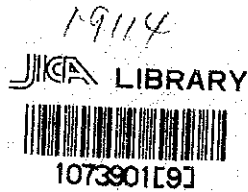


パキスタン回教共和国
地質科学研究所技術協力事業
事前調査団報告書

平成元(1989)年1月

国際協力事業団

パキスタン回教共和国
地質科学研究所技術協力事業
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19114

は し が き

パキスタンは、地質構造からいって、鉛・亜鉛鉱床、銅鉱床（含金）等の発見への期待が大きく、同国の第7次5ヶ年計画（1989～1994）でも鉱物資源調査及び開発に重点が置かれている。

石油天然資源省に所属するパキスタン地質調査所（Geological Survey of Pakistan-GSP）は、国内の各地で鉱物資源調査を実施しているが、資金力及び技術力の不足から、各支所の建屋の老朽化、機器の陳腐化がひどく、目下、岩石鉱物の地質分析のほとんどを海外に依存している。このため、「パ」政府は、GSPに新たに岩石・鉱物分析研究所を設立し、地質分析を自国で行うとともに、未調査・未発見のまま胚胎している膨大な有用鉱物資源の調査を強力に推進することを計画し、無償資金協力を要請するとともに、基本的な分野についてプロジェクト方式技術協力を要請してきた。

我が国は、この要請に応じて昭和63年12月9日から12月21日まで、事前調査団を派遣して、本件の要請の背景調査、要請内容の詳細についての協議及び確認を行った。

本報告書は、事前調査団の現地における調査及び協議事項をとりまとめたものである。

ここに、本調査団派遣に際し、ご協力を頂いた在パキスタン日本国大使館をはじめとする日・パ両国の関係各位に対して深甚なる謝意を表する次第である。

平成元年1月

国際協力事業団

鉱工業開発協力部

部長 角野祥三



G S Pとの協議



研究所建設予定地

88. 12. 13



富田団長，ロディ石油天然資源
省次官補およびカズミG S P所長
による署名交換

はしがき

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I. 事前調査団の派遣

1-1 派遣の経緯

パキスタンは地質構造からみて、鉛、亜鉛鉱床、銅鉱床などの発見への期待が大きく、同国の第7次5ヵ年計画（1988～1993）でも鉱物資源の調査と開発が重要政策の一つになっている。

石油天然資源省に所属するパキスタン地質調査所（GSP）は、国内各地で鉱物資源調査を実施しているが、施設・機器の老朽化・陳腐化が著しく、技術力の不足もあり、目下、岩石鉱物の地質分析は殆んど海外に依存している。このため、パキスタン政府はGSPに新たに岩石鉱物分析研究所を設立し、地質分析を自国で行うとともに、未調査・未発見のまま胚胎されている有用鉱物資源の調査を強力に推進することを計画しており、これが当国の資源開発から国内関連産業の発展に寄与することは明らかである。

パキスタン政府は我が国に対し、岩石鉱物分析研究所の建設及び機材の整備について無償資金協力を要請するとともに、基本的な分野について、プロジェクト方式技術協力を要請してきた。

（関連公信 昭和62年12月21日 公信第892号）

1-2 派遣の目的

パキスタン側からのプロジェクト協力要請に対し、協力実施の可能性について確認するため、協力要請の詳細と実施体制を調査し、プロジェクト実施の基本方針と実施計画(案)を策定することが調査団派遣の目的である。おもな調査事項は下記のとおり。

- (1) 要請の背景
- (2) 協力分野の現状
- (3) 要請内容の調査・確認
- (4) プロジェクト実施計画（案）の協議
- (5) 専門家の生活環境の調査
- (6) 無償資金協力の立場からの調査・確認

1-3 調査団の構成

担当事項	氏名	所 属
総括(団長)	冨田 堅二	JICA 専門技術嘱託
技術協力計画	須藤 貞久	通産省資源エネルギー庁長官官房鉱業課鉱物探査専門職
地質 鉱床	藤井 敬三	通産省工技院地質調査所燃料資源部燃料鉱床課長
化学分析	白波瀬 輝夫	通産省工技院地質調査所地質情報センター長
無償資金協力 計画調査	瀬戸 茂之	JICA 無償資金協力計画調査部基本設計調査第二課
業務調整	高橋 悟	JICA 鉱工業開発協力部鉱工業開発技術課

1-4 調査日程

月	日	曜	AM/PM	主 要 日 程	宿泊地
12	9	金	AM PM	・東京発 (PK-751) 北京経由 ・イスラマバード着	イスラマバード
12	10	土	PM	・JICA 事務所 (谷川所長、戸川職員 川井・角口両専門家と打合せ)	"
12	11	日	AM PM	・JICA 事務所 (谷川所長、川井専門家と打合せ) ・PMDC (業務概要と本件プロジェクトとの関係などについて聴取) ・HDIP (研究所施設の視察) ・JICA 事務所 (GSP 所長と面談、スケジュールの打合せ)	"
12	12	月	AM PM	・JICA 事務所 (GSP 所長と第1回協議、質問書への回答書受領) ・EAD (次官補と面談) ・石油天然資源省 (次官と面談) ・古生物学堆積学研究所建設現場を視察 ・団員打合せ (第1回) (回答書の検討など)	"
12	13	火	AM PM	・石油天然資源省 (次官補と面談) ・CAD (計画部長と面談、プロジェクトサイトの現状について聴取) ・プロジェクトサイト予定地 (実地調査)	"
12	14	水	AM PM	・GSP イスラマバード支所 (支所長と面談、所内視察) ・イスラマバード発 (PK-325) ・クエッタ着 ・GSP 所長主催夕食会 ・団員打合せ (第2回) (プロジェクト担当官からの質問書について)	クエッタ
12	15	木	AM PM	・GSP (GSP 所長と第2回協議) ・GSP (GSP 所長と第3回協議) (所内視察)	クエッタ
12	16	金	AM PM	・クエッタ発 (PK-324) ・イスラマバード着 ・団員打合せ (第3回) (M/M案の作成)	イスラマバード

月	日	曜	AM/PM	主 要 日 程	宿泊地
12	17	土	AM PM	<ul style="list-style-type: none"> • G S P イスラマバード事務所 (プロジェクト担当官とM/M案の作成について協議) • J I C A 事務所 (谷川所長へ経過報告) (G S P 担当官とM/M案の照合) 	イスラマバード
12	18	日	AM PM	<ul style="list-style-type: none"> • G S P 担当官からM/M (案) に対するパキスタン側の意向聴取 • 日本大使館 (狩俣、原口両書記官へ経過報告、M/M (案) を説明) • G S P 所長と第4回協議 (M/Mの最終案作成) • 日本大使公邸 (小林大使へ経過報告) 	"
12	19	月	AM PM	<ul style="list-style-type: none"> • G S P 担当官とM/Mの点検 • 石油天然資源省 (調査団長と次官補並びにG S P 所長との間でM/Mに署名交換) • 石油天然資源省次官主催昼食会 • J I C A 事務所 (谷川所長へ報告) • 日本大使館 (原口書記官へ報告) • 団員打合せ (第4回) (調査結果の総括) 	"
12	20	火	AM PM	<ul style="list-style-type: none"> • 帰国準備 • イスラマバード発 (PK-309) • カラチ着 	機中
12	21	水	AM PM	<ul style="list-style-type: none"> • カラチ発 (JL-472) (バンコク経由) • 東京着 	

1-5 主要面談者

- * Economic Affairs Division (EAD) (対先進国援助要請機関)
 - Mr. A. Chafoor Mirza, Joint Secretary
- * Capital Development Authority (CAD) (プロジェクト用地管理機関)
 - Mr. Shafiq Ali Siddiqui, Director, Planning Wing
- * Ministry of Petroleum & Natural Resources
 - Mr. Bashir Ahmad, Secretary
 - Mr. Mohammad Iiyas Lodhi, Joint Secretary (Administration)
 - (M/M署名者)
 - Mr. Ikram Arif, Deputy Secretary (Minerals)
 - Mr. Mohboob Elahi, Deputy Secretary (Administration)
- * Geological Survey of Pakistan (GSP), Ministry of Petroleum & Natural Resources (本プロジェクト実施機関)
 - Mr. Ali Hamza Kazmi, Director General (M/M署名者)
 - Dr. Ali N. Fatmi, Deputy Director General
 - Dr. S. M. Ibrahim Shah, Deputy Director General

Mr. E. H. Chauhan, Chief Chemist

Mr. S. Hashim Raza, Chief Geophysicist

Mr. Mohammad Ali Mirza, Director, Planning & Information

(本プロジェクト担当官)

Mr. M. Saeed-uz-Zafar Khan, Director (Northern Division, Islamabad)

(本プロジェクトの在イスラマバード連絡担当官)

Mr. Firdaus Khan, Deputy Director (ND, Islamabad)

Mr. K. Sabir Ali Khan, Deputy Director (ND, Islamabad)

Mr. G. Mujtaba, Deputy Director (ND, Islamabad)

Dr. Farhat Husain, Deputy Director General, Northern Division,
Lahore

Dr. Mohmood Raza, Paleontology & Sedimentology Laboratory

* Pakistan Mineral Development Corporation (Private) Ltd. (PMDC)

Mr. Khurshid A. Siddiqui, Chief, Planning & Development

Mr. Abdul Sattar Memon, Chief Geologist

* Hydrocarbon Development Institute of Pakistan (HDIP)

Mr. Wasim Ahmad, Principal Geochemist

* 在パキスタン日本国大使館

特命全権大使 小林俊二

公 使 小畑紘一

一等書記官 狩俣茂雄

一等書記官 原口亮介

* JICAパキスタン事務所

所 長 谷川和男

戸川正人

専門家 (GSP) 川井正和

専門家 (PMDC) 角口俊宏

Ⅱ. 要 約

- (1) 本調査団は本件プロジェクトに関し、要請の背景及び内容、プロジェクト実施場所、パキスタン側のカウンターパート及びローカルコストの確保など、プロジェクト実施の可能性についてパキスタン側のプロジェクト実施機関である石油天然資源省地質調査所をはじめ関係諸機関との間で協議を行い、さらに実地調査も行った。
- (2) プロジェクトの件名について、パキスタン側は“Petrolabs cum Geochemical Prospecting Centre”を採用していたが、協議の結果、“Geoscience Laboratory”(略称 Geolab) (地質科学研究所) とすることを双方は確認した。
- (3) プロジェクトサイトについて、パキスタン側はイスラマバード郊外のラウル湖南東約 2 kmの地点に、約10エーカー (約 4 万㎡、約 1 万 2 千坪) の用地を確保できる見込みである旨、説明した。
- (4) プロジェクトの実施に必要なカウンターパート及びローカルコストについては、本プロジェクトが第 6 次 5 ヶ年計画にひきつづき、第 7 次 5 ヶ年計画 (1988~1993年) においても承認されているので、目下申請中の ECNEC (国家経済評議会執行委員会) の承認がえられ次第、確保できる旨、パキスタン側は説明した。
- (5) 今回の協議・調査を通じ、双方が理解を示した事項については議事録 (M/M) を作成し、調査団長と石油天然資源省次官補並びにパキスタン地質調査所長との間で署名交換を行なった。
- (6) 本調査団は今回の協議・調査を総括し、本件技術協力について実施の可能性を確認した。
- (7) 今後は、長期調査員を派遣するなど、プロジェクトの効率的な実施へ向けて、適切な措置がとられることが望ましい。

Ⅲ. 調査団とパキスタン側の確認事項

調査団とパキスタン側（石油天然資源省及びパキスタン地質調査所）は下記の事項について、それぞれ確認した。

3-1 プロジェクトの名称

本件プロジェクトの名称について、パキスタン側では要請の当初から、“Petrol-abs-cum-Geochemical-Prospecting-Centre”を適用していたが今回、調査団との協議の結果、“Technical-Cooperation-Project-on-Geoscience-Laboratory-in-the-Geological-Survey-of-Pakistan”略称“Geolab”とすることになった。因に日本側としては、“パキスタン地質科学研究所技術協力事業”とすることが適当と思われる。

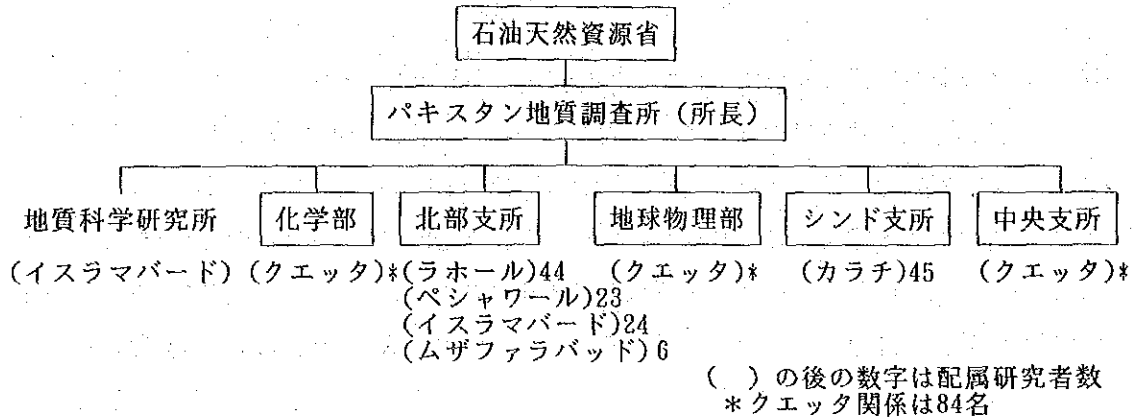
3-2 プロジェクトの実施機関

パキスタン側のプロジェクト実施機関は、石油天然資源省に所属する“パキスタン地質調査所（GSP）”であることを双方は確認した。

パキスタン地質調査所は、石油天然資源省に属する試験研究機関で、1947年に創立され、1983年3月現在、研究者226名、事務官・技官963名、用務員など433名、合計1622名の規模を擁している。本所は、クエッタに置かれ、支所がカラチ、ベジャワールなど各州・地区単位に設置されているほか、本所には化学部と地球物理部とが設けられている（図-1参照）。研究者226名の本所・支所への配置数は、図-1に示したとおりである。

パキスタン地質調査所の事業は、経常研究と開発プロジェクトに大別される。経常研究では、国土の基本地質調査（地質図の作成・発行）と地下資源の基礎探査（鉱物及びエネルギー資源）を軸に、地震、地滑り、地下水、ダム地質など、パキスタンの国土の保全と開発・利用に関する研究を幅広く担当している。一方、開発プロジェクトでは、国際機関、外国機関、国内の関連公社、各州政府、一般企業などと協力し、石炭や天然ガス、鉱物資源、地下水の開発などを行っている。

図-1 パキスタン地質調査所の組織



3-3 プロジェクトの協力期間

本プロジェクトの協力期間は、今後、派遣される実施協議調査団とパキスタン側がR/Dで合意した日から5年間とすることになった。

3-4 パキスタン側の負担実施事項

パキスタン側は、調査団が説明した日本政府が実施するプロジェクト方式技術協力のシステムに理解を示した上で、下記の事項をパキスタン側の負担で実施することを確認した。

- (1) カウンターパートの確保 (M/MのAnnex 5 参照)
- (2) プロジェクト運営費の確保 (M/MのAnnex 6 参照)
- (3) 日本側から提供されなかったプロジェクトに必要な追加機材の調達
- (4) J L C A と E A D との間で合意される T / R に準拠した日本人専門家への便宜供与

Ⅳ. パキスタン側からの説明事項

4-1 地質科学研究所設立計画

パキスタン側は地質科学研究所設立計画について、下記のとおり説明した。

4-1-1 背景と必要性

パキスタンの産業構造は、農業中心から徐々に工業及び第三次産業に比重を移して来ているが、鉱業に関しては従来、埋蔵量の豊富なクロマイトを除くと、石炭・石灰石・イオウなどの非金属鉱物を主に生産してきてはいるものの、大部分の金属鉱物資源及びエネルギー資源は輸入にあおいできた。オイルショックから立ち直る間に、政府は天然資源の自給度を高め外貨の流出を抑制すべく、1983年に始まる第6次5ヵ年計画から鉱物資源開発に対する投資を重要視する方針を打ち出した。鉱物資源の探査を任務とする石油天然資源省地質調査所(GSP)は、国連・カナダ・米国・日本など各国の協力をえて、広範な地域で物理探査・地化学探査・ボーリング調査等を行った結果、全国各地において鉄・銅・鉛・亜鉛・燐等の有望鉱床を発見し、開発のための投資対象を提供するに至った。

1988年に始まる第7次5ヵ年計画においても、上記有望鉱床の開発を進めるとともにさらに新しい鉱床発見の可能性の高い地域に対して、地質調査及び鉱床探査を集中すべきことが、GSPの任務とされている。GSPがこの要請に応えるためには、その探査能力を飛躍的に高めることが必要である。なぜなら、GSPは1947年独立時にインド地質調査所から分離、8名の職員から出発し、1960年代初には当時の高いレベルの設備を導入し、人材養成も行ってきたが、1965年、1971年の印パ戦争、国土の二分化、さらに1973-74年のオイルショックにより、職員の離散、予算の減少が続き、その機能はほとんど停止の状況に置かれた。

一方、この間に先進諸国においては、地球科学上新規な学説が提唱され、世界中の造山帯の地質鉱床の再検討が開始されるとともに、高度精密な分析技術やデータ処理技術が急速に進展したため、パキスタン国土における鉱物資源賦存の可能性が増大した反面、GSPと先進諸国との技術レベルの較差は著しく広がることとなった。

このため政府は、第6次5ヵ年計画からGSPの近代化・合理化の計画を策定し、米国等の協力をえて分析設備の導入をはかるとともに、老朽化した施設の更新、新しい理論・技術を修得するための人材養成を行い、GSPの地質調査・鉱床探査能力の充実拡大に努力しているが、その一環として、GSPの組織の中に地質科学研究所を設立する計画を策定したところである。(詳細はM/MのAnnex 7参照)

4-1-2 Geolabの目的

岩石・鉱物の岩石学的、鉱物学的、岩石化学的、古地磁気学的、古生物学的研究と、鉱

床の地化学探査技術の分野でG S Pの機能の強化を図ること。

4-1-3 Geolabの業務

- (1) 実験室における研究と野外における地化学探査を通じて鉱物資源開発に関する地質科学的研究を行うこと。
- (2) G S Pの職員に対し、O J T及び特別研修計画によって技術移転を行うこと。
- (3) 岩石化学的研究、記載岩石学的研究、古地磁気学及び古生物学的地質年代学、X線回折、蛍光X線分析、並びに鉱物処理を行うこと。

4-1-4 Geolabの組織

地質科学研究所はパキスタン地質調査所長に直属する組織として、1991年に設立されることが計画されている。

Geolabは下記の部門で構成される。

- (1) 地化学探査
- (2) 岩石化学
- (3) 岩石学・鉱物学
- (4) 試料調製
- (5) 古地磁気学的地質年代学
- (6) アイソトープ地質年代学
- (7) 古生物学的地質年代学
- (8) 管理運営

4-2 人員配置計画

パキスタン側は、地質科学研究所技術協力プロジェクトにたいし、次のような人員配置計画を関係当局へ要求中であり、その実現については最善を尽くす旨表明した。(M/M Annex-5 参照)。

- (1) 20職種の専門職については、29名を3年間で配置する。
- (2) 12職種の補助・支援職については、35名を4年間で配置する。
- (3) 最終的には、専門職29名、補助・支援職35名、計64名とする。
- (4) 専門職29名のうち、B P S -17以上の28名について現在のパキスタン地質調査所の定員の現状と比較してみると次表のとおりとなり、配置転換と新規採用によって、実現可能であるとパキスタン側は説明している (B P S : パキスタンの公務員の給与号俸)。

専 門 職 種	G S P の現定員 / 本技協のための新たな要求				
	BPS-17	BPS-18	BPS-19	BPS-20	合 計
地 質 (Geologist)	119/ 6	38/ 3	16/ 2	4/ 2	177/13
地球物理 (Geophysicist)	14/ 0	8/ 0	4/ 0	1/ 0	27/ 0
化 学 (Chemist)	20/ 3	4/ 2	1/ 2	1/ 0	26/ 7
航空測量 (Photogrammetrist Surveyor)	4/ 0	1/ 0	0/ 0	0/ 0	5/ 0
試錐技師 (Drilling Engineer)	27/ 0	11/ 0	1/ 0	0/ 0	39/ 0
その他 (Other Professional)	12/ 1	6/ 3	0/ 0	0/ 0	18/ 4
庶務・会計 (Establishment & Accounts)	8/ 2	3/ 0	0/ 0	0/ 0	11/ 2
合 計	204/12	71/ 8	22/ 4	6/ 2	303/26

(1988年12月現在)

4 - 3 運営費確保計画

パキスタン側は、地質科学研究所技術協力プロジェクトに対し、下記のとおり、運営費確保計画を関係当局に要求中であり、その実現について最善の努力を尽す旨、表明した。

(M/MのAnnex-6参照)

(1) プロジェクト運営経費要求額

職員給与及び手当	6,929,370ルピー	(4年間)
職 員 旅 費	1,500,000ルピー	(4年間)
その他の経費*	9,666,630ルピー	(5年間)
計	18,096,000ルピー	(5年間)

(*その他の経費には上地購入費500万ルピーが含まれている)

(2) 第7次5ヵ年計画で本プロジェクトに承認されている予算額

(単位：百万ルピー)

	総 額			第6次 5ヵ年計画 割当額	第7次 5ヵ年計画 割当額
	外貨分	内貨分	計		
地質科学研究所設立計画に 必要な経費 (G S P - J I C Aプロジェクト)	162.0	19.0	181.0	0.1	113.0

(3) GSPの年次予算の実績

(単位：千ルピー)

年	経常予算			開発予算			総予算		
	内貨	外貨	計	内貨	外貨	計	内貨	外貨	計
83~84	33,290	100	33,390	13,182	12,818	26,000	46,472	12,918	59,390
84~85	34,389	100	34,489	18,500	6,700	25,200	52,889	6,800	59,689
85~86	38,334	100	38,434	11,639	35,960	47,599	49,973	36,060	86,033
86~87	53,331	120	53,451	22,516	32,110	54,626	75,847	32,230	108,077
87~88	41,196	150	41,346	27,100	53,000	80,100	68,296	53,150	121,446

*1987~88年内貨分予算に対する職員総数は1543名

職員1名当りの内貨分予算は44,000ルピー

4-4 Geolabの建設予定地

パキスタン側は地質科学研究所の建設予定地について、以下のとおり説明した。

(Annex-I及びI A参照)

(1) 所在地

イスラマバード所在のNational Health Laboratoriesのすぐ南に隣接する地域。
 イスラマバードG-6所在のAbpara Marketから約5 km、ラワル湖から約2 kmの地点。

(2) 所有者

予定地の所有権は、現在政府機関たる首都圏開発公社(Capital Development Authority; CDA)にあるが、すでにCDA内では、譲渡価格の設定を除いて、GSPへの譲渡は内定済みとのことである。

(3) 面積・地形・価格

600フィート × 724フィートのほぼ平坦地

面積：40,348 m² (12,205坪) (9,97エーカー)

価格：平方ヤード当り400ルピー

1,931 万ルピー (≒1億35百万円 @7円/ルピー)

GSPへの譲渡価格については目下、CDAと交渉中

GSPは、土地代金を2年間にわたって分割払いする計画である。

(4) インフラストラクチャー

サイト西側には90名ほどの職員が働くNational Centre for Rural Developmentがあり、南側には民家数十戸、東側にはレンガ工場がある。北側は現在開放地。

CDAの説明によれば、電気、ガス、水道はCDAが供給するとのことである（但し、水源は地下水に頼っている。付近の井戸を見学したところでは、地下水位は4～5mと極めて高く、水量も豊富な模様。）

アクセスロードは砂利敷道路となっている。

4-5 パキスタン政府のプロジェクト承認手続

本件プロジェクトに対するパキスタン政府の承認については13の段階の手続きが必要であるが、すでに10段階を終えて、目下、ECNEC（国家経済評議会執行委員会）の承認要請中である旨、パキスタン側は説明した。（M/MのAnnex-8参照）

4-6 政府関係機関の支援体制

パキスタン地質調査所の所属する石油天然資源省の下には10の関連公社・関連会社があり、これらとは同省の指導の下に共同で開発プロジェクトを実施するなど密接な協力関係にあること、これらを含めて省全体で今回のプロジェクトを支援して行くことが石油天然資源省から表明された。特に、パキスタン鉱物開発公社（PMDC）、資源開発公社（RDC）、パキスタン宝石公社（GCP）とは密接な協力関係にあり、今回訪問したパキスタン鉱物開発公社（PMDC）においても、地質科学研究所設立のあかつきには、連携をより密にし、同所の施設の積極的利用を行いたいとの見解が表明された。

4-7 外国政府及び国際機関による協力の実績

4-7-1 日本政府による協力

現在実施されている日本政府による協力のうち、鉱物資源開発に関係するものは以下のとおりである。

(1) 国際協力事業団・金属鉱業事業団（1986-1989）

「バルチスタン州クズダール地域資源開発協力基礎調査」 重晶石-鉛・亜鉛鉱床有望地域の精査のため地質調査・物理探査・地化学探査及びボーリングを行う。

(2) 国際協力事業団（1988-1989）

「鉱物探査技術専門家派遣」 GSP本支所職員に地化学探査技術を研修させるため、北部山岳地帯を例として河川堆積物を採集し、化学分析は海外に依頼し、結果の解析を行う。

(3) 工業技術院地質調査所（1987-1990）

「コリジョン帯地質・鉱物資源の研究」 北部山岳地帯及びソルトレンジ地域の地質構造及び鉱物資源の研究を行う。

(4) 文部省広島大学他 (1975-1988)

「インド-ユーラシア大陸コリジョン帯の地質構造と堆積作用及び鉱物資源の研究」
バルチスタン州中部-南部造山帯の地質構造・古生物及び鉱床の調査研究を行う。

(3)(4)はパキスタンに日本の協力によって地質科学研究所を設立する計画の基礎をつくった。(1)(2)の協力は、化学分析がパキスタン国内で十分に行われることによって一層進展するものと考えられる。

4-7-2 第三国政府及び国際機関による協力

最近終了、または現在進行中の当分野に係るプロジェクトは以下のとおりである。

(1) カナダ国際開発公社 (C I D A) (1978-1983、1983-1988)

「バルチスタン州西部及び南部の空中磁気探査(フェーズ1)、同地域の精査(フェーズ2)」32ヵ所に鉱物及び地下水の有望地を発見した。

(2) 国連開発計画 (U N D P) (1988-1992)

「バルチスタン州クズダール地域、グンガ地区で1千万トン級の金属鉱床を発見(フェーズ1) 北部山岳地帯及びバルチスタン州西部チャガイ地域における金・スズ・タングステン及び主要金属鉱床の探査と評価(フェーズ2)」

(3) 米国オレゴン州立大学 (1982-1987、1988-1991)

「北西辺境州及びソルトレンジ地帯の地質構造・鉱物資源探査及び地震災害と活断層の関係についての研究」

(4) 英国考古学調査団 (1988終了)

「ポツワール高原、シワリク層群の生層序学的及び堆積学的研究」

(5) イタリア (1988)

「北部、ミスガール-チャプルサン地域の地質図作成のための踏査」

(6) 西ドイツ (1988開始)

「イスラマバード炭化水素研究所 (H D I C) に対する協力」 石油探査のための古生物学、層位学、有機地球化学的研究に対する協力。

(7) U S A I D (1983-1988)

野外用調査機器及び実験室用機器の調達費への援助、長期及び短期研修員の受入れ。

V. パキスタン側からの要請事項

パキスタン側（石油天然資源省及びパキスタン地質調査所）は、本件プロジェクト方式技術協力事業及び無償資金協力事業について下記のとおり日本側の協力を要請した。

5-1 プロジェクト方式技術協力事業

5-1-1 プロジェクトの目的

鉱物資源開発の促進を図るパキスタンの国策に寄与するため、鉱物資源探査の分野で人材養成を目指すことが本プロジェクトの目的である。

5-1-2 プロジェクトの目標

- (1) Geolab の施設、機材を活用し、日常業務における訓練を通じて、鉱物及び岩石の岩石学的、鉱物学的、古生物学的、鉱床学的並びに地化学的分析技術の分野で人材を養成すること。
- (2) 特定モデル地域での野外調査と Geolab の実験室における業務を通じた訓練によって、地質図と地化学図の作成技術の分野で人材を養成すること。

5-1-3 技術協力の範囲

下記の分野において日本人専門家からパキスタン側カウンターパートへ適性技術の移転を図ること。

- (1) 岩石学的、鉱物学的、鉱床学的手法による火成岩及び変成岩に伴う鉱床の探査技術。
- (2) 層位学的、古生物学的、古地磁気学的手法による堆積岩に伴う鉱床の探査技術。
- (3) 鉱物・岩石の化学分析と地化学探査法による鉱床の探査技術。

5-1-4 日本人専門家の派遣

(1) 長期専門家

専門分野	人数	期間（年）
チーフアドバイザー	1	5
コーディネータ	1	5
機器分析専門家	1	4
地質年代測定（古地磁気）専門家	1	2
地化学探査専門家	1	4
鉱物学専門家	1	2

(2) 短期専門家

下記の分野について、必要に応じ、派遣を要請する。

- 1) 岩石学、 2) 鉱床学、 3) 層位学、 4) 古生物学
- 5) アイソトープ地質学、 6) 物理探査、 7) データ処理
- 8) 機器保守管理

5-1-5 カウンターパートの日本での研修

研 修 分 野	人 数	期 間 (月)
地化学探査	2	6
機器分析	3	9
アイソトープ地質年代測定	1	9
岩石学	1	6
鉱物学	1	6
機器保守管理	2	6
データ処理	1	6

5-1-6 機材の供与

パキスタン側は本プロジェクトの実施に際して必要な機材のうち、無償資金協力で供与される機材と、パキスタン側で調達可能な機材を除いたその他の機材については、プロジェクト方式技術協力事業において供与されたい旨、要請した。

5-2 無償資金協力事業

パキスタン側は地質科学研究所の設立に関し、日本政府の無償資金協力を下記のとおり要請した。

5-2-1 建物及び施設 (M/MのAnnex-3参照)

(1) 実験棟

- 1) 古地磁気地質年代学実験室
- 2) 岩石学及び鉱物学実験室
- 3) 岩石化学実験室
- 4) 地化学探査実験室
- 5) アイソトープ地質年代学実験室
- 6) 古生物学的地質年代学実験室
- 7) 試料調製実験室

- (2) 管理棟
- 1) 管理部門
 - 2) 情報サービス部門
 - 3) 技術サービス部門
- (3) その他の支援施設
- 1) 資料展示施設
 - 2) 付属施設

5-2-2 機材 (M/Mの Annex-4 参照)

機材を必要とする部門	主 要 機 材
1. 管理部	<ul style="list-style-type: none"> • 実験室の保守管理、研究所の管理・運営に必要な機材
2. 図書室と文書作成部門	<ul style="list-style-type: none"> • 図書室と文書作成に必要な機材
3. 試料調製実験室	<ul style="list-style-type: none"> • 試料調製と処理に必要な機材
4. 岩石学・鉱物学部門	<ul style="list-style-type: none"> • 示差熱分析装置 • スペクトロメータ • その他の必要な機材
5. X線回折・分光実験室	<ul style="list-style-type: none"> • 蛍光X線分析装置 • X線回折装置 • E P M A
6. 岩石・鉱物標準試料実験室	<ul style="list-style-type: none"> • 岩石、鉱物の標準試料と薄片保存に必要な機材
7. 古地磁気地質年代学ユニット	<ul style="list-style-type: none"> • デジタルスピナーマグネットメータ • 透磁率計 • ダイヤモンドドリル • その他必要な機材
8. 古生物学的地質年代学実験室	<ul style="list-style-type: none"> • 走査型電子顕微鏡 • その他必要な機材
9. 分析化学部門	<ul style="list-style-type: none"> • 原子吸光スペクトロメータ • ガスクロマトグラフ • 発光分光分析装置 • I C P スペクトロメータ • その他必要な機材
10. 地化学探査部門	<ul style="list-style-type: none"> • データ処理システム • 地化学サンプリングに必要な機材
11. 車輛	<ul style="list-style-type: none"> • 野外調査用車輛
12. 資材	<ul style="list-style-type: none"> • 化学薬品 • その他

VI. 調査団とパキスタン側の合意事項

調査団とパキスタン側（石油天然資源省とパキスタン地質調査所）は下記事項について合意した。

6-1 合同委員会の設置

パキスタン側は本プロジェクトの実施に際して、下記構成による合同委員会を設置することに合意した。

(1) パキスタン側

地質科学研究所 : 所長

パキスタン地質調査所 : 所長

1～2名を指名

石油天然資源省 : 次官補

次官補代理（鉱物担当）

(2) 日本側

JICA 専門家 : チーフアドバイザー

コーディネータ

専門家

JICA パキスタン事務所 : 所長

日本国大使館 : 必要に応じ担当書記官

Ⅶ. その他の協議・調査事項

7-1 アイソトープによる年代測定

アイソトープによる年代測定については、試料採取と試料調製を日本人専門家の指導の下にパキスタンにて行い、その測定はカウンターパートの日本での研修の際に、日本の研究所において実施したい旨、パキスタン側は提案した。これに対し、調査団はカウンターパートの受入れ計画のなかで対処したい旨、表明した。

7-2 プロジェクトの暫定実施計画

パキスタン側は本プロジェクトの実施スケジュールについて調査団に説明を求めた。これに対し調査団は、すべての手続き等が順調に進行した場合の大凡の日程を口頭で説明し、M/Mへは記録しないことで、パキスタン側の上承をえた。

VIII. 本件技術協力の妥当性

8-1 技術協力の妥当性

本調査団は上述の調査・協議事項の結果を総括し、また諸般の情勢を勘案した上で、本件プロジェクトの要請に対し、プロジェクト方式の技術協力を実施する可能性を確認した。そのおもな理由は以下のとおりである。

- (1) 要請の背景が理解できたこと。
- (2) 本プロジェクトの必要性が認められたこと。
- (3) パキスタン側の受入体制が比較的、整っていること。
- (4) プロジェクトサイトについては、未確認であるが、予定地の条件は比較的恵まれていること。
- (5) パキスタンの地質構造に対して日本の専門家が興味を示していること。
- (6) プロジェクト協力期間中に、成果品として対象地域についての地質図および地化学図の作成が見込めること。
- (7) 地質科学研究所設立への技術協力は長期的にみて、日本およびパキスタン双方の国益に合致すること。

8-2 地質科学研究所の波及効果

地質科学研究所の建設及びこれに関する技術協力のもたらす波及効果は、以下のようなものであることが期待される。

- 1) 地質調査所が行うべき調査の能力が、図1のように地質図及び地球化学図の作成において、飛躍的に向上する。(地質図の作成は鉱物資源調査を含め、あらゆる調査の基礎となる。地球化学図は、直接鉱床に触れなくとも、その周辺から鉱床の存在を予測できる効率的な地化学探査法の結果を示す。)
- 2) 鉱物分析及び化学分析の機能の向上によって、地化学探査を大幅に拡大できるとともに、従来の調査の精度では発見が困難であった鉱物種について、別表のように新たに存在が確認できるようになる。(金、銀、希土類などの元素は感度のよい分析機器によらなければ含有量を知ることが出来ない。)
- 3) 地質調査所の鉱物資源概査に必要な分析を行うのみでなく、国際機関や外国の協力によって行われている資源開発事業に必要な分析、さらには鉱物開発公社の行う鉱床賦存地域の精査及び評価に必要な分析も行える。
- 4) 人材養成計画においては、当面、Geolab.に配属される研究員が養成され、引き続いて地質調査所本所及び各支所の研究員が順次、Lab.及び野外において養成され、

将来は鉱物開発公社の地質・鉱物探査の専門家、さらには各州の科学工業研究所の化学分析の専門家などにも養成の機会が提供される。

- 5) 上記のように Geolab. の機能が発揮されるならば、1970年代に世界中に普及されたプレートテクトニクス論に基づく新しい鉱床成因論によって示されるように、パキスタンの地質構造に特有な、鉱物資源の発見される可能性が一層高くなり、当国の経済開発に大きく寄与することができる。

図-1 地質図・地球化学図作成面積、化学分析数の年間平均値の変化

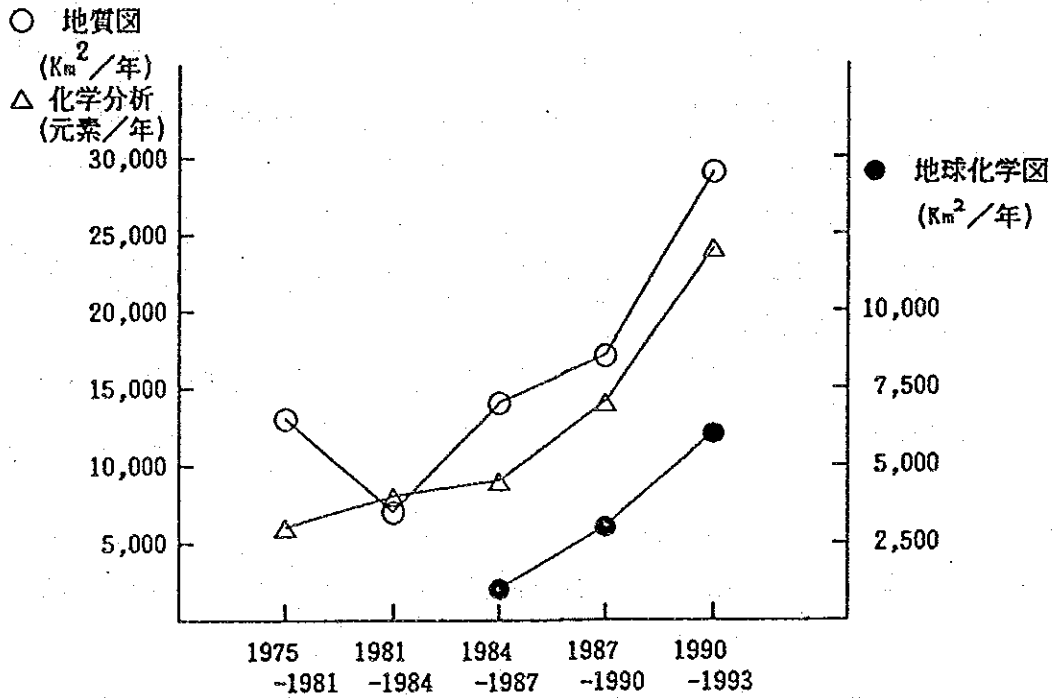
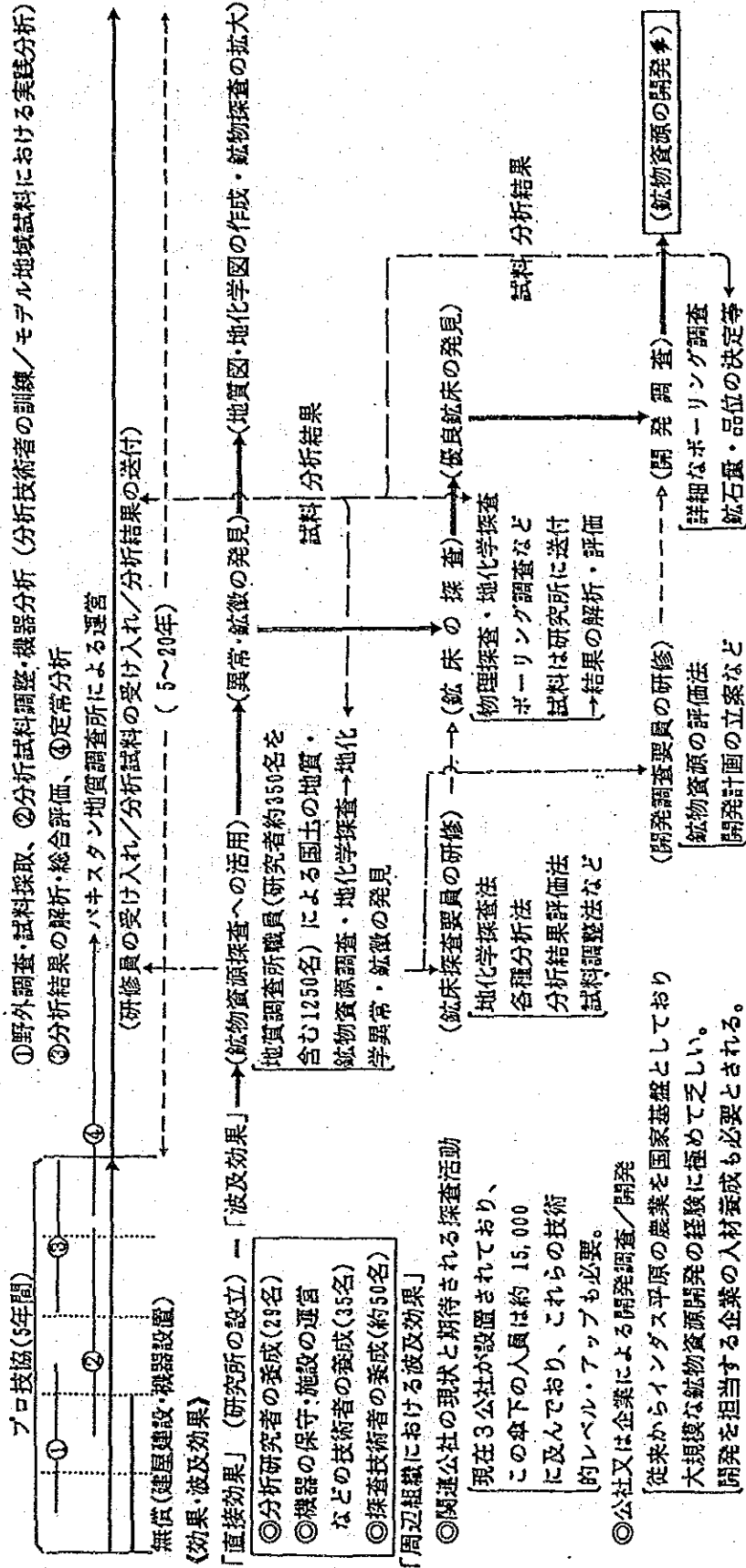


表-1 元素の種類からみたパキスタン国内で産出する鉱物資源の増加

1947-1948	1987-1988	1992-1993
Cr, Na, S	Cr, Na, S, Al, F, Fe, Mn, Sr	Cr, Na, S, Al, F, Fe, Mn, Sr, Cu Au, Ag, Mo Pb, Zn, etc.
3	10	16+

地質科学研究所設立の波及効果



Ⅸ. 今後への留意事項

本プロジェクトの実施に際しては、とくに下記の事項について留意することが望ましい。

- (1) プロジェクトサイトの正式決定の促進
- (2) 本プロジェクトのECNEC承認の早期実現の促進
- (3) カウンターパート及びローカルコスト確保の促進
- (4) パキスタン側が確保可能なローカルコストに対応した範囲での協力実施計画の作成
 - a) 基本設計への要望事項

パキスタン側の予定しているローカル・コスト負担額の範囲で、地質科学研究所の事業が継続可能な規模・グレードを検討すること。

具体的には、

 - ・建物・施設は光熱水料等の維持費の削減に努めた設計とすること。
 - ・機材は可能な限り省エネルギー型でメンテナンスフリー型とすること。
 - ・予想される部品、消耗品等を十分に供与すること。
 - b) プロ技協への要望事項
 - ・協力範囲が拡大しないように留意すること。
 - ・予想される補修部品、薬品、消耗品等を十分に供与すること。
- (5) 今回の事前調査では協力の範囲、実施計画などについてパキスタン側との協議が不十分なままに終わっているため、日本側の専門家派遣計画とカウンターパート受入計画に対応した範囲で協力計画を作成し、パキスタン側と協議することが望ましい。
- (6) このため、今後、適当な時期に長期調査員を派遣することが望ましい。

< 資料 1 >

議 事 録

MINUTES OF MEETING
BETWEEN THE JAPANESE PRELIMINARY SURVEY TEAM AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF PAKISTAN
ON THE TECHNICAL COOPERATION FOR THE PROJECT
ON GEOSCIENCE LABORATORY IN THE GEOLOGICAL
SURVEY OF PAKISTAN

The Japanese Preliminary Survey Team (hereinafter referred to as "the Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Dr. Kenji Tomita, Special Technical Advisor of JICA, visited Pakistan from December 9 to December 21, 1988, for the purpose of clarifying the outline and background of the Pakistani proposal as well as studying the feasibility on the Japanese Project-type Technical Cooperation (hereinafter referred to as "the Project") and the Japanese Grant Aid Program (hereinafter referred to as "the Program") on the Project on Geoscience Laboratory in the Geological Survey of Pakistan.

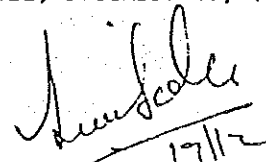
During its stay in Pakistan, the Team had a series of discussions to exchange views on the Project and the Program with the officials of the authorities concerned of the Government of Pakistan, and also made a field survey to the relevant sites and facilities.

As a result of the discussions, both parties reached understandings concerning the matter referred to in the document attached herewith.

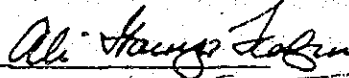
Islamabad, December 19, 1988

富田 聖二

Dr. Kenji Tomita
Leader,
Preliminary Survey Team
Japan International
Cooperation Agency,
Japan


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Mr. Mohammad Ilyas Lodhi
Joint Secretary,
Ministry of Petroleum
and Natural Resources,
the Islamic Republic of
Pakistan



MR. A.H. Kazmi
Director General
Geological Survey of Pakistan
Ministry of Petroleum & Natural Resources

ATTACHED DOCUMENT

1. Name of the Project

Technical Cooperation Project on Geoscience Laboratory
in the Geological Survey of Pakistan.

2. Implementation Agency of the Project

Geological Survey of Pakistan (hereinafter referred to as "GSP"),
Ministry of Petroleum and Natural Resources.

3. Duration of the Project

The duration of the technical cooperation by the Government of
Japan would be five (5) years from the date agreed by the both
sides in the Record of Discussions (R/D).

4. Location of the Site for the Program and the Project

As to the location of the site for the Program and the Project,
the Pakistani side explained as follows:

The location of Geoscience Laboratory is immediate south of
National Health Laboratories, Islamabad. It measures about
10 acres and has the plain topography. The site is about 5 km
from Abpara Market, G-6, Islamabad and about 2 km from the
Rawal Lake. It is approachable by a metal road where gas,
electricity and water have already been provided by Capital
Development Authority (CDA). Maps are shown in Annex-1.

5. Brief Outline of the Geoscience Laboratory

The Pakistani side explained that the Geoscience Laboratory
(hereinafter referred to as "the Geolab") would be operated on the
following guidelines:

5.1 Objective/Mission of the Geolab

To improve the capability of GSP for petrological, mineralo-
gical, petrochemical, paleomagnetic and paleontological study
of rocks and minerals and for geochemical exploration of mineral
prospects.

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5.2. Functions/Activities of the Geolab

- 1) To undertake geoscientific research for the development of minerals through laboratory studies and geochemical prospecting.
- 2) To introduce transfer of technology through on the job and specialized training for GSP personnel.
- 3) To carry out petrochemical and petrographic studies, paleomagnetic and paleontological geochronology, X-ray diffractometry, X-ray fluorescence analyses and mineral processing.

5.3. Organization of the Geolab

The Geolab will be established in 1991 as an organization under the control of GSP as shown in Annex-2.

6. Request for the Project from the Pakistani Side

The Pakistani side requested the project-type technical cooperation which consists of dispatch of Japanese experts, provision of equipment and acceptance of the Pakistani counterpart personnel for training in Japan under the following framework:

6.1 Purpose of the Project

The purpose of the Project is to aim at human resources development in the field of mineral prospecting technology in order to contribute to the national policy for promotion of mineral resources development in Pakistan.

6.2 Targets of the Project

- 1) To develop human resources in the fields of techniques for petrological, mineralogical, paleontological, structural and geochemical analyses of rocks and minerals through the training in daily activities by utilizing equipment and facilities of the Geolab.
- 2) To develop human resources in the fields of geological and geochemical mapping through training at the field survey works in the specific model fields and the laboratory works in the Geolab.

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6.3 Scope of the Project

The appropriate technology transfer to the Pakistani counterparts from the Japanese experts will be for the following fields:

- 1) Prospecting techniques for the ore deposits associated with igneous and metamorphic rocks by means of petrology, mineralogy and mining geology.
- 2) Prospecting techniques for the ore deposits associated with sedimentary rocks by means of stratigraphy, paleontology and paleomagnetism.
- 3) Prospecting techniques for the ore deposits by means of chemical analyses of minerals and rocks and geochemical exploration.

6.4 Dispatch of Japanese experts

6.4.1 Long Term Experts

(Field of experts)	(No. of experts)	(Duration) (years)
1) Chief technical adviser	1	5
2) Coordinator	1	5
3) Instrumental chemical analyst	1	4
4) Paleomagnetic geochronologist	1	2
5) Exploration geochemist	1	4
6) Mineralogist	1	2

6.4.2 Short Term Experts

Short term experts in the following fields, if necessary:

- (1) Petrology (2) Mining geology (3) Stratigraphy
(4) Paleontology (5) Isotope geology (6) Geophysical exploration (7) Data processing (8) Equipment maintenance

6.5 Counterparts training in Japan

(Training subject)	(No. of counterparts)	(Training period) (months)
1) Geochemical prospecting	2	6
2) Instrumental analysis	3	9
3) Isotope geochronology	1	9
4) Petrology	1	

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5) Mineralogy	1	6
6) Instrument maintenance	2	6
7) Data processing	1	6

6.6 Provision of equipment and materials

The Pakistani side requested that equipment and materials necessary for the Project, except for those items provided by the Program and those which are available with the Pakistani side, would be provided by the Project.

7. Request for the Program from the Pakistani Side

The Pakistani side requested the Grant Aid Program by the Government of Japan for establishing Geoscience Laboratory as follows:

- (1) Buildings and facilities as shown in Annex-3.
- (2) Equipment, machinery and materials as shown in Annex-4.

8. Allocation of Manpower and Operational Costs for the Project by the Pakistani Side

- (1) The Team stressed that sufficient allocation of manpower and operational costs is essential for smooth and effective implementation of the Project.
- (2) The Pakistani side explained that they would make efforts to get necessary manpower and operational budget for smooth and effective implementation of the Project as shown in Annex-5 and 6.

9. Others

9.1 Project-type technical cooperation scheme

The Pakistani side well understood the system of the project-type technical cooperation scheme of the Government of Japan explained by the Team.

9.2 Joint committee

Both sides agreed that a Joint Committee should be established for effective and successful implementation of the Project.

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The proposed members of the Committee will be as follows:

1) Pakistani side

The Geolab:	Project Director
GSP :	Director General and 1 to 2 nominees
Ministry of Petroleum and Natural Resources:	Joint Secretary Deputy Secretary (Minerals)

2) Japanese side

JICA Experts :	Chief Advisor Coordinator Experts
JICA Pakistan Officer:	Resident Representative
Embassy of Japan :	Secretary concerned, if necessary

9.3 Undertaking of Pakistani side for the project

The Pakistani side confirmed that the following undertakings for the Project will be provided by them.

- 1) Securing of counterpart personnel for the Project as proposed in Annex-5.
- 2) Securing operational cost for the Project as proposed in Annex-6.
- 3) Procurement of additional machinery, equipment and materials necessary for the Project except those items provided by Japanese side.
- 4) Necessary facilities will be provided to Japanese experts by GSP as per terms of reference to be agreed between the EAD/Government of Pakistan and JICA/Government of Japan.

9.4 Background of the Pakistani request for the Project and the Program

The Pakistani side explained the background of the Pakistani

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request for the Project and the Program as follows:

Specialized divisions and branches were established in GSP for the first time during late fifties and early sixties. However due to 2 wars with India in 1965 and 1971 and due to oil crisis in 1973-74, the newly created technical units were worst hit. This was the period when the rest of the scientific world made significant achievements in geoscience, thus widening the gap between GSP's capabilities and the national requirements.

With the active support of the Ministry and through collaboration with international geoscientific agencies, GSP is now trying to rebuild itself in the technical fields. Establishment of Geolab is the most important step that GSP has proposed to catch up with the present scientific world. GSP feels that there will be enough work load for the Geolab during the next 20 years or so.

The details are shown in Annex-7.

9.5 Steps for Government of Pakistan approval for project implementation

The Pakistani side explained that out of 13 steps involved in Government of Pakistan approval to implement the project, GSP has already completed 10 steps as shown in Annex-8.

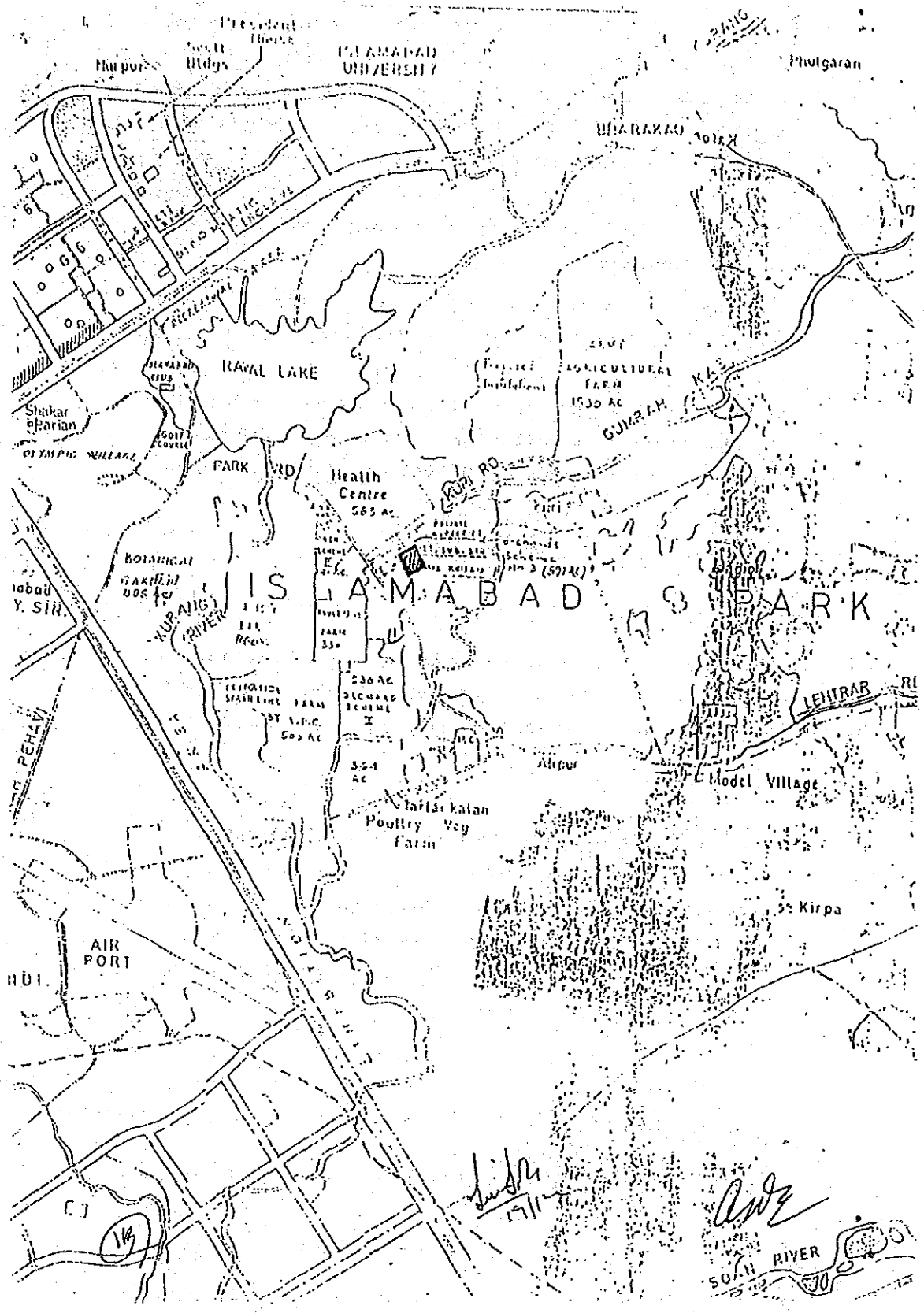
9.6 Isotope dating

Field sampling will also be carried out in selective areas of Pakistan under the guidance of Japanese experts for isotope dating. These samples will be prepared in the Geolab and analysed in isotope geochronological laboratories in Japan. The GSP counterpart geologist will work on these samples in Japan.

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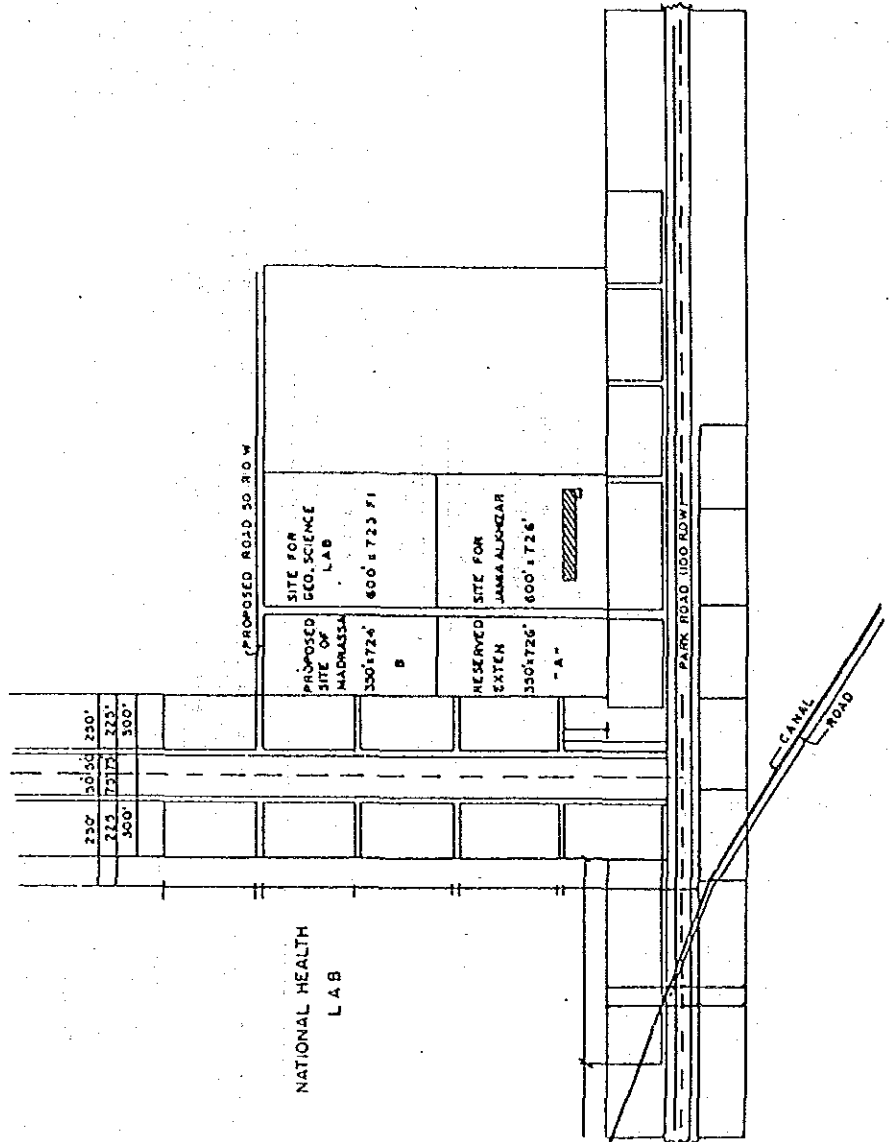
ANNEX-1A

PLAN COVERING THE SITE FOR GEOSCIENCE LABORATORY AND ITS SURROUNDINGS

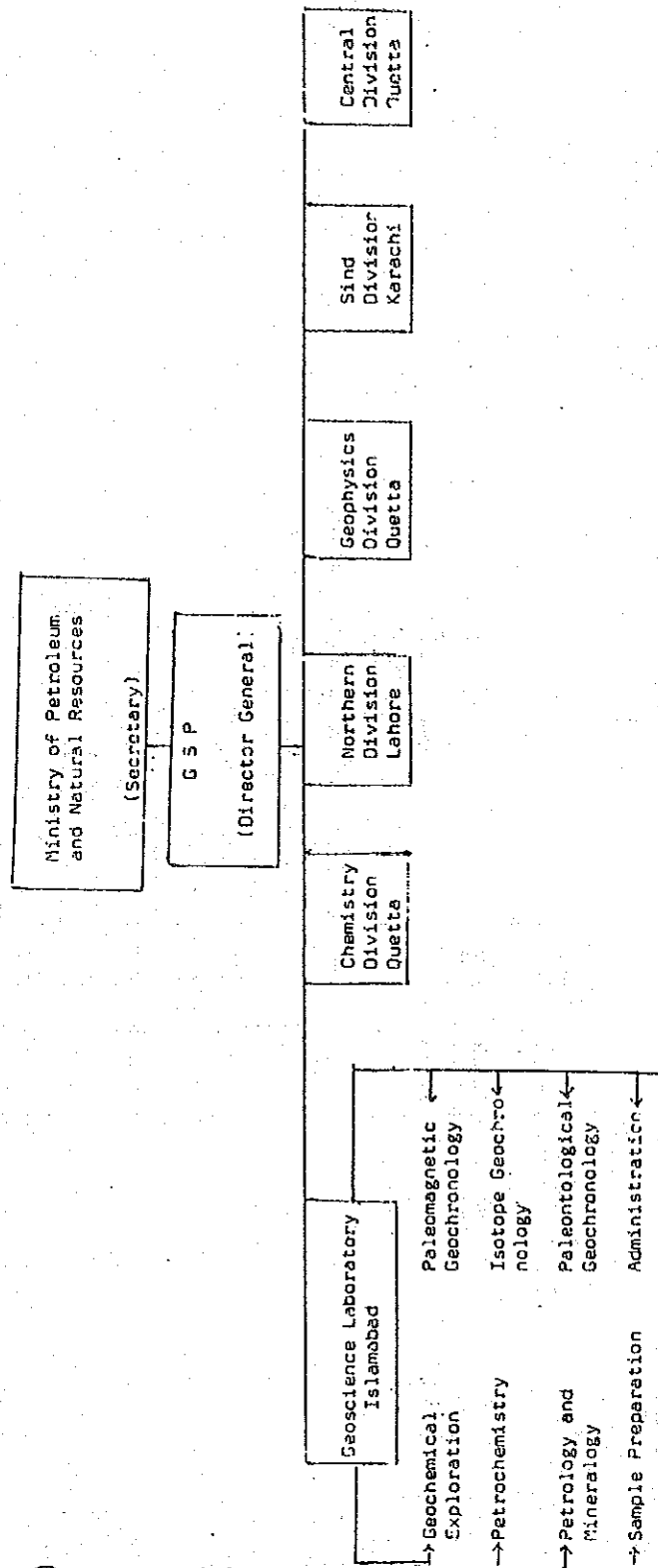


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ANNEX-2 : Organization Chart of Geoscience Laboratory



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ANNEX-3 : Request for the Construction of Buildings and Facilities by the Program

1. Laboratory

- 1) Paleomagnetic geochronology laboratory
- 2) Petrology and mineralogy laboratory
- 3) Petrochemistry laboratory
- 4) Geochemical exploration laboratory
- 5) Isotope geochronology laboratory
- 6) Paleontological geochronology laboratory
- 7) Sample preparation laboratory

2. Administration

- 1) Management section
- 2) Information service
- 3) Technical service

3. Other supporting facilities

- 1) Museum
- 2) Ancillary services

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ANNEX-4 : Request for the Provision of Equipment,
Machinery and Materials by the Program.

(Title of unit requiring equipment)	(Major equipment)
1. Administration Division	Equipment necessary for maintenance of laboratory setup and administrative and financial management
2. Library and Documentation Branch	Equipment necessary for reference library and documentation centre
3. Sample Preparation Laboratory	Equipment and machinery necessary for preparation and processing of samples
4. Petrology and Mineralogy Division	1) Differential thermal analyser 2) Spectrometer 3) Other equipment necessary for Petrology and Mineralogy Division
5. X-ray Spectrometry and Diffractometry Laboratory	1) X-ray fluorescence spectrometer 2) X-ray diffractometer 3) Electron probe microanalyser
6. Rock and Mineral Standard Laboratory	Equipment necessary for maintenance of rock and mineral standard specimens and their thin slides
7. Paleomagnetic Geochronological Unit	1) Digital spinner magnetometer 2) Magnetic susceptibility meter 3) Diamond drill 4) Other equipment necessary for paleomagnetic analyses
8. Paleontological Geochronology Laboratory	1) Scanning electron microscope 2) Other equipment necessary for paleontological analyses

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ANNEX-4 (Contd)

- | | |
|---|--|
| 9. Analytical Chemistry | 1) Atomic absorption spectrometer |
| | 2) Gas chromatograph |
| | 3) Emission spectrograph |
| | 4) ICP spectrometer |
| | 5) Other equipment necessary
for chemical analyses |
| 10. Geochemical Exploration
Division | 1) Data processing system |
| | 2) Other equipment necessary for
geochemical sampling |
| 11. Vehicles | Vehicles for field survey |
| 12. Materials | Chemical reagents and others |

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ANNEX-5 : Statement Showing Project Recruitment Plan of Employees Required

A. Gazetted Staff

S.No.	Title of post and BPS No.	1st year (Preparation)	2nd year	3rd year	4th year	5th year	Total
1.	Chief Geoscientist (Project Director) BPS-20	-	1	-	-	-	1
2.	Superintending Chemist, BPS-19	-	-	1	1	-	2
3.	Senior Chemist, BPS-18	-	1	-	1	-	2
4.	Chemist, BPS-17	-	2	1	-	-	3
5.	Chief Geochemist, BPS-20	-	-	-	1	-	1
6.	Superintending Geochemist, BPS-19	-	-	-	1	-	1
7.	Geochronologist, BPS-18	-	-	-	1	-	1
8.	Assistant Geochronologist, BPS-17	-	-	2	1	-	3
9.	Supdg. Petrologist, BPS-19	-	-	1	-	-	1
10.	Petrologist, BPS-18	-	1	1	-	-	2
11.	Assistant Petrologist, BPS-17	-	2	1	-	-	3
12.	Maintenance/Electronic Engineer, BPS-18	-	1	-	-	-	1
13.	Geophysical Engineer, BPS-17	-	-	1	-	-	1
14.	Deputy Director (Library), BPS-18	-	-	-	1	-	1
15.	Computer Programmer, BPS-18	-	1	-	-	-	1
16.	Documentation Officer, BPS-17	-	-	-	1	-	1
17.	Accounts Officer, BPS-17	-	1	-	-	-	1
18.	Instrument Officer, BPS-16	-	-	1	-	-	1
19.	Admn. Officer, BPS-16	-	1	-	-	-	1
20.	Care Taker of Building, BPS-16	-	1	-	-	-	1
		-	12	9	8	-	29

B. Non-Gazetted Staff

1.	Stenographer, BPS-15	-	1	1	2	-	4
2.	Field Assistant, BPS-11	-	-	-	1	-	1
3.	Accounts Assistant, BPS-9	-	1	-	-	-	1
4.	Sr. Store Keeper, BPS-7	-	-	1	-	-	1
5.	Cashier, BPS-7	-	1	-	-	-	1
6.	Upper Division Clerk, BPS-7	-	1	-	-	-	1
7.	Lab. Assistant, BPS-7	-	1	1	2	-	4
8.	Lower Division Clerk/Typist BPS-5	-	-	2	2	-	4
9.	Driver, BPS-4	-	1	3	-	-	4
10.	Lab. Attendant, BPS-3	-	-	-	1	1	2
11.	Section Cutter, BPS-2	-	-	-	1	1	2
12.	Naib Qasid/Sweeper/Mali/Cleaner/Lab. Boy, BPS-1	-	4	4	2	-	10
		-	10	12	11	2	35

(BPS : Basic Pay Scale)

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ANNEX-6: Yearwise and Itemwise Summary of Proposed Project Cost.

S. No.	Item	Amount required for					Total
		1st year (Preparation)	2nd year	3rd year	4th year	5th year	
1.	Salary of officer and Staff	-	539160	967230	1450374	1538664	4495,428
2.	Allowances and Honoraria for officer and Staff	-	257994	531977	797706	846265	2433,941
3.	TADA for Officers and Staff	-	80000	420000	500000	500000	1500,000
4.	Other charges	1517000	4573000	2234920	835000	506710	9666,630
4.1	Cost of Land (10 Acres)	1517000	3483000	-	-	-	5000,000
4.2	Cost of Boundary Wall & other development structures	-	-	800000	-	-	800,000
4.3	Cost of 4 vehicles Jeep=1, Double Cab. Pickup=2, Suzuki Jeep=1	-	400000	700000	-	-	1100,000
4.4	Water Supply/Cost of Tube-well Installation	-	350000	-	-	-	350,000
4.5	Office Furniture & Fixture	-	50000	200000	200000	19710	469,710
4.6	Office Stationery and Printing Material	-	20000	80000	50000	50000	200,000
4.7	Machinery and Equipment (Electric Typewriter with 4 ordinary typing machine/electric/manual).	-	65000	75000	200000	100000	440,000
4.8	Communication (telephone, trunk calls).	-	50000	50000	50000	50000	200,000
4.9	Utilities (Hot and Cold weather charges)	-	50000	75000	75000	75000	275,000
4.10	Maintenance and Running of Vehicle and equipment including POL charges	-	50000	100000	150000	150000	450,000
4.11	Postage & Telegram	-	5000	25000	30000	20000	80,000
4.12	Misc. and Unforeseen charges including rent of building	-	50000	129920	80000	42000	301,920
GRAND TOTAL		1517000	5150154	4154127	3583080	3391639	18096,000

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ANNEX-7 Background of Request for Project and to Program

The Geological Survey of Pakistan started functioning soon after independence in August, 1947 at Quetta. At its start the GSP had only 6 geologists and 2 chemists who opted for service in Pakistan from the Geological Survey of India.

After Independence the geological mapping programme was accorded a very high priority by the Geological Survey of Pakistan. As the first and the most essential step towards attaining that objective, an area of about 537,970 sq. km. representing almost 90 percent of outcrop region of the country was brought under reconnaissance mapping coverage on scales of 1:250,000 and 1inch=4 miles. With the accumulation of this reconnaissance data, it was then possible to initiate systematic regional geological mapping whose scale was thereafter standardised on 1:50,000 and is being currently followed.

By early 1960's the GSP had collected sufficient field data about the general geological set-up of the country that it enabled the publication of the first ever Geological Map of Pakistan in 1964 on a scale of 1:2,000,000. This was the most outstanding achievement of the Department in the early years of its establishment. The sufficiently visible intensification in the exploration of oil, natural gas, solid minerals and groundwater following 1964 can be greatly attributed to the publication of this map.

The momentum gained by the GSP in the acceleration and expansion of field and laboratory studies in late fifties and early sixties abated due to two wars with India in 1965 and 1971 and the oil crisis during 1973-74. A large scale exodus of trained manpower created a vacuum which could not be readily filled. Paucity of financial resource kept the field and research activities at the barest minimum. This was the period when the rest of the world made significant achievements in the fields of plate tectonics, metallogeny, paleomagnetism, computer technology etc; thus widening the gap between GSP's capabilities and the national requirements.

The circumstances briefly outlined above needed a rational analysis for their lasting solution. Therefore, an operational programme was prepared by the GSP at the time of the commencement of the 7th Plan in order to revitalise the whole Department and to expand the sphere of its activities to the level commensurate with the plan objectives.

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With the active support of the Ministry and through collaboration with international geoscientific agencies like JICA, CIDA, USAID, UNDP, GSP is now trying to rebuild and modernise its facilities. Establishment of Geolab is the most important step that GSP has proposed to undertake in collaboration with JICA to catch up with the present scientific world. GSP feels that there will be enough work load for the Geolab during the next 20 years or so.

Outline of GSP's Proposed Perspective Plan (1986-2008)

1. Complete geological mapping of the whole country on 1:50,000 scale.
2. Preparation and compilation of (a) revised geological map of Pakistan on 1:1 m. scale; (b) Metallogenic map of Pakistan on 1:2 m. scale; and (c) various types of lithofacies, isopach and paleogeographic maps on suitable scales.
3. Complete coverage of the country with gravity and ground magnetic surveys. Preparation of (a) gravity and (b) magnetic overlay maps on 1:1 m. and 1:250,000 scales, accompanied with suitable reports. Seismotectonic and seismic risk maps on appropriate scale.
4. Complete coverage of the country by quadranglewise geological reports.
5. Detailed analyses and assessment of minerals and ores collected from major mineralogic regions of Pakistan as listed below:-
 - i) Axial belt of Baluchistan.
 - ii) Zhob District.
 - iii) Tharparkar region.
 - iv) Mohmand to Waziristan tribal belt.
 - v) Chitral-Gilgit region.
 - vi) Hazara-Swat-Dir region.

Mineral processing and beneficiation/upgradation tests of the promising ores will be undertaken.

6. Complete aeromagnetic survey of the above areas.
7. Complete geochemical prospecting in the areas listed in (5) above and laboratory analyses of geochemical samples.
8. Complete basin-wise studies of the important sedimentary basins mainly from the standpoint of their hydrocarbon potential. Analyses of representative rock samples to study the hydrocarbon contents of the samples.
9. Geochronological tests (paleomagnetic, isotope and paleontological) of selective rock and mineral samples for age determination and environmental control.
10. Proving of mineral reserves and issuance of updated mineral directory of Pakistan.
11. Continuous programme of training of personnel in specialized fields and acquisition of technology.
12. Expansion of Publication facilities to cope with the publication of maps and reports as indicated above.

The above listed programmes will be undertaken by GSP independently and in collaboration with international geoscientific agencies; in particular JICA, USAID, CIDA and UNDP.

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ANNEX-8 : Steps for Government of Pakistan Approval
For Project Implementation

FLOW DIAGRAM

- 1 Preparation of PC Scheme by the Executing Agency on PC Proforma.
 - 2 Submission of PC Scheme to the Administrative Ministry.
 - 3 Submission of request for concept clearance (on prescribed proforma) of Scheme for approval of Planning Division.
 - 4 Approval of the Concept Clearance by the Planning Division, Government of Pakistan (Chairman, Concept Clearance Committee).
 - 5 Submission of the case (by the Ministry) to Economics Affairs Division for including the Scheme in the list of aid worthy projects.
 - 6 EAD's formal request to Donor Agency, to provide grant-in-aid for the Scheme.
 - 7 Consideration of the Scheme by the Pre-CDWP Committee of the Administrative Ministry.
 - 8 Allocation of project funds in the ADP by Priority Committee of Planning Division.
 - 9 Submission of Scheme (on proforma) for Anticipatory Approval of ECNEC to utilize allocated ADP funds for preliminary project activities.
 - 10 Pre-Feasibility of the Scheme for consideration of Planning Division.
-
- 11 Anticipatory Approval of the Scheme by ECNEC.
 - 12 Approval of the Scheme by CDWP.
 - 13 ECNEC's Approval for implementation of Project.

(PC: Planning Commission)

(CDWP: Central Development Working Party)

(ADP : Annual Development Plan)

(ECNEC: Executive Committee of the National Economic Council)

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ANNEX-9 List of Discussion Members

(Japanese Side)

Preliminary Survey Team.

1. LEADER

Dr. Kenji TONITA

Special Technical Adviser, JICA

2. TECHNICAL COOPERATION

Dr. Sadahisa SUDO

Senior Specialist, Mining Division
Agency of Natural Resources and Energy,
Ministry of International Trade & Industry.

3. MINERALOGY & GEOLOGY

Dr. Keizo FUJII

Director, Fuel Geochemistry Section,
Fuel Resources Dept.,
Geological Survey of Japan,
Agency of Industrial Science and Technology,
Ministry of International Trade & Industry

4. CHEMICAL ANALYSIS

Dr. Teruo SHIRAHASE

Director of Geological Information Center
Geological Survey of Japan,
Agency of Industrial Science and Technology,
Ministry of International Trade & Industry

5. GRANT AID PROGRAM

Mr. Shigeyuki SETO

Staff, Second Basic Design Study Division,
Grant Aid Planning and Survey Dept., JICA

6. COORDINATOR

Mr. Satoru TAKAHASHI

Staff, Technical Cooperation Div.,
Mining & Industrial Development Cooperation Dept.,
JICA.

JICA Pakistan Office:

1. Mr. Kazuo Tanigawa
Resident Representative.

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(Pakistan Side)

1. Ministry of Petroleum &
Natural Resources.

1. Mr. Basheer Ahmad, Secretary.
2. Mr. Mohammad Ilyas Lodhi, Joint Secretary.
3. Mr. Ikram Arif, Deputy Secretary (Minerals).

2. Economic Affairs Division.

Mr. A. Ghafoor Mirza, Joint Secretary.

3. Geological Survey of Pakistan (GSP).

1. Mr. A. R. Kazmi, Director General.
2. Mr. E. H. Chohan, Chief Chemist.
3. Dr. A. N. Fatmi, Deputy Director General.
4. Mr. S. H. Raza, Chief Geophysicist.
5. Dr. S. M. Ibrahim Shah, Deputy Director General.
6. Mr. Saeed-uz-Zafar Khan, Director (ND).
7. Mr. Mohammad Ali Mirza, Director Planning & Information.

4. Capital Development Authority (CDA).

Mr. Shafiq Ali Siddiqui, Director Regional Planning.

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19/12

< 資料 2 >

質問事項への回答書

GOVERNMENT OF PAKISTAN
GEOLOGICAL SURVEY OF PAKISTAN

QUESTIONNAIRE FOR THE PROPOSED TECHNICAL COOPERATION
PROJECT AND GRANT AND PROGRAM ON A PETROLAB CUM
GEOCHEMICAL PROSPECTING CENTRE IN PAKISTAN

REPLY BY
GEOLOGICAL SURVEY OF PAKISTAN

(December, 1988)

Subject:- QUESTIONNAIRE FOR THE PROPOSED TECHNICAL COOPERATION PROJECT AND GRANT AID PROGRAM ON A PETROLAB CUM GEOCHEMICAL PROSPECTING CENTRE IN PAKISTAN.

QUESTIONS (BY JICA)

ANSWERS (BY GSP)

Background Survey on the Technical Cooperation Project and Grant Aid Program for a Petrolab cum Geochemical Prospecting Centre in Pakistan.

A-1. Governmental Policy for mineral resources development in relation to the Seventh Five Year National Development Plan.

The mineral sector contribution to the development of national economy has been negligible when many of the advances in meeting the human needs for food, housing, health care and transport etc. are mineral based. The strength and affluence of industrial advancement owe this position to the extensive development of country's mineral resources.

While formulating strategies for the 7th Plan it has been kept in view that the public sector or the private sector can not independently achieve the envisaged national goals for expanding mineral sector activities. As such an integrated collaborative effort will be essential by the public and private sectors.

During 7th Plan, 2 fields of mineral sector have been given high priority; (i) energy and (ii) metallic minerals resources exploration, evaluation and development.

Exploration, evaluation and development work to be carried out during 7th Plan period is broadly divided into the following three categories.

- 1) Detailed exploration and pre-investment studies in respect of mineral resources.
- 2) Estimation of reserves in respect of minerals having geological extent and acceptable goals.
- 3) Establishment of mineral processing facilities and Research & Development programmes through laboratory support.

A-2. Governmental Policy for the scheme of establishing a Petrolab cum Geochemical Prospecting Centre (hereinafter referred to as "the Petrolab-GPC") in relation to the Seventh Five Year National Development Plan.

Laboratories always constitute an important part of a scientific organization and are to be essentially modernized with a view to enhancing its productivity as well as achieving higher level of precision.

In the wake of its expanding activities, GSP has felt the need to add modern units/instruments to augment its lab. facilities, endeavouring at the same time to upgrade/improve the existing facilities, to attain higher level of efficiency.

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With this end in view Government of Pakistan/GSP is seeking grant-in-aid of Rs.162 million from the Government of Japan (through JICA) who have already assisted other countries in developing similar labs to establish petrochemical labs on turn-key basis, equipped with state-of-the-art instruments to cope with increased quantum of work with greater precision.

The Government of Pakistan, Planning Division has approved concept of PETROLAB-GPC, Ministry of Petroleum and Natural Resources has approved the proposal and Economic Affairs Division has cleared the scheme and formally requested the Government of Japan to sponsor it.

During the 7th Five Year Plan, Government of Pakistan will lay more emphasis on the exploration and development of minerals for which proposed PETROLAB will be a great help in the analyses, testing and development of mineral deposits. With this end in view the Government of Pakistan has given high priority to PETROLAB and made an allocation of Rs.180 million in the Seventh Plan Period (Annexure-A).

A-3. Present situation of the Ministry of Petroleum and Natural Resources (hereinafter referred to as "the Ministry").

(1) Organizational structure.

The Ministry of Petroleum and Natural Resources came into being in April, 1977 as a result of the Government's decision to bifurcate Ministry of Fuel, Power and Natural Resources. The Ministry carries out its functions through its main secretariat at Islamabad, its two attached Departments viz. The Geological Survey of Pakistan with Headquarters at Quetta and the Technical Wing at Islamabad comprising four units. In addition, there are five Autonomous Organizations in the Mineral and Oil Section, and six Companies concerned with production, distribution and refineries of Oil and Gas.

(2) Functions.

The Ministry of Petroleum and Natural Resources is responsible for all matters relating to Oil, Gas, and Minerals at the National and International level. These responsibilities range from formulation of legislation, development and exploration policies to commerce, industrial and global matters related to the Petroleum and Natural Resources.

(3) Activities.

The Ministry through its attached departments i.e. Technical Wing Departments and the GSP, undertake Geological Surveys, Mineral and Fuel Exploration, Basic and Applied Research studies, and regulations regarding mineral development. It is also responsible for the pricing, taxations, distributions and import of equipments. The Ministry is the Secretariat for national Energy Policy Committee and also for development of renewable sources of energy.

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(4) Staff allocation.

The Ministry of Petroleum and Natural Resources is headed by a full time Secretary (BS-22) who is assisted by a team of 27 Officers including Chief Executives & Sectional Heads of various component Units/Departments (as indicated in the organizational chart). Each Unit/Department, in turn, has its own panel of officers and supporting staff.

(5) Budgetary allocation.

Rs.24 million (1987-88), excludes allocation of depts & units.

(6) Relationship between the Ministry and the other organization related to exploration and development of mineral resources such as PMDC, RDC, GMYCP, etc.

Ministry of Petroleum and Natural Resources is the Administrative Ministry for national mineral sector agencies (GSP, PMDC, OGDC, RDC, GEACOP, HDIP, PCC). All major administrative and financial issues involving policy decisions are addressed by the MINISTRY.

A-4. Present situation of the Geological Survey of Pakistan (hereinafter referred to as "GSP").

(1) Organizational structure.

The Geological Survey of Pakistan is a Federal Agency responsible to produce geological maps of the country and make scientific assessment of mineral resources. It functions under the Director General. Its headquarters is at Quetta where most of the specialized units, laboratories and museums are located. Some of the functional units of GSP have been regionalized with offices located at Lahore, Karachi, Peshawar, Islamabad and Muzaffarabad.

The existing organizational set-up is given in Fig.1.

(2) Functions.

The Geological Survey of Pakistan is an attached Department of the Ministry of Petroleum and Natural Resources, Government of Pakistan. It is a national organization primarily responsible for collecting and providing geological information about the country so that the resources of the earth could be best exploited and utilized by the people. The basic form in which geological information is compiled and disseminated is in the shape of geological reports and geological maps. These maps provide a bird's eye view as it were, of the surface (and subsurface) distribution of various types of rocks and economic minerals that are found in a particular region. These maps are thus essential for all future detailed geological work including mineral exploration, civil engineering projects, soil surveys, land use and soil conservation projects.

(3) Activities.

a) To conduct systematic geological mapping of the country and to prepare geological maps on desired scales.

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- b) To investigate in detail such areas as are indicated by geological mapping to be favourable for accumulation of industrial rocks, mineral fuels, groundwater and other natural resources.
- c) To conduct extensive geochemical, geophysical and test drilling operations in order to evaluate the known mineral deposits.
- d) To undertake systematic sampling of rocks, minerals, mineral fuels and groundwater resources and to carry out mineralogical, geochronological and chemical analyses of the samples. To beneficiate and upgrade the ores for research and for development.
- e) To advise the Government in all matters connected with geology and resources of the earth and to provide information and assistance in geological work and analyses of samples to concerned Government and Semi-Government agencies.
- f) To publish the results of the activities in the form of standard maps and reports.

(4) Staff allocation.

Sanctioned manpower strength under the regular and development budget divided into various disciplines is given below:-

Geologist.	177
Geophysicist.	27
Chemist.	26
Photogrammetrist Surveyor.	5
Drilling Engineer	39
Other Professional	18
Establishment and Accounts.	11
Total:	303

The above strength of 303 officers is supported by a work force of 1240 officials.

(5) Budgetary allocation.

The annual budget allocation to the GSP in the recent past has generally averaged at about Rs.90.00 million.

In million Rupees.	
Year	Budget
1983-84	59.390 (FEC 12.918)
1984-85	59.689 (FEC 6.800)
1985-86	86.033 (FEC 36.060)
1986-87	108.077 (FEC 32.230)
1987-88	121.446 (FEC 53.150)

(6) Equipment and Facilities.

GSP has the necessary knowhow and trained staff to undertake studies in the fields of geological mapping, geophysical and geochemical surveys, analytical assays, diamond core drilling, data management using computer facilities and resource evaluation. The Department is capable of addressing all geological, geophysical, structural and tectonic problems with the help of above stated expertise and the following aptly

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equipped laboratory, library and publication units;

- Chemical laboratory equipped with Atomic Absorption and other conventional instruments.
- Petrologic-Mineralogic laboratory equipped with X-Ray fluorescence, Spectroscopes, Polarising microscope and Image Analyser.
- Paleontologic-Stratigraphic laboratories (invertebrate and vertebrate), Sedimentologic and Palaeomagneto-Stratigraphic equipments and methods.
- Photogeologic and photogrammetric laboratory equipped with aerial photographs, satellite imagery, Kelsh plotters, stereoscopes and Surveying equipments.
- Geophysical laboratory equipped with Seismic, Gravity, Magnetic, Induced Polarization, Electromagnetic and Resistivity instruments and bore hole logging units.
- Publication Branch equipped with offset printing, photo-enlargement, drafting and computer composing of reports and maps.
- Drilling Branch equipped with 6 old and two new truck mounted rigs for diamond core exploratory drilling.
- Library with 73,625 books and periodicals.

A-5. Present situation of the technical cooperation by the bilateral countries and/or international organizations in the field of mineral resources development (Assistance by manpower, equipment and facilities, finances, etc).

At present GSP is executing 3 major PC-I programmes in collaboration with foreign agencies. These are lead-zinc project in Axial Belt of Baluchistan with UNDP, lead-zinc project in Sumai area, Baluchistan with JICA and coal exploration in Lakhra Sonda Thatta area, Sind with USAID. The requisite data pertaining to these international agencies is tabulated as under;

International Agency	Grant-in Aid, FEC in Million Rs.	Experts	Training Opportunities.	Equipment
UNDP	10.5	6	7	Vehicle 1 Chemical Lab. Equip.
JICA	27.0	7	6	Vehicles 2 Pet-Min Lab. Equipment.
USAID	77.28 (under PASA) 138.5 (under ECEP)	25	52	Drilling rigs 2 Loggers 2 Geophysical Equipment. Coal Lab. Equipment. Computers 7

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B. Conceptual Scheme of Establishing a Petrolab cum Geochemical Prospecting Centre.

B-1. Objectives of the Petrolab-GPC.

To improve the capability of GSP for study of rocks and minerals and explore geochemically for hidden deposits.

To develop and establish local expertise in petrology, mineralogy, geochronology (isotope etc.), analytical spectrochemical and geochemical prospecting techniques for a self-sustained growth and advancement.

To provide the mineral industry in Pakistan with basic data for the evaluation of mineral potential through accurate mineralogical, geochronological, spectrochemical and chemical analyses and geochemical prospecting studies and through mineral processing.

B-2. Functions of the Petrolab-GPC.

To undertake geoscientific research for the development of minerals through laboratory studies and geochemical prospecting. To introduce transfer of technology and undertake programme of on the job and specialized training for project personnel.

B-3. Activities of the Petrolab-GPC.

To carry out petrochemical analyses, thermal analyses, petrographic studies, isotope, paleomagnetic and paleontological analyses and dating, X-ray diffractometry, X-ray fluorescence analyses and mineral beneficiation and processing. To undertake these activities, units of Analytical Chemistry, Geochronology, Petrology-Mineralogy and Mineral Processing will be established.

B-4. Organization of the Petrolab-GPC.

(1) Organizational chart.

The scheme proposes to employ 29 technical and administrative officers and 35 supporting staff.

The detail is given as under;

GAZETTED STAFF:

1. Chief Geoscientist		
	(Project Director)BPS-20.	1
2.	Superintending Chemist, BPS-19.	2
3.	Senior Chemist, BPS-18.	2
4.	Chemist, BPS-17.	3
5.	Chief Geochronologist, BPS-20.	1
6.	Superintending Geochronologist, BPS-19.	1
7.	Geochronologist, BPS-18.	1
8.	Assistant Geochronologist, BPS-17.	3
9.	Superintending Petrologist, BPS-19.	1
10.	Petrologist, BPS-18.	2
11.	Assistant Petrologist, BPS-17.	3
12.	Maintenance/Electronic Engineer, BPS-18.	1
13.	Geophysical Engineer, BPS-17.	1
14.	Deputy Director(Library), BPS-18.	1
15.	Computer Programmer, BPS-18.	1
16.	Documentation Officer, BPS-17.	1
17.	Accounts Officer, BPS-17.	1
18.	Instrument Officer, BPS-16.	1
19.	Adm. Officer, BPS-16.	1
20.	Care Taker of Building, BPS-16.	1
	Total:	29

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NON-GAZETTED STAFF.

1. Stenographer, BPS-15.	4
2. Field Assistant, BPS-11.	1
3. Accounts Assistant, BPS-9.	1
4. Sr. Store Keeper, BPS-7.	1
5. Cashier, BPS-7.	1
6. UDC, BPS-7.	1
7. Lab. Assistant, BPS-7.	4
8. LDC/Typist, BPS-5.	4
9. Driver, BPS-4.	4
10. Lab. Attendant, BPS-3..	2
11. Section Cutter, BPS-2.	2
12. Naib Quasid/Sweeper/Mali/ Cleaner/Lab. Boy, BPS-1.	10
Total:	<u>35</u>

The organizational chart is enclosed.

- (2) Functions and duties of each Division, Section, Branch.
- a) Analytical Chemistry; for analytical study of rocks and mineral samples.
 - b) Mineralogy-Petrology; for petrological, mineralogical analyses of samples.
 - c) X-Ray Spectrometry; X-Ray diffractometry and X-ray fluorescence analyses.
 - d) Geochronology; for dating of rocks with isotope, paleomagnetic and paleontologic methods.
 - e) Mineral Processing; To beneficiate and upgrade the ore.

In addition administrative and service unit, library and documentation branch and sample preparation section will assist the technical units.

B-5. Manpower conditions of the Petrolab-GPC.

- (1) Present staffing condition.

The Project Director has been designated. Other staff will be recruited in due course.

GSP is running conventional chemical, petrological, mineralogical and paleontological laboratories to undertake routine work for which the staff is available.

- (2) Staffing allocation plan for management, operation and maintenance of the Petrolab-GPC.

The scheme makes a provision of having Administration, Library & Documentation and Sample Preparation sections for which 5 officers and 35 staff, included in the list given under B-4(1), will be recruited when the scheme is approved by ECNEC.

B-6. Budgetary conditions of the Petrolab-GPC.

- (1) Present budgetary condition.

GOP Allocation in the 7th Plan is Rs.180.0 million.
GOP Allocation in the ADP (1988-89) is Rs.5.17 million.

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(2) Budgetary allocation plan for management, operation and maintenance of the Petrolab-GPC.

The budgetary allocations are intended to be utilized on; (a) establishment of office, (b) construction of laboratories complex and installation of equipments, (c) expert advisory services from JICA, (d) manpower training and (e) miscellaneous contingencies. The yearwise expenditure is proposed in the enclosed annexure.

C. Preliminary Survey on the Project-Type Technical Cooperation by the Government of Japan for a Petrolab cum Geochemical Prospecting Centre (Hereinafter referred to as "the Project").

C-1. Purpose of the Project.

To improve the capability of GSP for study of rocks and minerals and explore geochemically for hidden deposits. To promote mineral industry in Pakistan.

C-2. Targets of the Project.

To develop and establish local expertise in petrology, mineralogy, geochronology (isotope etc.), analytical spectrochemical and geochemical prospecting techniques for a self-sustained growth and advancement. To provide the mineral industry in Pakistan with basic data for the evaluation of mineral potential through accurate mineralogical, geochronological, spectrochemical and chemical analyses and geochemical prospecting studies and through mineral processing.

C-3. Scope of Project (Scope of technology transfer).

- i) On the job and specialized training of project personnel in Laboratory analyses and researches. The GSP will thus develop its own expertise on completion of the project.
- ii) Promotion of Research and Development programmes in GSP in earth-sciences and mineral processing technologies through interaction with other national mineral sector agencies, universities and the private sector.
- iii) Establishment of a permanent facility for efficient and reliable analyses and assays (of mineral and rock samples) and mineral processing. Samples will be provided by GSP field parties and out-side agencies.
- iv) Establish the facility to generate revenue (income) through selling of services to mineral sector agencies and the private sector.
- v) GSP will become a pioneer researcher and provide an interface for exchange of modern technology within the country.
- vi) Facilitate mineral sector projects executed in collaboration with foreign agencies like USAID, UNDP, ODA-UK and USNSF by providing efficient and reliable services in laboratory analyses and researches pertaining to collaborative projects in Pakistan.
- vii) Provide a sound base for future scientific research and development projects of JICA-Japan with GSP and other agencies.

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- C-4. Implementation schedule of the Project.
- (1) Duration of the Project. Five Years (1988-93).
 - (2) Schedule for manpower allocation by Pakistani side. As per Annexure-B.
 - (3) Schedule for operational budget allocation by Pakistani side. As per Annexures-C & D.
 - (4) Schedule for dispatch of Japanese experts. As proposed in Annexure-E. This will however be decided by the Government of Japan/JICA.
 - (5) Schedule for training in Japan of Pakistani counterpart personnel. As proposed in Annexure -E. The Programme will be finalized in consultation with JICA.
- C-5. Request from Pakistani side to Japanese side for the Project.
- (1) Dispatch of Japanese experts, (Specific field with term, Number, role, qualification, etc. As per enclosed request of EAD, Government of Pakistan to the Government of Japan vide letter No.3(36)CM-III/87 dated 14th January, 1988. (Annexure-F).
 - (2) Acceptance of Pakistani counterpart personnel for training in Japan. (Specific field with term, number, qualification, etc.) Government of Pakistan's request is under preparation. This will be discussed with Japanese experts and finalized.
- C-6. Management of the Project.
- (1) Implementation agency (responsible organization) of Pakistani side. Geological Survey of Pakistan (GSP).
 - (2) Steering committee organized by Pakistani and Japanese sides. Director General, Deputy Director General, Chief Chemist, Chief Geophysicist, Project Director (Pakistan side).
- C-7. Proposed field survey areas for the Project. Axial Belt of Baluchistan and Munshehra area of NWFP.
- Preliminary Survey on the Grant Aid-Program by the Government of Japan for Establishing a Petrolab-cum Geochemical Prospecting Centre (Hereinafter referred to as "the Program").
- D-1. Site of the Petrolab-GPC.
- (1) Location of the site. Immediate south of National Health Laboratories, Islamabad.
 - (2) Topography of the site. Site is nearly plain.
 - (3) Size (Area) of the site. 10 acres.
 - (4) Infrastructure of the site. The site is 5 km from Abpara G-6, Islamabad and 2 km from the Rawal Lake. It is situated on a metal road where gas, electricity and water have already been provided by CDA.

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- (5) Land-owner of the site. Capital Development Authority (CDA) of the Government of Pakistan.
- (6) Schedule of procurement for the site. On clearing payment of the land.
- (7) Schedule of budgetary allocation for land preparation. During 1988-89 out of GOP budget. (Annexure-G).
- D-2. Request for grant aid program by the Government of Japan from Pakistani side.
- (1) Buildings and facilities (Layout, size, etc.) Under study.
- (2) Equipment, instruments, machinery, tools and materials (List of major items with priority order). Tentative list of equipment is attached. (Annexure-H).
- (3) Schedule of implementation for the Program. As given in Annexure-E.
- E. Undertaking of Pakistani Side.
- E-1. Preparation and procurement of the site for the Program. Site has been allocated by Capital Development Authority (CDA) of the Government of Pakistan (map attached).
- E-2. Securing of counterpart personnel for the Project. Project Director has been designated (copy of the government order attached Annexure-I).
- E-3. Securing of operational cost for the Project. Allocation of total project cost (Rs. 180 million) is made in the 7th Five Year Plan of Government of Pakistan. ADP of Rs. 5.17 million is proposed for project activities, including purchase of land for the project during 1988-89.
- E-4. Preparation of machinery, equipment and materials necessary for the Project except for those items provided by Japanese side. Procurement of land is under way. Limited office facilities will be established during January to June, 1989 when ADP funds (Rs. 5.17 million) are released by the GOP. This will be done on receipt of Anticipatory Approval of the Scheme. The details of project requirements are being firmed up. Prefeasibility of the project has been prepared by the Project Director PETROLAB.
- E-5. To provide the necessary facilities to the Japanese experts based on the agreement on technical cooperation between Pakistani and Japanese Government. Necessary facilities will be provided to Japanese Experts by GSP as per terms of reference agreed between the EAD/Government of Pakistan and JICA/ Government of Japan.
- Others.
- F-1. Useful information for the smooth implementation of the Project and the Program. The status of PETROLAB is demonstrated in the enclosed flow diagram. It may kindly be noticed that out of 13 steps involved in Govt. of Pakistan approval to implement the project we have already achieved more than eleven. (Annexure-J).

ANNEXURES



SEVENTH FIVE YEAR PLAN
(1988-93)
AND
PERSPECTIVE PLAN
(1988-2003)
REPORT
OF THE
WORKING GROUP
ON
MINERAL

PLANNING COMMISSION
GOVERNMENT OF PAKISTAN
ISLAMABAD
July 1987

Geological Survey of Pakistan

A. On-Going Projects

1. Energy Planning and Development Umbrella Project (Coal Resource Assessment) A GSP-USAID Joint Project (1985-89)	3.00	17.00	20.00
2. Construction of Residential Accommodation for the Employees of the GSP at Quetta	20.00	—	20.00
3. Exploration and Development of Surmai Lead-Zinc Prospects, Khuzdar district, Baluchistan, Pakistan	3.00	9.00	12.00
4. Exploration of coal in Punjab Plains (1988-89)	1.50	0.10	1.60
5. Geological Appraisal of Mineral Resources of AJK. A GSP-AKMIDC Joint Project (1986-89)	2.468	—	2.468
6. Exploration of Minerals Associated with Acid Magmatism in NWFP, Pakistan (1986-90)	2.00	1.00	3.00

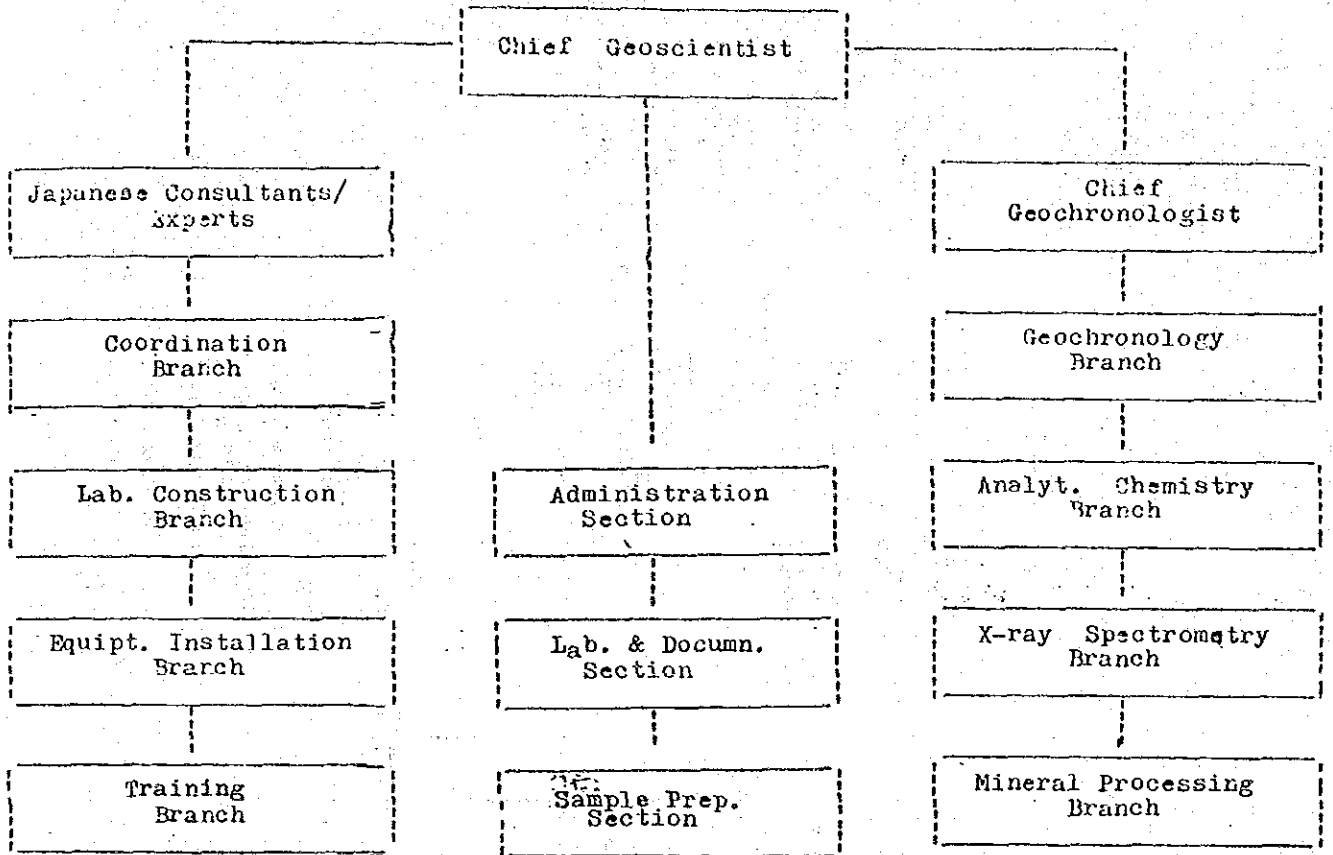
B. New Projects, Commencing from July, 01, 1987 onward :

7. Coal Exploration and Evaluation Project of Mach, Abo-Gum, Baluchistan, Pakistan (1987-90)	10.535	1.50	12.035
8. Coal Exploration in Sor-Range Area, Baluchistan, Pakistan (1987-90)	26.00	—	16.00
9. Gold Exploration in Pakistan (A GSP-UNDI Joint Project 1987-90)	10.00	5.00	15.00
10. Exploration of Lead-Zinc Prospects in Lasbela Khuzdar Metallogenic Belt (A GSP-UNDP Joint Project 1987-90)	3.80	5.20	9.00
11. Establishment of Petrolabs-cum-Geochemical Prospecting Centre with Project Type Technical Training (A GSP-JICA Joint Project (1987-90)	10.00	90.00	100.00
12. Construction of Office, Laboratories and Residential Accommodation for GSP at Peshawar (1987-92)	210.00	24.00	234.00
13. Establishment of Training Institute in the GSP (1987-90)	7.00	2.500	9.50
14. Geological Appraisal of Coal Resources-GSP-I under the National Coal Exploration Programme (GSP-USAID collaborative Project). 1988-93	120.60	193.00	313.60

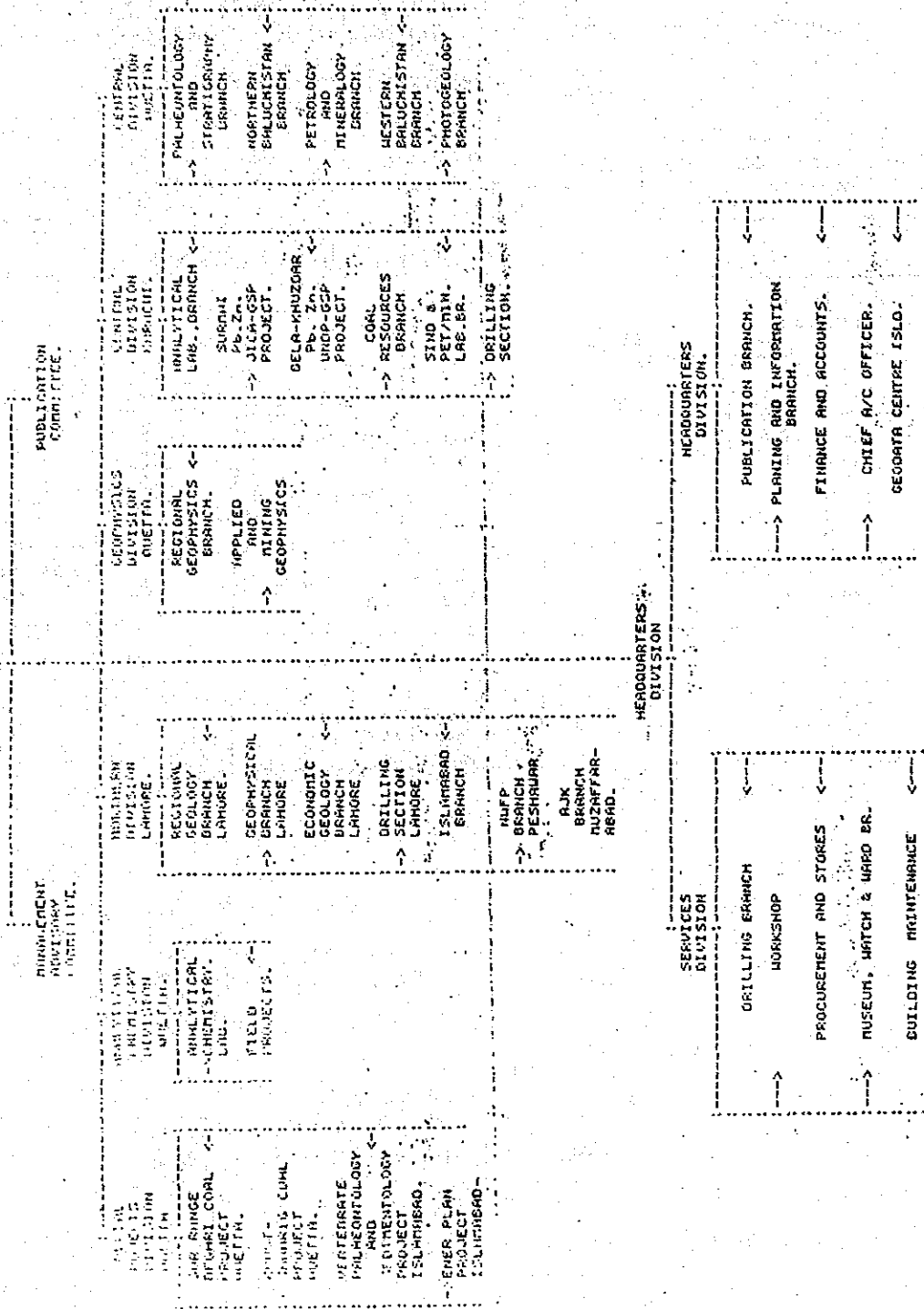
• Rs. 80.0 million proposed for expenditure during 1987-88 could not be utilized

Total 429.903 348.30 778.203

PROPOSED ORGANIZATIONAL CHART
PETROLAB



GOVERNMENT OF PAKISTAN
MINISTERIAL SUPPLY OF PETROLEUM
ORGANIZATIONAL CHART
DIRECTOR GENERAL



ANNEXURE - B.

STATEMENT SHOWING RECRUITMENT
PLAN OF PERSONNEL REQUIRED

A. GAZETTED STAFF.

S. No.	Title of Post and BPS No.	1st yr.	2nd year	3rd year	4th year	5th year	Total posts required
1.	Chief Geoscientist (Project Director) BPS-20	-	1	-	-	-	1
2.	Superintending Chemist, BPS-19	-	-	1	1	-	2
3.	Senior Chemist, BPS-18	-	1	-	1	-	2
4.	Chemist, BPS-17	-	2	1	-	-	3
5.	Chief Geochronologist, BPS-20	-	-	-	1	-	1
6.	Superintending Geochronologist, BPS-19	-	-	-	1	-	1
7.	Geochronologist, BPS-18	-	-	-	1	-	1
8.	Assistant Geochronologist, BPS-17	-	-	2	1	-	3
9.	Supdg. Petrologist, BPS-19	-	-	1	-	-	1
10.	Petrologist, BPS-18	-	1	1	-	-	2
11.	Assistant Petrologist, BPS-17	-	2	1	-	-	3
12.	Maintenance/Electronic Engineer, BPS-18	-	1	-	-	-	1
13.	Geophysical Engineer, BPS-17	-	-	1	-	-	1
14.	Deputy Director (Library), BPS-18	-	-	-	1	-	1
15.	Computer Programmer, BPS-18	-	1	-	-	-	1
16.	Documentation Officer, BPS-17	-	-	-	1	-	1
17.	Accounts Officer, BPS-17	-	1	-	-	-	1
18.	Instrument Officer, BPS-16	-	-	1	-	-	1
19.	Admn. Officer, BPS-16	-	1	-	-	-	1
20.	Care Taker of Building, BPS-16	-	1	-	-	-	1
			12	9	8	-	29

ANNEXURE - B CONTINUED.

STATEMENT SHOWING RECRUITMENT
PLAN OF PERSONNEL REQUIRED.

B. NON-GAZETTED STAFF.

S.No.	Title of Post and BPS No.	Ist yr.	2nd year	3rd year	4th year	5th year	Total posts required
1.	Stenographer, BPS-15		1	1	2	-	4
2.	Field Assistant, BPS-11		-	-	1	-	1
3.	Accounts Assistant, BPS-9		1	-	-	-	1
4.	Sr. Store Keeper, BPS-7		-	1	-	-	1
5.	Cashier, BPS-7		1	-	-	-	1
6.	UDC-7		1	-	-	-	1
7.	Lab. Assistant, BPS-7	H	1	1	2	-	4
8.	LDC/Typist, BPS-5	H	-	2	2	-	4
9.	Driver, BPS-4		1	3	-	-	4
10.	Lab. Attendant, BPS-3		-	-	1	1	2
11.	Section Cutter, BPS-2		-	-	1	1	2
12.	Naib Quasid/Sweeper/Mali/ Cleaner/Lab. Boy, BPS-1		4	4	2	-	10
Total.....			10	12	11	2	35

ANNEXURE - C.

DETAILS OF OTHER CHARGES

S No.	Item	(Figures in Rupees)					Total
		Ist year	2nd year	3rd year	4th year	5th year	
1.	Cost of land (10 Acres).	1517000	3483000	-	-	-	5000,000
2.	Cost of Boundary Wall & other development structures.	-	-	800000	-	-	800,000
3.	Cost of 4 vehicles. Jeep=1, Double Cab. Pickup=2, Suzuki Jeep=1	-	400000	700000	-	-	1100,000
4.	Water Supply/Cost of Tube-well installation.	-	350000	-	-	-	350,000
5.	Office Furniture & Fixture.	-	50000	200000	200000	19710	469,710
6.	Office Stationery & Printing Material.	-	20000	80000	50000	50000	200,000
7.	Machinery & Equipment (Electric typewriter with 4 ordinary typing machine/electric/manual).	-	65000	75000	200000	100000	440,000
8.	Communication (telephone, trunk calls).	-	50000	50000	50000	50000	200,000
9.	Utilities (hot and cold weather charges).	-	50000	75000	75000	75000	275,000
10.	Maintenance and Running of Vehicles & equipment including POL charges.	-	50000	100000	150000	150000	450,000
11.	Postage & Telegram.	-	5000	25000	30000	20000	80,000
12.	Misc. & unforeseen charges including rent of building.	-	50000	129920	80000	42000	301,920
Total.....		1517000	4573000	2234920	835000	506710	9666,630

ANNEXURE - D.

YEARWISE AND ITEMWISE SUMMARY OF PROJECT COST.

							(Local Currency).
S. No.	Item	Amount required for					Total
		Ist year	2nd year	3rd year	4th year	5th year	
1.	Salary of Officers and Staff.	-	539160	967230	1450374	1538664	4495,428
2.	Allowances and Honoraria for Officers and Staff.	-	257994	531977	797706	846265	2433,942
3.	TA/DA for Officers and Staff.	-	80000	420000	500000	500000	1500,000
4.	Other charges.	1517000	4223000	2584920	835000	506710	9736,710
Total:		1517000	5100154	4504127	3583080	3391639	18096,000
*FOREIGN EXCHANGE.....:		-	30000000	80000000	40000000	12000000	162000000
Grand Total.....:		1517000	35100154	84504127	43583080	15391639	180096000

* The phasing of FE is subject to change on the requirement of JICA.

PHYSICAL PHASING OF THE PROJECT

- 1st Year To purchase adequate land for the labs and procure utilities vis., electricity, water supply and gas connection.
- 2nd Year GOP's Component:
- i) To provide liason and coordination for completion of the project including arrangement of logistics within Pakistan e.g. procurement of tax exemption certificates from CBR etc.
 - ii) To rent a temporary office building.
 - iii) To appoint a Project Director and provide the necessary officers and staff for the project work.
- Japan Government Component:
- i) To undertake construction of two Main Laboratory Buildings, each bearing basement, ground floor and first floor, and small sample preparation cum Section Cutting Laboratory building and providing furniture and fixture for these labs.
 - ii) To provide services of 2-3 experts in laboratory sciences.
 - iii) To import instruments, apparatus, chemicals, equipments, vehicles, etc., for the constructed Petrolabs cum Geochemical Prospecting Centre.
- 3rd Year GOP's Component:
- i) To provide the necessary officers and staff.
 - ii) To carry out a regional geochemical sampling in 2000 square kilometer territory of Axial Belt/Northern Areas, beginning with the Surmai Project area in Baluchistan.
 - iii) To analyse 1000 samples.
- Japan Government Component:
- i) Training of GSP nominees in Japan/other country for the transfer of technology to operate the Petrolabs cum Geochemical Prospecting Centre.
 - ii) Provide services of 2 more experts in laboratory sciences.
 - iii) To complete construction work.
- 4th Year GOP's Component:
- i) To provide necessary officers and staff.
 - ii) To carry out regional geochemical sampling in 2000 sq.km area of Axial Belt/Northern Areas.
 - iii) To analyse 1500 samples.

Contd....p/2

Japan Government Component:

- i) To import additional instruments, apparatus, chemicals equipments, vehicles, etc., for the constructed Petrolabs cum Geochemical Prospecting Centre and complete installation at site.
- ii) To provide services of 2-3 additional experts.
- iii) To provide on the job training to project personnel.

5th Year

GOP's Component:

- i) To provide the necessary officers and staff for the project work.
- ii) To undertake and complete the petrographic, mineralographic and geochronological studies for lead, zinc and/or silver and interpretation of data through maps and reports. From the analytical data pattern obtain the detailed channel sampling in the selective metallogenic areas followed by petrographic, mineralographic and geochronological analysis for the above named elements and issue of final reports and maps concerning the area of study.
- iii) To undertake and complete chemical Analysis of additional 2,500 rock samples collected from the territory of Axial Belt/Northern Areas for lead, zinc and/or silver and interpretation of data through geochemical maps and reports. From the analytical data pattern obtain the detailed channel sampling in the selective metallogenic areas followed by chemical analysis for the above named elements and issue the final report and geochemical map concerning the area of study.

Japan Government Component:

- i) To provide from Japan/other country one expert in Petrolabs cum Geochemical Prospecting Centre in geochemical prospecting and data interpretation techniques, one expert in spectrography conversent with the installation of a new spectrographic laboratory and preparation of semiquant and quant standard (Master) plates of elements, such as Fe, Pb, Au, Ti, W, Co, Ni, Pt, Co Zn, Mo, Zn and Mn for 12 months and one expert in field geochronology for the radio-active age dating field and lab. techniques, such as, the installation and operation of C 14 analyzer, spectrometer (solid and gas) and gas chromatography for 12 months duration, cumulatively for 27 months.
- ii) To provide the necessary technical books and journals.
- iii) To import additional instruments, apparatus, chemicals, equipments, vehicles etc., for the constructed Petrolabs cum Geochemical Prospecting Centre and undertake installation of the instruments and equipment at site.
- iv) To complete the training of GSP participants, also in Japan/other country, for the purpose of transfer of technology.

D.G. G.S.P. Qta.

Dy No. 448
Date 28-1-88

3(38)CM-III/87

GOVERNMENT OF PAKISTAN
ECONOMIC AFFAIRS DIVISION

7.1.88

Islamabad the

16th Jan, 1988
27th-Dec, 87

SECTION OFFICER
PH. 826732

Dear Mr. Obu,

Please refer to this Division's letter No.2(5)CM-III/86 dated 4th June, 1987 sponsoring the Project "Petrolab-Cum-Geochemical Prospecting Centre" for Japanese financial grant.

2. Ministry of Petroleum and Natural Resources (Geological Survey of Pakistan) desired that the services of the following Japanese Experts may be sponsored to train the Geological Survey of Pakistan Scientist in Mineral exploration methods :-

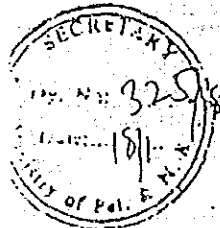
FIELD OF EXPERT	NO. OF EXPERTS	DURATION
Leader/Chief Technical Advisor	1	5 Years
Coordinator.	1	5 Years
Exploration Geo-Chemist	1	2 Years
Analytical Chemist	1	3 Years
Isotope Geo-Chronologist.	1	2 Years
Paleomagnetic Geo.Chronologist	1	2 Years
Mineralogist Petrologist	1	4 Years

3. Form A-I are enclosed. It is also requested that a Japanese Embassy Mission may visit Pakistan in January, 1988 to help Geological Survey of Pakistan in firming up the details of the above project documents. With best regards.

Yours Sincerely,

(KHALID JAVED)

Mr. S.Obu,
First Secretary,
Embassy of Japan, Islamabad.



19/1
16/1
19/1/88

Khalid Javed
19.1.88

Handwritten signatures and dates: 19/1/88, 19/1/88, 19/1/88

PLAN FOR ESTABLISHMENT OF THE PETROLABS CUM GEOCHEMICAL PROSPECTING CENTRE AT ISLAMABAD

(A GSP-JICA COLLABORATIVE PROJECT, 1989-92)

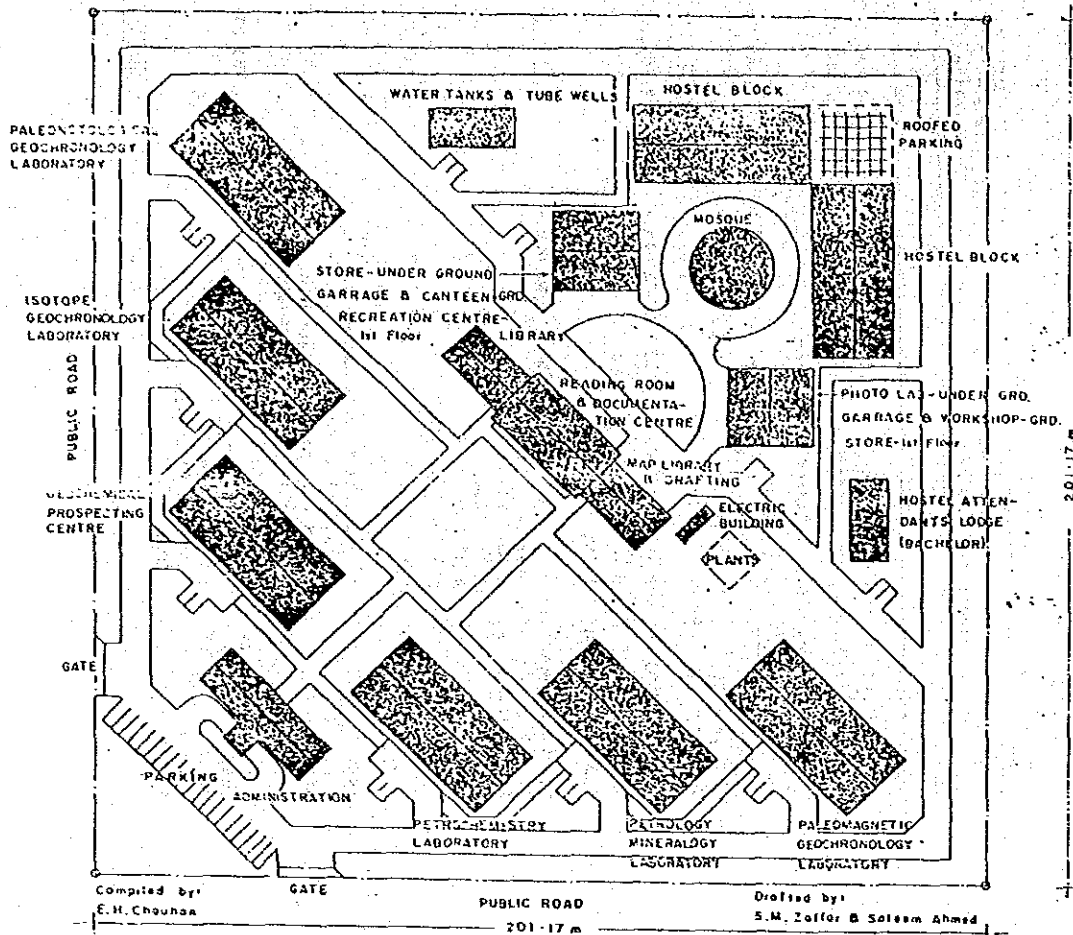
TOTAL FLOOR AREA (IN SQUARE METERS)

ADMINISTRATION BUILDING.....	209
LABORATORY (6-BUILDING, 516 SQ. M. FOR EACH).....	3,096
LIBRARY, READING ROOM, DOCUMENTATION CENTRE AND DRAFTING	552
ELECTRIC BUILDING.....	30
PLANTS (FUEL GAS AND DISTILLED WATER).....	100
WATER TANKS AND TUBE WELLS.....	200
STORE-UNDER GROUND, GARAGE AND CANTEN - GROUND AND RECREATION CENTRE-1ST FLOOR.....	400
MOSQUE.....	255
MOULAN-UNDERGROUND, GARAGE AND WORKSHOP- GROUND, AND STORE-1ST FLOOR.....	400
HOSTEL ATTENDANTS LODGE (BACHELOR).....	200
HOSTEL BLOCKS (2- BUILDINGS, 600 SQ. M. FOR EACH).....	1,600
HOSTEL PARKING.....	400
	<hr/>
	7,442

TOTAL AREA OF THE PLOT..... 40,468

OPEN AREA 33,026

PROJECT DIRECTOR: EHSANUL H. CHAUHAN



SITE PLAN



ANNEXURE-H.

FUNCTIONAL UNITS OF THE PROJECT

APPENDIX I

No.	Title of Unit	Description of Unit	Requirements of Equipments, Accessories etc (quantity)	Unit Price	Approximate Cost (CIF) (in million Yen)
1	2	3	4	5	6
1.	Service Division	Maintenance of laboratory set-up and administrative and financial management	<p>i. Drafting and cartographic units (1)</p> <p>Drafting board : Max. 1000x1500mm Gradient : 0 - 80° with drafting machine and lettering machine</p> <p>ii. Power Generators (2)</p> <p>Output : AC220V 5KVA Tank capacity : 12 liter Continuous operation: 4 hours</p> <p>iii. X-rox copying and Duplicating Machine (2)</p> <p>Copy size : Max. 297 x 420mm Copy speed : 25 sheets/min. Zoom up and down : 65% - 155%</p> <p>iv. Electric typewriter (5)</p> <p>Praten size : 394mm Paper size : Max. 335mm Indicator : 5 x 12dot Key board : 47 key Memory : 4,000 character</p>	800,000.-	1,600,000.-
2.	Library and documentation Branch	Reference Library and documentation centre	<p>i. Microfische (1)</p> <p>Type : 16mm jacket camera processor Copy size : Max. 257 x 364mm Film size : 16mm x 30.5m roll film with automatic film developing processor</p> <p>ii. Slide Projectors (1)</p> <p>Lamp : Xenon lamp 750v Motor : Film feeder Slide tray : Circule 80 sheets Film size : 35mm</p>	7,250,000.-	2,800,000.-
				Sub Total=	<u>1,500,000.-</u>

3. Sample Preparation Laboratory

Preparation of Samples for use in various service sections

3,900,000.-

i. Automatic thin sectioning machine (1)
 Wheel : 255x x 1.2T x 31.7H
 Revolution : 3,000rpm
 Vice opening : 60mm
 Capacity : Max. 60mm²

ii. Diamond cutting machine (1)
 Revolution : 0 - 300rpm adjustable
 Diamond wheel : 4"
 With various chattering discs

iii. Grinders (2) 1,200,000.- 2,400,000.-
 Capacity : 1kg
 Crushing size : 3mm - 0.25 mm

iv. Mills (2) 500,000.- 1,000,000.-
 Container capacity : 100cc
 Container material : Tungsten carbide

v. Shaker (2) 500,000.- 1,000,000.-
 Ro-tap type and magnetic type

vi. Crusher (1) 1,200,000.-
 Capacity : 50kg
 Crushing size : 35mm - 3mm

4. Petrolabs Mineralogy and Petrology Division

Thermal analysis, mineral synthesis and petrographic analysis

7,000,000.-

i. Differential thermal analysis (1)
 Temperature range : 1300°C
 Sample weight : 200mg or less
 Atmosphere : Air, gas

ii. Ultrasonic Drilling Machine (1) 4,000,000.-
 Output : 100V
 Frequency : 28KHz
 Oscillation : 8LT

iii. Spectrometer (1) 16,000,000.-
 Wavelength : 190 - 900nm
 Light source : 50W tungsten-halogen lamp
 Resolution : 0.1nm
 Data processor : Automatic calculation with CRT display

iv. Microscopes (2) 1,300,000.- 2,600,000.-
 Magnification : 40x - 2000x

Sub Total = 10,100,000.-

v. Microhardness Tester (1)		2,300,000.-
Test load	: 10,25,50,100,200,300,500,1000gf	
Loading mechanism	: Automatic loading and releasing method	
Data display	: Digital	
vi. Universal stage (1)		500,000.-
Movement	: Right and left and swing of head	
	Sub Total=	<u>32,400,000.-</u>
i. X-Ray fluorescence Spectrometer (1)		40,000,000.-
X-Ray generator	: 60KV, 80mA	
X-Ray tube	: Rh target JKV	
Analyzing crystal	: LiF, Ce, TAP, PET	
Microcomputer	: Central control and data processing	
Heat exchanger	: Closed circuit system with complete accessories	
ii. X-Ray diffractometer (1)		27,000,000.-
X-Ray generator	: 60KV, 80mA	
X-Ray tube	: Cu, Cr, Fe	
Measuring range	: -40° - 160°	
Control & data processing system	: 16 bit with complete accessories	
iii. Electron probe microanalyser (1)		63,000,000.-
Magnification	: x20 to x400,000	
Resolution	: 100A	
Analytical element	: 58 to 92U	
Accelerating voltage	: 0 - 30KV	
Data processing system	: with complete accessories	
Standard accessories with (i) (ii) & (iii) included		<u>130,000,000.-</u>
Sub Total=		1,300,000.-
i. Stereo microscopes (1)		1,300,000.-
Magnification	: 5x - 160x	
Body	: 55° inclined binocular tube	
ii. Polarizing microscopes (1)		1,300,000.-
Magnification	: 40x - 1000x	
with phase contrast		
iii. Universal stage (1)		500,000.-
Movement	: Right and left and swing of head	
iv. Microhardness tester (1)		2,100,000.-
Test load	: 10,25,50,100,200,300,500,1000gf	
Loading mechanism	: Automatic loading and releasing method	
Data display	: Digital	
	Sub Total=	<u>5,200,000.-</u>

5. X-Ray Spectrometry and Diffractometry Laboratory
 X-Ray fluorescence analysis
 X-Ray diffraction analysis
 and Electron probe micro analysis

6. Rock and Mineral Standard Laboratory
 Maintenance of rock and mineral standard specimens and their thin slides

7. Geochronology Division C 14 and K-Ar dating

1. Argon gas separation, gas extraction and gas refining units (one each) : 5 82g/cm²g
 Temperature : Room temperature
 Crude gas flow rate : 1.2m³/h
 Purified gas flow rate: 1m²/h

12,000,000.-

ii. Mass spectrometer (1)
 Resolution : Better than 10,000
 Sensitivity : 1ppb
 Mass range : m/z 1 to 500
 Accelerating voltage: 15 to 30KV

48,000,000.-

iii. Scintillation spectrometer (1)
 Counting correction method: N-number
 Counting channel : 3 channels
 Counting efficiency : 111 more than 80% etc.

2,000,000.-

8. Paleomagnetic Geochronological unit. Paleomagnetic analysis and dating

i. Digital spinner magnetometer (1)
 Sensitivity : 1.5 x 10¹⁰ spins/10⁻⁴t
 Resolution : 1 x 10⁻⁵
 Magnetic field : Max. 0.65T

6,000,000.-

ii. Thermal demagnetiser (1)
 Demagnetizing currents: AC 1000A - 0

4,200,000.-

iii. AC demagnetiser (1)
 Demagnetizing currents: 30A
 Demagnetizing force : AC8000 ampere-turn

400,000.-

iv. Magnetic susceptibility meter (1)
 Magnet rotator : Chuck rotator and probe holder
 Measuring range : 0 - 3000 gauss

5,200,000.-

v. Diamond drill (1)
 Drilling capacity : Max. 200m
 Diamond drill bit : 45mm ϕ
 Power : 10HP

5,000,000.-

20,800,000.-

Sub Total=

2	3	4	5	6
9. Paleontological Geochronology Laboratory	Paleontological analyses and dating			
		1. Polarizing microscopes with phase contrast	(2) 1,300,000.-	2,300,000.-
		Magnification : 40x 1000x		
		11. Stereo microscopes	(2) 1,300,000.-	2,600,000.-
		Magnification : 5x 160x		
		Body : 55" inclined binocular tube		
		111. Zoom Stereo microscopes	(1)	1,300,000.-
		Magnification : 29x 160x		
		Numerical aperture : 0.08 - 0.16		
			Sub Total=	<u>6,200,000.-</u>
10. Petrochemical Analyser Branch	Petrochemical wet and dry analyses			
		1. Atomic absorption spectrometer with standard accessories	(1)	5,433,826.-
		Wavelength range : 190 - 900nm		
		Hollow cathode lamp : accepts 8 lamps together		
		Various elements		
		Burner type : Air-cooled and pre-mix type		
		Data processor : Automatic calculation		
		11. Gas chromatograph with standard accessories	(1)	3,500,000.-
		Detector : Flame Ionization Detector (FID)		
		Electron Capture Detector (ECD)		
		Thermal Conductivity Detector (TCD)		
		Column Over : Temperature range : -99°C to +399°C		
		Sample Injection Port: Type : On-column system		
		111. Balances	(2)	1,000,000.-
		Capacity : 160g		
		Sensitivity : 0.1mg		
		1v. Emission spectrograph with standard accessories	(1)	35,000,000.-
		System : Vacuum emission system with data processor		
		Wavelength range : 1650 4200A		
		Number of Photomultiplier: 48		
		Excitation source : Low voltage spark		
		Ignitor : 10kVp		
		Measuring system : Simultaneous integration of multiple elements		
			BY Miller integrator	
			Sub Total=	<u>44,933,826.-</u>

APPROXIMATE COST OF CONSTRUCTION OF PETROLAB COMPLEX

APPENDIX II

(in Million Yen)

1. Architects Consultation Fee	=		
2. Cost of designing the building	=	¥ 69,000,000.-	(Pak Rs. 7,998,000.-)
3. Construction Cost:			
i) Unit Cost (per sq. meter/ft)	=	¥ 140,000.-x3900M ²	
ii) Total Cost (covered areaxunit cost)	=	¥ 546,000,000.-	
iii) Cost of ancillary services: parking place, sheds, boundary wall, guard posts, horticulture sites, etc. etc.	=	Included	
Sub Total	=	¥ 546,000,000.-	(Pak Rs. 72,781,800.-)
4. Cost of services	=	¥ 40,000x3900 M ²	
i) Gas Fittings			
ii) Water supply system			
iii) Air conditioning			
iv) Electricity			
v) Telephones/telex			
vi) Fittings and Fixtures			
Sub Total	=	¥ 156,000,000.-	(Pak Rs. 20,794,800.-)
Total	=	¥ 762,000,000.-	(Pak Rs. 101,574,600.-)

BUDGET FOR JAPANESE EXPERTS AND TRAINING OF GSP SCIENTISTS

APPENDIX III

JAPANESE EXPERTS

S.No.	Category of Experts	Contract Period	Approximate rate/person year	Total Charges
1.	Chief Technical Adviser (Co-ordinator)	36 Months	¥ 10,000,000.-	
2.	Instrumental Chemical Analyser	12 "	Total= 120 months	
3.	Isotope Geochronologist	12 "	" 10 Years	
4.	Paleomagnetic Geochronologist	12 "	Total Charge=	
5.	Paleontologist Geochronologist	12 "	=10,000,000.-x10	
6.	Exploration Geochemist	12 "	=¥ 100,000,000.-	
7.	Mineralogist	12 "		
8.	Petrologist	12 "		
Sub Total: = ¥ 100,000,000.-				
(Pak Rs. 13,330,000.-)				

B. TRAINING OF GSP SCIENTISTS

S.No.	Category of Trainees	Nos	Training Period	Approximate rate/ person month includes Air passage	Training Cost (in million) Yen
1.	Geochemical Prospecting	3	9 months	¥ 300,000.-	
2.	Petrochemistry	4	12 "		
3.	Isotope Geochronology	1	24 "	Total = 80 months	
4.	Paleomagnetic Geochronology	1	24 "	Total Charges=	
5.	Petrology	1	3 "	= 300,000x80	
6.	Mineralogy	1	3 "	= ¥ 24,000,000.-	
7.	Instrument Maintenance	1	3 "		
8.	Data Management	1	2 "		
Sub Total= ¥ 24,000,000.-					
(Pak Rs. 3,199,200.-)					
Total= ¥ 124,000,000.-					
(Pak Rs. 16,529,200.-)					

Grand Total Appendix-I+II+III = ¥ 1,215,303,826.-
= (Pak Rs. 162,000,000.-) @ (1 YEN = PAK RS. 0.1333)

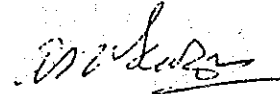
ANNEXURE-1.

No.P&I/PPM-18/88
Government of Pakistan
Geological Survey of Pakistan

Quetta, dated November 28, 1988

OFFICE ORDER

With immediate effect, Mr. Muhammad Ali Mirza will act as Project Director GSP-JICA Petrolab. Project (in place of Mr. E.H. Chauhan), in addition to his present assignment.



(A. H. KAZMI)
Director General.

DISTRIBUTION.

All Concerned.

STEPS FOR GOVERNMENT OF PAKISTAN
APPROVAL FOR PROJECT IMPLEMENTATION

FLOW DIAGRAM

1. Preparation of PC Scheme by the Executing Agency on PC Proforma.
2. Submission of PC Scheme to the Administrative Ministry.
3. Submission of request for concept clearance (on prescribed proforma) of Scheme for approval of Planning Division.
4. Approval of the Concept Clearance by the Planning Division, Government of Pakistan (Chairman, Concept Clearance Committee).
5. Submission of the case (by the Ministry) to Economics Affairs Division for including the Scheme in the list of aid worthy projects.
6. EAD's formal request to Donor Agency, to provide grant-in-aid for the Scheme.
7. Clearance of the Scheme by the Pre-CDWP Committee of the Administrative Ministry.
8. Allocation of project funds in the ADP by Priority Committee of Planning Division.
9. Submission of Scheme (on proforma) for Anticipatory Approval of ECNEC to utilize allocated ADP funds on preliminary project activities.
10. Pre-Feasibility of the Scheme for consideration of Planning Division.
11. Anticipatory Approval of the Scheme by ECNEC.
12. Approval of the scheme by CDWP.
13. ECNEC's Approval for implementation of Project.

