5 | 3 | 11 |
| 4 | 9060407 | <0.001 | <0.2 | 0.4 | <2 | <10 | 40 | <0.5 | <2 | 0.04 | <0.5 | 3 | 8 |
| 5 | 09060408A | <0.001 | <0.2 | 1.83 | <2 | <10 | 70 | <0.5 | <2 | 0.55 | <0.5 | 19 | 87 |
| 6 | 09060408B | <0.001 | <0.2 | 2.1 | 14 | <10 | 90 | 0.7 | <2 | 0.56 | <0.5 | 31 | 138 |
| 7 | 9060409 | <0.001 | <0.2 | 0.1 | <2 | <10 | 40 | <0.5 | <2 | 0.01 | <0.5 | 1 | 2 |
| 8 | 9060410 | <0.001 | <0.2 | 0.15 | 2 | <10 | 40 | <0.5 | <2 | 0.03 | <0.5 | 1 | 6 |
| 9 | 9060503 | <0.001 | <0.2 | 0.33 | <2 | <10 | 40 | <0.5 | <2 | 0.05 | <0.5 | 3 | 11 |
| 10 | 9060504 | <0.001 | <0.2 | 0.28 | <2 | <10 | 20 | <0.5 | <2 | 0.03 | <0.5 | <1 | 7 |
| 11 | 9060505 | <0.001 | 0.2 | 1.12 | 50 | 60 | 10 | 1.7 | <2 | 0.13 | <0.5 | 15 | 30 |
| 12 | 9060510 | <0.001 | 0.2 | 0.07 | <2 | <10 | 20 | <0.5 | <2 | 0.03 | <0.5 | 1 | 5 |
| 13 | 9060801 | <0.001 | <0.2 | 0.52 | <2 | <10 | 30 | <0.5 | 2 | 0.06 | <0.5 | 1 | 2 |
| 14 | 9060803 | <0.001 | <0.2 | 0.36 | <2 | <10 | 20 | <0.5 | <2 | 0.05 | <0.5 | 1 | 4 |
| 15 | 9060804 | <0.001 | <0.2 | 0.24 | <2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | <1 | 3 |
| 16 | 9060805 | <0.001 | <0.2 | 0.24 | <2 | <10 | 20 | <0.5 | <2 | 0.02 | <0.5 | 1 | 3 |
| 17 | 9060806 | <0.001 | <0.2 | 0.2 | <2 | <10 | 20 | <0.5 | <2 | 0.11 | <0.5 | 1 | 2 |
| 18 | 09060807A | <0.001 | <0.2 | 0.82 | <2 | <10 | 30 | 0.5 | <2 | 0.29 | <0.5 | 2 | 7 |
| 19 | 09060807B | 0.001 | <0.2 | 0.27 | <2 | <10 | 20 | <0.5 | <2 | 0.03 | <0.5 | 1 | 2 |
| 20 | 9060808 | <0.001 | <0.2 | 0.3 | <2 | <10 | 20 | <0.5 | 2 | 0.03 | <0.5 | 1 | 3 |
| 21 | 9060901 | <0.001 | <0.2 | 0.51 | <2 | <10 | 30 | <0.5 | <2 | 0.08 | <0.5 | 4 | 28 |
| 22 | 9060902 | <0.001 | <0.2 | 0.12 | <2 | <10 | 20 | <0.5 | <2 | 0.01 | <0.5 | 1 | 8 |
| 23 | 9060904 | <0.001 | <0.2 | 1.01 | <2 | <10 | 60 | <0.5 | <2 | 0.18 | <0.5 | 9 | 50 |
| 24 | 9060906 | <0.001 | <0.2 | 1.45 | 6 | <10 | 60 | 0.6 | <2 | 0.28 | <0.5 | 10 | 45 |
| 25 | 9060907 | <0.001 | <0.2 | 2.5 | 7 | <10 | 110 | 0.7 | 2 | 0.58 | <0.5 | 21 | 45 |
| 26 | 09060908A | <0.001 | <0.2 | 3.4 | 5 | <10 | 60 | 0.7 | <2 | 2.85 | <0.5 | 64 | 485 |
| 27 | 09060908B | <0.001 | <0.2 | 3.44 | <2 | <10 | 80 | 0.7 | <2 | 2.57 | <0.5 | 71 | 486 |
| 28 | 9061003 | <0.001 | <0.2 | 0.14 | <2 | <10 | 40 | <0.5 | <2 | 0.03 | <0.5 | 2 | 10 |
| 29 | 9061004 | 0.001 | 0.2 | 0.49 | <2 | <10 | 30 | <0.5 | <2 | 0.03 | <0.5 | 2 | 9 |
| 30 | 9061102 | <0.001 | <0.2 | 1.15 | <2 | <10 | 70 | 0.6 | <2 | 0.07 | <0.5 | 14 | 18 |
| 31 | 9061103 | <0.001 | <0.2 | 0.56 | 2 | <10 | 80 | <0.5 | <2 | 0.04 | <0.5 | 13 | 26 |
| 32 | 9061104 | <0.001 | <0.2 | 0.17 | <2 | <10 | 30 | <0.5 | <2 | 0.01 | <0.5 | 2 | 10 |
| 33 | 9061105 | <0.001 | <0.2 | 1.64 | <2 | <10 | 1200 | 1.8 | <2 | 0.57 | <0.5 | 16 | 24 |
| 34 | 9061203 | <0.001 | <0.2 | 0.7 | <2 | <10 | 70 | <0.5 | 2 | 0.23 | <0.5 | 10 | 101 |
| 35 | 9061205 | 0.002 | <0.2 | 0.22 | <2 | <10 | 710 | <0.5 | <2 | 0.02 | <0.5 | 1 | 11 |
| 36 | 9061401 | <0.001 | <0.2 | 0.61 | <2 | <10 | 40 | <0.5 | <2 | 0.06 | <0.5 | 3 | 15 |
| 37 | 9061402 | <0.001 | <0.2 | 1.08 | <2 | <10 | 70 | <0.5 | <2 | 0.14 | <0.5 | 14 | 29 |
| 38 | 9061403 | 0.001 | <0.2 | 0.74 | 3 | <10 | 50 | <0.5 | <2 | 0.09 | <0.5 | 6 | 12 |
| 39 | 9061404 | <0.001 | <0.2 | 0.58 | 2 | <10 | 40 | <0.5 | <2 | 0.11 | <0.5 | 8 | 36 |
| 40 | 9061501 | <0.001 | <0.2 | 0.48 | <2 | <10 | 50 | <0.5 | <2 | 0.01 | <0.5 | 2 | 16 |
| 41 | 9061502 | <0.001 | <0.2 | 0.48 | <2 | <10 | 40 | <0.5 | <2 | 0.01 | <0.5 | 1 | 9 |
| 42 | 9061504 | <0.001 | <0.2 | 0.12 | <2 | <10 | 40 | <0.5 | <2 | <0.01 | <0.5 | <1 | 16 |
| 43 | 9061505 | <0.001 | <0.2 | 0.11 | <2 | <10 | 50 | <0.5 | <2 | 0.01 | <0.5 | <1 | 4 |
| 44 | 9061506 | <0.001 | <0.2 | 0.3 | <2 | <10 | 50 | <0.5 | <2 | 0.01 | <0.5 | <1 | 9 |
| 45 | 9061508 | <0.001 | 0.2 | 1.07 | <2 | <10 | 10 | <0.5 | <2 | <0.01 | <0.5 | <1 | 40 |
| 46 | 9061601 | <0.001 | 0.2 | 0.58 | 3 | <10 | 50 | <0.5 | <2 | 0.06 | <0.5 | 3 | 9 |
| 47 | 9061602 | <0.001 | <0.2 | 0.46 | <2 | <10 | 30 | <0.5 | 2 | 0.05 | <0.5 | 3 | 11 |
| 48 | 9061603 | <0.001 | <0.2 | 0.55 | 9 | <10 | 50 | <0.5 | <2 | 0.14 | <0.5 | 6 | 19 |
| 49 | 9061604 | <0.001 | <0.2 | 0.55 | 3 | <10 | 50 | <0.5 | <2 | 0.13 | <0.5 | 4 | 12 |
| 50 | 9061605 | <0.001 | 0.2 | 0.35 | <2 | <10 | 30 | <0.5 | <2 | 0.05 | <0.5 | 3 | 12 |
| 51 | 9061606 | <0.001 | <0.2 | 0.27 | <2 | <10 | 30 | <0.5 | <2 | 0.05 | <0.5 | 2 | 7 |

# Appendix V-10 Results of Geochemical Analysis

| | | Cu | Fe | Ga | Hg | K | La | Mg | Mn | Mo | Na | Ni | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE ID | ppm | % | ppm | ppm | % | ppm | % | ppm | ppm | % | ppm | ppm |
| 1 | 9060401 | 3 | 0.82 | <10 | <1 | 0.03 | 10 | 0.03 | 174 | <1 | 0.01 | 2 | 50 |
| 2 | 9060402 | 3 | 0.91 | <10 | <1 | 0.04 | <10 | 0.03 | 164 | <1 | 0.01 | 1 | 30 |
| 3 | 9060406 | 5 | 1.34 | <10 | <1 | 0.12 | 20 | 0.04 | 232 | <1 | 0.02 | 3 | 90 |
| 4 | 9060407 | 3 | 0.87 | <10 | <1 | 0.05 | 10 | 0.04 | 77 | <1 | 0.01 | 2 | 60 |
| 5 | 09060408A | 20 | 3.87 | 10 | <1 | 0.09 | 10 | 0.49 | 585 | 1 | 0.04 | 19 | 150 |
| 6 | 09060408B | 31 | 7.19 | 10 | <1 | 0.1 | 10 | 0.63 | 830 | 1 | 0.04 | 28 | 210 |
| 7 | 9060409 | 1 | 0.53 | <10 | <1 | 0.04 | <10 | <0.01 | 96 | <1 | 0.01 | <1 | 20 |
| 8 | 9060410 | 1 | 0.56 | <10 | <1 | 0.04 | 10 | 0.02 | 137 | <1 | 0.01 | <1 | 20 |
| 9 | 9060503 | 3 | 1 | <10 | <1 | 0.04 | 10 | 0.04 | 126 | <1 | 0.01 | 2 | 50 |
| 10 | 9060504 | 5 | 0.51 | <10 | <1 | 0.03 | <10 | 0.03 | 41 | <1 | 0.11 | 1 | 30 |
| 11 | 9060505 | 4 | 8.86 | <10 | <1 | 0.93 | 20 | 0.94 | 408 | 1 | 0.2 | 9 | 410 |
| 12 | 9060510 | 7 | 0.66 | <10 | <1 | 0.04 | <10 | 0.04 | 72 | <1 | 0.18 | <1 | 40 |
| 13 | 9060801 | 1 | 0.84 | <10 | <1 | 0.14 | <10 | 0.05 | 225 | <1 | 0.05 | <1 | 60 |
| 14 | 9060803 | 1 | 0.62 | <10 | <1 | 0.13 | 10 | 0.02 | 81 | <1 | 0.03 | 1 | 40 |
| 15 | 9060804 | 1 | 0.47 | <10 | <1 | 0.14 | <10 | <0.01 | 47 | <1 | 0.02 | <1 | 20 |
| 16 | 9060805 | 1 | 0.54 | <10 | <1 | 0.14 | <10 | 0.01 | 248 | <1 | 0.03 | <1 | 20 |
| 17 | 9060806 | <1 | 0.45 | <10 | <1 | 0.08 | <10 | 0.02 | 155 | <1 | 0.02 | <1 | 30 |
| 18 | 09060807A | 5 | 1.16 | <10 | <1 | 0.22 | 10 | 0.07 | 255 | <1 | 0.06 | 2 | 60 |
| 19 | 09060807B | 1 | 0.71 | <10 | <1 | 0.14 | <10 | 0.01 | 141 | <1 | 0.03 | <1 | 30 |
| 20 | 9060808 | 2 | 0.54 | <10 | <1 | 0.14 | <10 | 0.01 | 206 | <1 | 0.03 | <1 | 30 |
| 21 | 9060901 | 5 | 1.2 | <10 | <1 | 0.05 | 10 | 0.11 | 153 | <1 | 0.02 | 15 | 100 |
| 22 | 9060902 | 1 | 0.67 | <10 | <1 | 0.02 | 10 | 0.01 | 118 | <1 | 0.01 | 2 | 60 |
| 23 | 9060904 | 11 | 2.04 | <10 | <1 | 0.08 | 10 | 0.29 | 279 | <1 | 0.02 | 36 | 220 |
| 24 | 9060906 | 12 | 2.84 | 10 | <1 | 0.13 | 10 | 0.46 | 332 | <1 | 0.04 | 32 | 240 |
| 25 | 9060907 | 36 | 5.29 | 10 | <1 | 0.22 | 10 | 0.86 | 784 | 1 | 0.03 | 41 | 340 |
| 26 | 09060908A | 74 | 6.8 | 10 | 1 | 0.05 | 10 | 4.24 | 902 | 1 | 0.04 | 409 | 490 |
| 27 | 09060908B | 78 | 7.32 | 10 | <1 | 0.06 | 10 | 4.55 | 1,120 | 1 | 0.04 | 439 | 550 |
| 28 | 9061003 | 2 | 0.65 | <10 | <1 | 0.01 | <10 | 0.02 | 68 | <1 | 0.01 | 5 | 40 |
| 29 | 9061004 | 4 | 0.72 | <10 | <1 | 0.02 | 10 | 0.02 | 73 | <1 | 0.01 | 1 | 80 |
| 30 | 9061102 | 8 | 2.17 | <10 | <1 | 0.05 | 10 | 0.07 | 1,110 | <1 | 0.02 | 6 | 70 |
| 31 | 9061103 | 12 | 1.99 | <10 | <1 | 0.03 | 10 | 0.04 | 394 | <1 | 0.01 | 8 | 50 |
| 32 | 9061104 | 2 | 0.68 | <10 | <1 | 0.02 | <10 | 0.02 | 73 | <1 | 0.01 | 2 | 40 |
| 33 | 9061105 | 9 | 2.49 | <10 | <1 | 0.33 | 30 | 0.5 | 649 | <1 | 0.03 | 33 | 460 |
| 34 | 9061203 | 13 | 2.61 | <10 | <1 | 0.03 | <10 | 0.14 | 618 | <1 | 0.02 | 11 | 80 |
| 35 | 9061205 | 2 | 0.69 | <10 | <1 | 0.02 | <10 | 0.02 | 124 | <1 | 0.01 | 1 | 40 |
| 36 | 9061401 | 8 | 1.08 | <10 | <1 | 0.04 | 10 | 0.05 | 115 | <1 | 0.02 | 5 | 100 |
| 37 | 9061402 | 18 | 2.42 | <10 | <1 | 0.03 | 10 | 0.09 | 645 | <1 | 0.02 | 11 | 230 |
| 38 | 9061403 | 18 | 1.53 | <10 | <1 | 0.03 | 10 | 0.04 | 229 | <1 | 0.01 | 7 | 200 |
| 39 | 9061404 | 12 | 2.46 | <10 | <1 | 0.03 | <10 | 0.05 | 313 | <1 | 0.02 | 6 | 180 |
| 40 | 9061501 | 4 | 0.85 | <10 | <1 | 0.01 | 10 | 0.02 | 60 | <1 | 0.01 | 4 | 70 |
| 41 | 9061502 | 3 | 0.45 | <10 | <1 | 0.01 | <10 | 0.01 | 33 | <1 | 0.01 | 1 | 30 |
| 42 | 9061504 | 1 | 0.51 | <10 | <1 | <0.01 | <10 | <0.01 | 40 | <1 | 0.01 | <1 | 10 |
| 43 | 9061505 | 1 | 0.46 | <10 | <1 | <0.01 | <10 | <0.01 | 45 | <1 | 0.01 | <1 | 20 |
| 44 | 9061506 | 5 | 0.98 | <10 | <1 | <0.01 | <10 | <0.01 | 69 | <1 | 0.01 | 1 | 30 |
| 45 | 9061508 | 15 | 1.01 | 10 | <1 | 0.01 | <10 | 0.01 | 38 | <1 | 0.01 | 1 | 140 |
| 46 | 9061601 | 4 | 1.29 | <10 | <1 | 0.14 | 10 | 0.06 | 209 | <1 | 0.02 | 2 | 70 |
| 47 | 9061602 | 4 | 1.36 | <10 | <1 | 0.09 | <10 | 0.08 | 213 | <1 | 0.02 | 3 | 80 |
| 48 | 9061603 | 8 | 1.91 | <10 | <1 | 0.13 | 10 | 0.13 | 438 | <1 | 0.03 | 8 | 160 |
| 49 | 9061604 | 4 | 1.51 | <10 | <1 | 0.09 | 10 | 0.11 | 219 | <1 | 0.02 | 4 | 90 |
| 50 | 9061605 | 3 | 1.23 | <10 | <1 | 0.07 | <10 | 0.06 | 175 | <1 | 0.02 | 3 | 70 |
| 51 | 9061606 | 1 | 0.87 | <10 | <1 | 0.1 | <10 | 0.03 | 197 | <1 | 0.02 | 1 | 40 |

# Appendix V-10 Results of Geochemical Analysis

| | | Pb | S | Sb | Sc | Sr | Th | Ti | Tl | U | V | W | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE ID | ppm | % | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm |
| 1 | 9060401 | 6 | 0.01 | <2 | 1 | 3 | <20 | <0.01 | <10 | <10 | 11 | <10 | 14 |
| 2 | 9060402 | 7 | <0.01 | <2 | <1 | 3 | <20 | <0.01 | <10 | <10 | 11 | <10 | 11 |
| 3 | 9060406 | 8 | <0.01 | 3 | 1 | 7 | <20 | 0.01 | <10 | <10 | 13 | <10 | 20 |
| 4 | 9060407 | 5 | <0.01 | <2 | 1 | 3 | <20 | 0.01 | <10 | <10 | 13 | <10 | 9 |
| 5 | 09060408A | 8 | 0.01 | <2 | 8 | 28 | <20 | 0.06 | <10 | <10 | 120 | <10 | 29 |
| 6 | 09060408B | 11 | 0.01 | <2 | 9 | 30 | <20 | 0.09 | <10 | <10 | 225 | <10 | 36 |
| 7 | 9060409 | <2 | <0.01 | 2 | <1 | 3 | <20 | <0.01 | <10 | <10 | 5 | <10 | <2 |
| 8 | 9060410 | 6 | <0.01 | <2 | <1 | 2 | <20 | <0.01 | <10 | <10 | 14 | <10 | 4 |
| 9 | 9060503 | 5 | <0.01 | <2 | 1 | 4 | <20 | 0.01 | <10 | <10 | 18 | <10 | 7 |
| 10 | 9060504 | 9 | 0.06 | <2 | 2 | 4 | <20 | <0.01 | <10 | 10 | 5 | <10 | 3 |
| 11 | 9060505 | 21 | 0.02 | <2 | 5 | 19 | <20 | 0.01 | <10 | <10 | 56 | <10 | 39 |
| 12 | 9060510 | 2 | 0.04 | <2 | <1 | 4 | <20 | 0.01 | <10 | <10 | 4 | <10 | 4 |
| 13 | 9060801 | 4 | 0.01 | <2 | 1 | 6 | <20 | 0.02 | <10 | <10 | 5 | <10 | 9 |
| 14 | 9060803 | 4 | 0.01 | <2 | 1 | 5 | 20 | 0.01 | <10 | <10 | 4 | <10 | 4 |
| 15 | 9060804 | 6 | <0.01 | <2 | <1 | 1 | <20 | <0.01 | <10 | <10 | 2 | <10 | <2 |
| 16 | 9060805 | 2 | <0.01 | <2 | <1 | 3 | <20 | <0.01 | <10 | <10 | 4 | <10 | 2 |
| 17 | 9060806 | 5 | <0.01 | <2 | <1 | 2 | <20 | 0.01 | <10 | <10 | 3 | <10 | 3 |
| 18 | 09060807A | 9 | 0.01 | <2 | 1 | 11 | <20 | 0.02 | <10 | <10 | 8 | <10 | 10 |
| 19 | 09060807B | 4 | <0.01 | <2 | <1 | 4 | <20 | 0.01 | <10 | <10 | 3 | <10 | 2 |
| 20 | 9060808 | 5 | <0.01 | 2 | <1 | 4 | <20 | 0.01 | <10 | <10 | 4 | <10 | 3 |
| 21 | 9060901 | 2 | 0.01 | <2 | 2 | 7 | <20 | 0.02 | <10 | <10 | 20 | <10 | 11 |
| 22 | 9060902 | <2 | <0.01 | <2 | <1 | 2 | <20 | <0.01 | <10 | <10 | 6 | <10 | 3 |
| 23 | 9060904 | 7 | 0.01 | <2 | 3 | 13 | <20 | 0.03 | <10 | <10 | 36 | <10 | 24 |
| 24 | 9060906 | 9 | 0.01 | <2 | 4 | 17 | <20 | 0.09 | <10 | <10 | 51 | <10 | 60 |
| 25 | 9060907 | 17 | 0.01 | <2 | 7 | 46 | <20 | 0.04 | <10 | <10 | 89 | <10 | 74 |
| 26 | 09060908A | 8 | 0.01 | <2 | 17 | 52 | <20 | 0.56 | <10 | <10 | 187 | <10 | 75 |
| 27 | 09060908B | 8 | 0.01 | <2 | 17 | 50 | <20 | 0.58 | <10 | <10 | 182 | <10 | 65 |
| 28 | 9061003 | 2 | <0.01 | <2 | 1 | 3 | <20 | 0.01 | <10 | <10 | 10 | <10 | 2 |
| 29 | 9061004 | 6 | 0.01 | <2 | 2 | 3 | <20 | <0.01 | <10 | <10 | 18 | <10 | 5 |
| 30 | 9061102 | 15 | <0.01 | <2 | 4 | 8 | <20 | <0.01 | <10 | <10 | 53 | <10 | 13 |
| 31 | 9061103 | 8 | <0.01 | <2 | 3 | 5 | <20 | 0.01 | <10 | <10 | 47 | <10 | 10 |
| 32 | 9061104 | 4 | <0.01 | <2 | <1 | 3 | <20 | <0.01 | <10 | <10 | 10 | <10 | 4 |
| 33 | 9061105 | 16 | 0.03 | <2 | 4 | 44 | <20 | 0.01 | <10 | <10 | 36 | <10 | 43 |
| 34 | 9061203 | 5 | 0.01 | <2 | 3 | 14 | <20 | 0.02 | <10 | <10 | 74 | <10 | 10 |
| 35 | 9061205 | 2 | 0.02 | <2 | 1 | 5 | <20 | 0.01 | <10 | <10 | 17 | <10 | 2 |
| 36 | 9061401 | 4 | 0.01 | <2 | 2 | 7 | <20 | 0.01 | <10 | <10 | 26 | <10 | 8 |
| 37 | 9061402 | 8 | 0.01 | <2 | 3 | 19 | <20 | 0.03 | <10 | <10 | 68 | <10 | 16 |
| 38 | 9061403 | 7 | 0.01 | <2 | 3 | 16 | <20 | <0.01 | <10 | <10 | 37 | <10 | 11 |
| 39 | 9061404 | 6 | <0.01 | <2 | 2 | 15 | <20 | 0.02 | <10 | <10 | 73 | <10 | 10 |
| 40 | 9061501 | 5 | <0.01 | <2 | 2 | 3 | <20 | 0.03 | <10 | <10 | 17 | <10 | 7 |
| 41 | 9061502 | 7 | <0.01 | <2 | 1 | 3 | <20 | <0.01 | <10 | <10 | 16 | <10 | 2 |
| 42 | 9061504 | 2 | <0.01 | 2 | <1 | 2 | <20 | <0.01 | <10 | <10 | 19 | <10 | <2 |
| 43 | 9061505 | 4 | <0.01 | <2 | <1 | 3 | <20 | <0.01 | <10 | <10 | 7 | <10 | <2 |
| 44 | 9061506 | 5 | <0.01 | <2 | 1 | 3 | <20 | <0.01 | <10 | <10 | 16 | <10 | <2 |
| 45 | 9061508 | 5 | 0.01 | <2 | 5 | 1 | <20 | 0.01 | <10 | <10 | 47 | <10 | 2 |
| 46 | 9061601 | 14 | <0.01 | <2 | 1 | 6 | <20 | 0.02 | <10 | <10 | 18 | <10 | 23 |
| 47 | 9061602 | 12 | <0.01 | <2 | 1 | 6 | <20 | 0.02 | <10 | <10 | 20 | <10 | 19 |
| 48 | 9061603 | 6 | <0.01 | <2 | 1 | 14 | <20 | 0.02 | <10 | <10 | 22 | <10 | 15 |
| 49 | 9061604 | 8 | <0.01 | <2 | 1 | 9 | <20 | 0.03 | <10 | <10 | 22 | <10 | 15 |
| 50 | 9061605 | 6 | <0.01 | <2 | 1 | 6 | <20 | 0.06 | <10 | <10 | 18 | <10 | 10 |
| 51 | 9061606 | 7 | <0.01 | <2 | 1 | 5 | <20 | 0.05 | <10 | <10 | 11 | <10 | 7 |

# Appendix V-10 Results of Geochemical Analysis

| | | | GPS | | | |
|---|---|---|---|---|---|---|
| | SAMPLE ID | Province | Latitude N | Longitude E | Elev. | Legend of Area |
| 52 | 9061607 | KS | 11 41.266 | 104 7.96 | 76 m | |
| 53 | 9061608 | KS | 11 38.95 | 104 11.798 | 71 m | Bat |
| 54 | 9061609 | KS | 11 37.597 | 104 14.847 | 92 m | Battangban |
| 55 | 9061701 | Tak | 10 39.385 | 104 52.113 | 3 m | |
| 56 | 9061707 | Tak | 10 33.934 | 104 51.151 | 12 m | Pai |
| 57 | 9061708 | Tak | 10 34.643 | 104 47.967 | 6 m | Pailin |
| 58 | 9080601 | Kra | 13 2.426 | 106 10.919 | 43 m | |
| 59 | 9080602 | Kra | 13 9.08 | 106 8.765 | 45 m | KK |
| 60 | 9080701 | ST | 13 30.05 | 106 21.177 | 60 m | Koh Kong |
| 61 | 9080702 | RK | 13 27.75 | 106 38.566 | 81 m | |
| 62 | 9080708 | RK | 13 28.508 | 106 59.798 | 97 m | |
| 63 | 9080802 | RK | 13 58.447 | 106 48.883 | 92 m | |
| 64 | 9080804 | RK | 13 35.47 | 106 48.506 | 124 m | |
| 65 | 9080901 | Kra | 12 27.211 | 106 10.588 | 23 m | |
| 66 | 9080902 | Kra | 12 28.516 | 106 12.954 | 27 m | |
| 67 | 9080903 | Kra | 12 30.208 | 106 15.527 | 39 m | |
| 68 | 9080904 | Kra | 12 24.847 | 106 13.824 | 28 m | |
| 69 | 9080905 | Kra | 12 23.597 | 106 14.434 | 27 m | |
| 70 | 9081004 | MK | 12 59.994 | 107 8.031 | 165 m | |
| 71 | 9081005 | MK | 13 1.76 | 107 3.261 | 141 m | |
| 72 | 9081007 | MK | 13 3.679 | 107 2.606 | 138 m | |
| 73 | 9081102 | Kra | 12 24.699 | 106 16.955 | 36 m | |
| 74 | 9081103 | Kra | 12 24.697 | 106 16.959 | 37 m | |
| 75 | 9081301 | PV | 13 50.333 | 104 41.735 | 43 m | |
| 76 | 9081302 | PV | 13 45.779 | 104 44.283 | 57 m | |
| 77 | 9081303 | PV | 13 46.697 | 104 39.298 | 61 m | |
| 78 | 9081304 | PV | 13 45.611 | 104 37.778 | 64 m | |
| 79 | 9081701 | SR | 13 53.912 | 103 32.158 | 16 m | |
| 80 | 9081702 | OMC | 14 10.406 | 103 29.267 | 41 m | |
| 81 | 9081703 | OMC | 14 10.519 | 103 24.012 | 39 m | |
| 82 | 9081704 | OMC | 14 9.814 | 103 16.017 | 46 m | |
| 83 | 9081705 | BMC | 13 57.071 | 103 2.912 | 43 m | |
| 84 | 9081801 | Bat | 12 49.723 | 102 54.628 | 38 m | |
| 85 | 9081802 | Bat | 12 42.752 | 102 57.428 | 58 m | |
| 86 | 9081803 | Bat | 12 43.355 | 102 48.54 | 84 m | |
| 87 | 9081804 | Bat | 12 42.945 | 102 46.177 | 101 m | |
| 88 | 9081805 | Pai | 12 52.606 | 102 36.179 | 150 m | |
| 89 | 9081806 | Pai | 12 53.279 | 102 35.41 | 145 m | |
| 90 | 9081807 | Pai | 13 1.282 | 102 35.106 | 68 m | |
| 91 | 9082001 | KK | 11 8.311 | 103 46.257 | 2 m | |
| 92 | 9082002 | KK | 11 23.023 | 103 15.375 | 6 m | |
| 93 | 9082003 | KK | 11 33.91 | 103 7.672 | 18 m | |
| 94 | 9082004 | KK | 11 41.249 | 103 25.653 | 390 m | |
| 95 | 9082101 | KK | 11 43.894 | 103 4.618 | 0 m | |
| 96 | 9082102 | KK | 11 43.21 | 103 0.121 | 0 m | |
| 97 | 9082103 | KK | 11 42.898 | 102 58.115 | 2 m | |
| 98 | 9082301 | Tak | 10 59.628 | 104 58.606 | 5 m | |
| 99 | 9111101 | ST | 13 36.096 | 105 55.247 | 46 m | |
| 100 | 9111102 | ST | 13 37.946 | 105 45.256 | 75 m | |
| 101 | 9111103 | ST | 13 38.368 | 105 42.685 | 93 m | |
| 102 | 9111104 | ST | 13 37.095 | 105 50.283 | 68 m | |

# Appendix V-10 Results of Geochemical Analysis

| | | Au | Ag | Al | As | B | Ba | Be | Bi | Ca | Cd | Co | Cr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE ID | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm |
| 52 | 9061607 | <0.001 | <0.2 | 0.31 | <2 | <10 | 20 | <0.5 | <2 | 0.04 | <0.5 | 1 | 6 |
| 53 | 9061608 | <0.001 | <0.2 | 0.63 | <2 | <10 | 50 | <0.5 | <2 | 0.09 | <0.5 | 3 | 7 |
| 54 | 9061609 | 0.003 | <0.2 | 1.03 | 16 | <10 | 40 | <0.5 | 2 | 0.26 | <0.5 | 8 | 24 |
| 55 | 9061701 | <0.001 | 0.2 | 0.33 | <2 | <10 | 50 | <0.5 | <2 | 0.02 | <0.5 | 1 | 8 |
| 56 | 9061707 | 0.001 | <0.2 | 0.4 | <2 | <10 | 20 | <0.5 | 2 | 0.01 | <0.5 | 1 | 4 |
| 57 | 9061708 | <0.001 | <0.2 | 0.2 | <2 | <10 | 20 | <0.5 | <2 | 0.01 | <0.5 | <1 | 2 |
| 58 | 9080601 | 0.001 | <0.2 | 0.24 | 2 | <10 | 30 | <0.5 | <2 | 0.06 | <0.5 | 2 | 8 |
| 59 | 9080602 | 0.001 | <0.2 | 0.24 | 2 | <10 | 30 | <0.5 | <2 | 0.06 | <0.5 | 2 | 7 |
| 60 | 9080701 | 0.001 | <0.2 | 0.51 | 5 | <10 | 40 | 0.5 | <2 | 0.06 | <0.5 | 9 | 57 |
| 61 | 9080702 | 0.001 | <0.2 | 0.37 | 3 | <10 | 30 | <0.5 | <2 | 0.05 | <0.5 | 5 | 27 |
| 62 | 9080708 | <0.001 | <0.2 | 0.35 | <2 | <10 | 30 | <0.5 | <2 | 0.05 | <0.5 | 5 | 26 |
| 63 | 9080802 | 0.001 | <0.2 | 0.88 | <2 | <10 | 60 | 0.6 | <2 | 0.07 | <0.5 | 8 | 28 |
| 64 | 9080804 | 0.001 | <0.2 | 1.01 | 3 | <10 | 190 | 1.7 | <2 | 0.02 | <0.5 | 31 | 102 |
| 65 | 9080901 | 0.001 | <0.2 | 0.18 | <2 | <10 | 20 | <0.5 | <2 | 0.04 | <0.5 | 3 | 6 |
| 66 | 9080902 | 0.001 | <0.2 | 0.22 | <2 | <10 | 20 | <0.5 | <2 | 0.05 | <0.5 | 5 | 7 |
| 67 | 9080903 | <0.001 | <0.2 | 0.24 | 2 | <10 | 30 | <0.5 | <2 | 0.08 | <0.5 | 4 | 6 |
| 68 | 9080904 | 0.003 | <0.2 | 1.27 | 7 | <10 | 100 | 0.8 | <2 | 0.32 | <0.5 | 33 | 31 |
| 69 | 9080905 | 0.004 | <0.2 | 0.41 | 16 | <10 | 20 | <0.5 | <2 | 0.08 | <0.5 | 6 | 23 |
| 70 | 9081004 | 0.015 | <0.2 | 0.44 | 2 | <10 | 30 | <0.5 | <2 | 0.1 | <0.5 | 5 | 19 |
| 71 | 9081005 | 0.001 | <0.2 | 0.33 | 3 | <10 | 20 | <0.5 | <2 | 0.05 | <0.5 | 4 | 14 |
| 72 | 9081007 | 0.001 | <0.2 | 0.8 | 2 | <10 | 50 | <0.5 | <2 | 0.17 | <0.5 | 13 | 39 |
| 73 | 9081102 | 0.003 | <0.2 | 1.35 | 10 | <10 | 90 | 0.8 | <2 | 0.25 | <0.5 | 20 | 52 |
| 74 | 9081103 | 0.001 | <0.2 | 0.42 | <2 | <10 | 40 | <0.5 | <2 | 0.1 | <0.5 | 6 | 17 |
| 75 | 9081301 | <0.001 | <0.2 | 0.1 | <2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | 2 | 13 |
| 76 | 9081302 | 0.001 | <0.2 | 0.18 | <2 | <10 | 30 | <0.5 | <2 | 0.03 | <0.5 | 2 | 5 |
| 77 | 9081303 | 0.001 | <0.2 | 0.31 | <2 | <10 | 40 | <0.5 | <2 | 0.05 | <0.5 | 6 | 25 |
| 78 | 9081304 | 0.001 | <0.2 | 0.35 | <2 | <10 | 70 | <0.5 | <2 | 0.06 | <0.5 | 5 | 9 |
| 79 | 9081701 | 0.001 | <0.2 | 0.06 | <2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | 1 | 5 |
| 80 | 9081702 | 0.001 | <0.2 | 0.24 | 7 | <10 | 160 | <0.5 | <2 | 0.12 | <0.5 | 11 | 38 |
| 81 | 9081703 | 0.001 | <0.2 | 0.11 | <2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | 2 | 14 |
| 82 | 9081704 | 0.001 | <0.2 | 0.11 | 2 | <10 | 20 | <0.5 | <2 | 0.03 | <0.5 | 3 | 28 |
| 83 | 9081705 | 0.001 | <0.2 | 0.51 | 6 | <10 | 120 | 0.6 | <2 | 0.11 | <0.5 | 18 | 40 |
| 84 | 9081801 | 0.002 | <0.2 | 1.09 | 2 | <10 | 20 | <0.5 | <2 | 0.36 | <0.5 | 9 | 29 |
| 85 | 9081802 | 0.001 | <0.2 | 0.46 | 3 | <10 | 40 | <0.5 | <2 | 0.18 | <0.5 | 8 | 17 |
| 86 | 9081803 | 0.009 | <0.2 | 1.78 | <2 | <10 | 60 | <0.5 | <2 | 1.63 | <0.5 | 32 | 84 |
| 87 | 9081804 | 0.003 | <0.2 | 1.87 | 3 | <10 | 150 | 1 | <2 | 0.18 | <0.5 | 33 | 74 |
| 88 | 9081805 | 0.002 | <0.2 | 1.16 | 2 | <10 | 70 | 0.5 | <2 | 0.37 | <0.5 | 19 | 36 |
| 89 | 9081806 | 0.002 | <0.2 | 0.96 | 6 | <10 | 60 | <0.5 | <2 | 0.22 | <0.5 | 20 | 46 |
| 90 | 9081807 | 0.002 | <0.2 | 1.28 | 6 | <10 | 70 | 0.6 | <2 | 0.23 | <0.5 | 16 | 36 |
| 91 | 9082001 | <0.001 | <0.2 | 0.12 | <2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | 1 | 3 |
| 92 | 9082002 | 0.003 | <0.2 | 0.31 | <2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | 2 | 21 |
| 93 | 9082003 | 0.001 | <0.2 | 0.36 | <2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | 2 | 13 |
| 94 | 9082004 | 0.002 | 0.3 | 0.26 | <2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | 1 | 8 |
| 95 | 9082101 | 0.001 | <0.2 | 0.25 | <2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | 1 | 5 |
| 96 | 9082102 | <0.001 | <0.2 | 0.21 | 2 | <10 | 10 | <0.5 | <2 | 0.01 | <0.5 | 1 | 6 |
| 97 | 9082103 | 0.001 | <0.2 | 0.15 | <2 | <10 | 20 | <0.5 | <2 | 0.01 | <0.5 | <1 | 2 |
| 98 | 9082301 | 0.064 | <0.2 | 0.16 | 2 | <10 | 20 | <0.5 | <2 | 0.06 | <0.5 | 1 | 4 |
| 99 | 9111101 | 0.001 | <0.2 | 0.45 | 4 | <10 | 50 | <0.5 | <2 | 0.09 | <0.5 | 15 | 25 |
| 100 | 9111102 | 0.001 | <0.2 | 0.36 | 4 | <10 | 60 | <0.5 | <2 | 0.1 | <0.5 | 7 | 9 |
| 101 | 9111103 | 0.002 | <0.2 | 0.43 | 2 | <10 | 70 | <0.5 | <2 | 0.11 | <0.5 | 7 | 13 |
| 102 | 9111104 | 0.002 | <0.2 | 0.54 | <2 | <10 | 70 | <0.5 | <2 | 0.17 | <0.5 | 11 | 26 |

# Appendix V-10 Results of Geochemical Analysis

| | | Cu | Fe | Ga | Hg | K | La | Mg | Mn | Mo | Na | Ni | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE ID | ppm | % | ppm | ppm | % | ppm | % | ppm | ppm | % | ppm | ppm |
| 52 | 9061607 | 1 | 0.63 | <10 | <1 | 0.13 | <10 | 0.02 | 121 | <1 | 0.04 | 1 | 40 |
| 53 | 9061608 | 4 | 1.21 | <10 | <1 | 0.13 | 10 | 0.06 | 249 | <1 | 0.02 | 2 | 80 |
| 54 | 9061609 | 11 | 2.62 | <10 | <1 | 0.1 | 10 | 0.26 | 241 | <1 | 0.02 | 10 | 160 |
| 55 | 9061701 | 4 | 1.42 | <10 | <1 | 0.03 | <10 | 0.01 | 63 | <1 | 0.01 | 1 | 50 |
| 56 | 9061707 | 1 | 0.55 | <10 | <1 | 0.18 | 10 | 0.01 | 211 | <1 | 0.02 | 1 | 40 |
| 57 | 9061708 | 1 | 0.41 | <10 | <1 | 0.1 | 10 | <0.01 | 86 | <1 | 0.02 | <1 | 50 |
| 58 | 9080601 | 2 | 0.85 | <10 | <1 | 0.02 | 10 | 0.06 | 129 | <1 | <0.01 | 3 | 80 |
| 59 | 9080602 | 2 | 0.85 | <10 | <1 | 0.02 | 10 | 0.06 | 129 | <1 | <0.01 | 3 | 80 |
| 60 | 9080701 | 8 | 2.7 | <10 | <1 | 0.03 | 10 | 0.08 | 205 | 1 | 0.01 | 18 | 310 |
| 61 | 9080702 | 4 | 1.25 | <10 | 1 | 0.02 | 10 | 0.07 | 145 | 1 | <0.01 | 8 | 140 |
| 62 | 9080708 | 3 | 1.16 | <10 | <1 | 0.02 | 10 | 0.06 | 135 | <1 | <0.01 | 8 | 140 |
| 63 | 9080802 | 18 | 1.79 | <10 | 1 | 0.1 | 20 | 0.2 | 269 | 1 | <0.01 | 10 | 270 |
| 64 | 9080804 | 40 | 7.04 | 10 | 1 | 0.02 | 10 | 0.02 | 1,235 | 5 | 0.01 | 5 | 420 |
| 65 | 9080901 | 2 | 0.5 | <10 | <1 | 0.01 | <10 | 0.05 | 110 | <1 | <0.01 | 1 | 50 |
| 66 | 9080902 | 2 | 0.69 | <10 | 1 | 0.01 | <10 | 0.06 | 265 | <1 | <0.01 | 2 | 70 |
| 67 | 9080903 | 2 | 0.53 | <10 | 1 | 0.02 | <10 | 0.07 | 257 | <1 | 0.01 | 2 | 80 |
| 68 | 9080904 | 19 | 3.95 | 10 | 1 | 0.09 | 10 | 0.55 | 864 | <1 | 0.01 | 17 | 350 |
| 69 | 9080905 | 5 | 1.2 | <10 | 1 | 0.02 | <10 | 0.1 | 142 | <1 | 0.01 | 8 | 130 |
| 70 | 9081004 | 5 | 1.4 | <10 | 1 | 0.03 | 10 | 0.11 | 172 | <1 | 0.01 | 6 | 130 |
| 71 | 9081005 | 3 | 1.11 | <10 | 1 | 0.02 | 10 | 0.08 | 143 | <1 | 0.01 | 5 | 100 |
| 72 | 9081007 | 9 | 2.37 | <10 | 1 | 0.02 | 10 | 0.26 | 256 | <1 | 0.01 | 23 | 230 |
| 73 | 9081102 | 19 | 4.6 | <10 | 1 | 0.08 | 10 | 0.53 | 752 | <1 | 0.01 | 17 | 290 |
| 74 | 9081103 | 5 | 1.27 | <10 | <1 | 0.03 | 10 | 0.15 | 262 | <1 | 0.01 | 4 | 100 |
| 75 | 9081301 | <1 | 0.38 | <10 | 1 | 0.01 | <10 | 0.01 | 125 | <1 | <0.01 | <1 | 50 |
| 76 | 9081302 | 1 | 0.56 | <10 | 1 | 0.02 | <10 | 0.03 | 122 | <1 | <0.01 | 2 | 80 |
| 77 | 9081303 | 2 | 1 | <10 | 1 | 0.02 | 10 | 0.05 | 348 | <1 | <0.01 | 4 | 120 |
| 78 | 9081304 | 3 | 0.87 | <10 | 1 | 0.03 | 10 | 0.07 | 307 | <1 | <0.01 | 4 | 90 |
| 79 | 9081701 | 108 | 0.25 | <10 | 1 | 0.01 | <10 | <0.01 | 48 | <1 | <0.01 | <1 | 30 |
| 80 | 9081702 | 8 | 2.31 | <10 | <1 | 0.01 | 10 | 0.02 | 1,005 | 1 | 0.01 | 2 | 40 |
| 81 | 9081703 | 1 | 0.57 | <10 | <1 | <0.01 | <10 | 0.01 | 64 | <1 | <0.01 | <1 | 20 |
| 82 | 9081704 | 2 | 0.67 | <10 | 1 | <0.01 | <10 | 0.01 | 154 | 1 | <0.01 | <1 | 40 |
| 83 | 9081705 | 7 | 2.8 | <10 | <1 | 0.02 | 10 | 0.03 | 1,135 | 1 | 0.01 | 3 | 80 |
| 84 | 9081801 | 19 | 2.34 | <10 | <1 | 0.03 | 10 | 0.33 | 140 | <1 | 0.01 | 18 | 140 |
| 85 | 9081802 | 6 | 1.25 | <10 | 1 | 0.02 | <10 | 0.14 | 338 | <1 | 0.01 | 6 | 110 |
| 86 | 9081803 | 32 | 4.25 | 10 | <1 | 0.03 | 10 | 0.78 | 855 | <1 | 0.02 | 56 | 160 |
| 87 | 9081804 | 26 | 4.81 | 10 | 1 | 0.03 | 10 | 0.46 | 898 | 1 | 0.01 | 51 | 690 |
| 88 | 9081805 | 19 | 2.86 | 10 | <1 | 0.03 | 10 | 0.36 | 739 | <1 | 0.01 | 22 | 310 |
| 89 | 9081806 | 17 | 2.7 | <10 | 1 | 0.03 | 10 | 0.31 | 536 | <1 | 0.01 | 23 | 300 |
| 90 | 9081807 | 19 | 3.01 | <10 | 1 | 0.05 | 10 | 0.36 | 579 | <1 | 0.01 | 22 | 330 |
| 91 | 9082001 | <1 | 0.26 | <10 | 1 | 0.02 | <10 | 0.02 | 22 | <1 | 0.01 | 1 | 30 |
| 92 | 9082002 | 2 | 0.69 | <10 | <1 | 0.01 | <10 | 0.01 | 49 | <1 | 0.01 | 7 | 60 |
| 93 | 9082003 | 1 | 0.71 | <10 | <1 | 0.02 | <10 | 0.03 | 18 | 2 | 0.01 | 5 | 70 |
| 94 | 9082004 | <1 | 0.36 | <10 | 1 | 0.01 | <10 | 0.01 | 21 | <1 | <0.01 | 2 | 60 |
| 95 | 9082101 | <1 | 0.47 | <10 | 1 | 0.02 | <10 | 0.03 | 18 | <1 | 0.01 | 1 | 40 |
| 96 | 9082102 | 29 | 0.24 | <10 | <1 | 0.02 | <10 | 0.03 | 9 | 1 | 0.03 | 32 | 30 |
| 97 | 9082103 | 2 | 0.17 | <10 | <1 | 0.01 | <10 | 0.03 | 10 | <1 | 0.03 | 3 | 20 |
| 98 | 9082301 | 4 | 0.35 | <10 | <1 | 0.03 | <10 | 0.03 | 40 | <1 | 0.01 | 2 | 210 |
| 99 | 9111101 | 8 | 2.68 | <10 | <1 | 0.01 | <10 | 0.07 | 809 | <1 | 0.01 | 6 | 150 |
| 100 | 9111102 | 16 | 2.01 | <10 | <1 | 0.01 | <10 | 0.06 | 685 | <1 | 0.01 | 2 | 160 |
| 101 | 9111103 | 14 | 1.66 | <10 | <1 | 0.01 | <10 | 0.1 | 400 | <1 | 0.01 | 3 | 170 |
| 102 | 9111104 | 12 | 1.64 | <10 | <1 | 0.01 | <10 | 0.21 | 427 | <1 | 0.01 | 10 | 130 |

# Appendix V-10 Results of Geochemical Analysis

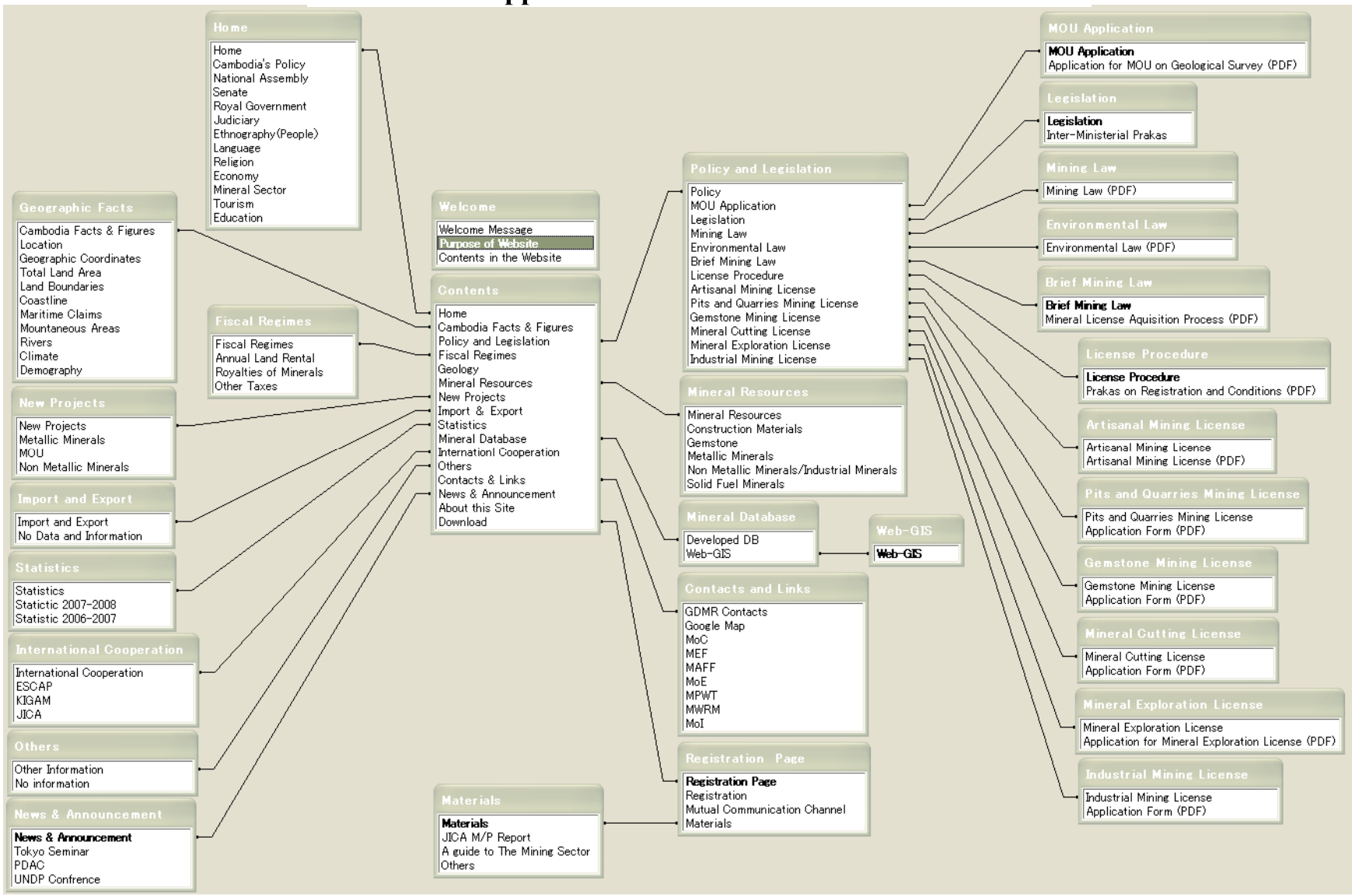
| | | Pb | S | Sb | Sc | Sr | Th | Ti | Tl | U | V | W | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | SAMPLE ID | ppm | % | ppm | ppm | ppm | ppm | % | ppm | ppm | ppm | ppm | ppm |
| 52 | 9061607 | 3 | <0.01 | <2 | <1 | 5 | <20 | 0.01 | <10 | <10 | 4 | <10 | 4 |
| 53 | 9061608 | 15 | <0.01 | <2 | 1 | 8 | <20 | 0.02 | <10 | <10 | 15 | <10 | 25 |
| 54 | 9061609 | 10 | <0.01 | <2 | 2 | 24 | <20 | 0.01 | <10 | <10 | 26 | <10 | 26 |
| 55 | 9061701 | 6 | <0.01 | <2 | 1 | 4 | <20 | <0.01 | <10 | <10 | 15 | <10 | 4 |
| 56 | 9061707 | 6 | <0.01 | <2 | <1 | 2 | <20 | <0.01 | <10 | <10 | 2 | <10 | 3 |
| 57 | 9061708 | 3 | <0.01 | <2 | <1 | 2 | <20 | <0.01 | <10 | <10 | 2 | <10 | 3 |
| 58 | 9080601 | 5 | <0.01 | <2 | 1 | 7 | <20 | 0.01 | <10 | <10 | 14 | <10 | 10 |
| 59 | 9080602 | 4 | <0.01 | <2 | 1 | 6 | <20 | 0.01 | <10 | <10 | 13 | <10 | 10 |
| 60 | 9080701 | 7 | <0.01 | <2 | 2 | 7 | 20 | 0.03 | <10 | <10 | 39 | <10 | 26 |
| 61 | 9080702 | 3 | <0.01 | <2 | 1 | 7 | <20 | 0.03 | <10 | <10 | 20 | <10 | 14 |
| 62 | 9080708 | 2 | <0.01 | <2 | 1 | 7 | <20 | 0.03 | <10 | <10 | 18 | <10 | 12 |
| 63 | 9080802 | 9 | 0.01 | <2 | 3 | 7 | 20 | 0.05 | <10 | <10 | 32 | <10 | 24 |
| 64 | 9080804 | 31 | 0.01 | <2 | 6 | 4 | 30 | 0.04 | <10 | 10 | 183 | <10 | 19 |
| 65 | 9080901 | 2 | <0.01 | <2 | 1 | 4 | <20 | 0.01 | <10 | <10 | 11 | <10 | 5 |
| 66 | 9080902 | 3 | <0.01 | <2 | 1 | 4 | <20 | 0.01 | <10 | <10 | 13 | <10 | 7 |
| 67 | 9080903 | 2 | <0.01 | <2 | 1 | 8 | <20 | 0.01 | <10 | <10 | 12 | <10 | 7 |
| 68 | 9080904 | 21 | <0.01 | 2 | 4 | 20 | <20 | 0.08 | <10 | <10 | 74 | <10 | 46 |
| 69 | 9080905 | 2 | 0.01 | <2 | 1 | 8 | <20 | 0.02 | <10 | <10 | 21 | <10 | 12 |
| 70 | 9081004 | 5 | 0.01 | <2 | 1 | 9 | <20 | 0.01 | <10 | <10 | 25 | <10 | 17 |
| 71 | 9081005 | 5 | <0.01 | <2 | 1 | 5 | <20 | 0.01 | <10 | <10 | 12 | <10 | 12 |
| 72 | 9081007 | 5 | 0.01 | <2 | 3 | 19 | <20 | 0.04 | <10 | <10 | 32 | <10 | 27 |
| 73 | 9081102 | 20 | 0.01 | 2 | 3 | 22 | <20 | 0.03 | <10 | <10 | 65 | <10 | 50 |
| 74 | 9081103 | 5 | <0.01 | <2 | 1 | 9 | <20 | 0.01 | <10 | <10 | 19 | <10 | 14 |
| 75 | 9081301 | <2 | <0.01 | <2 | <1 | 3 | <20 | <0.01 | <10 | <10 | 10 | <10 | <2 |
| 76 | 9081302 | 3 | <0.01 | <2 | <1 | 4 | <20 | <0.01 | <10 | <10 | 8 | <10 | 6 |
| 77 | 9081303 | 3 | <0.01 | <2 | 1 | 13 | <20 | 0.01 | <10 | <10 | 21 | <10 | 7 |
| 78 | 9081304 | 7 | <0.01 | <2 | 1 | 7 | <20 | <0.01 | <10 | <10 | 14 | <10 | 11 |
| 79 | 9081701 | 14 | <0.01 | <2 | <1 | 1 | <20 | <0.01 | <10 | <10 | 7 | <10 | 81 |
| 80 | 9081702 | 8 | <0.01 | <2 | 2 | 8 | <20 | 0.01 | <10 | <10 | 73 | <10 | 7 |
| 81 | 9081703 | 4 | <0.01 | <2 | 1 | 1 | <20 | <0.01 | <10 | <10 | 22 | <10 | <2 |
| 82 | 9081704 | 3 | <0.01 | <2 | 1 | 2 | <20 | <0.01 | <10 | <10 | 31 | <10 | 2 |
| 83 | 9081705 | 29 | <0.01 | <2 | 3 | 12 | <20 | <0.01 | <10 | <10 | 69 | <10 | 8 |
| 84 | 9081801 | 4 | <0.01 | <2 | 5 | 31 | <20 | 0.02 | <10 | <10 | 54 | <10 | 32 |
| 85 | 9081802 | 3 | <0.01 | <2 | 2 | 17 | <20 | 0.02 | <10 | <10 | 24 | <10 | 19 |
| 86 | 9081803 | 5 | 0.01 | <2 | 8 | 42 | <20 | 0.09 | <10 | <10 | 119 | <10 | 44 |
| 87 | 9081804 | 7 | 0.01 | <2 | 8 | 36 | <20 | 0.19 | <10 | <10 | 81 | <10 | 56 |
| 88 | 9081805 | 4 | <0.01 | <2 | 6 | 32 | <20 | 0.08 | <10 | <10 | 60 | <10 | 37 |
| 89 | 9081806 | 4 | 0.01 | <2 | 4 | 26 | <20 | 0.09 | <10 | <10 | 57 | <10 | 35 |
| 90 | 9081807 | 7 | 0.01 | 2 | 5 | 23 | <20 | 0.04 | <10 | <10 | 52 | <10 | 45 |
| 91 | 9082001 | 2 | 0.03 | <2 | <1 | 2 | <20 | <0.01 | <10 | <10 | 4 | <10 | 3 |
| 92 | 9082002 | 6 | 0.54 | <2 | 1 | 2 | <20 | 0.04 | <10 | <10 | 7 | <10 | 9 |
| 93 | 9082003 | 6 | 0.06 | <2 | 1 | 3 | <20 | 0.01 | <10 | <10 | 10 | <10 | 12 |
| 94 | 9082004 | 4 | 0.01 | <2 | 1 | 1 | <20 | 0.01 | <10 | <10 | 6 | <10 | 5 |
| 95 | 9082101 | 4 | 0.04 | <2 | <1 | 2 | <20 | <0.01 | <10 | <10 | 7 | <10 | 4 |
| 96 | 9082102 | 16 | 0.02 | <2 | <1 | 3 | <20 | 0.01 | <10 | <10 | 4 | <10 | 27 |
| 97 | 9082103 | 5 | 0.01 | <2 | <1 | 4 | <20 | <0.01 | <10 | <10 | 2 | <10 | 6 |
| 98 | 9082301 | 8 | <0.01 | <2 | <1 | 4 | <20 | <0.01 | <10 | <10 | 5 | <10 | 20 |
| 99 | 9111101 | 5 | <0.01 | <2 | 3 | 6 | <20 | 0.01 | <10 | <10 | 69 | <10 | 18 |
| 100 | 9111102 | 14 | <0.01 | <2 | 2 | 5 | <20 | 0.01 | <10 | <10 | 34 | <10 | 42 |
| 101 | 9111103 | 6 | 0.01 | <2 | 2 | 8 | <20 | 0.01 | <10 | <10 | 35 | <10 | 36 |
| 102 | 9111104 | 6 | 0.01 | <2 | 3 | 11 | <20 | 0.01 | <10 | <10 | 38 | <10 | 34 |

# Appendix VI-1 Governmental Web Sites in Cambodia

## Governmental Web Sites in Cambodia

| Name | URL | English web |
|---|---|---|
| Office of the Council of Ministers | www.cambodia.gov.kh/unisql1/egov/english/home.view.html | Yes |
| Royal Government of Cambodia (e-Gov of Cambodia) | www.cambodia.gov.kh/krt | Yes |
| Ministry of Commerce | www.moc.gov.kh | Yes |
| Ministry of Economy and Finance (MEF) | www.mef.gov.kh | Yes |
| Ministry of Foreign Affairs & International Cooperation (MFAIC) | www.mfaic.gov.kh/e-visa/index.aspx | Yes |
| Ministry of Agriculture, Forestry and Fisheries (MAFF) | www.maff.gov.kh/en | Yes |
| Ministry of Environment （MOE） | www.camnet.com.kh/moe/ | Yes |
| Ministry of Planning (MOP) | www.mop.gov.kh/ | Yes |
| Ministry of Interior (MOI) | www.interior.gov.kh/ | Yes |
| Ministry of Health (MOH) | www.moh.gov.kh/ | Yes |
| Ministry of Posts and Telecommunications (MPTC) | www.mptc.gov.kh/ | Yes |
| Ministry of Public Works and Transport (MPWT) | www.mpwt.gov.kh/ | Yes |
| Ministry of Education, Youth & Sport (MOEYS) | www.moeys.gov.kh/ | Yes |
| Ministry of Tourism (MOT) | www.mot.gov.kh/default.php | Yes |
| Ministry of Industry Mines and Energy （MIME） | www.mime.gov.kh/english/index.php | Yes |
| General Department of Mineral Resources (GDMR) | www.gdmr.gov.kh | Yes |
| Ministry of Information | www.information.gov.kh | UC |
| Ministry of Justice | www.moj.gov.kh | UC |
| Ministry of Labor and Vocational Training | www.mlv.gov.kh | UC |
| Ministry of Land Management, Urban Planning & Construction | www.mlmupc.gov.kh | NA |
| Ministry of National Defense | www.mond.gov.kh | Yes |
| Ministry of Parliamentary Affairs and Inspection | www.mnasrl.gov.kh | UC |
| Ministry of Religions and Cults | www.morac.gov.kh | UC |
| Ministry of Rural Development | www.mrd.gov.kh | Yes |
| Ministry of Social Affairs Veteran and Youth Rehabilitation | www.mosalvy.gov.kh | NA |
| Ministry of Water Resources and Meteorology | www.mowram.gov.kh | NA |
| Ministry of Women Affairs | www.mwva.gov.kh | NA |
| Ministry of Culture and Fine Arts | www.mcfa.gov.kh | UC |
| Municipality of Phnom Penh | www.phnompenh.gov.kh | Yes |
| Secretariat of Public Service | www.sspf.gov.kh | UC |
| Secretariat of Civil Aviation | www.civilaviation.gov.kh | UC |
| Department of Energy Technique (DET) within the MIME | www.recambodia.org | Yes |
| Council of Ministers (OCM) | www.pressocm.gov.kh | No |
| Council for Administrative Reform | www.car.gov.kh | Yes |
| Council for the Development of Cambodia (CDC), Cambodia Investment Board (CIB) | www.cdc-crdb.gov.kh | Yes |
| Constitutional Council of Cambodia | www.ccc.gov.kh/english/index.php | Yes |
| Cambodia Customs & Excise Department | www.customs.gov.kh | Yes |
| Cambodian Mine Action Centre (CMAC) | www.cmac.org.kh/index.asp | Yes |
| Cambodian Rehabilitation and Development Board (CRDB) | www.cdc-crdb.gov.kh | Yes |
| Cambodia Development Resource Institute (CDRI) | www.cdri.org.kh | Yes |
| Special Economic Zone Board | www.combodiasez.gov.kh | Yes |
| Cambodian Information Directory (KHMERNET) | www.khmernet.com | Yes |
| National Information Communications Technology Development Authority | www.nida.gov.kh | Yes |
| Electricity Authority of Cambodia （EAC） | www.eac.gov.kh | Yes |
| National Institute of Statistics (NIS) | www.nis.gov.kh | Yes |
| Mekong River Committee (MRC) | www.camnet.com.kh/cnmcs | NA |
| Khmersenate.org | khmersenate.org | |
| Cambodia Parliament | cambodian-parliament.org | NA |

# Appendix VI-2 Web Site Structure



# Appendix VI-3 GDMR Administration Training

| | |
|---|---|
| Title | The GDMR administration training |
| Date | On 27th and 28th October |
| Venue | Office of MANICH Enterprises |
| Trainees | • Mr. Kong Makara, Chief of Mineral Resources Development Office, Department of Mineral Resources Department<br>• Mr. Yos Samoth, Chief of Mapping Office Department of Geology<br>• Mr. Sok Sokha, Office of Department of Construction Material Resources<br>• Mr. Sok Ly, Office of Department of Construction Material Resources<br>• Mr. Leoung Vanmonirak, Office of Department of Mineral Resources<br>• Mr. Vanna Rith, Office of Department of Construction Material Resources |
| Trainers | Mr. Sann Sophar, production manager, MANICH Enterprises<br>Mr. Tim Francis, content manager, MANICH Enterprises<br>Dr. Kazushige Wada, JICA Study Team, Observer |
| Material | The GDMR web and web-GIS user handbooks |

## Appendix VI-4 GDMR Admin Guide (left) and WebGIS User Handbook (right)

GENERAL DEPARTMENT OF MINERAL RESOURCES

-Project-

The Master Plan Study for Promotion of

Mining Industry in the Kingdom of Cambodia

GDMR ADMIN GUIDE

Version 1.01

Supervising Editor: Dr. Kazushige Wada, GIS Expert to the JICA Survey Team

GENERAL DEPARTMENT OF MINERAL RESOURCES

– Project –

The Master Plan Study for Promotion of

the Mining Industry in the Kingdom of Cambodia

WEBGIS USER HANDBOOK

Written by Tim Francis

## Appendix VI-5 Certification of Maintenance Training for the GDMR Website

CERTIFICATE OF ACHIEVEMENT

THIS CERTIFICATE IS PRESENTED TO

[redacted]

FOR SUCCESSFULLY COMPLETING THE COURSE

MAINTENANCE TRAINING FOR THE GDMR WEBSITE

THE PROJECT ON THE MASTER PLAN STUDY

FOR

PROMOTION OF THE MINING INDUSTRY IN THE KINGDOM OF CAMBODIA

CONDUCTED ON

27- 29 OCTOBER 2009

# Appendix VII-1

## Main Points of the Mineral Policy for the Government of Cambodia

– The signpost that shows the way from promising mineral country
– to mining country –

The Royal Government of Cambodian is working to promote mineral resources development that will contribute to the growth of the national economy. In 2001, the Government promulgated the 'Law on Management and Exploitation of Mineral Resources', which clarifies the framework for mineral development.

Mineral development involves efforts to both attract mining investment and promote sustainable mining that takes the environment into consideration. To undertake these activities, the Government should work with existing and potential stakeholders to recommend and introduce practical techniques and technologies that are suited to the features of mineral resources in Cambodia, and aim for management that enhances transparency, fairness and accountability.

In this report, the Cambodian Government explains about its Mineral Policy.

### 1. Promoting Economic Growth and Local Development

By promoting the development of the rich mineral resources that exist in Cambodia as a means of making a significant contribution to the national economy, the government is working to reduce poverty in the country. Most of the country's mineral resources exist in remote areas where there is relatively little industrial development. Mining in those areas will stimulate local economic development and create employment not only in mining itself, but also in related industries. For this purpose, the Government must enhance its international competitiveness for promoting the mining sector.

### 2. Establishing a Transparent, Effective and Efficient Mining Administration based on Good Governance

The success of Cambodia's nascent mining sector will largely depend on how mining administration handles investment, development, operations, health and safety of miners and residents of affected areas and environmental protection. For this purpose, the Government will establish mining administration based on science and technology, international market economics and democracy, with the cooperation and assistance of miners, mining experts (including foreigners), and residents of mining areas.

3. Establishing Sustainable Mineral Development with Environmental Considerations

Cambodia's mineral resources are a natural endowment. The Government should utilize these finite resources for constructing a society in which the people are able to enjoy everlasting prosperity.

In some cases, mining activities have caused severe pollution, accidents resulting in injury or death, and conflict with local communities and neighboring countries. To prevent these problems, the Government should establish practical measures to prevent mining pollution and accidents, protect the environment, encourage cooperation between miners and local communities, and with neighboring countries, and to maximize mineral recovery.

The following 9 guidelines have been established in order to materialize the above 3 principles of mining policy,

1. The Role of the Government in Mine Development

The Government has administered the mining sector according to laws and regulations that have been implemented based on this Mineral Policy. Furthermore, the Government should encourage and facilitate mineral development in line with the Mining Development Plan and Action Plan that have been formulated with a science and technology foundation.

In addition, the Government should facilitate and regulate investment, exploration, construction and operations of private sector companies related to mining, and provide support for developing infrastructure. It should also collect the taxes and related fees that are generated by mineral development.

2. The Establishment of Laws and Regulations Related to Mining

The Government has been promulgating decrees and prakas that correspond to mining-law enforcement regulations since the implementation of the Law on Management and Exploitation of Mineral Resources.

The most urgent issues of mineral development in today's Cambodia are to find ways to sustain and expand mining investment. In fact, these are urgent issues for most countries that have rich mineral resources. Today, more than ever, they must have international competitiveness in order to attract mining investment.

To strengthen the international competitiveness of Cambodia's mining sector, the Government should improve laws and regulations related to mining investment, including mining procedures, security of tenure and rights, incentives and taxation, deregulation that promotes the market economy, etc., while paying attention to trends in mining countries around the world.

In addition, to prepare for the start of full-scale mining operations, the Government should formulate laws and regulations related to health and safety, and environmental protection,

as soon as possible.

3. Strengthening Management and Good Governance

The Government will strengthen the systems for managing and supervising the mining sector in accordance with the Law on Management and Exploitation of Mineral Resources and laws and regulations that may be implemented in future.

Specifically, this will involve the following:

Promoting the simplification and streamlining of mining-related procedures.

Cracking down on and eventually eliminating illegal mining by assigning mining inspectors to regional offices.

Minimizing mining accidents and pollution through guidance and control provided by mining inspectors,

Promoting rational mining activities based on state-of-art science and technology; and

Strengthening the system for collecting taxes and fees related to mining, in order to enable the Cambodian people to properly benefit from these activities.

At the same time, good governance, which is the centerpiece of Cambodia's basic national strategy, the 'Rectangular Strategy', will be instilled in the people who are involved with mining administration. By strengthening the monitoring system of the good governance while increasing officials' awareness of its importance, the Government is aiming to improve the transparency, fairness and accountability of mining administration.

4. Increasing and Disclosing Basic Information

In order to promote investment in the mining sector, it will be necessary to attract the interest of international mining investors in the mineral resources of Cambodia through the disclosure of information on the country's geology, mineral resources, concession cadastre, legal and tax systems of the mining sector, current mining conditions, mining administration, etc., as well as general information about the social, political and economic conditions in Cambodia.

As the first step, the Government should update geological maps and provide high-quality services and information related to mineral resources and geology. In addition, the Government has the responsibility to improve and update mining statistics.

This added and improved information is being published and distributed through the Website, and at the office of General Department of Mineral Resources, Ministry of Industry, Mines and Energy.

5. Strengthening Partnerships

Cooperative relationships - Partnerships - among the Government, mining investors, prospectors, mine operators, experts, service industries related to mining, local governments and residents of local communities are essential for successful mining promotion.

When formulating key measures, the Government should improve the competitiveness of investment in and productivity of mining, reflecting the sound opinions expressed by the

partners.

In addition, a cooperative system is being constructed that will increase the opportunities for the Government, prospectors and mine operators to report and discuss their plans and current mining activities with the local communities, as well as to promote sound mining practices and development, in order to enhance local economic development through mining.

Moreover, the Government will construct a foundation with its neighbors - namely, Laos, Vietnam and Thailand- for integrated regional mining development of the resources located in border areas, in order to increase the efficiency and international competitiveness of mining in the region.

6. Training Human Resources

The training of human resources for exploration, mining, mineral processing, metallurgy, health and safety, environmental management, marketing, and business management, as well as government administration, is one of the most critical issues for mining promotion.

With respect to the introduction of adequate technology and management into private mining operations, the Government will ease restrictions on the employment of foreigners, the importation of exploration and production equipment, etc., to encourage foreigners who have advanced skills, technologies and/or know-how to train Cambodian employees.

For their part, government officials will be taught state-of-the-art exploration and mining techniques that include considerations for environmental protection, as they work with international organizations, exploration and mining companies possessing highly advanced mining and environmental technologies, etc.

Moreover, the Government will encourage private citizens and government officials to receive education and training for mining at educational and research institutes in advanced mining countries, and work with other countries to support this training.

In the future, the Government will establish a training and educational institute in collaboration with the Ministry of Education Youth and Sports, and domestic educational organizations, to ensure the manpower that will be required under the Mining Development Plan.

7. Development of Mining Infrastructure

Most of Cambodia’s mineral resources exist in remote areas where infrastructure, such as transportation and energy, is not well developed. Furthermore, it is known that the conditions of mining infrastructure have a major effect on mining viability. It is estimated that most metal ore deposits in Cambodia are small or medium size compared to similar deposits in other parts of the world; therefore, it would impose a very heavy financial burden on a mining company to try to develop the necessary infrastructure on its own. The promotion of exploration by private sector companies, and the construction of infrastructure for mine development should be able to produce multiplier effects for local socio-economic development.

Since the development of mining infrastructure can stimulate the socio-economic development of remote areas, the Government will construct the infrastructure for mining and local community development in remote areas, based on the following principle.

The Government will construct mining infrastructure gradually in the areas where mining development is expected to have the greatest benefit for socio-economic development. The costs borne by the Government will be collected through the beneficiary pays principle based on public-private-partnership. These funds will be used to finance the next mining infrastructure project.

8. Fostering Artisanal, and Small- and Medium-size Mining Operations, and Supporting Improved Environmental Protection

Illegal mines have been operating in some areas of Cambodia. These operations not only infringe on the rights of legitimate concessioners and governmental management, but also are a source of environmental pollution, accidents, and health problems. The Government has been cracking down hard on illegal mining in order to eliminate it.

At the same time, the Law on Management and Exploitation of Mineral Resources has established the Artisanal Mining License that provides the opportunity for local miners who have little capital to engage in mining activities. Together with large-scale mining activities, artisanal mining is a key element of poverty reduction. The Government should provide support to help artisanal miners grow into stable domestic companies.

The Government will provide instruction in mining and environmental management technologies, and business management for local people who intend to become artisanal miners.

Government officials are providing technical and educational guidance in mining and environmental preservation to local residents who are engaged in artisanal mining. Furthermore, the Government will establish a cooperative system for artisanal, small- and medium-size mining operations to help support and strengthen their marketing capacity.

In the future, the Government, with the cooperation of international organizations, is planning to establish a loan system for artisanal, small- and medium-size mining operations.

9. Increasing the Amount of Value-Added Mineral Products

The Cambodian Government has been helping mining companies to freely earn the maximum profit in the market through on-going efforts to ease regulations and improve mining-related systems. At the same time, the Government has encouraged related industries to increase the amount of value-added mineral products made in Cambodia. The purpose is not only to increase national revenue, but also to increase employment of Cambodians.

The Government will construct public infrastructure in mining and industrial areas to help increase the production of value-added mineral products. In addition, it will set royalties based on the level of processing. The Government is also providing tax incentives for companies that introduce high-level processing equipment.

# Appendix VII-2 Operation Manuals

## An example from the operation manual- 1-: Registration of a mining company at DMRD

1. Procedure

(1) DMRD sends the necessary documents for registration to an investor.

↓

(2) The documents are prepared by the investor and submitted to DMRD, which acknowledges their receipt.

↓

(3) Formal check of the submitted documents by DMRD

↓

(4) The documents are transferred to the Dept. of Administration at MIME.

↓

(5) The appropriateness of the application is checked by the Dept. of Administration at MIME.

↓

(6) The documents are transferred to DGMR at GDMR.

↓

(7) The documents are transferred to the Minister of MIME who makes a decision on Registration and informs DGMR of the result.

↓

(8) DGMR instructs DMRD to issue a Registration Certificate.

↓

(9) Details of the documents submitted by the investor are checked.

↓

(10) DMRD checks the details by visiting the investor's office.

↓

(11) DMRD prepares the Registration certificate.

↓

(12) The Registration Certificate is transferred to DGMR.

↓

(13) The Registration certificate is transferred to the Under Secretary of the State of MIME.

↓

(14) The Registration certificate is transferred to the Secretary of the State of MIME.

↓

(15) The Registration certificate is transferred to the Minister.

↓

(16) The Registration certificate is delivered to the investor, who pays an issuing fee.

↓

(17) The issuing fee is submitted to the Revenue Office at DMRD.

↓

(18) All documents are filed and stored.

↓

(19) Compilation of management documents

2. Procedure for each task

(1) Distribution of documents necessary for registration to an investor by DMRD

- Documents necessary for application
  - ✓ Application form : Name, Nationality, Passport No. or ID number, Investor's address, Fax No, Telephone No.
  - ✓ Application letter : Submit with attached documents
  - ✓ Attached documents : Application letter、ID or Passport copy, copy of commercial registration, registration memorandum and articles of association, Organization chart, map of office location
- Distributor: Chief Officer at DMRD

(2) Investor prepares the documents and submits them to DMRD

- Receiver: Chief Officer at DMRD

(3) Formal check of the submitted documents by DMRD

- Check: Chief officer at DMRD
- Items for checking: Omissions in documents and description

(4) The documents are transferred to the Dept. of Administration at MIME

(5) The Dept. of Administration at MIME checks the appropriateness of the application

(6) The documents are transferred to DGMR at GDMR

(7) The documents are transferred to the Minister of MIME who makes a decision on Registration and informs DGMR of the result

(8) DGMR instructs DMRD to issue Registration Certificate

(9) Details of the documents submitted by the investor are checked

- Check: Chief Officer at DMRD
- Contents: Investor's business, office location, representative, communication media

(10) DMRD checks the details by visiting the investor's office

- Check: Officer at DMRD
- Contents: Investor's business, office location, representative, correspondent, current business, changes in contents of submitted documents
  : Meeting with the investor is to verify the contents of the documents
  : Check in 1-2 days
- Number of staff to be dispatched: Preferably two

(11) Preparation of the Registration Certificate by DMRD

- Information includes: Date of issue, Type of license, Applicant's name, Occupation, Date of birth, Place of birth, Name of company, Address of Cambodian office, Telephone number, ID number or passport number, Certificate number, Corporate number in Commercial Registration. Purpose of investment (exploration or mining)
- Preparation: Chief Officer at DMRD

(12) The Registration Certificate is transferred to DGMR.

- Check at DGMR: Formal

(13) The Registration Certificate is transferred to the Undersecretary at MIME.

(14) The Registration Certificate is transferred to the Secretary at MIME.

(15) The Registration Certificate is transferred to the Minister.

(16) The Registration certificate is delivered to the investor, who pays an issuing fee.

- Investor is informed that the certificate is ready to pick up by the Chief Officer at DMRD.

(17) The issuing fee is submitted to the Revenue office at DMRD.

- The Chief officer at DMRD receives the fee and sends it to the Revenue Office:

= Fees for Registration=

| | | |
|---|---|---|
| 1. | Artisanal Mining License | 50,000 riel |
| 2. | Pit / Quarry Mining License | |
| | a. For construction sand, laterite and clay | 400,000 riel |
| | b. For crushed stone, block stone, gravel, and other stones used for similar purposes | 800,000 riel |
| 3. | Gem Mining License | 2,000,000 riel |
| 4. | Mineral (Gemstone) Cutting License | 400,000 riel |
| 5. | Mineral Exploration License | 800,000 riel |
| 6. | Industrial Mining License | 1,200,000 riel |

(18) Filing of all documents and preservation

- Preparation of data files and management: Chief Officer at DMRD

(19) Compilation of management documents

- Management: Chief Officer at DMRD

3. Preservation of documents：preservation year and person in charge

(1) Application form and attached materials: Chief officer at DMRD, for ten years

(2) Copy of the certificate: Chief officer at DMRD, for perpetual

(3) Computer software for preparation of the certificate: Chief officer at DMRD, for five years

(4) Related management documents and materials: Chief officer at DMRD, for perpetual

4. Miscellaneous

Attachments of related documents

- Laws and regulations related to the Registration
- Blank application form
- Blank form of documents produced

## Example from the operation manual-- 2: Issue of Construction materials mining license at DCMR

1 .Procedure

(1) Distribution of application form for license of construction mineral mining to investor

↓

(2) Preparation of necessary documents by investor and submit to Secretary of DGMR

↓

(3) Check of the documents by Secretary of DGMR and transfer to the Minister at MIME

↓

(4) Check of the application documents by the Minister and return to DGMR

↓

(5) Transfer of the application documents to DCMR by DGMR

↓

(6) Check the contents of the application documents by DCMR

↓

(7) Location investigation by a site survey team organized by DCMR

↓

(8) Preparation of report on the location investigation

↓

(9) Preparation of draft Agreement on issuance of license at DCMR

↓

(10) Transfer of the draft to DGMR for his check

↓

(11) Conclusion of the Agreement on issuance of license with investor and payment of fee by investor

↓

(12) Custody of the application documents and Agreement

↓

(13) Preparation of data base on the contents of Agreement

↓

(14) Compilation of internal materials for management

2. Procedure for each work

(1) Distribution of application forms for license of construction mineral mining licenses to investors

- Documents necessary for application
  - ✓ Application form: Cover letter by Provincial Director, and Application form and related documents, Name, Nationality, Passport No. or ID number, Investor's address, Fax No, Telephone No.
  - ✓ Cover letter from the Provincial Director
  - ✓ Application form: Name, Nationality, Address, Passport No. or ID number
  - ✓ Attached documents: CV, Company's inventory report, Map of concession with signature of local

authority, Technical report of professional staff, Company license

- ✓ Company share, License of registration with GDMR

- Distributor: Secretary of DGMR

(2) Investor prepares necessary documents and submits them to the Secretary of DGMR

(3) The Secretary of DGMR checks the documents and transfers them to the Minister of MIME

(4) The Minister checks the application documents and returns them to DGMR

- The Minister instructs DGMR to proceed with the license issuing process

(5) DGMR transfers the application documents to DCMR

(6) DCMR checks the contents of the application documents

- Officer in charge: Deputy director in charge of the respective office for sand, rock and laterite
- Details of the documents are cross-checked

(7) Location investigation by a site survey team organized by DCMR

- Purpose: Confirmation of site, geology and types of minerals, deposit size and consideration of environmental issues
- Preparation: Map, GPS, Camera, Hammer and Bags for carrying samples
- Members:: DCMR officers (1-2), Provincial government officer and investor
- Payment of costs: 100% of costs paid by investor (including transportation, accommodation and daily allowance)

(8) Preparation of report on the site study

- Prepared by chief of site study team
- Contents of the report: Site, types of minerals and reserve condition, geological map, topographic map
- Preparation within one week

(9) Preparation of a draft agreement on the issuance of a license

- Prepared by the Chief Officer at DCMR
- Contents: Location, type of agreement, space, time, license conditions, working conditions, rental and others and fee charged (royalties, surface rentals, etc.), funds for reconstruction (investment)

(10) Transfer of the draft to DGMR for checking

(11) Conclusion of the agreement on the issuance of license with the investor and payment of fee by the investor

- After the investor signs the documents, they are transferred to the Minister by the Chief Officer through the Director of DCMR, DGMR, Under Secretary of the State and Secretary of the State.
- Surface rental fee: For Sand and gravel: US$20 per year per hectare
  For Rock US$40per year per hectare
  For Literate and land US$20 per year per hectare
- The surface rental fee and license fee are paid to the Revenue Office at DMRD, while royalties are paid to the Provincial Treasury

(12) Custody of the application documents and Agreement

- They are kept in the Chief Officer's cabinet

(13) Preparation of a database of the contents of the Agreement

- Data and information includes: Name of company, the company's detailed information such as financial data and site for mining, quantity of construction materials

- Person in charge: Chief Officer

(14) Preparation of internal materials for management

- Chief Officer prepares them when necessary

3. Preservation of documents: Person in charge and storage period

(1) Applications for licenses and related documents submitted by investors: Chief Officer at DCMR: Ten or more years

(2) Licenses: Chief Officer at DCMR: Permanent

(3) Agreement on license between GDMR and investor: Chief Officer at DCMR: Permanent)

(4) Computer software of the above documents: Chief Officer at DCMR: Five years

(5) Management data and information: Chief Officer at DCMR: Permanent

4. Other

Attachments of related documents

- Laws and regulations related to the Registration
- Blank application forms
- Blank forms of documents produced