№

トルコ共和国
鉱山保安技術向上協力事業
巡回指導調査団報告書

1999年8月

国際協力事業団

鉱 開 二
ＪＲ
99－8

序　　文

トルコ共和国政府は、経済の自立促進、経済基盤強化及び産業発展と民生の向上の両立をめざし、1990年から始まった第６次経済社会開発５か年計画において、エネルギー資源の開発による経済政策の推進に力を注いでいます。

その一環としてトルコ共和国政府は、石炭の生産性向上に資するため、エネルギー・天然資源省の傘下のトルコ石炭公社において鉱山保安技術向上を推進することを計画し、我が国にプロジェクト方式技術協力を要請してきました。

この要請を受けて我が国政府は、国際協力事業団（JICA）を通じて1994年11月に事前調査団を派遣し、要請の背景、計画の妥当性、協力の規模などを調査し、その後さらに協力内容の詳細を詰めるための長期調査員の派遣を経て、1995年８月に実施協議調査団を派遣して討議議事録（Record of Discussions）の署名・交換を行いました。本プロジェクトは、同討議議事録に基づき、1995年11月１日から５年間にわたり技術協力を実施中です。

本プロジェクトは、開始後約３年７か月が経過したところで、現在までのプロジェクト活動と、実施体制の確認、プロジェクト実施上の問題点・要望などの調査を行うことを主な目的として、1999年６月７日から６月18日まで巡回指導調査団を派遣することとしました。

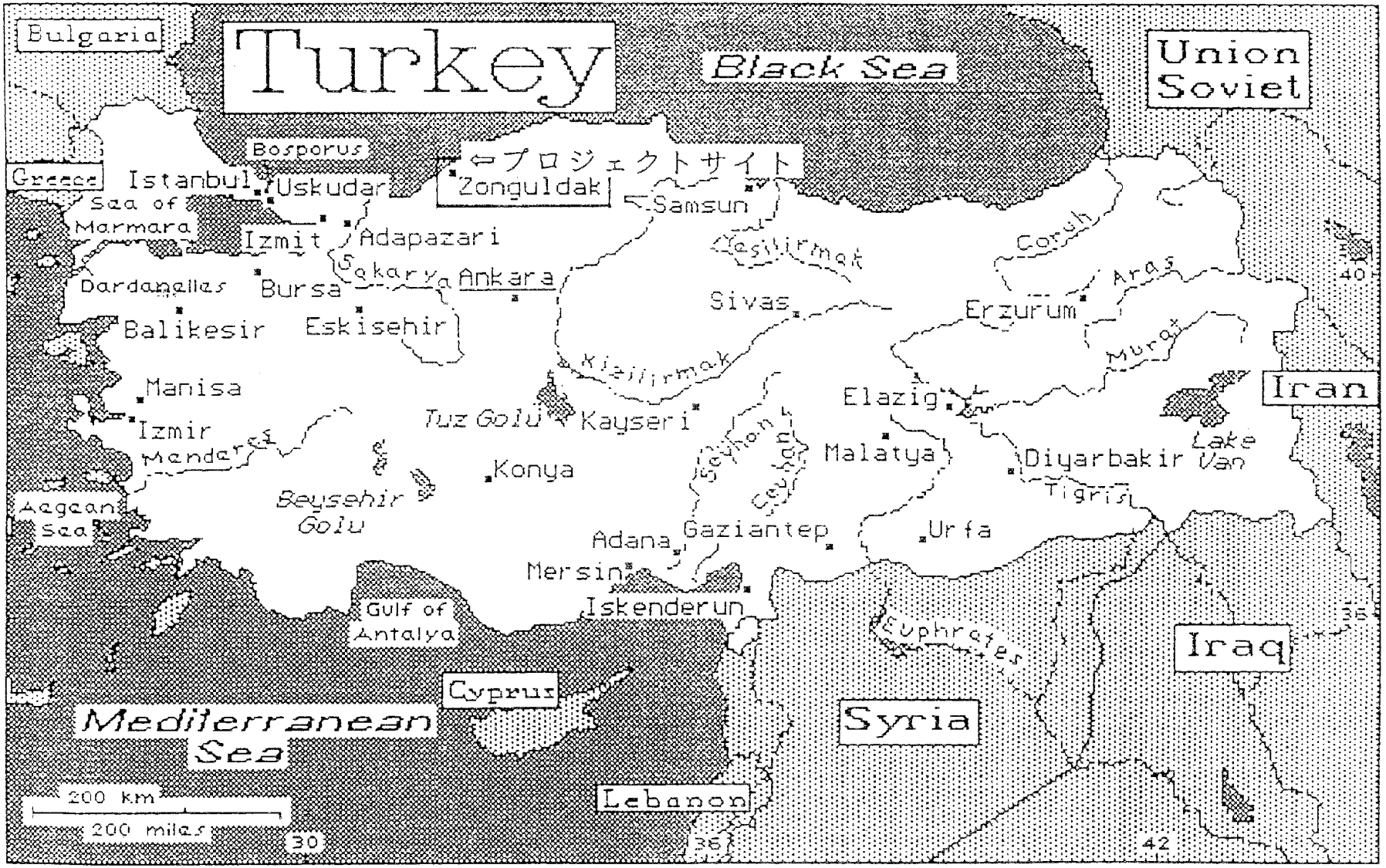
本報告書は、同調査団の調査結果を取りまとめたものです。ここに本調査団の派遣に関しご協力を頂いた日本及びトルコ両国の関係各位に対し、深甚の謝意を表するとともに、あわせて今後のご支援をお願いする次第です。

1999年８月

国際協力事業団
鉱工業開発協力部
部長　林　　典伸

写　　真

M／D署名・交換（左よりGunduz TTK保安部課長、Ismail TTK副総裁、
香室団長、宇多団員、山尾チーフアドバイザー）



プロジェクトサイト位置図

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第１章　巡回指導調査団の派遣

１－１　要請の背景及び経緯

(1) トルコ共和国の炭鉱では、1983年に死者103名を出すガス・炭塵爆発事故を起こして以来毎年20名ほどの死亡災害事故を繰り返しており、最近では1992年３月にゾングルダック地区のトルコ石炭公社（以下、「TTK」という）コズル炭鉱においてガス・炭塵爆発事故により死者265名を出す大惨事が発生した。このため、TTKは重大災害の低減と安全確保及び炭鉱の合理化・生産性向上を目的に、地質条件が類似し高度の炭鉱保安技術を有する我が国に対し、保安改善のために緊急に実施すべき重点項目について指導を受けるべく、1992年６月、我が国にプロジェクト方式技術協力を要請してきた。

(2) この要請に応えて我が国は1995年８月に実施協議調査団を派遣し、1995年11月１日より2000年10年31日まで５年間の協力期間で「トルコ鉱山保安技術向上協力事業」が開始されるに至った。

(3) 現在、実施計画に基づき1995年11月にチーフアドバイザー１名、技術専門家３名（保安管理技術担当／災害対策技術担当／保安機器技術担当)、業務調整員１名計５名の長期専門家が派遣し、当初計画された機材もほぼ供与され、セミナーや研修も実施されるなど順調に技術移転が進められている。

１－２　調査団派遣の目的

本プロジェクト開始から約３年６か月が経過したところ、今次調査では中間評価を行い、プロジェクトの進捗状況確認、プロジェクト実施上の問題点などについてトルコ側と協議を行うことを主な目的とする。

１－３　主要調査項目

(1) 中間評価

1）計画管理諸表（PO、APO）の作成

2）PDMの見直し

3）1999年６月の時点での中間評価表の作成

(2) プロジェクトの技術移転活動の確認及び見直し

1）暫定実施計画（TSI）進捗状況の確認及び見直し

① 日本側（専門家派遣、研修員受入、機材供与、ローカルコスト支援）

② トルコ側（建物・施設などの整備、組織、C/Pの配置、予算措置）

2）活動計画の確認

(3) プロジェクト実施・運営上の問題点についての協議

1）合同調整委員会

１－４　調査団の構成

氏　名	分　野	所　属
香室　修造	団長・総括	財団法人　石炭エネルギーセンター 国際協力部　部長
大村　倫久	技術協力政策	外務省　経済協力局　技術協力課 外務事務官
鯉江　雅人	技術協力計画	通商産業省　環境立地局 鉱山保安課　石炭保安室　通商産業技官
宇多　智之	プロジェクト運営管理	国際協力事業団　鉱工業開発協力部 鉱工業開発協力第二課　職員

１－５　調査日程　期間：1999年６月７日～1999年６月18日

日順	月日	曜日	スケジュール		宿泊
1	６/７	月	移動（成田13:00発→Frankfurt18:00着）JL407便		Frankfurt
2	６/８	火	移動（Frankfurt12:50発→Ankara16:55着）LH3488便		Ankara
3	６/９	水	JICAトルコ事務所打合せ 在トルコ日本大使館表敬 国家計画庁（SPO）表敬 エネルギー・天然資源省（MENR）打合せ		Ankara
4	６/10	木	移動（Ankara→Zonguldak） TTK表敬訪問 プロジェクトサイト視察（坑内外見学）		Zonguldak
5	６/11	金	トルコ側と協議（中間評価）		Zonguldak
6	６/12	土	移動（Zonguldak→Ankara） 資料整理	大村団員： 移動（Zonguldak→Ankara→空港） （Ankara17:50発→Frankfurt20:15着） LH3469便	Ankara
7	６/13	日	資料整理	（Frankfurt20:50発→	Ankara
8	６/14	月	トルコ側と協議（中間評価） M/D最終案作成	→成田14:55着）JL408便	Ankara
9	６/15	火	合同調整委員会 M/D署名式		Ankara
10	６/16	水	移動（Ankara17:50着→Frankfurt20:15発）LH3469便		Frankfurt
11	６/17	木	（Frankfurt20:50発→		機中
12	６/18	金	→成田14:55着）JL408便		

１－６　主要面談者リスト

＜トルコ側＞

(1) 国家計画庁（State Planning Organization：SPO）

Mr. Pinar Ozer	Expert

(2) エネルギー・天然資源省（Ministry of Energy and Natural Resources：MENR）

Mr. Mehmet Ali Turkoglu	Deputy Undersecretary

(3) トルコ石炭公社（Turkish Hard Coal Enterprise：TTK）

Mr. Ismail Verimbas	Assistant Director General
Mr. Yusuf Celik	Assistant Director General
Mr. Cetin Onur	Assistant Director General
Mr. Sami Inan	Assistant Director General
Mr. Ali Riza Akin	Assistant Director General
Mr. Mesut Ozturk	Head of Safety Department
Mr. Temel Cakir	Head of Planning Department
Mr. Mustafa Isbitiren	Mine Manager of Kozlu Colliery
Mr. Kaya Arslan	Mine Manager of Uzulmez Colliery
Mr. Hayrullah Cakmak	Mine Manager of Karadon Colliery
Mr. Osman Nuri Pekin	Mine Manager of Amasra Colliery
Mr. Fazil Ersoy	Mine Manager of Armtcuk Colliery
Mr. Gunduz Yerebasmaz	Research Manager of Safety Department

＜日本側＞

(1) 在トルコ日本国大使館

河南　正幸	二等書記官

(2) JICAトルコ事務所

米林　達郎	所長
大竹　茂	所員
Timur Sayrac	ローカルスタッフ

(3) トルコ鉱山保安技術向上派遣専門家

山尾　信一郎	チーフアドバイザー
阿部　吉夫	業務調整員
大西　彦輔	長期派遣専門家
一戸　千博	長期派遣専門家
坂口　敏則	長期派遣専門家

第２章　調査結果の概要

２－１　調査・協議項目、現状及び問題点、対処方針、調査結果

調査・協議項目	現状及び問題点	対処方針	調査結果
0　中間評価			
0-1　Project Cycle Management（PCM）手法	1998年３月の調査団派遣時にトルコ側に下記を説明している。	左記について、トルコ側に再度説明する。	左記についてトルコ側に説明し、理解を得た。
	1）プロジェクトの円滑な実施のため、すべてのプロジェクト方式技術協力案件に関し、PCMと呼ばれるプロジェクトの計画、モニタリング、評価手法が導入されている。 2）PCM導入に伴い、手法を具現化するため、PDMが作成されている。	（このマトリックス導入の）結果として、現在ではプロジェクトは投入重視ではなく、成果重視であることが求められている。 換言すると、専門家派遣、研修員受入、機材供与はプロジェクト方式技術協力を構成する３要素であるが、現在では専門家からC/Pへの技術移転の成果が重要視されており、他の２つ、すなわち研修員受入れと機材供与は技術移転を円滑に実施するための補完であると見なされている旨、トルコ側に説明し、M/Dに記載する。	左記についてトルコ側に説明し、理解を得、M/Dに記載した。
0-2　Project Design Matrix（PDM）手法		PDMに基づく運営管理手法及び評価手法（含む評価５項目）を説明し、トルコ側の理解を得、M/Dに記載する。	左記についてトルコ側に説明し、理解を得、M/Dに記載した。

調査・協議項目	現状及び問題点	対処方針	調査結果
0-3　終了時評価の手順	前回の調査団派遣時にプロジェクト終了前６か月を目途に終了時評価調査団を派遣して評価を実施する旨説明している。	以下の点をトルコ側に説明し、理解を得、M/Dに記載する。 1）評価の公正・中立性を確保するため、トルコ側評価チームはプロジェクトに直接参加していないメンバーを含む必要がある。同様の理由で、JICAは日本側評価チームの一員として、専任のコンサルタントを雇用する。 2）上記のコンサルタントは、評価に必要な情報を収集するために他の日本側評価チームメンバーに先立ちプロジェクトに派遣され、評価を実施するために必要な情報及びデータを収集し、評価グリッド案として取りまとめる。 3）上述のグリッド作成準備を含む評価は、PDMと評価５項目を基本として実施され、同５項目は評価の視点として活用される。 4）日本側評価チームの他のメンバーが派遣され、トルコ側評価チームとともに、成果品として合同評価報告書を作成する。	左記についてトルコ側に説明し、理解を得、M/Dに記載した。

調査・協議項目	現状及び問題点	対処方針	調査結果
1　計画管理諸表の見直し及び策定			
1-1　PDM	1995年９月に派遣された実施協議調査団において、PDMは確定されているものの指標と指標データ入手手段についてはC/P側と引き続き検討する余地がある。	PDM修正について、トルコ側と協議を行う。指標の具体的数値については炭坑災害発生数・被害者数、保安管理機材の導入数、保安教育及び救護隊訓練回数、石炭生産能率の案でC/P側と検討する。プロジェクト概要（プロジェクト目標、成果等）欄を修正する場合には、R/Dを修正することが必要になることについても理解を得たうえで、修正案をM/Dに添付する。	指標入手手段に生産能率、教育訓練回数等が検討されていたが、従来用いられていた指標の、災害統計、生産能率変成統計から読み込めることから、変更は行わず、指標に用いる各統計や資料を入手した。
1-2　活動計画（PO）	PDMの確定後、POを作成する必要がある。	左記について、トルコ側と協議し、作成したPOをM/Dに添付する。	左記について、トルコ側と協議し、作成したPOをM/Dに添付した。
1-3　年次活動計画（APO）	上記のPO作成に伴い、POに基づく年次ごとの活動を管理する資料としてAPOを作成する必要がある。	左記について、トルコ側と協議し、作成したAPOをM/Dに添付する。	左記について、トルコ側と協議し、作成したAPOをM/Dに添付する。

調査・協議項目	現状及び問題点	対処方針	調査結果
2　暫定実施計画(TSI)の進捗状況確認及び見直し （日本側） 2-1　専門家派遣 2-1-1　長期専門家	協力期間開始から1999年５月までの派遣実績と、各長期専門家の分野と任期は以下のとおりである。 ・チーフアドバイザー 山尾　信一郎 1995/10/30～1999/10/29 ・業務調整員 阿部　吉夫 1998/3/10～2000/3/9 ・保安管理 大西　彦輔 1995/10/30～1999/10/29 ・災害対策 一戸　千博 1997/10/5～1999/10/14 ・保安機器 坂口　敏則 1997/10/30～1999/10/29 （任期が終了した専門家については以下のとおりである。） ・業務調整員（大塚　彩子） 1995/10/30～1998/3/29 ・災害対策（富樫　弘治） 1995/10/30～1997/10/29 ・保安機器（高木　英夫） 1995/10/30～1997/10/29	左記の実績を確認し、M/Dに記載する。 1999年度内協力期間途中に任期満了となる専門家の任期延長の意向について聞き取り調査を行う。	左記の実績を確認し、M/Dに記載した。 長期専門家より、全員任期延長を１年間行いたい旨意向が表明された。 また、山尾チーフアドバイザーより各分野の業務詳細計画について説明があり、プロジェクト目標の達成のためには残りのプロジェクト期間についても各分野の専門家が必要であることが伝えられた。
	1999年度計画 1999年度は派遣されている専門家の交代時期にあたることから、PO、APOに基づき、長期専門家の役割（含む人数及び構成）を再検討し、1999年度以降の専門家派遣計画を作成する必要がある。	左記について、トルコ側と協議し、結果をM/Dに添付する。	PO、APOに基づき1999年度の専門家派遣計画の作成行い、M/Dに添付した。

調査・協議項目	現状及び問題点	対処方針	調査結果
2-1　専門家派遣 2-1-2　短期専門家	協力期間開始から1999年５月までの派遣実績と、各短期専門家の分野と任期は以下のとおりである。 1996年度 ・呼吸保護具管理技術（土井　卓士） 1996/7/9～1996/7/29 ・通気網解析技術（井上　雅弘） 1996/10/8～1996/11/2 1997年度 ・ガス警報器（鈴木　紀夫） 1997/9/1～1997/9/15 ・集中監視データ処理（千歳　恒盛） 1997/9/1～1997/10/15 ・集中監視データ処理（松瀬　和敏） 1997/9/1～1997/10/15 1998年度 ・保安総合管理（内野　健一） 1998/7/4～1998/7/15 ・坑内ガス分析（新谷　茂） 1999/1/30～1999/2/14 ・自然発火対策（樋口　澄志） 1999/3/6～1999/3/14	左記の実績を確認し、M/Dに記載する。	左記の実績を確認し、M/Dに記載した。
	1999年度計画については、1999年２月のリーダー会議の時点で以下の４名の要請がなされている。 ・集中監視技術 1999年６月 ・集中監視技術 1999年６月 ・教育・訓練技術 1999年10月 ・ガス炭塵爆発防止技術 2000年１月～２月	トルコ側要望を聴取しプロジェクトの全体計画も踏まえ派遣期間などを打合せのうえ、M/Dに記載する。	トルコ側とも調整のうえ、各分野の短期専門家の派遣期間を以下のように調整した。 ・集中監視技術２名 1999/6/1～ 1999/7/3 ・教育・訓練技術１名 1999/10/4～ 1999/10/15 ・ガス炭塵爆発防止技術１名 2000/1/17～ 2000/1/28

調査・協議項目	現状及び問題点	対処方針	調査結果
2-2　研修員受入	協力期間開始から1999年５月までの派遣実績と、各短期専門家の分野と任期は以下のとおりである。 1995年度 ・Mr. Hayrettin Soytas 1996/1/30～1996/2/16 ・Mr. Tugrul Muftuoglu 1996/1/30～1996/2/16 1996年度 ・Mr. Ali Yorulmaz 1996/8/31～1996/9/19 ・Mr. Ramazan Karaaslan 1996/8/31～1996/9/19 ・Mr. Kamal Rasit Kutlu 1996/8/31～1996/9/19 1997年度 ・Mr. Mesut Ozturk 1997/7/13～1997/8/9 ・Mr. Orhan Dalahmetoglu 1997/7/13～1997/8/9 ・Mr. Nurettin Eren 1997/7/13～1997/8/9 1998年度 ・Mr. Halim Bultan 1998/5/10～1998/6/6 ・Mr. Ilyas Yazicioglu 1998/5/10～1998/6/6 ・Ms. Sukran Bozkurt 1998/5/10～1998/6/6 1999年度計画については、リーダー会議の時点で保安管理技術、保安機器技術の分野から３名のC/P研修要請がなされている。候補者は以下のとおりである。 ・Mr. Cengiz Burma ・Mr. Ali Ozcan ・Mr. Ejder Erbay	左記の実績を確認し、M/Dに記載する。 トルコ側要望を聴取し研修の時期や内容などを打合せのうえ、M/Dに記載する。 受入時期は７月５日から８月４日まで、受入は北海道国際センターで行い、太平洋炭礦、松島炭鉱での保安管理を中心に研修する予定。	左記の実績を確認し、M/Dに記載した。 ７月５日から８月４日まで、左記の研修員候補者３名が来日する予定。主な研修項目は以下のとおりである。 ・通気、集中監視システムの研修 ・採炭切羽保安施設の研修 ・掘進切羽の保安施設の研修 ・坑内通信システムの研修 ・通気網解析の講義 ・救護隊、消火隊の研修

調査・協議項目	現状及び問題点	対処方針	調査結果
2-3　機材供与	協力期間開始から1999年５月までの機材供与の実績は以下のとおりである。 1995年度 <u>通気網解析システム</u> ・パーソナルコンピュータ　２台 ・プリンター　２台 ・A1インクジェットプロッター　１台 ・電源装置　２組 ・ソフトウェア　１式 ・ブック型パソコン　１台 2,300千円 <u>COマスク保守・管理システム</u> ・COマスク用呼吸模擬装置　１式 ・通気調整・加湿装置　２台 ・COガス分析計　２台 ・ガス温度測定装置　２台 ・精密微差圧計　１台 ・記録計　１台 ・濾煙能力試験機　１台 ・恒温恒湿槽　１台 ・振動試験器　１台 ・デジタル電子天秤　１台 ・定電圧電源装置　３台 58,700千円 <u>自己救命器保守・管理システム</u> ・呼吸模擬装置　１台 ・二酸化炭素ガス分析計　２台 ・ガス温度測定装置　２台 ・精密微差圧計　１台 ・記録計　２台 ・採気用ダグラスバッグ　１個 ・湿式ガスメーター　１台 ・U字型マノメーター　１台 ・人頭模型　１個 ・定電圧電源装置　３台 30,000千円 <u>業務用自動車</u> ・ランドクルーザー　１台 2,610千円 <u>1995年度合計　93,610千円</u>	左記の実績を確認し、M/Dに記載する。 協力期間開始後、現在までに供与した機材についての配置、維持管理状況及び利用状況を確認する。	左記の実績を確認し、M/Dに記載した。 本機材を使用し、これまで手計算で行ってきた通気網解析をC/P独力でコンピュータで計算可能となった。A1インクジェットプロッターが故障した際にもC/Pが独自で修理した。 本機材を使用した保安器機の保守・管理技術の技術移転は完了している。同機材を用いてコズル炭鉱以外でのTTKの炭鉱及びトルコ褐炭公社のマスクテストも行っている。 本機材を使用する分野における技術移転は完了している。故障等の問題は特にない。 有効に活用されている。燃料フィルターがトルコ国内で入手できなかったので、平成10年度に供与した。

調査・協議項目	現状及び問題点	対処方針	調査結果
2-3　機材供与	1996年度 ガス警報器／センサー保守管理システム ・ガス警報器検知素子試験装置　1台 ・低温恒湿器　1個 ・温度試験用ガス混合器　1式 ・検知遅れ試験装置　1式 ・交流電源装置　1台 ・直流電源装置　1台 ・外部出力機構検査装置　1式 ・減圧弁　3台 ・導線補償抵抗　3台 ・干渉型精密可燃性ガス検定機　4台 ・直立単管型精密マノメーター　2台 ・純水装置　1台 ・フォルタン水銀気圧計　1台 ・精密アネロイド気圧計　1台 ・アスマン通風乾湿計　1台 ・干渉型ガス検定整備用工具　1式 ・定電圧電源装置　2台 ・COガス漏れ警報機　2台 ・衝撃試験用具　2枚 20,728千円 集中監視データ処理システム ・中央監視盤　1式 ・防爆型ローカル局　5台 ・リピーター（中継器）　6台 ・低電圧電源装置　3台 40,300千円 入出坑者管理システム ・Main Processing Unit　1式 ・Data Collection System　1式 ・Card Processing System　1式 23,032千円 業務用ミニバス ・三菱ローザバス　1台 5,159千円 1996年度合計　89,219千円	左記の実績を確認し、M/Dに記載する。 協力期間開始後、現在までに供与した機材についての配置、維持管理状況及び利用状況を確認する。	左記の供与機材を確認した。配置、維持管理状況に問題はみられなかった。 ガス警報器／センサー保守管理システムについては、既に定期的な性能試験を実施しており、警報機の適正作動を図っている。 集中監視処理システムは、平成9年度の立ち上げの際にソフト的な整合性の問題があったが、現在はソフトの翻訳を含め、問題は解決したと判断される。 1997年度と2分割で納入された。当初納入分については先に設置された。 有効に活用されていることが確認できた。

調査・協議項目	現状及び問題点	対処方針	調査結果
2-3　機材供与	1997年度 自然発火対策システム／連続ガス分析システム ・ガスクロマトグラフ　1式 ・CO連続分析装置　1式 ・CO_2連続分析装置　1式 ・CH_4連続分析装置　1式 17,661千円 入出坑者管理システム追加機材 ・Main Processing Unit -Personnel Management Software -Payroll Module -Human Resources Module　1式 ・Data Collection System -Industrial Computer -RF Antenna -OS/2 Warp Server　1式 15,055千円 1997年度合計　32,716千円 1998年度 坑内通信システム ・主要機械装置　1式 ・工具と試験装置　1式 ・無線固定局、移動局　1式 47,672千円 集中監視システム追加機材 ・監視システムローカル局　1式 ・リピーター（中継器）　1式 ・中央監視盤用ソフト　1式 11,214千円 1998年度合計　58,886千円 供与機材総額合計　272,877千円 （平成11年５月現在） ・1999年度計画 既供与機材の保守並びに性能維持のため、スペアパーツの要請がなされると予測される。（計画額2,000千円）	左記の実績を確認し、M/Dに記載する。 協力期間開始後、現在までに供与した機材についての配置、維持管理状況及び利用状況を確認する。	左記の供与機材を確認した。配置、維持管理状況に問題はみられなかった。 本機材を使用した連続ガス分析システムは総排気を24時間体制で連続自動分析を行っており、坑内の状態が常に把握できる状態にある。野外設置用の機材であるにもかかわらず、堅固な小屋の中に設置されていた。 入出坑者管理システムについては、立坑口でのIDカードによる入出坑者自動管理態勢は確立されている。本装置のソフトのトルコ語への翻訳はC/P自体の手でなされた。 坑内通信システムは1999年４月に導入がなされた。保安技術の重要項目であり、残りのプロジェクト期間で技術移転がなされる予定。 追加のローカル局とリピーターを設置したことにより現在は-560mレベルまでの監視が可能となった。ガス監視、自然発火防止対策上のシステム導入は完了したといえる。 必要なスペアパーツの仕様書の作成は終了し、調達手続きに取りかかった。計画額等については本年２月のリーダー会議と変更なし。 合同調整委員会の場で、TTK副総裁よりショットクリート機材供与の要請が出されたが、予算上及び技術移転での必要性の観点より要請が承認される可能性は低い旨回答（持ち帰り検討）した。

調査・協議項目	現状及び問題点	対処方針	調査結果
2-4　現地業務費支援	1995年度実績：2,565千円 1996年度実績：3,300千円 1997年度実績：3,060千円 1998年度実績：2,969千円 1999年度実績：2,700千円	左記について予算対実績見通しを確認するとともに帳簿、証憑書類を確認する。	予算対実績見通し及び帳簿、証憑書類を確認した。1999年度は当初計画額どおり、2,700千円の支出見込みであることを確認した。

調査・協議項目	現状及び問題点	対処方針	調査結果
3　暫定実施計画(TSI)の進捗状況確認及び見直し (トルコ側)			
3-1　TTK組織	1999年４月18日に総選挙が行われ、関係省庁の人事異動があった。TTKの位置づけには変化がなく、プロジェクト実施には支障がない。	左記については詳細を確認する。	TTKの所轄がMENRから国務省（Ministry of State）に変更になった。 実際にTTKを担当する国務省大臣には組織的な裏付けがないことが判明。本所轄変更による影響は表面化していない。なお、MENRより従来と変わらない支援が約束されている。
3-2　建物施設などプロジェクトサイト基盤整備状況	1998年10月のプロジェクト活動状況報告書で確認した、供与機材の据えつけ、調整などに対応して、トルコ側が製作・工事及び供与・購入した資機材等は別紙資料に記載されているとおりである。	提供施設及び備品の活用状況を確認する。 また、機材全品目の配置図、保守管理状況及び利用状況を確認し、M/Dに記載する。 機材設置箇所の環境についても確認する。	施設及び備品の活用状況を確認し、M/Dに記載した。機材設置箇所の環境も確認したが、管理状態も問題なかった。多くの機材の修理もC/P自身の手で行われている。
3-3　C/P、職員の配置	1998年10月のプロジェクト活動状況報告書で確認したC/P配置状況は別紙資料に記載されているとおり。	左記について確認し、M/Dに記載する。 またC/Pの定着状況についても調査する。	C/Pの配置状況について確認し、M/Dに記載した。概略以下のとおりである。 保安管理技術：　18名 災害防止技術：　6名 保安用機器：　10名 PD、PM等管理職　3名 総計37名
3-4　ローカルコスト負担	1995年度実績：　2,990 million TL 1996年度実績：28,770 million TL 1997年度実績：27,930 million TL 1998年度実績：36,450 million TL 1999年度実績：30,000 million TL ※1999年１月のレートで、 1million TL　350円	1995、96、97、98年度実績、1999年度計画、並びに５年間全体の予算計画を確認し、M/Dに記載する。	各年度及び５年間全体の予算計画を確認し、M/Dに記載した。

調査・協議項目	現状及び問題点	対処方針	調査結果
4　その他 4-1　専門家の安全確認	1999年２月16日にクルド労働者党（PKK）の党首であるAbdullah Ocalan氏がケニアでトルコ当局に身柄拘束された後、トルコ国に移送された。このことからイスタンブール周辺を中心にPKK組織による断続的な報復テロ爆弾事件が発生している。外務省より３月19日付でトルコ国内全域に危険度１の「注意喚起」が発出された。ゾングルダック地域では幸いにして不穏な動きは認められていないとのこと。	左記については詳細を確認する。 専門家の安全を確認するとともに、危険地域への出張及び夜間の外出などを控えるように伝える。	調査団のトルコ滞在中は、アンカラ・ゾングルダックとも治安は大変落ち着いており、不穏な動きはまったくなかった。 在トルコ日本大使館より在留邦人を対象に発信された治安情報を入手した。直近においては、新たな治安情報を流すべき事態が発生していないことから、国内全域の危険度１を取り下げる見込みもあることを確認した。

２－２　PDMの指標

本プロジェクトPDMの指標データの入手手段として、現在以下のものが使用されている。

① Reduction of mine accidents in TTK.

② Improvement of safety facilities in TTK.

③ Improvement of mine appliances in TTK.

④ Productivity improvement based on the enhancement of safety technologies in TTK.

TTKは、統計類を非常によく整備しており、PDM指標として主に以下の統計が入手・利用が可能なことがわかった。

しかしながら、炭鉱別等の細かい統計はトルコ語のみの場合が多いので入手した資料は英語または日本語に訳することが必要である。

今回入手した資料：

・SAFETY REPORT ON TTK APRIL 1999（資料５、英語冊子）

・TTK ISGUVENLIGI DAIRE BASKANLIGI 1998 YILI FAALIYET RAPORU（トルコ語冊子）

(1) 災害統計

災害による死傷者数のみでなく、災害率（日本において一般的に使われている「百万時間当たり災害率」に該当すると思われる）についての統計もあり、各年を比較することが可能である。

災害統計の代表例としてTable Accident Analysesがある。この他に炭鉱別、負傷部位別、事由別などの統計も整備されている。よってPDMの指標入手手段である、「Accident statistics in TTK」は適切といえる。

(2) 保安設備の導入実績

トルコ側にて年度別の保安設備の導入実績がまとめられている。

保安設備の導入実績推移については、過去の資料を入手すれば把握可能である。また、JICAで作成している供与機材導入実績の統計及びPO、APOからも把握可能であり、PDMの指標入手手段である、「Achievement of improved mine safety facilities introduction into TTK」は適切といえる。

(3) その他の統計

救護訓練や水棚の設置数の統計が整備されている。

(4) その他

今回の調査で、①通気解析ソフト「風丸」が既にTTK傘下５炭鉱において利用されており、ソフトの利用方法や入手するデータの測定方法が充分移転されている点や、②COマスクについても、TTKが所有している分は既に試験を終了し、現在TTK傘下以外の褐炭鉱のものを試験しているなどプロジェクトチームの技術移転が順調に行われていることがわかったが、統計的なデータがとれる種類のものではないため、PDM指標としての数値データにはなりにくい。

２－３　治安状況及び専門家活動に係る安全確認

(1) 1999年３月、外務省海外危険情報の注意喚起（危険度１）が、イスタンブール及び南東部のみから全土へ対象地域を拡大し発令されたところ、経緯等については以下のとおりである。

1）1999年２月、オジャラン・クルド労働者党首領がトルコ当局により身柄を拘束されて以後、イスタンブール市内各地及び他地域にて爆弾テロ事件が散発している。

2）クルド労働者党はトルコ全土で爆弾や銃を使った活動を展開し、外国人観光客の安全は保障されないとの趣旨の声明を発表している。なお、同年３月より、トルコ国の主要都市は厳戒態勢に入った。

(2) 本件調査団は在トルコ日本大使館 河南正幸二等書記官より治安情勢につき情報を収集したところ、概要以下のとおりである。

1）上記(1)のとおり、1999年３月、対象地域を拡大し注意喚起（危険度１）が発令された。

2）邦人在留届の提出者については、上記 1）に際し、在トルコ日本大使館より治安情報を３～４回発信した。また、直近においては、新たな治安情報を流すべき事態が発生していない。

3）なお、直近において、イスタンブールにおき、ゲリラによる未遂事件も含めて何ら事件が発生していないところ、今後、見直しの是非につき検討を進める可能性がある。

4）なお、在トルコ日本大使館は治安情勢につき在イスタンブール日本総領事館と密接に連絡を取り合っている。

(3) 本件調査団はゾングルダック（プロジェクトサイトのある都市）の治安情勢等（６月９日現在）につき確認したところ、概要以下のとおりである。

1）現地滞在中、治安は大変落ち着いており、不穏な動きはまったくなかった。

2）本件プロジェクト・チーフアドバイザーより、ゾングルダックの治安は大変平静であり、何ら問題がない旨言及した。

3）滞在した宿泊施設において、同施設側より宿泊者に対して治安情勢・安全対策に係る特段の助言・注意等はなかった。

(4) 今後の専門家が講ずべき対策

JICAトルコ事務所、在トルコ日本大使館、在イスタンブール日本総領事館、現地関係機関より治安に係る最新情報を入手するとともに、以下の点に留意すること。

1）イスタンブールをはじめとする都市部において

① イスタンブールでは、不要な外出はできるだけ控え、夜間の外出は極力慎むこと。

② 置き去りにされたカバン、袋、包みなどの不審物を発見した場合は近づかないようにすること。また、（公園のイスの下など）周囲に不審なものがないか常に気を配ること。

③ 不特定多数の人が利用しており、警備上十分な対策が施されていない施設（公園、ショッピングセンターの駐車場、街頭の公衆便所など）や交通機関（市バス、市電など）の利用はできるだけ控えるとともに、できるだけ人混みに近づかないこと。

④ 街頭のゴミ箱には近づかないこと。

⑤ 治安当局機関（軍関係施設、警察署等）には、特に用務のない限り近づかないこと。

2）南東部地域等をはじめとする都市部以外の地域において

① 山間部及び僻地への旅行は極力避けること。

② 夜間（日没～日の出）の長距離（都市間）の移動は極力避けること。

③ 個人による徒歩及び車両による移動はなるべく避けること。

第３章　調査団所見

標記調査団は、標記プロジェクトの中間評価、進捗状況の確認及び全体活動計画の確認・見直しなどのため1999年６月８日から６月16日までトルコ国を訪問した。同調査団は、派遣前の対処方針に基づき、トルコ側関係部局との協議及び炭鉱現場の視察等も行った。

最終的には、1999年６月15日、アンカラで開かれた合同調整委員会の場において、日本・トルコ国双方による一連の協議結果を協議議事録として取りまとめ、トルコ石炭公社のイスマル・ベリンバス副総裁との間で署名・交換を行った。

本件調査結果の概要は以下のとおりである。

３－１　主要協議結果

(1) 中間評価

トルコ側は、本プロジェクトの進捗状況について十分満足しており、日本の技術移転について高い評価を与えている旨表明した。これまでのプロジェクトの活動・投入実績、個別活動状況、成果、問題点、波及効果などについておのおのの項目についてまとめ、評価を行った。中間評価表に結果をまとめたことにより、プロジェクトの進捗状況が明確化しただけでなく、今後１年半の協力期間内に重点的に行うための活動計画を作成する際の参考資料になった。

集中監視システムは、－560mレベルまでの監視が可能となり、ガス監視、自然発火防止対策上のシステム導入完了したと判断される。坑内のCH_4センサー、COセンサーの設置状況、維持管理状況も適切である。

入昇坑管理システムは、立坑口でのIDカードによる入昇者自動管理体制が確立されている。本装置のソフトのトルコ語への翻訳、改善・追加等は、カウンターパート自らが行っており、今後の自立発展性は可能と判断される。

通気制御技術は、九州大学井上助教授開発の「風丸Windows」を導入し、通気網解析を実施しているが、コズル炭鉱は、歴史が古く、坑内骨格構造が複雑な炭鉱であるため、これまで手計算で行ってきた通気網解析を、コンピュータで性格に実施できることになったことは、画期的なことである。今後はTTK以外の炭鉱への普及が期待される。

坑内通信技術は、トルコ国では初めての導入であり、坑内の生産・保安両面における飛躍的向上に寄与すると判断される。

自然発火防止技術は、総排気のCO、CO_2ガスの連続自動分析機と坑内ガス分析用のガスクロマトグラフの導入が完了し、分析が開始されている。今後、自立のためには分析技術、維持・管理技術について引き続き技術移転を行う必要がある。

ガス・炭塵爆発防止技術は、日本式の水棚式爆発伝播防止システムの技術移転を行い、完了している。従前のトルコ式爆発伝播防止システムは、ポリ製の箱型であったが、日本式の袋型は、爆発時の水拡散による消炎効果、伝播防止効果が大きく、災害発生予防効果が大である。

保安機器の保守・管理技術は、COマスク、O_2マスク、防塵マスクの性能試験システムの技術移転は完了している。コズル炭鉱のほか、TTKの他の炭鉱、褐炭公社の炭鉱の性能試験も実施している。マスク購入・交換時には、この試験結果を用いており、実用段階に入っている。

ガス警報機保守・管理技術は、定期的な性能試験を既に実施しており、警報機の適正作動を図っている。

これら技術移転、機材供与が実施され、コズル炭鉱のみならず、他の炭鉱にも普及している。技術的に自立は十分に達成されることと思われ、他炭鉱への普及が期待される。

(2) 終了時評価

プロジェクト終了６か月前を目途に行う終了時評価調査について、日本側、トルコ側双方の評価チーム編成、評価方法について説明、トルコ側の理解は得られた。

(3) プロジェクト・デザイン・マトリックス（PDM）

プロジェクト・デザイン・マトリックス（PDM）の各項目についての理解がトルコ側から得られた。指標入手手段として、生産能率、教育訓練回数等が検討されていたが、従来用いられていた指標の、災害統計、生産能率変遷統計の中に含まれることから、特に語句の変更は行わず、指標に用いる各統計や資料を入手した。

(4) 全体活動計画（PO）及び年次活動計画（APO）

PDMに基づく全体活動計画（PO）及び年次活動計画（APO）の作成を、トルコ側とともに行い、両者の合意が得られた。

(5) 暫定実施計画（TSI）の進捗状況

機材の供与及び設置､短期専門家派遣､カウンターパート研修などは順調に進捗している。他方、カウンターパート配置、サイト基盤整備、ローカルコスト負担等、トルコ側の責任範囲については、TTKの経済的困難な状況にもかかわらず、必要な投入が今年度もなされた。

(6) プロジェクト終了後のJICAとの継続的関係の維持

トルコ側より本プロジェクト終了後もJICAとの関係を引き続き継続し、長期専門家１名の派遣の希望が提案された。今時調査ではこれまでの技術移転進捗状況から、供与された機材の維持・管理、運営をトルコ側独自で行うことは、プロジェクト終了時点で可能な段階に達する見通しであることが確認されている。プロジェクト終了後の専門家の派遣については、来年度に予定されている終了時評価調査時点で最終的判断を行う必要がある。

３－２　その他プロジェクトの実施運営上の課題・留意点等

(1) 自然発火防止対策用コンクリート吹付け機供与

TTK傘下の炭鉱の炭層状況賦存状況、採炭条件等から自然発火発生の危険性が高く、その防止対策として、沿層（炭層）坑道にセメントモルタルを吹き付けるコンクリート吹付け機の供与の追加要請がなされた。しかしながら、本プロジェクトは４年目を迎え、当初計画の機材は昨年度までにほぼ供与が完了し､今年度はこれまでのスペアパーツのみの予算であり、技術移転に緊急かつ必要不可欠とは考えられず、当初計画外の本機材供与の要請は、非常に困難である旨説明した。

(2) 竣工式開催

1999年の７月に２名の短期専門家が集中監視システムの追加機材の設置のため、派遣されている。これをもって、当初計画の供与機材設置がすべて完了予定のため、1999年９月～10月の間に竣工式の実施が提案されている。日にちについては、この期間内で問題ない旨各機関の了承を得た。

(3) 治安問題

外務省より、現在トルコ国に対する危険度１の指定がなされているが、大使館、派遣専門家からの聞き取り調査によれば、アンカラ、ゾングルダック周辺での現状特段の治安上の問題点はないとのことである。しかし、今後ともより一層の情報収集など、危機管理体制の継続は必要である。

(4) カウンターパート

TTKのコズル炭鉱は、150年以上の歴史があり、組織的、技術的にはしっかりとしており、保安・生産両面での技術革新には非常に意欲的である。今後、石炭販売価格、民営化問題など直面する問題は多いが、長年にわたり蓄積された技術力によりプロジェクトの自立発展性は非常に高いと判断される。

(5) 炭鉱現場視察

コズル炭鉱に入坑し現場視察を行ったが、150年以上の歴史のある炭鉱で、立坑のほか主要坑道は堅固な構造で長い歴史を感じさせるものである。しかし長い歴史と複雑な地質条件とにより、坑内構造は広範な採掘エリア、長い維持坑道長、複雑に入り組んだ骨格構造となっている。このため坑内整備に多大な塵を必要としており、生産コストアップ要因となっていることがうかがえる。

なお炭層賦存状況が急傾斜であることから、採掘深度の急激な深部化が避けられない。今後はこの採掘エリアの集約、維持坑道長の短縮を図り、人員の削減、コストの低減を図っていくことが、炭鉱経営としての課題である。

(6) プロジェクトの評価

本プロジェクトは計画段階から到達目標がきちんと定められ、プロジェクト運営管理が厳しくなされており、リーダーの統率のもと派遣各専門家がそれぞれの役割分野の計画どおり達成しているため、トルコ側のプロジェクトに対する評価は非常に高いものがある。

資　　料

１．Minutes of Discussions

２．Midterm Evaluation Report

３．和文中間評価表

４．1999年6月15日開催　合同調整委員会配布資料

５．SAFETY REPORT ON TTK（1999年４月発行）

MINUTES OF DISCUSSIONS
BETWEEN THE JAPANESE ADVISORY TEAM
AND
THE AUTHORITIES CONCERNED OF THE GOVERNMENT OF TURKEY
ON THE JAPANESE TECHNICAL COOPERATION
FOR
THE PROJECT ON THE IMPROVEMENT OF MINE SAFETY TECHNOLOGIES
IN
THE REPUBLIC OF TURKEY

The Japanese Advisory Team (hereinafter referred to as "the Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Shuzo Kamuro, General Manager, International Cooperation Department, Japan Coal Energy Center, visited the Republic of Turkey from June 8 to June 16, for the purpose of monitoring and reviewing the activities and of formulating further operational plans for the project on the Improvement of Mine Safety Technologies (hereinafter referred to as "the Project").

During its stay in the Republic of Turkey, the Team had a series of discussions and exchanged views with the Turkish authorities over the matters for the successful implementation of the Project.

As a result of the discussions, both sides reached a common understanding concerning the matters referred to in the document attached hereto.

Ankara, June 15, 1999

Shuzo Kamuro
Leader
Advisory Team
Japan International Cooperation Agency
Japan

İsmail Verimbaş
Acting Director General
Turkish Hard Coal Enterprise

The Republic of Turkey

ATTACHED DOCUMENT

1. Joint Evaluation and Five (5) Basic Evaluation Component

(1) Joint Final Evaluation

The Team reaffirmed and the Turkish side understood that in the final year of the Project, usually six (6) months before the termination of the Project, final evaluation would be conducted to examine the level of achievement of the objectives from the aspects as mentioned in the next section. It will be a joint evaluation by the Japanese evaluation team dispatched by JICA and the Turkish evaluation team, as stipulated in the Record of Discussions signed on September 8, 1995 (hereinafter referred to as "R/D").

In this connection, the Team further explained to the Turkish side that the membership of the latter's evaluation team should consist of the persons who were not directly involved in the Project to secure the fairness of the said evaluation.

(2) Five Basic Evaluation Components

The Team explained and the Turkish side understood that in the final evaluation, the Project will be evaluated from the five aspects as described in ANNEX 1 is of significance in this regard.

2. Confirmation of the Project Design Matrix (PDM)

Based on the basic logic that PDM inheres as shown in ANNEX 2.

Through discussions on propriety of overall goal, project purpose, outputs and activities, as well as availability of indicators, means of verification, and important assumptions, both sides confirmed the PDM as shown in ANNEX 3.

Both side further confirmed that the PDM might be reviewed with the progress of the Project by the time of final evaluation.

3. Plan of Operation (PO) and Annual Plan of Operation (APO)

Both sides confirmed the Plan of Operation which describes the contents and the schedule of implementation of the Project is as shown in ANNEX 4. Annual Plan of Operation in Japanese Fiscal Year 1998, 1999 and 2000 are as shown in ANNEX 5.

4. Review and Revision of Tentative Schedule of Implementation (TSI)

Based upon the reviews and of current activities and future work plan for the Project, both sides confirmed the revised Tentative Schedule of Implementation (TSI) as shown in ANNEX 6.

5. Input by the Turkish side

(1) Buildings, Facilities, Machinery and Equipment

Both sides confirmed that the preparation of buildings and facilities by the Turkish side for the Project was timely and appropriate.

(2) Maintenance and Repair of Machinery and Equipment

Both sides confirmed the importance of maintenance condition of machinery and equipment and timely supply of spare parts and repairs of machinery and equipment.

(3) Assignment of Counterpart for the Project

Both sides confirmed the assignment of C/P is as shown in ANNEX 7.

(4) Budget Plan of TTK for the Project

Both sides confirmed the budget plan on TTK expenses is as shown in ANNEX 8.

6. Input by the Japanese side

(1) Dispatch of Experts

Both sides confirmed the record of dispatch of the Japanese experts to date as shown in ANNEX 9.

(2) Counterpart Training in Japan

Both sides confirmed the record of C/P training in Japan to date as shown in ANNEX 10.

(3) Provision of Machinery and Equipment

Both sides confirmed the record of provision of machinery and equipment by field of technical cooperation to date as shown in ANNEX 11.

7. Request by the Turkish side

The Turkish side strongly requested JICA to provide a Japanese expert to support the successful sustainability after the completion of the Project.

8. Attendance in the Meetings

The attendants of the meetings are as shown in ANNEX 12.

ANNEX 1 The Five (5) Basic Evaluation Components

1 Five Basic Evaluation Components

The five basic components defined by JICA as mentioned below are in line with those used for the evaluation works by Development Assistant Committee (DAC) of Organization for Economic Cooperation and Development (OECD) and other international assistant organization. Introduction of these components has enabled a consistent, well-balanced evaluation, which minimizes evaluator bias. Further, it allows us to share the results, knowledge and lessons with other aid organizations, since we are using common components and can discuss with them from the same viewpoints.

(1) Efficiency

Evaluate the method, procedure, term and cost of the project with a view to productivity.

(2) Effectiveness

Evaluate the results in comparison with the goals (or revised ones) defined at the initial or intermediate stage, and evaluate the attributes (factors and conditions) of the results.

(3) Impact

Evaluate the positive and negative effects of the project, extent of the effect and beneficiaries.

(4) Relevance

Preliminary evaluate whether the needs in the country have been correctly identified, and whether the design is consistent with the national and/or master plan.

(5) Sustainability

Evaluate the autonomy and sustainability of the project after the termination of cooperation, from the perspectives of operation, management, economy, finance and technology.

2 Relation between Five Basic Components and PDM

The five components are used for the evaluation and a selection of a project.

These components are directly connected to the elements of PDM as shown in the Figure in the following page.

(1) Efficiency

The component "Efficiency" is a measure to qualitatively and quantitatively compare all resource (input) to the results (output) of the project in order to evaluate the economic efficiency of conversion from input to output.

(2) Effectiveness

The component "Effectiveness" is a measure to evaluate whether the project purpose has been achieved or not, or to evaluate how much the outputs contributed to the achievement of the project purpose, or to evaluate whether or not the characteristics of the outputs were as expected.

(3) Impact

The component "Impact" is a foreseeable or unforeseeable, and a favorable or adverse effect of the project upon society. The evaluate impact, both the overall goal and project purpose should be referred to in the beginning of the evaluation. Evaluation with this components could lead to more than the confirmation as whether or not the overall goal have been obtained. Evaluation with this component requires comprehensive surveys in many cases.

(4) Relevance

The component "Relevance" is to comprehensively evaluate whether or not the project meets the overall goal, politics of both the donor and recipient, local needs and given priority levels, in order to decide whether the project should be continued, reformulated or terminated.

(5) Sustainability

The component "Sustainability" is to comprehensively evaluate how long the favorable effect as a result of the project can continue after the project has been terminated. Evaluation with this component is required to decide how much the local resources should continue to be used for the project, and to evaluate how much the country receiving the assistance has been considering important. According to OECD (1989), "Sustainability" is a component to be used for the final test of the success of a development project.

All five components are essential for any of the projects or programs. The five components give necessary information to the decision maker so that he/she can decide how to approach the next step. Since each of the five components build on the intervention strategy, they also lay the foundation for standardization in monitoring and information handling within and among organizations and agencies.

In practice, each of the five components should also contain project-specific information.

ANNEX 2 What is PDM (Project Design Matrix)?

PDM is a worksheet - a tool to view a project based on an assumption - designed to analyze a multi-level chain of cause-to-effect: activities with input to output, output to project purpose, project purpose to overall goal. Because PDM explicitly showing the interrelation among the chain elements (input, output, project purpose and overall goals) can be used as a tool to evaluate whether or not the goals have been obtained either during or after the project, it is now being used as a framework for evaluation.

PDM is a tool for management-by-objective. The matrix table of PDM should thus have been created in the design stage of a project, not at the stage of evaluation.

PDM has the following features:

1) It can clearly describe the overall goal, project purpose, output and input.
2) It can clearly describe the relation between any of the interconnected two of the above mentioned four elements. Namely, it can describe the structure (vertical logic) of the project.
3) It can clearly describe the indicators, means-of-verification and assumptions, and the interrelation (horizontal logic) among them as a scale for measuring the status (progression) of the project.

ANNEX 3 Project Design Matrix (PDM) of the Project on the Improvement of Mine Safety Technologies
Target Group: The technical staff of Turkish Hard Coal Enterprise

Narrative Summary	Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal Reduction of mine accidents	(1) Reduction of accident rates (2) Pervasion of the outputs from the Project	(1) Accident statistics (2) Achievement of advice,information offers, seminars and manual presentation etc, for pervasion of safety technologies	
Project Purpose The prevention technologies for mine accidents in TTK will be enhanced	(1) Reduction of mine accidents in TTK (2) Improvement of safety facilities in TTK (3) Improvement of mine appliances in TTK (4) Productivity improvement based on the enhancement of safety technologies in TTK	(1) Accident statistics in TTK (2) Achievement of improved mine safety facilities introduction into TTK (3) Transition statistics of safety appliances used in TTK (4) Statistics of productivity	(1) MENR promotes the pervasion of TTK mine safety technologies to other mines
Outputs (1) Mine safety management and control technologies are improved (2) Accident prevention technologies are improved (3) Maintenance and examination technologies for mine appliances are established (4) Education and training technologies are improved	(1) Indicators here coincide with each item of the project activities (2) TTK mine engineers become more capable and knowledgeable in mine safety technologies	(1) Numerical appraisal of the attainment level for each item described in the Project Activities (2) Affirmation of safety improvement after the introduction of developed technologies	(1) Demonstration of the developed mine safety technologies in the practical cases (2) TTK gives opportunity to as many mine engineers and miners as possible to join the training and demonstration
Activities 1)-1 Developing the appropriate technologies of central monitoring 1)-2 Developing the appropriate technologies of checking for going in -and -out workers 1)-3 Developing the appropriate technologies of ventilation control 1)-4 Developing the appropriate technologies of underground communication 2)-1 Developing the appropriate technologies of spontaneous combustion prevention 2)-2 Developing the appropriate technologies of gas and/or coal dust explosion prevention 2)-3 Developing the appropriate technologies of mine fire prevention 2)-4 Developing the appropriate technologies of degasfication 3)-1 Developing the appropriate technologies of breathing apparatuses 3)-2 Developing the appropriate technologies of gas detectors 3)-3 Developing the appropriate technologies of flame-proof machinery 4) Developing the appropriate safety and rescue education program and its materials	Inputs Japanese side (1) Dispatch of Long Term Experts a. Chief Advisor b. Coordinator c. General Mine Safety d. Accident Prevention e. Mine Appliances (2) Dispatch of Short Term Experts in the field of: a. General Mine Safety Technologies b. Accident Prevention Technologies c. Mine Safety Appliances Technologies d. Education and Training Technologies e. Computer System Engineering (3) Counterpart Training in Japan a. General Mine Safety 1 month x 5 persons b. Accident Prevention 1 month x 5 persons c. Mine Safety Appliances 1 month x 3 persons d. Education and Training 1 month x 2 persons (4) Provision of machinery, equipment and materials a. Central monitoring data processing system b. Checking system of going in-and-out workers c. Underground communication system d. Spontaneous combustion combating system e. CO mask examination system f. Self-rescuer examination system g. Ventilation network analysis system h. Gas alarm/sensor examination system i. Vehicle(s) for local transport of experts j. Other necessary equipment for the Project	Turkish Side (1) Allocation of secure qualified personnel required (2) Provision of machinery, equipment and materials necessary for implementation of the Project other than provided by Japanese side (3) Preparing of all the basic infrastructure for laboratory works and civil works (4) Privileges, exemption and other facilities for Japanese experts	**Pre-conditions** (1) Turkish Government recognizes the necessity of the Project and makes it a national authorized one in the National Development Plan

ANNEX 4 Plan of Operation (PO) Project on the Improvement of Mine Safety Technologies

Calendar Year	95	1996				1997				1998				1999				2000				A person in charge	Inputs	
Fiscal year(*)	1995		1996				1997				1998				1999				2000					Japanese side	Turkish side
Quarter	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III			
Term of Technical Cooperation	–	–	–	▲	–	–	–	–	–	▲	–	–	–	–	–	▲	–	–	▲	–	–			
1. Mine safety management and control technologies are to be improved																								
1)-1 Developing the appropriate technologies of central monitoring						–	–	–	–	–	–	–	–	–	–	–	–	–				PM	LE	C/P
1)-2 Developing the appropriate technologies of checking workers going in-and-out						–	–	–	–	–	–	–	–	–	–	–	–	–				PM CA	LE	C/P
1)-3 Developing the appropriate technologies of ventilation control	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–			PM	LE	C/P
1)-4 Developing the appropriate technologies of underground communication										–	–	–	–	–	–	–	–	–	–	–	–	PM CA	LE	C/P
2. Accident prevention technologies are to be improved																								
2)-1 Developing the appropriate technologies of of spontaneous combustion prevention										–	–	–	–	–	–	–	–	–	–	–	–	PM CA	SE LE	C/P
2)-2 Developing the appropriate technologies of gas and/or coal dust explosion prevention						–	–	–	–	–	–	–	–	–	–	–	–	–				PM	SE LE	C/P
2)-3 Developing the appropriate technologies of mine fire prevention										–	–	–	–	–	–	–	–	–	–	–	–	PM	SE LE	C/P
2)-4 Developing the appropriate technologies of degasification													–	–	–	–	–	–	–	–	–	PM	SE LE	C/P
3. Maintenance and examination technologies for mine appliances are to be established																								
3)-1 Developing the appropriate technologies of of breathing apparatuses	–	–	–	–	–	–	–	–	–	–	–	–	–	–								PM CA	CA SE LE	C/P
3)-2 Developing the appropriate technologies of gas detectors			–	–	–	–	–	–	–	–	–	–	–	–								PM CA	CA SE LE	C/P
3)-3 Developing the appropriate technologies of flame proof machinery	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	PM	SE LE	C/P
4. Education and training technologies are to be improved																								
4)-1 Developing an appropriate safety and rescue education program and its materials											–	–	–	–	–	–	–	–	–	–	–	PM	SE LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March.

– Technical transfer and guidance ▲ Mission Team

PM Project Manager CA Chief Advisor LE Long term Expert
C/P Counterpart SE Short term Expert

ANNEX 5

1. Mine safety management and control technologies are to be improved

Project on the Improvement of Mine Safety Technologies

Annual Plan of Operation (APO)

Year of 1998

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1998												1999			A person in charge	Inputs	
	1997			1998													Japanese side	Turkish side
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
	–	–	▲	–	–	–	–	–	–	–	–	–	–	–	–			
1)-1 Developing the appropriate technologies of central monitoring																PM	LE	C/P
· Seminar on General Mine Safety Management							◎										SE	
· Preparation for the introducing equipment	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
· Setting up the system & giving instruction of operation procedure	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
1)-2Developing the appropriate technologies of checking workers going in and out																PM CA	LE	C/P
· Making the operation manual													□				LE	C/P
· Setting up the system & giving instruction of operation procedure	–	–	–	–	–		–	–	–	–	–	–	–	–	–		LE	C/P
1)-3 Developing the appropriate technologies of ventilation control																PM	LE	C/P
· Giving advice of ventilation analysis	–	–	–	–	–	–	–	–	–	–		–	–	–	–		LE	C/P
1)-4 Developing the appropriate technologies of underground communication																PM CA	LE	C/P
· Installation of the equipment															△		LE	C/P
· Setting up the system & giving instruction of operation procedure	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March.

– Technical transfer and guidance
▲ Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipmen

PM Project Manager
C/P Counterpart
CA Chief Advisor
LE Long term Expert
SE Short term Expert

2. Accident prevention technologies are to be improved

Year of 1998

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1998											1999				A person in charge	Inputs	
	1997		1998														Japanese side	Turkish side
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
	—	—	▲	—	—	—	—	—	—	—	—	—	—	—	—			
2)-1 Developing the appropriate technologies of spontaneous combustion prevention																PM CA	LE	C/P
· Seminar on the technologies of spontaneous combustion prevention															◎		SE	
· Setting up of the equipment & making the operation manual														△	□		SE LE	
· Instruction of the operation procedure of the equipment & analysis method	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		LE	C/P
2)-2Developing the appropriate technologies of gas and/or coal dust explosion prevention																PM	SE LE	C/P
· Counseling on the coal dust explosion prevention	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		LE	C/P
· Counseling on the gas explosion prevention	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		LE	C/P
2)-3 Developing the appropriate technologies of mine fire prevention																PM	LE	C/P
· Counseling on the electric fire prevention & fire extingushing facilities	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		LE	C/P
2)-4 Developing the appropriate technologies of degasification																PM	LE	C/P
· Counseling on the degasification method	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—		LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March.

— Technical transfer and guidance
▲ Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart

CA Chief Advisor
LE Long term Expert
SE Short term Expert

3. Maintenance and examination technologies for mine appliances are to be improved

Year of 1998

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1998												1999			A person in charge	Inputs	
	1997		1998														Japanese side	Turkish side
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
	–	–	▲	–	–	–	–	–	–	–	–	–	–	–	–			
3)-1 Developing the appropriate technologies of breathing apparatuses																PM CA	CA LE	C/P
· Counseling on the self rescuer test procedure	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
· Instruction on the dust mask test procedure	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
3)-2Developing the appropriate technologies of gas detectors																PM CA	CA LE	C/P
· Instruction on the gas alarm/sensor test procedure	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
3)-3 Developing the appropriate technologies of flame-proof machinery																PM	LE	C/P
· Instruction and management of the flame-proof machinery	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March.

– Technical transfer and guidance
▲ Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart

CA Chief Advisor
LE Long term Expert
SE Short term Expert

4. Education and training technologies

Year of 1998

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1998												1999			A person in charge	Inputs	
	1997			1998														
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		Japanese side	Turkish side
	–	–	▲	–	–	–	–	–	–	–	–	–	–	–	–			
4)-1 Developing the appropriate safety and rescue education program and its materials																PM CA	SE LE	C/P
· Instruction on the safety apparatus technologies				–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March.

-- Technical transfer and guidance
▲ Mission Team
◎ Seminar
□ Makingf Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart

CA Chief Advisor
LE Long term Expert
SE Short term Expert

Project on the Improvement of Mine Safety Technologies

Annual Plan of Operation (APO)

Year of 1999

1. Mine safety management and control technologies are to be improved

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1999												2000			A person in charge	Inputs	
	1998			1999													Japanese side	Turkish side
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
	–	–	–	–	–	▲	–	–	–	–	–	–	–	–	–			
1)-1 Developing the appropriate technologies of central monitoring																PM	LE	C/P
· Installation of the additional equipment					△												SE	
· Making the operation manual						□											LE	C/P
· Setting up of the system & instruction on the operation procedure	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
1)-2 Developing the appropriate technologies of checking workers going in and out																PM CA	LE	C/P
· Making the operation manual	□																LE	C/P
· Setting up of the system & counseling on the operation procedure	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
1)-3 Developing the appropriate technologies of ventilation control																PM	LE	C/P
· Instruction in the improvement of ventilation	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
1)-4 Developing the appropriate technologies of underground communication																PM CA	LE	C/P
· Setting up the equipment			△														LE	C/P
· Making the operation manual				□													LE	C/P
· Setting up the system & counseling on the operation procedure	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March

– Technical transfer and guidance
▲ Visiting Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipment
PM Project Manager
C/P Counterpart
CA Chief Advisor
LE Long term Expert
SE Short term Expert

2. Accident prevention technologies are to be improved

Year of 1999

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1999												2000			A person in charge	Inputs	
	1998			1999													Japanese side	Turkish side
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
	–	–	–	–	–	▲	–	–	–	–	–	–	–	–	–			
2)-1 Developing the appropriate technologies of spontaneous combustion prevention																PM CA	LE	C/P
· Seminar on the technologies of spontaneous combustion prevention			◎														SE	
· Setting up the equipment & Making the operation manual		△	□														SE LE	
· Instruction of the operation procedure of the equipment & analysis method	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
2)-2Developing the appropriate technologies of gas and/or coal dust explosion prevention																PM	SE LE	C/P
· Seminar on gas and/or coal dust explosion prevention													◎				SE	
· Counseling on the coal dust explosion prevention	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
· Counseling on the gas explosion prevention	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
2)-3 Developing the appropriate technologies of mine fire prevention																PM	LE	C/P
· Seminar on the mine fire prevention									◎								SE	
· Counseling on the electric fire prevention & fire extinguishing facilities	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
2)-4 Developing the appropriate technologies of degasification																PM	SE LE	C/P
· Counseling on the degasification method	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P

Note:(*) Japanese fiscal year stars in April and ends in March

– Technical transfer and guidance
▲ Visiting Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart

CA Chief Advisor
LE Long term Expert
SE Short term Expert

3. Maintenance and examination technologies for mine appliances are to be established

Year of 1999

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1999												2000			A person in charge	Inputs	
	1998			1999													Japanese side	Turkish side
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
	–	–	–	–	–	▲	–	–	–	–	–	–	–	–	–			
3) 1 Developing the appropriate technologies of breathing apparatuses																PM CA	CA LE	C/P
· Seminar on the breathing apparatuses maintenance																	SE	
· Counseling on the self rescuer test procedure	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
· Instruction of the dust mask test procedure		–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P
3) 2Developing the appropriate technologies of gas detectors																PM CA	CA LE	C/P
· Instruction of the gas alarm/sensor test procedure	–	–															LE	C/P
3) 3 Developing the appropriate technologies of flame-proof machinery																PM	LE	C/P
· Instruction and management of the flame-proof machinery	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P

Note:(*) Japanese fiscal year starts in April and ends in March.

– Technical transfer and guidance
▲ Visiting Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart

CA Chief Advisor
LE Long term Expert
SE Short term Expert

4. Education and training technologies are to be improved

Year of 1999

Calendar Year	1999												2000			A person in charge	Inputs	
Fiscal year(*)	1998			1999													Japanese side	Turkish side
Month	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3			
Term of Technical Cooperation	–	–	–	–	–	▲	–	–	–	–	–	–	–	–	–			
4)-1 Developing an appropriate safety and rescue education program and its materials																PM CA	SE LE	C/P
· Seminar on the safety and rescue education										◎							SE	
· Instruction of the sefety apparatus technologies	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–		LE	C/P

Note:(*) Japanese fiscal year starts in April and ends in March.

– Technical transfer and guidance
▲ Visiting Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart

CA Chief Advisor
LE Long term Expert
SE Short term Expert

Project on the Improvement of Mine Safety Technologies

Annual Plan of Operation (APO)

Year of 2000

1. Mine safety management and control technologies are to be improved

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1999			2000												A person in charge	Inputs	
	1999			2000													Japanese side	Turkish side
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12			
	–	–	–	–	–		–	▲	–	–	–	–	–					
1)-1 Developing the appropriate technologies of central monitoring																PM	LE	C/P
· Setting up of the system & Instruction on the operation procedure		–	–	–	–	–											LE	C/P
1)-2Developing the appropriate technologies of checking workers going in and out																PM CA	LE	C/P
· Setting up of the system & counseling on the operation procedure	–	–	–	–	–												LE	C/P
1)-3 Developing the appropriate technologies of ventilation control																PM	LE	C/P
· Instruction in the improvement of ventilation	–	–	–	–	–	–	–	–	–								LE	C/P
1)-4 Developing the appropriate technologies of underground communication																PM CA	LE	C/P
· Setting up the system & counseling on the operation procedure	–	–	–	–	–	–	–	–	–	–	–	–	–				LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March.

– Technical transfer and guidance
▲ Visiting Mission Team
◎ Seminar
☐ Making Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart
CA Chief Advisor
LE Long term Expert
SE Short term Expert

2. Accident prevention technologies are to be improved

Year of 2000

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1999			2000												A person in charge	Inputs	
	1999			2000													Japanese side	Turkish side
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12			
	–	–	–	–	–	–	–	▲	–	–	–	–	–					
2)-1 Developing the appropriate technologies of spontaneous combustion prevention																PM CA	LE	C/P
· Instruction of the operation procedure of the equipment & analysis method	–	–	–	–	–	–	–	–	–	–	–	–	–				LE	C/P
2) 2Developing the appropriate technologies of gas and/or coal dust explosion prevention																PM	SE LE	C/P
· Seminar on gas and /or coal dust explosion prevention				◎														
· Counseling on the coal dust explosion prevention	–	–	–	–	–	–	–	–	–	–	–	–	–				LE	C/P
· Counseling on the gas explosion prevention	–	–	–	–	–	–	–	–	–	–	–	–	–				LE	C/P
2)-3 Developing the appropriate technologies of mine fire prevention																PM	LE	C/P
· Counseling on the electric fire prevention & fire extingushing facilities	–	–	–	–	–	–	–	–	–	–	–	–	–				LE	C/P
2)-4 Developing the appropriate technologies of degasification																PM	SE LE	C/P
· Seminar on degasification										◎							SE	
· Counseling on the degasification method	–	–	–	–	–	–	–	–	–	–	–	–	–				LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March.

– Technical transfer and guidance
▲ Visiting Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart

CA Chief Advisor
LE Long term Expert
SE Short term Expert

3. Maintenance and examination technologies for mine appliances are to be established

Year of 2000

Calendar Year / Fiscal year(*) / Month / Term of Technical Cooperation	1999			2000												A person in charge	Inputs	
	1999			2000													Japanese side	Turkish side
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12			
	–	–	–	–	–	–	–	▲	–	–	–	–	–					
3) 1 Developing the appropriate technologies of breathing apparatuses																PM CA	CA LE	C/P
· Seminar on the breathing apparatuses maintenance								◎									SE	
· Counseling on the self-rescuer test procedure	–	–	–	–	–	–	–	–	–	–	–	–	–				LE	C/P
· Instruction of the dust mask test procedure	–	–	–	–	–	–	–	–	–	–	–	–	–				LE	C/P
3) 2Developing the appropriate technologies of gas detectors																PM CA	CA LE	C/P
3) 3 Developing the appropriate technologies of flame-proof machinery																PM	LE	C/P
· Instruction and management of the flame-proof machinery	–	–	–	–	–	–	–	–	–	–	–	–	–				LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March.

– Technical transfer and guidance
▲ Visiting Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart

CA Chief Advisor
LE Long term Expert
SE Short term Expert

4. Education and training technologies are to be improved

Year of 2000

Calendar Year	1999			2000												A person in charge	Inputs	
Fiscal year(*)	1999			2000													Japanese side	Turkish side
Month	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12			
Term of Technical Cooperation	–	–	–	–	–	–	–	▲	–	–		–	–					
4) 1 Developing an appropriate safety and rescue education program and its materials																PM CA	SE LE	C/P
· Seminar on the safety and rescue education	◎																SE	
· Instruction of the safety apparatus technologies		–	–		–	–	–	–	–	–	–	–	–				LE	C/P

Note: (*) Japanese fiscal year starts in April and ends in March.

– Technical transfer and guidance
▲ Visiting Mission Team
◎ Seminar
□ Making Manual
△ Installation of equipment

PM Project Manager
C/P Counterpart

CA Chief Advisor
LE Long term Expert
SE Short term Expert

ANNEX 6

TENTATIVE SCHEDULE OF IMPLEMENTATION

Calendar Year	95	1996				1997				1998				1999				2000		
	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ
Fiscal Year (*)	1995	1996				1997				1998				1999				2000		
	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ
Ⅰ. Term of Technical Cooperation	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ⅱ. Japanese Side																					
1. Long Term Experts																					
(1) Chief Advisor	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Coordinator	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(3) General Mine Safety	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(4) Accident Prevention	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(5) Mine Safety Appliances	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Short Term Experts (**)				▲	▲			▲	▲			▲		▲▲	▲		△	△	△	△	
3. Provisuon of Machinery and Equipment			▲	▲	▲	▲	▲▲	▲		▲			▲▲	▲			△				
4. Training of Turkish Personnel in Japan		▲		▲				▲			▲					△				△	
5. Dispatch of Mission				▲							▲				▲				△		
Ⅲ. Turkish Side																					
1. Land, Building and Facilities																					
(1) Office for Japanese Experts	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Computer Room		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(3) Equipment Setting Rooms		—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Local Costs	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Allocation of counterpart Personnel and other Staffs	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ⅳ. Joint Evaluation														▲					△		

Note: (*) Japanese fiscal year starts in April and ends in March.
(**) Short term expert(s) will be dispatched when necessity arises.

ANNEX 7

Assignment of Counterpart

Calendar Year	95	1996				1997				1998				1999				2000			
	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Fiscal Year (*)	1995		1996			1997				1998				1999				2000			
	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III
1)Project Manager																					
Mesut Öztürk																					
2)Project Coordinator																					
Gündüz Yerebasmaz																					
3)General Mine Safety																					
Recep Danacıoğlu																					
Mualla Çakmaklı																					
A. Dörttepe(A.Sarıalioğlu)																					
O. Balamir (E.Sözer)																					
Yakup Akayıldız																					
M.A.Özkan (M.Aksoy)																					
Ejder Erbay																					
Seref Altan																					
Emin Subaşı																					
Lale Tetik																					
C. Akçe (B.Yücedağ)																					
Sükran Bozkurt																					
Halim Bultan																					
Kemal Reşit Kutlu																					
Turan Tutuğ																					
Fazıl Ersoy																					
N. Döngel(K. Arslan)																					
Z. Erdönmez(H.Cakmak)																					
Osman Nuri Pekin																					
A.Yorulmaz(M.İşbitiren)																					
4)Accident Prevention																					
Ramazan Karaaslan																					
Şenol Avcı																					
Ali Özcan																					
Nurettin Eren																					
Nevzat Günay																					
Orhan Dalahmetoğlu																					
Hasan Ali Aksekti																					
Levent Usman																					
5)Mine SafetyAppliances																					
Cengiz Burma																					
Mithat Dinçer																					
Nezih Ünal																					
İlyas Yazıcıoğlu																					
Muhammet Arslanboğa																					
Gülçin Önder																					
Vedat Yücel																					
Esen Rona																					
İlyas Sucu																					
Şule Ünlü																					
Arzu Yüce																					

Note : (*) Japanese fiscal year starts in April and ends in March.
TTK personnel will be assigned as a counterpart flexibly in terms of the substance of technical transfer.
—— Assigned period
—— Planning period

ANNEX 8 ANNUAL BUDGET PLAN OF TTK FOR THE PROJECT

In millions of Turk Lirasi (1,000,000 TL)

Items / Year	1995	1996	1997	1998	1999	2000
1-Salaries of counterpart staff						
5 Engineers fulltime	1,000	6,000	6,000	6,000	6,000	
10 Engineers halftime	1,000	6,000	6,000	6,000	6,000	
Travelling expenses		2,000	1,200	1,200	1,200	
2-Local transport expenses						
Driver	100	600	600	600	600	
Fuel	200	1,200	1,200	1,200	1,200	
3-Preparation of offices						
a) Office equipment		1,055				
Electrical equipment etc.		300				
Furnishing of office		1,235				
b) Mask test room						
Gas pipe line		1,000				
Electrical equipment		150				
Sanitary equipment		500				
c) Gas alarm sensor maintenance						
Gas cylinders		100		100	100	
Installation		300				
d) Preparation of monitor room						
Furnishing		500				
e) Preparation of CSPGU room			500	5,000		
RPG/400 training				1,000		
4-Equipment						
Cabling		1,500	1,930	1,350		
Sensors			5,000	10,000		
Setting up of UGCS					10,900	
5-Board and lodging						
Long-term experts	500	2,195	2,300	2,300	2,300	
Short-term experts		500	500	500	500	
6-Others						
Communication	20	100	100	100	100	
Electrical etc.	20	100	100	100	100	
Tax & customs expenditure		1,435	1,000			
Transportation	150	2,000	1,500	1,000	1,000	
- TOTAL -	2,990	28,770	27,930	36,450	30,000	

A yearly foreign exchange rate against U.S. dollar (on the date of 1st January). (-) (59,501 TL) (107,505 TL) (205,110 TL) (315,439 TL)

ANNEX 9

Dispatch of Long and Short-Term Experts

Calendar Year	95	1996				1997				1998				1999				2000			
	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ
Fiscal Year (*)	1995		1996				1997				1998				1999				2000			
	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ	Ⅳ	Ⅰ	Ⅱ	Ⅲ
Long-term Experts																					
Chief Advisor *Shin-ichiro YAMAO	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.....	.....	.....	.....	...
Coordinator *Ayako MATSUMOTO *Yoshio ABE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.....	.....	.....	.....	...
General Mine Safety *Hikosuke ONISHI	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.....	.....	.....	.....	...
Accident Prevention *Hiroji TOGASHI *Chihiro ICHINOHE	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.....	.....	.....	.....	...
Mine Safety Appliances *Hideo TAKAGI *Toshinori SAKAGUCHI	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.....	.....	.....	.....	...
Short-term Experts																					
Breathing Apparatus Maintenance Technologies *Takushi DOI				—																	
Ventilation Network Analysis Technologies *Masahiro INOUE					—																
Gas Alarm and Sensor Maintenance Technologies *Norio SUZUKI							—														
Central Monitoring Data Processing Technologies *Tsunemori CHITOSE *Kazutoshi MATSUSE							—	—	—												
General Mine Safety Management Technologies *Kenichi UCHINO												—									
Mine Gas Analysis Technologies *Shigeru SHINTANI														—							
Spontaneous Combustion Prevention Technologies *Kiyoshi HIGUCHI														—							
Central Monitoring Technologies *Tsunemori CHITOSE *Akira ITO															—						

Note: (*) Japanese fiscal year starts in April and ends in March.
— assigned period ···planning period

ANNEX 10

Counterpart Trainning in Japan

Calendar Year	95	1996				1997				1998				1999				2000			
	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Fiscal Year (*)	1995		1996			1997				1998				1999				2000			
	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III

Name of Counterparts & Period of Trainning	
Year of 1995 (31/Jan~15 Feb 1996)	+ Hayrettin SOYTAŞ (Field of Mine Safety Management) + Tuğrul Müftüoğlu (Field of Mine Safety Management
Year of 1996 (01/Sep~28/Sep1996)	+ Ali YORULMAZ (Field of Mine Safety Management) + Kemal Reşit KUTLU (Filed of Accident Prevention) + Ramazan KARAASLAN (Field of Mine Safety Appliances)
Year of 1997 (12/July~10/Aug1997)	+ Mesut ÖZTÜRK (Field of Mine Safety Management) + Nurettin EREN (Field of Accident Prevention) + Orhan DALAHMETOĞLU (Field of Mine Safety Appliances)
Year of 1998 (10/May~06/June1998)	+ Halim BULTAN (Field of Mine Safety Managemnet) + Şükran BOZKURT (Field of Mine Safety Appliances) + İlyas YAZICIOĞLU (Field of Accident Prevention)
Year of 1999(**) (04July~03 Aug1999)	+ Cengiz BURMA (Field of Mine Safety Management) + Ali ÖZCAN (Field of Mine Safety Management) + Ejder ERBAY (Field of Mine Safety Appliances)

Note: (*) Japanese fiscal year starts in April and ends in March.
(**) According to the 1999 training programme.

ANNEX 11 PROVISION OF MACHINERY AND EQUIPMENT

CO MASK & SELF-RESCUER EXAMINATION SYSTEM

NAME OF EQUIPMENT (*)	MAKER	MODEL NO.	ARR.DATE	ROOM	QUA.	PRICE
CO Mask Simulator	Kawasaki	BS-CO-1	1996.7.12	Safety Dep.Lab.	1 set	¥23,434,000
Cooling Circulator	Yamato	CTE-82W	1996.7.12	Safety Dep.Lab.	2 sets	¥1,082,000
CO Gas Analyzer (Portable type)	Shimadzu	CGT-10-3A	1996.7.12	Safety Dep.Lab.	1 set	¥441,000
CO Gas Analyzer	Riken Keiki	RI-555	1996.7.12	Safety Dep.Lab.	1 set	¥808,000
Gas Thermometer	Advantest	TR2114H	1996.7.12	Safety Dep.Lab.	4 sets	¥968,000
Surface Thermometer (Handy Type)	Yokokawa	2455-04	1996.7.12	Safety Dep.Lab.	1 set	¥37,000
Digital Manometer	Kosumo Keiki	DM-3500	1996.7.12	Safety Dep.Lab.	2 setS	¥574,000
Recorder (three pens)	Rikadenki Kogyo	R-63A	1996.7.12	Safety Dep.Lab.	3 set	¥1,200,000
Smoke Filtering Efficiency Tester	Kawasaki	ST-1	1996.7.12	Safety Dep.Lab.	1 set	¥15,400,000
Temp. & Humi. Chamber	Tabai Espec	PL-1ST AC380V	1996.7.12	Safety Dep.Lab.	1 set	¥2,320,000
Vibration Testing Machine	Kawasaki	VT-1 Rotap Test	1996.7.12	Safety Dep.Lab.	1 set	¥657,000
Digital Electronic Balancer	Shimadzu	EB-4300S	1996.7.12	Safety Dep.Lab.	1 set	¥92,000
Auto. Volt. Regulator	Matsunaga	TA-1020-A	1996.7.12	Safety Dep.Lab.	6sets	¥1,548,000
Breathing Test Simulator	Kawasaki	BS-SCBA-1	1996.7.12	Safety Dep.Lab.	1 set	¥33,637,000
Infrared CO2 Gas Analyzer	Best (Portable)	BIR-200HS	1996.7.12	Safety Dep.Lab.	2 sets	¥2,808,000
O2 Gas Analyzer (Portable Type)	Best	BMG-200HS	1996.7.12	Safety Dep.Lab.	1 set	¥2,070,000
Mouthpiece Connector	Kawasaki		1996.7.12	Safety Dep.Lab.	1 set	¥32,000
Douglas Bag	Kawasaki	DB-150	1996.7.12	Safety Dep.Lab.	1 set	¥159,000
Wet Gas Meter	Shinagawa Seiki	WNK-Da-2B	1996.7.12	Safety Dep.Lab.	1 set	¥825,000
U-Type Manometer c/w Stand	Okano Seisakusho	PA-500PCDS	1996.7.12	Safety Dep.Lab.	1 set	¥38,000
Head Model	Kawasaki		1996.7.12	Safety Dep.Lab.	1 set	¥424,000
Gas Regulator for CO	Yutaka	SR-200 HS-OP		Safety Dep.Lab.	1pce	¥113,800
Gas Regulator for N2	Yutaka	FR-200 HS-OP		Safety Dep.Lab.	1pce	¥29,000
TOTAL PRICE (**)						¥88,696,800

VENTILATION NETWORK ANALYSIS SYSTEM

NAME OF EQUIPMENT (*)	MAKER	MODEL NO.	ARR.DATE	ROOM	QUA.	PRICE
Personal Computer	IBM	PC750-P133	1996.8.12	Computer Room	2 pcs	¥540,000
Colour Display (Hello !!)	Iiyama Denki	MF-8517E	1996.8.12	Computer Room	2 pcs	¥118,000
Printer	Epson	LP-8200(L230A)	1996.8.12	Computer Room	2 pcs	¥278,000
A1 Colour Inkjet Plotter	Hewlett Packard	HP-3190A	1996.8.12	Computer Room	1 pce	¥268,000
(Simm Memory 8MB)				"	1 pce	¥77,000
(Interface Cable 3M)				"	1 pce	¥11,000
(Stand Set)		C3192A		"	1 pce	¥42,600
Uninterrrupted Power Supply	Yutaka Denki	UPS-1010NPC	1996.8.12	Computer Room	2 pcs	¥244,000
Down Transformer	Sanyo	TSD-N15E	1996.8.12	C/N Room	2 pcs	¥24,000
Down Transformer	Sanyo	TSD-N15E	"	Meeting Room		¥24,000
Software(Word Perfect 6.0CD)	Novell		1996.8.12	Computer Room	3 pcs	¥41,000
Software(Ichitaro Ver.6)	Justsystem		"	"	3 pcs	¥31,000
Software(Lotus 1-2-3 R5J)	Lotus		"	"	3 pcs	¥16,500
Personal Computer	IBM(B746060R)	Thinkpad 701C	1996.8.12	Kozlu CMR	1 pce	¥235,700
TOTAL PRICE (**)						¥1,950,800

Note: (*) Excluding articles of consumption
(**) Excluding CIF (Cost,Insurance and Freight)

GAS ALARM/SENSOR EXAMINATION SYSTEM

NAME OF EQUIPMENT (*)	MAKER	MODEL NO.	ARR.DATE	ROOM	QUA.	PRICE
Perfomance Test Controller c/w Sensor Test Chamber CO Gas Detector	Riken Riken Riken	Sensor Test System GP-631A	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥4,564,000
Low Temperature Test Chamber	Isuzu	SSL-1LS	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥1,010,000
Gas Mixer c/w compressor	Riken	Sensor Test System	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥4,900,000
Response Time Test Controller Sensor Test Chamber	Riken Riken	Sensor Test System	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥5,510,000
Volt Slider	Yamabishi	S-260-5	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥16,000
Regulated DC Power Supply	Kikusui	PMC35-2A	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥55,000
Output Inspection Unit	Riken	Sensor Test System	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥1,140,000
Gas Regulator	Crown	FR-II S-OP	1997.6.25	Lab. (Gas Alarm / Sensor)	3 set	¥63,000
Resister Unit	Riken	Sensor Test System	1997.6.25	Lab. (Gas Alarm / Sensor)	3 set	¥480,000
Gas Indicator (Interferometor)	Riken	Riken -18Type	1997.6.25	Lab. (Gas Alarm / Sensor)	4 set	¥920,000
Mono-Tube Liquid-Column Manometer	Okano	SP-800PS	1997.6.25	Lab. (Gas Alarm / Sensor)	2 set	¥360,000
Deionized Water Plant	Sibata	Pureport- PP101	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥218,000
Fortin Mercurial Barometer	Isuzu	6112	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥166,000
Aneroid Barometer	Isuzu	3-1050-01	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥17,000
Assman's Aspiration Psychrometer	Isuzu	3-4080-01	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥83,000
Maintenance Tools for Gas Indicator	Riken	Riken-18type	1997.6.25	Lab. (Gas Alarm / Sensor)	1 set	¥120,000
Stabilized Power Supply Unit	Toyozumi	CD220-15	1997.6.25	Lab. (Gas Alarm / Sensor)	2 sets	¥66,000
CO Gas Detector / Alarm	Riken	EC-632A- K3	1997.6.25	Gas Cylinder Room	1 set	¥470,000
		EC-632A- K3		CO Mask Test Room	1 set	¥470,000
Jig For Drop Test	Riken		1997.6.25	Lab. (Gas Alarm / Sensor)	2 set	¥100,000
TOTAL PRICE (**)						¥20,728,000

CENTRAL MONITORING DATA PROCESSING SYSTEM

NAME OF EQUIPMENT (*)	MAKER	MODEL NO.	ARR.DATE	ROOM.	QUA.	PRICE
Central Processing Unit Board (c/w P.C for Data Processing)	Advantech	PCA-6145	1997.6.25	Kozlu C.M.R	1 pcs	¥5,300,000
Terminal Controller			1997.6.25	Kozlu C.M.R	1 pcs	¥3,900,000
Graffic Controller			1997.6.25	Kozlu C.M.R	1 pcs	¥4,000,000
Programable Controller			1997.6.25	Kozlu C.M.R	1 pcs	¥800,000
Back-up Power Supply	Nishimu	NUP-1000A	1997.6.25	Kozlu C.M.R		¥2,300,000
Application Soft	T&C	GPPRO II / V GP-PRO/PB III	1997.6.25	Kozlu C.M.R	1 set	¥2,800,000
Colour Printer	Epson	MJ-3000C (P890A)	1997.6.25	Kozlu C.M.R	1 unit	¥210,000
CRT	NEC	PC-KM174	1997.6.25	Kozlu C.M.R	2 pcs	¥400,000
Local Station	Matsushima E	MTLCE-961	1997.6.25	Kozlu Mine	5 pcs	¥19,000,000
Repeater Panel	Matsushima E	MTLRE-961	1997.6.25	Kozlu Mine	6 pcs	¥4,290,000
Local Station	Matsushima E	MTLCE-961	1999.3.25	Kozlu Mine	2 pcs	¥7,250,000
Repeater Panel	Matsushima E	MTLRE-961	1999.3.25	Kozlu Mine	2 pcs	¥1,280,000
Application Soft	T&C		1999.3.25	Kozlu Mine	1 set	¥2,150,000
TOTAL PRICE (**)						¥53,680,000

VEHICLE

NAME OF EQUIPMENT (*)	MAKER	MODEL NO.	ARR.DATE	ROOM.	QUA.	PRICE
Nissan Patrol	Nissan	WRLGY60GSFC1	1996.12	TTK Park	1	¥2,140,000
Rosa Bus (26 pass)	Mitsubishi	BE439ELMSI1	1997.11	TTK Park	1	¥3,130,000
TOTAL PRICE (**)						¥5,270,000

Note: (*) Excluding articles of consumption
(**) Excluding CIF (Cost,Insurance and Freight)

CHECKING SYSTEM OF WORKERS GOING IN-AND-OUT

NAME OF EQUIPMENT (*)	MAKER	MODEL NO.	ARR.DATE	ROOM	QUA.	PRICE
Main Processing Unit (MPU)	IBM		1997.3	Kozlu Monitoring Room		85,257 US$
AS400 System Unit(2131)	"	AS/400	"	"	1 Set	(30,399$)
Work Station (B&W)	"	3486-BAT	"	"	17	(12,347$)
Work Station Colour	"	3487-CAT	"	"	5	(5,837$)
Line Printer	"	6400-008	"	"	1	(8,645$)
Matrix Printer	"	2381	"	"	4	(1,854$)
Uninterruptible Power Source	"	9910-B64	"	"	1	(1,747$)
Software Install for MPU	"		"	"	1 Set	(19,749$)
Software Install for AS400	"		"	"	5	(4,679$)
Data Collection System (DCS)	IBM		1997.3	Kozlu Monitoring Room		48,304 US$
Supervision Configuration	"	7585-560	"	"	2 Set	(19,111$)
Data Collection Terminal & etc.	"	7526-150	"	"	11	(20,558$)
Software Configuration for DCS	"		"	"	1	(5,828$)
DCS Installation	"		"	"	3	(2,807$)
Card Processing System (CPS)	IBM		1997.3	Kozlu Monitoring Room		46,873 US$
Hardware Configuration	"	Pentium	"	"	1 Set	(24,789$)
Software Configuration	"		"	"	1 Set	(2,785$)
Card & other Equipt.	"		"	"	4,000	(16,492$)
ID CPS Installation	"		"	"	3	(2,807$)
Industrial Computer	IBM		1998.3	Kozlu Monitoring Room	1	6,806 US$
Industrial Computer Software	"		"	"	1	893 US$
Radio Frequency Equipment (RFE)	"		"	"	1	39,354 US$
RFE Software	"		"	"	1	6,540 US$
Application Software	"		1999.1	Kozlu Monitoring Room		61,266 US$
TOTAL PRICE (**)						295,293 US$

SPONTANEOUS COMBUSTION COMBATING SYSTEM

NAME OF EQUIPMENT	MAKER	MODEL NO.	ARR.DATE	ROOM	QUA.	PRICE
Gas Chromatograph (GC)	Shimadzu	GC-14 BPTF	1998.12	Safety Dep. Lab.	1	¥1,521,540
Gas Chromatograph (GC)	Shimadzu	GC-14 BPT	"	"	1	¥1,322,590
Data Processing Device	Shimadzu	C-R7A for 14BPTF	"	"	1	¥1,094,230
Data Processing Device	Shimadzu	C-R7A for 14BPT	"	"	1	¥1,094,230
Vacuum Pump c/w Transformer	Shinku Kiko	DA-20D	"	"	2	¥207,600
Running Tool Kit For GC		With Drawers	"	"	2	¥247,400
Standard Gas Bomb N2	Taiyo Toyo Co.	10 L	"	"	1	¥173,000
Standard Gas Bomb HE	"	10 L	"	"	1	¥173,000
Digital Flowmeter	Shimadzu	DFM-140	"	"	2	¥190,300
Oilless Air Compressor	Hitachi	Bebicon	"	"	1	¥85,640
Column Goods Set	Shimadzu	Handy Box	"	"	2	¥42,820
Step Down Transformer	Shimadzu	B-10 No.1345398	"	"	1	¥43,250
CO Infrared Gas Analyzer	Shimadzu	IRA-307DX	1998.12	Incivez	1	¥2,178,300
CO2 Infrared Gas Analyzer	Shimadzu	IRA-307DX	"	"	1	¥2,178,300
CH4 Infrared Gas Analyzer	Shimadzu	IRA-307DX	"	"	1	¥2,178,300
Recorder for CO,CO2 & CH4	Shimadzu		"	Kozlu C. M. R.	1	¥909,700
Step Down Transfomer (GA-1)	Shimadzu	for CO GA	"	Incivez	1	¥151,500
Step Down Transfomer (GA-2)	Shimadzu	for CO2 GA	"	"	1	¥151,500
Step Down Transfomer (GA-3)	Shimadzu	for CH4 GA	"	"	1	¥151,500
Standard Gas Bomb N2	Taiyo Toyo Co.	Zero Gas10L	"	"	1	¥33,700
Standard Gas Bomb CO	"	Span Gas 50ppm	"	"	1	¥37,900
Standard Gas Bomb CO	"	Span Gas500ppm	"	"	1	¥35,100
Standard Gas Bomb N2	"	Zero Gas10L	"	"	1	¥33,700
Standard Gas Bomb CO2	"	Span Gas 2% 10L	"	"	1	¥37,900
Standard Gas Bomb CO2	"	Span Gas 10% 10L	"	"	1	¥35,100
Standard Gas Bomb N2	"	Zero Gas10L	"	"	1	¥33,700
Standard Gas Bomb CH4	"	Span Gas 2% 10L	"	"	1	¥39,400
Standard Gas Bomb CH4	"	Span Gas 10% 10L	"	"	1	¥39,400
TOTAL PRICE (**)						¥14,420,600

Note: (*) Excluding articles of consumption

(**) Excluding CIF (Cost,Insurance and Freight)

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UNDERGROUND COMMUNICATION SYSTEM

NAME OF EQUIPMENT	MAKER	MODEL NO.	ARR. DATE	ROOM	QUA.	PRICE(US$)
SURFACE COMMS.						
Surface Control Station	GAI-TRONICS	BMX/EX	24.03.99	Kozlu Colliery	1	13,101.24
Surface Audio Barrier to PABX	"	BMA/EX/1U	"	"	1	675.45
UNDERGROUND COMMS.						
Radio Base Unit for Surface	GAI-TRONICS	RFM2000	24.03.99	Kozlu Colliery	5	36,700.59
UPS for Mine Radio Base	"	PSU-00IC	"	"	5	23,104.82
ISSU	"	ISSU-001	"	"	5	5,082.38
Surface Audio to PAX Coupler	"	01/930	"	"	1	675.45
Leaky Feeder (metres)	"		"	"	20,000	59,589.21
Leaky Feeder Supports (tywraps)	"		"	"	10,000	199.97
Two Way Line Repeaters	"	TUR2000	"	"	40	30,282.51
Passive Splitter	"	PAS2000	"	"	20	5,049.88
Termination Unit	"	TER2000	"	"	30	6,696.58
Mobile Transciever (Transcom)	"	TCS1	"	"	30	54,992.63
Aerials c/w Connection Leads for Transcoms	"		"	"	30	7,009.12
Handheld Portable Radio Transceiver 146	"		"	"	55	86,399.54
Charger for Portable Batteries (LM/140/160)	"	S6RTOP	"	"	9	7,904.13
Batteries for Portables	"		"	"	70	14,695.88
CONSUMABLES						
Screwdriver 3-6-3	GAI-TRONICS		24.03.99	Kozlu Colliery	20	118.54
Screwdriver 1-4-4	"		"	"	20	146.38
Screwdriver 3-8-8	"		"	"	20	200.6
Jewellers Screwdriver Set	"		"	"	4	106.63
Metric Hexagon Key Sets	"		"	"	4	84.85
Soldering Iron, Light Duty Mains c/w Stand	"		"	"	2	254.01
I.S. Multimeter (METRIX)	"		"	"	2	2,807.50
Spares Pack for Surface Control Station	"				1	883.85
Distribution Module	"		"	"	1	223.88
Combiner Module	"		"	"	2	460.47
Transmitter Module	"		"	"	3	1,108.18
Receiver Module	"		"	"	3	2,655.77
Base Audio Module	"		"	"	2	1,218.07
BMA Interface Module	"		"	"	2	796.77
Power Cable Loom	"		"	"	1	79.99
Audio Cable Loom	"		"	"	1	79.99
RF Connector Cable Set	"		"	"	5	157.06
I.S. Cable Glang for Leaky Feeder	"		"	"	30	56.88
ISSU Module	"		"	"	1	37.49
ISSU Relay	"		"	"	1	178.69
20mm I.S. Cable Gland	"		"	"	10	155.34
Handset	"		"	"	2	2,214.42
Handset Assy	"		"	"	10	1,845.35
Cable Gland Assy 16mm	"		"	"	5	25.05
Blanking Plug Plastic	"		"	"	10	33.4
LED Green	"		"	"	20	51.77
LED Amber	"		"	"	20	51.77
LED Red	"		"	"	20	51.77
Loudspeaker	"		"	"	10	38.41
Termination PCB	"		"	"	4	377.42
Transceiver PCB	"		"	"	4	2,882.42
Aerials c/w Connection Leads	"		"	"	10	2,336.33
Spares Kit	"		"	"	10	16,016.97
Aerial	"		"	"	20	639.61
TOTAL PRICE (*)						390,535.01

Note: (*) Excluding CIF (Cost, Insurance and Freight)

ANNEX 12 LIST OF ATTENDANTS

Japanese Side:

1) Shuzo KAMURO	General Manager, International Cooperation Department, Japan Coal Energy Center (JCOAL)
2) Norihisa OMURA	Technical Cooperation Division, Economic Cooperation Bureau, Ministry of Foreign Affairs
3) Masato KOIE	Coal Mine Safety Office, Mine Safety Division, Industrial Location and Environmental Protection Bureau, MITI
4) Tomoyuki UDA	Staff, 2nd Technical Cooperation Division, Mining and Industrial Development Cooperation Department, JICA
5) Shin-ichiro YAMAO	Chief Advisor of the Project
6) Yoshio ABE	Coordinator of the Project
7) Hikosuke ONISHI	Long-term Expert of the Project
8) Chihiro ICHINOHE	Long-term Expert of the Project
9) Toshinori SAKAGUCHI	Long-term Expert of the Project

Obsevers:

1) Masayuki KANNAN	Second Secretary, Embassy of Japan
2) Tatsuo YONEBAYASHI	Resident Representative, JICA Turkey Office
3) Shigeru OTAKE	Head of General Affairs & Planning Division, JICA Turkey Office
4) Timur SAYRAÇ	Head of 2nd Technical Cooperation Division, JICA Turkey Office

Turkish Side:

1) İsmail VERİMBAŞ	Acting Director General, TTK
2) Yusuf ÇELİK	Assistant General Director, TTK
3) Çetin ONUR	Assistant General Director, TTK
4) Sami İNAN	Assistant General Director, TTK
5) Ali Riza AKIN	Assistant General Director, TTK
6) Mesut ÖZTÜRK	Head of Safety Department, TTK
7) Temel ÇAKIR	Head of Planning Department, TTK
8) Mustafa İŞBİTİREN	Mine Manager of Kozlu Colliery, TTK
9) Kaya ARSLAN	Mine Manager of Üzülmez Colliery, TTK
10) Hayrullah ÇAKMAK	Mine Manager of Karadon Colliery, TTK
11) Osman Nuri PEKİN	Mine Manager of Amasra Colliery, TTK
12) Fazıl ERSOY	Mine Manager of Armutçuk Colliery, TTK
13) Gündüz YEREBASMAZ	Research Manager of Safety Department, TTK

Observers:

1) M. Ali TURKOĞLU	Deputy Undersecretary, MENR
2) Hüseyin ÇETİN	Sectoral Planning Department, State Planning Organization

MIDTERM EVALUATION REPORT CONCERNING THE TECHNICAL COOPERATION FOR THE PROJECT ON THE IMPROVEMENT OF MINE SAFETY TECHNOLOGIES IN THE REPUBLIC OF TURKEY

The Japanese Advisory Team (hereinafter referred to as "the Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA") and headed by Mr. Shuzo Kamuro, General Manager, International Cooperation Department, Japan Coal Energy Center, visited the Republic of Turkey from June 8 to June 16.

During its stay in the Republic of Turkey, the Team had a series of discussions and evaluated the achievement of the Project on the Improvement of Mine Safety Technologies (hereinafter referred to as "the Project") and exchanged views on the possible technical cooperation programs to be further implemented to fulfill the Master Plan of the Record of Discussions signed on 8th of September, 1995.

As a result of the discussions, the Turkish and Japanese sides agreed upon the matters referred to in the documents attached hereto.

Ankara, June 15, 1999

Shuzo Kamuro
Leader
Advisory Team
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Midterm Evaluation Table (Project on the Improvement of Mine Safety Technologies)

(As of June, 1999)

Project Outputs	Project Activities	Inputs	Individual Activities	Individual Outputs/Problems	Sustainability/Proliferation
(1)Improvement of safety management technologies	1)-1 Developing the appropriate technologies of central monitoring			★ A central monitoring system for monitoring main parts underground at the Kozlu colliery has been established.	☆ Assignment of C/Ps was appropriate. When transfer of operation and management technologies, which is currently underway, reaches completion, perfect sustainability will be obtained.
		◆Long-term Expert: ■Hikosuke Onishi 30/10/1995~29/10/1999	■Gave a seminar on "central monitoring technologies"(04/06/1996).	■ By virtue of the seminar, C/Ps' understanding significantly deepened.	
		■Toshinori Sakaguchi 30/10/1997~29/10/1999	■Provided guidance on operation/maintenance technologies and produced operation manuals.	■ Continually providing guidance on maintenance technologies and the like.	◇TTK has already been making attempts at introducing transfered technologies to its Amasra colliery. Under the circumstances, these attempts might be applied to other coal mines in the future.
		◆Short-term Expert: ・Centralized Monitoring Data-processing Technologies ■Kazutoshi Matsuse, Tsunemori Chitose 01/09/1997~15/10/1997	■Installed and adjusted equipment, and made improvements to software.	■Although dificulties were experienced in suppressing adverse effects from surrounding high voltage electric circuit, a solution has eventually been arrived at.	◇Professors and college students from mining engineering departments have visited to learn about the systems. The proliferation of technologies through them can also be expected.
		・ditto ■Tsunemori Chitose, Akira Ito 02/06/1998~01/07/1998	■Installed and adjusted additional equipment, enhanced data-processing ability, and made improvements to software.	■ It was necessary to make some modifications to software in order to accommodate differences between the social systems of both countries. Furthermore, it has also become possible to indicate, data deriving from continuous gas analyzers that have been introduced for the purpose of detecting early diagnosis of spontaneous combustion, on the centralized monitoring system.	◇Since the equipment provided is Japanese-made special equipment, follow-up support may become necessary after completion of the project for such purposes as conducting maintenance work and procuring spare parts.
		・Comprehensive Safety Management Technologies ■Kenichi Uchino 04/07/1998~14/07/1998	■ Provided guidance on safety management technologies and gave a seminar entitled "Comprehensive safety management technologies" (09/07/1998).	■ It was contributed to renew C/P's awareness of the importance of safety management technologies.	

		◆C/P Training in Japan: ■Halim Burtan 10/05/1998~06/06/1998 ■Ilyas Yazcioglu 10/05/1998~06/06/1998 ◆Provision of Equipment: ■Centralized Monitoring Data-processing System (¥40.3 million, FY1996) ＊Completion Ceremony (10/10/1997) ■Additional Equipment for the Above System (¥11.214 million, FY1998) ＊Completion Ceremony (/09/1999) ■Attachments for the Above System (¥1.5 million, FY1999) ◆Others: ■Seminar	■ Charged with overseeing a department that are involved in machinery and electricity-related work at the Kozlu colliery. ■ Leading work related to the centralized monitoring system. ■ 20 methane and 20 CO detection points, and 40 On-Of data become possible to be monitored. ■ Additional 16 methane-sensing points were installed, and another 16 On-Of data points were added. The silicon disk capacity was increased to 80 Mb from 40 Mb. ■ Attachments for the central control panel, local and repeater panels underground. ■ "Coal-mine safety management technologies" (23/10/1998, Yamao).	■It has become possible to implement centralized monitoring down to a level of -485 m at Kozlu colliery. ■ It has become possible to perform monitoring down to a level of -560 m. ■Spare-parts for maintenance purposes, in quantities enough to last for approx. 2 years. ■The seminar yielded an understanding of what coal mine safety management technologies should be.	
	1)-2 Developing the appropriate technologies of checking persons going in-and-out underground	◆Long-term Expert: ■Hikosuke Onishi 30/10/1995~29/10/1999 ◆C/P Training in Japan: ■Sukran Bozkurt 10/05/1998~06/06/1998	■Continually providing guidance on all aspects of introduction. ■Leading the modification /addition of softwares as well as on connection with TTK's host computer.	★ When introduction work is finished, the Kozlu colliery's checking system for persons going in-and-out underground will be significantly rationalized. ■ Although guidance on hardware technology is not much of a problem, there is considerable hardship in translating all software printouts into Turkish. ■Problems of connection with the host computer have been solved. Dtailed adjustments are being made for softwares.	☆ Judging from the fact that C/Ps has been conducting software-improvement work such as modifications and additions on their own, C/Ps are highly likely to become sustainable. ◇ Since suppliers are based in Turkey, maintenance is easy for TTK. ◇There are expectations that contributions may be made not only to safety management but also to the rationalization of labor/wage management operations.

		◆Provision of Equipment: ■Checking System for Persons Going in-and-out Underground (¥23.032 million, FY1996) * Completion Ceremony (/09/1999)	■One AS400 host computer and 2 industrial-use PCs were installed in the central processing room. A total of 17 PCs were installed in strategically important places in the administration building and annex. Also, a total of 3 PCs were placed in major facilities that are external to the above buildings. Data reading terminals were installed in the following places: 6 sets at the pit mouths, 3 sets in the administration building, 1 set in the annex, and 3 sets in the outside facilities. In addition, a set of ID-card preparation equipment was installed in the safety supervisor's station of the administration building.	■It has become possible to manage 2,114 underground workers and 628 surface workers.	
		■Additional Equipment for the Above System (¥15.055 million, FY1997) * Completion Ceremony (/09/1999)	■Equipment to automatically detect the passage of personnel were installed at New, No.1 and No.2 shafts. An industrial-use PC was additionally installed in the central processing room.	■A system to automatically record the time/person of going in-and-out at 3 shaft mouths has been established.	
	1)-3 Developing the appropriate technologies of ventilation control	◆Long-term Expert: ■Hiroji Togashi 30/10/1995~29/10/1997	■Gave an advice on the improvement of ventilation at the Üzülmez colliery. Held a ventilation pressure measurement workshop at the Kozlu colliery (26~27/11/1996). Gave a seminar entitled "Ventilation at the Taiheiyo coal mine" (24/10/1997) and a training course "Ventilation measurements using pitot tubes" (26~26/06/1997).	★ Technology transfer is finished almost completely. ■ Technologies to carry out accurate ventilation measurements underground have been transferred. Ventilation has been improved at the Üzülmez colliery.	☆ Since excellent engineers have become C/Ps, things have already entered into the self-sustainable stage. ◇ A point has been reached where the ventilation networks of TTK's all coal mines can be analyzed by C/Ps alone.
		■Chihiro Ichinohe 05/10/1997~14/10/1999	■ Provided guidance on what to do when main fans are experiencing negative-pressure fluctuations. ■ Introduced new software called "Kazemaru for Windows"	■ Transferred methods of performing checkups and making repairs. ■Introduction of "Kazemaru for Windows" newly developed by Prof. Inoue at the Kyushu University has been completed.	◇ C/Ps are expected to play an important role in the analysis of ventilation networks at other coal and metal mines in operation other than TTK.

		◆Short-term Expert: ・Ventilation Network Analysis Technology ■Masahiro Inoue 08/10/1996~02/11/1996 ◆C/P Training in Japan: ■Mesut Ozturk 13/07/1997~09/08/1997 ■Orhan Dalahmetoglu 13/07/1997~09/08/1997 ■Nurettin Eren 13/07/1997~09/08/1997 ■Ali Ozcan 05/07/1999~03/08/1999 ◆Provision of Equipment: ■Ventilation Network Analysis System (¥2.3 million, FY1995) ＊Completion Ceremony (25/10/1996) ◆Others: ■Seminar ■Manual	■Held a seminar titled "Underground ventilation" (18/10/1996) and a training course of "Ventilation network analysis" (15~24/10/1996). ■Serving as a project manager. ■Charging with the improvement of ventilation at the Kozlu colliery. ■Charging with ventilation analysis work at the Karadon colliery. ■Providing guidance on ventilation network analysis of TTK's all coal mines. ■Completed a system capable of simultaneously running analysis on two ventilation networks. ■A seminar on the theme of "Local ventilation technology" (20/06/1997, Takagi). ■ Following ventilation-related manuals are prepared (Yamao): ・How to use an aneroid barometer. ・How to use a digital barometer. ・How to use a Fortin barometer. ・How to use a self-recording barometer.	■The ventilation analysis software called "Kazemaru" developed by Prof. Inoue in Japan, who was dispatched as a short-term expert, has been completely transferred. ■At the 7th Energy Conference in Turkey (07/11/1997), presented a paper titled "Mine safety project with JICA" which was made by co-authored with Mr. Yamao ■ A system, which makes it possible for TTK's Safety Department to make analyses of ventilation networks at all TTK's coal mines, has been established. ■Japan's state-of-the-art local ventilation technology has been transferred. ■ All of the manuals listed in the left-hand column have been translated into Turkish by C/P.	
	1)-4 Developing the appropriate technologies of underground communication			★ When installation work reaches completion, the system represents Turkey's first-ever introduction of a full underground communication system. From the viewpoint of mine safety, the system is expected to contribute to the dramatic improvement of safety management technology.	☆Because of the extremely high engineering abilities of C/Ps engaged in machinery- and electricity-related operations, no problem stands in the way of their becoming self-sustainable.

			◆Long-term Expert: ■Toshinori Sakaguchi 10/10/1997~29/10/1997 ◆Provision of Equipment: ■Underground Communication System (¥47.672 million, FY1998) ＊Completion Ceremony (/09/1999) ◆Others: ■Technical Guidance	■Continually providing guidance on all aspects of introduction and operation. ■One set of center-station equipment and 65 portable hand sets were introduced. ■Gave an advice on the installation of the surface exchanger and underground antennas (Ohnishi).	■After the completion, combined usage with the centralized monitoring system shall be transferred. ■ Communications among main underground sites and persons at the Kozlu colliery have become possible. ■It has become possible for the system to perform functions as per its design specifications.	◇ Since equipment was procured through the Turkish agent of the British machinery manufacturer of the equipment, there will be no problem with maintenance after completion of the project. ◇If the financial standing of TTK permits, it is easy to disseminate the technologies to other TTK's coal mines.
(2) Improvement of accident prevention technologies	2)-1 Developing the appropriate technologies of spontaneous combustion prevention	◆Long-term Expert: ■Shinichiro Yamao 30/10/1995~29/10/1999 ■Chihiro Ichinohe 05/10/1997~14/10/1999 ◆Short-term Expert: ・Continuous Gas Analysis Technology ■Shigeru Shintani 30/01/1999~14/02/1999 ・Gas Chromatography Technology ■Masao Hotta 25/01/1999~29/01/1999	★A coal mine gas analysis system for early detection of spontaneous combustion has been established. ■Transferred gas analysis technology using gas chromatography. ■Introduced continuous coal mine gas analysis equipment. ■Provided guidance on the method of interpreting gas analysis results as to the diagnosis of spontaneous combustion. ■Installed and adjusted continuous coal mine gas analysis equipment. ■Conducted the installation and adjustment of two gas chromatographies along with operating instructions.	■Since instructions provided by the supplier were inadequate, it is necessary to open a "operation training course" again. ■Completed a continuous coal mine gas analysis system ■Criteria for evaluating diagnoses of spontaneous combustion have been introduced. ■Multi-pen recorder and CO_2 analysis equipment have developed problems. However, these problems have been solved as follows: the former recorder was replaced while the latter's standard-side gas chamber was changed. ■Because the period of time available for the guidance was short, C/Ps were not be able to get an enough training of operating procedures. And the carrier-	☆ In order to enable C/Ps to achieve mastery of analysis technologies, it is necessary to let the C/Ps attend to a "training course" which will be opened in Kyoto by the supplier in the next year in Japan. ◇ Since the Japanese supplier has a branch office in Istanbul, there will be no problem with maintenance after completion of the project. ◇ In the future, it is to be hoped that C/Ps will be able to play the role of a gas-analysis center for other coal mines operating in Turkey.

			gases purchase by TTK has suffered a delay, the required gases had to be obtained from another organization on rent. (TTK is now in the process of making procurement arrangements.
	・Spontaneous Combustion Prevention Technologies ■Kiyoshi Higuchi 06/03/1999~14/03/1999	■Gave an advice on spontaneous combustion prevention methods and held a seminar on "Early detection of spontaneous combustion" (10/03/1999).	■Japan's state-of-the-art spontaneous combustion prevention technologies were introduced, and the seminar was well-received.
	◆C/P training in Japan: ■Kemal Resit Kutlu 31/08/1996~19/09/1996	■Acting as a leader to prevent spontaneous combustion associated with underground mining at the Kozlu colliery.	■Serving as a head of Zonguldak annex of Turkish Coal Mining Engineers Association.
	◆Provision of Equipment: ■Gas Analysis System for Early Detection of Spontaneous Combustion (¥17.661 million, FY1997) ＊Completion Ceremony (/09/1999)	■3 infrared gas analyzers for analyzing CO, CO_2 and CH_4 and 2 gas chromatographies were introduced.	■Completed a continuous gas analysis system responsible for monitoring the Kozlu colliery's total upcast as well as a coal mine gas analysis laboratory in the Safety Department.
	◆Others: ■Seminar:	■Gave a seminar on "Hydraulic backfilling of slurry" when the study team visited in June of 1995 under a long-term dispatch program (Yamao and Ohnishi).	■Although studies had been conducted on hydraulic slurry backfilling with the TTK side as a technology to prevent spontaneous combustion, this method had to be eventually abondoned because of high cost of obtaining slurry.
		■"Safety technology of steep seam mining"(27/02/1997, Yamao and Onishi).	■As a method to prevent spontaneous combustion when extracting coal from steeply inclined seams, backfilling technology was introduced.
	■Technical Guidance	■Provided guidance on a fly-ash backfilling method(Togashi).	■Information about such things as appropriate fly-ash density and dewatering time have been transfered.
		■Provided guidance on methods for measuring underground temperature(Togashi).	■The method for determining locations for installation of digital thermometers, installation methods of those thermometers and how to make temperature sensors were transfered.

	2)-2 Developing the appropriate technologies of gas and/or coal dust explosion prevention	◆Long-term Expert: ■Shinichiro Yamao 30/10/1995~29/10/1999	■ Provided guidance on explosion prevention technologies in general. ■ Delivered a special lecture on "Coal-dust explosion prevention technologies" at the 11th Turkish Coal Convention (11/06/1998). ■Gave a seminar on the theme of "Measurement of underground gas" (20/12/1996). ■A seminar entitled "Technologies to measure dust at coal mines" is scheduled to be held (/05/2000).	★ Japanese water barrier type explosion prevention system has been introduced. ■ Completed the water-barrier-type explosion-prevention system for TTK. ■Contributed to technology transfer by introducing Japan's state-of-the-art explosion prevention technologies to Turkish persons concerned. ■ Appropriate gas measurement technologies, which are a prerequisite for to the prevention of gas explosions, have been transfered. ■The objective is to transfer suitable dust measurement technologies which are essential to the appropriate implementation of coal-dust explosion prevention technologies.	☆ The Japanese-pioneered water barrier method has already found its way into not only the Kozlu colliery but also all other TTK's coal mines. Under the circumstances, it is highly likely that sustainability will be achieved so long as the maintenance technologies can be established. ◇ In order to make it possible for the above-mentioned water barrier type explosion propagation prevention system to securely take root in Turkey, it is necessary to provide guidance based on engineers' experiences that have been accumulated at their actual worksites in Japan. For this reason, it is desired that a short-term expert in this field be dispatched. ◇ In the future, it is to be hoped that the transferred technologies will find their way into other coal mines such as TKI.
		■Hiroji Togashi 30/10/1995~29/10/1997	■Provision of guidance on water-barrier installation standards.	■Promoted the introduction of the water barrier type explosion prevention system for TTK.	
		◆Short-term Expert: ・Gas/Coal Dust Explosion Prevention Technologies ■Katsuhiko Seo /01/2000~ /01/200	■ Will provide guidance on explosion prevention technologies and open a seminar under the theme of "On-site technologies to prevent gas/coal dust explosion" (/01/2000).	■ Expected to contribute to the establishment of maintenance/management technologies for explosion prevention systems.	
		◆Others: ■Technical Guidance	■Provided guidance on technologies to monitor goaf gas (Ichinohe).	■ Relocation technologies of gas sampling lines under driving of headings were transferred.	
	2)-3 Developing the appropriate technologies of mine fire prevention			★ Technical guidance on mine fire prevention technologies was provided through the opening of seminars and the like.	☆ By virtue of the introduction of the central monitoring system, the gas analysis system, the maintenance /management systems for gas alarms and sensors and the underground communication

		◆Long-term Expert: ■Shinichiro Yamao 30/10/1995~29/10/1999 ◆Others: ■Study Tour ■Seminar ■Technical Guidance	■ Providing guidance on mine fire prevention technologies in general and has a plan to give a seminar on "Mine fire prevention technologies" (/09/1999). ■A study tour was conducted to a worksite using shotcrete (06/091998). ■Gave a seminar on "Electricity and mine fires" (08/05/1998, Ohnishi). ■ Provided guidance on how to use protective relays for electrical equipment (Ohnishi). ■ Provided guidance on work standards for the application of shotcrete (Ichinohe).	■The objective is to provide guidance on basic theoretical technologies that are essential to the prevention of mine fires. ■With the study tour as an impetus, TTK has been making attempts at introducing the shotcrete-application method as one way to make roadways noncombustible. ■ Technologies essential to electricity-induced fire prevention measures were transferred. ■ A contribution was made to the prevention of electric equipment-induced fires. ■ Provided basic data for shotcrete-introduction feasibility studies.	system, it can be said that TTK's fire-prevention technologies have significantly been improved and a rapid response system has been established. ◇To achieve self-sustainability, the maintenance and management of the newly introduced systems becomes important.
	2)-4 Developing the appropriate technologies of degasfication	◆Long-term Expert: ■Hiroji Togashi 30/10/1995~29/10/1997 ■Chihiro Ichinohe 05/10/1997~14/10/1999	■Provided guidance on gas-drainage technologies. ■Provided guidance on gas-drainage technology and gas-outburst prevention technology.	★At this stage, the transfer of technologies is not yet to be complete. Since gas-drainage technology varies widely from site to site, the technology transfer is being implemented in the form of individual solution-finding consultation. It is to be hoped that the technology-transfer effort be complemented by the specialist who will be dispatched next year as a short-term expert. ■Explanations of Japan's advanced boring standards for gas drainage were provided to the Karadon colliery where has a high incidence of gas-outburst accidents. ■ Will offer consultative support in response to future inquiries.	☆Since, even among the coal mines operating under TTK, the occurrence of gas and geological conditions vary from one mine to another; it is difficult to implement technology transfers in a uniform, standardized manner. Although it is desirous of providing guidance coincided with the conditions of individual underground working faces, the fact of the matter is that support cannot be provided to all cases due largely to the problem of insufficient expert resources. ◇ TTK's individual coal mines have been taking measures in their own ways. Since gas drainage is a type of work that must be done, sustainability itself will probably be established--even though their technological trial-and-error processes might continue.

		◆Short-term Expert: ・Gas-outburst Prevention Technologies ■Nobuo Kiyama /07/2000~ /07/2000	■Planned to provide guidance on gas-drainage technologies for the prevention of gas outbursts and open a seminar on the theme of "On-site technologies to prevent outbursts of gas".	■ Expected to contribute to the enhancement of TTK's gas-outburst prevention technologies.	
(3) Improvement of maintenance /examination technologies for mine appliances	3)-1 Developing the appropriate technologies of breathing apparatuses	◆Long-term Expert: ■Shinichiro Yamao 30/10/1995~29/10/1999	■Provided guidance on technologies in general and ways of interpreting test results. ■ The following manuals have been prepared: ・CO mask performance test method. ・Infrared gas analyzer operating instruction (RI-555). ・Temperature controller operating instruction. ・Multi-pen recorder operating instruction. ・O_2 mask performance test method. ・Portable gas analyzer operating instruction. ・Smoke-filtering performance test method. ・Wet-type gas flowmeter operating instruction. ・Electronic balance operating instruction. ・Dust-mask test method.	★ The transference of performance test technologies for CO and O_2 masks as well as the test equipment has almost reached completion. ■Since the test system uses harmful gases, meticulous attention has been paid to preclude the accidents caused by operating errors and equipment failures. ■All of the manuals listed in the left-hand column have been translated into Turkish by C/P.	☆ Last year, TTK finished conducting performance tests by itself on all CO masks, oxygen masks and dust masks by random sampling. Considering the fact that TTK has even begun conducting purchase/replacing work based on the results of the above tests, there is no problem with self-sustainability except for the maintenance of testing equipment. ◇ Since the equipment and materials adopted are Japanese-made special-purpose products, some follow-up support may become necessary after completion of the project. ◇TTK has already begun running tests on masks (CO and dust masks) of TKI (Turkish Lignite-coal Enterprise), demonstrating the enormity of the proliferation of the technology transfered. In the future, it is not a dream that TTK will play the role of a test center for breathing apparatuses not only for Turkey but also for neighboring countries.

■Hideo Takagi 30/10/1995~29/10/1997	■Provided guidance on ways of conducting performance tests on breathing apparatuses and conducted a workshop called "Intensive course for mask testing methods" (30/09~06/10/1997).	■Although some difficulties were experienced in providing guidance on gas piping work for the mask test system, highly safe facilities could eventually be completed.
◆Short-term Expert: ・Breathing Apparatus Management Technology ■Takushi Doi 09/07/1997~29/07/1997	■Installed and adjusted supplied equipment and materials and provided guidance on the operation of equipment.	■After the short-term expert returned home, it has become necessary to translate markings /legends on equipment/devices into Turkish in order to ward off possible operating errors.
・Breathing Apparatus Maintenance Technology ■Yet to be appointed /06/2000~ /06/2000	■Will give guidance on maintenance technologiy of the breathing aparatus test system.	■Required for the purposes of providing guidance on technologies to maintain /manage the test system in the future as well as opportunity to achieve self-sustainability.
◆C/P Training in Japan: ■Ramazan Karaaslan 01/09/1996~28/09/1996	■Provision of guidance on dust-mask performance tests.	
■Ejder Erbay 05/07/1999~03/08/1999	■Playing a leading role in performance testing of CO and oxygen masks.	
◆Provision of Equipment: ■CO Mask Maintenance /Examination System (¥58.7 million, FY1995) ＊Completion Ceremony (25/071996)	■The system is equipped with functions which can be applied to the performance testing of all filtering-type masks. Improvements have been added to the smoke-filtering performance test equipment which is appurtenant to the system in order that the said equipment can also be used to run performance tests on dust masks.	■The addition of improvements to mask-mounting hardware will make it possible for the system to run performance tests on any type of gas masks as well in addition to CO masks.
■Attachments for the Above System (¥368,000, FY1999)	■Mainly consumables such as recording paper and ink.	
■Oxygen Mask Maintenance /Examination System (¥30 million, FY1995 ＊Completion Ceremony (25/071997)	■Equipped with the functions to run performance tests on all oxygen-supplying-type masks.	

	3)-2 Developing the appropriate technologies of gas detectors	◆Long-term Expert: ■Shinichiro Yamao 30/10/1995~29/10/1999 ■Hideo Takagi 30/10/1995~29/10/1997 ◆Short-term Expert: ・Gas Detectors Maintenance /Management Technologies ■Norio Suzuki 02/09/1997~14/09/1997 ◆C/P Training in Japan: ■Cengiz Burma 05/07/1999~03/08/1999 ◆ Provision of Equipment: ■Gas Alarm/Sensor Maintenance/Management System (¥20.278 million, FY1996) ＊Completion ceremony (12/09/1997) ■Attachments for the Above System (¥133,000, FY1999)	■ Implemented all aspects of technology transfer and provided guidance to interpret test results. ■Provided guidance on methods for conducting performance tests. ■Installed and adjusted supplied equipment and provided guidance on the operation of performance test equipment. ■Charging with providing guidance on maintenance/management technologies for safety equipment, notably gas alarms and the like, as a chief of electric and machinery section at TTK's Safety Department. ■ The system can be used to conduct performance tests on methane gas alarms, CO gas alarms and various kinds of sensors for precision, response time, alarm-point calibration and so on. It can be also used to perform calibration work on interfererometer type methane detectors. ■ Consumables for pure-water producing equipment.	★ By virtue of the introduction of this system, a system to carry out performance tests on gas alarms/sensors possessed by TTK has been established. ■Approximately 2 years' supplement of consumables.	☆ The staf members of TTK's Safety Department include several highly competent C/P's responsibly for electricity and machinery/equipment. Since these C/P's are involved in the operation of the system, TTK is judged to possess a sufficient future potential for self-sustainability. ◇ This system is special-purpose equipment manufactured in Japan. It uses virtually no components which are likely to develop problems. Should the system suffer a breakdown, TTK's engineers are considered to satisfactorily repair it. ◇ Since consumables such as standard gases and chemicals which need to be replenished can be procured by TTK, there exists no problem with maintenance either.
	3)-3 Developing the appropriate technologies of flame-proof machinary			★ Since Turkey is moving toward the adoption of EU standards, it has been judged that it is impossible to force the county with Japanese standards. With this being the situation, the guidance provided was limited to be just enough for TTK to become self-sustainable under EU standards.	☆ Judging from the fact that TTK owns a explosionproof-equipment test center outfitted with decent test facilities, self-reliance is secured.

		◆Long-term Expert: ■Hikosuke Ohnishi 30/10/1995~29/10/1999 ◆Others: ■Provision of Materials	■Provided guidance concerned with all aspects of technology transfer. ■Technical guidance: "Guidance on solutions to the problem of dew condensation that occurs on underground machinery". ■Technical guidance: "Guidance on measures to cope with voltage drops affecting coal-mining machinery, compressors, main fans and the like in use at the Kozlu colliery". ■JIS standards for explosion proof equipment/machinery (English edition).	■ Provided explanations about all aspects of Japan's regulations for explosion proof electrical appliances/equipment. ■ The problem of deliquescence accretions ascribable to dew condensation caused by changes in electric machinery's underground temperature has been solved. ■ Visited individual worksites, checked for possible voltage anomalies, and instructed remedial measures.	
(4) Improvement of education and training technologies	4)-1 Developing the appropriate safety and rescue education program and its materials	◆Long-term Expert: ■Shinichiro Yamao 30/10/1995~29/10/1999 ◆Short-term Expert: ・Miner Training/Education Technology ■Hiroshi Kisaki /10/1999~ /10/1999	■ Provided guidance concerned with all aspects of technology transfer. ■ Provision of guidance on technologies for education and training and giving a seminar under the theme of "Technologies for providing education to miners and training of rescue crews" (/10/1999).	★ In this particular aspect, TTK had obtained 4-year-long training and education support (mainly targeted at qualified personnel) with cooperation from the EU in the wake of the disaster at the Kozlu colliery. It has, therefore, been decided to provide just enough guidance to supplement the above training and education under this project. ■ TTK's safety education/training technologies are expected to be enhanced.	☆Since TTK has a respectable training center, there is a good likelihood of self-sustained development if full use can be made of the center's facilities.

(5) Others (Requests received for technical guidance and issues that came up in course of the project in areas other than those discribed above for consultation)	[Issue (Expert)]	[Descriptions]	[Action taken]	[Results]
	◆Assistance to construct a coke plant (Yamao)	■Officials from TTK conferred with us about possible Japanese assistance to construct a coke plant using TTK-produced coal.	■Through the office concerned of the Ministry of International Trade and Industry, we sent an inquiry to the Japan Coke Association to find out if there is any possibility.	■The results of studies of coal-analysis data have shown that the proposition is not economically viable for reasons such as the following: - TTK's coal is deficient in quality to qualify use for coke. - There is no guarantee of security in terms of buyers/consumers and quantity.
	■Development of a new coal mine in the Amasra area (Yamao)	■TTK's planning department conferred with us about the possibility of winning Japanese assistance for the development of coal seams that are located at deep depths in the Amasra area.	■We asked them to submit us detailed geological data as well as materials related to feasibility studies.	■As of this writing, no materials have been submitted to us.
	■Compilation of a dictionary entitled "Glossary of Mining Terms" (Yamao)	■The Turkish-English-Japanese glossary containing approximately 4,000 mining terms has been compiled.		■The glossary proved useful in the implementation of the project. It was distributed among interested parties and individuals on the Turkish side, and it enjoyed great popularity.
	■Creation of a booklet called "Turkish Grammar Notebook" (Yamao)	■The Turkish-grammar handbook, about 100 pages long, has been prepared.		■The handbook has contributed to the specialists' acquisition of proficiency in the Turkish language. The grammar book was also distributed among other specialists who are acting in Turkey.

トルコ鉱山保安技術向上協力プロジェクト　中間評価表

（１９９９年６月　現在）

目　標	目標達成要素	投　入　実　績	活　動　状　況	効果／問題点等	自立発展／波及効果
(1) 保安管理技術の改善	1)-1 集中監視技術の向上	◆長期専門家派遣 ■大西　彦輔 1995/10/30~1999/10/29 ■坂口　敏則 1997/10/30~1999/10/29 ◆短期専門家派遣 ・集中監視データ処理技術 ■松瀬　和敏、千歳　恒盛 1997/09/01~1997/10/15 ・同上技術 ■千歳　恒盛、伊東　聡 1998/06/02~1998/07/01 ・総合保安管理技術 ■内野　健一 1998/07/04~1998/07/14 ◆研修員受入 ■Halim Burtan 1998/05/10~1998/06/06 ■Ilyas Yazcioglu 1998/05/10~1998/06/06	■セミナー「集中監視技術」開催（1996/06/04）。 ■操作・保守管理技術の指導及び操作マニュアルの作成。 ■機材据付・調整及びソフトの改良の実施。 ■追加機材の据付・調整及びデータ処理能力アップとソフトの改良の実施。 ■保安管理技術の指導及びセミナー「総合保安管理技術」開催（1998/07/09）。 ■コズル炭鉱の機電業務部門を統括している。 ■集中監視システムの統括業務指導行っている。	★コズル炭鉱主要箇所の集中監視システムが確立された。 ■セミナーの開催によりC/Pの理解度が飛躍的に向上した。 ■保守点検技術等を引続き指導中。 ■周辺強電回路の影響排除に苦慮したが最終的に解決した。 ■社会制度の相違によるソフトの手直しを必要とした。また、自然発火早期検知の目的で導入された連続ガス分析計データも集中監視へ取込み可能となった。 ■保安管理技術の重要性をC/Pに再認識させることが出来た。	☆C/Pの配置適正であり、実施中の操作・管理技術の移転が完了すれば完全自立可能である。 ◇TTKは既に翼下のアマスラ炭鉱への移転技術の導入を試みており、今後の他炭鉱への波及が期待できる。 ◇大学の鉱山学科の教授、学生がシステムの勉強のために視察に訪れており、この面からの技術の波及も期待できる。 ◇納入機材が日本製の特殊機器のためプロジェクト終了後の保守並びにスペアパーツの供給等に関するフォローアップが必要となるであろう。

		◆機材供与			
		■集中監視データ処理システム（40,300千円） 1996年度 ＊竣工式(1997/10/10)	■メタン２０点、CO ２０点、On-Off 情報４０点の監視可能となる。	■コズル炭鉱の－485m レベルまでの集中監視が可能となった。	
		■同上追加機材(11,214千円) 1998年度 ＊竣工式(1999/09/)予定	■メタン１６点、On-Off情報１６点の増設及びシリコンディスク容量を４０Mbから８０Mb へアップした。	■同上の－560m レベルまでの監視が可能となった。	
		■付属品（1,500千円） 1999年度予定	■中央操作盤、ローカル盤及びリピーター盤用の付属品。	■約２年間分のメインテナンス用消耗品類。	
		◆その他			
		■セミナー開催	■「炭鉱保安管理技術」(1998/10/23)（山尾）。	■炭鉱保安管理技術の在り方を理解させた。	
	1)-2 入昇坑者管理技術の向上			★導入作業が完了すればコズル炭鉱の入昇坑管理業務が飛躍的に合理化される。	☆ソフトの改善・追加等の作業はC/P 自身で実施しており、自立発展性は十分にある。
		◆長期専門家派遣			
		■大西 彦輔 1995/10/30~1999/10/29	■導入全般を継続指導中。	■ハード的な技術の指導には問題ないが、ソフトの出力を全てトルコ語にする苦労がある。	◇納品業者がトルコ国内であるためTTK にとってはメインテナンスが容易である。
		◆研修員受入			
		■Sukran Bozkurt 1998/05/10~1998/06/06	■ソフト変更・追加及びTTK ホストコンピュータとの接続を指導している。	■主要接続の問題点をほぼ解決し、細部のソフト調整を実施中である。	◇保安管理のみでなく労務・給与管理業務の合理化にも貢献できるものと期待される。
		◆機材供与			
		■入昇坑者管理システム (23,032千円) 1996年度 ＊竣工式(1999/09/)予定	■中央演算室に AS400 ホストコンピュータ１台と工業用 PC ２台、管理棟と別館の主要箇所に同PC を計１７台、外部主要	■コズル炭鉱坑内2,114 人、坑外 628 人の入昇坑管理が可能となった。	

			施設にも同PC 3台設置した。データ読取端末を入昇坑口に6台、管理棟に3台、別館に1台、外部施設に3台それぞれ設置した。また、管理棟係員詰所にID カード作成機1式を設置した。		
		■同上追加機材 (15,055千円) 1997年度 ＊竣工式(1999/09/　)予定	■新立坑No.1とNo.2に人員通過自動検出装置と中央演算室に工業用PC 1台を補充した。	■立坑口で人員入昇坑を自動管理できる体制が確立した。	
	1)-3 通気制御技術の向上			★ほぼ完全に技術移転完了。	☆能力高い優秀な技術者がC/Pとなっており，既に自立発展段階に入っている。
		◆長期専門家派遣 ■富樫　弘治 1995/10/30~1997/10/29	■ユズルメズ炭鉱の通気改善指導。通気圧測定実習会(1996/11/26~27)をコズル炭鉱で開催、セミナー「太平洋炭鉱における通気の実際」開催(1997/10/24)及び講習会「ピトー管による通気測定」開催(1997/06/26~27)。	■坑内現場での正確な通気測定技術の移転及びユズルメズ炭鉱の通気を改善した。	◇TTK 翼下の全ての炭鉱の通気網解析をC/Pのみで完全に実施できる状態になった。 ◇将来はTTK 以外の炭鉱・鉱山の通気網解析の指導的機関としての役割を果たすものと期待される。
		■一戸　千博 1997/10/05~1999/10/14	■主要扇風機負圧変動時の対応策指導。 ■「風丸」新ソフトの導入。	■点検方法、修復方法を習得させた。 ■九州大学井上先生新開発の「風丸 Windows」の移植を完了した。	
		◆短期専門家派遣 ・通気網解析技術 ■井上　雅弘 1996/10/08~1996/11/02	■セミナー「坑内通気」開催(1996/10/18)及び講習会「通気網解析」開催(1996/10/15~24)	■短期専門家が日本で開発した通気解析ソフト「風丸」の完璧な技術移転がなされた。	

		◆研修員受入 ■Mesut Ozturk 1997/07/13~1997/08/09 ■Orhan Dalahmetoglu 1997/07/13~1997/08/09 ■Nurettin Eren 1997/07/13~1997/08/09 ■Ali Ozcan 1999/07/04~1999/08/03 ◆機材供与 ■通気網解析システム (2,300千円) 1995年度 ＊竣工式(1996/10/25) ◆その他 ■セミナー開催 ■マニュアル作成	■プロジェクト・マネジャーとして活躍中。 ■コズル炭鉱の通気改善を指導している。 ■カラドン炭鉱の通気解析を指導している。 ■TTK 翼下の各炭鉱の通気網解析を指導している。 ■2系列の通気網解析を同時に実行するシステムを完成した。 ■「局部通気技術」(1997/06/20) 高木 ■以下の通気関係機材のマニュアルを作成（山尾） ・アネロイド気圧計使用法 ・ディジタル気圧計使用法 ・フォルタン気圧計使用法 ・自動記録式気圧計使用法	■山尾と共著で第7回トルコエネルギー会議（1997/11/07）にて論文「JICA との鉱山保安プロジェクト」を発表しプロジェクトの広報に役立った。 ■TTK 翼下の全炭鉱の通気網解析を TTK 保安部で実施できる体制が出来上がった。 ■日本の最新の局部通気技術の移転を行った。 ■左記のマニュアルは全て C/P によってトルコ語へ翻訳された。	

	1)-4 坑内通信技術の向上	◆長期専門家派遣 ■坂口　敏則 1997/10/10~1999/10/29 ◆機材供与 ■坑内通信システム (47,672千円) 1998年度 ＊竣工式(1999/09/　)予定 ◆その他 ■技術指導	■導入並びに運用全般を継続指導中。 ■親局1式、携帯子局65台が導入された。 ■坑外交換機及び坑内アンテナの設置方法を指導（大西）。	★設置作業が完了すればトルコの炭鉱で初めての坑内通信システム導入となり、安全確保の面から保安管理技術の飛躍的な向上に寄与する。 ■今後は集中監視システムとの統括併用技術の移転を実施する。 ■コズル炭鉱の坑内主要箇所間の相互通信が可能となった。 ■設計通りの機能が発揮出来るようになった。	☆機重関係のC/Pの技術能力が極めて高いので自立性には問題なし。 ◇トルコの機械メーカー代理店を通した英国製が採用されたので、プロジェクト終了後のメインテナンスに問題はないであろう。 ◇TTKの財政さえ許せば翼下の他炭鉱への技術の波及は容易である。
(2) 災害防止技術の改善	2)-1 自然発火防止技術の向上	◆長期専門家派遣 ■山尾　信一郎 1995/10/30~1999/10/29 ■一戸　千博 1997/10/05~1999/10/14 ◆短期専門家派遣 ・連続ガス分析技術 ■新谷　茂 1999/01/30~1999/02/14	■ガスクロマトグラフによるガス分析技術を移転。 ■坑内ガス連続分析計の導入を指導。 ■ガス分析結果による自然発火の判定法指導。 ■坑内ガス連続分析計の設置・調整作業を実施。	★自然発火早期検知のための坑内ガス分析システムが確立された。 ■納品業者によるインストラクションが不十分であったので、“実習”の再開設が必要である。 ■坑内ガス連続分析システムを完成させた。 ■自然発火兆候判定基準を導入した。 ■多ペン記録計並びにCO_2分析計に不都合が生じたが、前者は入替、後者は標準側ガスチャンバーの交換で解決した。	☆C/Pに分析技術を完全にマスターさせるには、次年度の日本国内研修において納品業者が京都において実施している“講習会”に参加させる必要がある。 ◇日本の納品業者の支店がイスタンブルにあるのでプロジェクト終了後のメインテナンスには特別な問題は生じないであろう。 ◇将来的にはトルコ国内の他の鉱山のガス分析センターの役割を担えるよう期待する。

		・ガスクロマトグラフ技術 ■堀田　昌男 1999/01/25~1999/01/29 ・自然発火対策技術 ■樋口　澄志 1999/03/06~1999/03/14 ◆研修員受入 ■Kemal Resit Kutlu 1996/08/31~1996/09/19 ◆機材供与 ■自然発火対策（坑内ガス分析）システム (17,661千円) 1997年度 ＊竣工式(1999/09/　)予定 ◆その他 ■セミナー開催 ■技術指導	■ガスクロマトグラフ2台の据付調整及び操作方法の指導を実施。 ■自然発火対策技術の指導及びセミナー「自然発火早期検知技術」開催(1999/03/10)。 ■コズル炭鉱の採炭に伴う自然発火対策を指導している。 ■CO, CO2及びCH4の3台の赤外線ガス分析計とガスクロマトグラフ2台が導入された。 ■「スラリー流送充填」1995年6月の長期調査団時に開催、（山尾、大西）。 ■「急傾斜採炭保安技術」(1997/02/27)（山尾、大西） ■フライアッシュ充填方法の指導（富樫）。	■指導期間が短くC/Pが操作方法を十分に理解できず。また、TTK側のキャリヤーガス購入が遅れ他機関からの借用で間に合わせた（TTK購入手続中）。 ■日本の最新の自然発火対策技術が紹介され好評を得た。 ■トルコ石炭技術者協会ゾングルダック支部長を務めている。 ■コズル炭鉱の総排気ガスの連続分析システム並びに保安部に坑内ガス分析室を完成させた。 ■自然発火防止対策技術としてスラリー流送充填法の導入をその後もTTK側と検討したが、スラリーの確保に経費がかかりすぎることから導入を断念せざるを得なかった。 ■急傾斜採炭の自然発火防止として充填技術を移転した。 ■フライアッシュの適正濃度、脱水時間等の技術を移転した。	

			■坑内温度計測法の指導（富樫）。	■ディジタル温度計設置箇所と方法及びセンサー作成技術を移転した。	
	2)-2 ガス・炭塵爆発防止技術の向上	◆長期専門家派遣 ■山尾　信一郎 1995/10/30~1999/10/29	■爆発防止技術全般を指導。 ■第１１回トルコ石炭大会にて「炭塵爆発防止技術」を特別講演（1998/06/11）。 ■セミナー「坑内ガス計測」開催（1996/12/20）。 ■セミナー「炭鉱における粉塵計測技術」開催予定（2000/05/　）。	★日本の水棚式爆発伝播防止システムの導入を図った。 ■TTK への水棚式爆発防止システムを完了させた。 ■トルコの石炭関係者へ日本の最新爆発防止技術を紹介し技術移転に貢献した。 ■ガス爆発防止の前提条件である適正なガス計測技術を移転した。 ■炭塵爆発防止技術の適正施工の基本である適正な粉塵計測技術の移転を図る。	☆既にコズル炭鉱のみならずTTK 翼下の全炭鉱に日本式水棚が普及しており、下に述べる維持・管理技術さえ確立されれば自立性は十分にある。 へ上記の水棚式爆発伝播防止システムの維持・管理を確実に根付かせるためには、日本の現場で実際に経験のある技術者の体験に基づいた指導が必要と考えられるため、この方面の短期専門家派遣が望まれる。 ◇将来的には TKI 等の他の炭鉱への技術の波及が期待される。
		■富樫　弘治 1995/10/30~1997/10/29	■水棚設置基準の指導。	■TTK への水棚式爆発防止システム導入を促進した。	
		◆短期専門家派遣 ・ガス／炭塵爆発防止技術 ■瀬尾　勝彦（予定） 2000/01/　~2000/01/	■爆発防止技術の指導及びセミナー「ガス・炭塵爆発防止現場技術」開催予定（2000/01/　）	■爆発防止システムの維持・管理技術の確立に貢献するものと期待される。	
		◆その他 ■技術指導	■古洞ガスの監視技術の指導（一戸）。	■ガス採取管の配置、採掘進行に伴う移設技術を移転した。	

	2)-3 坑内火災防止技術の向上	◆長期専門家派遣 ■山尾　信一郎 1995/10/30~1999/10/29	■坑内火災防止技術全般の指導及びセミナー「坑内火災防止技術」開催予定（1999/09/　）。	★セミナーの開催等によって坑内火災防止技術の指導を行った。 ■坑内火災防止のための基礎理論的技術の指導を行う。	☆集中監視システム、ガス分析システム、ガス警報器・センサーの保守・管理システム及び坑内通信システム等の導入によりTTKの火災対策技術は飛躍的に向上し、即応体制が確立されたと云ってよい。 へ自立性のためには今後は導入された新システムの維持・管理が重要となる。
		◆その他 ■見学会	■ショットクリート現場見学会開催（1998/10/06）。	■見学会を契機としてTTKは坑道不燃化対策のひとつとしてショットクリート工法の導入を試みている。	
		■セミナー開催	■「電気と坑内火災」開催（1998/05/08）（大西）。	■電気火災対策技術を移転した。	
		■技術指導	■電気機器の保護リレーの使用方法の指導（大西）。	■電気機器火災の予防に貢献した。	
			■ショットクリートの施工基準の指導（一戸）。	■ショットクリート導入のフィージビリティー・スタディーの基礎データを提供した。	
	2)-4 ガス抜き技術の向上			★現段階では技術移転は完全ではないが、ガス抜き技術はその実施現場によって千変万化であるため、個々の相談に応じる形で実施している。次年度の短期専門家招聘によって補完を図りたい。	☆TTKの炭鉱間でもガスの賦存状態、地質条件が異なるため画一的な技術移転は困難である。各採炭現場の実態にあった指導が望まれるが、人的資源の問題もあり全てに対応できていないのが実態である。

		◆長期専門家派遣 ■富樫　弘治 1995/10/30~1997/10/29 ■一戸　千博 1997/10/05~1999/10/14 ◆短期専門家派遣 ・ガス突出防止技術 ■木山　伸雄　　(予定) 2000/07/　~2000/07/	■ガス抜き技術の指導。 ■ガス抜き技術・ガス突出対策技術の指導。 ■ガス突出防止のためのガス抜き技術の指導を行い、セミナー「ガス突出防止現場技術」を開催予定。	■ガス突出事故の多いカラドン炭鉱へ日本のガス抜き先進ボーリングの規格を解説。 ■今後の相談事項に応ずる。 ■TTK のガス突出対策技術の向上に寄与するものと期待される。	◇TTK の各炭鉱ではそれなりの対応は一応実施しており、技術的な模索は続くものの、やらなくてはならない作業であるので自立性そのものは確保されるであろう。
(3) 保安機器の保守・管理技術の確立	3)-1 呼吸保護具の保守・管理技術の向上	◆長期専門家派遣 ■山尾　信一郎 1995/10/30~1999/10/29	■技術全般及び試験結果の判定手法の指導を主に行った。 ■以下のマニュアルを作成。 ・CO マスク性能試験方法 ・赤外線ガス分析計(RI-555)操作方法 ・湿度制御器操作方法 ・多ペン記録計使用方法 ・O2 マスク性能試験方法 ・携帯ガス分析計操作方法 ・除煙能力試験方法	☆CO マスク及び酸素発生式自己救命器の性能試験技術の移転をほぼ完了した。 ■試験システムでは有害ガスを使用するため、誤操作、故障等による事故が発生しないよう細心の注意を払った。 ■左記のマニュアルは C/P によってトルコ語に翻訳された。	☆TTK は昨年度既に C/P 自身によって翼下の炭鉱が所有する全 CO マスク、酸素マスク及び防塵マスクの抜取性能試験を完了し、この試験結果に基づき坑入交換作業に入っているほどで、試験装置のメインテナンスを除けば自立性には全く問題はない。 ◇機材が日本製の特殊機器のため、将来的にメインテナンスの点において多少のフォローアップが必要になるやもしれない。

			・湿式ガス流量計操作方法 ・電子天秤使用方法 ・防塵マスク試験方法		◇TTKは既にTKI(トルコ褐炭公社)のマスク（COマスク及び防塵マスク）の試験も実施しており、技術の波及効果も極めて大である。将来的にはトルコ国内は勿論のこと周辺国を含めての呼吸保護具のテストセンターとなることも夢でない。
		■高木　英夫 1995/10/30~1997/10/29	■呼吸保護具の性能試験方法の指導及び講習会「マスク試験方法集中講習会」開催(1997/09/30~1997/10/06)。	■TTK側のガス配管工事の指導に苦慮したが、最終的には安全性の高い設備を完成させた。	
		◆短期専門家派遣 ・呼吸保護具管理技術 ■土井　卓士 1997/07/09~1997/07/29 ・呼吸保護具試験装置メインテナンス技術 ■未　定（予定） 2000/06/　~2000/06/	■供与機材の据付調整並びに装置の操作方法を指導。 ■メインテナンス技術の指導。	■短期専門家帰国後に誤操作回避のために装置の表示のトルコ語化の必要が生じた。 ■システムの今後の維持・管理技術の指導と自立性確保のために必要である。	
		◆研修員受入 ■Ramazan Karaaslan 1996/09/01~1996/09/28 ■Ejder Erbay（予定） 1999/07/04~1999/08/03	■防塵マスク性能試験を指導している。 ■CO及び酸素マスクの性能試験のリーダー的存在。		
		◆機材供与 ■COマスク保守・管理システム (58,700千円) 1995年度 ＊竣工式(1996/07/25)	■濾過式の全てのマスクの性能試験に応用可能な機能を有する。本システムに付随する除塵能力試験装置を防塵マスクの性能試験に使えるように改良した。	■マスク取付金具を改良すればCOマスク以外の防毒マスクの性能試験に使用できる。	

		■同上付属品(368千円) 1999年度予定 ■自己救命器保守・管理システム (30,000千円) 1995年度 ＊竣工式(1997/07/25)	■主として記録紙、インク等の消耗品類。 ■酸素発生式の全てのマスクの性能試験に対応できる性能を有する。		
	3)-2 ガス警報器保守・管理技術の向上	◆長期専門家派遣 ■山尾　信一郎 1995/10/30~1999/10/29 ■高木　英夫 1995/10/30~1997/10/29 ◆短期専門家 ・ガス警報器保守管理技術 ■鈴木　規雄 1997/09/02~1997/09/14 ◆研修員受入 ■Cengiz Burma（予定） 1999/07/04~1999/08/03 ◆機材供与 ■ガス警報器／センサー保守・管理システム (20,278千円) 1996年度 ＊竣工式(1997/09/12) ■同上付属品（133千円） 1999年度予定	■技術移転全般及び試験結果の判定手法を指導した。 ■性能試験方法を指導した。 ■供与機材の据付調整並びに性能試験装置の操作指導を行った。 ■TTK保安部機電課長として保安機器，特にガス警報器類の保守・管理技術の指導を行っている。 ■メタン、COのガス警報器及び各種センサーの精度，応答速度、警報点校正等の性能試験並びに干渉式メタン計の補正作業等に使用できる。 ■純水製造装置用消耗品類。	★本システムの導入によりTTK所有のガス警報器・センサーの定期的な性能試験を実施できる体制が確立された。 ■約2年間分の追加補給。	☆TTK保安部には機電担当の優秀なC/Pが数名おりシステムの運用に当っている。将来的に見ても自立性は十分確保されていると判断される。 ◇本システムは日本製の特殊機器ではあるが、故障すると思われる箇所は殆どなく、また、故障したとしてもTTKの技術者で十分修理できると思われる。 ◇追加供給が必要な標準ガス、薬品等の消耗品類はTTKで調達可能であるためメインテナンス上も問題はない。

	3)-3 防爆機器保守・管理技術の向上	◆長期専門家派遣 ■大西　彦輔 1995/10/30~1999/10/29 ◆その他 ■資料提供	■技術移転全般を指導。 ■技術指導「坑内機械の露結問題解決指導」。 ■技術指導「コズル炭鉱の採炭機械、コンプレッサー、主扇等の電圧降下対策指導」。 ■防爆機器JIS規格（英語版）	★トルコはEU規格採用の方向にあり日本の規格を押し付けることは無理と判断し、TTKがEU規格下で自立できる程度の指導にとどめた。 ■日本の防爆電気機器規則全般について解説した。 ■電気機械の坑内温度変化による露結から生じる潮解物付着を解決した。 ■各現場に赴き電圧不調を調べ対策を指示。	☆TTKは防爆機器試験センターを所有しており一通りの試験設備は備えているので、自立性は確保されている。
(4) 教育・訓練技術の改善	4)-1 保安教育及び救護隊訓練技術の向上	◆長期専門家派遣 ■山尾　信一郎 1995/10/29~1999/10/30 ◆短期専門家派遣 ・坑員教育訓練技術 ■木崎　宏（予定） 1999/10/　~1999/10/	■移転技術全般の指導。 ■教育訓練技術の指導並びにセミナー「坑員教育／救護隊訓練技術」開催予定(1999/10/　)	★この面においてTTKはコズル炭鉱災害後EUの協力を得て4年間に渡る訓練教育（主に有資格者教育）支援を受けており当プロジェクトとしてはそれを補う程度で十分であろうと判断した。 ■TTKの保安教育・訓練技術の向上が期待される。	☆TTKには立派な訓練センターがありその設備をフル活用すれば自立発展性は十分にある。

(5)その他（プロジェクト実施中に上記以外の領域で技術指導或いは相談を受けた事項）	[項目(担当専門家)] ◆コークスプラント建設援助（山尾）。 ◆アマスラ地区新坑開発（山尾）。 ◆辞典「鉱業用語辞典」編纂（山尾）。 ◆冊子「トルコ語文法ノート」作成（山尾）。	[内容] ■TTK幹部よりTTK産石炭を使用したコークスプラント建設支援の相談を受ける。 ■TTKの企画部よりアマスラ地区に賦存する深部炭層の開発支援の相談を受ける。 ■鉱業用語約４，０００語を集録したトルコ語⇨英語⇨日本語辞典を編纂した。 ■約１００ページのトルコ語文法解説書を作成した。	[対応] ■通産省の然るべき部局を通して日本コークス協会へその可能性を問い合わせた。 ■詳細地質データとフィージビリティー・スタディーの提出を要請した。	[結果] ■石炭分析データの検討結果、コークス用炭としては良質でないこと、消費先と量が担保されていないこと等の理由で採算取れずとの判断が下された。 ■今だに資料の提出がないままである。 ■プロジェクト遂行に役立った。トルコ側関係者にも配布され好評を得た。 ■専門家のトルコ語習得に貢献した。トルコ在住の他の専門家希望者へも配布した。	

資料４．1999年6月15日開催　合同調整委員会配布資料

Joint Coordinating Committee

Project on the Improvement of Mine Safety Technologies

JICA-TTK

(June 15, 1999)

AGENDA and TIME SCHEDULE

Joint Coordinating Committee (June 15, 1999)

Project on the Improvement of Mine Safety Technologies

Place:Meeting Room at the JICA Turkey Office, MNG Bld., 6th Flo. Uğur Mumcu Cad., GOP., Ankara (TEL.0312-447-2530)
Time: 15:00~17:00

(1)Opening Address by the Committee Chairman, Mr. İsmail Verimbaş. [15:00~15:10]

(2)Address by Attendants.[15:10~15:30]
1)Mr. Tatsuo Yonebayashi, Resident Representative, JICA Turkey Office
2)Mr. M. Ali Türkoğlu, Deputy Undersecretary, MENR
3)Mr. Hüseyin Çetin, State Planning Organization

(3)Report on the Activities and Outputs during the Fiscal Year of 1998.
- Japanese Side : by Dr. Shinichiro Yamao, Chief Advisor of the Project.[15:30~15:45]
- Turkish Side : by Mr. Mesut Öztürk, Head of Safety Department.[15:45~16:00]

(4)Explanation on the Draft of "Minutes of Discussions".[16:00~16:15]
by Mr. Shuzo Kamuro, Leader of the JICA Advisory Mission.

(5)Explanation on the Plan for the Fiscal Year of 1999. [16:15~16:30]
by Mr. Tomoyuki Uda, Member of the JICA Advisory Mission.

(Tea Break [16:30~16:45])

(6)Questions and Answers. [16:45~17:00]

Signing Ceremony on "the Minutes of Discussions"

*After the Committee, Buffet-style Dinner Party will be held.
Place: Best Apart Hotel, Uğur Mumcunun Sokağı, 71 (TEL.446-8080)
Time: 18:00~20:00

Attendant List of the Committee on June 15, 1999

Chairman: Ismail Verimbas (Acting Director General, TTK)

Japanese side:

(1) Shinichiro Yamao (Chief Advisor)

(2) Yoshio Abe (Coordinator)

Japanese Experts designated by the Chief Advisor:

(3) Hikosuke Onishi (Expert of Mine Safety Management Technology)

(4) Chihiro Ichinohe (Expert of Mine Accident Prevention Technology)

Observers:

(5) Masayuki Kannan (Second Secretary, Embassy of Japan)

(6) Tatsuo Yonebayashi (Resident Representative, JICA Office)

(7) Shigeru Otake (Head, General Affairs and Planning Div., JICA Office)

(8) Timur Sayrac (Head, 2nd Technical Cooperation Div., JICA Office)

JICA Advisory Team:

(9) Shuzo Kamuro (General Manager, International Cooperation Dept., JCOAL)

(10) Masato Koie (Coal Mine Safety Office, Mine Safety Div., MITI)

(11) Tomoyuki Uda (Staff, 2nd Technical Cooperation Div. JICA)

Turkish side:

Representative of the State Planning Organization:

(1) Huseyin Cetin

Representative of the Ministry of Energy and Natural Resources:

(2) M. Ali Turkoglu (Deputy Undersecretary)

TTK:

(3) Yusuf Celik(Assistant Director General)

(4) Cetin Onur(Assistant Director General)

(5) Sami Inan(Assistant Director General)

(6) Ali Riza Akin(Assistant Director General)

(7) Mesut Ozturk (Head of Safety Department)

(8) Temel Cakir (Head of Planning Department)

(9) Mustafa Isbitiren (Director of Kozlu Colliery)

(10) Kaya Arslan(Director of Uzulmez Colliery)

(11) Hayrullah Cakmak (Director of Karadon Colliery)

(12) Osman Nuri Pekin(Director of Amasra Colliery)

(13) Fazil Ersoy(Director of Armtcuk Colliery)

(14)Gunduz Yerebasmaz (Research Manager of Safety Department)

ACTIVITIES AND OUTPUTS DURING THE FISCAL YEAR OF 1995 (S. YAMAO)

Month	Activities/Outputs
1993 June	Proposal of the Project-type Technical Cooperation by TTK
1994 November 11	Continuous Contact through MITI-TTK Line ↓ Project Presurvey Team (21/11/'94～03/12/'94) : Minutes of Meeting (25/11/'94)
1995 May 5	Review of the TTK Proposal → Acceptance by the Japanese Government Expert Study Team (22/05/'95～18/06/'95) : Minutes of Discussions (12/06/'95) Proceeding of A4 Form for the Equipment Provision in the FY '95
June 6	
July 7	Settlement of Pending Matters — Scheme of Equipment Provision during the Project Formulation of the Project Identification Formulation of the Project Design Matrix Timing of the Implementation Study Team and so forth
August 8	
September 9	Implementation Study Team (30/08/'95～12/09/'95) : Record of Discussions, Tentative (Determination of the Equipment to be provided in the FY 1995) Schedule of Implementation, and Minutes of Discussions (08/09/'95) Proceeding of A1 Form for the Dispatch of 5 Long-term Experts
October 10	Dispatch of 5 Japanese Long-term Experts (29/10/'95) — Dr. Shin-ichiro Yamao, Miss Ayako Matsumoto, Mr. Hideo Takagi, Mr. Hikosuke Onishi, Mr. Hiroji Togashi
November 11	START OF THE PROJECT (01/11/'95) Arrival of Experts at Zonguldak (08/11/'95)
December 12	Preparation of the Project Office Fixing of the Expert Residences
1996 January 1	Project Office Opening Ceremony (12/01/'96) Project Management Meeting (17/01/'96) — Mr. Hayrettin Soytaş, Mr. Tugrul Muftuoglu
February 2	Leader Meeting at the JICA Headquarter (29/01/'96～11/02/'96) (Discussion on the Plan of Activities/Inputs in the FY '96) Counterpart Training in Japan (VIP Invitation) (31/01/'96～15/02/'96) —
March 3	Proceeding of A1 Forms for the Dispatch of Short-term Experts in the FY '96 Proceeding of A4 Form for the Equipment Provision in the FY '96 Consultation with Persons Concerned at the Kozlu Colliery (05/03/'96) Project Management Meeting (15/03/'96)

ACTIVITIES AND OUTPUTS DURING THE FISCAL YEAR OF 1996 (S. YAMAO)

Month	Activities/Outputs
1996 April 4	Joint Coordinating Committee (05/04/'96) Visiting Each TTK Colliery to Confirm the Mine Safety Problem(16,18 and 24/04/'96) Proceeding of $A_{2\cdot3}$ Forms for the Counterpart Training-in-Japan in the FY '96
May 5	10 Visitors from the JATEC (Japan Technical Cooperation Center for Coal Resources Development) (16/05/'96~22/05/'96)
June 6	Arrival of the CO Mask and Self-rescuer Maintenance-Examination Systems(05/06/'96) Project Management Meeting+Seminar on the Central Monitoring Technology(14/06/'96)
July 7	Arrival of the Ventilation Network Analysis System(02/07/'96) Short-term Expert for the Breathing Apparatus Technology(09/07/'96~26/07/'96) Inauguration Ceremony of the Breathing Apparatus Maintenance-Examination Systems (25/07/'96)
August 8	Counterpart Training in Japan (01/09/'96~28/09/'96) (Focused on the Safety Management Technology) Mr. Ali Yorulmaz Mr. Ramazan Karaaslan Mr. Kemal Resit Kutlu
September 9	Arrival of the Car for the Japanese Experts at Istanbul (18/09/'96) Mission from JICA(17/09/'96~25/09/'96) --> Joint Coordinating Committee(20/09/'96)
October 10	Short-term Expert for the Ventilation Network Analysis(09/10/'96~31/10/'96) Seminar on the Mine Ventilation Technology(18/10/'96) Inauguration Ceremony of the Ventilation Network Analysis System(25/10/'96) Making the Plan of Activities/Inputs in the FY '97 Preparation for Setting-up the Equipment to be Provided in the FY '96
November 11	Central Monitoring Data Processing System Checking System for Persons Going in-and-out Underground Gas Alarm/Sensor Maintenance-Examination System A Car(Mini-bus)
December 12	Seminar on the Adequate Gas Measuring Technology(20/12/'96) Hand-over Ceremony of the Land-rover(20/12/'96) Project Management Meeting(20/12/'96)
1997 January 1	
February 2	Leader Meeting at the JICA Headquarter(02/02/'97~08/02/'97) (Discussion on the Plan of Activities/Inputs in the FY '97) Proceeding of $A_{1\sim4}$ Forms for the FY '97 Seminar on the Steep Coal Seam Mining Technology(27/02/'97)
March 3	Explanation Meeting on the Specifications of Equipment to be Provided in the FY '97 at the Kozlu Colliery(07/03/'97) Arrival of the Checking System for Persons Going in-and-out Underground(31/03/'97)

ACTIVITIES AND OUTPUTS DURING THE FISCAL YEAR OF 1997 (S. YAMAO)

Month	Activities/Outputs
1997 April 4	Consultation with various sectors about next 2 long-term experts
May 5	Receiving a Visit of the JICA Vice President, Mr. Osumi (08/05/'97～09/05/'97) Joint Coordinating Committee (23/05/'97) Arrival of the Gas Alarm/Sensor Maintenance System at Istanbul (28/05/'97) Arrival of the Central Monitoring Data Processing System at Istanbul (28/05/'97)
June 6	Project Management Meeting (13/06/'97) Seminar on the Local Ventilation Technology (20/06/'97) Training Course on "How to Use Pitot Tube" (26, 27/06/'97)
July 7	Counterpart Training in Japan (12/07/'97～10/08/'97) (Focused on the Ventilation Technology) — Mr. Mesut Öztürk, Dr. Orhan Dalahmetoğlu, Mr. Nurettin Eren
August 8	Advice on the Improvement of Ventilation at the Uzulmez Colliery (15/08/'97)
September 9	Arrival of a Personal Computer at Istanbul (02/09/'97) Short-term Expert for the Gas Alarm/Sensor Maintenance System (02/09/'97～14/09/'97) Short-term Experts for the Central Monitoring System (02/09/'97～14/10/'97) Inauguration Ceremony of the Gas Alarm/Sensor Maintenance System (12/09/'97) Arrival of a Mini-bus at Istanbul (12/09/'97) Intensive Training Course of Mask Test Procedures (30/09/'97～06/10/'97)
October 10	Making the Plan of Activities/Inputs in the FY '98 Inauguration Ceremony of the Central Monitoring Data Processing System (10/10/'97) Seminar on Ventilation Practice at the Taiheiyo Colliery/Report of C/P (24/10/'97) Personal Change of the 2 Long-term Experts — Mr. C. Ichinohe → Mr. H. Togashi (Ar. 16/10/'97) (Rv. 29/10/'97); Mr. T. Sakaguchi → Mr. H. Takagi (Ar. 31/10/'97) (Rv. 29/10/'97)
November 11	Report Presentation on the 7th Turkish Energy Congress (03/11/'97～08/11/'97)
December 12	Project Management Meeting (20/11/'97) Preparation for Setting-up the Equipment to be Provided in the FY '97
1998 January 1	Spontaneous Combustion Combatting System (Early Detection Gas Analysis System) Supplements to the Checking System for Persons Going in-and-out Underground
February 2	Leader Meeting at the JICA Headquarter (02/02/'98～15/02/'98) (Discussion on the Plan of Activities/Inputs in the FY '98) Hand-over Ceremony of the Mini-bus (19/02/'98)
March 3	Mission from JICA (03/03/'98～11/03/'98) → Joint Coordinating Committee (10/03/'98) Proceeding of $A_{1\sim4}$ Forms for the FY '98 Change of the Coordinator (27/03/'98) — Mr. Yoshio Abe → Mrs. Ayako Otsuka (Ar. 11/03/'98) (Rv. 27/03/'98) Arrival of the Supplements for the C.S.P.G.U. (31/03/'97)

ACTIVITIES AND OUTPUTS DURING THE FISCAL YEAR OF 1998 (S. YAMAO)

Month	Activities/Outputs
1998 April 4	Report Presentation on the 3rd National Workers' Health Congress by C/P(20/04/'98)
May 5	Seminar on the Electric and Mine Fires(08/05/'98) Counterpart Training in Japan (10/05/'98~06/06/'98) — Mr. Halim Bultan, Mr. Ilyas Yazıcıoğlu, Mrs. Şukran Bozkurt (Focus on the Central Monitoring Technology)
June 6	Special Presentation on the 11th Turkish Coal Congress(10/06/'98~12/06'98)
July 7	Short-term Expert for the Mine Safety Management Technology(05/07/'98~13/07/'98) Seminar on the General Mine Safety Management Technology(09/07/'98)
August 8	
September 9	Confrenece on the Project Activity Report at the Kozlu Colliery(25/09/'98)
October 10	Observation Tour of the Shotcrete Demonstration(06/10/'98) Seminar on the Coal Mine Safety Management by VIDEO(23/10/'98) Preparation for Setting-up the Equipment to be Provided in the FY '98
November 11	Underground Communication System Spare-parts for the Central Monitoring Data Processing System Making the Plan of Activities/Inputs in the FY '99
December 12	Project Management Meeting(04/12/'98) Arrival of the Mine Gas Analysis System at Istanbul(08/12/'98)
1999 January 1	Short-term Expert fot the Gaschromatography(25/01/'99~29/01/'99) Short-term Expert for the Continuous Gas Analysis System(31/01/'99~12/02/'99) Leader Meeting at the JICA Headquarter(31/01/'99~12/02/'99)
February 2	(Discussion on the Plan of Activities/Inputs in the FY '99) Arrival of the Spare-parts for the Central Monitoring D.P.S. at Istanbul(25/02/'99) Proceeding of $A_{1\sim4}$ Forms for the FY '99
March 3	Short-term Expert of Spontaneous Combustion Combatting Tech.(07/03/'99~12/03/'99) Seminar on the Early Detection of Spontaneous Combustion(10/03/'99) Arrival of the Underground Communication System(02/03/'99)

ACTIVITIES AND INPUTS DURING THE FISCAL YEAR OF 1999 (S.YAMAO)

Month	Activities/Inputs
1999 April 4	
May 5	Project Management Meeting (28/05/'99)
June 6	Short-term Experts for the Central Monitoring System (02/06/'99～01/07/'99) Mission from JICA (08/06/'99～16/06/'99) ⟶ Joint Coordinating Committee (15/06/'99)
July 7	Counterpart Training in Japan (05/07/'99～03/08/'99) ⟵ Mr. Cengiz Burma, Mr. Ali Özcan, Mr. Ejder Erbay (Focus on the Mine Safety Appliance Technology)
August 8	
September 9	Project Management Meeting (/09/'99) Inauguration Ceremony of Equipment Provided at Kozlu (/09/'99)
October 10	Short-term Expert of Miner Training Technology (/10/'99～ /10/'99) Seminar on the Miner Training (/10/'99)
November 11	Making the Plan of Activities/Inputs in the FY '00
December 12	Arrival of the Spare-parts for Equipment Provided Previously (/12/'99) Seminar on Mine Fires (/12/'99)
2000 January 1	Short-term Expert of Explosion Prevention Technology (/01/'00～ /01/'00) Seminar on the Explosion Prevention Technology (/01/'00)
February 2	Leader Meeting at the JICA Headquarter (/02/'00～ /02/'00) (Discussion on the Plan of Activities/Inputs in the FY '00) Proceeding of A1～3 Forms for the FY '00
March 3	Project Management Meeting (/03/'00)

ACTIVITIES AND INPUTS DURING THE FISCAL YEAR OF 2000 (S.YAMAO)

Month	Activities/Inputs
2000 April 4	
May 5	Seminar on a Dust Measuring Technology (/05/'00) Mission from JICA(/05/'00~ /05/'00) ⟶ Joint Coordinating Committee(/05/'00) [EVALUATION OF THE PROJECT]
June 6	Short-term Expert of Gas Outburst Prevention Technology(/06/'00~ /06/'00) Seminar on the Gas Outburst Prevention (/06/'00) Project Management Meeting (/06/'00)
July 7	Counterpart Training in Japan (/07/'00~ /08/'00) —— (Forcus on the Gas Analysis Technology)
August 8	
September 9	Ceremony of the Project Completion(/09/'00)
October 10	END OF THE PROJECT(31/10/'00)

資料５．SAFETY REPORT ON TTK（1999年４月発行）

SAFETY REPORT ON TTK

April 1999

EXISTING STUATION ON SAFETY IN TTK'S UNDERGROUNDA HARD COAL MINES

1- INTRODUCTION

Hard coal mining in Turkey is carried out by TTK in and around the city of ZONGULDAK. TTK has five mining collieries called Karadon, Üzülmez, Kozlu, Amasra and Armutçuk.

Saleable coal is about 2,5 million ton/year. There are 37 mine able seams between 0.7 t0 30 m thickness.

TTK employs about 17 406 workers . When 1250 workers are working at mine site for a month the other 1 250 men stay in their village working in their own farms.

Zonguldak coal field is highly folded and faulted. The seam inclination varies from 0 to 90 degree. The seams are gassy and liable to spontaneous combustion. Mechanisation of coal face is very difficult due to geological disturbances and tectonic movements. Pneumatic picks, hand picks and explosives are used in excavation and timber support is used at the coal face.

2- ORGANIZATION CHART OF SAFETY

11 684 workers of the total 17 406 workers work underground. Also 700 technicians, 356 Mining Engineer and 471 overman work for TTK.

17 % Mining Engineer and 35 % Overmen are in charge of safety .

Organisation chart of safety can be seen in Annex 1

3-WORKING SUBJECTS OF SAFETY DEPARTMENT

1-Responsibilities:

The safety department of TTK is responsible for the safety matters and gives report to the Deputy General Manager.

2-Duties:

-Study of potential hazards of mining.
-Examination of accidents and occurrences.
-Advise on safety, design and new mining methods .
-Advise on protective clothing for the promotion of safety

3- EQUIPMENT

Mine sites and the Safety Department have been furnished with modern equipment. Most of environmental parameters are measured and controlled by these safety devices.

About 500 000 $ worth new and 500 000 $ worth spare parts are bought a year. Some mining equipment have been purchased by World Bank Loan for modernisation projects of Asma, Gelik and Armutçuk Mines in 1990-1991.

5-SAFETY TRENDS IN COAL MINES OF TTK

1-Classification of Accidents/ Disasters in Coal Mines

The accidents are classified as below between 1989-1998 for ten years.

TABLE 1: The Main Reason of Fatal Accidents

	Underground fatal accidents	%
1	Roof falls	26.45
2	Methane and Other gases	60.98
3	Transport	5.38
4	Machinery - Electrical	1.12
5	Miscellaneous	1.34
	Total	95.31
	Surface fatal accidents	*%*
1	Transport	3.36
2	Machinery and electrical	0.44
	Miscellaneous	0.89
	Total	4.69

TABLE 2: The Main Reason of Injuries

	Underground fatal accidents	%
1	Roof falls	38.45
2	Material handing and usage	20.86
3	Miscellaneous	23.18
4	Transport	8.24
5	Machinery – Electrical	1.67
	Total	92.6
	Surface fatal accidents	*%*
1	Material handing and usage	3.22
2	Miscellaneous	1.54
3	Machinery and electrical	1.50
4	Transport	6.34
	Total	100.00

TABLE 3: Location of Accidents

	Fatal accidents	%
1	Coal face	65.52
2	Main roads (Transport)	13.15
3	Miscellaneous	21.33
	Total	100.00
	Injuries	%
1	Coal face	72.22
2	Main roads (Transport)	13.08
3	Miscellaneous	9.76
4	Road ripping	4.94
	Total	100.00

TABLE 4 : Distribution of Injuries on the Body

	Parts 0f Body	%
1	Hand	32.28
2	Body	24.76
3	Foot	21.30
4	Head	12.02
5	Arm	5.00
6	Knee	1.82
7	Leg	2.82
	Total	100

TABLE 5 : Distribution of Injuries of Accidents to the Collieries

	Collieries	*Fatal* %	*Injury* %
1	Armutçuk	3.01	7.2
2	Kozlu	63.36	18.36
3	Üzülmez	16.16	24.6
4	Karadon	12.28	36.0
5	Amasra	4.53	10.2
6	Workshop	0.64	3.6
	TOTAL	100.00	100.00

6- SPONTANEOUS COMBUSTION

Seams are classified according to the liability to spontaneous combustion based on experience Armutçuk's Büyük Damar, Üç Köylü, Kozlu and Karadon and Üzülmez Çay, A□□k Sulu seams and Amasra's Ta□□and Ka□n seam are highly liable to spontaneous combustion.

Every year 8 faces are sealed due to spontaneous combustion and about 5 are opened . The following table indicates incubation period.

Colliery	*Armutçuk*	*Kozlu*	*Amasra*
Incubation period (moth)	4	8	7,5
Sealed period (moth)	6	13	9
Excavation period (m/day)	0,7	0,6	0,4

7- SELF RESCUER

The only way for underground workers to escape in poisonous atmosphere occurring after explosion or fire is using self rescuers.

TTK has imported 7800 CO and 5400 O2 mask in 1992 and 1000 CO masks in 1995. The warranty period in service is 3 years for CO and 5 years for O2 rescuers. Leakage test is carried out regularly. The weight gain should not exceed 5 grams per unit. The service life of CO mask increased by performance test and weight gain limits. CO and O2 mask maintenance and examination system provided by JICA. TTK and TKI and Private Companies's masks is being carried out by TTK engineers ones a year. In case the mask passes the test the life of mask is extended. The new masks purchased are also tested .

8- VENTILATION AND GAS MEASURMENT

13 main fans draw 54 000 m3/min of air from 300 km long tunnels in TTK. Also 185 auxiliary fans ventilate 34 km of roadways. The problem of ventilation cause major disasters. Training of ventilation engineers, provision of ventilation network analysing system, solving the problems in a short time have greate importance.

The ventilation programme of Kazemaru, Computers plotters and other necessary equipment for ventilation network analysing system have been supplied by JICA . And TTK engineers have been trained by Japanese expert in Zonguldak.

Mine gases are measured by gas dedectors, gas analyse laboratory and central monitoring system.

8.1- Gas Dedectors; portable type dedectors, staintubes optical methane dedectors, safety lamps and digital hand held type dedectors are used for CH4, CO, O2, H2.

8.2- Gas Analysing Laboratory; Three full gas analysing sets have been used in since 1988. Each set has double beam luft type infrared gas analyser. Every day about 20 tube sample from each mine are collected and analysed for methane , carbondioxide, carbonmonoxide, oxygen and hydrojen. Gas tubes from long distance of mines are collected once a week. In emergency the measurements take place more often and mobile laboratory unit may be used as well. The result of analyses are evaluated by using a computer programme.

8.3-Gas Monitoring System: The first gas monitoring system in Kozlu and Armutçuk mines were installed in 1986. Methane gas at 40, CO gas at 30 locations in two mines can be

monitored. Also the system contains telecommunication system (TST) for calibration of sensors. The system have been obtained from RIKEN of JAPAN.

TTK has also imported 3 central monitoring system in 1990 by World Bank Loan. Üzülmez, Karadon and Armutçuk collieries have been installed with these systems having hiher capacity and control facilities. Methane gas 140, CO gas and air velocity at 72, air doors at 77, auxiliary fans at 23, main fans at 6, water levels at 40, vibration at 54 locations, belt conveyors and other mine equipment can be measured and controlled together.

During the Kozlu explosion disaster in 1992 most of equipment below -200 m level have been ruined. The existing central monitoring system in Kozlu Mine is renovated having capability to control underground equipment under the "Project on the Improvement of Coal Mine Safety Technologies" by JICA. The equipment arrived in May 1997 at site installation is continiousing.

8.4- Gas Alarm and Sensor maintenance Examination System; JICA has supplied gas alarm and sensor maintenance system under the Project on the Improvement of Coal Mine Safety Technologies. Gas alarm dedectors and sensors are checked by this system for their reliability and sensitivity under various conditions.

9- METHANE DARINAGE

Methane gas is knowing to be explosive and caused suffocations.The first methane dainage system was installed at Kozlu mine in early 1970's near an upcast shaft of Ali Soyda□, but stopped in late 1970's.

Low concentration of methane in the methane drainage system (about %20) and lack of organisation and maintenance caused two surface methane exractors to stop. It was also said that some sealed areas had been connected to the system and this application caused spontaneous combustion in the sealed areas.

Some local methane drainage have been applied by using underground ventiruis in some faces of Kozlu, Armutçuk and Karadon mines having ventilation problems in the return gates. Drainage holes from appropriate locations are drilled in the roof strata and connected by pipes to the venturies located in the ventilation drifts. It is planned that underground methane exhausters will bee used instead of venturies.

10- MEASURMENT OF THE METHANE CONTENT OF THE COAL SEAMS

A direct gas measuring method similar to that used by CHERCHAR of France has been developed in cooperation with a Canadian Consultant. Irregular measurements are being carried out in each colliery. Some result have been obtained since the measurements started in 1987. The Çay seam of Kozlu containing 21,6 m3/t methane is the maximum among the others. In the direct gas measuring method the coal from drill holes are taken placed in the containers. The gas relased from the coal samples is is measuered and recorded tiem time to time. The quantity of methane released from the crushed coal in the drum crusher is also measured. The determination of methane content of more seams is going on. The distance from the coal face and size of samples effected the meausurement. The methane content of coarse coal samples taken from bore holes twice more than the ones taken from 6m. long bore holes.

11-DUST MEASUREMENT

1- *Airborne Dust*; Airborne dust has long been recognized as serious health hazard in coal mining. The gravimetric dust sampler have been used in TTK's underground mines since 1977. There are 23 gravimetric and 6 digital dust measuring devices.

Dust filters from the collieries are collected every day to the Central Laboratory for evaluation. Silica content of the ash is also determined.

2-*Explosive Coal Dust*; Stone dust provided since 1989, is 200 mesh of lime stone and sprinkled in underground return drifts where coal dust is dence. Silica content of stone dust should be less than 3 %. After the explosion disaster of Kozlu in 1992 it was seen that World Standard stone dusting and water barriers have to be installed for prevention of fire expanding. TTK has brought in British Coal Standarts for stone dusting and North Ren Westfalia Coal Basin Standarts for Water barriers. TTK used 24.5 stone dust in 1991 and year by year increased. In recent years average 2200 ton a year stone dust is used.

12-RESCUE STATIONS AND RESCUE TEAMS

There are 5 rescue stations fully equipped with breathing apparatus and gas measuring devices. Main rescue station is located in the center of the Zonguldak city. The others are located in Armutçuk, Karadon, Kozlu and Amasra Collieries.

The central rescue station carries out maintenance, calibration and repair work for TTK and for other mines in Turkey. Also training of miners take place at the central rescue station established in 1938 by Germans. According to Turkish regulations 3 % of miners are trained as rescue men.5 % of them are trained for first aid. The beginners training period is 5 days and repeated twice a year. In emergency the local rescue station acting first then central and the others may be called to duty according to the volume. One rescue team is comprised of 6 men and one engineer. A list of their address and telephone are available at the stations. One fully equipped car is ready to act. The number of rescue staff is about 1000 for the time being.

14-DISASTERS IN THE MINE AND BRIEF DECRIPTION

Armutçuk 1983
In 1983 an explosion occured in Armutcuk mine and 102 men died.It was started with a methane explosion and continued with coal dust explosion in a belt conveyor drift. Some people died from the shock of explosion and some died from poisoining effect of CO.

Kozlu 1983
Two weeks later after the Armutçuk explosion, a methane explosion took 10 lives in Kozlu mine. Following a spontaneous combustion an open fire started at the goaf area of the face. It was decided that the face had to be sealed off from intake and return stopping. The explosion occured during the sealing off operations. The workers died were intalling the stoppings. Chief safety mining engineer also died in the explosion.

Kozlu 1992
An explosion occured in Kozlu Mine on March 1992, 263 workers died and 77 injured. After the explosion fire started in the mine and rescue operation became very difficult. In order not to risk the life of rescue men the mine was sealed off completly from the surface on 6 March 1992 leaving 147 corpses in underground. Water from the surface was pumped into

the mine from 26 March to 26 June with an amount of 5 500 000 cubic meter and the operations to re-open started on 28 July 1992. When the water level underground reached -300 m level pumping was stopped. It was seen that the fire was extinguished. The -200 m level was ventilated first and 63 corpses were taken from this level and pumping water from underground to surface started. The re-opining operations has been completed at -560 m level and rest of two corpses have been taken out in the mine end of May 1996.

The exact reason is not known at the moment. It is thought that a gas outburst took place and this gas was ignited by an unknown source causing coal dust explosions underground. Miners at the upper levels died from high CO concentration. At the lower levels they died from CO and Explosion shock.

15-IMPORTANT SAFETY PROJECTS

1.Rehabilitation Projects

Asma and Gelik modernisation projects were prepared by foreign consultants in 1989. And implementation of the projects started in 1990. Various type modern equipment (Hand held methane-meters, self rescuer, Mine monitoring system etc.) have been purchased by the World Bank Loan.

2- Project on The Improvement of Coal Mine Safety Technologies

TTK has applied to MENR for cooperation with JICA in 1992. Project implementation started in 1995. Project activities are development of central monitoring technologies, checking in and out of workers, ventilation network analysis, developing underground communication, prevention of spontaneous combustion, coal dust explosion and mine fires, examination of breathing apparatus, gas detectors, methane drainage and training programme.

Under this project, CO and O2 breathing mask self rescuers test equipment, Central Monitoring Equipment , Gas Alarm and Sensor Maintenance System, Checking System for Persons Going in and out Underground and Underground Radio Communication System provided and 8 engineers from TTK have been trained in Japan by JICA. And also A Nissan Car and a Mitsubishi minibus have been supplied for Japanese experts for travelling project sites.

3- Training Project

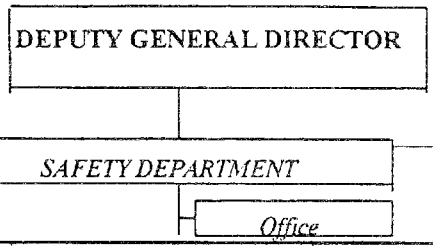
The training project was started in 1997 for 5 years with the Europian Community. Some training equipment have been purchased by EC' aid and tutors of TTK are trained by foreign consultants.

16-CURRENT ACTIVITIES

The following activities are carried out to improve underground safety conditions

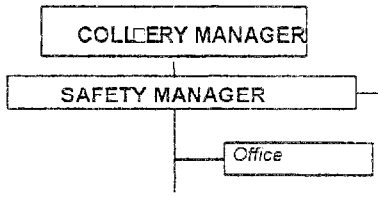
-Installation of stone dust barriers, water barries and stone dusting of road ways.
-Furnishing of miners with self rescuers.
-Automation of sealing operations of underground fires.
-Installation of fire fighting equipment.
-Training of technicans and overmen.
-Determination of sudden gas outburst zone.
-Checking and controlling of fire source .
-Installation of emergency warning systems.

Organisation of Safety :



Inpection Manager.	Elektro-Mecanical.Mang.	Research&Develop ment Mang.
Inspection Chief. Eng. Vantilation Chief Eng.	Mechanic Chief Eng. Elecrification Chief. Eng.	Research Chief Eng. Statistics Eng. Gas.Fighting Chief.Eng. Dust Fighting Chief Eng.
Rescue Station		**Laboratory Chief**
Rescue Chief Eng. Rescue Overmen Apparatus and Maintenenance staff		Laboratory Chief Eng. Mining Technicans Laboratory Staff. Sampler

Organisation of Collieries of Safety Management



Rescue Chief. Eng.	Safety Chief Eng.	Ventilation & Dust Control Chief Eng
Rescue eng.	Safety Eng.	Ventilation Eng. Dust Cont Eng.
Rescue Station	**Safety Staff**	**Dust Staff**
Overmen Apparatus Maintenans Methane Drenaj Drilling staff	Safety Overmen Stoppers and Air Door workers	Mechanics

Table Rescue and Safety Staff 1981-1998

Year	Rescu Eng	Safety Over/Wor	Safety Eng.	Safety Staff	Rescu Overm.	Underg Overman	Undergrd. Workers	Total Workers
1981	42	955	24	145	39	1 397	22 337	39 935
1982	32	952	23	142	42	1 568	22 289	39 259
1983	34	904	19	178	42	1 625	22 826	39 012
1984	44	926	22	166	39	1 534	21 987	37 645
1985	44	858	22	143	38	1 491	22 931	38 231
1986	22	505	15	146	34	1 477	21 236	36 557
1987	93	1004	43	182	43	1 453	21 485	36 623
1988	97	863	32	375	51	1 328	21 744	36 476
1989	155	906	35	208	53	1 283	21 298	35 492
1990	127	792	36	193	37	1 185	20 739	34 703
1991	138	634	52	159	53	1 036	18 277	31 215
1992	143	866	51	152	49	1 098	17 652	30 116
1993	137	737	61	167	49	1 151	16 592	28 429
1994	158	579	61	167	49	471	13 881	22 381
1995	119	574	102	55	33	471	13 500	21534
1996	125	616	97	49	35	471	12830	20073
1997	102	502	100	60	37	491	12028	17989
1998	43	513	35	76	39	470	11684	17406

Table Accident Analyses 1983-1998

Year	Shift	Effectiv work hour	Fatal	Injured	Lost day	TP Fatal	TP Inj	AP F+Inj
1983	10563334	79225005	145	8159	1199636	1.72	104.82	15.14
1984	10426463	78198473	18	8358	245284	0.21	107.72	3.14
1985	10555152	79163640	35	8132	369023	0.44	102.72	4.66
1986	10172742	76295564	23	6718	316370	0.30	88.05	4.15
1987	10177405	76330545	33	6485	343668	0.43	84.96	4.50
1988	9980235	74851762	32	7255	343145	0.43	98.00	4.64
1989	9755439	73165793	20	6824	253673	0.27	93.27	3.47
1990	8669304	65019780	22	6836	268195	0.35	105.14	4.12
1991	7898558	59239185	16	5650	193455	0.27	95.38	3.27
1992	8045958	60344685	276	5403	2171775	4.57	89.54	35.99
1993	7456516	55923870	14	4423	173170	0.25	79.09	3.10
1994	6413258	48099435	12	3116	145784	0.25	64.78	3.03
1995	5248434	39363255	13	2373	142119	0.33	60.28	3.61
1996	5425664	40692480	4	2560	65686	0.10	62.91	1.61
1997	4942344	37067580	22	2561	2044363	0.59	69.09	5.51
1998	4577831	34333733	11	2119	119005	0.32	61.72	3.43

Tp= Frequency Rate of Accident
Ap= Severity Rate of Accident

Distribition of Injuries on Body

Year	Injuries							TOTAL
	Head	Hand	Arm	Body	Foot	Leg	Knee	
1983	1068	2955	235	1779	1749	141	232	8159
1984	1100	3170	230	1720	1809	147	182	8358
1985	1048	3006	293	1805	1691	117	172	8132
1986	909	2499	298	1333	1366	180	133	6718
1987	874	2254	259	1448	1378	118	154	6485
1988	941	2566	276	1621	1551	109	191	7255
1989	788	2341	355	1608	1403	157	172	6824
1990	778	2369	377	1589	1381	141	201	6836
1991	633	1970	338	1338	1112	94	165	5650
1992	586	1765	291	1407	1139	68	147	5403
1993	480	1500	275	1070	895	61	142	4423
1994	343	1019	164	768	670	67	85	3116
1995	303	696	98	647	531	37	66	2378
1996	317	742	95	714	570	51	71	2560
1997	267	724	94	794	546	51	85	2561
1998	243	616	97	623	407	64	69	2119

Table Place where fatal accident were occured (1983-1998)

Year	Underground									Surface	TOTAL
	Face	Drv	Gate.	Halu	Rip	Ove	Elkc	Misc	U.T	ST	
1983	43	4	2	30	37	9	-	19	144	1	145
1984	15	-	-	1	1	-	-	-	17	1	18
1985	18	2	-	6	5	1	-	3	35	-	35
1986	16	-	-	-	1	2	-	-	19	4	23
1987	21	1	-	3	1	2	-	3	31	2	33
1988	21	1	3	1	3	1	-	1	31	1	32
1989	15	-	2	1	-	-	-	1	19	1	20
1990	12	-	1	5	2	-	-	2	22	-	22
1991	13	1	-	1	-	-	-	-	15	1	16
1992	156	7	14	42	11	20	20	5	275	1	276
1993	9	-	-	3	-	-	2	-	14	-	14
1994	9	-	-	2	-	-	-	1	12	-	12
1995	8	-	-	1	-	-	-	2	11	2	13
1996	4	-	-	-	-	-	-	-	4	-	4
1997	6	-	-	3	-	-	-	-	9	13	22
1998	4	1	-	7	-	-	-	-	11	-	11

Table P lace where the□njuries were occured (1983-1998)

	Coal Digger.		Support.er		Dirvage		Gate		Haluge.		Ripping		Over	Misc	Surf	Total
Year	Usta	Yed	Usta	Yed	Usta	Ye	Usta	Y	Usta	Y	Usta	Y				
1983	1092	1052	657	536	210	157	177	760	607	438	213	323	323	493	12	8159
1984	1291	1004	678	553	253	164	237	183	890	669	422	209	243	357	12	8358
1985	1357	1029	628	383	312	193	243	211	943	687	461	233	171	380	901	8132
1986	1076	745	607	300	313	183	231	129	983	427	451	161	151	287	674	6718
1987	1147	880	584	347	254	85	238	176	825	385	438	120	154	242	610	6485
1988	1142	1201	597	550	217	145	204	215	805	515	376	144	155	268	718	7255
1989	1268	1098	661	388	174	85	197	189	435	327	327	127	130	298	665	6824
1990	1524	1228	598	344	155	67	184	129	682	439	322	97	128	270	651	6836
1991	1426	732	606	313	148	55	167	111	555	436	256	65	119	180	481	5650
1992	1318	596	581	267	142	65	186	77	630	500	299	67	150	122	403	5403
1993	995	594	548	273	128	42	164	85	513	360	241	67	100	69	244	4423
1994	803	496	378	213	104	18	81	39	331	245	127	19	53	-	151	3116
1995	403	655	169	131	70	46	70	36	245	263	112	71	33	-	125	2378
1996	578	395	451	25	51	83	81	43	216	253	90	86	27	38	143	2560
1997	689	315	391	87	76	44	69	46	280	145	147	39	34	63	136	2561
1998	478	335	257	94	78	19	117	64	234	109	142	41	25	64	62	2119

Usta = Workers who experiment
Yd: Yedek =worker

Table Distribition of Fatal Accident on Collieries 1983-1998

Year	Armutçuk	Kozlu	Üzülmez	Karadon	Amasra	Merkez	TTK
83	112	16	9	5	2	1	145
84	-	7	6	2	2	1	18
85	4	7	9	8	7	-	35
86	2	4	8	4	3	2	23
87	1	9	14	7	1	1	33
88	3	6	9	8	5	1	32
89	1	4	9	3	3	-	20
90	2	3	6	5	6	-	22
91	1	3	2	8	1	1	16
92	3	264	4	2	3	-	276
93	1	2	2	8	1	-	14
94	2	1(*)	6(*)	4	1	-	12
95	3	-	5	3	2	-	13
96	1	1	1	1	-	-	4
97	-	2	2+13(*)	5	-	-	22
98	1	2	2	5	1	-	11

Distribition of Injuries on Collieries 1983-1998

Year	Armutçuk	Kozlu	Üzülmez	Karadon	Amasra	Merkez	TTK
83	754	1871	2074	2239	516	725	8159
84	623	2139	2068	2350	521	657	8358
85	728	1934	1897	2433	693	447	8132
86	608	1543	1518	2058	704	287	6718
87	654	1403	1473	1970	688	297	6485
88	602	1530	1723	2199	824	377	7255
89	452	1249	1579	2464	735	345	6824
90	417	1196	1781	2583	655	267	6836
91	337	899	1409	2175	629	201	5650
92	354	780	1385	2234	479	191	5403
93	318	657	1108	1830	448	62	4423
94	265	493	716	1257	377	8	3116
95	166	366	597	900	329	15	2373
96	182	418	680	910	352	18	2560
97	200	398	661	990	293	19	2561
98	161	424	777	506	236	15	2119

MUKAYESELİ İŞ KAZALARI (1988-1998)

Kaza Sebebi	1988		1989		1990		1991		1992		1993		1994		1995		1996		1997		1998	
	Ölü	Yaralı	Ölü	Yaralı	Ölü	Yaralı	Ölü	Yaralı	Ölü	Yaralı	Ölü	Yaralı	Ölü	Yaralı	Ölü	Yaralı	Ölü	Yaralı	Ölü	Yaralı	Ölü	Yaralı
OCAK İÇİ																						
1- GAZLAR																						
a) Zehirlenme	-	2	2	1		2			1				1									
b) İnfilak					5				263	78												
c) İştial						3																
2-GÖÇÜK	24	2545	14	2466	9	2692	13	2216	9	2051	9	1740	8	1266	8	905	4	890	6	977	4	824
3-NAKLİYAT																						
a) Mekanik	5	352	3	340	3	275	1	264	1	149	3	149	2	92	1	129		168	2	159	6	173
b)Hayvan el	1	313	-	203		158		118		197		170		144		76		49		96	1	52
4-PATLAYICI M.	-	1			2	5		3		6		7		2		2		4		1		3
5-MAKİNA ELK	-	119		85	2	81	1	73		80	2	70		54		54		96		58		49
6-MALZEME T.	-	1482		1371		1486		1187		1155		1002		755		530		637	1	771		610
7-MUHTELİF	1	1432		1369	1	1261		1128	1	1162		1041		644		551		573		360		343
a) Asit	-	268		298	-	270										1				3		3
b)Su baskını	-	-																				
c) Diğer																						
TOPLAM	31	6514	19	6133	22	6183	15	5169	275	5000	14	4179	12	2957	11	2248	4	2417	9	2425	11	2057
OCAK DIŞI																						
1-NAKLİYAT																						
a) Oto kamyon		41		27		71		13		8		5		5		7		20	13	50		1
b) Demiryolu		28		11		13		13		11		11		8		4		1		1		1
c)Diğer		46	1	40		29		14		13		10		2		3		2		1		5
2-MAKİNA ELK	1	125		122		97	1	103		70		41		24		26		35		11		6
3-MALZEME T.		296		314		259		201	1	168		85		51		46		54		41		30
4-MUHTELİF		205		177		184		137		133		92		69	2	39		31		32		19
TOPLAM	1	741	1	691		653	1	481	1	403		244		159	2	225		144	13	136		62
GENEL TOPLAM	32	7255	20	6848		6816	16	5650	276	5403		4423	12	3116	13	2373	4	2560	22	2561	11	2119

Yıl	Fiili Yevmiye	Effektif iş Saati	Ölü Sayısı	Yaralı Sayısı	Kayıp iş Günü	Tp Ölü	Tp Yar	Ap Ö+Y
1983	10 563334	79 225 005	145	8159	1199636	1.72	104.82	15.14
1984	10 426463	78 198 473	18	8358	245284	0.21	107.72	3.14
1985	10 555152	79 163 640	35	8132	369023	0.44	102.72	4.66
1986	10 172742	76 295 564	23	6718	316370	0.30	88.05	4.15
1987	10 177405	76 330 545	33	6485	343668	0.43	84.96	4.50
1988	9 980235	74 851 762	32	7255	343145	0.43	98.00	4.64
1989	9 755439	73 165 793	20	6824	253673	0.27	93.27	3.47
1990	8 669304	65 019 780	22	6836	268195	0.35	105.14	4.12
1991	7 898558	59 239 185	16	5650	193455	0.27	95.38	3.27
1992	8 045958	60 344 685	276	5403	2171775	4.57	89.54	35.99
1993	7 456516	55 923 870	14	4423	173170	0.25	79.09	3.10
1994	6 413258	48 099 435	12	3116	145784	0.25	64.78	3.03
1995	5 248434	39 363 255	13	2373	142119	0.33	60.28	3.61
1996	5 425 664	40 692 480	4	2560	65 686	0.10	62.91	1.61
1997	4 942 344	37 067 580	22	2561	204363	0.59	69.09	5.51
1998	4 577 831	34 333 733	11	2119	119005	0.32	61.72	3.43