

*THREE NEW MISSIONS FOR HUNTSVILLE DIVISION*

In the history of Huntsville Division, the years 1974, 1975, and 1976 were years principally marked by a growing diversification of tasks, a characteristic that was first manifested with the Postal mission in 1971 and which has since grown more pronounced in the post-ABM Treaty era. Born a division with a unique and exclusive dedication to ABM facilities design and construction, the Division has now become an organization with a spectrum of civilian and military mission assignments. The assumption and course of some of these post-SAFEGUARD missions have already been explored in previous chapters. This chapter deals with the history of three other missions assumed during 1974-1976: the ERDA fossil fuel conversion program, the Jordanian Armor Rebuild Center mission, and the Saudi Arabian GFP procurement program. Each of these recent tasks is stamped with a high degree of individuality and draws on the engineering, procurement, and management skills and systems developed from previous or on-going mission assignments. And while it may fairly be said that up to 1977 all three of the missions have been relatively modest in size, at least one, the Saudi Arabian procurement, holds the promise of setting new records for the Division and the Corps in terms of dollar value and international implications.

**I. In Conjunction With ERDA**

One of the most serious problems confronting the United States in the decade of the 1970's and beyond is what is commonly termed "the energy crisis," a critical and increasing shortage of petroleum and natural gas available for energy and chemical raw material. At the root of the crisis is the fact the United States derives three-quarters of its energy from oil and natural gas and depends heavily upon these minerals for chemicals, fertilizers, plastics, synthetic fibers, and other uses. A soaring demand for the good things that petroleum can produce has steadily driven imports upwards as domestic supplies dwindle. In 1976 petroleum imports amounted to about 35 percent of total consumption, imports which cost more than \$30 billion and which had a highly detrimental impact on the nation's balance of trade.

By contrast with the dismal picture of petroleum and natural gas usage, however, the United States has immense proven coal deposits estimated at between 250 and 400 years' supply at current rates of consumption. The utilization of coal to reduce American dependence on oil and natural gas

obviously appears to be a promising path in relieving the energy crisis. Despite the richness of reserves and a relatively low pithead price, though, the extensive substitution of coal for petroleum or natural gas had been frustrated by high transportation costs and especially by dirty burning and handling characteristics. Hence, in the face of the energy crisis, conversion of coal into clean, easily moved gaseous or liquid hydrocarbons has generated considerable national interest as a solution to raw coal's drawbacks.

Serious investigation of coal conversion technology in the United States had its real beginning after the Arab oil embargo of October 1973. Prompted by the ominous consequences of the embargo, the Office of Coal Research of the U.S. Department of the Interior undertook research and development programs in advanced coal-fired power systems and in the conversion of coal to clean liquid and gaseous fuels. Since the coal conversion program required the planning, design, construction, and operation of a number of pilot plants and one or more demonstration plants, and since the Department of the Interior had no appropriate engineering support organization, the Office of Coal Research sought the assistance of the Corps of Engineers. Exploratory conversations for support in coal conversion were apparently held with OCE and Huntsville Division during April 1974,<sup>1</sup> and on 30 April 1974 Col. Lochlin Caffey, the Huntsville Division Engineer, and Bernard L. ("Barney") Trawicky, Chief of the Engineering Division, visited the Office of Coal Research to establish an initial working liaison. The next day, 1 May 1974, three representatives from Huntsville Division began informal assistance to the Office of Coal Research in preparing its Request For Proposals (RFP) for a Clean Boiler Fuel Demonstration Plant. This plant was to demonstrate the commercial feasibility of converting bituminous high sulfur coal into a low sulfur emissions ("clean") liquid fuel suitable for boiler firing under contemporary Environmental Protection Agency standards.<sup>2</sup> With this modest unwritten and informal collaboration on the Clean Boiler Fuel Demonstration Plant, RFP Huntsville's ERDA mission may be said to have actually started.<sup>3</sup>

Formalization of Huntsville's assistance with coal conversion followed ex post facto during the next six weeks. On 30 May 1974 Secretary of the Interior Rogers Morton wrote to Secretary of Defense James R. Schlesinger to solicit an agreement whereby the

Corps of Engineers would provide technical and engineering assistance to the Office of Coal Research. Specifically, the Corps would assist in the preparation and review of plans and specifications, bid proposal packages, and cost estimates for construction projects. Army Engineers might also be asked to serve on source evaluation boards and other planning and review committees, as well as to provide on-and off-site quality assurance through supervision of fabrication and construction. Reimbursement for Army efforts would be funded by the Office of Coal Research.<sup>4</sup> After internal review within the Office of the Secretary of Defense, Deputy Secretary of Defense William Clements replied favorably to the Office of Coal Research's request for Corps assistance:

I have reviewed this matter with the Secretary of the Army, who advises me that the Corps will be able to undertake this program without impairing its ability to carry out currently assigned programs. I am pleased to authorize the Secretary of the Army to have the Chief of Engineers proceed with the negotiation of a definitive agreement covering the services which you desire, the funding arrangements, and the required personnel augmentation.<sup>5</sup>

Deputy Secretary Clements' 18 June letter marked the official beginning of Corps of Engineers participation in the nation's coal conversion programs. As the letter noted, the Chief of Engineers was authorized to negotiate a "definitive agreement" with the Office of Coal Research concerning Corps' services. It further noted that the approval of the Office of Management and Budget would be necessary for funding arrangements. By 6 August the two parties had drafted a "Memorandum of Understanding" for Contract No. 14-32-001-1759 which governed their relationship, but the draft remained unsigned until approval from the Office of Management and Budget was received in the spring of 1975. In the interim the Division was asked to submit estimated manpower and funding requirements demanded by the coal program. Initial figures supplied to OCE on 13 August indicated that under conditions of two demonstration plant contracts managed concurrently, the Clean Boiler Fuel program alone would probably require an average staff of eleven and a peak of sixteen during FY 1975 and an average of thirty-five and a peak of fifty during FY 1976. Costs would be \$353,000 for FY 1975 and \$1,180,000 for FY 1976. Support for additional Office of Coal Research programs was very ill-defined at the time, but it was thought that "based on the very limited knowledge we have to date, an estimate in the

range of 25 manpower spaces, at an expenditure at about 1.0 million dollars annually, will be required to support other OCR programs that may be assigned to HND."<sup>6</sup> Pending Office of Management and Budget approval of these figures, a letter from OCE on 30 August authorized continued support to the Office of Coal Research for its Clean Boiler Fuel RFP.

As Clean Boiler Fuel activities proceeded during the fall of 1974, an important consolidation of Government energy agencies occurred to change the name of the Corps' latest civilian customer. On 11 October 1974 President Ford signed a Congressional act creating the Energy Research and Development Administration (ERDA). In the reshuffling of agencies that followed, ERDA absorbed the functions of the Office of Coal Research, along with most of those of the Atomic Energy Commission and other energy-related bodies. Activities formerly conducted by the Office of Coal Research now came under an ERDA Assistant Administrator for Fossil Energy who oversaw five subordinate divisions. Those devoted to coal technology included a Division of Fossil Energy Research, a Division of Fossil Demonstration Plants, and a Division of Coal Conversion and Utilization. The new agency began functioning on 19 January 1975.

A few months after the creation of ERDA, the Office of Management and Budget gave its concurrence to the ERDA-Corps arrangement. On 18 March 1975 Maj. Gen. George A. Rebh signed the "Memorandum of Understanding" for the Corps, and Dr. Robert C. Seamans, Jr., Administrator of ERDA, executed the agreement on 12 June 1975. While not specifically mentioning Huntsville Division, this document comes as close as any to defining the Division's role in the ERDA mission. According to Article I, ERDA needs were to be met on a task-by-task basis through letters of request directed to the Chief of Engineers, who would forward them to the appropriate Corps field operating agency. Although this implied that OCE had freedom of choice in using any or all divisions and districts for ERDA support, only Huntsville Division as yet has actually had significant fossil energy assignments. Article III defined the primary Corps services to be provided to ERDA:

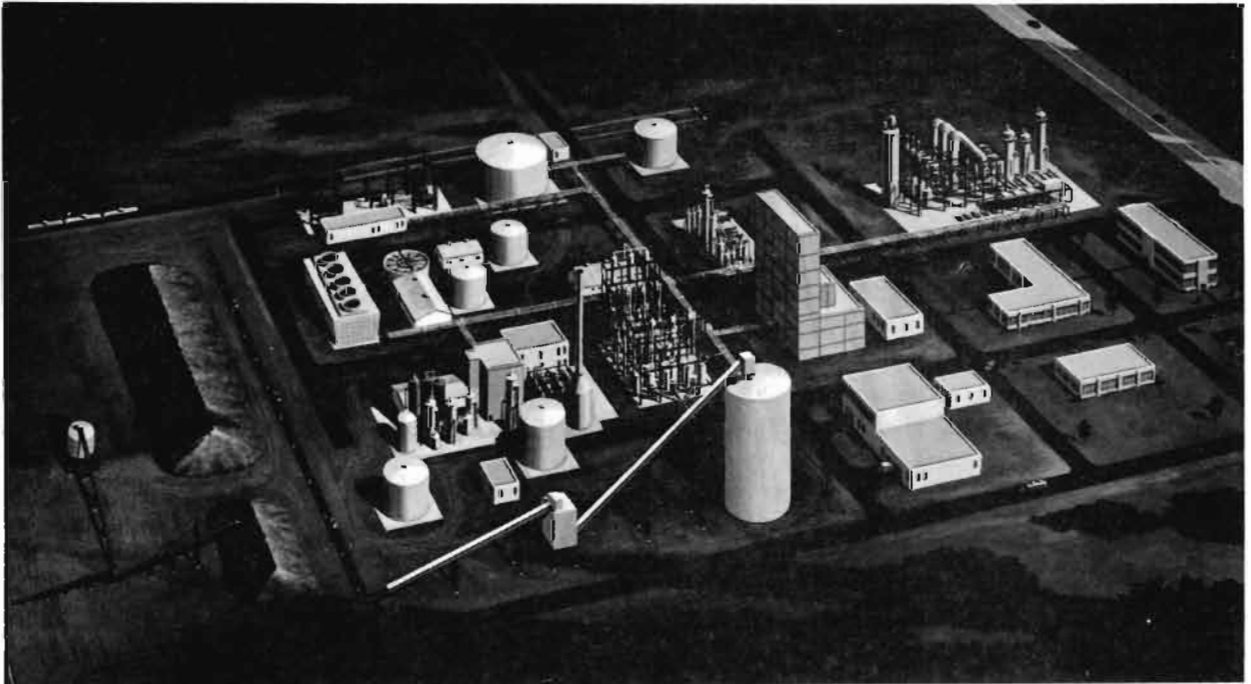
The principal technical services provided by the Corps will include, but not be limited to (a) assistance in the preparation and review of plans and specifications, bid proposal packages, and cost estimates of construction projects, (b) membership on source evaluation boards and other planning or

review committees and (c) on-and-off site quality assurance through supervision and inspection of fabrication and construction.<sup>7</sup>

Other services, including legal, procurement and supply, fiscal (comptroller), automated data processing, value engineering, safety engineering, construction laboratories and research work, reproduction, and utilities services support might be provided by the Corps on an individual request basis. Theoretically, then, the ERDA - Corps "Memorandum of Understanding" opened the door to a wide variety of possible Corps of Engineers services as the fossil energy program matured. In fact, however, limited program progress has largely confined Corps participation to assistance in preparation, review, and evaluation of RFP's and cost estimates, all within the purview of Huntsville Division.

In practice, the formation of ERDA in late 1974, the belated concurrence of the Office of Management and Budget, and the conclusion of a "Memorandum of Understanding" in June 1975 made no difference at all to Huntsville Division's functions in the realm of fossil

energy. Whether formally sanctioned on inter-agency paper or not, periodic assignments for the Division were made by OCE after 18 June 1974 on the basis of individual task requests from the Office of Coal Research or, later, from ERDA. The first written task request made by the Office of Coal Research was for Corps personnel to assist its staff with evaluating design proposals submitted for the Clean Boiler Fuel Demonstration Plant, the most advanced of three coal conversion concepts to be explored in demonstration plant form by the Office. According to the RFP, the plant was to demonstrate the commercial feasibility and economic viability of a chemical process for converting the type of soft, high-sulfur coal common in the eastern United States to No. 6 clean-burning boiler fuel and into substitute natural gas suitable for pipeline transport. Smaller than a hypothetical full-scale commercial facility, the plant was to process 2,600 tons of coal per day to produce 3,900 barrels of liquid fuel and 22 million cubic feet of pipeline quality gas. Sulfur and impurities would be additional by-products.<sup>8</sup>



*ARTIST RENDERING of a Clean Boiler Fuel Demonstration Plant.*

As it was projected in the summer of 1974, the Clean Boiler Fuel Plant was to be executed in four phases from concept development to normal production status. Eight years were envisioned from receipt of proposals to completion of the plant. Phase I was the preliminary engineering period during which concepts would be proposed by private industry and evaluated by the Government. This phase included both the design of a commercial-size plant and the demonstration plant scaled down from it, some test work, technical studies, site selection, reliability and quality assurance studies, environmental analysis, and documentation and reporting. Phase II was the demonstration plant engineering period during which concepts would be transformed into detailed design engineering. It included preparation of detailed specifications, drawings, and construction bid packages. Both Phase I and Phase II were to be wholly funded by ERDA. Phase III was the construction period from ground-breaking to plant acceptance and checkout. Phase IV was the demonstration plant operation period of several years. During this time the plant would be started up and operated with production variables such as different grades and sizes of coal and the results assessed for further commercial potential. ERDA was to pay 50 percent of Phase III construction costs, plus 50 percent of Phase IV operations expenses for the first forty-two months, at the end of which the contractor would be required to buy out the 50 percent Government interest.<sup>9</sup>

When the Office of Coal Research first solicited technical support from the Corps of Engineers, the Clean Boiler Fuel Demonstration Plant project was at the inception of Phase I. As mentioned earlier, during May and June 1974 three members of Huntsville Division had informally assisted the Office of Coal Research in drafting a RFP for the Clean Boiler Fuel Demonstration Plant to be disseminated in the private industrial sector. The RFP specified the approximate scale of operations, rough technical parameters, and the end products desired while permitting respondents to propose their own design processes. A Clean Boiler Fuel RFP along these lines was issued by the Office of Coal Research on 28 June 1974, with submittals due by 25 September.

The Office of Coal Research received only two Clean Boiler Fuel proposals, one submitted by Coalcon, a joint venture of Union Carbide and Chemical Construction Corporation (Chemico), and another from the Northern Illinois Gas Company (NIGas). Despite this rather lukewarm response, the agency went on to an evaluation of the two proposals.

Once again, the assistance of the Corps was solicited in making the review. On 23 August 1974 the Director of Coal Research asked that OCE make available several qualified personnel from Huntsville Division to supplement his staff on the Source Selection Board. The Board was to convene in Washington on 26 September and sit for about three to four weeks. On 30 August OCE approved the request and forwarded it to Huntsville, together with authorization to freely coordinate the choice of personnel directly with the Office of Coal Research. Ultimately, eight representatives from the Division's Engineering and Construction Division staffs journeyed to Washington for the Clean Boiler Fuel Source Selection Board. These men were: William L. Little, William R. Major, Harold L. Watts, Henry O. Everitt, James T. Ammons, William Crow, Carl Manley, and John L. Thompson.<sup>10</sup>

The Source Selection Board's opinion was that NIGas' proposal was nonresponsive as submitted and that only the Coalcon proposal fulfilled the terms laid down in the RFP. This decision freed the Office of Coal Research to negotiate contract terms with Coalcon, and on 17 January 1975 the agency awarded the joint venture contract E(49-18)-1736 worth \$237,200,000 for design and construction of the Clean Boiler Fuel Demonstration Plant. Two days later the contract was transferred to the newly-formed ERDA for further administration, where it became program no. BA-07-01.

The process to be used by Coalcon was the Union Carbide Hydrocarbonization Process. In this process the coal is crushed, ground to a uniform particulate size, and fed into a heated and pressurized hydrocarbonization reactor operating at 1040°F and 37 atmospheres pressure. In the reactor the gases in the coal are driven off, and some of the coal reacts with hydrogen gas to form simple hydrocarbons. The residue from the reactor, the char, is used for hydrogen production in the gasifier. Char in excess of that required to produce hydrogen is burned to produce steam. Gas from the reactor is cooled and fractionated, separating the liquids from the gases. The liquids are further refined to produce a clean liquid boiler fuel and other lighter hydrocarbons. The gases are cleaned to remove sulfur, ammonia, and other impurities. By subjecting the gas to extremely low temperatures, butanes, propanes, and similar compounds are cryogenically separated. Hydrogen in excess of that required for methanation is removed and returned to the reactor. The primary product is a clean liquid fuel similar to No. 6 fuel oil. Other products include light oil (No. 2 fuel oil), sulfur, ammonia,

butane, and substitute natural gas. The overall thermal efficiency is approximately 70 percent with a gas/liquid ratio of approximately 50-50 on a BTU basis.<sup>11</sup>

With the award of the Coalcon design-construction contract in January 1975, ERDA believed it could initiate the procurement of some long-lead items needed in the construction phase. On 3 January 1975 the Office of Coal Research asked for Corps support in procuring \$10 million worth of long-lead time items for the Clean Boiler Fuel Demonstration Plant. By OCE letter dated 13 January, Huntsville Division was designated as the Corps' Field Operating Agency to carry out the procurement, and on 6 February the Division was authorized to proceed with the procurement using a monthly system of accounting for reimbursement from ERDA funds. Several long-lead items were identified and procurement specifications prepared during the spring. As it turned out, however, this procurement effort proved premature because Coalcon's process design was still fluid. For example, it was not determined until late 1975 that the plant would operate on three kinds of coal or that it would be about one-fifth the size of a commercial plant.<sup>12</sup>

Site selection for the Clean Boiler Fuel Demonstration Plant also began to be developed with the help of Huntsville staff during the spring of 1975. By April site selection was well advanced and preliminary contacts made with interested states. One of the most advantageous locations appeared to be the Peabody Coal Company's River King #3 Strip Mine near New Athens, Illinois. Situated on the Kaskaskia River about forty miles southeast of St. Louis, Missouri, the site offered a large active strip mine with a ready supply of Illinois No. 6 coal and ample water from the river. This site was chosen for the demonstration plant in November 1975, with construction scheduled to start about October 1977.

As the Clean Boiler Fuel Demonstration Plant moved forward on schedule during 1975, ERDA initiated the development of two other coal conversion concepts. Both were explorations of coal gasification and both involved some task assignments to Huntsville Division. The first of these gasification efforts was a Pipeline Gas Demonstration Plant, ERDA program no. BA-07-02. The Pipeline Gas Demonstration Plant was to convert high-sulfur eastern bituminous coal into a clean, high BTU (approximately 1,000 BTU per cubic foot) pipeline quality gas suitable for industrial or residential consumption. ERDA desired that the specific process to be used, the demonstration plant capacity, and the location of the plant all be proposed by the contractor.

The demonstration plant would have a capacity between one-tenth and one-half full-scale commercial size.

Most, if not all, of the potential high-BTU gasification process designs offered to ERDA featured certain common steps. The first is pre-treatment of the coal and induction into a coal gasifier. The gasifier was a critical plant component, and ERDA sought gasifiers which would advance the threshold of known technology. In the gasifier, coal is burned in an oxygen-deficient atmosphere, producing a combustible gas plus some undesirable gaseous by-products and solid slag. The combustible gas is transferred to phase shift equipment where it is reacted with steam. Further processing in a gas cleanup operation yields a pure synthesis gas plus ammonia, sulfur, and carbon dioxide. The pure synthesis gas is separated, passed over a nickel catalyst, and methanated to produce high-BTU pipeline gas (ch<sup>4</sup>).

The second of ERDA's coal gasification thrusts was toward a series of three Fuel Gas Demonstration Plants intended for conversion of high-sulfur coal into a clean, low BTU fuel gas (ERDA program no. BA-07-03). Unlike either the Clean Boiler Fuel RFP or the Pipeline Gas RFP, ERDA's Fuel Gas RFP asked for submittals on three kinds of facilities: one to supply fuel gas to industrial consumers, one to supply gas to utilities, and one supplying small scale industrial enterprises. Respondents might answer any, or all, of these categories. As with the Pipeline Gas Plant, the process used and the location were to be proposed by the contractor and reviewed by the Government; again, gasifiers not previously proven might be accepted. Capacities of the Fuel Gas plant were to be based on the results of the process design of a commercial plant reduced to demonstration plant size by a factor of anywhere from one-third to one-eighth.

Coal conversion for fuel gas is generally simpler than for the production of pipeline gas, but the end product is not economically suitable for long distance pipeline transportation because of the relatively low percentage of methane. Generally, the gas must be consumed at or near the manufacturing plant, in effect making the plant an intermediate pollution control facility between the coalyard and the boilers. The initial stage of gasification is similar to the pipeline process, but there are no subsequent phase shift and methanation steps to raise the thermal value of the gas beyond 150-200 BTU per cubic foot. Instead, the gaseous products of initial gasification are cooled, cleansed of sulfur and ammonia, and used directly for power generation, industrial applications, or other uses. Liquids and tars from the gasifier are recycled

through it, and the solid ash is removed as in the Pipeline Gas process.

As with its Clean Boiler Fuel Demonstration Plant, ERDA sought the assistance of Huntsville Division in the early stages of its gasification projects. On 6 March 1975 ERDA forwarded a request to OCE for Corps assistance with three new demonstration plants, the exact nature of which was unspecified but which was understood to include the two gasification plants plus a third conversion concept to be decided later. On 12 June 1975 a followup request was more precise. ERDA asked that the Corps continue to support the Coalcon project design and that it provide for categories of assistance for the Pipeline Gas and Fuel Gas Demonstration Plants. These four areas were:

1. Provide assistance in the preparation of project management plans, reliability and quality assurance plans, configuration management plans, etc.
2. Provide representation at preproposal conferences and assist in the evaluation of inquiries from potential bidders.
3. Participate in the review and evaluation of proposals for the design, construction, and operation of pipeline and fuel gas demonstration plants.
4. Perform special studies relating to facility designs and construction.<sup>13</sup>

As it transpired, Huntsville Division's involvement with ERDA gasification projects was somewhat more limited than this description implied, mostly because the gasification programs did not go forward as rapidly as expected. During the summer of 1975 the Engineering Division assisted ERDA with preparation of its RFP for the Pipeline Gas Demonstration Plant, and ERDA RFP No. E(49--18)--2012 was duly issued on 3 October 1975. Five technical proposals were received by 20 January 1976. Unlike the Clean Boiler Fuel project; however, no representation from the Division was asked for the Source Evaluation Board that followed. Instead, ERDA personnel scored the technical, managerial, and siting aspects of the proposals, while Huntsville Division staff formed independent Government cost estimates for each proposal submitted.

After about six months of evaluative study, ERDA concluded in mid-1976 that the two best overall Pipeline Gas proposals were those offered by Illinois Coal Gasification Group (ICGG) and CONOCO Coal Development Company (CONOCO). ICGG, a

consortium of five Illinois public utilities, offered a concept with Phase I costs of \$28,428,000 and Phase II and III combined costs of \$292,968,000. ICGG's demonstration plant was to be about one-eighth commercial size. Based on the COED/CO Gas Process, the plant would consume 2,200 tons of coal per day and generate 18 million cubic feet per day of substitute natural gas plus 2,900 barrels per day of synthetic crude oil. The ICGG demonstration plant would be located in Perry County, Illinois.

The CONOCO Coal Development Company is a wholly owned subsidiary of the Continental Oil Company. Its proposal utilized the Lurgi Slagging Coal Gasification Process to convert 3,800 tons of coal per day into 59 million cubic feet of substitute natural gas at an estimated efficiency of 67 percent. The demonstration plant would be sited on several thousand acres of coal-rich lands owned by CONOCO in Noble County, Ohio. CONOCO's total cost estimate for the first three phases of design and construction was \$292,178,000. During the second half of 1976 ERDA entered contractual negotiations with ICGG and CONOCO, but due to a schedule slippage of about six months, no contract had been awarded by the end of 1976.<sup>14</sup>

The development of the Fuel Gas Demonstration Plant during 1976 also met with delay and uncertainty. With the support of Huntsville Division, ERDA issued its RFP on 28 January 1976. Industry proposals were returned early in May 1976. Fifteen proposals were received, evenly divided among the three types of plants, utility, industrial, and small-scale industrial. For the Source Selection Board review, R.C. Hellier from Huntsville's Engineering Division joined four ERDA representatives at ERDA's Mound Laboratory at Moundville, Ohio. Eight other representatives of the Division had no vote on the Board but supported its scoring by serving on technical committees. The evaluation for Industrial and Small Scale Fuel Gas Plants was essentially completed by October 1976, but a series of revisions, clarifications, and re-submittals prevented further ERDA action before the end of the year.<sup>15</sup>

After an uneventful start and steady progress during 1975, the Coalcon Clean Boiler Fuel contract began to encounter a morass of difficulties during 1976. Coalcon's original proposal to the Office of Coal Research in late 1974 had been based on about ten years' experience with the conversion of western low-sulfur coal, rather than its high-sulfur, high-caking eastern counterpart. During 1976 experiments with conversion of high-sulfur coal in a very small pilot reaction vessel produced reactor clogging and

contaminants in the liquid product, in part because of the small size of the pilot reactor and in part because of the high sulfur content in the coal now being used. These technical problems cast uncertainty on the practicality of scaled-up reactors for the demonstration plant. As these technical problems accrued, Union Carbide's venture partner, Chemical Construction Company, became insolvent, necessitating a reorganization of the Coalcon management. Additional setbacks and disruption were caused by changes in Environmental Protection Agency policy for the amount and type of emissions other than sulfur that might be allowed through industrial burning.<sup>16</sup>

Because of these factors and others, Coalcon undertook negotiations for a new or highly modified contract in May 1976. Coalcon's first revised program was rejected by ERDA, and a redefined scope of work was not arranged until December 1976. As matters stood at the end of the year, Coalcon was to complete and submit its commercial and demonstration plant designs complete through Phase I, with Phases II and III to receive further consideration.

## **II. The Jordanian Armor Rebuild Facility**

The Jordanian Armor Rebuild Facility mission that began in 1975 is one of the most unusual military engineering tasks yet assumed by Huntsville Division. The engineering design requirements for the facility are rather conventional by comparison with some other Division tasks, but the Jordanian facility is distinguished by its overseas location. The facility is the first assignment undertaken by the Division for a foreign customer, and the course of its development to date reflects some of the diplomatic and military complexities associated with United States policy in the Middle East during the mid-1970's. While some unanswered questions about the facility's evolution and use remain, the account that follows is based on unclassified documents in Huntsville Division files and interviews with personnel present during joint military conferences.<sup>1</sup>

American interest in locating an armor rebuild center in the Middle East seems to have begun with Joint Chiefs of Staff situation studies in 1972. After analyzing the armament needs of various nations in the area, the Joint Chiefs concluded that a facility should be located in the region capable of servicing the major types of American and British armored vehicles found in the inventory of some Arab states. Up to this time, depot-level maintenance required the vehicles to be returned to suppliers in Europe and the U.S.A. The

primary job of the center would be the conversion of the American-made M48A-1 tanks then equipping the army of the Hashemite Kingdom of Jordan to the M48A-5 model configuration. This was a depot-level undertaking involving teardown, modification, and reassembly of several hundred tanks. In addition to conversion, the depot could accomplish routine depot-level maintenance of the M48 and Centurion tank, armored personnel carriers, armored cars, artillery, and light vehicles.<sup>2</sup>

After conversations with U.S. military advisers, a team of representatives from the Jordanian Armed Forces (JAF) made a six-month inspection tour of the U.S. Army's M48 tank depot at Anniston, Alabama, during the summer of 1972. The Jordanians were impressed with the assembly line methods found at the Anniston Center. Notes were taken, and the JAF began to formulate plans for building a facility similar to Anniston somewhere in Jordan. Before the project could go beyond preliminary discussions, however, increasing tensions in the Middle East culminating in the Yom Kippur War of October 1973 brought delay to the armor center. In the meanwhile, the Corps of Engineers through its Mediterranean Division began to assist the Jordanian government with other military construction desiderata. In 1972, for example, the Corps recommended three American AE firms to the Jordanian government to build a new general headquarters building for the kingdom's Ministry of Defense and armed forces.<sup>3</sup>

In 1974 thoughts of a Jordanian armor center were revived, and in September of that year initial studies were made by the U.S. Military Assistance Program (MAP) office in Amman, Jordan. Almost immediately it was apparent that the MAP office was not staffed to take on a design and construction task of this type for the JAF. In further discussions between the Department of the Army, Army Materiel Command, and the OCE staff during January 1975, it was found that the Jordanian facility was more a procurement and construction mission than a logistics mission, and that the Corps of Engineers' Mediterranean Division should be the single project management focus for execution.<sup>4</sup>

Mediterranean Division initiated work by dispatching a small team of representatives to Jordan for field studies on 22-24 March 1975. This team spent two days in the country, contacting American Ambassador Pickering, the MAP office, and at least ten members of the JAF, along with collecting a sheaf of data about construction costs and conditions in Jordan. The team stated in its trip report that the

facility was "of prime importance to Jordan in that it represents a capability to upgrade their entire armored force through rebuild of on hand US/British equipment rather than purchase new [equipment] which they cannot afford." The team found that the Jordanian military personnel contacted had clear ideas of what was wanted, but it also discovered that "wide divergence of opinions continues between CE and JAF concerning project cost. (15 million dollars JAF vs. 80-100 million dollars CE)." At this stage the JAF desired to negotiate and award its own contract to Corps prequalified bidders, then have the Corps of Engineers manage the actual construction effort.<sup>5</sup>

The matters of contracting and costs were among the subjects of further discussion when JAF representatives conferred with U.S. Army staff in Washington on 21 April 1975. Enough differences were resolved to permit drafting a Foreign Military Sales Case HAA agreement between the countries committing \$500,000 of Jordanian funds for the Corps to begin facility design. On the last day of April 1975 an implementing "Technical Agreement Concerning Assistance by the United States Army Corps of Engineers in Design and Constructing an Armor Rebuild Facility for the Government of Jordan" was signed by Maj. Gen. D.A. Raymond, Deputy Chief of Engineers, and Lt. Gen. Sharif Zeid ben Shaker, Chief of the General Staff of the Jordanian Armed Forces. This one-page charter stated that the U.S. Army Corps of Engineers would "provide the engineering and construction management services for the design, engineering, contracting, construction of facilities, and for procurement and installation of equipment" for the Jordanian government. The agreement went on to note that "the Mediterranean Division of the United States Army Corps of Engineers shall carry out these responsibilities on behalf of the CE." For its part, the JAF was to "bear all costs of the services to be provided" through Foreign Military Sales (FMS) procedures.<sup>6</sup> The source of JAF funding was not identified in this document or further correspondence. Annex "A" detailed operating procedures to be respected by both parties, including step-by-step JAF consultation and review.

The above JAF-U.S. agreement of April 1975 stipulated that the Mediterranean Division of the Corps would carry out the Jordanian armor center mission. Mediterranean Division, however, was headquartered in Livorno, Italy, and the Jordanian facility called for specialized expertise in industrial design, construction, and procurement. Frequent

contact and close interaction with the American AE firms and vendors were to be expected over a period of several years. Hence, Mediterranean Division looked to a Corps unit based in the United States for support. On 15 May the Mediterranean Division sent a teletyped message to this effect to Huntsville:

Pursuant to discussions between DEMDD and DEHND on subj[ect] project] this is formal request for HND to accept responsibility for the design of this project. The project consists of an industrial complex of approx[imately] 17 buildings including full range of machine tools and other industrial equip[ment] to be installed therein, prime duty power plant, plus other utilities, roads, parking, etc. Order [of] magnitude [of] cost is \$100 million. The project is funded under Foreign Military Sales (FMS) procedures and initial funding of \$500,000 has been authorized by the Jordanian govt. All costs are reimbursable by the host govt; no appropriated funds are involved.<sup>7</sup>

The message closed with the portentous caveat that "there exists at the start of the project considerable difference of opinion on project cost. Jordanian Armed Forces (JAF) believe cost to be in range of \$10 million. . . It may be anticipated that project will be tightly funded."<sup>8</sup> The next day, 16 May, a teletyped reply stated Huntsville Division's willingness to accept the mission.<sup>9</sup> Mediterranean Division continued to act as liaison between the parties.

The first step in the armor facility mission was selection of an AE firm to work up a set of criteria based on established Jordanian data. The Annex "A" to the mutual "Technical Agreement" of 30 April governing procedure specified that the name of three or more firms should be submitted to the JAF for approval before award, and on 29 July 1975 a list of four recommended AE firms was forwarded to OCE for review. Giffels Associates, Inc., Detroit, Michigan, headed the list as the Division's first choice.<sup>10</sup> Upon receiving OCE authorization, the list was sent to Mediterranean Division for presentation to Jordanian officials. Jordanian concurrence took about a month, but by message on 10 September 1975 Huntsville Division was notified that the JAF thought Huntsville Division's first choice, Giffels Associates, Inc., was acceptable. Meanwhile, on 10 August the Division was also notified that a site had been selected at Wadi Dalayl on the Amman-Mafraq road.<sup>11</sup> Selection of an AE was completed on 23 October 1975 when



negotiations with Giffels Associates produced contract DACA87-76-C-004. The basic award amount was \$205,130, with one option for the initial phase worth an additional \$125,525.<sup>12</sup>

For several months after award of the Giffels Associates contract, criteria development progressed smoothly and was generally reviewed with satisfaction on the part of the JAF. Early in November 1975 representatives of Huntsville Division and Giffels Associates traveled to Jordan to consolidate certain elemental decisions about design criteria. At this stage, the production capacity of the center and the number of working shifts the Jordanians wished to employ were only generally known, so Giffels based its design criteria on three presumed production loading models. The Case I model called for annual processing of 943 vehicles or major subassembly rebuilds, of which 145 were tank conversions. Case II assumed the same loading with second shift operations; Case III assumed the same loading with a second shift "in critical high bay operations only."<sup>13</sup> Based on these figures, Giffels drafted an initial design analysis to serve as criteria. Giffels' concept was given its first review at a conference of JAF officers, Giffels representatives, and Corps personnel held at Detroit, Michigan, on 24-26 February. Division Engineer Col. John V. Parish and four members of the Engineering Division represented Huntsville Division; Hugh Tamassia represented Mediterranean Division. Colonel Sayegh and three other lower ranking Jordanian officers present concurred with Giffels' overall facility layout presentation and approved Case I production loading, but they also asserted that the JAF wanted assembly line production methods of the type seen earlier at Anniston Depot, rather than the individual stall system proposed by Giffels. This change necessitated some rearrangement of functional process elements and changes in the dimensions or location of subassembly areas.<sup>14</sup>

Following the initial criteria conference, Giffels' staff proceeded to modify their proposals to incorporate the changes asked by the JAF. In March several communications between the parties strongly indicated that the JAF wanted to commit itself and \$5,500,000 in funding for final design and long-range procurement before 1 June 1976.<sup>15</sup> On 4 May Giffels' revised initial criteria were delivered to the JAF, and a last review conference was scheduled for 8-9 June to obtain JAF approval prior to final design contract award. At this conference, the JAF officers present "voiced dissatisfaction with both the estimated construction costs and the design schedule,"<sup>16</sup> but they continued to indicate a firm desire to start final design

in late June or early July, pending receipt of negotiated final design costs and schedule.<sup>17</sup>

By message to the MAP office in Amman on 25 June 1976, Huntsville Division forwarded estimated AE costs of \$3 million, including facility final design, industrial equipment specifications, and design of special tooling and fixtures. Rough site grading and warehousing would add approximately \$1,500,000. The message went on to conclude that "the [total] construction cost estimate of \$109M is the result of the best effort of the AE, thoroughly checked by USAEDH." Several cost factors in lower Jordanian estimates were questioned, such as neglect of the influence of inflation over eighteen months' construction time, the inclusion of heavy lifting and tow equipment, ambulances and fire vehicles, and special jigs and tooling, "It is our opinion," the communication observed, "that the JAF doesn't recognize the full scope and complexity of the project."<sup>18</sup>

For unknown reasons which may have been related to costs, the JAF position took a surprising volte-face in early July. On 6 July a puzzling message to the Department of the Army from MAP in Amman requested:

your assistance in getting the Jordan Armor Rebuild Facility project back on track. At meeting on 5 July with JAF representatives, they indicated their displeasure with the project. In delving into the various problem areas, it was obvious that we were in no position to respond to their grievances, misunderstandings and disagreements with the present and future progress of the project.<sup>19</sup>

The MAP office's suggested solution was a conference in Washington in August to be comprised of Jordanian Maj. Gen. Abdul-Haddie al-Majali, Assistant Chief of staff, and comparable rank officers from the U.S. Army that would be empowered to make binding decisions. Upon inquiry from Mediterranean Division, Huntsville Division replied that "we feel Reference A [the message above] was caused by some misunderstanding," but this notwithstanding, "USAEDH strongly feels all attempts at early resolution should be made and offers to travel to Mediterranean location of your desire to assist."<sup>20</sup>

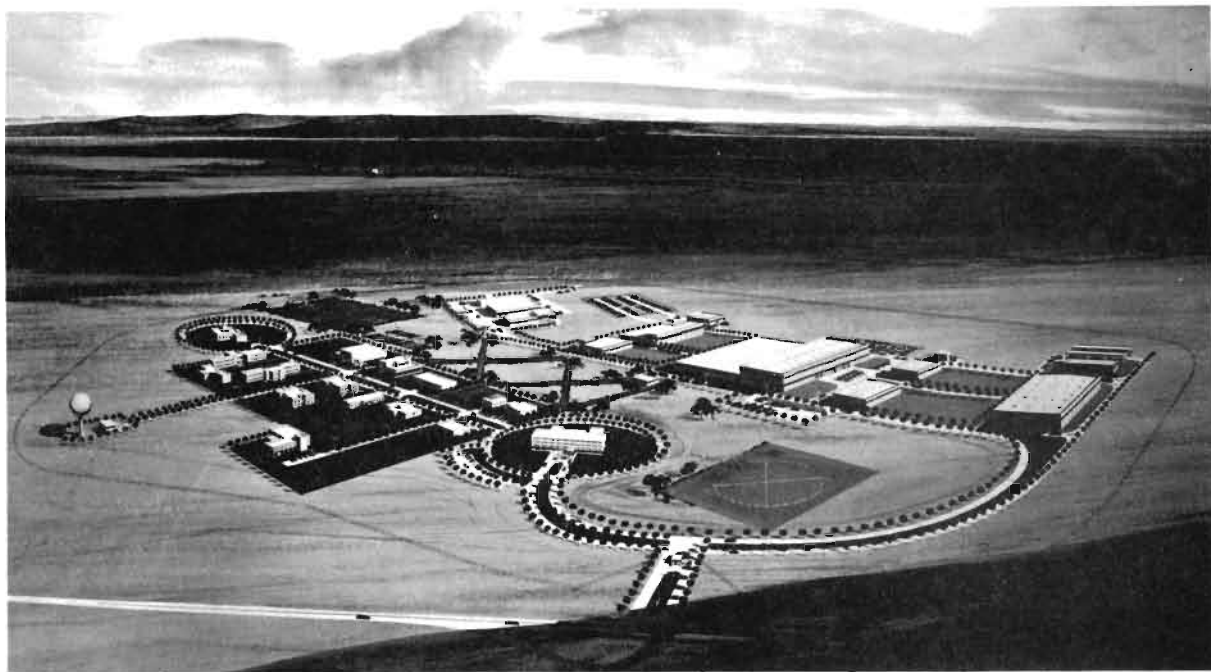
The Washington conference met at OCE in Washington, D.C., on 13 August. Here eyebrows must have gone up when General Majali unexpectedly presented a drastic downward revision of the desired facility's production capacity by 30 to 40 percent. He also presented numerous other major deletions in the interest of cost, such as landscaping, lawn irriga-

tion, perimeter fencing, test track, nine months' spares storage, all industrial vehicles, and three ancillary buildings. To permit incorporation of these changes, the Jordanian officers requested that the Corps present a new concept study and cost estimates. The revised Giffels Associates study and new estimates were to be reviewed with the JAF at an interim briefing in the middle of October, and a final presentation of revised concept and cost estimates would take place in December. Authorization for final design award was now projected for January 1977.<sup>21</sup>

In accordance with JAF wishes, Huntsville Division negotiated revised concept studies with Giffels Associates during the month of September. On 17 September Giffels agreed to contract modification P0005 for \$94,356, bringing the total for their AE services to \$394,824.<sup>22</sup> Time was now too short, however, to allow a thorough reappraisal of costs and concepts to be made in time for the October meeting of the joint military conference. When advised of this, the JAF agreed that the Corps could "present at the JMC your generalized concepts and related envelopes of potential cost savings associated with reductions."<sup>23</sup> As it turned out, the cost savings resulting from the August scale-down were quite substantial. At the conference held on 15 October, the JAF was informed that according to Giffels Associates' latest "ballpark" figures, the facility's cost was now reduced to about half of the June report, or \$55-60 million. By mid-November Giffels had compiled a more refined initial design analysis, and the firm indicated a "bottom line"

figure below \$50 million.<sup>24</sup>

On 8-9 December another meeting of senior ranking Jordanian and U.S. officers convened at Giffels Associates' Detroit office to hear an anticipated JAF approval for a "go-ahead" on final design. Maj. Gen. Majali again headed a five-man Jordanian party; the U.S. Army was represented by Maj. Gen. Louis Rachmeler, Col. John V. Parish, Jr., Col. Clarence Mann, and civilian personnel from Huntsville Division and from the newly-established Middle East Division based at Riyadh, Saudi Arabia. As had happened previously, however, the agenda produced some surprises. Giffels' revised concept figures now showed a current estimated construction costs of \$62.2 million, including materials handling equipment.<sup>25</sup> But instead of accepting this estimate and approving final design, the Jordanian officers now advised that the original primary function of the center, conversion of M48 tanks, was to be dropped, along with depot capability for certain British armored cars. The armor facility's primary mission was to become depot-level rebuilding of the British Centurion tank, and M48 depot-level maintenance dropped to second priority.<sup>26</sup> These parameters required yet another delay to allow Giffels to make adjustments to cope with the Centurion configuration. As of the end of 1976, an award for final design was planned for February 1977. Considering the history of the project, however, it is possible that further revision and consultations will take place before full customer satisfaction is obtained and final design proceeds.



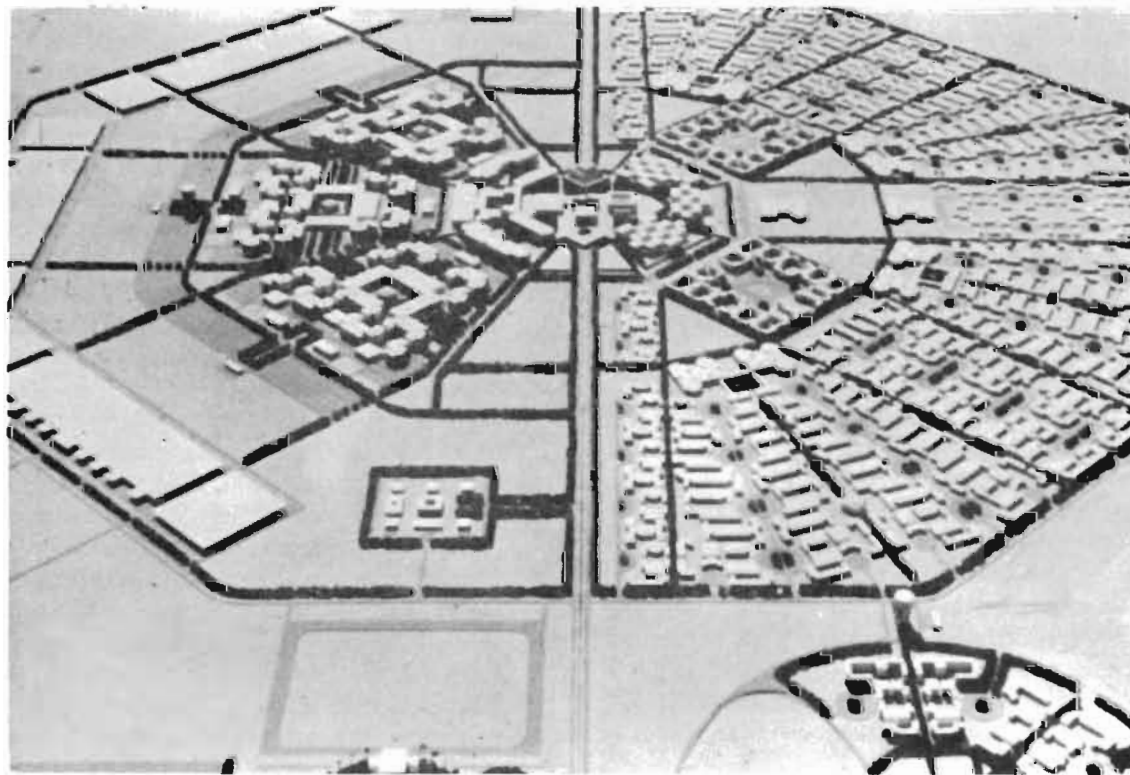
*ARTIST RENDERING Of the proposed Jordanian Armor Rebuild Facility.*

### III. The Saudi Arabian GFP Mission

One of the least known and appreciated, yet potentially most crucial, roles being played by the Corps of Engineers in the mid-1970s is its role in assisting the Kingdom of Saudi Arabia in modernizing their nation. Endowed with immense mineral riches in the form of perhaps 40 percent of the world's proven petroleum reserves, Saudi Arabia also occupies a strategic geopolitical location astride the major oil routes into and out of the Red Sea and Persian Gulf. The country's socio-economic evolution and political future are of great interest to the West. Presently a thinly populated monarchy with what is usually termed a developing economy, Saudi Arabia's leaders have demonstrated a vigorous determination to use their new-found wealth to create a modern industrial economy on the Western model. In the course of self-realization, Saudi Arabia had increasingly turned to the United States for inspiration and assistance in education, medicine, transportation, city planning, technology, and military affairs. The drive to modernity has led to a large Corps of Engineers presence in the country; in turn, the presence of the Corps led to a Saudi Arabian GFP mission for Huntsville Division in 1976.

Today's presence of about 750 Corps personnel in Saudi Arabia began in the late 1950s with minor military assistance. In 1959 the U.S. Army paved a

gravel airstrip built during World War II at Dhahran and constructed an ultra-modern terminal building there. In May 1965 a formal agreement was signed between the Saudi Arabian Government and the Corps of Engineers for further engineer assistance. Some of the first projects undertaken were a TV broadcast system for the Kingdom, a cantonment located at Khamis Mushayt in the southwestern part of the Kingdom, and a cantonment at Tabuk in the northwestern part of the Kingdom. Current Army engineer assistance projects include the strategically important King Khalid Military City, a cantonment in the northeastern part of the Kingdom which is a totally new urban settlement of 60,000 complete with its own port at Ras el Mishab on the Persian Gulf 180 miles away. The King Khalid Military City is officially estimated to cost about \$7 billion. As part of the Saudi Naval Expansion Program (SNEP), the Corps is constructing a naval base at Jeddah on the Red Sea and at Jubail on the Persian Gulf, as well as a headquarters in Riyadh. A headquarters facility for both the Air Force and National Guard is underway. The Corps is also constructing medical centers at Al Kharj and Riyadh and a military academy complex, also near Riyadh. The funds for these projects, including all Corps administrative expenses, are provided by the Saudi Arabian government.<sup>1</sup>



*King Khalid Military City*

As the volume of Corps contracts in Saudi Arabia mounted to major proportions after 1973, it became apparent that a reorganization and strengthening of overtaxed procurement elements was in order. Almost all of the GFP equipment and materials destined for Saudi Arabian contracts originated in the United States, and included in it were large quantities of long-lead procurement items. The Mediterranean Division based in Livorno, Italy, with its Saudi Arabia District in Riyadh, had responsibility for the Arabian peninsula, but the Division was neither conveniently located nor adequately staffed for the vast volume of goods that would be required for the construction in Saudi Arabia. Nothing could be done about the 5,000 mile communication lines, but a reorganization of responsibilities might bring about shorter delivery times.

The Corps began realignment of procurement responsibilities for the Saudi Arabian GFP task in January 1976 when Lt. Gen. William C. Gribble, Jr., the Chief of Engineers, decided to bring the Huntsville Division into Saudi operations for support in the area of GFP procurement. The decision was based on the extensive expertise and experience gained through the SAFEGUARD and Postal GFP procurements which were unparalleled in the Corps of Engineers. General Gribble envisioned a new operational infrastructure in which Huntsville Division would offer U.S. based GFP procurement service to the Mediterranean Division. Further in the future, a reorganization of Corps units in the Mediterranean and Middle East was planned to enhance operation of the Saudi Arabian construction program.

Pending the framing of a permanent charter between Mediterranean Division and Huntsville, and interim "Memorandum of Understanding" between Huntsville Division and Saudi Arabia District for "life support" procurement was signed in March 1976. According to this,

HND was requested and has agreed to support Saudi Arabia District (MDS) in the procurement of furniture and household furnishings for approximately 129 leased villas in Riyadh, Jidda and Dahran. . . Other requirements currently exist and will exist in the future which will require procurement of large dollar value and selected specialty items on an expedited basis in support of MDS. These are requirements over and above normal requirements being processed through Med Div Liaison Det., NY for NYD [New York District] procurement and/or GSA.<sup>2</sup>

Initial procurements during the spring of 1976 were made under this agreement, but it was superseded after 1 July 1976 by a permanent "Memorandum of Understanding Between US Army Engineer Division, Huntsville and US Army Engineer Division, Mediterranean." This document was Huntsville Division's fundamental charter for Saudi Arabian procurement. It states that "USAEDH is responsible for the procurement of GFP equipment and/or supplies and other procurement support. . . as requested by USAEDM, for the support of the Corps of Engineers Saudi Arabia Construction Program." In addition to the usual GFP procurement functions of solicitation, award, claims, and contract closeout, the Division was to develop an automated data processing system for management of the items to be procured. The equipment and materials requirements were to be provided as procurement packages complete with specifications, drawings, delivery need dates, and independent cost estimates. Following procurement actions per se and payment of the vendor, Huntsville Division was to be responsible for receipt of items at a continental United States port, packaging, freight forwarding, customs handling, and delivery in Saudi Arabia.<sup>3</sup>

As mentioned above, Huntsville Division's first customer in the Saudi program was the Mediterranean Division's Saudi Arabia District. In June and July 1976, however, the Corps units in the Mediterranean and Middle East were reorganized. The Mediterranean Division was disestablished, and its functions in the Arab nations of Egypt, Jordan, Kuwait, and Saudi Arabia passed to the newly-constituted Middle East Division with its Divisional Headquarters in Riyadh, Saudi Arabia. In turn, the Middle East Division established a Division Forward element in Riyadh for its construction and logistics functions, while a Division Rear element in Winchester, Virginia, maintained the engineering, procurement and supply, and construction project management functions. Corps functions in the Mediterranean basin were transferred to units based in Frankfurt, Germany. In practice, these changes meant that after mid-1976 Huntsville Division's Procurement and Supply Division staff extended Saudi GFP contract support directly to the Middle East Division's rear element in Winchester, Virginia, rather than to overseas elements of the Saudi Arabia District as before the reorganization. The "life support" procurement effort covered by the earlier interim agreement with Saudi Arabia District was continued through the spring of 1977, by which time the permanent element in Middle East Division Rear

was staffed to take over this task.

The assumption of the Saudi mission also brought a reorganization within Huntsville Division's Procurement and Supply Division, it being appreciated that the Saudi Arabian GFP mission would soon become its principal activity. In March 1975 the Procurement and Supply Division was still oriented towards the Postal Mission, with two specialized branches out of a total of four devoted to the Bulk Mail Centers procurement. By 30 June 1975, however, the Postal mission was nearing completion. At the direction of the Executive Office, a reorganization of the Procurement and Supply Division produced a Planning and Control Branch, a Contract Services Branch, a Requirements Branch, and a Contracting Branch. When the Saudi Program procurement became the principal mission of the Procurement and Supply Division about a year later, these branches were still in being and formed the organization for handling the mission during 1976. As of August 1976, the staff of the Procurement and Supply Division numbered thirty-five GS employees, including Division Chief Thor S. Anderson and Branch Chiefs Raymond D. Aldridge (Planning and Control), Clyde Mackey (Contract Service), B.G. Scott (Requirements), and T.J. Holt (Contracting).<sup>4</sup>

Until late 1976 much of the service rendered by the Procurement and Supply Division was directed

towards "life support" for the Saudi Arabia District and its expanded successor, the Middle East Division. Early in 1976 the Division began receiving Intra-Army Orders for household furniture, appliances, office furniture, printing plant equipment, and a prefabricated warehouse building for Corps quarters and offices. Most of the contracts for these goods were worth less than \$200,000 in initial award value; a representative sampling of the list includes:

--DACA87-76-C-0024 for \$17,300 to the Tappan Company for gas ranges

--DACA87-76-C-0027 for \$21,921 to the Ivan Allen Company for shelving

--DACA87-76-C-0032 for \$151,581 to the Fedders Corporation for air conditioners

--DACA87-76-C-0044 for \$43,803 to Kirby Building Systems for a prefabricated warehouse

--DACA87-76-C-0058 for \$95,171 to the Goodyear Tire Company for tires<sup>5</sup>

The last of the furniture items for Corps quarters departed Tampa, Florida, on 19 December 1976. It included 1414 wardrobes loaded in eleven containers intended for the ports of Jeddah and Dammam. The same ship was also loaded with eighty-two three-bedroom mobile homes and twenty-five office trailers, the delivery on contract DACA87-77-C-0004 awarded to Bendix Home Systems on 21 October for \$928,404.00.<sup>6</sup>



*CORPS FAMILY HOUSING in Jidda. A typical kitchen.*

Procurement for Saudi construction projects also got underway in the first quarter of 1976 with an order for GFP items for the Interim Repair Facility for the Saudi Naval Expansion Program at Dammam. Contracts for industrial plant equipment, related spare parts, and selected construction items totaled about \$1 million; by 9 July 1976 75 percent of these items were, or were in process of being delivered. The Interim Repair Facility contracts were virtually complete by mid-October 1976, by which time 90 percent had been, or were in process of being completed.<sup>7</sup>

During the last quarter of 1976 the Saudi Program GFP activities began to accelerate with the receipt of large orders destined for the King Khalid Military City project's Concrete Supply System and a dental clinic in Riyadh. Representative of these contracts were two awarded to Mack Trucks, Inc., for \$818,919.20 worth of concrete trucks and \$423,969.26 worth of other heavy trucks. Dental X-ray equipment was procured for the Riyadh clinic under Contract DACA87-77-C-0005 with GE Dental Systems Operations for \$12,451.84.



*A ROCK CRUSHER procured by the Huntsville Division for Saudi Construction work.*

The overseas shipment of items ranging from dental X-ray equipment to tires in the massive quantities demanded by the Saudi Program was a new experience for the Procurement and Supply Division. The transportation function fell to the Contract Services Branch, which had to research and assemble the requirements in contract solicitation form for receiving, packaging, and shipping supplies and equipment destined for the Middle East. Three channels have been utilized in dispatching Saudi items. Initially arrangements were made with the U.S. Army Packaging Branch in Bayonne, New Jersey, to receive, package, and ship some items. Some forty-one other shipments in 1976 were expedited through State Department Contract 0000-52-0038,<sup>1</sup> a requirements-type contract for packaging, crating, and shipping. Finally, the Division has employed private shipping firms under its own contracts for Saudi shipments. On 31 August 1976 the Procurement and Supply Division awarded the firm of Todd Warehouse and Distributing Company of Bayonne, New Jersey, an unusual requirements-type service contract DACA87-76-C-0054 for packaging, crating, and shipping of

Government property. This contract was specifically set up to handle transshipment of goods to Saudi Arabia. Delivery orders are written against the basic contract as required, and the contractor bills Huntsville Division for individual shipments made.<sup>8</sup>

A permanent comprehensive solution for Saudi logistics was begun by Huntsville Division in mid-1976 when the Middle East Division presented a task for developing a Logistics Management Contract. This contract would consolidate all Corps shipments to Saudi originating out of the Continental United States, provide modular packaging, and packing, arrange surface/air transportation, receive cargo in Saudi Arabia, and provide the management and inventory control for all Corps cargo going to Saudi Arabia. The issuance of a RFP for the Logistics Management Contract was scheduled for 1 November 1976, but shortly before that date the Division learned that pre-qualification of bidders with approval of the Saudi Arabian government would be required. This action delayed issuance of the RFP beyond January 1977.<sup>9</sup>



*At Jubal, Saudi Arabia Piers 3 and 4 have a synchrolift.*



*Royal Saudi Air Force Headquarters (RSAF) as constructed by the Corps.*

Tracking of massive procurements such as that for Saudi Arabia was nothing new to the Procurement and Supply Division. The SAFEGUARD and Postal missions had generated considerable experience in the management of vast quantities of material through computer inventoring. In particular, the Bulk Mail Centers program had underlined a valuable "lesson learned": it was a mistake to attempt to adapt computer software developed for an earlier scenario to later and different requirements. Profiting from this experience, an entirely new automatic data processing system for Saudi GFP procurement was launched in conjunction with the ADP Center Branch and the Middle East Division. As it is currently projected, the ADP tracking system will consist of four basic modules: raw data, preaward, awards, and transportation. All systems analysis and programming will be accomplished by the ADP Center in Huntsville Division in conjunction with the Planning and Control Branch.<sup>10</sup>



# CHAPTER VII FOOTNOTES

## I. In Conjunction With ERDA

<sup>1</sup> See an undated, unsigned, handwritten "Chronology of Events" concerning USAEDH in the ERDA mission. ERDA Liaison Office, CBFDP Working File.

<sup>2</sup> See the "Chronology of Events" in ERDA Liaison Office, CBFDP Working File.

<sup>3</sup> Personal interview with George Barter and Leo Carden, Project Management Branch, USAEDH-ED, 1 March 1977. In the course of this interview, these individuals provided very helpful information about the general course and evolution of Huntsville Division's association with ERDA. I am also indebted to Phil Bradley, ERDA Liaison Officer at USAEDH, for opening his files to me.

<sup>4</sup> Ltr, Sec of Int Rogers C. Morton to Sec of Def James R. Schlesinger, 30 May 1974, sub: Assumption of OCR Mission by CE. ERDA Liaison Office, CBFDP Working File.

<sup>5</sup> Ltr, Dpty Sec of Def William Clements to Sec of Int Rogers B. Morton, 18 Jun 74, sub: Approval of CE Assistance to OCR. ERDA Liaison Office, CBFDP Working File.

<sup>6</sup> "HND Funding Requirements for OCR CBFDP Program," three tabular sheets included with ltr, B.L. Trawicky, Chf USAEDH-ED to HQ Dept Army, 13 Aug 74, sub: Manpower and Funding Requirements OCR CBFDP. ERDA Liaison Office, CBFDP Working File.

<sup>7</sup> Memorandum of Understanding between Fossil Energy, United States Energy Research and Development Administration, and Office of the Chief of Engineers, Department of the Army, for Providing Technical Service," signed by Maj Gen George A. Rebh, Director of Mil Contr, OCE, on 18 Mar 75, and by Robert Seamans, Jr., Administrator for ERDA, on 12 Jun 75. Copy in ERDA Liaison Office, CBFDP Working File.

<sup>8</sup> Personal interview with Leo Carden, Project Management Branch, USAEDH-ED, 1 March 1977. The figures are for the successful Coalcon response to the RFP.

<sup>9</sup> Personal interview with Leo Carden, Project Management Branch, USAEDH-ED, 1 March 1977.

<sup>10</sup> Ltr, Acting Director OCR to Maj Gen George A. Rebh, OCE, 23 Aug 74, sub: Request for Delegation of Manpower from USAEDH for OCR CBFDP Source Selection Board. Copy in ERDA Liaison Office, CBFDP Working File. Further information on the Source Selection Board was provided by William Major, Project Management Branch, USAEDH-ED, who attended Board activities for the RFP CDFDP.

<sup>11</sup> Text of "Fossil Energy Demonstration Plants Briefing" to accompany slide presentation prepared by USAEDH-PAO, 1975; Personal interview with Leo Carden. Project Management Branch, USAEDH-ED, 1 March 1977.

<sup>12</sup> Ltr, F.B. McNeely, Chf Constr Div OCE, to Div Engr USAEDH, 13 Jan 75, sub: CBFDP Procurement Task One. ERDA Liaison Office, CBFDP Working File.

<sup>13</sup> Amendment 2 to ERDA/OCE Memo of Understanding, 12 Jun 75, signed by Maj Gen Bates C. Burnell, Director of Mil Contr, OCE, on 19 Feb 76. ERDA Liaison Office, CBFDP Working File.

<sup>14</sup> Data on the ERDA Pipeline Gas Demonstration Plant proposals was provided by Phil Bradley, ERDA Liaison Officer, USAEDH, through personal interviews during July 1978.

<sup>15</sup> Data on the ERDA Fuel Gas Demonstration Plant proposal activities was provided by Russell C. Hellier, Project Management Branch, USAEDH-ED, through personal interview on 13 July 1978.

<sup>16</sup> Personal interview with William Major, Project Management Branch, USAEDH-ED, 14 July 1978.

## II. The Jordanian Armor Rebuild Facility

<sup>1</sup> The principal sources for this section are copies of documents in the project working file maintained by Henry O. Everitt, Project Manager for the Jordanian Armor Rebuild Facility. This file was supplemented for the early period 1974-1975 by additional primary documents supplied by Tom Koonce, Directorate of Military Construction, OCE. The reader is advised that certain production figures for the Armor Center and other material were deleted as "sensitive to the Jordanian Government" by action of the Engineering Division staff, USAEDH. Additionally, the author has been informed that certain ASPR provisions prevent the revelation of other AE firms submitted to the Jordanian Government for design of the Center.

<sup>2</sup> Personal interview with Henry O. Everitt, Project Management Branch, USAEDH-ED, April 1977.

<sup>3</sup> Personal interview with Henry O. Everitt, Project Management Branch, USAEDH-ED, April 1977. Msg, USADAO/Amman, Jordan to Sec of Def, 23 Dec 72, sub: JAA GHQ Construction. Copy supplied to the author by Tom Koonce, Directorate of Military Construction, OCE.

<sup>4</sup> Msg, MAP/Amman, Jordan to Dept Army, 6 Jan 75, sub: Jordan Tank Rebuild Facility. Msg, Cmdr AMC to Dept Army, 8 Jan 75, sub: Jordan Tank Rebuild Facility. Msg, MAP/Amman, Jordan to Div Engr USAEDM, Leghorn, Italy, 29 Jan 75, sub: Jordan Tank Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>5</sup>Trip rpt filed by Lt Col Robert A. Dey, MDD-PD on visit to Amman, Jordan, 22-24 Mar 75, dated 27 Mar 75. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>6</sup>“Technical Agreement Concerning Assistance by the United States Army Corps of Engineers in Designing and Constructing an Armor Rebuild Facility for the Government of Jordan,” signed by Maj Gen D.A. Raymond, Dpty Chf of Engrs, 30 Apr 75, and by Lt Gen Sharif Zeid ben Shaker, Chf of Gen Staff, JAF, 25 Apr 75. Copy in USAEDH-ED, PM Jordanian Armor Center Working File. The formal commitment of \$500,000 for defined CE services rendered is contained in the U.S. DOD letter of offer signed by Maj Gen Abdul-Haddie al-Majali, Assist Chf Staff, JAF, on 24 Apr 75. A copy supplied to the author by Tom Koonce, Military Construction Directorate, OCE.

<sup>7</sup>Msg, Div Engr USAEDM, Leghorn, Italy to Div Engr USAEDH, 15 May 75, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>8</sup>Msg, Div Engr USAEDM, Leghorn, Italy to Div Engr USAEDH, 15 May 75, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>9</sup>Msg, Div Engr USAEDH to Div Engr USAEDM, Leghorn, Italy, 16 May 75, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>10</sup>Msg, OCE to Div Engr USAEDH, 30 Jul 75, sub: Approval of A-E Selection for Design of Tracked Vehicle Rehab Facility for Jordan Armed Forces. Msg, Div Engr USAEDM, Leghorn, Italy, to MAP/Amman, Jordan, 11 Aug 75, sub: Jordan Armor Rebuild Facility, USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>11</sup>Msg, MAP/Amman, Jordan to Div Engr USAEDM, Leghorn, Italy, 13 Aug 75, sub: Jordan Armor Rebuild Facility. Mst, Div Engr USAEDM, Leghorn, Italy to Div Engr USAEDH, 10 Sep 75, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File

<sup>12</sup>Contract record for Contract DACA87-76-C-0004 in Contract Records File, AE Contract Section, USAEDH-ED.

<sup>13</sup>Msg, Div Engr USAEDH to MAP/Amman, Jordan and to Div Engr USAEDM, Leghorn, Italy, 23 Jan 76, sub: Jordan Armor Facility.

<sup>14</sup>Annex “C” to U.S./Jordanian “Technical Agreement” of 30 Apr 75, “Points of Understanding Resulting from 24-26 February 1976 Review at Giffels Associates, Inc., Office, Detroit, Michigan,” attached to ltr, William L. Little, Acting Chf USAEDH-ED, to Div Engr USAEDM, Leghorn, Italy, 18 Mar 75, sub: Report of JMC Review of Giffels Initial Design Jordanian Armor Center. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>15</sup>See, for example, the msg, Div Engr USAEDM, Leghorn, Italy to Dept Army, 12 Mar 76, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>16</sup>Msg, Div Engr USAEDM, Leghorn, Italy to MAP/Amman, Jordan, 9 Jul 76, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>17</sup>This is the opinion of Henry O. Everitt, USAEDH Project Manager for the Armor Center, expressed to the author in a personal interview in April 1977. It is wholly supported by the continued activities of USAEDH and USAEDM during June 1976 in preparation of AE final design cost structures.

<sup>18</sup>Msg, Div Engr USAEDH to MAP/Amman, Jordan, 25 Jun 76, sub: Jordan Armor Rebuild Depot. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>19</sup>Msg, MAP/Amman, Jordan to Dept Army, 6 Jul 76, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File. According to the unclassified documents to the author, there was no prior indication of the volte-face at the beginning of July 1976. This is also the belief of Henry O. Everitt, Project Manager, USAEDH-ED.

<sup>20</sup>Msg, Div Engr USAEDH to Div Engr USAEDM, Leghorn, Italy, 12 July 76, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>21</sup>Annex “E” to U.S./Jordanian “Technical Agreement” of 30 Apr 75, “Points of Understanding Resulting from 13 August Meeting in Washington, DC, at the Office of the Chief of Engineers,” forwarded by W.L. Little, Chf USAEDH-ED, to U.S. Army Attache, USDAO, Amman, Jordan, on 19 Aug 76. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>22</sup>Msg, Div Engr USAEDH to USDAO, Amman, Jordan, 17 Sep 76, sub: Jordan Armor Rebuild - Annex E to Tech Agreement. USAEDH—ED, PM Jordanian Armor Center Working File. Contract record for Contract DACA87-76-C-0004 in Contract Records file, AE Contracts Section, USAEDH-ED.

<sup>23</sup>Msg, MAP/Amman, Jordan to Sec of Def, Washington, DC, 28 Sep 76, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>24</sup>Msg, MAP/Amman, Jordan to Sec of Def, Washington, DC, 3 Nov 76, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File. Estimates of costs as of October supplied by Henry O. Everitt in personal interview, April 1977.

<sup>25</sup>Msg, Div Engr USAEDH to USDAO, Amman, Jordan, 16 Dec 76, sub: Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

<sup>26</sup>Annex "F" to U.S./Jordanian "Technical Agreement" of 30 Apr 75, "Points of Understanding Resulting from 8 - 9 December Meeting in Detroit at the Office of Giffels Associates, Inc.," attached to ltr, Lt Col Robert W. Senn, Chf, Army Section, MAP/ Amman, Jordan to Div Engr USAEDH, 25 Jan 77, sub: Annex F to Technical Agreement for Jordan Armor Rebuild Facility. USAEDH-ED, PM Jordanian Armor Center Working File.

### III. The Saudi Arabian GFP Mission

<sup>1</sup>For the background to the contemporary Corps of Engineers presence in the Kingdom of Saudi Arabia, see "Saudi Assignment Appreciated Abroad More Than at Home," **Engineering News Report**, 17 February 1977, pp. 28-38.

<sup>2</sup>"Memo of Understanding" between USAEDH and Saudi Arabia District, USAEDM, 10 Mar 76, sub: "Interim Working Agreement to Provide Procurement Support by Huntsville Division for Saudi Arabia District."

<sup>3</sup>"Memorandum of Understanding Between US Army Engineer Division, Huntsville and US Army Engineer Division, Mediterranean," signed by Col John V. Parish, div Engr USAEDH, on 6 May 76 and Col Charles T. Williams, Div Engr USAEDM, on 9 June 76. Copy provided by Raymond Aldridge, Planning and Control Branch, USAEDH-PS.

<sup>4</sup>See USAEDH-PAO, "Historical Summary FY 1975," II, Documents, pp. 6-25, and USAEDH Table of Distribution and Allowances for August 1976. The TDA for August 1976 was provided by George G. Stewart, Public Affairs Office, USAEDH.

<sup>5</sup>See contract data for 1975 and 1976 provided in USAEDH-PS raw input data for "Historical Summary FY 1976" in USAEDH-PAO "Historical Summary" file.

<sup>6</sup>Ltr, Div Engr Col John V. Parish, Jr., to Lt Gen J.W. Morris, Chf of Engrs, 4 Jan 1977, sub: Quarterly Report USAEDH. Contract Data for 1976 in USAEDH-PS raw input data for "Historical Summary FY 1977" in USAEDH-PAO "Historical Summary" file.

<sup>7</sup>Ltr, Div Engr Col John V. Parish, Jr., to Lt Gen J.W. Morris, Chf of Engrs, 18 Oct 76, sub: Quarterly Report USAEDH.

<sup>8</sup>USAEDH-PS raw input data for "Historical Summary FY 1976" and "Historical Summary FY 1977" in USAEDH-PAO "Historical Summary" file.

<sup>9</sup>Personal interview with Raymond D. Aldridge, Planning and Control Branch, USAEDH-PS, July 1978.

<sup>10</sup>Personal interview with Thor S. Anderson, Chief, USAEDH-PS, July 1978.