No. 13

フィリピン共和国
フィリピン窯業研究開発センター協力事業
エバリュエーション調査団報告書

1982年9月

国際協力事業団

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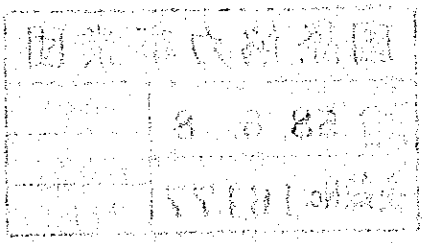

国際協力事業団

国際協力事業団
受入月日 '84. 4. 24
登録No. 03955
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はしがき

国際協力事業団は，1976年7月16日に本プロジェクトを開始し，その後，協力期間を2年間延長し，技術協力を実施してきたが，延長R/Dによる協力期間が本年7月15日に終了することとなった。

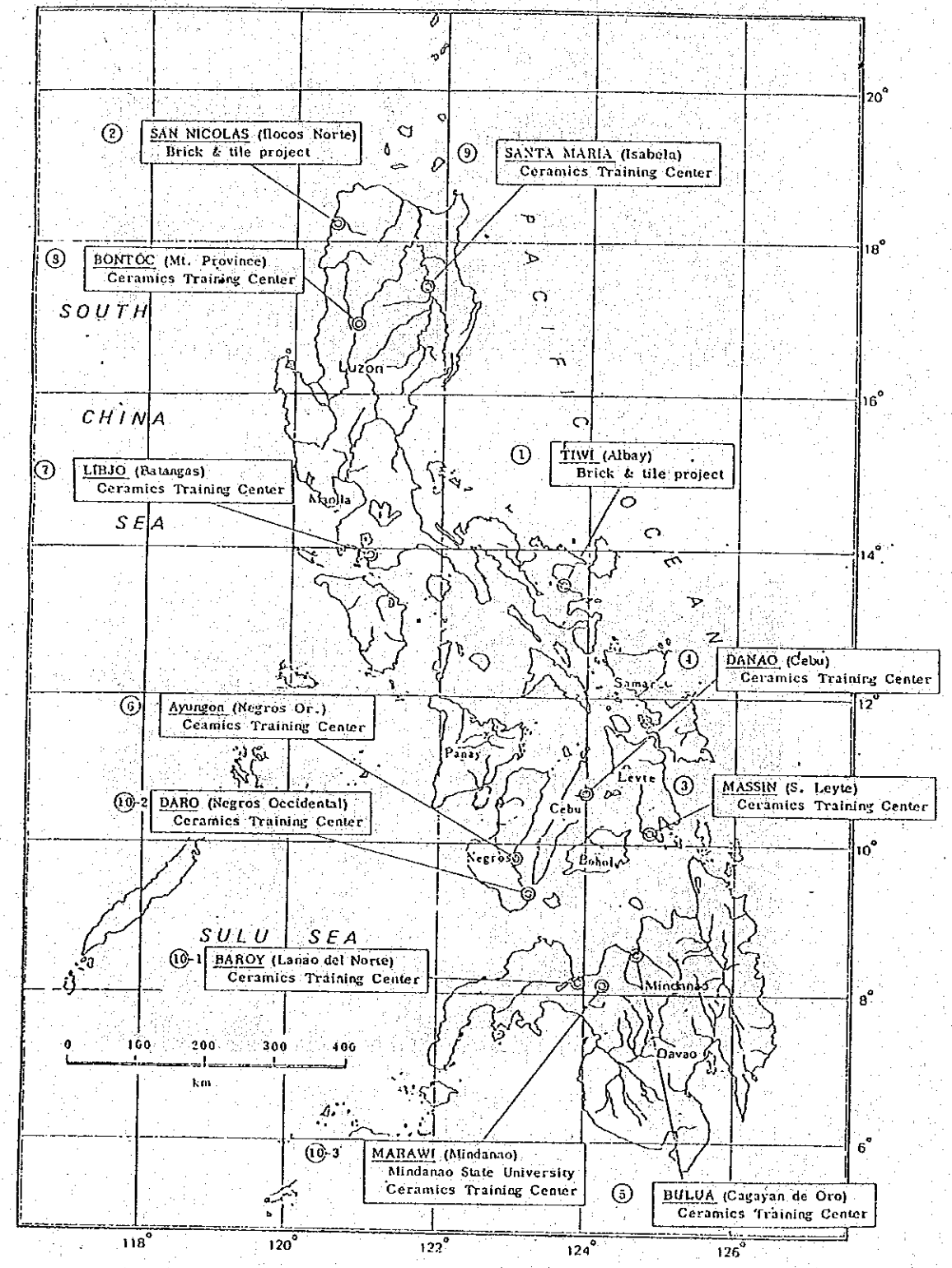
今般，これまでの協力効果の評価，実績と内容の確認，並びに全面的に本プロジェクトを相手国に引き渡すことの可否につき調査することを目的として，1982年6月22日から7月6日までの15日間，エバリュエーション調査団を派遣した。

同調査団は，派遣専門家を交え現地調査を行い，更に相手国政府関係者と討議を重ねた結果，未達成項目について本年度一杯協力を継続することが不可欠との結論に達し，これらを討議議事録（R/D）に取りまとめ，7月1日に署名，交換した。

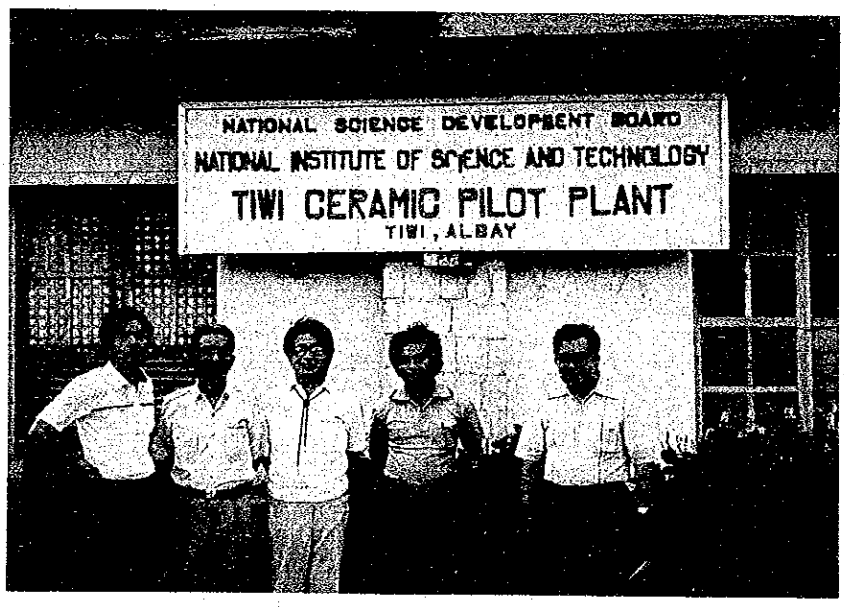
本報告書は，同調査団の現地調査結果及び協力効果の評価，並びに今後の協力に関する相手国関係機関との討議結果を取りまとめたものである。

1982年 9 月

国際協力事業団
鉱工業開発協力部
部長　角南　平


② SAN NICOLAS (Ilocos Norte)
Brick & tile project
⑨ SANTA MARIA (Isabela)
Ceramics Training Center
⑧ BONTOC (Mt. Province)
Ceramics Training Center
SOUTH
CHINA
SEA
Luzon
① TIWI (Albay)
Brick & tile project
⑦ LIBJO (Batangas)
Ceramics Training Center
Manila
④ DANAO (Cebu)
Ceramics Training Center
Samar
⑥ Ayungon (Negros Or.)
Ceamics Training Center
Panay
Leyte
③ MASSIN (S. Leyte)
Ceramics Training Center
⑩-2 DARO (Negros Occidental)
Ceramics Training Center
Cebu
Negros
Bohol
SULU SEA
⑩-1 BAROY (Lanao del Norte)
Ceramics Training Center
Mindanao
0 100 200 300 400
km
Davao
⑩-3 MARAWI (Mindanao)
Mindanao State University
Ceramics Training Center
⑤ BULUA (Cagayan de Oro)
Ceramics Training Center
20°
18°
16°
14°
12°
10°
8°
6°
118°
120°
122°
124°
126°

討議議事録（延長　R/D）の署名・交換
左から　Ms. Mañalac CRDC所長　Dr. Kintanar NSTA副長官
角南団長　梅沢団員　（1982年7月1日　CRDC）



レガスピ地区のＴＩＷＩ地方窯業センター視察

川上団員による，デザイン，着彩，印刷に関する
調査及びCRDCカウンターパートへの指導

レガスピ地区における地場窯業製造工場の調査

目　　次

I. プロジェクトの概要

(1) プロジェクト名 ： フィリピン窯業研究開発センター事業
（Technical Cooperation on the Establishment of the Ceramic Research and Development Center）

(2) 協力期間（R／D） ： 昭和51年7月16日～昭和55年7月15日 〔4年間〕
延長 昭和55年7月16日～昭和57年7月15日 〔2年間〕

(3) 相手国協力機関 ： 国立科学技術研究所 （NIST）
（National Institute of Science and Technology）

(4) プロジェクト住所 ： Ceramic Research and Development Center, IRC Building, NSDB Science Community Complex, Bicutan, Taguig, Metro Manila, The Republic of the Philippines

(5) プロジェクト内容 ：

a）目　的 …… 国立科学技術研究所（N.I.S.T.）の工業研究センター（I.R.C.）窯業部を改組・拡充し，陶磁器及び建材の分野において研究開発とその成果に基づいて地場窯業産業の振興を行い，併せて，これに必要な人材の養成を行う機能を有する「窯業研究センター」を設立すること。

b）事業計画 …… ① 調査団派遣

② 専門家派遣 ― ○現行5名の長期専門家を協力期間終了まで派遣
○短期専門家を必要に応じ派遣

③ 研修員の受入

④ 機材供与

Ⅱ. エバリュエーションチームの派遣

1. 派遣の経緯と目的

国際協力事業団から派遣されたエバリュエーション調査団は，1980年5月14日，フィリピン共和国政府関係機関との間で延長R／Dに署名・交換した。本延長R／Dに基づいた延長協力期間が，1982年7月15日をもって終了することとなり，これに伴い，本プロジェクトに関する，当初設定された協力目標に対し，協力効果の測定，実績と内容の確認及び協議並びに本協力事業を相手国に引き継ぐことの可能性につき相手国協力機関と討議することを目的として，本調査団は派遣された。

2. 業務内容（T／R）

(1) 延長R／D上の協力目的に沿い，その具体的な協力項目の達成度について，フィリピン国関係者及び日本人専門家との協議，実績調査並びに評価を行う。

(2) CRDCの活動状況及びカウンターパートへの技術移転状況について調査し，評価する。

(3) 今後の課題と将来計画を踏まえ，本プロジェクトのフィリピン国側による自主運営の可否について協議する。

(4) 協力延長が必要であると判断された場合には，今後の協力の内容及び方法について協議し，討議議事録（再延長R／D）に取りまとめ署名・交換する。

Ⅱ－3. 調査団の構成

氏　　名	担当業務	所　　属　　先	職　　位	派遣期間
角　南　　平	団長（総括）	国際協力事業団 鉱工業開発協力部	部　　長	昭和57年6月22日から 昭和57年7月　6日まで
Taira SUNAMI	Leader	Mining and Industrial Development Cooperation Dept., JICA	Director	（15日間）
西村幸雄 Yukio NISHIMURA	窯業一般 Ceramic Technologies in General	通産省　工技院 名古屋工業技術試験所第六部第一課 1st Division, 6th Dept., Government Industrial Research Institute Nagoya, Agency of Industrial Science and Technology, MITI	課　　長 Head	昭和57年6月22日から 昭和57年7月　6日まで （15日間）
川上景也 Kagenari KAWAKAMI	デザイン Ceramic Design	多治見市陶磁器意匠研究所デザイン科 Tajimi City Ceramic Design Center, Gifu Prefecture	科　　長 Head	昭和57年6月22日から 昭和57年7月　2日まで （11日間）
梅沢賢浩 Yasuhiro UMEZAWA	業務調整 Coordination	国際協力事業団 鉱工業開発協力部　鉱工業開発技術課 Technical Cooperation Division, Mining and Industrial Development Cooperation Dept., JICA	課長代理 Assistant Head	昭和57年6月22日から 昭和57年7月　6日まで （15日間）

Ⅱ－4. 調　査　日　程

日順	月日	曜日	行　　程	交通手段	宿泊地	調　　査　　内　　容
1	6／22	火	TOKYO ⟶ MANILA JL741	航空機	MANILA	移動，ＪＩＣＡマニラ事務所と打合せ
2	23	水			〃	大使館表敬，CRDCとの打合せ，NSTA副大臣表敬，NSTA主催夕食会
3	24	木			〃	CRDCにてエバリュエーション検討会
4	25	金	MANILA ⟶ LEGASPI	航空機	LEGASPI	ＴＩＷＩセンター訪問，ALBAY等窯業地視察
5	26	土	LEGASPI ⟶ CEBU	〃	CEBU	ＬＩＬＯＡＮ等窯業地及びラッキー社（食器製造）視察
6	27	日	CEBU ⟶ MANILA	〃	MANILA	
7	28	月			〃	CRDCにて専門家との意見調整及びエバリュエーション検討会
8	29	火			〃	マニラ事務所との意見調整，CRDC側の要望聴取
9	30	水			〃	CRDCにて日本側の協力延長に係る見解を表明し，意見調整，NSTAと協議
10	7／1	木			〃	ＪＩＣＡ事務所と打合せ，Ｒ／Ｄ署名
11	2	金	川上氏帰国 MANILA ⟶ TOKYO PR432		〃	CRDCにてJOINT EVA．REPORTの作成
12	3	土			〃	〃　　〃
13	4	日			〃	〃　　〃
14	5	月			〃	マニラ近郊の関連工場見学，調査団主催夕食会
15	6	火	角南，西村 MANILA ⟶ TOKYO JL744	航空機		移動
	7／6	火	梅沢 MANILA→KUALA LUMPUR	航空機		移動
						MITEC エバリュエーション調査参加
	7／13	火	KUALA LUMPUR →TOKYO			移動日

Ⅲ. エバリュエーション調査結果

1. エバリュエーション調査概要

目　的　　'82.7.15で延長R／D（6年間の協力）が切れるので

① 現在までの技術協力の実績，技術移転の達成度，自立の見通し，問題点等を調査，評価する。

② 再延長問題の協議

結　論

① エバリュエーション

R／Dの技術協力項目ごとにJoint Evaluationを行い，未達成分野をidentifyした。（別添）

その結果，R／Dの大部分については，一応技術移転は行われ，自立に向ってtake offしつつあると思われるが，さらにある分野については，指導援助をしばらく継続する必要があるとの認識にいたった。

概要以下のとおり

原料に関する試験・研究 …… ほぼ達成（国産原料利用のこる）

製造技術 …… 機器操作はほぼ達成

窯炉および焼成技術 …… 生産技術は一部要指導

マーケッティング及び製品開発
地場陶磁器産業の指導
} … なおしばらく指導必要

② R／D延長問題 …… （別添　参照）

Joint Evaluationの結果をふまえ，原則，未達成項目に技術指導の分野を限定し（日本の協力が不可欠なもののみ），1983.3月末までR／Dを再延長し，follow up的に協力を継続する。新規分野の追加は含めず。

staff交替

7／15をもって，現地日本人staff 5名中，竹本調整員を残し，4名帰国，後任に京谷氏が9月赴任予定

協力内容（両国の責任分担）

（日本側）　Ⅰ．以下の分野について7人の短期専門家の派遣

1. 生産技術一般　（1名）

2. 耐火物

a. 200tプレス据付　（1名）

b. 耐火物（kiln設備）　（1名）

3. 素地，釉薬，顔料　　（１名）
4. 窯　炉　　（１名）
5. Program Analyst　　（１名）
6. 分析装置のメインテナンス　　（１名）

Ⅱ．Spare Partsの供与

Ⅲ．Counter Partの受入　　（１名）

（比　側）
1. MSRI（Materials Science Research Institute）の中でのCRDCの早期確立
2. CRDC の機器類の維持補修管理体制の確立
3. CRDC 職員をMSRI内で活用好遇する。
4. 研究開発活動を促進するため，CRDC職員の研究奨励制度の拡充

所　感

1. 今回の延長により，当初予定の技術移転・人材養成がほぼ達成される見通しを得られたことは，日比双方にとつて慶事といえよう。特に比側は，７月で打切りとの観測もあつたため，比側より大いに感謝されるところであつた。

CRDCが独り立ちし，真に比国の窯業振興発展に寄与し，民間からの期待にこたえうる機関になりうるためには，更に大いなる努力が必要と思われる。

８３．3月以降どうするか，これまでの努力を生かし，発展させ，真に協力の実に花を咲かせるには，残る協力期間中の検討課題でもあろう。

2. CRDCのstaffは比較的若い人が多く，技術の吸収に熱意が感じられ，自立への自覚が目ばえてきているように思えた。

特に，日本の協力が終束段階に入ってきたため，一層自立への意識が高まっているようにも思える。それだけに，今後の協力の仕方如何が，自立なり，発展のあり方に大きく影響するように思える。

3. 比国では，NIST−NSTA の機構改革が進行中で，CRDCの取扱いも問題となり新しくMSRIの中で位置づけられることになっているが，新組織の中でCRDCの事業が適切にworkするための組織，予算，人事，管理体制が未だ定まっていない。この点を比側及び日本側staffは強く懸念している。従って，この点についてNSTA の大臣及び次官に強く要望しておいたが，両者ともMSRIの中でのCRDCのきちんとした確立を約した。また，この点をR／Dの中でも明記した。

4. 比国の中には，十数のceramic centerがあり，CRDCとの間で技術交流もあるが，Japanese staffの直接なる指導は限定されている。

2. 現地調査結果

(1) CRDCでの調査

第一次R／Dによれば，協定の延長はポッタリープラントの工事の遅れにより初期の計画が十分に達成できず，物理的に2年間の延長をせざるを得ず，又技術移転も遅れていたのでCRDC側からの延長要請等により第一次エバリエーションの結果さらに協定の延長を行ったものである。このため4つのプロジェクトが計画された。それは下記のようである。

① 原　料

② 製造技術

③ 地方センター

④ ローコストハウジングのためのセラミックス

これらのプロジェクトを2年間で達成するための計画をたて，事業を推進してきたが，事実認識の不足，固有テーマへの片寄りなども原因して計画通りには進行していない面もあった。調査検討はCRDC側の自己評価の説明及びＪＩＣＡによる調査，報告資料等によって行った。それらの内容は以下のようである。

1）原　料

原料の調査と地質学的，鉱物学的調査と測定はフィリピン全土に及び，その結果はホールソートカードに記録されて整理し，リストは一冊にまとめ，分布地図とともに図書館に保管されていた。各原料，例えば石英や長石等の物性の測定もほとんど終了し，整理されていた。このように原料の調査と物性の測定は初期計画通り達成されていることが分った。しかし，原料の調査はこれで完了ということはなく，今後独自の計画により続行されるべきである。

2）窯業製品の標準評価法

レンガについての標準評価法の規格はＣＲＤＣにおいて確立され，引続いてせつ器，磁器食器及び耐火物の評価法がＡＳＴＭ，ＪＩＳ等を参考にして進行していた。このようにこれらの技術はCRDC独自により十分実施できると考えられる。又これらの結果の内，主として粘土についてまとめたものは日本側専門家の指導により，国際学会において発表され，国内の選考により3位となり，大統領から表賞されることになった。(7月１６日)　このことは大きく評価されるべきであり，関係者の努力に対して敬意と祝意をおくるものである。又外部への発表，内部資料等多くの成果が報告されていた。（Annex 2 ）

3）窯業建材の製造技術

手造りレンガ及び瓦の製造技術（Annex 3 ）と機械生産による技術はCRDC 側により今後も十分に対応できると報告されたが，ローコストハウジング及び地方窯業の発展に向けては今後さらに努力が必要と考えられる。

4）実験室での測定分析技術

多くの機材の供与をうけ，これらの装置による測定法の習熟及び使用説明書の英文化は専門家の努力と指導により完備していた（Annex 1）。ただこれらの機器の依持と管理は精密性，部品調達の困難性などから今後に問題を残すものと思われる。

5）陶磁器の製造技術

せつ器，磁器及び白雲陶器の開発及びこれらの精製技術，成形技術，焼成法等についての計画はほとんど達成したと報告された。しかし，これらの技術は調査の結果なお多くの問題をかかえていると考えられる。とくにフリットの必要な白雲陶器についてはさらに研究することが必要である。

6）耐火物の開発

国産原料を主として用いる低価格の耐火レンガ，さや，窯道具等の開発を行おうとするものである。この場合二つの問題があった。その一は，成形用プレスとしての２００トン 油圧プレスの建設と運転で，他は熱膨張が大きいために発生するクラック（熱衝撃による）であった。これにはさや素地の組成，密度などから解決するという方針で，さらにこの技術についての専門家の要請があった。

7）パイロメトリックコーン（ゼーゲル錘）

窯温度測定用ゼーゲル錘として，ＳＫ 7, 8, 9については試験を完了したが，SK 05a，０4a，０3a，について今後開発を行うが，問題は低温用フリットの完成と錘の成形技術が指摘された。ゼーゲル錘は窯内温度測定の指標であり，原料一製品の完全な品質管理と規準化が必要であると指摘した。

8）窯の改善

昇，倒煙式窯のうち，高温戦成（1,600℃）用窯の開発が不十分であった。この問題は窯道具の開発に必要で，今後に問題を残したものといえる。又電気炉については数量や高温用に問題があるとともに，評価，測定用としてコントロールを行いうる窯の必要性が大きいと報告された。又窯を独自で開発するにしても耐火レンガ，発熱体，コントローラ断熱材等問題が多く，完全には対応できないと考えられた。

9）その他

CRDCの自己評価説明によれば，その他としてスタッフの研修，業界への 研修手引書の作製，シンポジューム，技術相談，依頼試験等多くの実績をこなしていた。これらの面についてはフィリピン共和国唯一の窯業研究所としての機能をはたすようにCRDCが発展したと感じられた。

(2) 地方センター

6月25日レガスピ地区のTIWI地方窯業センターを視察した。この付近にはPutchan, Bolo, Baybayなどの陶業地が散在し，その工場数は約200程ということであった。TIWIセンターにはジョークラッシャー，ボールミル，土練機，ロクロ，窯（電気炉と倒煙窯）等が設置され，地方窯業振興のための協同組合の設立，セミナーによる教育とせっ器の製造技術の普及を行い，地方センターとしての実をあげていた。又この地方は地熱発電が盛んで，亜硫酸ガスによる屋根材（鉄板）の腐食があり，このためとロ－コストハウジングの両面からあらたに粘土瓦の開発（手作り），普及を計画していた。今後CRDCの指導により地方窯業が発展するものと期待できる。

(3) 地方窯業事情

1) TIWI

この地区の粘土は塩基性母岩のため鉄分の含有量は多いが，良好な可塑性を持っていた。この原料を足踏み混練したものを手造り成形していた。この成形法はきわめて特徴があり，手まわし作りの後たたき成形を行っていた。乾燥後，竹材，わら等を重ねた野焼により焼成していた。製品は壺，置物であった。

2) セブ地区

リロワンの植木ばち工場及びセブのラッキーチャイナ工場の視察を行った。植木ばちは工場近くの原土（可塑性良，鉄分を含む）を足踏みで混練し，手練り工－ロクロけり工－ロクロ師の3人1組で成形し，自然乾燥後へび窯で焼成していた。これらの工場の生産工程は全く動力を使用せず，人力のみによっていたが，地方産業，雇用等の促進という見地から注目できると思われる。ラッキーチャイナでは磁器食器及び中国風置物（呉す染付）を生産していた。

3) マニラ地区

ロイアルポーセレン工場は近代的な設備（ほとんど台湾製，一部日本製の機械とトンネル窯）をそなえ，製土 — 成形 — 乾燥 — 素焼 — 施釉 — 焼成 — 絵付と一貫工程により生産を行う他に，さやの製造，転写紙の作成，及び独自開発による間けつ窯の建設を行っていた。従業員は約500名，月産100万ピースの磁器テーブル食器を生産し，原料のかなりの部分を国産によっていた。品質は中程度で，変形黒ボツなどの欠点があるが，販売はすべて国内であった。

次にClay burn及びGolden clayの二社を視察した。これらの工場はノベリティーを日本からの輸入原料により生産していた。従業員は約80名と50名であった。ノベリティーは日本でもほとんど手造りのため，比国内での生産は優位になることが予想できる。

(4) デザイン，着彩，印刷

1) デザイン，印刷室にて色々な試作品とテストピースがあり，その中で一つのデザインができていた。

それは，フィリピンの食事方法を中心にしたファミリーセットで，そのセットアップは
- コーヒーカップ・ソーサー
- スープ
- フィッシュ・ミートプレート

同じ形で朝，夜と兼用，又カップに積み重ね（スタッキング）ができ，収納性の考慮がされて良いと思う。

2) パターン（表面文様）として，フィリピンの伝統的な服装と風景からの展開の中に意欲的なものがみられ，パターンの発想が自分の土地の風土等から生れるのは，基本的な態度として良いと思う。

3) スクリーン印刷に関してもオープンハウス（開設記念）のポスターデザインができ，刷るところ迄準備されていた。140枚印刷するとの事で刷り上りの楽しみなデザインであった。スクリーン印刷は，設備も整いアミ点も分解もできている。

コンタクトスクリーン　　65，　85，　100　線

スクリーン・メッシュ　　200，　225，　250，　270メッシュ（テトロン使用）

特に人物のアミ点の調子も良く研究されている。上絵絵具の種類が少なくコバルト色がほしいという意見があった。

スクリーン張液がかたくなっていて流動性をつける様に指示する。

スクリーン印刷の利用は広く，上絵，下絵，イングレーズと広範囲にできるから，今後更に研究開発される様に望みます。

マニラ近くの小さなノベリティ会社，中国系のローヤルチャイナにもスクリーン印刷の利用が見られ，更に利用発展する可能性があり，今後C.R.D.Cに技術指導を期待するところである。

銅版印刷は，昨年愛知氏の指導がなされ，技術的には良いけれど，プレスが弱いため，実際には刷りにくい。オープンハウス展示に一セット銅版張付を準備しているという。

今後デザインとして期待するところは，フィリピンの生活にあったデザインが必要でC.R.D.Cの窯業製作においてデザイン部門が重要視されると良いと思う。何故ならば，優れた釉薬，素地ができてもそれを生かすデザインがなければ，それらの材質の本領が発揮できない。その特質を生かすデザインが大切である事を今後，真剣に考えてほしい。

(5) ま と め

これらの結果をまとめると，前エバリュエーションの結果とり交わされたR／Dのほとんどは達成され，CRDC独自で今後も発展していけるものと考えられるが，今まで述べたように，さらにJICAによる指導や援助がなお少し必要とされるものであった。それらは以下のようである。

1) 200トンプレスの設置ー運転とさやの開発

200トンプレスの設置と運転を行い，これによって高温用さやと窯道具の開発を行う。これらは高温での変形や熱衝撃に対し十分安定なものでなければならない。これには組成，粒度配合，密度，熱伝導などを改善することが必要で，まして国産原料で開発しようとすれば原料の選定，シャモットなど仮焼物結晶の製造など多くの問題点を解決していくことが必要である。

2) ゼーゲル錘及び低火度陶器の開発

この問題はいずれもフリットが必要なものである。フリットの組成と製造法の研究，ゼーゲル錘のうちSK05a～03aの組成の開発と成形法，及び品質管理法の確立，低火度陶器（白雲陶器）の素地と釉薬及び施釉，焼成法の開発等を行う必要がある。現在試作されているものは白雲陶器の本来の品質から相当なへだたりがある。

3) 窯の改善

木材等で焼成できる窯がこの国で求められて居り，シャットル窯，塩焼窯及びいぶし窯についての要望があった。CRDCでは低温窯についてはAnnex 4のようにある程度の実績を持っている。より高温な窯の設計と建設は今後の問題として重要である。例えばせつ器を地方センターで開発する場合などである。この他，国産原料による窯材料や耐火物の開発，さらに討論の中で述べられたセラミック材料（高アルミ磁器，ボール，ルツボ）の開発研究などにも高温窯（1,600℃）の開発が必要である。又電気炉についても築炉法と材料，発熱体，コントロール法などの問題はさらに指導を続ける必要がある。

4) 機器類の維持と管理

CRDCの機器類は窯業の研究所としては大変よく整備されている。しかし，それらはほぼ全部がわが国からの供与であり，長い年月の使用により当然部品の損耗，故障の発生はさけることができない。この場合の補修部品はある程度は準備されているが，フィリピン国内での入手は非常に困難であるとともに修理調整に要する専門的な知識や技術は不完全である。このようなことから，なお部品の供与と修理技術者の派遣が必要と考えられる。

5）研　修

現在まで日本で約３０名の研修が実施され，それぞれの分野で活躍しているが，前記等の内容にてらして，さらに専門的研修が必要と考えられる。

（※　Annexは　V. Joint Evaluation Report を参照）

3.　フィ側の協力要請内容

項　　目	達成度	実　　績	課　　題
窯業原料及び生産品に対する評価技術	80％	試験，分析の結果を取り纏め，TIWI，ALBAY，STA・MARIA，ISABELA，BUREAU等の80種の原料については，評価技術報告書を作成し，粘土に関しては評価法が確立された。 国内各地のシリカについて化学分析を主体に試験を完了	CRDCにより開発された原料の評価方法は，特定材料の利用法に関するガイド・ブックとなるが，材料の可能性を査定する明確な方法は確立されていない。 Feldspar の評価法について研究を継続
生産品の標準評価法の確立	40％	赤レンガの標準的評価手法は完成	石器，陶器・磁器の製品の評価標準を設定する必要がある。
小規模の土器製造及び工芸用に商業ベースで販売し得る粘度及び顔料の分析評価	80％	小規模の土器製造に関し，広く一般的に使用されている粘土，顔料については主要試験，分析は完了	左記以外の試験等，詳細分析について継続する必要がある。
地方原料を使用し，磁器を製造することが可能であるかの可能性について査定	80％	地方の原料による試験的磁器の製造は幾つか行い，CRDCに展示している。	TIWI の 原料に関して実施したが，大部分の地方原料について磁器製造についての技術的可能性査定を行う必要がある。
低価格原料を利用しての低価格耐火レンガ及び耐火炉及び工業耐火物の製造に関する技術研究	80％		製造法について研究段階で開発したものがあるが，実際規模で利用するものは製造するに到っていない。

項　　目	達成度	実　　績	課　　題
ゼーゲル・コーンの製造技術	50%	S-K 7，8 及び 9 に関し，テスト製品は開発された。	S-K 051，041 及び 03a 等低温度のコーンは開発中であるが，開発には時間がかかる。
講師の養成コースの開催	80%		JICA専門家を通じ技術を吸収し，CRDCを確立する段階にあり，技術を普及させる意味のシンポジュームは，開催されるに到っていない。
地方センター SAN.NICOLAS のレンガ・タイル・プロジェクトに対する協力	80%	1976年に，7,000個のレンガ製造容量の平窯を建設し，70,000個のレンガを試験的に製造し，更に訓練コースを開催した。	技術上の問題により稼動が停止し，現地側に引継ぐ最終段階に入っているが，完了していない。
NEGROS, DARO, CEBU, BOHOL, MAASIN, BATANGAS 及び BICOL 地域の窯業振興に関するデモンストレーション及び訓練センターの設置	40%		マニラ・センター（CRDC）における業務量が多く，又，スタッフの不足していることから地方センターに対する協力が限定されている。
DARO センター に対する協力	70%		地方政府の予算不足により，第2の単窯の建設が遅れている。

Ⅳ. 討議議事録（R／D）

THE RECORD OF DISCUSSIONS

ON THE TECHNICAL COOPERATION PROJECT

ON THE ESTABLISHMENT OF THE CERAMIC RESEARCH AND DEVELOPMENT CENTER

I. The Japanese Evaluation Team (hereinafter referred to as "the Team") organized by the Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Taira Sunami, Director of Mining and Industrial Development Cooperation of JICA, visisted the Republic of the Philippines from June 22, 1982 to July 1, 1982, and exchanged views and had a series of discussions with the Philippine authorities concerned for the purpose of evaluating the performances and achievements of the Technical Cooperation Project on the Establishment of the Ceramic Research and Development Center (hereinafter referred to as "the Project") which was conducted for two (2) years on the basis of the Record of Discussions signed on May 14, 1980 between JICA and the Philippine authorities.

II. As a result of the discussions, both parties agreed to recommend to their respective governments that it is still necessary to follow up the Project until March 31, 1983, and to implement the cooperation mentioned in the following papers.

Manila, 1 July 1982

MR. TAIRA SUNAMI
Leader
Evaluation Team
JAPAN INTERNATIONAL
COOPERATION AGENCY

DR. QUINTIN L. KINTANAR
Deputy Director General
NATIONAL SCIENCE AND
TECHNOLOGY AUTHORITY

RESPONSIBILITIES OF THE GOVERNMENT OF THE REPUBLIC OF THE REPUBLIC OF THE PHILIPPINES THRU THE NATIONAL SCIENCE AND TECHNOLOGY AUTHORITY

I. Implement the early establishment of the Ceramic Research and Development Center within the framework of the Materials Science Research Institute.

II. Establish a system of regular maintenance and repair of CRDC equipment.

III. Endeavor to utilize and give preference to all trained CRDC Personnel in the appointment to new positions under the Materials Science Research Institute.

IV. Extend to CRDC staff benefits of personnel incentive plan to promote research and development work.

RESPONSIBILITIES OF THE GOVERNMENT OF JAPAN THRU JAPAN INTERNATIONAL COOPERATION AGENCY

I. Dispatch of Seven (7) Short Term Experts in the following areas:

1. Production Technique in General (One Expert)
2. Refractory
   a. Installation of 200-ton press (One Expert)
   b. Refractory (Kiln Furniture) (One Expert)
3. Body, Glaze and Pigment (One Expert)
4. Kiln (One Expert)
5. Program Analysis (One Expert)
6. Maintenance of Analysis Apparatus (One Expert)

II. Provision of Spare Parts

III. Advanced Training of One Counterpart in Japan

V. JOINT EVALUATION REPORT

JOINT EVALUATION REPORT

BY

EVALUATION TEAM OF

THE JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

AND

THE NATIONAL SCIENCE AND TECHNOLOGY AUTHORITY (NSTA)

ON

THE CERAMIC RESEARCH AND DEVELOPMENT CENTER PROJECT

IN THE REPUBLIC OF THE PHILIPPINES

July 5, 1982

MANILA, PHILIPPINES

DISCUSSION PAPER BETWEEN THE EVALUATION TEAM OF THE JAPAN INTERNATIONAL COOPERATION AGENCY (JICA) AND THE NATIONAL SCIENCE AND TECHNOLOGY AUTHORITY (NSTA) ON THE EVALUATION OF THE CERAMIC RESEARCH AND DEVELOPMENT CENTER PROJECT WHICH IS TERMINATED ON JULY 15, 1982

DATE: June 22 - July 6, 1982

PLACE: CERAMIC RESEARCH AND DEVELOPMENT CENTER
NSTA SCIENCE COMPLEX, BICUTAN, TAGUIG, METRO MANILA, PHILIPPINES

ATTENDANCE:

JAPANESE PANEL:

JAPANESE EVALUATION TEAM:

Mr. Taira Sunami	-	Leader, Evaluation Team, Director-Mining and Industrial Development Cooperation Department, JICA
Mr. Yukio Nishimura	-	Head of First Section Six Department, Governmental Institute of Research and Industry of Nagoya (GIRIN)
Mr. Kagenari Kawakami	-	Head of Design Section, Tajimi Pottery and Porcelain Design Research Center
Mr. Yasuhiro Umezawa	-	Deputy Section Chief, Mining and Industrial Development Cooperation Department, JICA

JICA MANILA OFFICE:

Mr. Toshikazu Miura	-	Resident Representative JICA, Manila Office

CRDC JAPANESE EXPERTS:

Mr. Kanji Kano	-	Chief Advisor
Mr. Motoo Ueno	-	Production of Ceramic Products
Mr. Ryuichi Yamamoto	-	Beneficiation of Raw Materials
Dr. Koya Shimosaka	-	Applied Mineralogy
Mr. Setsuo Takemoto	-	Program Analysis

PHILIPPINE PANEL:

NATIONAL SCIENCE AND TECHNOLOGY AUTHORITY:

Dr. Quintin L. Kintanar	-	Deputy Director General
Ms. Nuna Almanzor	-	Planning and Programming Division
Ms. Zenia Velasco	-	Planning and Programming Divison

CERAMIC RESEARCH AND DEVELOPMENT CENTER:

Ms. Guillermina C. Mañalac	-	Project Director
Mr. Christopher C. Salegumba	-	Head, Program Coordination Department
Mr. Severino T. Bernardo	-	Head, Research and Development Department
Ms. Natividad R. Villostas	-	Head, Technical Guidance Department
Mr. Tomas D. Recio	-	Head, Pilot Plant Department

MUTUALLY ATTESTED AND SUBMITTED

TO ALL CONCERNED

July 5, 1982

MR. TAIRA SUNAMI
Leader
Evaluation Team
Japan International
Cooperation Agency

MS. GUILLERMINA C. MAÑALAC
Project Director
Ceramic Research and
Development Center
National Science and
Technology Authority

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JOINT EVALUATION REPORT

INTRODUCTION:

The implementation of the JICA/NIST joint project for the Establishment of the Ceramic Research and Development Center was first brought about by mutual agreement between duly constituted representatives of the Republic of the Philippines and the Government of Japan. Terms of agreement were embodied in a Record of Discussions signed on July 15, 1976. Initially, this project was designed for completion on July 14,, 1980. However, upon evaluation of the progress of the project last May, 1980, it was jointly recommended by authorized representatives of both governments to extend the project for another two years up to July 15, 1982.

In order to evaluate and assess the present achievement of the project an Evaluation Mission was sent by Japan International Cooperation Agency to the Ceramic Research and Development Center on June 22 - Julv 6. 1982. A series of meetings and discussions were held among members of the Mission and CRDC staff together with JICA experts assigned to the Project. A comprehensive report of accomplishments (see Attachment 1) for the period from July 15,1976 to June 15, 1982 was presented and discussed in detail. Evaluation of performance was based on the provisions of two (2) Records of Discussions (RD) dated July 15, 1976 and May 14, 1980. Also used as basis for assessment of performance was a long range Program of Activities of Ceramic Research and Development Center which was jointly prepared in 1978 by CRDC staff and Experts assigned to the project (see attached Minutes of Meetings).

OBSERVATIONS:

While it was observed that most of the identified targets have been attained satisfactorily, there were certain aspects of the Project that were not fully attained. More specifically the following observations were made:

1. Refractories Project

   Results of previous studies indicated that need for a 200-ton press to be able to correctly form saggers. Due to unavoidable reasons, this press is still due for delivery to CRDC sometime next month. Besides the problem of lack of this above-named equipment, characteristic properties of locally available materials, indicated the need for better quality materials and/or more intensive research studies, hence the need for a short-term expert.

2. Product Development Studies

As a result of initial success attained in using local materials for porcelain, stoneware, earthenware and glaze formulations, CRDC staff proceeded to more sophisticated studies towards production of frits, seger cones and porcelain crucibles for which there was a felt need for short term experts.

3. Bricks and Roof Tiles Project

It was noted that considerably progress was attained in this project. CRDC had been involved in several field projects were they set-up wood fired kilns. Also some simple equipment and accessories have been designed and fabricated. Because of this, it is the consensus that CRDC has the capability to install recently provided equipment for a Model Brick and Tile Plant for the rural area.

4. To further upgrade CRDC competence in improved kiln designs and construction was also noted.

5. Past experience also revealed difficulty in obtaining spare parts and maintaining and repairing sophisticated laboratory equipment.

RECOMMENDATIONS:

In view of the foregoing observations, it was mutually agreed to recommend to the proper authorities the early esta establishment of the Ceramic Research and Development Center within the framework of the Materials Science Research Institute and the further extension of the joint project with possible provision of short term experts in the area of product research and development, refractories, kiln design and maintenance of sophisticated equipment, program analysis, provision of spare parts and advanced counterpart training in Japan.

ANNEX 1 - Minutes of the Meeting on the 5-Year Progress and Achievements of CRDC Conducted by the JICA Evaluation Mission on June 24, 1982 at the CRDC Conference Room

I. Present:

JICA Evaluation Team:

Mr. Taira Sunami
Mr. Yukio Nishimura
Mr. Kagenari Kawakami
Mr. Yasuhiro Umezawa

CRDC Japanese Experts:

Mr. Kanji Kano
Mr. Motoo Ueno
Mr. Ryuichi Yamamoto
Dr. Kova Shimosaka
Mr. Setsuo Takemoto

CRDC Panel:

Ms. Guillermina C. Mañalac
Mr. Severino T. Bernardo
Mr. Christopher C. Salegumba
Mr. Tomas D. Recio
Ms. Natividad R. Villostas
Ms. Suzita Oredina
Mr. Angelo Torillo

NSTA Representatives:

Ms. Nuna Almanzor
Ms. Zenia Velasco

II. The meeting started at 9:48 A.M.

III. Matters Discussed in the Meeting:

Mrs. Mañalac opened the discussion regarding the Self-Evaluation Report on the JICA/NSTA/CRDC joint project by reading the introductory part of the said report, then moving on to the account of accomplishments made by the Philippine side on the following items:

1. Physical Facilities
2. Staffing
3. Provision of Budget
4. Organizational Structure and Efforts for Institutionalization
5. Self-Evaluation Performance

PHYSICAL FACILITIES:

According to the Report, the construction of the Pottery Pilot Plant, Brick and Tile Plant, and water system has been completed. Aside from the laboratory and office fixtures designed and fabricated in CRDC, additional furniture were also purchased.

STAFFING:

The total number of authorized positions at present is 108. Fifty five (55) of these are those of contractual personnel whose contracts of services expire every year and are accordingly renewed.

Twenty three (23) personnel are being employed under emergency status due to their inability to comply with employment requirements.

Chemists, ceramic engineers, chemical engineers, mechanical engineers constitute about 50% of the CRDC staff.

PROVISION OF BUDGET:

Ms. Manalac called the attention of the meeting participants to the 1980 budget appropriation, saying that whereas the appropriation was P1,879,000.00, the actual expenditures amounted only to P1,016,124.50. She explained that this was brought about by very stringent administrative and purchasing procedures

As to Mr. Sunami's question on whether the balance could still be carried over the following year, Ms. Manalac said that, usually, it can still be spent up to March of the succeeding year, but after that, the excess is reverted to the national fund.

ORGANIZATIONAL STRUCTURE AND EFFORTS FOR INSTITUTIONALIZATION:

According to Ms. Manalac, the CRDC is still in the official plantilla of the NIST and has been allowed to function as a center only internally. She added that it has been operating according to its inauguration last July 10, 1978. Despite yearly justifications made toward the establishment of the CRDC, the proposal did not pull through due to internal constraints within the NIST.

Lately, with the issuance of Executive Order No. 784, the Materials Science Research Institute was created in which it was specifically provided that one of the main components is ceramic research. Thru this MSRI, it is hoped that the CRDC will finally be recognized.

Ms. Manalac then disclosed that Dr. Javier, NSTA Director-General, has given assurance that CRDC shall exist as a center under the MSRI.

SELF-EVALUATION PERFORMANCE:

The Self-Evaluation Performance Report was prepared based upon a long-range Program of Activities drawn by both Japanese experts and CRDC counterparts in 1978, in which the different activities were classified into categories under major headings, namely, 1) Common Facilities, 2) Transfer and Adaptation of Technology, 3) Training of Manpower, 4) Promotion of Local Ceramic Industries. As accordingly laid out in the said Program, the CRDC accomplishments are herein reported category by category.

Categories 01 and 02 were taken up by Ms. Mañalac, Categories 1, 2, 3, 4, 5, 6 and 7 by Mr. Bernardo and the rest by Ms. Villostas.

A. Common Facilities

0. Category 01 - Management System
Category 02 - Physical Facilities

0.1. Sub-Systems were established to expedite coordination and implementation of CRDC activities. In addition, a manual on management was prepared for future use after CRDC's official institutionalization.

0.2. The repartitioning of the IRC Building and construction of the Pottery and Brick and Tile Plants were completed, as well as the installation of equipment/provision of utilities.

B. Transfer and Adaptation of Technology

1. Category 1 - Technology on Survey and Evaluation of Raw Material Deposits

1.1. Targets 1, 2 and 3 under Category 1 have been rated 100% accomplished. A standard methodology on survey and assessment of ceramic materials, eight (8) geologic/reconnaissance reports and a distribution map of ceramic raw material deposits have been prepared, completed and are now available in the CRDC Library.

2. Category 2 - Laboratory Test and Analysis Technology

2.1. Methods/procedures of test and analysis of ceramic materials and products have been established, and training of staff to conduct such tests have been carried out, hence, targets 1 and 2 of Category 2 is rated 100% accomplished.

3. Category 3 - Evaluation Technology of Ceramic Materials and Products

3.1. Mr. Bernardo explained that there is actually no problem regarding the establishment of standard evaluation methodologies for different ceramic materials and products. This activity was just delayed since efforts were mostly concentrated on the attainment of other targets. The CRDC staff has assisted, among others, the Philippine Standard Association is making standards for red clay, bricks, roof tiles, porcelain and refractories. He assured the Evaluation Team that CRDC is already capable of testing any ceramic materials and products submitted.

4. Category 4 - Production Technology for Ceramic Construction Materials

4.1. Targets 1, 2 and 3 have each been rated 100% accomplished. Procedures for manual, semi-mechanized and mechanized production of common bricks and roof tiles are presently available in the CRDC library.

5. Category 5 - Production Technology B (Other Products and Common Technology)

5.1. Except for Target 2, Production Technology on Porcelain, all other targets under Category 5 have been rated 100% accomplished.

5.2. Although CRDC has already developed acceptable porcelain body and glaze formulations and has come up with test products, a feasibility study is still to be made, hence, the accomplishment rating for this project is only 80%.

6. Category 6 - Production Technology C (Refractory)

6.1. As to Mr. Nishimura's question on what problem are being encountered in refractory research, Ms. Oredina identified the following: a) inadequate/inappropriate equipment, b) poor quality of materials, c) design of sagger molds.

6.2. Ms. Oredina said that in Japan, materials are first converted to mullite and cordierite before using these in refractory production, whereas in CRDC, local materials are just converted to chamotte. Unfortunately, chamotte, when combined with clay does not produce good quality refractory. The life span of the products is very short.

She believe that facilities for refractory manufacture should be improved, that some imported materials, especially those with high-alumina content, should be incorporated with the local ones, and that technology for material processing should further be studied.

6.3. Regarding the pyrometric cones, Mr. Bernardo explained that CRDC plans to develop low-melting cones after the on-going studies on SK 7, 8, and 9 are completed. At present, the frit to be used in this project is still under formulation studies under Mr. Yamamoto's assistance.

6.4. Mr. Nishimura suggested that a standard frit be developed.

An explanation was made regarding the basis or criteria used in rating the different projects and programs.

Ms. Mañalac informed the Evaluation Team that there were actually no fixed criteria followed, but that the ratings were based on the expected total output, as suggested by the project leaders.

Mr. Bernardo also clarified that the rating was done by both Japanese and CRDC groups during an evaluating meeting.

As further explained by Ms. Mañalac, if the objectives of the project as a whole were made the basis for rating, then this would have made things easier. But since the report covers details of the project whose objectives were not explicitly given or spelled out, it is then very difficult to set defined criteria for rating. She, therefore, suggested that what has been reported be considered only as a basis for whatever criteria the meeting participants will later decide to adopt to rate the over-all project.

7. Category 7 - Ceramic Equipment

7.1. Several simple equipment and kilns for the production of bricks, tiles and pottery have been designed and fabricated by CRDC.

C. Training of Manpower

8. Category 8 - Staff Training

8.1. Advanced training program in Japan was not pursued inasmuch as basic knowledge and skills of CRDC staff had to be developed and upgraded first.

8.2. Standard training manuals/procedures were established and are being adopted in CRDC training activities.

9. Category 9 - Instructor Training

9.1. The scheduled training activities for small-scale producers were indefinitely postponed due to priority activities. These are envisioned for implementation during CRDC's self-reliance stage.

10. Category 10 - Technical Services

10.1. Routine technical services are being carried out in areas of material testing, information dissemination (free consultation), and outside technical assistance upon individual or official requests.

11. Category 11 - Local Facilities

11.1. Ceramic Field Centers located in San Nicolas, Daro and Tiwi are presently being supervised and assisted by CRDC through laboratory studies, training programs and construction of kilns. On the other hand, the center in Maasin Leyte had laready been turned over to the local government.

11.2. The Tiwi Ceramic Pilot Plant, envisioned to become a model center, is being given CRDC's all out support.

Having observed earlier the Design and Decoration facilities Mr. Kawakami inquired (as interpreted by Mr. Takemoto) how the design technology is applied in daily operations of the Center and how such application is evaluated.

Mrs. Mañalac explained that emphasis was first directed to the building up of the staff's competence in the area of screen printing, decal preparation, etc., hence, no method for evaluating this kind of technology has been established yet. However, as impressed on her by short term expert on ceramic design, Mr. Miura design is really very important. She said that it is about time to integrate design technology into CRDC's system of operation and expressed hopes for more concerted plans along this line in the future.

Mr. Bernardo added that after Mr. Miura left for Japan, a design group was organized to carry out the following functions: a) to create design on paper, b) to apply the design on ceramic products, c) to find out its market acceptability. This, however, did not materialize due to other priority projects.

Mr. Sunami then acknowledged the clarifications made and requested that further discussion/comments be conducted in the afternoon or on Monday, June 28, 1982, since the Evaluation Team need to review and re-study the whole report first. According to him, CRDC's evaluation is generally identical with what they had previously discussed back in Japan.

IV. The meeting ended at 12:02 noon to resume at 3:00 in the afternoon.

Recorded by:

Ms. ADORACION COBILE

(CONTINUATION)

June 24, 1982

Afternoon Session:

I. Present:

JICA Evaluation Team:

Mr. Taira Sunami
Mr. Yukio Nishimura
Mr. Kagenari Kawakami
Mr. Yasuhiro Umezawa

CRDC Japanese Experts:

Mr. Kanji Kano
Mr. Motto Ueno
Mr. Ryuichi Yamamoto
Dr. Koya Shimosaka
Mr. Setsuo Takemoto

CRDC Panel:

Mrs. Guillermina C. Mañalac
Mr. Severino T. Bernardo
Mr. Tomas D. Recio
Mrs. Natividad R. Villostas
Miss Suzita Oredina
Mr. Angelo R. Torillo

II. The meeting resumed at 3:05 P.M.

III. Questions/Clarifications/Comments on the Self-Evaluation Report Presented in the Morning Session:

I. Pyrometric Cones

I.1. Mr. Nishimura asked if the problems encountered in the pyrometric cone research are mainly technological. He said that a study on how to make a standard cone should be undertaken. Market demand should also be considered.

I.2. Mrs. Villostas explained that what actually inspired CRDC to undertake the research is the inavailability of pyrometric cones in the local market. With this research, it is hoped that demand for the said products will be satisfied.

I.3. Mr. Bernardo said that as soon as the on-going study on pyro-cones proves to be successful, CRDC will consider the possibility of marketing the products. However, it has to

ascertained first that said products will have a satisfactory or similar quality as standard cones. Further tests need to be conducted, such as, giving samples of CRDC-developed pyrometric cones to small-scale producers for actual testing. But, as to when this research will be completed is not definitely known yet.

I.4. According to Mrs. Manalac, the preparation of pyrometric cone formulation in batch must be controlled. Very careful batching should be observed; afterwards, statistical sampling for tests should be made before actual utilization in cone production.

I.5. The problem on correct forming of cones was also brought up. Mrs. Manalac stressed that close attention be placed not only on the correct formulation but also on the method used in forming.

I.6. Mr. Bernardo pointed out that the problem actually lies on two things - raw materials and the manufacture of frit. He said that, in Japan, the materials are more or less standardized, unlike those in the Philippines. Also, in frit production, some imported materials have to be added, however, CRDC does not have any criteria for testing said materials yet.

2. Porcelain

2.I. Regarding Mr. Nishimura's question on why the porcelain project was rated only 80%, Mr. Bernardo explained that this relates to the successful results of elutriation technique applied on Calagnaan clay and the right formulations developed. CRDC still has to conduct a feasibility study to find out if the porcelain project is economically viable or not.

2.2. Mr. Nishimura then asked how CRDC could assist small scale ceramic producers who wants to venture into porcelain production.

Mrs. Manalac said that, as or the present, no small scale producers are engaged in porcelain manufacture, but even if CRDC introduces the porcelain body, these producers still may not find any use for it inasmuch as their kilns are good only for firing stoneware or earthenware. So, along with the porcelain body, the right kiln to be used should also be introduced.

3. Kilns

3.1. Mr. Bernardo informed the Evaluation Team that a CRDC

personnel who recently returned from a training on kiln construction in Japan has proposed the construction of an ascending kiln which will cost about ₱52,000.00. He also mentioned the plan to construct a snake kiln to improve on the open-firing method used by local potters.

3.2. With regard to high-firing electric kilns, Mr. Bernardo disclosed that Mr. Kano had once proposed to arrange for a short-term expert to teach CRDC on how these will be fabricated. One problem encountered in this area is the inavailability of materials necessary for the construction such as, heating element, refractory lining, ceramic fibers, which still have to be imported from Japan. Besides, nobody in CRDC knows the techniquesinvolved in the fabrication of high-firing electric kilns.

3.3. Mr. Bernardo further said that there is also the need to know how to design and construct a shuttle kiln. Although some CRDC staff were present to observe the construction of the shuttle kiln at the Pottery Plant, they were not provided with a detailed drawing of the same.

4. Maintenance and Repair of Equipment

4.1. When the question about maintenance of equipment was raised, Mrs. Manalac said that it is not much of a problem when the trouble only calls for the replacement of spare parts. But when the cause of breakdown could not be identified, then CRDC has to avail of the assistance of a specialist. At this point, Mrs. Manalac expressed her hopes that even after the termination of the joint project, JICA can still provide some kind of arrangement regarding the maintenance of sophisticated equipment.

4.2. As to Mr. Recio's question on whether CRDC can still request assistance from JICA in case additional materials and equipment spare parts are not locally available, Mr. Sunami said that since the subject of discussion is just limited to fact-finding, future plans or decisions will have to wait until after the deliberation of the Self-Evaluation Report is thoroughly finished.

4.3. Mr. Kano reminded the CRDC group that, as discussed before, urgently needed materials may be considered, however, CRDC will have to make its own arrangements for other material requirements.

5. Others

5.1. The minutes of the day's meeting is expected for distribution on Monday, June 28, 1982.

5.2. Mr. Sunami suggested that the discussion on the Self-Evaluation Report be finished on Monday morning (June 28). Talks on future plans and programs will be started in the afternoon, same day.

5.3. Mr. Kano suggested that the Self-Evaluation Report be finalized, and that page number and table of contents be placed to facilitate location of subject and discussion.

IV. The meeting was adjourned at 3:55 P.M.

RECORDED by:

ADORACION E. COBILE

JOVENCIA GARCIA

ANNEX 1 - Minutes of the Meeting on the 5-Year Progress and Achievements of CRDC Conducted by the JICA Evaluation Mission on June 29, 1982 at the CRDC Conference Room

I. Present:

JICA Evaluation Team:

Mr. Taira Sunami
Mr. Yukio Nishimura
Mr. Kaganari Kawakami
Mr. Yasuhiro Umezawa

CRDC Japanese Experts:

Mr. Kanji Kano
Mr. Motoo Ueno
Mr. Ryuichi Yamamoto
Dr. Koya Shimosaka
Mr. Setsuo Takemoto

CRDC Panel:

Ms. Guillermina C. Mañalac
Mr. Severino T. Bernardo
Mr. Christopher C. Salegumba
Mr. Tomas D. Recio
Ms. Natividad R. Villostas
Ms. Suzita Oredina
Mr. Angelo R. Torillo

II. The meeting started at 3:02 P.M.

III. Matters Discussed/Decided in the Meeting:

At the outset, Ms. Mañalac informed the JICA Evaluation Team that during the meeting at the NSTA at 2:00 P.M. the next day, Dr. Kintanar will expect to hear from them about future plans related to the CRDC project.

Before proceeding to the main discussion of the day's meeting, both the Japanese and the CRDC panels made some corrections/comments on the minutes of the meeting held last June 24, 1982. The said minutes will be finalized and included as part of the documents on the CRDC project evaluation.

According to Ms. Mañalac, a few months earlier, she mentioned to Mr. Kano and Mr. Miura that she had been thinking about the effects of the imminent termination of the joint project. She said that while the project is till in progress, CRDC is very fortunate to have the experts' services and ready assistance in terms of cash, replacement of very necessary spare parts, and also provision of short term pexerts - all of which contributed to the CRDC's performance. Upon the termination of the joint project, such assistance as well as the provision of the local counterpart fund will naturally cease, which more or less means hard times for CRDC. It is nevertheless felt that through the five year cooperation, the CRDC staff have had very good opportunities to upgrade and build up their competence. Anticipating that CRDC will undergo a test of self- reliance, Ms. Mañalac had asked Mr. Miura beforehand regarding any possibility for a follow-up activity/assistance. She was informed that, as a matter of policy, there can be no second extension to the joint cooperation; however, a follow-up activity may be possible, in which CRDC could still look up to JICA for further assistance in terms of short term experts' services and provision of spare parts.

Mr. Sunami then pointed out that the Evaluation Team has two objectives: 1) to evaluate the present status of CRDC and find out the progress of projects and the extent to which technology transfer has been achieved so far; and 2) to discuss about future plans. He disclosed that the Team has made earlier assessments of the project and has noted that is objectives, as a whole, have almost been achieved in the light of CRDC's self-reliance and what has been stipulated in the existing RD. However, some specific aims have bot been attained yet, such that it is believed that it may still be necessary to continue giving assistance to the project. According to Mr. Sunami, an extended assistance is possible, but it should be confined to areas or targets not achieved yet. He then encouraged the CRDC group to voice out specific requests for assistance, especially underlining necessity and background, to be discussed so as to arrive at some consensus and finally work out some kind of recommendation for both governments of Japan and the Philippines.

Mrs. Mañalac disclosed that, in a meeting with CRDC key personnel further needs for assistance have been identified particularly on the deficiencies of the projects, as brought up by Mr. Nishimura, such as studies on pyrometric cones, porcelain, refractories, kilns. Hence, more efforts are needed along these areas. Ms. Mañalac further said that if the follow-up activity is only up to March 1983, then it may be carried out through the coordinator and some short term experts, then thereafter, CRDC researchers could establish communication lines with GIRIN researchers.

Mr. Kano said that CRDC could avail of the services of short term experts only on short durations, thus enough preparation should be conducted first so that the expert could work effectively within one or two months.

The specific areas which need further assistance were discussed item by item. Discussions/commnets/suggestions were as follows:

1. Porcelain

1.1. Mr. Bernardo informed the Team that, so far, porcelain ware and crucibles have already been developed with the assistance of Mr. Yamamoto. In addition, CRDC intends to develop porcelain, electrical insulators, grinding balls, thus more equipment, materials, chemicals and short term expert's services are needed.

1.2. Since the proposed research on other porcelain products is not in the original plan, Ms. Mañalac explained that this was actually an offshot of the results of the initial studies. She added that said matter was brought to CRDC's attention by the NSTA Chairman himself. Besides, the MIRDC Director also identified the need for alumina crucibles and has requested CRDC to work out the research. In view of this, Ms. Mañalac proposed, if there is still further assistance available, that this assistance be directed in identified areas where it is most needed. Considering also

that the cooperation is in its final stage, CRDC would like to take the remaining opportunities to further upgrade the capability of the researchers along this line.

Mr. Sunami then reiterated that areas of cooperation be confined to what has been unaccomplished so far based on the existing RD, not on new areas. He said that the very reason for the evaluation was to find out what targets have been accomplished, and what are yet unaccomplished.

With regard to the foregoing, Mrs. Manalac then suggested that the JICA group be the one to identify which areas need further assistance based on their own evaluation, and accordingly make the necessary recommendations, instead of asking CRDC to present requests for assistance.

Mr. Kano interposed that new requests may be considered, but first priority must be given to on-going, unaccomplished projects; new projects, as second priority may be discussed later.

2. Refractories

2.1. Regarding Mr. Kano's question on what will be Miss Oredina's plan after arrival of the 200-ton press, the latter said that the previous formulation will be tried on the new equipment to find out if the forming method will have improved the quality life span of refractory products. If this fails, then some of the local materials used in the formulation will be substituted with more stable ones. Higher quality materials will also be incorporated, the preparation of which, requires additional equipment and technology.

2.2. Ms. Manalac instructed Ms. Oredina to prepare a schedule of activities identify when she will need the technician to install the 200-ton press.

2.3. As to the length of time needed to finish her test on the 200-ton press using existing formulation, Ms. Oredina said that it will take her up to December. Still she doubts if the results of the test will be good since problems on refractory study concern not only insufficient pressure in forming but also the quality of the material itself. She believes that the use of the 200-ton press along will not be sufficient to improve the life span of the products.

2.4. Ms. Nishimura pointed out the properties of materials affect the life span of the saggers more than the pressing strength applied in forming.

2.5. Mr. Kano noted that Ms. Oredina will be needing a short term expert after December, when she obtains the results of her study. He emphasized that everything must be prepared: materials, formulations, etc. - prior to the arrival of the short term expert so that he will only be staying briefly at CRDC.

3. Brick and Tile/Kilns

3.1. Mr. Recio requested for a short term expert on design and construction of a shuttle kiln and another on the production of smoked, salt-glazed tiles, including kiln construction. The latter was suggested by Mr. Martinez.

3.2. Mr. Nishimura said that a smoked kiln has a very different construction than the kiln for salt-glazing.

3.3. Ms. Mañalac said that the CRDC staff has acquired the competence as far as construction of electric kiln which can be fired below 1300°C is concerned. She mentioned Sta. Maria's intention to increase production output using a bigger kiln. In this regard, CRDC feels that in order to be of assistance, it should acquire the capability to construct a shuttle kiln since it is possible to increase production with this type of kiln, and besides much time will be saved in the process.

4. Dolomite

4.1. Mr. Bernardo said that a short term expert on body/glaze formulation, and frit preparation is still needed in the dolomite research, as well as the right equipment for the latter item.

5. Pyrometric Cones

5.1. Frit preparation is likewise required in the preparation of low-temperature cones, such as SK 05_a - 03_a.

6. Maintenance and Repair of Equipment

6.1. Ms. Mañalac informed the Evaluation Team that according to Mr. Torillo, there is no problem with the repair and maintenance of JEOL equipment since the serviceman visits the CRDC regularly. With Shimadzu equipment, however, there is need for periodic inspection by an expert because Shimadzu personnel do not provide regular check-up/service for CRDC.

Mr. Sunami then requested Mr. Yamamoto to summarize what areas of assistance CRDC needs based on the Program of Activities.

The following specific areas were identified by Mr. Yamamoto: Installation of 200-ton press and improvement of refractory products, development of pyro-cones' (fritting kiln) and maintenance/repair of equipment.

Mrs. Mañalac again proposed that the JICA team make recommendation regarding what is best for CRDC. She said that there was no

point of discussion as most of the needs for assistance identified are not found in the original plans, although these are but effects of the initial activities of CRDC. According to her, perhaps other new proposals may be arrange on more detailed improvements later, in the future.

Mr. Sunami said JICA could still make provisions for very necessary spare parts which are not locally available. He requested that the kinds of equipment needed be identified.

Among those mentioned by Mr. Torillo are spareparts for SEM, IR and X-Ray equipment and silica glass for dilatometry. Also identified were high-temperature thermocouples (PR).

Mr. Sunami requested that his team be given some time to study about the request on provision of short term experts. He suggested that another discussion be made the following day, Wednesday.

7. Others - Training of CRDC Staff

7.1. The possibility of providing training grants for CRDC staff was considered. Particular areas of training suggested were advanced training on porcelain insulators, refractory, management, feasibility study, research on synthetic materials, and regular ceramic course for new trainees.

Another meeting was scheduled the following day, Wednesday, June 30, 1982 at 9:30 in the morning.

IV. The meeting was adjourned at 4:21 P.M.

Recorded by:

ADORACION COBILE

JOVENCIA GARCIA

ANNEX 1 - Minutes of Meeting on the 5-Year Progress and Achievements of CRDC Conducted by the JICA Evaluation Team Mission on June 30, 1982 At the CRDC Conference Room

I. Present:

JICA Evaluation Team:

Mr. Taira Sunami
Mr. Yukio Nishimura
Mr. Kagenari Kawakami
Mr. Yasuhiro Umezawa

CRDC Japanese Experts:

Mr. Kanji Kano
Mr. Motoo Ueno
Mr. Ryuichi Yamamoto
Dr. Koya Shimosaka
Mr. Setsuo Takemoto

CRDC Panel:

Ms. Guillermina C. Mañalac
Mr. Severino T. Bernardo
Mr. Christopher C. Salegumba
Mr. Tomas D. Recio
Ms. Natividad R. Villostas
Ms. Suzita Oredina
Mr. Angelo Torillo

II. The meeting was called to order at 10:15 in the morning

III. Matters Discussed/Decided in the Meeting:

As a result of the discussion that transpired the day before (Tuesday, June 29), the JICA Evaluation Team has come up with a proposal of assistance on the following areas: a) provision of short term experts; (b) provision of necessary spare parts; (c) training of CRDC counterparts. Details of these were discussed in the meeting:

1. Provision of Short Term Experts

1.1. Mr. Nishimura informed the CRDC group of the tentative plan to arrange for six (6) short term experts and one (1) program analysis coordinator to provide CRDC the necessary assistance within the one year cooperation extension which is due to terminate on March 1983. Short term expert's services will cover the following areas: general production techniques, installation of hydraulic 200-ton press, refractory development, development of body, glazes and pigment to include pyro-cones and earthenware, kiln construction and maintenance of equipment.

1.2. According to Mr. Sunami, the short term experts may be detailed in CRDC for only about two (2) months since their present laboratory work requires time and attention. Hence, it is expedient that CRDC be very well prepared prior to the arrival of the short term expert. As for the adviser on production techniques and program analysis coordinator, they will assigned much longer until the termination.

1.3. Ms. Mañalac expressed her appreciation for the said proposal. She requested the team that CRDC be informed beforehand of the final arrangements made regarding the short term experts so that necessary preparations could be worked out.

She further inquired if the short term experts could possibly assist CRDC in fabricating a fritting kiln and a high temperature kiln for refractory use, specifically in the development of mullite.

1.4. As pointed out by Mr. Nishimura, the study on refractory does not require a kiln whose maximum firing temperature is 2000°C. Besides, said kiln will be very expensive.

1.5. Mr. Takemoto said that it may be easier and more practical to import cordierite-mullite rather than produce these in CRDC.

1.6. In preparation to the coming of a short term expert on refractory, Ms. Oredina has prepared a schedule of activities. She explained why a high-temperature kiln is needed in refractory research.

2. Provision of Necessary Spare Parts

2.1. Mr. Sunami emphasized that, within the period of extended cooperation, JICA can provide very necessary spare parts not locally available as long as these are within the budget. With regard to the high-temperature kiln for refractory, he said it cannot be provided.

3. Training of CRDC Staff

3.1. Regarding the specialized training course, Mr. Umezawa said that CRDC may select the most preferable one from three (3) suggested subjects, namely: a) refractory development, b) material research, c) porcelain.

3.2. Mr. Takemoto explained that material research was suggested by Messrs. Shimosaka and Yamamoto because it was observed that CRDC researchers only concentrate on a particular method of analysis, hence they lack experience on the management of a wider field of fundamental technology. They need to build experience and competence not only in operation of equipment, but also in interpretation of different test results, as well integration and correlation of all data for over-all evaluation.

3.3. A suggestion was made by Mr. Bernardo that an expert on material research be detailed at CRDC instead of sending trainee in Japan. He pointed out that this will be more beneficial considering that local materials will be utilized in the research. In this case, CRDC researchers who have had training in Japan can lead the counterpart training themselves.

3.4. Ms. Manalac further added that more of those who are presently attending very narrow fields will benefit if an expert be made available at CRDC.

3.5. Mr. Takemoto then said that is such is the arrangement then the researchers must be free from routine work, which is quite impossible in CRDC. Whereas if the training will be in Japan, the trainee can have full concentration on his study and can avail of complete reference materials/ books. In addition, his training will require the guidance of more experts, not just one.

3.6. As to Ms. Villostas question if the said training is separate from the group training course, Mr. Takemoto replied that it will be a sort of advanced training.

3.7. Mr. Umezawa informed the group that the plan is not yet definite in as much as JICA still has to look for a suitable place with the proper facilities where the specialized training maybe conducted. CRDC must therefore wait for further advice from JICA regarding this matter.

3.8. With regard to Mr. Kano's previous suggestion that a researcher be trained in Japan in case a short term expert on refractory is not available, Ms. Oredina wanted to clarify in w-ich slot will the said training be taken.

According to Mr. Kano, the slot for advanced training will be used.

Mrs. Manalac said that as CRDC and JICA groups are more or less agreed on the proposals, some kind of final documents will then be prepared in case these will be needed in the JICA Evaluation Team's meeting with Dr. Kintanar.

Mr. Sunami informed the CRDC panel that some requirements will also be expected from the Philippine side during the extension.

As decided by the JICA team, the cooperation to be provided by the Philippine government are as follows: a) implement the early establishment of the CRDC within the framework of the Materials Science Research Institute, b) establish a system of regular maintenance and repair of equipment, c) appointment from contractual status to regular status, d) provide incentive plan for CRDC to promote research and development work.

Ms. Mañalac told the JICA team that she cannot give assurance that such requirements will be complied with since she is not the only one who makes the decisions. However, Dr. Javier and Dr. Kintanar have assured her that CRDC will exist as a Center under Materials Science Research Institute. She said she will try to discuss with Dr. Kintanar the cooperation expected from the Philippine side before 2:00 P.M.

IV. The meeting was adjourned at 11:46 P.M.

Recorded By:

ADORACION COBILE

ANNEX 1 - Minutes of Meeting Held at the NSTA Executive Lounge on June 30, 1982 at 2:00 P.M.

Present:

Philippine Side:

Dr. Quintin L. Kintanar
Dr. Arizabal
Mr. Marcial Diamante
Ms. Lydia Tansinsin
Ms. Guillermina C. Manalac

Japanese Side:

Mr. Taira Sunami
Mr. Kanji Kano
Mr. Setsuo Takemoto

The meeting was started with Dr. Quintin L. Kintanar greeting the Evaluation Mission Members and extending his appreciation for the assistance so far given to the joint project. He also expressed to the group that it is the intention of National Science and Technology Authority to continue all the research and development function of the Ceramic Research and Development Center. He then also mentioned some further needs of CRDC which he said were previously identified to him by CRDC staff and which he hopes would merit favorable consideration by the Mission.

Mr. Sunami also returned the greetings of Dr. Kintanar and made the following remarks:

"Dr. Kintanar, I am very glad to see you again and I would like to report the evaluation work on CRDC activity which is going on very smoothly, thanks to the very good preparation work of the Philippine counterpart. We are also discussing the future plan. We have come up with some recognition that it would still be necessary to continue technical cooperation to some extent, and I think we could reach some good consensus and work out recommendations to both governments. As part of its work, I would like to ask something mainly about institutionalization which I touched on the other day. This is our major concern and closely related to our cooperation on future plans of CRDC. The establishment of the Ceramic Research and Development Center has been the objective of the technical cooperation of our two governments for the last six (6) years, costing a considerable amount of expenditures and manpower. These are as follows: assignment of experts and counterparts, provision of equipment, counterpart training in Japan, construction of buildings and plans and maintenance and repairing. The main target of these has been to set-up one

strong systematic organization in the field of ceramic research and development in this country.. The skeleton of Ceramic Research and Development Center as an implementing body is at this moment in the process of full establishment and I believe the result of joint evaluation of CRDC activity shows considerably higher mark. However, it is found out that some of the cooperation work are not well implemented. I hope you would to take these into consideration for the future of CRDC establishment, especially in the field of management and administration, for example, "administrative's back-up and management on research and development", and management on inventory control" especially foreign made spare parts. CRDC still has to have some time to attain such objectives. The Executive Order issued last March has specified the creation of the Materials Science Research Institute (MSRI) in which CRDC is considered to be a nucleus function with still lacking of concrete idea at this time after three (3) months. After the evaluation, it is observed that there are something still undone in the committed Japanese contribution which was mentioned in the Record of Discussion and therefore, it is under consideration by Japanese side how to accomplish the unfinished activities. But even though this follow-up work would be implemented and still the MSRI's establishment would be delayed, the Philippine and Japanese Governments efforts might be of no avail. Therefore, I would be grateful if you would proceed further efforts to establish the MSRI and to resolve those institutional issues. Thank you very much."

In reply to this, Dr. Kintanar assured the Mission that the Ceramic Research and Development Center (CRDC) would form one Center of the Materials Science Research Institute and possibly the other Center would be the Metals Casting Technology Center(MCTC) and maybe a Plastics and Composite Research Center later. At this point he asked Dr. Arizabal if he had something else to say.

Dr. Arizabal, in turn gave a brief summary of the history of the Metals Casting Technology Center (MCTC) Project and expressed hope to see these implemented in the new Materials Science Research Institute (MSRI)

Mr. Sunami, replied that such proposal is not within the assignment of the present Mission and so he cannot possibly make any recommendation on this.

Dr. Arizabal, however, provided the Team with a copy of his proposal as an advance information to concerned authorities of Japan International Cooperation Agency (JICA). He also assured the Mission that Dr. Javier, Director General of Materials Science Research Institute will take this up with proper authorities of the Philippine Government.

The meeting was adjourned at 3:00 P.M.

ANNEX 2 - JOINT REPORT OF ACCOMPLISHMENTS

July 15, 1976 to June 15, 1982

This record of accomplishments jointly compiled by Japan International Cooperation Agency (JICA) Experts and the staff of the Ceramic Research and Development Center covers the period of implementation of the JICA/NIST/NSDB Joint Project for the Establishment of the Ceramic Research and Development Center. The provisions of Record of Discussions stipulating the responsibilities of the cooperating governments (dated July 15, 1976 - Annex A) and another Record of Discussions (dated May 15, 1980 - Annex B) providing for the two (2) year extension of the joint project was made the basis of this report.

The items covered in the above agreements included the following as committments of the Philippine Government:

1. Provision of adequate land, buildings and facilities to house all donated equipment of the Center.

2. Provision of required personnel to implement the project.

3. Provision of operating expenses.

4. Establishment of the Ceramic Research and Development Center as an independent Center within National Institute of Science and Technology.

Committment of the Japanese Government to the joint activity consisted of the following:

1. Provision of equipment for tests and analysis of materials/products and also provision of test production equipment.

2. Provision of expert services.

3. Training of filipino counterparts in Japan.

In 1978, a long range program of activities was jointly prepared by the Japanese Experts and the Filipino Counterparts. Specific targets were identified and programmed for completion within set time frame. This program was also used as basis in the preparation of this joint report.

A. Accomplishments of Philippine Side

I. Physical Facilities

The Ceramic Research and Development Center is located within the National Science and Technology Authority (NSTA), formerly the National Science Development Board (NSDB), in Bicutan, Taguig, Metro Manila. Its testing and research laboratories and staff rooms are situated in the Industrial Research Center Building. Constructed in two (2) separate buildings are the Brick and Tile and Pottery Pilot Plants. Near these pilot plants is the water system equipped with a deep well and overhead tank. Details are as follows:

A. Physical Facilities/Floor Areas of the Different Facilities of the CRDC are:

1. Industrial Research Center Building

   a. Ground Floor, 1500 square meters (Laboratories, Staff/Conference Rooms)

   b. Mezzannine Floor, 204 square meters (Stock Rooms, Library and Classroom)

2. Brick and Tile Pilot Plant, 438 square meters (Processing, Forming and Firing Raw Materials Areas, Storage, Staff/Tool Room)

3. Pottery Building, 1050 square meters

Note: Floor Plans/Layout of the above facilities is shown in Figure 1

B. Water System:

The water system is equipped with a deep well and overhead tank. Details are as follows:

1. Well Depth - 700 feet

2. Pump Horsepower - 25

3. Overhead Tank Capacity - 40,000 gallon

Note: Working Drawing of Water Tank is shown in Figure 2

C. List of Furnitures and Office Fixtures That Were Designed and Fabricated:

	Items	Quantity	Location
1.	Laboratory Table, 163"x46"x37"	2	Room 109
2.	High Table, 61"x26"x32"	32	Rooms: 105, 106, 107, 109, 110, 110A, Balance Room, 111, 114, 115, 117 Pottery Pilot Plant
3.	Low Table, 61"x26" x 24"	25	Rooms: 110A, 111, 113, 114, 117, Pottery Pilot Plant, Brick and Tile Pilot Plant
4.	Square Table, 34" x 34" x 22"	4	Rooms: 111,114
5.	Mini-Table, 33"x19" x30"	14	Rooms: 105, 106, 107, 111, 114, 115, Stock Room
6.	DGC-30 Thermo Balance 58"x36"x25"	1	Room 110
7.	Iso-Dynamic Balance 31"x26"32	1	Room 110
8.	Office Table, 55"x28"x 29"	20	Rooms: 101, 102, 103, 112, Pottery Pilot Plant, Brick and Tile Plant, Library, Stockroom #2
9.	Drying Rack	12	Pottery Pilot Plant
10.	Libbor ED-200 Table	1	Room 111
11.	Cabinet with Drawer 67"x23"x42"	1	Room 101
12.	3-1 Cabinet	1	Room 105
13.	Wall Cabinet; 79"10"x19"	2	Room 106, Pottery Plant
14.	Cabinet, 47"x15"x12"	11	Rooms: 105, 110, 112, 113, 114, 115, 118, Pottery Pilot Plant, Stock Room #2

	Items	Quantity	Location
15.	Chart Cabinet, 26"x26"x56"	1	Room 110
16.	Sample Cabinet 18"x24"x56"	1	Room 110
17.	Shelves, 48"x13"x68"	16	Rooms: 113, Pottery Pilot Plant, Stock Room #1 and #2
18.	Shelves, 47"x13"x72"	23	Rooms: 105, 106, 111, 112, 113, 114, 115, Pottery and Stock Room #1
19.	Fume Hood	1	Room 109
20.	Stool, High and Low Steel	19	Rooms: 105, 106, 107, 108, 109, 110A, Balance Room, 111, 113, 114, 115, 116, Pottery Plant, Stock Room #2
21.	Blackboard with stand and wall blackboard	1 2	Room 112 Room 112 and Pottery Pilot Plant
22.	Lecture Chair	31	Library
23.	Map Stand with Frame	1	Room 112
24.	Telephone Table, 18"x12"x29"	4	Rooms: 102, 103, 104, Pottery Plant and Brick and Tile Plant
25.	Dictionary Stand, 23"x23"x48"	1	Library
26.	Divider (Counter) L-Type, 93"x73"x21"42"	1	Library

	Items	Quantity	Location
27.	Reading Table, 88"x36"x32"	3	Room 104, Library
28.	Card Catalogue, 45"x13"x50"	3	Library
29.	Book Shelves, 47"x12"x63"	4	Library
30.	Book Shelves, 47"x13"x72"	5	Library
31.	Magazine Rack, 41"x15"x50"	1	Library
32.	Storage Rack, 68"x25"x7"	3	Room 113

D. List of Office Furnitures Purchased:

	Items	Quantity	Location
1.	Senior Executive Table with chairs	3 sets	Rooms: 101, 102, 103
2.	Junior Executive Table with chairs	4 sets	Rooms: 104, 112, 112A, 11
3.	Office Table with chairs	20 sets	Rooms: 102, 104, 112, 112 118, Pottery Pilot Plant
4.	Clerical Table	5 sets	Rooms: 101, 102, 103, 112
5.	Armless Chair Stainless	19 pieces	Rooms: 103, 112, 113, 118, Library
6.	Stool (Plastic)	22 pieces	Rooms: 105, 106, 108, 109, 110, 110A, Balance Room, 111, 113, 117
7.	Classroom Chair	31 pieces	Library
8.	Conference Table with chairs	11 pieces	Room 103

II. Staffing

A. Authorized Positions:

		Number
1.	Permanent - - - - - - - - - -	30
2.	Contractual - - - - - - - - - -	55
3.	Emergency - - - - - - - - - -	23
	Total	108

B. Breakdown of Positions According to Levels:

Positions	Number	Filled-Up	Vacant
Senior Research Specialist	3	1	2
Research Specialist IV	6	6	
Research Specialist III	10	9	1
Research Specialist II	17	13	4
Research Specialist I	13	10	3
Research Assistant II	17	16	1
Administrative Assistant I	1	1	
Technician II	1	1	
Research Assistant I	8	7	1
Technician I	1	1	
Research Aide	5	4	1
Storekeeper II	1	1	
Driver	2	1	1
Emergency Employee	23	23	
Total	108	94	14

C. Present Composition of Staff

Title(s)	Number
Chemists	25
Chemical Engineers	14
Ceramic Engineers	2
Mining Engineer	1
Mechanical Engineers	4
Geologists	2
Industrial Education (Ceramic)	2
Industrial Education (Mechanical)	1
Social Workers	2
Technicians	13
Clerical	10
Storekeeper	1
Laborers	15
Total	94

III Provision of Budget

The following table shows the yearly appropriations and actual expenditures of the Philippine Government on the project.

Record of CRDC Appropriations and Actual Expenditures

	1980		1981		1982	
General Fund & GIA Projects	Appropriation	Actual Expenses	Appropriation	Actual Expenses	Appropriation	Actual Expenses *
Personal Services	₱ 630,000.00	₱629,553.86	₱ 630,000.00	₱571,809.57	₱ 719,007.00	₱67,950.83
Maintenance & Operating Expenses	₱ 390,000.00	₱386,570.71	₱ 415,000.00	₱414,026.04	₱ 400,000.00	₱72,090.49
Equipment	-	-	-	-	-	-
Capital Outlay	-	-	-	-	-	-
Counterpart Fund						
Personal Services	₱ 209,000.00		₱ 398,000.00	₱394,091.54	₱ 653,000.00	₱63,407.47
Maintenance & Operating Expenses	₱ 650,000.00		₱ 400,000.00	₱399,806.04	₱ 500,000.00	₱17,494.81
T O T A L	₱1,879,000.00	₱1,016,124.50	₱1,843,000.00	₱1,779,733.10	₱2,272,007.00	₱220,943.60

*As of April 30, 1982.

BUDGET APPROPRIATION AND ACTUAL EXPENDITURES FOR CERAMIC PROJECTS

	1977		1978		1979	
	Appropriation	Actual Expenses	Appropriations	Actual Expenses	Appropriations	Actual Expenses
General Fund Project	₱ 360,812.00	₱ 180,684.00	₱ 229,337.00	₱ 401,432.00	₱ 783,588.00	₱ 385,842.00
G.I.A. Projects	₱ 855,974.00	₱ 810,715.00	₱ 890,491.00	₱ 820,856.00	₱ 611,795.00	₱ 611,795.00
Equipment	-	₱ 57,870*	-	-	-	-
Counterpart Fund						
Maintenance and Operating Expenses	-	-	-	-	-	-
Capital Outlay	-	₱ 276,500.00*	₱ 900,000.00	-	₱ 900,000.00	₱ 512,101.00
T O T A L	₱ 1,216,785.00	₱1,325,769.00	₱2,219.828.00	₱ 1,222,288.00	₱2,295,353.00	₱ 1,509,738.00

IV. Organizational Structure and Efforts for Institutionalization

The present unofficial organizational structure of Ceramic Research and Development Center and distribution of personnel are shown in Figure 2 and Figure 3.

Since July 10, 1978, the day of official turnover of equipment from Japan International Cooperation Agency and the inaugural ceremony, the Ceramic Research and Development Center has been allowed to function internally as a Center. Thereafter, yearly budget proposals of the CRDC always included justifications for its official establishment as a Center within National Institute of Science and Technology. However, because of internal constraints within the NIST, it was not possible for NIST top management to pursue these proposals. Instead, upon appointment of the Chief of the Industrial Research Center, the Ceramic Research and Development Center was ordered to be officially known as the Inorganic Chemistry Research Department. Externally, however, because of the rapport we had already established with the private sector and other government agencies, the name of CRDC continued to be used by the outsiders.

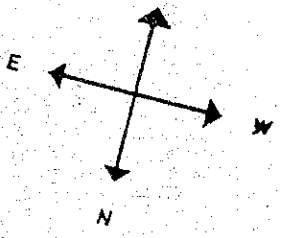
With the appointment of the new head of the reorganized National Science Development Board, now known as the National Science and Technology Authority (NSTA) there was new hope for the final institutionalization of Ceramic Research and Development Center. Thru his initial representation with the Committee of Reorganization, Presidential Executive Order No. 784 was finally issued on March 18, 1982. This Executive Order provides for the establishment of the Materials Science Research Institute (MSRI) with Ceramics Research as one of its main component.

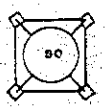
Implementation of this Executive Order, hopefully will be realized within the later half of 1982.

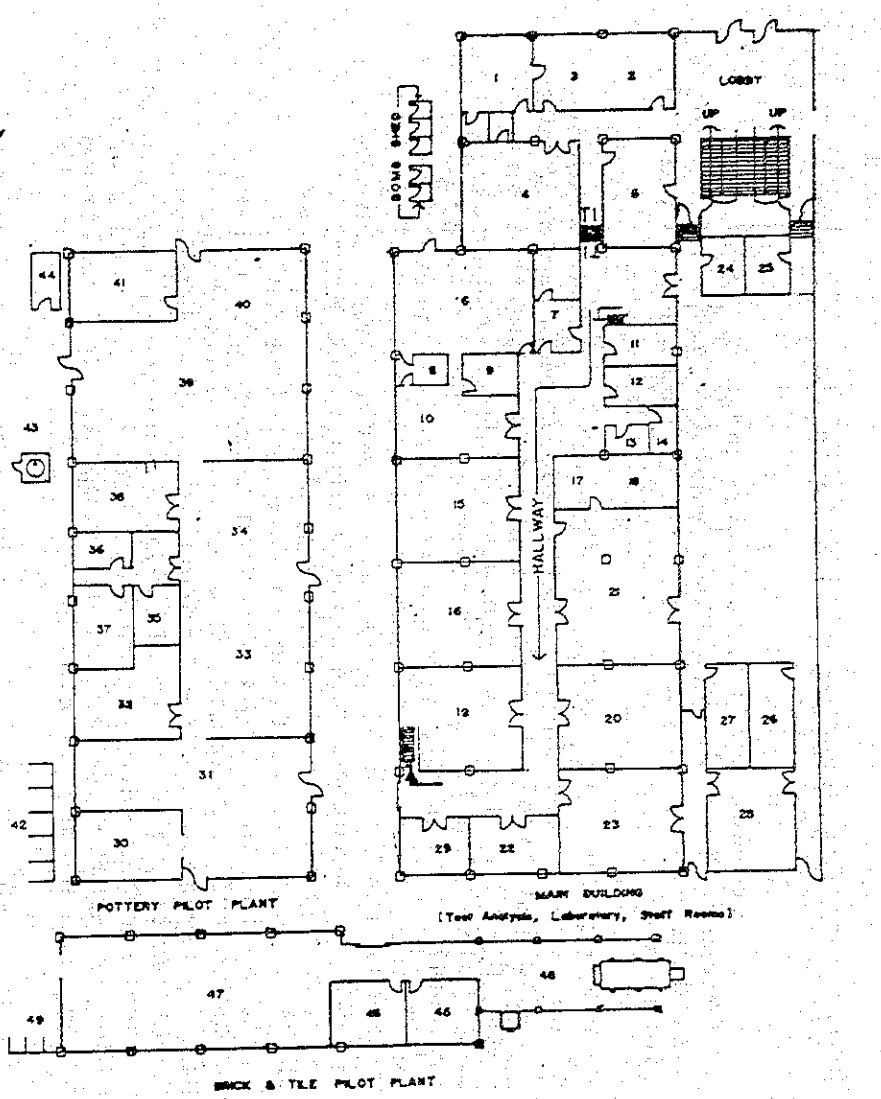
Figure 1

LEGEND:

1. DIRECTOR'S OFFICE
2. OFFICE OF THE PROGRAMMING & COORDINATING DEPT.
3. OFFICE OF THE CHIEF ADVISOR
4. CONFERENCE & DISPLAY ROOM
5. OFFICE OF THE TECHNICAL GUIDANCE DEPT.
6. CHEMICAL LABORATORY
7. DARK & COPY ROOM
8. BALANCE ROOM
9. MICROSCOPE ROOM
10. THERMAL TEST ROOM
11. X-RAY ROOM
12. SCANNING ELECTRON MICROSCOPE ROOM
13. STOCK ROOM FOR CONSTRUCTION MATERIALS 1
14. INFRARED ROOM
15. PHYSICAL TEST ROOM 1
16. SAMPLE PREPARATION ROOM
17. OFFICE OF SECTION HEADS, RESEARCH & DEV. DEPT.
18. OFFICE OF HEAD RESEARCH & DEV. DEPT.
19. LABORATORY 2
20. LABORATORY 1
21. STAFF ROOM RESEARCH & DEV. DEPT.
22. PHYSICAL TEST ROOM 2
23. KILN ROOM
24. LAVATORY (FEMALE)
25. LAVATORY (MALE)
26. SHOWER ROOM (MALE)
27. SHOWER ROOM (FEMALE)
28. STOCK ROOM FOR CONSTRUCTION MATERIALS 2
29. STAFF ROOM
30. WET PROCESSING SECTION
31. DRY PROCESSING SECTION
32. MOULD MAKING SECTION
33. FORMING SECTION
34. GLAZING SECTION
35. DARK ROOM
36. DECORATION ROOM
37. PRINTING ROOM
38. QUALITY CONTROL ROOM
39. DIESEL, GAS & ELECTRIC KILN SECTION
40. SAGGER SECTION
41. CARPENTRY SECTION
42. RAW MATERIALS STORAGE
43. DIESEL FUEL TANK SUPPLY
44. GAS FUEL TANK SUPPLY
45. TOOL/REPAIR ROOM
46. STAFF/LABORATORY ROOM
47. PROCESSING & FORMING AREA
48. KILN AREA
49. RED CLAY STORAGE
50. WATER STORAGE TANK SUPPLY







CRDC FLOOR PLAN

SCALE : 1: 250 MTS.

NATION