

ネパール王国
尿素肥料工場建設計画事前調査
報告書

1984年1月

国際協力事業団

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ネパール王国

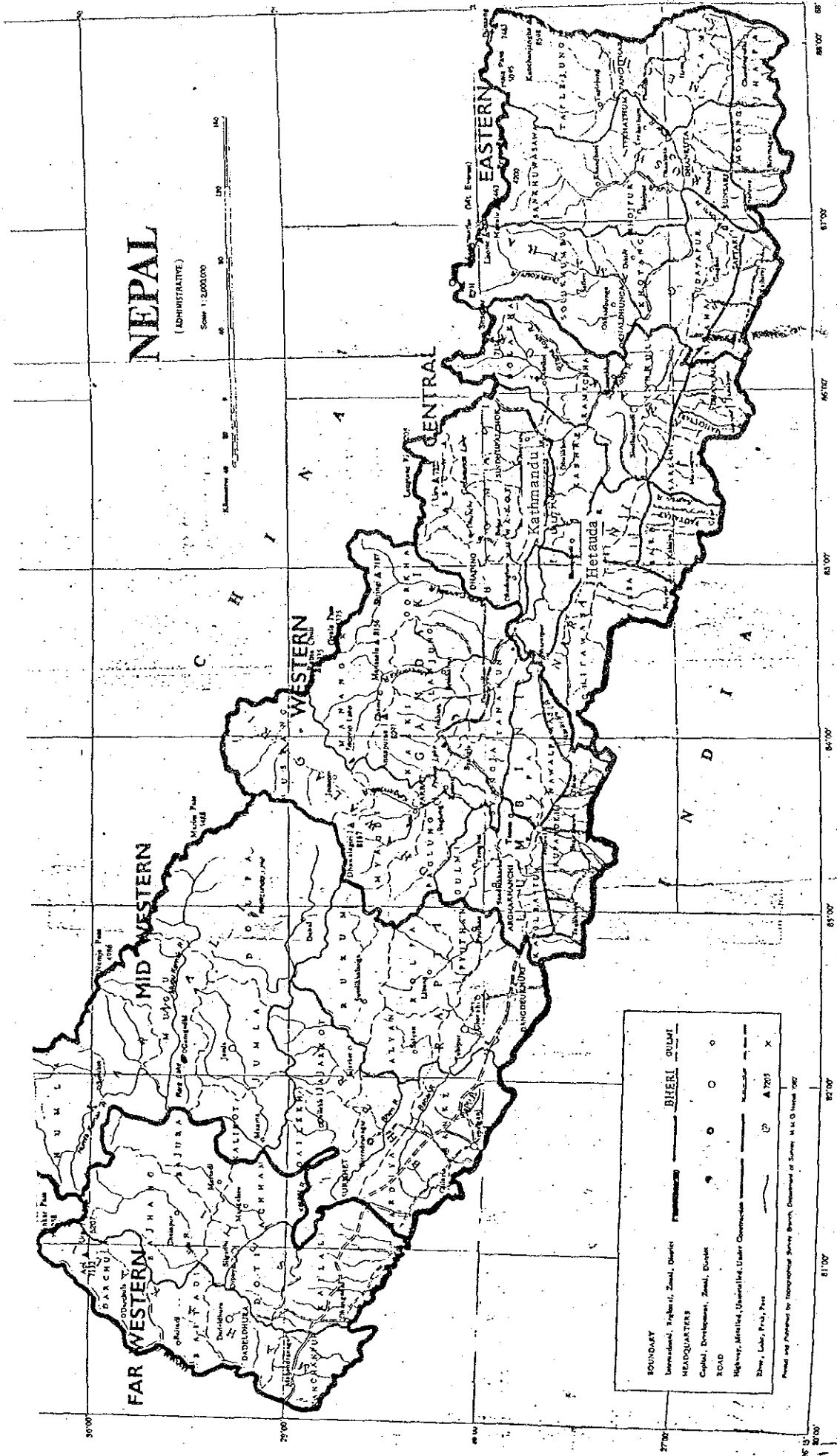
尿素肥料工場建設計画事前調査
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I. 事前調査の概要

I 事前調査の概要

1. 調査の目的と経緯

ネパール王国は年率 2.6 % の人口増加を支えるべく食糧の増産が緊急の課題となっており、この対策として同国政府は尿素肥料を生産する工場の建設を計画している。このような背景のもと同国政府は日本政府に対し同工場の建設計画に係る技術協力（再開発調査）の実施を要請した。

本事前調査は、ネパール政府のかかる要請の背景、経緯及び内容を明確、詳細に把握するとともに、次回 F/S の基本的な前提条件の確認及び技術協力の可能な範囲を明らかにするものである。なお事前調査の具体的な調査事項は次の通りである。

- 1) 要請の背景、内容等の具体的把握
- 2) 関連情報の収集
- 3) 関連サイトの実情把握
- 4) SCOPE OF WORK (S/W) の協議

2. 調査団の構成と日程

(1) 構成

岩口健二	総括・団長	国際協力事業団	鉱工業計画調査部工業調査課長
田仲信夫	技術協力行政	通商産業省	通商政策局技術協力課
木村 靖	プロセス・市場	昭和テクノシステム㈱	代表取締役社長
石井隆弘	業務調整	国際協力事業団	鉱工業計画調査部工業調査課

(2) 調査日程

月/日 (曜)	宿泊地	訪問先・作業内容
9/25 (日)	バンコック	東京発 → JL467 → バンコック着
9/26 (月)	カトマンズ	バンコック発 → TG311 → カトマンズ着 15:00~15:45 大使館表敬 16:00~17:30 工業省訪問, 調査概要説明・討議
9/27 (火)	カトマンズ	9:30~10:30 調査団内部打合せ 11:00~11:30 国家計画委員会 (National Planning Centre) 訪問, 調査概要説明, 討議 11:45~12:30 農業省 (Ministry of Agriculture) 訪問, "

9/27 (火)	カトマンズ	15:00~15:40 大蔵省 (Ministry of Finance) 訪問, 調査概要説明, 討議 16:00~17:00 JICA 事務所訪問, 調査概要説明, 討議 19:00~21:00 西澤大使主催夕食会 大蔵省, 調査団等参加
9/28 (水)	カトマンズ	10:30~11:30 水資源省 (Ministry of Water Resources) 訪問, 調査概要説明, 討議 12:00~14:00 ヒマールセメント工場訪問, 調査概要説明, 情報収集及びプラントサイト調査 15:00~16:00 農業投入物公社 (Agricultural Input Corporation) 訪問, 調査概要説明, 討議 16:00~17:00 日本工営訪問, 情報収集
9/29 (木)	カトマンズ	10:30~12:15 } 工業省訪問 S/W協議 15:00~16:30 } 16:45~17:30 電気局 (水資源省) 訪問, 調査概要説明, 討議 18:00~18:30 商社より情報収集
9/30 (金)	カトマンズ	9:00~10:00 ヘタウダセメントカトマンズ事務所訪問, 情報収集 10:00~12:00 カウンターパートとのS/W協議 15:00~17:00 工業省訪問 S/W協議
10/1 (土)	カトマンズ	調査団 内部打合せ
10/2 (日)	カトマンズ	10:30~11:00 ネパール標準局 (Nepal Bureau of Standard) 訪問, 情報収集 11:05~12:00 鉱山地質局 (Department of Mines and Geology) 訪問, 情報収集 12:00~13:00 カウンターパートとのS/W協議
10/3 (月)	カトマンズ	11:00~15:00 工業指導所 (Industrial Services Centre) 訪問 情報収集, 技術セミナー 15:30~16:00 国連開発計画 (UNDP) ネパール事務所訪問, 情報収集 19:00~20:30 工業省主催夕食会 各省, 調査団他参加
10/4 (火)	カトマンズ	9:30~10:00 大使館有信参事官, 森川書記官へS/W最終案説明 10:00~11:00 国家計画委員会 (NPC) 訪問

10/4 (火)	カトマンズ	15:00~16:00 ネパール工業促進公社 (Nepal Industrial Development Corporation) においてS/W署名 16:30~17:00 大使館へ調査結果報告 18:30~20:30 調査団主催夕食会, 大使館, JICA事務所, 各省参加
10/5 (水)	バンコック	10:00~11:00 JICA事務所へ調査結果報告 カトマンズ発 $\xrightarrow{\text{TG-312}}$ バンコック着
10/6 (木)		バンコック発 $\xrightarrow{\text{TG-600}}$ 東京着

3. カウンターパート機関の概要

(1) I.S.C (Industrial Services Centre 工業指導所) の概要

① 設立

ネパールの工業促進を目的として Development Board Act 2013 (1956) に基づきネパール政府の出資により Nov. 4, 1974 に設立されたもの。

② 機能

- 1) 地域の技術・経済調査
- 2) プロジェクトの技術的, 経済的及びマーケティングの側面の調査
- 3) 工業化プロジェクトにおけるF/Sレポートの作成
- 4) 契約者へ工業情報及び統計データの提供
- 5) 工業化政策における計画及び執行に関するネパール政府への助言
- 6) ネパールの工業用資産の監督
- 7) マネジメント訓練計画の実行
- 8) 調査・研究の割当てと工業化プロジェクトに関するケーススタディの実施
- 9) 工業の設立, 拡張, 近代化に関する契約者へのコンサルタントサービスの提供

③ 組織 (組織図別添1)

主要組織部門

- | | |
|--|------------|
| 1) Industrial Promotion Division | 工業促進部門 |
| 2) Industrial Projects Division | 工業プロジェクト部門 |
| 3) Industrial Extention Services Division | 工業拡張サービス部門 |
| 4) Industrial District Coordination Division | 工業地域調整部門 |
| 5) Administration & Finance Division | 管理及び財政部門 |

④ メンバー構成

委員長

Mr. Ajit Narayan Singh Thapa

Joint Secretary, Ministry of Industry

構成委員

大蔵省代表 (Ministry of Finance)

工業省代表 (Ministry of Industry)

国家計画委員会代表 (National Planning Commission)

小屋・村落工業部門代表 (Department of Cottage & Village Industry)

ネパール工業育成公社代表 (Nepal Industrial Department Corporation)

Member Secretary

Mr. Bhavani Dhungana

Executive Director, Industrial Services Centre.

⑤ ISCのエコノミスト及びエンジニアのリスト (別添2)

(2) 工業省

組織図別添3のとおり

4. 収集資料

リスト別添4

5. 主たる面談者

リスト別添5

II. 調査結果の概略

II 調査結果の概略

1. S/W 協議の経緯と内容

S/W日本側原案は関係各省訪問の際に提示し予め検討しておいてもらった上、9月29日工業省において工業省及びISC関係者と集中的に協議し、その修正案をもって9月30日工業省において大蔵省、ISC等関係機関担当者及び工業省 Thapa 次官補との間で署名した。

協議においては「ネ」側との間で基本的な対立点はなかったが次の諸点につき「ネ」側からの要望が強く、その各々の項目につきいずれも対処方針の枠内でのことであるが、S/W原案に修正を加える等の対応をした。

(1) 「ネ」側の実施機関

S/W原案では工業省工業局 (Depart. of Industry) をカウンターパート機関としていたが、「ネ」側の要望により工業省を実施機関 (Implementing Agency) とし工業指導所が工業省の任命するカウンターパート機関として実質的に調査業務に当り各省との調整は工業省が行うことで了承しS/Wにその旨記載する形で修正した。

(2) 製造プロセスと製造対象品目

S/W原案ではII目的の項で「水電解による水素を利用してのアンモニア製造プロセスを採用した」(尿素肥料)と規定し調査のいわば前提を明記したところであるが、協議に際し工業省を始め農業省、国家経済委員会等では、ナフサ、天然ガス等他の原料を利用した場合の可能性あるいは硝安、石灰窒素更には燐鉱石の開発利用も含めた混合肥料製造の可能性の検討もした上でプロセスと対象品目を決めて欲しいとの要望があった。これに対し調査団としては「ネ」側の要請書及びUNDP専門家のレポートが当該プロセスを前提としていること、国内において予備的な検討を行った結果としても「ネ」国固有の事情の中で、当該プロセスは「ネ」国における肥料工場の第一歩としては現実的と判断されるとの説明をしつつも、「ネ」側としては本件プロジェクトは「ネ」国にとり最初の肥料工場計画であり、国家的重要プロジェクトであるので何よりも総合的、長期的展望に立った計画作りが肝要であり概略的な比較検討が必要であるとの判断から、対処方針の考え方にに基づき、基本的にこの要望には対応することとした。S/W IIの目的の記述のうち「……プロセスを考慮した (keeping in view)」に書き変えた部分を除き特にS/W上の文言の変更は行わないこととした。

(3) プラント立地サイト

事前調査において面談した各省関係者とサイトについての考え方、(カトマンズ及びヘタウダ) 各々地域の条件、事情等及び彼等の個人的意見を聴取し議論したが見方は三分されている。い

れにせよ本格調査において両地域について詳細に比較検討した上で結論を出すことにして欲しいとの要望であり、その必要がある。

この点については対処方針においても了解を得たところであるが特にS/W上の表現は変更せず対応することとした。

又一部の省庁では、山間部等の遠隔地への(肥料)供給を前提としたミニプラントの立地の可能性、その場合の候補地の検討もして欲しいと要望があったが、取り上げることは困難として断った。

(4) 電力事情

想定されるプロセスによる工場計画にとり安価で安定的な電力の供給は致命的に重要な要素となるのでこの点については十分に時間をかけて聴取、協議した。総論的には後述のとおり「ネ」側は供給につき楽観の見通しであると同時に必要量の確保と特別な政策的料金の設定に対し優先的に考慮したいと述べているが、各論においては難行も予想される。「ネ」側はF/S調査団と細部に亘り十分協議したいとしている。

S/W上は、Ⅲ-7-8)の感度分析の対象として特に「電気料金」の項目を追加し、原案にb)の原材料価格の項目は削除した。なお、「ネ」側の要請もあり「販売価格」の変化についての感度分析を追加した。

(5) 研修・訓練関係

「ネ」側にとり肥料工場計画の案は化学工業計画の調査はこれまで経験例もなく専門家も育っていないことから、①調査の過程における知識、手法の移転、②報告書中の要員育成訓練計画及び経営管理についての詳細な記述及び③カウンターパートの日本における研修について日本側に特に配慮して欲しいとの要望が強くあった。①については事前調査期間中には数時間のTechnical Seminarを開く等配慮したが本格調査においてもできるだけの配慮が望まれる。②についてはS/WⅢ-5-9)に「経営的側面を含む」を、及び同Ⅲ-7-1)-(1)に「訓練費用及びコンサルティング費用を含む」との表現を追加した。③については、口頭にて前向きに検討する旨約しS/Wはminutesへの記載は行わなかった。

(6) その他

「ネ」側の取るべき措置について「ネ」側の要請もあり「ネパールに於ける法律に従い」との表現を挿入した。

2. ネパールに於ける農業と肥料事情

(1) 農業部門

① ネパールの人口は1950年8.2(百万人)であったが、1981年には14.1(百万人)に達した。即ち2.6%の年率で増加して来し、今後も同様に増加していくことが予想されて居る。

- ② GDPは1979/1981年NRS 18,606 M (3,014億円)であり、人口一人当りNPS, 1,320, (21,380円)と成っている。
- ③ 農業部門のシェアは他部門の伸びに比し効果が上らず低下傾向にあるが、それでも1975年から1980年の間、平均61%であり、ネパールの経済を支えている最も太い柱であることに変わりはない。即ち、
- 1) 人口に対する食糧を生産する。(一人当り2,266 cal ⊕ 59.8 gr PROTEIN)
 - 2) 最大の就労の場を提供している。(人口の90%)
 - 3) 輸出の主体と成っている。(80%)
 - 4) 他の国内工業の原材料を供給している。

(註) ()内の数字は第6次5ヶ年計画(目標値)

④ 第6次5ヶ年計画

	GDP	
	第5次 (1979/80) (百万円)	第6次 (1980~85) (百万円)
(農業部門)	219,040 (55.4%)	256,397 (52.5%)
(他部門)	176,548 (44.6%)	231,871 (47.5%)
	395,588 (100%)	488,268 (100%)

- ⑤ ネパール全土面積14.7(百万Ha)に対し、16.3%が農地として開発されている。地形的に全土を分類すると次の3区分となる。
- 1) テライ地区：インドに国境を接した平坦な土地で南北26~32 kmの幅で東西に伸びる、ゆるやかに海拔300 mから600 mの間に展開し、北の山岳地区に1200 mの高さで接する。全土面積の17%を占める。
 - 2) 山岳地区：テライ地区の北側で海拔4877 mまでの南北64~80 kmの幅で東西に展開する。多くの丘陵及び盆地を包含している。全土面積の68%を占める。
 - 3) ヒマラヤ地区：4877 mから8839 mまでの高い山々が東西に連なり、世界の屋根といわれる地区。

(註) 政治上の区分は東西に長い国土を4分割する。

{ 東部地区
 { 中央地区
 { 西部地区
 { 極西部地区

- ⑥ ネパールの農業生産値。(添付資料参照)
- ⑦ 第6次5ヶ年計画での農業部門は37,260(百万円)が計上されている。

表1 - 主要農産物地区別生産状況 (1978/79) -

	東 部		中 央 部		西 西 部		極 西 部		合 計	
	面積 (Ha)	生産 (千トン)	面積 (Ha)	生産 (千トン)	面積 (Ha)	生産 (千トン)	面積 (Ha)	生産 (千トン)	面積 (Ha)	生産 (千トン)
米	412	726	414	791	233	428	204	395	1,263	2,339
とうもろこし	106	163	135	225	99	167	114	188	454	743
小 麦	56	66	140	177	75	86	84	86	356	415
大 麦	2	2	7	6	4	4	13	11	26	23
き び	30	31	27	28	42	46	25	28	123	133
砂糖きび	3	49	13	208	6	107	-	6	22	370
オイルシード	27	15	43	26	23	12	51	39	144	92
煙 草	2	2	4	3	-	-	-	-	8	5
じゃがいも	22	122	14	80	7	39	7	38	51	279
	660	1,176	797	1,541	489	889	498	791	2,447	4,399

(2) 肥料事情

- ① AIC (AGRICULTURAL INPUT CORP.) が全ての肥料を輸入し、インドとの国境14ヶ所のストックポイントにカルカッタより輸送し、貯蔵の上ネパール国内に配送する。
- ② ネパールが輸入した化学肥料は添付の資料の通り。
- ③ 地域別の Ha 当りの肥料消費量は添付資料の通り。

カトマンズ盆地のみ	50 kg/Ha <	全消費量の50%
テライ地区	10~20 kg/Ha	38~39%
西部及び極西部	10 kg/Ha >	残
- ④ ネパールは前項で述べた如く、農業立国であり、人口増加対策、就労対策、輸出振興等のある政策面からその振興に力を入れているが、そのための肥料の国産は採算が取れるものであれば優先して実現したいという希望を各官庁が持っている。
- ⑤ しかし乍ら5ヶ年計画の中で農業部門の投資と達成率は他部門に比して低い。それは農業技術の画期的発展もないし農夫への浸透にも時間がかかる故であると云う。その意味からネパールへの初めての肥料生産の途は大きな意義を持つ可能性がある。

§ 1 ネパールの肥料状況

表 2 - ネパールの肥料状況 -

(RE: STATISTICAL POCKET BOOK) (NPC, 1982)

	SALES OF FERTILIZERS (千トン)	NITROGEN IMPORT (トン)	FERTILIZER CONSUMPTION (トン)	TOTAL FERTILIZER	
				IMPORT (トン)	CONSUMPTION (トン)
1963/64		693	345	719	378
64/65		294	370	494	592
65/66	651	586	342	678	444
66/67	3,150	1,297	1,070	1,903	1,450
67/68	7,904	2,823	1,839	4,171	2,734
68/69	9,878	2,541	2,382	3,562	3,200
69/70	14,540	4,241	3,380	5,952	4,585
70/71	16,848	3,951	4,111	5,331	5,406
71/72	24,352	5,798	5,554	8,546	7,968
72/73	37,602	12,768	7,698	22,252	11,900
73/74	57,706	8,040	9,003	12,680	13,088
74/75	71,797	14,488	8,923	21,758	12,658
75/76	74,426	1,780	8,423	2,180	12,266
76/77	83,849	11,061	10,634	13,849	14,833

§ 2 第 6 次 5 ヶ年計画の目標値

RE: (第 6 次計画 (1980~1985) (NPC JAN, 1981))

	第 5 次計画最終年度 (1979/80)	第 6 次計画目標値 (1980~85)	第 6 次計画最終年度 (1984/85)
化学肥料の 配 送	(トン) 84,133	(トン) 215,402	(トン) —

§ 3 第 5 次 5 ヶ年計画実績 (1975~80)

RE: (INVESTORS' GUIDE TO NEPAL (ISC))

	第 5 次 5 ヶ年計画		達 成 率
	(目標値)	(実績値)	
化学肥料	(トン) 162,875	(トン) 84,133	(%) 51.65

§ 4 FERTILIZER DEMAND (UNIDO REPORT)

(RE: STATISTICS OF AIC)

1. IMPORT (TOTAL FERTILIZER)

1970 / 71	18,000 t
1979 / 80	49,000 t

2. TYPE AVERAGE N-CONTENT

1975 / 76	27 %
1979 / 80	31 %

3. AMMONIUM SULPHATE & UREA

	AS (トン)	UREA (トン)
1975 / 76	6,500	10,300
1979 / 80	5,400	22,400

4. 化学肥料の CONSUMPTION

表 3 - 化学肥料の消費量 -

	HILL AREA		KATHMANDU VALLEY		TERAI AREA		TOTAL	
	(トン)	(%)	(トン)	(%)	(トン)	(%)	(トン)	(%)
1975/76	3,077		12,021		14,806		29,904	100
76/77	4,197		14,404		18,459		37,060	100
77/78	6,319		15,748		23,203		45,269	100
78/79	6,277		15,843		23,353		45,471	100
79/80	7,954		16,207		24,481		48,642	100
	7,954,000 kg / 750,000ha 10.6 kg / ha 輸送が高価		16,207,000 kg / 70,000 ha 231.5 kg / ha 全国の 1/3消費		輸送が幹線のみが 整備			

§ 5 ネパールに於ける肥料の流通価格構成 (AIC総裁説明より)

日本(第2 KR) 独自調達 世銀・ADB

FOB価格

CIFカルカタ	230~240\$/MT	175~177\$/MT	185~190\$/MT	
価格	(3,478RPS)	(260\$5RPS) [*]	(2,782RPS)	@1\$=14.80RPS

1. Letter of Credit @ 0.75 %
2. Clearing & Forwarding & Border — Border Price
3. Internal transport @ 217.29/MT
4. Storage charge @ 3.40/MT (6ヶ月)
5. Administration Overhead 195.87/MT
6. Loss 20 @ 1.5 %
7. Contingency @ 2 % of 10%
8. Distribution Margin @ 6 %

	日本(第2 NR)	独自調達	世銀・ADB
Total cost			
(農家渡)販売価格	4,500RP/MT (72% up)	4,000RP/MT (54% up) [*]	4,200RP/MT
		3,500RP/MT (500は政府補助金)	

(3) ネパールに於ける化学肥料

ネパールに於けるはAIC (AGRICULTURAL INPUTS CORP.) が全ての肥料を輸入し、適応在庫を保つ役目を果している。そして輸送費の差があるが、貧困な購買力を考慮して均一価格で国内に分配する AGENCY でもある。その統計によるネパールに於ける化学肥料の分析は以下の通りである。

① 第5次5ヶ年計画に於ける数量と到成度

	目標値 1976~1980	実績値					合計	%
		1976/76	1976/77	1977/78	1978/79	1979/80		
尿素 /全肥料	81,963 ton (%)	10,060 32.3	13,661 36.1	16,290 36.0	19,739 43.4	22,324 44.5	82,124 ton 39.1	100.2

② 第5次5ヶ年計画に於ける地区別の尿素販売状況

	東 部	中 央 部	西 部	極西部	そ の 他	合 計
数量	6,446 ton	64,428	9,056	1,520	674	82,124 ton
%	7.8	78.5	11.0	1.9	0.8	100.0

図1 一年度別肥料消費量

トン/年

○—○ 硫安

×—× 尿素

△—△ 複合肥料
(N:P:K=20:20:0)

20,000

15,000

10,000

5,000

65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80

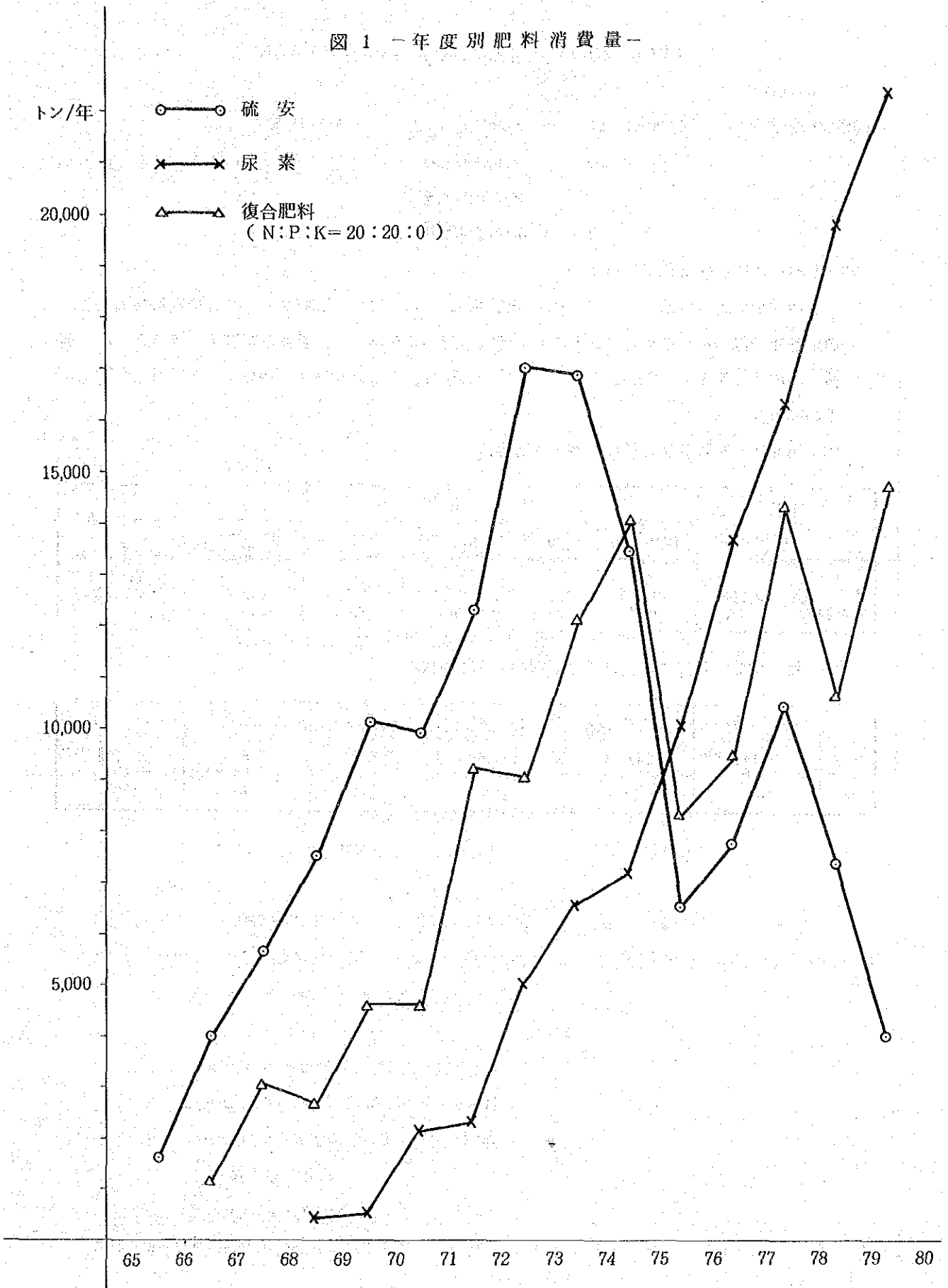
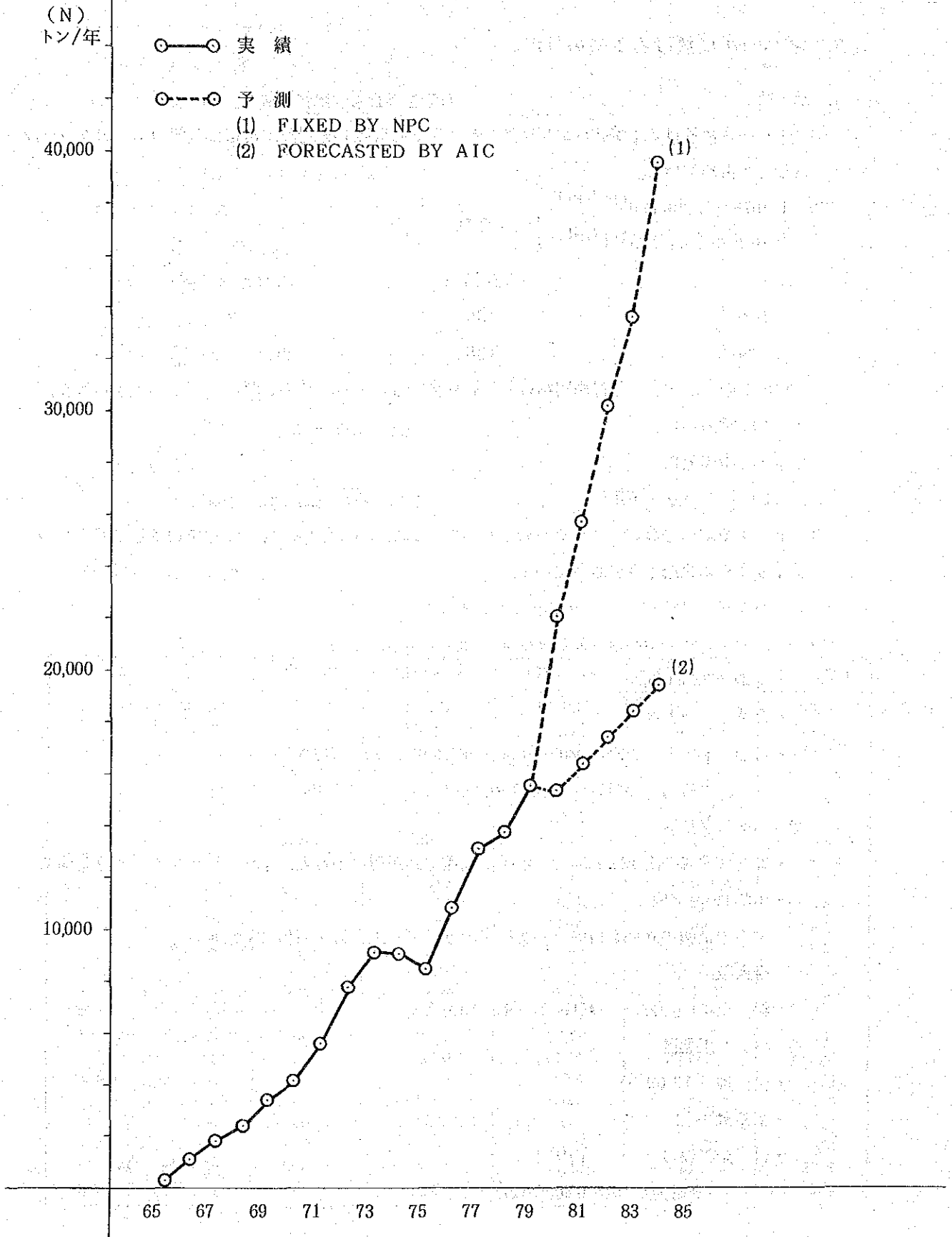


図2 - 年度別N肥料消費量(実績及び予測) -



3. ネパールに於ける工業の状況

1. 総括

(1) ネパールに於ける工業化は農業関連の軽工業から展開して居り、74%は食料加工、繊維及び皮革加工で占めている。

(2) $\left\{ \begin{array}{l} 1973 \text{ 年 ; } 29,128 \text{ (百万円)} \\ 1978 \text{ 年 ; } 41,715 \text{ (百万円)} \end{array} \right\}$ 生産額

	(生産指数)	(生産成長年率)
1975 年	100	—
1980 年	138	6.7 (%) / 年

故にこの第5次5ヶ年計画実績は芳しいものでなかった。その問題点は下記の3点である。

- 1) 電力不足
- 2) 市場開拓
- 3) マンパワー不足

(3) 9-工業地区を設定して重点行政を行っている。これらの地区では、土地を造成して準備し、ユーティリティの供給も準備されている。

① バラジュ地区

- ・カトマンズの中心から僅か3.5 kmの場所に優位性がある。
- ・土地 35.41 ha
- ・企業 47 社
- ・料金 $\left\{ \begin{array}{l} \text{水} \quad \text{NRS } 0.70 \sim 0.80 / \text{m}^3 \text{ (14.8 NRS / US\$)} \\ \text{電力 (MIN.) NRS } 0.30 / \text{kwh} \oplus 5 \% \text{ (LOSS)} \end{array} \right.$

② ヘタウダ地区

- ・カトマンズの南135 kmで、東西の高速道路が通っており、ネパールの中央部に位置する。
- ・132 haの土地
- 大企業立地の立地を目的とした将来のリーダー工業区を目指して設定。
- ・企業数：26
- ・料金；(電力) (MIN.) NRS 0.30 / kwh

③ パタン工業区

- ・土地 13.69 ha
- ・企業数；53
- ・料金；(水) FREE
- (電力) NRS 0.30 / kwh

④ ダーラン工業区

- ・土地；10.18 ha
- ・建家；16棟
- ・企業数；小企業対照で設置された工業区
- ・料金；(水) NRS 1.80/m³
(電力) NRS 0.30/kwh ⊕ 5%

⑤ ポカラ工業区

- ・土地；25.20 ha
- ・建家；17棟
- ・企業数；現在13
- ・料金；(電力) NRS 0.36/kwh

⑥ ネパルグン工業区

- ・土地；9.31 ha ⊕ 3 ha (増設用地)
- ・企業数；16
- ・料金；NRS 0.20/kwh ⊕ 5%

⑦ バットワール工業区

- ・土地；15.24 ha

表4 - 主要工業製品生産状況 -

RE: ("INVESTORS' GUIDE TO NEPAL" 1982, ISC)

業種	単位	1977/78	1978/79	1979/80	1980/81
ジュート製品	トン	16,347	15,520	14,777	16,264
砂糖	トン	26,502	27,200	14,158	12,010
煙草	00,000	1,63,37	2,06,86	1,64,24	1,81,13
マツチ	000 グロス	6,77	7,24	6,99	6,26
酒類	000 lt	5,87	4,55	6,98	7,88
洗剤	トン	1,317	1,121	1,174	2,631
靴	足	59,031	55,779	70,299	81,845
皮革製品	000 個	12,56	13,20	18,57	18,02
農器	トン	313	179	(39,449 個)	86
茶	トン	413	326	387	535
ステンレス器具	トン	173	294	760	470
ワラ製品	トン	749	1,410	965	1,638
煉瓦, タイル	000 個	2,05,46	1,24,03	3,37,91	2,56,42
ビール	000 lt	7,88	11,81	13,10	14,59
肥料	トン	423	569	287	254
木綿製品	000 m	38,89	24,29	34,89	53,17
セメント	トン	35,850	21,019	29,163	32,326
プラスチック製品	トン	44	75	69	79
ビスケット	トン	1,197	2,037	1,912	1,675
合板	000 ft ²	18,35	18,09	10,51	41,49
プラスチックパイプ	000 m	1,85	5,75	4,26	788
合成繊維	000 m	17,17	17,17	21,90	23,29
鑄鉄製品	トン	3,573	4,471	5,963	5,070

表5 - 第6次5ヶ年計画の主要目標値-(1980-1985)

(RE: THE 6TH PLAN JAN, 1981 NPC)

	第5次5ヶ年計画 最終年度 (1979/80)	第6次5ヶ年計画 目標値 (1980~1985)	第6次5ヶ年計画 最終年度 (1984/85)
主要農産物(成長率)	-2.0%/年	3.0%/年	
工業製品(成長率)	6.7%/年	10.0%/年	
化学肥料(配 送)	84,133 t	215,402 t	
農業関係クレジット (ADB)	15,853 (百万円)	28,254 (百万円)	
電 力(既設分)	68,346 kw	144,923 kw	213,269 kw
工業関係クレジット (NIDC)	3,784 (百万円)	8,144 (百万円)	

4. ネパールの電力状況

(1) 電力行政

元来、ヒマラヤ山系の膨大な水資源をネパールは持っていることは、高くなることはあっても安価になることのないエネルギーコストの観点から見た場合、その有効利用は大切に計画する可きであり、水資源省(含、電力局)が全てを管理して居り、建設後操業を受け持つ電力公社は地区により担当公社が異っている。

中部地区 西部地区	NEC
	EEC
東部地区	EEC
西部(ブトツル地区)	BPC

(2) 発電設備

ネパールの現有発電設備の容量は添付資料の通りであるクリニカ水力(NO. 1)がFULLに操業して、(現在、雨期が終了する寸前) PEAK ROADに対応しているとのことであり、ネパールの現在の電力供給は DEMANDの上昇に追いつかず苦しい状況と考える。

又、今後の発電設備の開発計画は添付資料の通りであり、今回の事前調査を行った肥料のPROJECTも実施の場合はマルシャンディー水力より送電を受けることを考えたいとしている。マルシャンディー水力計画及びサブトガンダキ水力計画は10月/下旬/83'のパーリーに於ける会議でFINANCEを中心に討議され、完成は1986あるいは1987年となれば今回の肥料計画の工程に合致しよう。

表 6

§ (1983年現在) 既設発電設備
(CENTRAL REGION)

			(MW)
GODAWARI	HYDRO	AGR, DEPT.	0.030
JANAKPUR	DIESEL	NEC	0.032
BHARATPUR	DIESEL	NEC	0.600
SUNKOSI	HYDRO	NEC	10.050
TRISULI	HYDRO	NEC	21.000
PANAUTI	HYDRO	NEC	2.400
SUNDARIJAL	HYDRO	NEC	0.600
PHARPING	HYDRO	NEC	0.400
PATAN	DIESEL	NEC	1.490
KATHMANDU	DIESEL	NEC	1.728
HETAUDA	DIESEL	NEC	14.470
VARIOUS	STEAM	PRIVATE	2.400
HETAUDA	DIESEL	NEC	10.000
KULEKHANI (No. 1)	HYDRO	NEC	60.000

表 7

§ 発電設備開発計画

LOCATION	INSTALLED CAPACITY (MW)	PEAK CAP. (DRY SEASON) (MW)	ACCUMULATED PEAK CAP. (MW)
1982/83 TRISULI	3.0	2.0	125.202
84/85 DEVIGHAT	14.1	14.1	139.302
86/87 KULEKHANI (No. 2)	32.0	32.0	172.302
86/87 MARSYANDI	66.0	66.0	238.302
89/90 SAPT GANDAKI	75.0	75.0	313.302
90/91 SAPT GANDAKI	75.0	75.0	388.302
92/93 SAPT GANDAKI	75.0	24.0	412.302

(3) 電力需要

電力量及び電力の総需要予測は（NEC系統）は下記の図表の通りである。ネパールにおける一般需要は冬場のヒーターが大きいと聞かすが、季節変動（掲水期／豊水期）及び日負荷変動（昼間／夜間）を考慮に入れて需給を考えねばならない。何れにせよ今回の肥料計画としては、ネパールで最初の電力多消費型の工業プラントとなることであり、電力の安定供給も重要であるが如何に上記の変動に対応出来るプラントの設置を考えるかがポイントである。

表 8

年 次	電力量需要 (10^6 kwh)	電力需要 (10^3 kw)
1977/78	144.2	39.2
78/79	165.8	45.1
79/80	190.7	51.8
80/81	218.7	59.4
81/82	250.2	68.0
82/83	297.0	80.8
83/84	338.9	92.1
84/85	416.0	113.1
85/86	590.2	156.7
86/87	710.2	188.5
87/88	810.5	215.1
88/89	920.8	244.4
89/90	1,077.5	286.1
90/91	1,212.6	314.6
92/93	1,511.5	392.2
94/95	1,847.3	479.3
96/97	2,236.5	567.4
98/99	2,689.6	682.4
99/2,000	2,942.2	746.4

(4) 電力料金

1967年以後のネパールにおける電力料金の変遷は表9のとおりである。最も新しい料金改訂は1983年4月14日に実施されたもので、その具体的内訳は表10に示すとおりである。この改訂は平均料金を58%値上げするというかつてない大巾なもので、10%のインフレ値を差し引いても48%の実質値上げになる。なお電気局ではこれにより負荷予想値が短期で4.8%、長期で9.6%減少しようと予測している。現行の料金体系の中で工業用電力料金は大中小規模の3グループに分け設定されており（昨年迄は大、小の2グループ）、基本料金は規模にスライドし高くなっているものの、kwh当りのユニット料金については逆転させている。又灌漑用電力料金は工業用よりも更に低く設定（400Vで0.42ルピー/kwh、11kvで0.35ルピー/kwh）されている。

ネパールでは水力が唯一の所有資源であり、※ それを利用して水電解法により水素を生産して

アンモニア/尿素的肥料にするという今回の計画プラントは電力料金の高低でF/Sの結果が判定されてしまう性格であり、JICA側からの提案のKEY POINTとなる。安定供給の基本料金レートと共にこのプラントが使わなければWASTEとして流れてしまう夜間電力の特別料金レートの組合せで他の工業にない安価の平均レートの設定が大巾であろう。

備考1. ※電気局長の説明では技術的に feasible な包蔵水力は 3600万 kwh であり、世銀が調査を計画しているカルナリ川で約 150～200万 kwh、ガンダキ川で約 100万 kwhが期待できるとしている。

備考2. ネパールにおける電力行政は水資源省による計画策定を受け電力局 (Electricity lapartment) が建設を行い、配電以後は電気公社 (National Electricity Corporation) が担当する。

電力料金の決定については電気公社の素案を6人委員会で審議し水資源省で決定する。6人委員会の構成は次のとおり

水資源省 3人 (次官-委員長, 電力局主任技術者及び電力局長)

大蔵省 1人

工業省 1人

地方公共団体 (市長) 1人

その際、(電力局主任技術者の話によると) 電気公社は世銀との間の了解事項として収益率 (rate of return) を6%確保することが前提条件であるとの由。従って高圧でバルク供給を受ける場合は (末端に至る配電工事費等が不要なので) 特別な料金改定は可能であるとの由である。

表9

AVERAGE HISTORICAL ELECTICITY TARIFF LEVELS IN NEPAL

<u>Fiscal Year</u>	<u>Average Domestic Tariff</u>	<u>Inflation Rate</u>	<u>Inflation Index</u>	<u>Constant Price Tariff at 1982/83 Prices</u>
	N.Rs/kWh	%		N.Rs/kWh
1967/68	0.37		28.4	1.30
1968/69	0.37	4	29.5	1.25
1969/70	0.36	11	32.8	1.10
1970/71	0.28	5	34.4	0.81
1971/72	0.23	2	35.1	0.66
1972/73	0.23	8	37.9	0.61
1973/74	0.24	15	43.6	0.55
1974/75	0.24	17	51.0	0.47
1975/76	0.26	5	53.6	0.48
1976/77	0.40	1	54.1	0.74
1977/78	0.42	10	59.5	0.71
1978/79	0.41	4	61.9	0.66
1979/80	0.48	12	69.3	0.69
1980/81	0.49	15	79.7	0.61
1981/82	0.49	14	90.1	0.54
1982/83	0.52	10*	100.0	0.52

* Estimate

表 10

ELECTRICITY TARIFF IN NEPAL

DOMESTIC

2.5 to 15 Amps. KWH METER CONNECTION	– Rs. 12/– per month + 25 units free – 0 to 25 units – 44 paisa per unit – 26 to 100 units – 60 paisa per unit – 101 to 300 units – 80 paisa per unit – 301 to above units – 90 paisa per unit
16 to 30 Amps.	– Rs. 27/50 + 50 units free
31 to 60 Amps	– Rs. 60/50 + 100 units free
61 to 100 Amps	– Rs. 100/50 + 150 units free
100 to above Amps.	– Rs. 220/50 + 300 units free

**INDUSTRIAL POWER
CONNECTION**

0 to 50 KW	– Rs. 181/– per KW + 56 paisa per unit (kwhr)
50 to 500 KW	– Rs. 40/– per KW + 52 paisa per unit
501 to above KW	– Rs. 50/– per KW + 50 paisa per unit

**COMMERCIAL HOTEL
POWER CONNECTION**

Other	– Rs. 50/– per KW per month + 70 paisa per unit
	– Rs. 40/– per KW per month + 65 paisa per unit

DRINKING WATER

POWER CONNECTION	– Rs. 40/– per KW per month + 45 paisa per unit
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TRANSPORT

POWER CONNECTION	– Rs. 40/– per KW per month + 40 paisa unit
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**IRRIGATION POWER
CONNECTION**

	– Rs. 35/– per KW per month + 42 paisa per unit at 400 V supply
	– Rs. 35/– per KW per month + 35 paisa per unit at 11 KV supply

NON COMMERCIAL

TEMPORARY LIGHT	– Rs. 41/– per KW per month + 85 paisa per unit
	– Rs. 1/60 per unit

Effective date: 14th April 1983

5. PLANT SITE について

(1) 必要条件

今回、ネパールに於ける肥料計画は尿素を頭に置いて SITE を考える時、次の条件となる。

- ① 必要な CO₂ ガスをセメント工場の排ガス中から捕集し利用出来ること。～（セメント工場の近隣。）
- ② 大電力の安定供給を得られること。～（高圧受電の可能な SITE であれば、POWER PLANT に近い必要はない。）
- ③ 水電解用補給水を含め、プラント用水の確保出来ること。
- ④ 肥料の消費の市場の中心であること。
- ⑤ 肥料の配送に便利の地であること。～（交通網の中心。）

(2) カトマンズ地区

- ① ネパールの肥料消費の約半分はカトマンズ盆地であり、政治の中心地の近傍で、ネパール最初の化学プラントを設置することは、全ての点で第一候補の SITE であろう。但し、調査に訪問する以前では、HIMAL CEMENT CO. の CO₂ ガスに不安を持っていた。

② HIMAL CEMENT CO. の調査

160 T/D（現在）を 400 T/D に増設する計画が具体的に走っており、1986/1～3 月に試運転の予定。

- 1) 160 T/D の排ガス量は 100 T/D の尿素に必要な CO₂ ガス量を捕集するのにぎりぎり。しかし、400 T/D と補強されればこの心配はなくなる。
- 2) CO₂ ガスの安定供給が 160 T/D × 1 系列の操業では非常に不安であった。（セメント工場は耐火物の補修等の操業停止が多い。）
しかし、400 T/D と増設後は 2 系列操業となり、交互に停止してメンテナンスを行う故に CO₂ ガスの供給が完全になくともなく、この不安も消えた。
- 3) セメント工場の排ガスの AIR POLLUTION が現在は放置されており、この処理は心配の一つであった。しかし、400 T/D 増設時に ESP（電気集塵器）を設置する計画であり、この心配もなくなった。

③ SITE

HIMAL CEMENT CO. の隣接地は、今回の肥料プラント用地として適当と考える。但し、下記の点を検討せねばならない。

- 1) 用地の広さは、水電解法 H₂ プラント、空気分離器（N₂ プラント）NH₃ 合成プラント及び尿素プラントというプラントのみでなく、ガス HOLDER、（H₂, H₂, NH₃, CO₂）及び製品倉庫等付帯設備まで考えると、余地の余りない広さか。

- 2) WATER FLOODING の心配は、川沿いの土地故に心配であったが問題なしとのこと。
- 3) 地耐力は隣接のセメントキルン（縦型）やその建家が建設されていることであり、心配はないか。

(3) ヘタウダ工業区

① 今回は調査の機会がなかったが、SITEとして検討の必要ありと考える。即ち、

1) 交通に便利。（東西に走るHIGHWAYに通ずる。）

カトマンズ地区は東西のHIGHWAYより北に入る。

2) 大、中企業向けのLEADER工業区として開発された。

3) UNIDOの1981年のPRE F/S REPORTでは下記の通り。

(1) 増設用の敷地がとれない。～（余地少し。）

(2) WATER FLOODINGの恐れあり。

4) HETAUDA CEMENT CO. は250,000T/Yで建設中であり、HIMAL CEMENT CO. に比しNEW PLANTである。（即ち、CO₂ガス供給に不安が少い。）

② HETAUDA CEMENT CO.の調査

現地訪問の時間は取れないため、カトマンズ事務所を訪問し調査した。

1984/6完成の予定で700 T/D（クリンカーとして）のプラントを建設中。（但し、インド CONTRACTOR 故遅延はあろうが。）

(註) 小野田エンジニアリングが、BASIC PARAMETERを設定している。

③ SITE

1) UNIDOのF/S REPORTの心配点を質問したがNO-COMMENTであった。（HETAUDA CEMENT CO. に対し）

2) 工業区には33社の企業が参加している。

22社～操業中

5社～操業停止（原料入手困難等の原因）

2社～建設中

4社～土地の契約済

(4) 結論

① ヘタウダ地区を未訪問であるが、今回の事前調査の結果次の如く考える。

1) カトマンズ地区（W/HIMAL CEMENT CO.）

最初の肥料プラントとして適当。

(1) CO₂ガスの供給もHIMAL CEMENT CO.の増強で不安なし。

(2) 肥料の需要の大きいカトマンズ盆地で市場の中心。

(3) SITEの大部分は平地の空地。

(4) 電力、水の供給に心配はない。

(5) 最初の化学プラントの建設には、行政上の諸配慮が入用であり、政治の中心のカトマンズは最適。(MAN-POWERの調達にBEST)

2) ヘタウダ地区 (W/HETAUDA CEMENT CO.)

2nd 肥料プラント以降の立地の候補として検討したい。

(1) 大、中企業向けの LEADER 工業区。

(2) 交通 (物流) に便。

② 第6次5ヶ年計画に UDAYAPUR CEMENT FACTORY (1500 T/D) の創立準備の記載があり、今回の肥料計画にはタイミングが合わないが、将来のための資料入手は入用。

6. ネパールの MAN POWER について

(1) BACK-GROUND

ネパールは前述の如く農業国であり、就労人口の90%が農業に従事しているが、人口の増加も併せ考え、その将来は工業の就労人口を増して行かなければならないことを国王も明言している。

① 第5次5ヶ年計画； TECHNICAL MANPOWER を 19,975 人供給。

② 第6次5ヶ年計画；

1) 訓練された MAN-POWER の増加 (重点指標)

中、低級の TECHNICAN は供給出来るが、高級の ADMINISTRATIVE AND TECHNICAL PERSONNEL の教育を重点とする。

2) LABOR SUPPLY CENTRE

HETAUDA, NEPALGUNJ, BUTWAL ; 7500 人訓練 (予定)

DHARAN, MAHENDRANAGAR

SURKHET, POKHARA, JHAPA

} ; SUPPLY CENTRE OPEN (予定)

BIRATNAGAR ; 40 人

KATHMANDU ; 250 人

} VOCATIONAL TRAINING CENTRE 訓練 (予定)

3) 364 (百万円) を経費として計上。

③ 賃金 UNSKILLED 4,200 円/月

(LABOR) SEMI-SKILLED 4,800 円/月

SKILLED 6,100 円/月

HIGHLY SKILLED 8,200 円/月

(2) 肥料プラント用 MAN-POWER

① プラントの建設について

1) CONSULTANT CO. に業務を依頼することを前提とすればこの段階は少人数のエンジニアで処理出来る。

2) 但し、訓練の意味から運転及びメンテナンスのエンジニア及びLABORが参画するのは別問題。

② プラントの操業

1) この段階は建設と別契約に TECHNOLOGY TRANSFER の目的で "TECHNICAL ASSISTANCE SERVICE" の契約を結び (2年間) / (契約期) として、操業(含MANAGEMENT) の指導を受ける可き。

2) エンジニア

全体のネパール人のエンジニアの数が少い。但し、若干は外国の大学のMANSTER コースを卒業している。

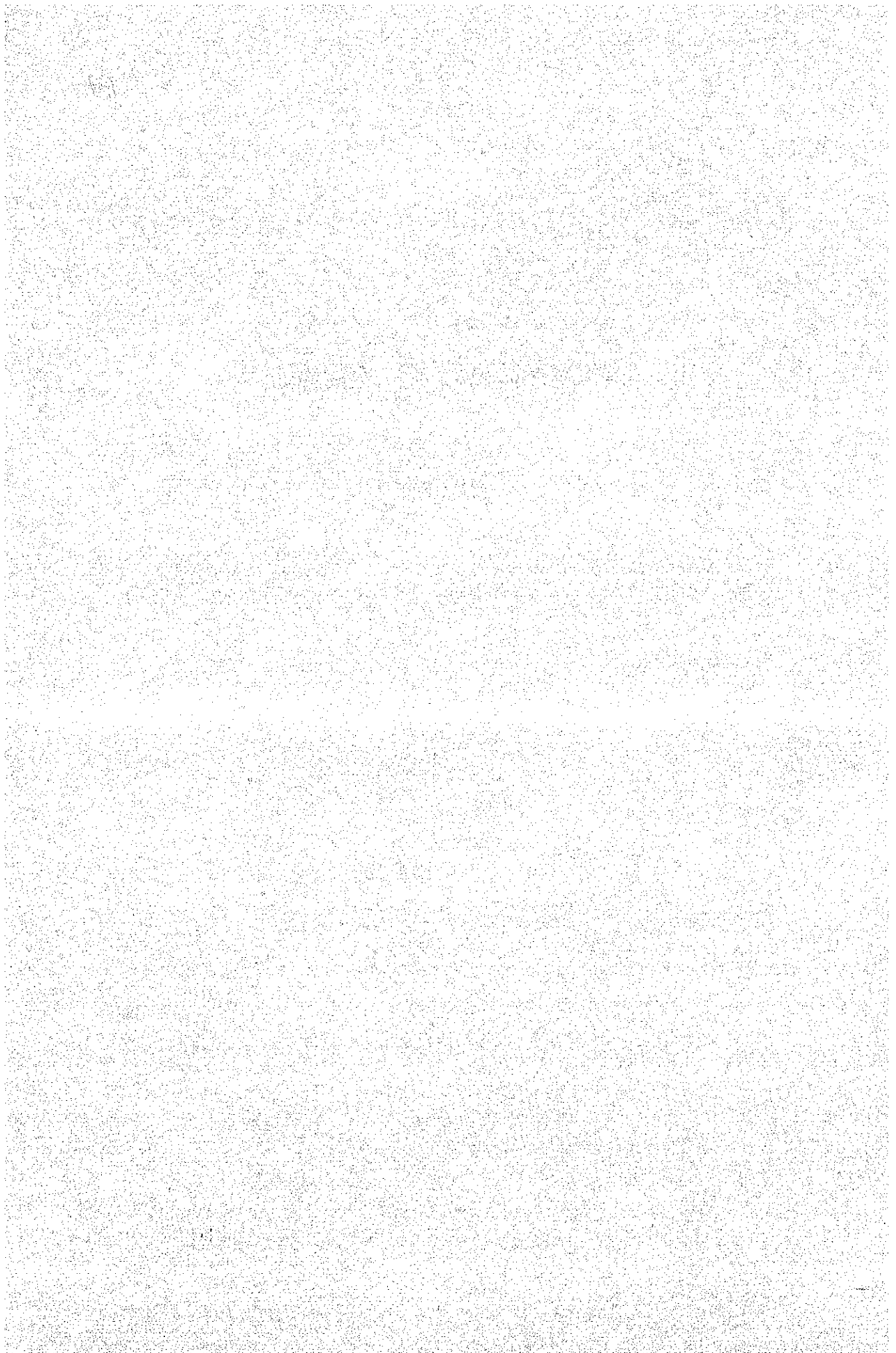
当初、最も心配していた CHEMICAL ENGINEER, CHEMIST という化学系は化学工業がないので採用可能であろうという。むしろ、他工業とも重複する MECHANICAL, CIVIL, ELECTRICAL が問題となる可能性もある。

3) LABOR

事前訓練及び ON THE JOB 訓練を如何に考えるかであり、数に不足なし採用は可能と考える。

他に同業種の工場が現出するまでの間、定着率も心配ないのではないかと考える。(転出先がない故)

III. 本格調査に当たっての留意点



Ⅲ 本格調査に当たっての留意点

1. 一般的留意点

ネパールの人口は、約9割が農業部門に属し、年率3%に近い率で増加している。これらの人口を支えて行くには農業開発が第一義的に重要である。可耕地の拡大が大巾には望めない状況の中でその方向とは単位当りの生産性向上（集約農業化）を図るしかない。このため「ネ」国政府は灌漑面積の拡大、改良品種の導入、農業投入物の投入等総合的施策を進めているが、その中でも肥料については全量が輸入（第2KRによる援助が大半）に依存しており増大する肥料需要に長期的に対応してゆくには国内で肥料生産を図ってゆくことの意義は極めて大きい。

本件調査はかかる背景とネパールという固有の事情の中で国家経済的にも、一つの生産単位としての経済性においても、又技術的にも成立し得る肥料工場計画は何かということを追求するもので、関連する全ての領域を検討した上で一つの最良のシステムを提言するものである。ネパール政府にとっては肥料工場計画設立の是非につき具体的計画において検討するのは本件が最初のケースであることもあり、各過程において教示的な調査の実施と報告書においては結論に至る誘導過程の考え方、基礎資料等も含めた構成とする等の配慮が必要である。

2. 電力問題と留意点

想定されるプロセスによる肥料工場にとり電力問題は量の確保もさることながら、いかに安い料金の適用が可能かという極めて政策的判断を要する部分が多い。従って本格調査においては我が国の経験も踏まえた電力料金についての考え方、知識を含め電力問題に精通した調査団員を現地に派遣し、関係者と十分協議して調査を進める必要がある。

3. PROCESSの選択と留意点

(1) 前提

今回の事前調査はネパール政府より100 T/Dの尿素プラントの企業社と指定されていたこともあり、他種類の肥料もあるが尿素に絞って考えると次のとおり。

(2) 水電解法H₂プラント

- ① ネパールに於ける資源の有効利用という意味で水力のPOWERに電力消費型の工業として水

電解法によるH₂プラントを考え、之より、アンモニア/尿素を誘導していく。但し、肥料用にこの方法を操業している処は少い。それは電力料金が非常に高価となったのも一因である。即ち、この方法を採用してFEASIBLEか否かは電力料金の安価の設定が出来るかにかかる。それにはこのプラントで受けなければ電力がWASTOとなってしまう夜間受電の利用 (TIME-OF-DAY TARIFF) 及び豊水期はFULLに受電する季節変動利用(SEASONAL TARIFF)を最大限に活用を考えねばならない。

(註) ネパールは、かかる電力料金設定の経験に乏しい。

- ② 型式に高圧 (加圧) 型と常圧型; BATH型とFILTER PRESS型の区分がある。

ネパールに導入は何れにせよ常圧型と考える。

(3) 空気分離によるN₂プラント

- ① ネパールにも小容量の空気の深冷分離プラントありという。
② 故に特に留意する特定事項なし。

(4) CO₂ガスプラント

- ① { カトマンズ/HIMAL CEMENT CO. } と何れに立地しても
{ ヘタウダ/HETAUDA CEMENT CO. }

セメントプラントの排ガス中のCO₂ (約18~20%) ガスを捕集する。ESP (電気集塵器) 後の排ガスを受入れて処理することとなるがMEA, DEA,等の溶剤で選択吸収させ、之を放射塔でCO₂ガスとして放散させて捕集する。

- ② 大量の排ガスを扱うことから大口経営の配管となる故、出来るだけセメント工場に近く設置すること、及び大型のEQUIPMENTのプラントとなる故、省エネルギーが大切となる。

(5) NH₃ (アンモニア) プラント

- ① 水電解法アンモニアプラントの場合はH₂/N₂ガス混合、圧縮及びアンモニア合成の構成となる。
② 尿素 100 T/Dの場合、NH₃のNET必要量は60 T/Dとなるがこの小容量のプラントとなると高温 (550℃)、高圧 (300 kg/cm²G) のREACTORとなるであろう。又、回転機は全てモーター駆動で考えねばならない。(蒸汽タービン駆動でなく。)
③ アンモニア工業は、化学工業の原点であり、その意味でネパールには意義大。

(6) 尿素プラント

- ① 水力の有効利用から水電解法アンモニアが生産されれば、それにセメント工場排ガス中のCO₂ガスを捕集し、その両者より尿素を生産出来れば、工業資源の少いネパール、そして農業国のネパールにとり、最も幸せのCASEとなる。肥料として中性であり、その含有のN₂分は46%と最も多い。
② プロセスとすれば、小容量プラントではあるが、省エネルギーの"GAS STRIPPING法"が望ましい。("SOLUTION RECYCLE法" でなく。)

ネパールの農産品の主体は米であることからCRYSTALLIZATION及びGRANULATIONは考えず、EVAPORATION及びPRILLINGで考えてよい。

(7) ガス HOLDER, 液貯槽及び製品倉庫

① 電力供給状況, CO₂ ガスの供給状況, そして製品尿素の出荷状況等のプラント操業の変動に対し設置の要がある。

② H₂ ガス
N₂ ガス } HOLDER
CO₂ ガス }
液体アンモニア } 貯槽
液体炭酸 }
尿素製品倉庫

(8) 公害防除設備

尿素が主体で考慮する設備となるが, 日本と同じきびしさで考えておく可き。(特にカトマンズ)

(9) ネパールに於けるプロセス設計 POLICY

次の点を留意したい。

① PLANT の設計能力と生産 LINE 数

基本: { CONSTANT 操業 (24 HR) × 1 生産 LINE
設計能力 100 T/D 尿素

電力料金が安価に設定されなければ水電解法 H₂ プラントは FEASIBLE とならない。

それ故に, { SEASONAL TARIFF } 等の特定安価契約を電力局/工業省で配慮す
{ TIME-OF-DAY TARIFF }

ることとなる場合を想定の上, その対応が可能である如く代案を準備する。

PLANT 設計能力 / (複数) 生産 LINES

② EASY OPERATION & EASY MAINTENANCE

100 T/D 尿素 (即ち 60 T/D アンモニア) とプラント能力が現在世界の標準に比し 1/10 であり, 必ずしも SCALE DOWN のみでは設計出来ない。(即ち, 現在公知の PROCESS とは必ずしもならない。) 但し, プラント能力の小さい時代の経験は皆持っていることであり, 保証された PROCESS 及び PLANT の提供に疑義はない。

ネパールに於ける化学工業の第一歩であれば { EASY OPERATION } が最重要。
{ EASY MAINTENANCE }

このためには多少効率が悪くとも, そして MODEL が古くともよしとする可き。

4. PLANT SITE の選定と留意点

(1) 前提

PLANT SITE の選定は次の点がPOINTとなる。

- { 1) 原材料の安定供給が受けられること
- { 2) 製品の市場に近いこと

尚、ネパールに於ける初めての化学プラントとなれば次の点加わる。

- { 3) MAN POWER の供給が容易
- { 4) 政府の行政上の配慮が得易い。

(2) 技術上の留意点

上記の条件を考えると次の如くなることが総意ではなかろうか。

- { 1 st PLANT SITE カトマンズ地区 (W/HIMAL CEMENT CO.)
- { 2 nd PLANT SITE ヘタウダ地区 (W/HETAUDA CEMENT CO.)

① 用地の広さ

増設の余地を持てるのか

② 電力供給 (高圧受電であろう) の安定度

停電の頻度と時間の VOLT, HZ の変動

③ CO₂ ガス供給の安定度

SHUT DOWN 及び BREAK DOWN の頻度と時間。

④ 地耐力と土質調査

河床は PILING が難しい。

⑤ 水位と地高 (SITE の)

WATER FLOODING

用水の PUMP HEAD

⑥ 地震係数 } 等の設計基準

風速力

⑦ 降雨と排水

⑧ SITE への機器の輸送

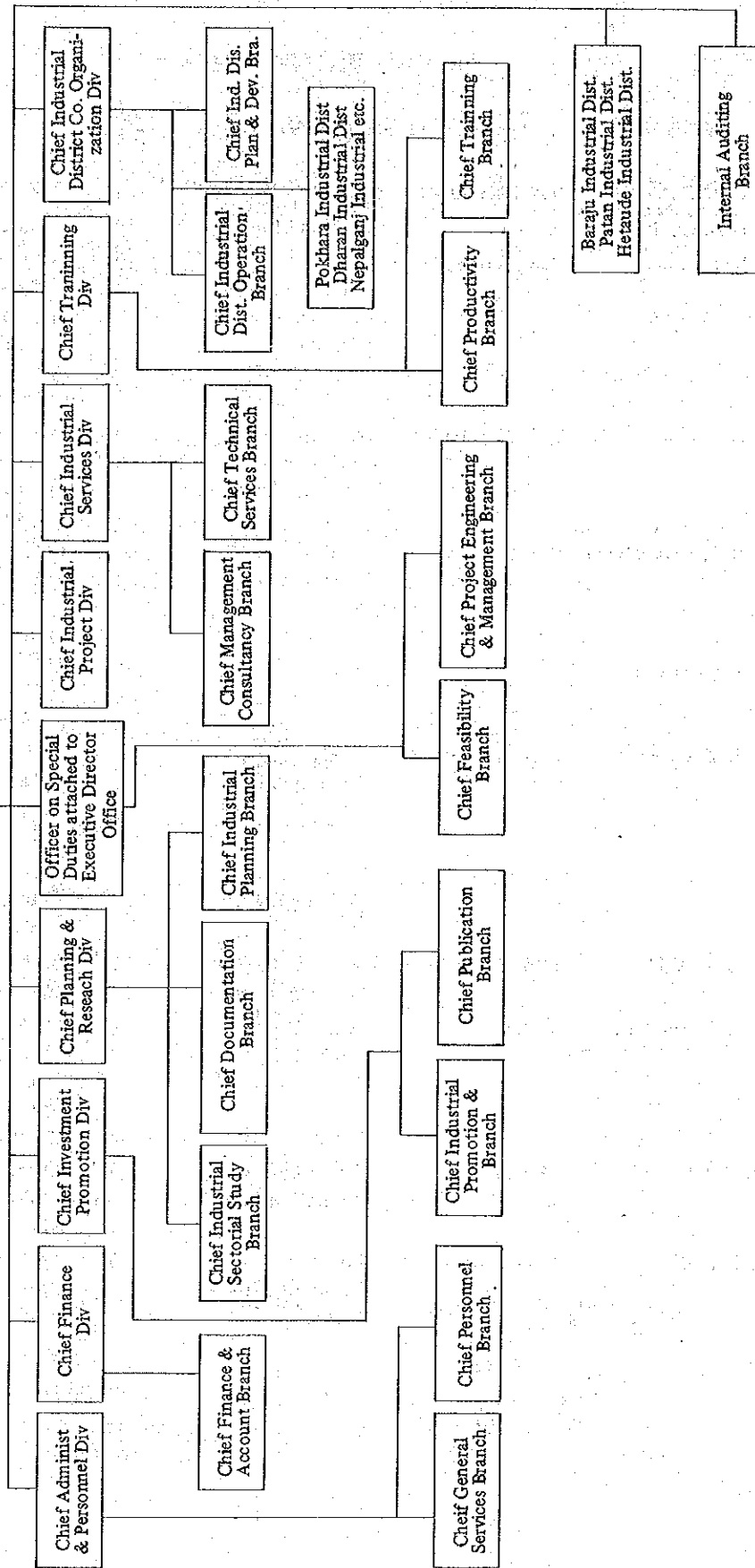
• BRIDGE の WEIGHT LIMIT。

• ROAD CURVE の LENGTH LIMIT。

Organization Chart of Industrial Services Centre (I.S.C. の組織図)

EXECUTIVE DIRECTOR

DEPUTY EXECUTIVE DIRECTOR



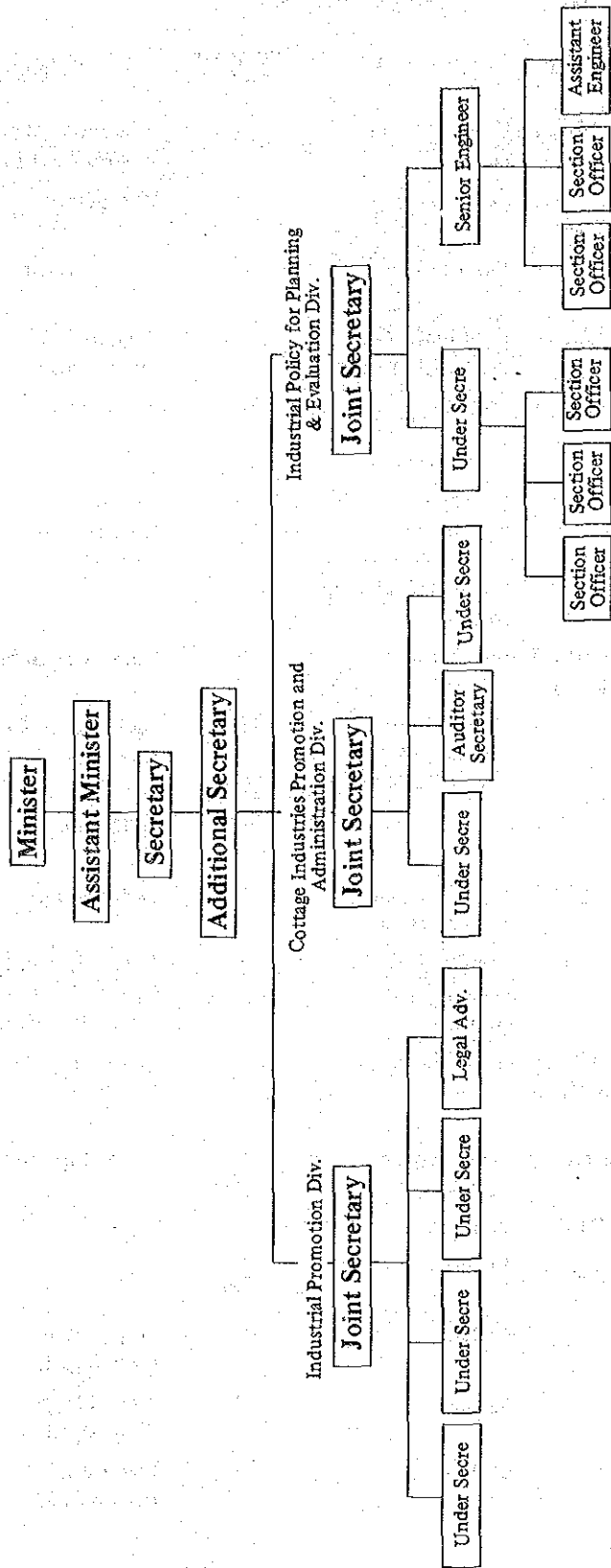
Brief Bio – Data of ISC Economists

S. No.	Name	Qualification	Present Post	Experience (yrs)	Training
1.	Mr. G.B. Shah	B.A. Economics	Executive Director	25	Management
2.	Mr. G.D. Panday	M. Com.	Division Chief	19	Industrial Projects
3.	Mr. K.P. Panday	M.A. Economics	Chief, Industrial District Coordination Division	19	1) The Small Industrial Consultancy 2) Industrial Services for Small Scale Enterprises 3) Entrepreneurship Development.
4.	Mr. D.B. Thapa	M.A. Economics	Manager, Small Industrial District, Bhaktapur.	7	1) Techniques of statistical Analysis 2) Small Business Consultancy.
5.	Mr. B.K. Manandhar	B.A. Economics	Chief, Training Branch	17	1) Project Analysis 2) Smaller Enterprises Development 3) Marketing Management 4) Planning and Management of Industrial Estate
6.	Mr. B.M. Gyawali	M.A. Economics	Chief, Promotion Branch	7	1) Regional Industrial Development 2) Project Study Preparation
7.	S.P. Shrestha	M.B.A.	Senior Officer, Training Branch		1) Industrial Management 2) Industrial Training Management
8.	Mr. D.R. Adhikary	M.A. Economics	Senior Officer, Planning Branch	5	Business Feasibility Study and Management Practice
9.	Mr. D.P. Adhikari	M.B.A.	Senior Officer Productivity Branch	4	1) Management Consultancy 2) Industrial Manpower Development Project 3) Overseas Training Officer Programme
10.	Mr. O.P. Subedi	M.Sc. B.L.	Senior Officer Promotion Branch	7	1) Fruit and Vegetable Processing 2) Management Consultancy
11.	Mr. H.P. Khanal	M.A. Economics	For Chief Feasibility Study Branch	7	1) Feasibility Study 2) Economic Policy and Planning

Brief Bio - Data of ISC Engineers

S. No.	Name	Qualification	Present Post	Experience (yrs)	Training
1.	Mr. Tej Kumar Sharma	Metallurgical Engg. (B.E.)	Chief, Training Division	24	- Production Mgmt. - Environment Engg.
2.	Keshav Prasad Sharma	Mech. Engg. M.S. (Ind. Engg)	Special Officer	20	- Management
3.	Mr. Bhavani Bhakta Joshi	Mech. Engg (B.E.)	Branch Chief	16	- Ind. & Systems Engg.
4.	Mr. Manohar Bahadur Shrestha	M.E. (Civil Engg)	For Chief, Industrial Projects Div.	15	- Appraisal of Ind. Projects - Management
5.	Mr. Madhav Pd. Pradhan	Chem. Engg (B.E.) Ind. Engg. & Mgmt. (M.E.)	For Chief, Industrial Extn. Service Div.	15	- Prod. Engg.
6.	Mr. Vijaya Raj Sharma	Mech. Engg (B.E.) Ind. Engg & Mgmt. (M.E.)	For Chief, Investment Promotion Div. and Research & Planning Div.	12	- Ind. Mgmt. & Consultancy - Services
7.	Mr. Dhan Karki	Mech. Engg. (B.E.) Ind. Engg (M.E.)	Branch Chief	17	- Mgmt. Consultancy
8.	Mr. Shiva Bahadur Karki	Mech. Engg (M.E.)	Chief, Mgmt. Consultancy Branch	15	- Ind. Engg & Mgmt. Low cost
9.	Mr. Ashok Raj Pandey	Mech. Engg (B.E.) MBA (Harvard Un.)	Branch Chief	10	- Automation Feasibility Study
10.	Mr. Mukunda Ram Bhandari	Mech. Engg. (B.E.)	For Chief, Sub-Sector Branch	8	- Packing Engg.
11.	Mr. Bishnu Sharma	Chem. Engg. (B.E.)	For Chief, Proj. Engg. & Mgmt. Branch	8	- Ind. & System Engg. Quality Control Production Mgmt.
12.	Mr. Ramesh Prasad Nepal	Mech. Engg (B.E.) Ind. Engg. & Mgmt. (M.E.)	Senior Engineer	8	- Production Mgmt. Ind. Extn.
13.	Mr. Pushpa Kumar Karki	Mech. Engg. (B.E.)	Senior Engineer	7	- Feasibility Study
14.	Rohit Man Markey	Civil Engg. (M.E.)	Engineer	4	-
15.	Mr. Ram Sharma Tiwari	Chem. Engg. (B.E.)	Engineer	2	-
16.	Laxmi Shankar Sainju	Civil Engg. (Diploma)	Officer	19	- Project Mgmt. Prod. Mgmt.
17.	Gopal Shanker Sainju	Civil Engg. (Diploma)	Officer	19	- Project Mgmt. Prod. Mgmt.
18.	Mr. Bishnu Bhakta Sharma	Electrical Eng. (Diploma)	Officer	19	- Electrical Distribution

Organization Chart of His Majesty's Government of Nepal, Ministry of Industry (नेपाली इन्डस्ट्री मन्त्रालयको संरचना)



- 1 Industrial Promotion Section
- 2 Government Industrial Corporation Section
- 3 Textile Industries Section
- 4 Law Section
- 5 Administration Section
- 6 Account Section
- 7 Cottage Industry Promotion Section
- 8 Policy for Planning and Evaluation Section
- 9 Technical Transfer & Man Power Development Section
- 10 Investigation and Policy Maker
- 11 Industrial Statistics
- 12 Policy for Planning & Progressive Evaluation
- 13 Project Classification and Joint Investment
- 14 Man Power Development and Scholarship
- 15 Technical Transfer

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Preliminary Survey Team on the Establishment
of Urea Fertilizer Plant:**

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25. Organization Chart of Ministry of Industry (Nepalese)
26. 1983 Electric Load Forecast for Period 1983 – 2001
27. Pre-Feasibility Study Report prepared by UNIDO – 1981

Japanese Preliminary Survey Team on the Establishment of Urea Fertilizer Plant in the Kingdom of Nepal.

Oct. 4, 1983

List of Persons Concerned

1. **Ministry of Industry (MOI)**
 - Mr. Ishwari Lal Shrestha — Secretary
 - Mr. Ajit Narayan Singh Thapa — Joint Secretary
 - Mr. Indu Shamsher Thapa — Senior Engineer (Under Secretary)
 - Mr. B.N. Chalise — Under Secretary
 - Mr. Sharada P. Pandit — Legal Officer (Under Secretary)
2. **Industrial Services Centre (ISC)**
 - Mr. G.B. Shah — Executive Director
 - Mr. M.B. Shrestha — Civil Engineer
 - Mr. H.R. Khanal — Economist
 - Mr. P.K. Karki — Feasibility Study Branch
 - Mr. Y.P. Acharya — Ditto
3. **Ministry of Finance (MOF)**
 - Mr. Heet Singh Shrestha — Additional Secretary
 - Mr. Sundar Man Shrestha — Section Officer
4. **Ministry of Agriculture (MOA)**
 - Mr. Rameshwar Bahadur Singh — Joint Secretary
5. **Ministry of Water Resources (MOWR)**
 - Mr. Madhu Sugal Dhakal — Secretary
6. **Electricity Department (MOWR)**
 - Mr. H.M. Shrestha — Chief Engineer
7. **National Planning Commission (NPC)**
 - Mr. Bed Bahadur Khadka — Co-member
 - Mr. Ram Prasad Shrestha — Under Secretary
8. **Agricultural Input Corporation (AIC)**
 - Mr. P.N. Rana — Chairman cum General Manager
 - Mr. Rawal — Chief of Fertilizer Section
9. **Himal Cement Co. Ltd.**
 - Mr. I.B. Shahi — General Manager
 - Mr. C.B. Rajbhandari — Senior Chief of Production
 - Mr. B.K. Kushle — Shift Engineer
10. **Hetauda Cement Industries Ltd.**
 - Mr. Rabindra N. Rimal — General Manager

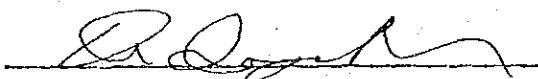
11. **Nepal Bureau of Standard (NBOS)**
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12. **Department of Mines & Geology (DOMG)**
 Mr. Mahendra N. Rana — Director General
 Mr. R.P. Bashyal — St. Geologist
 Mr. G.S. Thapa — St. Geologist
 Mr. P.P. Gorkhali — Research Officer
13. **United Nations Development Programme (UNDP)**
 Mr. Toshiyuki Niwa — Resident Representative
14. **Japanese Embassy**
 Mr. Kenichiro Nishizawa — Ambassador
 Mr. Takashi Arinobu — Counsellor
 Mr. Hideo Morikawa — Secretary
 Mr. Kazuyoshi Takayama — Staff
15. **JICA Kathmandu Office**
 Mr. Tatsuo Hosi — Resident Representative
 Mr. Hiroaki Nakagawa — Staff
16. **Nippon Koei Co. Ltd.**
 Mr. Masaru Koshiha — General Manager
 Mr. Takayasu Tsuyusaki — Administrator

添 付 資 料

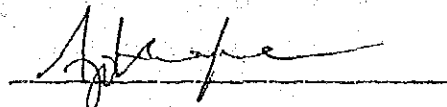
添付資料 - 1

SCOPE OF WORK
FOR
THE FEASIBILITY STUDY
ON
THE ESTABLISHMENT OF UREA FERTILIZER PLANT
IN
THE KINGDOM OF NEPAL
AGREED UPON BETWEEN
THE JAPAN INTERNATIONAL COOPERATION AGENCY
AND
THE MINISTRY OF INDUSTRY
HIS MAJESTY'S GOVERNMENT OF NEPAL

Kathmandu, October 4, 1983



Kenji IWAGUCHI
Leader of Japanese Survey Team



Ajit Narayan Singh Thapa
Joint Secretary
Ministry of Industry

I. Introduction

In response to the request of His Majesty's Government of Nepal (hereinafter referred to as "H.M.G.N."), the Government of Japan has decided to conduct a feasibility study on the establishment of urea fertilizer plant (hereinafter referred to as "the study") in accordance with the laws and regulations in force in Japan

The Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, will undertake the study, in close cooperation with the authorities of the Kingdom of Nepal

Ministry of Industry, H.M.G.N. (hereinafter referred to as "MOI") will be the executing agency and shall designate the Industrial Services Centre (ISC) as a counterpart agency to the Japanese study team (hereinafter referred to as "the Team") and MOI shall also act as coordinating body in relation with other governmental and non-governmental organizations concerned for the smooth implementation of the study

The Present Document sets forth the Scope of Work with regard to the study.

II. Objective of the Study

The objective of the Study is to examine the technical, financial and economic feasibility of the establishment of urea fertilizer plant (hereinafter referred to as "Project") in the Kingdom of Nepal and to prepare a feasibility study report keeping in view the ammonia production process using hydrogen by water electrolysis

III. Scope of the Study

In order to achieve the above objective, the study will cover the following items :

1. Review on the background of the Project

- 1) the present situation of and policy on agriculture in Nepal
- 2) the present situation of and policy on fertilizers in Nepal
 - (1) supply and demand of fertilizers
 - (2) trend of consumption of fertilizers
- 3) the present situation of and policy on industrialization
- 4) relation of the Project with the overall National Development Plan
- 5) the present situation and future plan of demand and supply of electric power
- 6) the present situation of and policy on manpower required for the Project such as chemical engineers, plant engineers and others
- 7) relevant laws and regulations

2. Study on the detailed urea fertilizer market in Nepal

- 1) present and past supply and consumption
- 2) present and past situation of import and its cost
- 3) trend and structure of price
- 4) potential demand and constraints in the application of fertilizers

- 5) projection of demand in the coming ten years
 - 6) marketing and distribution system
 - 7) cost and channel of transport and distribution from manufacturing site to major market area
3. Study on the raw materials for the urea fertilizer production
- 1) possibility of electric power supply
 - (1) present situation of electric power supply (capacity, tariff, stability, etc.)
 - (2) future demand and supply (construction projects, schedule, etc.)
 - 2) water
 - (1) quality and quantity of water
 - (2) water works necessary for the Project
 - 3) availability of Carbon Dioxide (CO₂)
 - (1) CO₂ from cement factory
 - (2) CO₂ from other sources
 - 4) materials for packing
 - 5) other materials
4. Study on the plant location and site
- 1) natural conditions of the site and its surrounding area focusing on meteorology, geology and topography
 - 2) utilities and infrastructure such as electricity, gas, water, transportation and communication
 - 3) regional development plan

- 4) selection of the plant site based on the results of the study on the availability of raw materials, utilities, infrastructure and other factors
 - 5) conditions of transportation of equipment and its installation
5. The basic plan and conceptual design of the urea fertilizer plant
- 1) comparison of production processes and determination of the most suitable process
 - 2) examination and determination of production scale
 - 3) fundamentals and major preconditions of conceptual design including list of major equipment
 - 4) process flow sheet
 - 5) layout of the plant and auxiliary facilities
 - 6) implementing program of the plant construction
 - 7) transport plan of equipment and materials for plant construction
 - 8) operation plan of the plant
 - 9) organization and manpower plan for the plant construction and operation including managerial aspects
 - 10) marketing and distribution system
6. Study on environmental protection

7. Financial analysis

1) capital requirements

(1) fixed capital (land, plant construction, auxiliary facilities and pre-operation cost, including training cost and consultancy fees, etc.)

(2) working capital

(3) investment schedule

2) procurement of capital

3) operation cost

4) production cost

5) projected balance sheet

6) projected flow sheet

7) financial internal rate of return

8) sensitivity analysis based on possible variations in

a) electricity tariff

b) investment cost

c) interest rate

d) inflation rate

e) sales price

8. Economic and social evaluation

9. Conclusion and recommendations

IV. Steps and Schedule of the Study

1. Steps

Step 1 : Preparatory office work in Japan

Step 2 : Field work in Nepal

Step 3 : Home office work in Japan

Step 4 : Presentation of and Discussion on the Draft
Final Report

2. Schedule

As shown in Annex

V. Reports

JICA will prepare and submit the following reports to
H.M.G.N.

1. Progress Reports written in English at the end of the
Step 2 in the IV : 10 copies
2. Draft Final Report and its summary written in English
within five (5) months after commencement of the
Step 3 : 15 copies
3. Final report and its summary written in English within
two (2) months after the receipt of comments on the
Draft Final Report by MOI : 30 copies

VI. Undertaking of H.M.G.N.

H.M.G.N. shall accord privileges, immunities and other
benefits to the Team in accordance with the laws on Nepal
and, through the authorities concerned, take following
necessary measures to facilitate the smooth implementation
of the Study :

1. Provide adequate number of full-time counterparts
2. Arrange the Team's visits to relevant authorities
concerned and ensure that the Team has access to all
relevant information required for the execution of
the study

3. Provide the Team with office accomodation with sufficient office supplies and equipment
4. Provide relevant information and data available to the Team
5. Exempt the Team from taxes, duties and charges in the Kingdom of Nepal on materials, equipment and personal effects brought into the Kingdom of Nepal for the purpose of the Study
6. Exempt the Team members from income taxes and charges of any kind imposed on or in connection with the staying expenses remitted from abroad
7. Ensure the security of the Team members during their stay in the Kingdom of Nepal
8. Bear claims, if any arises, against the Team members resulting from, occuring in the course of, or otherwise connected with the discharge of their duties in the implementation of the Study, except when such claims arise from the gross negligence or wilful misconduct on the part of the Team members

VII. Undertaking of the Government of Japan

For the implementation of the Study, the Government of Japan will, through JICA, take following measures :

1. To dispatch, at its own expense, study teams to Nepal
2. To pursue technology transfer to the Nepalese counterpart personnel in the course of the Study

VIII. Consultation

JICA and MOI will consult with each other in respect of any matter that may arise in the interpretation or implementation of the present arrangement.

Annex

Tentative Schedule of the Study

Year & Month	1983									1984									1985	
	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.		
Preparatory Office Work (Step 1)	=====	=====	=====	=====																
Field Work (Step 2)					=====															
Home Office Work (Step 3)									=====	=====	=====									
Presentation of Draft Final Report (Step 4)																				
Submission of Final Report																		△		

===== in Japan

===== in Nepal

INDUSTRIAL POLICY

&

ACTS

OF

HIS MAJESTY'S GOVERNMENT OF NEPAL

INDUSTRIAL POLICY

OF

His Majesty's Government of Nepal

2037 (1981)

1982

I - INTRODUCTION

I.01 Industrialisation is an integral part of national plans to accelerate the rate of economic development in Nepal. It is imperative, therefore, to create a situation in which industrial investment is encouraged and in which the private sector can be persuaded to play an important role. In this context the requirement is for attractive and uncomplicated incentive features and tax/duty concessions which will make the investment climate congenial. To this end a New Industrial Policy has been formulated and put into effect.

I.02 Special features of this policy are (a) Clearer definition and more logical classification of industries (b) Simplification and streamlining of the licensing procedures (c) The introduction of financial incentives for productivity-oriented ventures (d) Special provisions to attract foreign investments (e) Identification of institutions and agencies which are responsible for stimulating entrepreneurship, for providing financial assistance and for developing management expertise and technology.

I.03 Amendments are incorporated in the Act and Regulations to give effect to implementation of the policies and objectives.

I.04 It is believed that the changes mentioned will help promote industrialisation and thereby have a tangible impact on the economy and national income and will also create employment opportunities in the country.

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II - OUTLINES OF THE POLICY

Objectives

- OP.01 To encourage private sector industrial investment as an element in the growth of gross national product.
- OP.02 To open up gainful employment opportunities in the industrial sector for a labour force excessively dependent on agriculture.
- OP.03 To attain self-reliance in the production and supply of essential consumer goods and most construction materials.
- OP.04 To maintain regional economic balance.
- OP.05 To increase the output of and attain quality improvements in currently manufactured articles.
- OP.06 To improve the balance-of-payment position through increased exports and more import substitution.
- OP.07 To enhance entrepreneurial, managerial and technical capabilities as a means of assisting the development of industrial organizations.
- OP.08 To develop indigenous technologies and to import such appropriate technologies as will contribute to industrial productivity.

Policies

- P.01 Industrial investment will be made more attractive by the effective mobilisation of local capital, manpower and material resources.
- P.02 All industries, except those which are defence oriented, will be open for private sector ownership and investment.

P.03 Existing industrial enterprises will be given incentives to improve their operational efficiency, to consolidate their position and to embark upon expansion programmes.

P.04 The private sector will be given the first opportunity of promoting the development of industry through investment. Only if the private sector does not respond to meet the investment programme, will HMG / Nepal and agencies of government intervene by way of investment. Even under these circumstances, HMG will pursue a policy of disinvestment in favour of the private sector as and when the climate for this is appropriate.

P.05 As a principle, HMG/N will not establish industrial enterprises under its ownership except when large scale investment is involved and private sector investment is inadequate. HMG/N will, however, take the initiative itself by financing cottage, small and medium scale pilot projects in order to stimulate private sector investment.

P.06 Foreign investment will be encouraged in order to promote capital inflow, generate technical expertise and improve productivity. It may take the form of totally foreign owned enterprise or joint Nepalese-foreign investment. HMG/N will establish the priority areas for such foreign investment.

P.07 Relevant technology will be imported taking account of the socio-economic situation of the country and the rate at which new methods and concepts can be absorbed. When appropriate, new techniques and processes will be identified and developed, and will not be limited to improvements on the traditional arts and crafts.

- P.08 Administrative procedures concerned with the establishment of industrial enterprises will be simplified and made more efficient.
- P.09 Priority will be accorded to the promotion and development of labour-intensive cottage and small industries with a view to expanding employment opportunities, to meeting the domestic demand of their goods and services and increasing export earnings through the sale of their products and services. Domestically manufactured products will be given priority over goods in relation to governmental procurement.
- P.10 Tax and other incentives will be clearly defined and specified to avoid any administrative ambiguities.
- P.11 The type and scale of incentives to industrial enterprises will be based on the type of industry, location and the extent to which it makes use of domestic resources.
- P.12 Steps will be taken to encourage full capacity operation of existing industrial enterprises and where appropriate, their expansion and modernization. In the case of sick enterprises, assistance for rehabilitation will be provided if this can be justified financially and economically.
- P.13 Incentives related to the expansion, modernisation and diversification of industrial enterprises will be provided in the context of national economic benefits to be derived.
- P.14 Ownership of and investment in cottage and small industries will be reserved for Nepalese nationals only.
- P.15 Foreign investors will be permitted to have majority shareholding in medium scale enterprises. In the case of

large scale enterprises, only, the foreign investment may amount to one hundred percent.

- P.16 Apprentice and skill development training facilities will be expanded, with a view to attaining self-sufficiency in skilled manpower for the industrial sector.
- P.17 HMG and approved agencies will organize training courses designed to improve the supply of skilled manpower to industrial enterprises.
- P.18 The principle of engaging Nepalese nationals will be followed when employing unskilled, semiskilled and skilled labour and most other categories of employee. If circumstances demand, foreigners may be employed for a period of seven years, at the most, with the approval of HMG. The Nepalese nationals should be given appropriate training so that they can replace the foreigners within this period. If, however, specialists are not readily available within Nepal, an enterprise may continue to employ the foreigners for an additional period of five years.
- P.19 HMG will aim to maintain an atmosphere of industrial peace and amity. Labour welfare programmes will be implemented through mutual agreement between management and labour.
- P.20 Enterprises will continue to enjoy such incentives and facilities for the period specified as are provided in the current Act without let or hindrance, not-with-stand- ing the amendments incorporated in the present Act.
- P.21 Institutional arrangements will be made to encourage entrepreneurship and to develop innovative management and technical skills. Effective steps will also be taken to

train Nepalese personnel in these subjects through local or overseas training courses.

P.22 New industrial estates will be established and the existing ones will be developed and extended.

P.23 While setting up new industrial enterprises and/or expanding, modernising and diversifying the existing ones, effective ways and means will be adopted to preventing or minimising environmental pollution.

P.24 Industrial ventures complementary or ancillary to existing enterprises will be encouraged.

P.25 Financial Institutions and Commercial Banks will be activated to provide adequate long and medium term credit facilities to industrial enterprises and also loans to meet the short term working capital requirements.

P.26 Industrial enterprises will not be nationalised except in special circumstance, in which case, the owners will receive a just compensation.

P.27 Steps will be taken to establish an Export. Promotion Area with a view to the effective mobilisation of resources needed to develop and promote specified export industries.

P.28 The mechanism relating to official guarantees for foreign loans will be institutionalised and streamlined.

P.29 Special facilities and incentives will be accorded to industrial enterprises established in the remote and underdeveloped areas designated as such by HMG from time to time, in order to achieve a balanced regional distribution of industry.

P.30 Import duty and sales tax paid against the importation of raw materials, auxiliary materials and chemicals will be reimbursed to the HMG-recognised export industries. Such reimbursement will be in proportion to the value of imported materials used in the manufacture of such exports.

P.31 HMG will frame and enforce rules and regulations pertaining to patents, trade marks and designs.

P.32 Special facilities will be given for the promotion, consolidation and rehabilitation of agrobased enterprises such as animal husbandry, beekeeping, pisciculture, poultry etc, with a view to improving the living standards of the rural population, and providing them with employment opportunities.

P.33 Special incentives and due recognition will be accorded to those industrial enterprises which develop techniques to increase productivity exceptionally, expand production, modernise manufacturing processes or achieve noteworthy performances in the export of their manufactured goods.

P.34 Effective steps will be taken to intensify industrialisation in the underdeveloped areas and thereby complement the various integrated rural development programmes presently underway in the country.

P.35 Special ~~steps~~ provisions for the promotion and development of cottage industries:

- (1) Special programmes to promote cottage industries will be launched with a view to employing hitherto underutilised manpower and to using locally avail-

able skills, and raw materials, and other physical resources.

(2) Special attention shall be focussed on (a) developing manufacturing techniques so as to achieve higher productivity, (b) enhancing appropriate skills in accordance with the demand of domestic and export markets, (c) conducting research on the quality of products, and (d) disseminating information on such products.

(3) Labour intensive cottage industries will be promoted by the effective mobilisation of local skill, capital and material resources so that their products can satisfy the widespread domestic market, and special programmes will be launched to expand export trade.

(4) Institutional arrangements will be made to provide, on an integrated basis, facilities such as finance, technical assistance, extension and training services raw materials supplies and tools, and market research facilities in respect of cottage industry products.

P.36 Special provisions for the promotion and development of handicrafts:

(1) Special arrangements will be made to (a) modernise and expand those industries which specialise in producing goods reflecting Nepalese traditional art and culture and (d) raise the quality and standard of such goods.

(2) Handicraft industries will be developed as an important component of export trade.

(3) Encouragement will be given to produce light, high quality and attractive handicraft products to complement the tourism industry.

(4) Institutional arrangements will be made to facilitate the supply of raw materials to such industries, and to promote the sale of their products in the international market.

To encourage the development of cottage industries, particularly those producing handicrafts, programmes will be initiated to facilitate the sale of their products to institutional outlets at fair prices.

To achieve these objectives special arrangements will be made to produce and propagate new products features and to identify export markets. Awards will be given annually to those artists who have shown special talent or who have contributed substantially to the development of the handicraft industry.

P.37 Special encouragement will be given to those industries which are complementary to the growth of tourism.

P.38 Investment in industries associated with the extraction of mineral resources will be made especially attractive.

P.39 Priority will be given, by way of incentives, to industrial enterprises which contribute to the development of water resources in the country.

P.40 Administrative measures will be taken so that the new and existing industrial enterprises can operate in an effective and coordinated way.

III - CLASSIFICATION OF INDUSTRY

Industry denotes the following enterprises whether promoted by an individual, firm, company, cooperative or a corporation :

DI.01 *Manufacturing Industry* : One which uses/ re-uses/processes raw materials, semi-processed materials, and by-products or waste materials.

(a) *Essential Consumer Goods Industry* : One which engages in the production of food stuffs (viz. rice, pulses, flour, oil, sugar, including open pan sugar, milk, ghee, dairy products, loaf, biscuits, tea) and, textiles, footwear, soap, matches, paper, pens and pencils, ink, stationery goods as well as cotton ginning and cotton spinning, and pharmaceuticals.

(b) *Any Other Manufacturing Industry*.

DI.02 *Energy-based Industry* : One which engages in harnessing energy from water resources, solar source, coal, natural oil and gas, biogas and other sources.

DI.03 *Agro-based Special Industry* : Comprises animal husbandry, poultry, pisciculture, beekeeping, sericulture, dairy farm and others designated by HMG under this category.

DI.04 *Mining and Mineral Processing Industry* :

DI.05 *Tourism Industry* : Comprises tourist cottages, tourist lodges, motels, hotels, restaurants and bars of tourist

standard, trekking, travel agencies, skeing, rafting, cable-car complexes and other special type of recreational enterprises directly supporting and assisting the promotion of Tourism.

DI.06 *Service Industry* : Comprises such enterprises :

(a) Public transportation (trucking, bus services, ropeways, tram-ways, trolley buses, water transportation.)

(b) Construction enterprises (civil, mechanical, electrical and plumbing workshops equipped with machinery and equipment, drilling and boring operations to extract underground water etc.).

(c) Cold storage, large warehouses, rental apartments.

(d) Machinshops, workshops and repair shops.

(e) Printing presses.

(f) Industrial consultancy services.

(g) Hospitals, nursing homes and x-ray clinics.

(h) Packing, boiling and ginning enterprises.

(i) Photography.

(j) Other enterprises designated as service industry by HMG,

DI.07 *Recreational Industry* ;

(a) Cultural theatres.

(b) Motion picture production enterprises.

(c) Circuses.

DI.08 *Assembly Industry* : One which produces enduse goods by putting together and assembling various parts and components.

DI.09 HMG will designate the classification to an enterprise if it does not fall under any one of the above classifications.

IV - DEFINITION OF INDUSTRIES

CL.01 *Cottage Industry* : Denotes an industrial enterprise in which investment in machinery, equipment and tools does not exceed Rs. 200,000 in value and fixed assets do not exceed Rs. 500,000 in case of rural and Rs. 800,000 in case of urban areas.

CL.02 *Small Industry* : Denotes an industrial enterprise in which investment in machinery, equipment and tools exceeds Rs. 200,000 in value and in which fixed assets do not exceed Rs. 2 million.

CL.03 *Medium Industry* : Denotes an industrial enterprise in which fixed assets investment exceeds Rs. 2 million, but is below Rs. 10 million.

CL.04 *Large Industry* : Denotes an industrial enterprise in which investment in fixed assets exceeds Rs. 10 million.

NOTE (a) Fixed assets comprise the land owned by the industrial enterprise, land development costs (filling, boundary walls), onsite physical infrastructures (drainage, sewerage, internal roads), buildings, residential quarters, machinery, equipment and tools, transportation vehicles essential for the operation of the enterprise, electrification, furniture & fixtures, office equipment, water & tele-

phone distribution systems, pre-investment and preoperational expenses capitalised, engineering consultancy and supervision and interest costs, during construction.

(b) If used machinery and equipment are utilized, their valuation will be based on current market prices.

V - INDUSTRIAL LICENCING

IL.01 (a) A licence is not required for setting up a cottage industrial enterprises, unless it be of the type specified by HMG from time to time as requiring a licence.

(b) For setting up small, medium or large industrial enterprises, the licence should be obtained from the Department of Industry, HMG.

IL.02 Licences to set up an industrial enterprise will be issued on the basis of market, financial, economic and technical viability.

IL.03 Licences will be issued as follows:

(a) By Department of cottage and Village Industry for the exceptional cases mentioned in IL.01 (a.)

(b) By the Department of Industry:

(i) for small scale enterprises, acting alone.

(ii) for medium and large enterprises, based on the resolution of the Industrial Promotion Board.

IL.04 Licence applications involving joint investments, foreign investments and HMG guarantees applicable to long term foreign loans will be reviewed by the Industrial Promotion Board.

IL.05 Industrial enterprises will not be permitted to locate within 8 kilometers of the international borders. The following enterprises, however, will not be subject to this restriction:

- (a) Cottage Industry.
- (b) Industrial Enterprises established in the Industrial Districts owned by HMG or established with HMG approval.
- (c) Tourism Industry.
- (d) Service Industry.
- (e) Recreational Industry.

IL.06 The functions of the Industrial Promotion Board to be constituted by HMG will be as follows :

- (a) The Board will adjudicate and decide (a) on the granting of licences in the light of current rules and regulations and in accordance with policies, and (b) on providing effectively the incentives and facilities laid down in the relevant Acts.
- (b) The Board will have authority to appoint a sub-committee to represent appropriate agencies concerned with entrepreneurship and industrial development.
- (c) The Board may, from time to time, issue special directives with regard to the licensing of small industrial enterprises and to make effective the relevant facilities and incentives.

(d) The Board will function as a coordinating link between different agencies involved in industrial administration and development. The responsibility for initiating such coordination will be that of the Board Members concerned.

(e) The Board will review the Industrial Policy every five years.

IL.07 The following guidelines have been established for decisions relating to the issue of licences to industrial enterprises.

- (a) On receipt of an application with a feasibility report attached, the concerned Department will after due scrutiny, take action to ensure that a licence can be issued to a cottage or small industrial enterprises within 30 days, to a medium industrial enterprises within 60 days, and to a large industrial enterprises within 90 days.
- (b) Licenses will be issued expeditiously to the applicants wishing to establish, expand, diversify or modernize enterprises according to the priorities and targets set in the National Economic Plan.
- (c) The granting of licences will be governed by the need for maintaining regional economic balance.
- (d) The granting of licences will also take account of the need for a climate of healthy competition consistent with the interests of consumers and producers.
- (e) Cottage industrial enterprises will be protected against undue competition with small, medium and large industries.

(f) Existing industrial enterprises seeking a licence will need permission of the Industrial Promotion Board, only if, modernisation, expansion or diversification results in transfer to a different industrial classification. Except under this situation, the Department of Industry will be authorised to grant permission without reference to the Industrial Promotion Board.

(g) The licence will specify the facilities and incentives as well as the terms and conditions applicable to the grant of the licence.

(h) The concerned member of the Board will be responsible for making available the facilities and incentives laid down by the Industrial Enterprises Act.

(i) The licence will lay down the time period by which the industrial enterprises should be established and should start operations.

(j) If applications for a licence are more numerous than is economically justified, the principle of comparative evaluation will be adopted.

(k) If a sponsor who fails to establish an industrial enterprise within the time specified, applies for an extension of the time limit, the extension will be granted if the delay was due to natural or other causes beyond the control of the sponsor.

II - REGISTRATION OF INDUSTRIAL ENTERPRISES

R.01 It is compulsory that industrial enterprises should be registered prior to operation. Registration will be effected as follows :

(a) Cottage industrial enterprises must register with the Department of Cottage and Village Industry or with the District Offices of the Department or, if such District Office does not exist, with the Office of the Chief District Officer.

(b) All other enterprises falling under the definition of industries must register with the Department of Industry or with the Regional Offices of the Department.

(c) Small industrial enterprises are to be registered as limited liability companies or partnership, whereas medium and large enterprises should preferably be registered as a limited liability company.

(d) Industrial enterprises registered as public limited companies will be given preference in the granting of licences and for the provision of institutional facilities.

be given to enterprises which produce essential consumers goods.

(d) If an enterprise exports more than 25% of its total annual production, 15% rebate will be granted on the income tax levied for that year. Similarly 25% rebate will be applicable if any enterprise exports more than 50% of its total production in one year.

(e) Energy-based and mining and mineral processing enterprises will be entitled to six years tax holiday. Such industrial enterprises having more than 25% value added in each year will enjoy an additional six years tax holiday.

(f) Five and seven years tax holiday will be granted to new tourism enterprises, depending on their locations either in Tourism Areas or elsewhere.

[g] Service enterprises will not generally be granted tax exemption, but the following will be entitled to three year's tax holiday :

- workshops producing spare parts, components, tools or end use articles with the help of automatic or semi-automatic machinery (lathe, shaping and milling machinery)
- large warehouses
- cold storage
- hospitals, x-ray clinics
- large rental apartments
- printing presses
- trolley-bus and water transport services

VII - FACILITIES AND INCENTIVES

FI.01 Income Tax Concessions.

(a) Cottage industrial enterprises classified under manufacturing, except those declared by HMG, will be granted one hundred percent tax exemption for a period of six years.

(b) Manufacturing industrial enterprises, small, medium or large, will be granted income tax exemption as follows :

1. One hundred percent exemption for 5 years if the value added is between 20% and 50%.
2. An additional one year's exemption for every 10% increase in the value added above 50%.

Value added ; is defined as the ratio of net domestic annual operating costs and expenses (left after deducting all foreign costs such as imported raw materials, auxiliary raw materials, chemicals, expatriates, salary, wages, fees, remuneration, consultancy fee, royalty, depreciation of the imported assets) to the total annual operating costs and expenses.

(c) An additional 2 year's income tax exemption will

- (h) Industrial enterprises established in the Export Promotion Area will be granted an initial ten year's tax holiday followed by 50% rebate on income tax for the next five years.
- (i) Agro-based special industrial enterprises will be exempted from income tax for a period of 10 years.
- (j) Enterprises located in the areas designated as under-developed shall be entitled to 3 years tax holiday in addition to those enjoyed by similar enterprises established elsewhere.
- (k) If an enterprise expands its installed capacity by more than 50%, an investment allowance to an extent of 15% of the new investment in the fixed assets will be granted and can be claimed within a maximum period of 7 years.
- (l) Expenses incurred on training (recognised by the Department of Labour, HMG) with a view to providing employment for and upgrading the skills of Nepalese workers will be regarded as an item of operating expense, and such an expense will rank as a tax credit. The tax credit allowed for this purpose will be subject to a maximum of 1% of the total annual sales revenue.
- (m) The start-up date of production of providing service will be used for the purpose of computing the period of income tax exemption.
- Fl.02 Customs facilities**
- [a] Import duty at the rate of 1% only will be levied on (a) machinery, equipment and tools to be used

directly in the construction and operation of an enterprise (b) mining and related conveying equipment and (c) spare parts. The entitlement of an enterprise to total exemption or a rate below 1% is not affected by this clause.

- (b) Import duty of 1% only will be levied on raw materials, auxiliary raw materials and chemicals to be used in the production, mixing, blending and processing. But if the duty applicable to such materials is below 1% or the enterprise is totally exempted, it will retain the rights previously granted by HMG.

Not-with-standing anything mentioned in the sub-clause (b) above, the raw materials, auxiliary raw materials and chemicals will be subject to duties currently in force if the enterprises which import them fall under the schedule designated by HMG.

- [c] If the raw materials, auxiliary raw materials and chemicals, machinery, parts or components of suitable quality are readily available within the country, HMG will impose a minimum of 15% import duty on these materials or may even impose restriction on their imports.

- [d] Imports for industrial use by HMG, semigovernment agencies, cooperatives or by the designated public limited companies will be subject to custom duties as specified in (a), (b) and (c) above. The

appropriate agency of HMG will monitor the quantity of such imports and their use.

[e] Assembly enterprises which are established outside the Export Promotion Area and whose products have more than 20% value added, will pay 25% less than the rate of duty normally applicable on the parts and components imported, provided that the imports are for their own manufacturing operations

[f] Enterprises established in the Export Promotion Area will be liable for only 1% import duty (a) on the machinery, equipment, tools, spare parts and components to be used directly in construction and operation (b) on raw materials, auxiliary raw materials, and chemicals to be used directly in the production, processing, mixing and blending operations.

[g] Products manufactured in Nepal except those designated by HMG will not be subject to any export duty.

(h) If manufacturers who export their domestically manufactured products have previously paid more than 1% import duty on raw materials, auxiliary raw materials and chemicals, such duty paid in excess of 1% on the quantity of these materials used in the manufacture of the goods exported will be refunded.

(i) In relation to the tourism enterprise, customs duty will be levied at 1% only on imported items used

directly, except those notified from time to time by HMG in its Gazette.

FI.03 *Excise Duty Concessions*

(a) Cottage industrial enterprises will be exempt from excise duty for 5 years from the date of operation.

(b) Small, medium and large industrial enterprises will be exempt from excise duty for 3 years from the date of operation.

(c) Industrial enterprises established in the Underdeveloped Area will be entitled to 5 years exemption in addition to that applicable for similar enterprises located elsewhere.

(d) Domestically manufactured goods supplied to the enterprises established in the Export Promotion Area or exported will be exempted from excise duty.

(e) Excise duty will be waived totally on products manufactured in the Export Promotion Area.

(f) Industrial enterprises will be exempted from paying excise duty on raw materials, auxiliary raw materials or chemicals to the extent used in the manufacture of products subject to excise duty.

FI.04 *Sales Tax Concessions*

(a) Sales tax will not be levied on the products of cottage industry.

(b) Sales tax will not be levied on imports of (a) machinery, equipment and tools to be used directly in the construction and operation of an enterprise, (b) mining and related conveying equipment,

(c) spare parts, (d) raw materials, auxiliary raw materials and chemicals to be used in the production, mixing, blending and processing operations of an enterprise.

(c) Where sales tax is already paid on the raw materials, auxiliary raw materials and semi-processed materials purchased, manufacturers using such materials will be exempt from sales tax on the proportion of the taxed materials used in manufacturing

(d) Domestic products exported or supplied to the enterprises within the Export Promotion Area will have sales tax exemption to the extent of such export or supply.

(e) Sales tax exemption will not be granted on the products of cottage industrial enterprises and on such imports as may be designated by HMG by a notification in the Nepal Gazette.

FI.05 Concessions on Electricity Charges

(a) Royalties will not be charged on power generated by industrial enterprises for their own use.

(b) Royalties will be imposed on the basis of actual public sale of electric power by generating industrial enterprise.

FI.06 Concessions on Interest Rates: Industrial enterprises established in the Underdeveloped Areas shall pay interest to the banks at a rate 2 percent lower than others of similar status located elsewhere.

FI.07 Enterprises providing designated employment opportunities to the handicapped will be granted additional designated facilities.

FI.08 Convertible Foreign Exchange Facility:

Subject to the prior approval of HMG, convertible foreign exchange shall be provided to industrial enterprises on the basis of economic merit, for the following:

(a) The import of machinery, equipment and tools, spare parts and components, raw materials, auxiliary raw materials and chemicals which are used in the industrial enterprise.

(b) Technical consultancy, technical assistance, service charges, management fees, patent fees, investment promotion, market studies, sales promotion etc.

FI.09 Protection: HMG may provide protection to industrial enterprises for a definite period, by means of quantitative restrictions on imports or by higher import tariffs if such a policy is justified on economic grounds, financial conditions, or a time requirement to improve quality and price competitiveness.

VIII - PROVISIONS RELATING TO FOREIGN INVESTMENT

- FR.01 Foreign investment in industrial enterprises will be welcomed on the grounds of obtaining access to desirable technology, import substitution or expansion of export markets, higher management standards and an increase in employment opportunities.
- FR.02 Foreign investment will be limited to medium and large industrial enterprises. The investory may be a government, firm, individual, company or an international institution.
- FR.03 An industrial enterprises financed by foreign investment must be incorporated as a limited liability company in Nepal. Foreign investment is allowed upto majority holding in the medium and one hundred percent in the large industrial enterprises.
- FR.04 If a foreign investor makes an equity investment in a Nepalese industrial enterprises, in foreign currency, one hundred percent of the dividend may be remitted in that foreign currency, whether the enterprises is jointly or severally owned.
- FR.05 If a foreign investor invests in shares in terms of foreign currency, such shares may be sold only after an enterprises has commenced operation. Repatriation

tion of capital will be at the rate of 20% of the sales proceeds of the shares each year upto the limit of the total investment made in that foreign currency.

If foreign loan has been provided to a Nepalese company, remittance, in that foreign currency, of the principal installments and interest will be allowed.

FR.06 If a foreign investor has invested in a Nepalese public limited company and has sold shares through the Nepalese Security Marketing Centre, the sales proceeds may be remitted in that foreign currency at the maximum annual rate of 25% of the original total investment made in foreign currency.

FR.07 Foreign personnel who have been engaged, with the prior approval of HMG and who belong to countries where convertible currency is freely exchanged, can remit, in convertible currency, upto 75% of earnings generated by way of salary, allowances, remuneration etc.

FR.08 Industrial enterprises with foreign equity participation will not be nationalised except in special circumstances, in which case, just compensation will be paid to investors.

FR.09 If an industrial enterprises having foreign investment, goes into liquidation, a foreign investor can repatriate his share of proceeds of sale of assets in that foreign currency under the Nepal Company Act. No taxes will be levied on such amounts.

FR.10 HMG or its designated agency will stand guarantee on long-term loans under prescribed terms and conditions.

FR.11 Provision will be made through institutionalised procedures to facilitate a simple, smooth and integrated approach to foreign investment, joint ventures and arrangements for the guarantee of long-term loans. The Department of Industry will be the focal point and will be responsible as such for liaison in all these matters. Proposals for foreign investment, foreign loan and foreign technology transfer, applicable to an industrial enterprises, should have prior approval of HMG.

MF.04 Enterprises utilizing used machinery and equipment will be entitled to establish their costs at the prevailing market prices.

MF.05 If a Nepalese industrial enterprise competes successfully in an international bidding process and sells its products within the country, such a sale will be treated as exported and will enjoy facilities and concessions accordingly.

IX - MISCELLANEOUS FACILITIES

MF.01 Industrial enterprises are required to depreciate fixed assets on either straight line or on an accelerated basis.

MF.02 For the purpose of depreciation, the useful life of fixed assets has been determined as follows :

- | | |
|--|------------|
| (a) Building, drainage, sewerage, water distribution systems, etc. | - 20 years |
| (b) Machinery, equipment and tools. | - 10 years |
| (c) Transport vehicles, furniture and fixtures, office equipment. | - 5 years |
| (d) Other assets. | - 10 years |

MF.03 Pre-investment and pre-operation expenses may be amortized over a period of 10 years from the date of operations of an enterprise.

X - INSTITUTIONAL ARRANGEMENTS CONCERNING INDUSTRIAL POLICY

IA.01 The Industrial Promotion Board constituted as described below will be responsible for the coordination of industrial development policy, the effective implementation of this policy and the expeditious solution of problems which may emerge in the course of industrialisation.

Industrial Promotion Board

The Board will adjudicate and pass resolutions on applications for licences of large and medium industrial enterprises giving due regard to the national economic viewpoints. The structure of the Board will be as follows:

1. Hon'ble Minister for Industry & Commerce Chairman

2. Hon'ble Member, National Planning Commission (Industry) Member
3. Governor, Nepal Rastra Bank "
4. Secretary, Ministry of Industry & Commerce "
5. Secretary, Ministry of Finance "
6. Director General, Department of Industry Member-cum-Secretary
7. Specialists (as required) Invitees

The Board will meet at least 12 times a year. The Department of Industry will function as the secretariat of the Board.

IA.02 A separate unit consisting of designated officers from appropriate ministries of HMG will be constituted to work within the Ministry of Industry and Commerce. The functions of this unit will be (a) to design procedures to give effect to provision of the services, facilities and concessions applicable to industrial enterprises and (b) to facilitate smooth working of all aspects of industrial development policies, identify problems which emerge, and propose ways of overcoming them.

IA.01 *Industrial Promotion and Information Services:* The Industrial Services Centre will identify, develop and promote projects and will provide feasibility studies and consultancy services in management, marketing, finance, engineering, and training. This Centre will play an active role in planning for and preparing feasible projects, providing industry profiles, and

preparing pre-investment proposals, which will be made available to entrepreneurs.

Necessary measures will be taken to promote and develop industrial districts and to ensure their effective administration.

IA.04 *Financial Services.*

(a) *Nepal Industrial Development Corporation (NIDC)* : NIDC will provide longterm loans for the acquisition of assets, will participate in equity investment and make available to private sector industrial enterprises credit to finance working capital requirements.

On receipt of applications for loans and equity participation, all relevant information will be collected and appraised. Final decisions will be made and notified to the applicant within 30 days in the case of small industry, 60 days in case of medium industry and 120 days in case of large industry. If the applications can not be appraised because of lack of necessary information, applicants will be requested, in writing, to furnish the missing information within 30 days. If, on appraisal, a project proves to be unviable from technological, economic standpoints, the applicants shall be informed of the rejection, with reasons, as far as this is practicable.

NIDC will extend loans of upto 90% of the value of fixed assets to industries established in the Underdeveloped Areas. Cottage industrial

enterprises set up in the industrial districts will receive loans on economic merit.

(b) *Commercial Banks* : A separate division will be created in each of the Commercial Banks to be responsible for the financing of cottage industrial enterprises, for assisting them in the acquisition of fixed assets and for providing working capital. Commercial Banks will provide loans to cottage industrial enterprises of an amount upto one hundred percent of the value of the fixed assets including land and buildings. Under the guarantee of HMG or the Nepal Rastra Bank or the development banks, commercial banks will extend to industrial enterprises long term, medium term and short term loans.

(c) *Agriculture Development Bank (ADB)* : ADB will provide to agro-based enterprises, long, medium and short term loans to finance fixed assets and working capital.

(d) *Nepal Rastra Bank (NRB)* : NRB will extend to financial institutions refinancing facilities with a reasonable grace period and appropriate amortization schedule in order to strengthen their financial position and to enable them to finance industrial enterprises on relatively easy terms.

IA.05 *Credit Guarantees* : Institutional guarantees against credit provided to cottage industrial enterprises will be widened in scope, made more effective in application and simplified in procedure.

IA.06 *Underwriting and Securities Marketing (Share, Bond, Debentures)* : Institutional services will be strengthened, streamlined and made more effective in order to improve the availability and mobility of capital through the marketing of shares, bonds and debentures and through the underwriting of issues stocks of public limited companies.

IA.07 Financial institutions and development banks will jointly finance the fixed assets and working capital of industrial enterprises, either under a proportional security sharing arrangement or even against assets secured by mortgage to any one of the development banks.

IA.08 *Standardisation* : The services hitherto provided by the Nepal Institute of Standards will be further expanded to enable it to test the quality of industrial products, to determine the standards, to issue certificates, and to grant quality marks. Due recognition will be given to the manufacturers of quality products. Special measures will be taken to market quality products manufactured in the country and they will be given preference via government procurement policies. Special measures will be adopted to improve and maintain the standard of food stuffs and construction materials.

XI - STEPS TO ENSURE GOOD MANAGEMENT OF INDUSTRIAL ENTERPRISES

GM.01 To safeguard the public welfare, to ensure good management, to promote amicable relationships between labour and management, and to protect labour interests, to minimise environmental pollution, HMG may demand explanations, impose fines penalties and punishments, issue definite directives and even take over management of industrial enterprises which have a poor performance record.

GM.02 To effectively execute the above mentioned policies, objectives and programmes, HMG will strengthen existing industrial administration and control units, by injecting trained and competent manpower into them, where this is necessary, for the effective execution of policies and objectives.