START

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WHC-MR-0052

Backup Material for Treatment, Storage, and Disposal Units Replacement Cost Study

BEST AVAILABLE COPY

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Prepared for the U.S. Department of Energy
Assistant Secretary for Defense Programs

Westinghouse
Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

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BACKUP MATERIAL FOR TSD REPLACEMENT COST STUDY

The backup material for the treatment, storage, and disposal (TSD) unit replacement cost study is organized by each TSD unit in sections. Each TSD unit section contains information used in estimating the replacement cost of the TSD unit. In addition, a section containing information on the Freiman Analysis Technique Parametric Estimate System (FAST) is provided. Parametric cost estimates involve the development and utilization of estimating relationships between historical costs and system physical and/or performance characteristics. The FAST system is a multidimensional program and only a small portion of the capabilities were used during this study.

If the FAST program was used to estimate the TSD unit replacement cost, the input and output sheets from the program are included in the section. The hand written sheets contain the cost information, including the year expended, taken from the Richland Property Record System (RL-PS). This information was used as input to the FAST-C CALCMX Program.

The FAST-C CALCMX Program was used to escalate the input cost information (from RL-PS) to 1988 dollars. The page following the hand written pages is the FAST-C CALCMX printout and shows the program calculated cost escalation to 1988 dollars. This value is shown under TCOST (Total Cost). The FAST-C CALCMX printout also shows the input data from the hand written sheets.

The FAST-E program was used to estimate the TSD replacement cost using the escalated dollars determined from the FAST-C CALCMX program. The only variables used in the FAST-E program was PLTFM and ENTYPE.

The FAST-E output consists of two sheets. The first sheet shows the cost PCOST (Project Cost), taken from the FAST-C CALCMX output, and the PLTFM and ENTYPE variables used for the original facility. The second FAST-E output sheet uses the PCOST from the first output sheet and estimates the cost of a new facility based on the variables PLTFM and ENTYPE. The estimated replacement cost of the facility (PCOST) and the variables used (PLTFM and ENTYPE) are shown on the second output sheet. Using available information, the variables PLTFM and ENTYPE are determined and entered by the estimator.

Some of the sections contain additional information used to help determine the estimated replacement cost of the TSD unit. This information is self explanatory.

The last section contains portions of the FAST program users manual. This information describes the methodology for the FAST-C and FAST-E programs and provides definitions for the acronyms on the input and output sheets.

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9 2 1 2 4 9 8 0 6 5 9

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REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

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FACILITY HOUSED IN A PORTION OF THE 105-DR REACTOR BUILDING. ESTIMATED REPLACEMENT COST BASED ON 3718-F ALKALI METAL TREATMENT AND SRORAGE FACILITY.

9 2 1 2 4 9 8 0 6 6 2

fps

FAST-C
CALCMX PROGRAM

NAME 103

PROJECT 1706-KE Waste Treatment System

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

9212498063

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =						
2 =						
3 =						
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

Total 1706KE Acq Cost = $4.7M.
Quantify facility/process o-eqts
for ~~The~~ Waste Treatment System

FPS-14 11-20-82

```
PROJECT              : 1706-KE WASTE TREATMENT SYSTEM
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                 KSF   KLF   CYD   ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                  SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()      AMT()   UNIT()   UCOST()   UYEAR()   UMX()

1=NONE 1 EA 1 1988
2=
```

```
                 ***** FAST-C CALCMX PROGRAM *****

NAME:        103                          DATE: FRI, APR 07 1989   16:45:21
PROJECT:     1706-KE WASTE TREATMENT      ECONFILE:

                  EXCMX                 BAMT              BASE
                  0.015*                 1.0              CYD

                 TCOST($1000    )       UCOST/CYD         YEAR
                      0.00*                  1.00*        1988

                       ***** INPUT DATA *****

                         SINDEX   PINDEX   TYEAR
                          0.950    0.900   1988

       (X)  ITEM()            AMT() UNIT()          UCOST() UYEAR()        UMX()
        1= NONE                1.0 EA                1.00   1988           0.015*
```

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

Allow #1M

```
103
ENTER ECONOMIC FILENAME:

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

FILENAME: A103                                   DATE: SAT, APR 15 1989  14:46:14
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

                            ***** FAST-E *****

PROJECT:   103                                   DATE: SAT, APR 15 1989  14:46:15
LOCATION:  HANFORD                               FILENAME: A103
ITEM:      ACQUISITION COST                      ECONFILE:

                            ***** DETAIL ITEM *****

                          ***** CHARACTERISTICS *****

                 FASTE EQUIVALENT
                 FASTE                                      246.933*
                   TENVLE(FASTE)                         FAS.0.262*

                             ***** INPUT DATA *****

                   ESCAL      GECON       FPER       LCURVE          CMULT
 PRJGLOB           1.000      1988        12.  D      0.960*        1,000.
                   TYPE       SYSTEM      RERUN      REMBOX
 FILE              D            0         0            0
                   ALL    COST    UNCERT  LOHMAT   INPUT    FGRAPH   FDET
 FORMAT             0      0        0       0        1        0        0

                   PLTFM   ENTYPE MATVAL   TYEAR
 GLOB              1.000  100.000   1.00D   1986

                   WT         WTFAC           VOL         VOLFAC
 WTVOL        5,908.76*     1,393.3          154.31*     100.00
                   PMX        MXTYPE        ELWT       ELMX          STWT     STMX
 MXLINE            1.000*     4.224*         0.0       0.000          0.0    0.000

                   PCOST                  PQTY       PECON       FOAK
 PCOST             100.00                    1.        1988       1.000
                   PSTART     PFIN        PSCHDX     PRDMX       PYEARC     PDISC
 PSCHD             JAN.1988   OCT.1988*   100.00     4.223*       1988*      NONE
                   CONTIN     ADD
 END                1           0

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

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***** FAST-E *****

```
PROJECT:   103                                  DATE: SAT, APR 15 1989  14:46:42
LOCATION:  HANFORD                              FILENAME: A103
ITEM:      REPLACEMENT COST                     ECONFILE:
```

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	199.70	0.00	199.70

***** CHARACTERISTICS *****

```
                FASTE EQUIVALENT
                FASTE                              380.765*
                  TENVLE(FASTE)                   FAS.0.260*
```

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
199,695.94	199,695.94	199,695.94

***** INPUT DATA *****

```
                 ESCAL       GECON       FPER       LCURVE        CMULT
PRJGLOB          1.000       1988        12.         0.960        1,000.
                 TYPE        SYSTEM      RERUN      REMBOX
FILE             D            0          0           0
                 ALL      COST     UNCERT   LOHMAT   INPUT     FGRAPH    FDET
FORMAT            0        1         0        0        1         0         0

                 PLTFM    ENTYPE  MATVAL    TYEAR
GLOB             1.300    90.000    1.00D   1988

                 WT          WTFAC              VOL          VOLFAC
WTVOL       5,908.76R      1,466.7*           154.31R       104.35*
                 PMX         MXTYPE          ELWT       ELMX          STWT      STMX
MXLINE           1.000R      4.759*           0.0       0.000          0.0      0.000

                 PCOST                   PQTY       PECON      FOAK
PCOST            199.70*                   1.        1988       1.000
                 PSTART      PFIN        PSCHDX     PRDMX      PYEARC       PDISC
PSCHD            JAN.1988    MAR.1989*   100.00     3.598*       1988*      NONE
                 CONTIN      ADD
END               0           0
```

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DO YOU WISH TO MAKE CHANGES (Y/N):

fps

FAST-C
CALCMX PROGRAM

NAME 104

PROJECT 183-H Solar Evaporation Basin

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	183H	1	EA	182,200	1952	49
2 =				5,100	73	
3 =				263,400	88	
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

PROJECT : [redacted]
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=H183 1 EA 182200 1952
2=N 1 EA 5100 1973
3=N 1 EA 263400 1988
4=

***** FAST-C CALCMX PROGRAM *****

NAME: 104 DATE: FRI, APR 07 1989 16:47:39
PROJECT: 183-H SOLAR EVAPORATION ECONFILE:

EXCMX	BAMT	BASE
91,613.000*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
1,614.83	1,614,833.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	H183	1.0	EA	182,200.00	1952	74,536.781*
2=	N	1.0	EA	5,100.00	1973	548.790*
3=	N	1.0	EA	263,400.00	1988	12,672.248*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

04
ENTER ECONOMIC FILENAME:

FILENAME: A104 DATE: SAT, APR 15 1989 14:47:33
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 104 DATE: SAT, APR 15 1989 14:47:33
LOCATION: HANFORD FILENAME: A104
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	7,063.917*
TENVLE(FASTE)	FAS.0.355*

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12. D	0.960*	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.000	100.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	226,182.56*	6,270.6	5,906.88*	100.00			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.000*	4.224*	0.0	0.000	0.0	0.000	
	PCOST	PQTY	PECON	FOAK			
PCOST	1,614.80	1.	1988	1.000			
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	MAY.1989*	100.00	4.223*	1988*	NONE	
	CONTIN	ADD					
END	1	0					

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

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***** FAST-E *****

PROJECT: 104 DATE: SAT, APR 15 1989 14:47:58
LOCATION: HANFORD FILENAME: A104
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	1,616.63	0.00	1,616.63

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 7,063.917*
TENVLE(FASTE) FAS.0.355*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FFCOST
1,616.63K	1,616.63K	1,616.63K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.000	100.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	226,182.56R	6,270.6*	5,906.88R	100.00*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	4.224*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	FOAK	
PCOST	1,616.63*		1.	1988	1.000	
	PSTART	FFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JUN.1989*	100.00	2.079*	1988*	NONE
	CONTIN	ADD				
END	0	0				

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O YOU WISH TO MAKE CHANGES (Y/N):

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

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REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

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FAST-C
CALCMX PROGRAM

①

AME 201

PROJECT 221-T Const. Sys Test Fac 27-Max

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF 2 CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	221 T	1	Ea	5,444,800	1944/52	
2 =				2,000	45/52	
3 =				3,000	50/52	
4 =				195,000	1952	
5 =				494,100	1955	
6 =				45,900	1957	
7 =				50,200	1959	
8 =				28,800	1960	
9 =				117,200	1963	
10 =				180,700	1964	
11 =				176,200	1967	
12 =				231,200	~~1969~~ 1972	
13 =				18,900	1975	
14 =				134,800	1977	
15 =				531,300	1979	
16 =				206,000	1983	
17 =				120,300	1984	
18 =				506,100	1985	
19 =				706,900	1986	
20 =				70,600	1987	

PPS-14 11 30-8:

10,506.3

```
PROJECT            : 221T CONTAINMENT SYS.TEST FACILITY
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 39

MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=T221 1 EA 5444800 1952
 2=TWO 1 EA 2000 1952
 3=THREE 3"1 EA 3000 1952
 4=FOUR 1 EA 195000 1952
 5=FIVE 1 EA 494100 1955
 6=SIX 1 EA 45900 1957
 7=SEVEN 1 EA 50200 1959
 8=EIGHT 1 EA 28800 1960
 9=NINE 1 EA 117200 1963
10=TEN 1 EA 180700 1964
11=ELEVEN 1 EA 176200 1967
12=TWEL 1 EA 231200 1972
13=THIR 1 EA 18900 1975
14=FOUR 1 EA 134800 1977
15=FIF 1 EA 531300 1979
16=SIX 1 EA 206000 1983
17=EIGHT 1 EA 506100 1985
18=NIN 1 EA 706900 1986
19=TWEN 1 EA 70600 1987
20=SEVENTEEN 1 EA 120300 1984
21=
```

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```
               *****  FAST-C CALCMX PROGRAM *****

NAME:      201                          DATE: WED, APR 05 1989  14:33:30
PROJECT:   221T CONTAINMENT SYS.TES     ECONFILE:

                EXCMX               BAMT          BASE
            101,833.625*            39.0          CYD

            TCOST($1000    )      UCOST/CYD      YEAR
                51,133.96*     1,311,127.25*     1988

                      ***** INPUT DATA *****

                       SINDEX  PINDEX  TYEAR
                        0.950   0.900  1988

      (X)  ITEM()         AMT()  UNIT()        UCOST()  UYEAR()       UMX()
```
~~~~~~

2=	TWO	1.0	EA	2,000.00	1952	542.894*
3=	THREE	1.0	EA	3,000.00	1952	844.91[illegible]
4=	FOUR	1.0	EA	195,000.00	1952	80,267.15[illegible]*
5=	FIVE	1.0	EA	494,100.00	1955	195,016.71[illegible]*
6=	SIX	1.0	EA	45,900.00	1957	13,260.564*
7=	SEVEN	1.0	EA	50,200.00	1959	13,283.076*
8=	EIGHT	1.0	EA	28,800.00	1960	6,905.665*
9=	NINE	1.0	EA	117,200.00	1963	27,645.094*
10=	TEN	1.0	EA	180,700.00	1964	42,256.789*
11=	ELEVEN	1.0	EA	176,200.00	1967	35,597.055*
12=	TWEL	1.0	EA	231,200.00	1972	37,304.625*
13=	THIR	1.0	EA	18,900.00	1975	1,936.427*
14=	FOUR	1.0	EA	134,800.00	1977	13,992.492*
15=	FIF	1.0	EA	531,300.00	1979	51,140.047*
16=	SIX	1.0	EA	206,000.00	1983	12,188.350*
17=	EIGHT	1.0	EA	506,100.00	1985	29,169.211*
18=	NIN	1.0	EA	706,900.00	1986	40,219.625*
19=	TWEN	1.0	EA	70,600.00	1987	3,148.658*
20=	SEVENTEE	1.0	EA	120,300.00	1984	6,394.814*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

FAST-C
CALCMX PROGRAM

AME 201

PROJECT

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	TOTAL PG. I	1	EA			
2 =	221 TA	1	Ea	24,600	1944/52	
3 =		1		18,100	1968	
4 =						
5 =	271 T	1	Ea	1,112,600	1944/52	
6 =		1	Ea	237,000	45/52	
7 =				295,900	1955	
8 =				136,800	1956	
9 =				88,100	1967	
10 =				112,000	1971	
11 =				104,900	1980	
12 =				299,600	1982	
13 =				293,300	1986	
14 =				47,600	1987	
15 =				383,700	1988	
16 =	291-T/277T	1	Ea	119,200	1944/52	
17 =				113,200	1984	
18 =				57,200	1986	
19 =	2706T	1	Ea	106,600	1944/52	
20 =				30,000	1956	
				55,200	1959	
				111,400	1979	
				44,100	1986	

9212498006 8

PPS-16 11 30-8

FAST-C
CALCMX PROGRAM

NAME 201

PROJECT

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	2715 T	1	Ea	10.1	1965	
2 =	~~C116 T~~					
3 =	B459			1,000,000	1989	
4 =	C027			1,100,000	1989	
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

```
201
PROJECT              : 221T CONTAINMENT SYS.TEST.FAC
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                 KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 39

MX TYPE (MXTYPE): EXCMX

                     SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=TOTAL.PG.1 1 EA 51135960 1988
 2=TA221 1 EA 24600 1952
 3=THREE 1 EA 18100 1968
 4=T271 1 EA 1112600 1952
 5=N 1 EA 237000 1952
 6=N 1 EA 295900 1955
 7=N 1 EA 136800 1967
 8= 1 EA 88100 1967
 9=N 1 EA 112000 1971
10=N 1 EA 104900 1980
11=N 1 EA 299600 1982
12=N 1 EA 293300 1986
13=N 1 EA 47600 1987
14=N 1 EA 383700 18"988
15=T291.T277 1 EA 119200 1952
16=N 1 EA 113200 1984
17=N 1 EA 57200 1986
18=T2706T 1 EA 106600 1952
19=N 1 EA 30000 1956
20=N 1 EA 155200 1956
21=N 1 EA 111400 1979
22= 1 EA 44100 1986
23=T2715 1 EA 10100 1965
24=B459 1 EA 10000001989
   ERROR! UYEAR MUST BE ENTERED
   RE-ENTER TOTAL LINE
24=B459 1 EA 1000000 1989
25=C027 1 EA 1100000 1989
26=
```

```
                 ***** FAST-C CALCMX PROGRAM *****

NAME:      201                          DATE: WED, APR 05 1989   14:52:48
PROJECT:   221T CONTAINMENT SYS.TES     ECONFILE:

              EXCMX                 BAMT          BASE
          145,792.656*              39.0          CYD

            TCOST($1000    )        UCOST/CYD     YEAR
              71,050.48*        1,821,807.25*     1988
```

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	TOTAL.PG	1.0	EA	51,135,960.00	1988	**********
2=	TA221	1.0	EA	24,600.00	1952	8,388.842*
3=	THREE	1.0	EA	18,100.00	1968	2,833.966*
4=	T271	1.0	EA	1,112,600.00	1952	536,533.875*
5=	N	1.0	EA	237,000.00	1952	99,300.797*
6=	N	1.0	EA	295,900.00	1955	111,470.313*
7=	N	1.0	EA	136,800.00	1967	27,008.617*
8=	N	1.0	EA	88,100.00	1967	16,711.578*
9=	N	1.0	EA	112,000.00	1971	17,920.742*
10=	N	1.0	EA	104,900.00	1980	7,573.204*
11=	N	1.0	EA	299,600.00	1982	19,630.648*
12=	N	1.0	EA	293,300.00	1986	15,404.945*
13=	N	1.0	EA	47,600.00	1987	2,048.162*
14=	N	1.0	EA	383,700.00	1988	19,102.168*
15=	T291.T27	1.0	EA	119,200.00	1952	46,918.828*
16=	N	1.0	EA	113,200.00	1984	5,984.211*
17=	N	1.0	EA	57,200.00	1986	2,589.447*
18=	T2706T	1.0	EA	106,600.00	1952	41,535.242*
19=	N	1.0	EA	30,000.00	1956	8,748.326*
20=	N	1.0	EA	155,200.00	1956	52,551.281*
21=	N	1.0	EA	111,400.00	1979	9,303.141*
22=	N	1.0	EA	44,100.00	1986	1,949.760*
23=	T2715	1.0	EA	10,100.00	1965	1,731.969*
24=	B459	1.0	EA	1,000,000.00	1989	51,584.555*
25=	C027	1.0	EA	1,100,000.00	1989	57,236.703*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

~~221~~ 201

PROJECT : CONTAINMENT SYSTEM
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 39

MX TYPE (MXTYPE): XCMX

	SINDEX PINDEX TYEAR
GLOBAL DATA :	.95 .9 1988

	TCOST($K) UCOST/CYD EXCMX
ENTER DATA :	71050.480

92124980682

***** FAST-C COSTMX PROGRAM *****

NAME: 221T DATE: WED, APR 05 1989 16:02:00
PROJECT: CONTAINMENT SYSTEM ECONFILE:

EXCMX	BAMT	BASE
145,792.656*	39.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
71,050.47	1,821,806.75*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

DO YOU WISH TO ENTER ANY CHANGES (Y/N): Y
ENTER CHANGES : EXCMX=145792.656,TCOST=0

***** FAST-C COSTMX PROGRAM *****

NAME: 221T DATE: WED, APR 05 1989 16:02:45
PROJECT: CONTAINMENT SYSTEM ECONFILE:

EXCMX	BAMT	BASE
145,792.625	39.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
[redacted]	1,821,785.25*	1988

TCost for 39 Cells

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

DO YOU WISH TO ENTER ANY CHANGES (Y/N): Y
ENTER CHANGES : BAMT=2

***** FAST-C COSTMX PROGRAM *****

NAME: 221T
PROJECT: CONTAINMENT SYSTEM

DATE: WED, APR 05 1989 16:03:20
ECONFILE:

EXCMX	BAMT	BASE
145,792.625	2.0	CYD

TCOST(#1000)	UCOST/CYD	YEAR
4,666.92*	2,333,461.00*	1988

TCost for 2 Cells

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

4.) 4667

```
201
ENTER ECONOMIC FILENAME:

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FILENAME: W201                              DATE: WED, APR 12 1989  09:12:01
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                           ***** FAST-E *****

PROJECT:   201                              DATE: WED, APR 12 1989  09:12:02
LOCATION:  HANFORD                          FILENAME: W201
ITEM:      ACQUISITION COST                 ECONFILE:

                           ***** DETAIL ITEM *****

       $UNITS  =    1,000 BASIC COST   SCHD PENALTY     TOTAL COST
         PRODUCTION          4,666.90          0.00       4,666.90

                        ***** CHARACTERISTICS *****

               FASTE EQUIVALENT
               FASTE                                  21,468.168*
                 TENVLE(FASTE)                         FAS.0.386*

                     ***** PRODUCTION COST DATA *****

             AVERAGE UNIT COSTS BASED ON:
       TOTAL PRODUCTION COST  MANUFACTURING COST  THEORETICAL FPCOST
               4,666.90K               4,666.90K           4,666.90K

                            ***** INPUT DATA *****

                  ESCAL       GECON       FPER       LCURVE         CMULT
 PRJGLOB          1.000       1988        12. D       0.960*        1,000.
                  TYPE        SYSTEM      RERUN      REMBOX
 FILE             D            O          O           O
                  ALL    COST    UNCERT   LOHMAT   INPUT    FGRAPH   FDET
 FORMAT            O      1        O        O        1        O        O

                  PLTFM   ENTYPE MATVAL  TYEAR
 GLOB             1.100  100.000  1.00D  1988

                  WT          WTFAC           VOL          VOLFAC
 WTVOL      757,070.00*     10,323.6      19,771.29*      100.00
                  PMX         MXTYPE        ELWT      ELMX         STWT     STMX
 MXLINE           1.000*      4.315*         0.0      0.000         0.0    0.000

                  PCOST                     PQTY      PECON      FOAK
 PCOST         4,666.90                       1.        1988     1.000
                  PSTART      PFIN          PSCHDX    PRDMX      PYEARC     PDISC
 PSCHD            JAN.1988    NOV.1989*    100.00     4.314*      1988*     NONE
                  CONTIN      ADD
 END               1           O
```

92124980684

DO YOU WISH TO MAKE CHANGES (Y/N): N
O YOU WISH TO STORE DATA (Y/N): N

FILENAME: W201 DATE: WED, APR 12 1989 09:12:31
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 201 DATE: WED, APR 12 1989 09:12:31
LOCATION: HANFORD FILENAME: W201
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	15,061.67	0.00	15,061.67

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	76,345.359*
TENVLE(FASTE)	FAS.0.378*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
15,061.67K	15,061.67K	15,061.67K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT
PRJGLOB	1.000	1988	12.	0.960	1,000.

	TYPE	SYSTEM	RERUN	REMBOX
FILE	D	0	0	0

	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0

	PLTFM	ENTYPE	MATVAL	TYEAR
GLOB	1.300	80.000	1.00D	1988

	WT	WTFAC	VOL	VOLFAC
WTVOL	757,070.00R	12,497.8*	19,771.29R	109.21*

	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	5.091*	0.0	0.000	0.0	0.000

	PCOST	PQTY	PECON	FOAK
PCOST	15,061.67*	1.	1988	1.000

	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JUN.1990*	100.00	3.470*	1988*	NONE
	CONTIN	ADD				

NOT INCLUDED IN PRICE TOTAL. REPLACEMENT COST DETERMINED TO BE <.1 MILLION.

9 2 1 2 4 9 8 0 6 8 6

NOT INCLUDED IN PRICE TOTAL. REPLACEMENT COST DETERMINED TO BE <.1 MILLION.

9 2 1 2 4 9 8 0 6 8 7

FAST-C
CALCMX PROGRAM

NAME 204

PROJECT 242-A Evaporator

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	242A	1	Ea	17200	1944/1952	
2 =				2000	1950/52	
3 =				25900	1953.	
4 =				8,400	1971	
5 =				154,000	1973	
6 =				3,200	1975	
7 =				143,300	1976	
8 =				7,029,000	1977	
9 =				26,100	1978	
10 =				37,700	1982	
11 =				1,173,600	1983	
12 =				100,000	1985	
13 =				53,100	1987	
14 =	B534			15,600,000	1988	
15 =	W023			800,000	1988	
16 =	207A			5,200	1977	
17 =				105,800	1983	
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 6 3 8

```
PROJECT           : 242A EVAPORATOR
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE              KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                  SINDEX PINDEX TYEAR
GLOBAL DATA     : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=A242 1 EA 17200 1952
 2=TWO 1 ER"A 2000 1952
 3=THREE 1 EA 25900 1953
 4=FOUR 1 EA 8400 1971
 5=FIVE 1 EA 154000 1973
 6=SIX 1 EA 3200 1975
 7=SEVEN 1 EA 143300 1976
 8=EIGHT 1 EA 7029000 1977
 9=NINE 1 EA 26100 1978
10=TH"EN 1 EA 37700 1982
11=ELEVEN 1 EA 1173600 1983
12=TWEL 1 EA 100000 1985
13=THIR 1 EA 53100 1987
14=FOUR 1 EA
   UYEAR(14) IS INCORRECT
   RE-ENTER TOTAL LINE
14=B534 1 EA 15600000 1988
15=W023 1 EA 800000 1988
16=207?A207 1 EA 5200 1977
17=SEVENTEEN 1 EA 105800 1983
18=
```

******* FAST-C CALCMX PROGRAM *******

NAME: 204 DATE: WED, APR 05 1989 16:35:17
PROJECT: 242A EVAPORATOR ECONFILE:

EXCMX	BAMT	BASE
2,580,141.500*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
34,435.51*	34,435,504.00*	1988

******* INPUT DATA *******

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X) ITEM()	AMT() UNIT()	UCOST()	UYEAR()	UMX()
1= A242	1.0 EA	17,200.00	1952	5,677.637*

2=	TWO	1.0	EA	2,000.00	1952	542.894*
3=	THREE	1.0	EA	25,900.00	1953	8,528.930*
4=	FOUR	1.0	EA	8,400.00	1971	1,062.065*
5=	FIVE	1.0	EA	154,000.00	1973	22,589.004*
6=	SIX	1.0	EA	3,200.00	1975	278.978*
7=	SEVEN	1.0	EA	143,300.00	1976	16,206.953*
8=	EIGHT	1.0	EA	7,029,000.00	1977	**********
9=	NINE	1.0	EA	26,100.00	1978	2,148.447*
10=	TEN	1.0	EA	37,700.00	1982	2,045.965*
11=	ELEVEN	1.0	EA	1,173,600.00	1983	81,337.969*
12=	TWEL	1.0	EA	100,000.00	1985	4,973.555*
13=	THIR	1.0	EA	53,100.00	1987	2,307.647*
14=	B534	1.0	EA	15,600,000.00	1988	**********
15=	W023	1.0	EA	800,000.00	1988	42,578.344*
16=	A207	1.0	EA	5,200.00	1977	401.506*
17=	SEVENTEE	1.0	EA	105,800.00	1983	5,891.906*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

FILENAME: E204 DATE: TUE, APR 18 1989 13:29:46
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 204 DATE: TUE, APR 18 1989 13:29:47
LOCATION: HANFORD FILENAME: E204
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 170,784.406*
TENVLE(FASTE) FAS.0.444*

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE		CMULT	
PRJGLOB	1.000	1988	12. D	0.960*		1,000.	
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.300	100.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	7,211,289.00*	26,169.3	188,326.63*	100.00			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001*	4.480*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	FOAK		
PCOST	34,435.50		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	MAY.1991*	100.00	4.479*	1988*	NONE	
	CONTIN	ADD					
END	1	0					

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

FILENAME: E204 DATE: TUE, APR 18 1989 13:30:10

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

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***** FAST-E *****

PROJECT: 204 DATE: TUE, APR 18 1989 13:[illegible]
LOCATION: HANFORD FILENAME: E204
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

#UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	54,721.82	0.00	54,721.82

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	317,049.625*
TENVLE(FASTE)	FAS.0.439*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
54,721.82K	54,721.82K	54,721.82K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12.	0.960	1,000.		
	TYPE	SYSTEM	RERLN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0

	PLTFM	ENTYPE	MATVAL	TYEAR
GDOB	1.300	90.000	1.00D	1988

	WT	WTFAC	VOL	VOLFAC		
WTVOL	7,211,289.00R	29,200.0*	188,326.63R	104.35*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001R	4.759*	0.0	0.000	0.0	0.000

	PCOST		PQTY	PECON	FOAK	
PCOST	54,721.82*		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	MAY.1991*	100.00	2.517*	1988*	NONE
	CONTIN	ADD				
END	0	0				

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DO YOU WISH TO MAKE CHANGES (Y/N):

FAST-C
CALCMX PROGRAM

NAME 205

PROJECT Grout Treatment Facilities

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	B475	1	Ea	13,700,000	1988	
2 =	B214			8,600,000	1988	
3 =	B492			2,000,000	1988	
4 =	B566			3,800,000	1988	
5 =	B568			200,000	1987	
6 =	Vault (New)	41	Ea	4,300,000	1989	
7 =	SWPB01	1	Ea	300,000	1989	
8 =	W038/B475	1	Ea	100,000	1987	
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 6 8 3

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

***** FAST-C CALCMX PROGRAM *****

NAME : 205
PROJECT : GROUT TREATMENT FACILITIES
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=B475 1 EA 13700000 1988
2=B714 1 EA 8600000 1988
3=B492 1 EA 2000000 1988
4=B566 1 EA 3800000 1988
5=B568 1 EA 200000 1987
6=VAULTS(NEW) 41 EA 4300000 1989
7=SWPB01 1 EA 300000 1989
8=W038 1 EA 100000 1987
9=

***** FAST-C CALCMX PROGRAM *****

NAME: 205 DATE: WED, APR 05 1989 17:09:10
PROJECT: GROUT TREATMENT FACILITI ECONFILE:

EXCMX	BAMT	BASE
**********	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
196,860.41*	**********	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	B475	1.0	EA	13,700,000.00	1988	943,989.500*
2=	B714	1.0	EA	8,600,000.00	1988	568,018.125*
3=	B492	1.0	EA	2,000,000.00	1988	115,692.406*
4=	B566	1.0	EA	3,800,000.00	1988	233,023.531*
5=	B568	1.0	EA	200,000.00	1987	9,805.311*
6=	VAULTS(N	41.0	EA	4,300,000.00	1989	354,969.438*
7=	SWPB01	1.0	EA	300,000.00	1989	13,870.947*
8=	W038	1.0	EA	100,000.00	1967	4,603.265*

```
ENTER ECONOMIC FILENAME:

FILENAME: E205                                    DATE: TUE, APR 18 1989   13:31:02
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

                          ***** FAST-E *****

PROJECT:  205                                     DATE: TUE, APR 18 1989   13:31:02
LOCATION: HANFORD                                 FILENAME: E205
ITEM:     ACQUISITION COST                        ECONFILE:

                          ***** DETAIL ITEM *****

                       ***** CHARACTERISTICS *****

              FASTE EQUIVALENT
              FASTE                          2,486,468.000*
                TENVLE(FASTE)                    FAS.0.433*

                          ***** INPUT DATA *****

                ESCAL       GECON       FPER       LCURVE          CMULT
PRJGLOB         1.000       1988        12. D       0.960*        1,000.
                TYPE        SYSTEM      RERUN      REMBOX
FILE            D            0          0           0
                ALL     COST    UNCERT  LOHMAT  INPUT    FGRAPH   FDET
FORMAT           0       0       0       0       1        0       0

                PLTFM   ENTYPE MATVAL  TYEAR
GLOB            1.300   70.000   1.00D  1988

                WT          WTFAC          VOL          VOLFAC
WTVOL   8,781,672.00*     41,058.4     199,921.56*     100.00
                PMX         MXTYPE      ELWT       ELMX          STWT     STMX
MXLINE          1.001*      5.496*       0.0       0.000          0.0    0.000

                PCOST                   FQTY       PECON      FOAK
PCOST         196,860.40                   1.       1988       1.000
                PSTART      PFIN        PSCHDX     PRDMX      PYEARC     PDISC
PSCHD           JAN.1986    JUN.1991*   100.00     5.495*      1988*     NONE
                CONTIN      ADD
END              1           0

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N
```

FILENAME: E205 [illegible]

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT:	205	DATE:	TUE, APR 18 1989 13:31:26
LOCATION:	HANFORD	FILENAME:	E205
ITEM:	REPLACEMENT COST	ECONFILE:	

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	197,150.84	0.00	197,150.84

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	2,486,468.000*
TENVLE(FASTE)	FAS.0.433*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
197,150.84K	197,150.84K	197,150.84K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PROGLOB	1.000	1988	12.	0.960	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.300	70.000	1.00D	1988			

	WT	WTFAC	VOL	VOLFAC		
WTVOL	8,781,872.00R	41,058.4*	199,921.56R	100.00*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001R	5.496*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	FOAK	
PCOST	197,150.84*		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JUL.1991*	100.00	3.891*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N): N

DO YOU WISH TO STORE DATA (Y/N): N

END OF FILE E205

WBS 206

```
PROJECT              : T-PLANT TREATMENT TANK
 ECON. FILENAME      :

ECON YEAR (YEAR):  1988

BASE                 KSF  KLF  CYD  ACRES
BASE AMT. (BAMT):  0 0 1

MX TYPE (MXTYPE):  EXCMX

                     SINDEX PINDEX TYEAR
GLOBAL DATA        : .95 .9 1988

                     TCOST($K)  UCOST/CYD  EXCMX
ENTER DATA         : 0 0 145792.625
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                ***** FAST-C COSTMX PROGRAM *****

NAME:      WBS 206                       DATE: WED, APR 05 1989   16:10:49
PROJECT:   T-PLANT TREATMENT TANK        ECONFILE:

                EXCMX                   BAMT              BASE
            145,792.625                  1.0              CYD

              TCOST($1000    )          UCOST/CYD          YEAR
                2,472.22*             2,472,220.00*        1988

                        ***** INPUT DATA *****

                        SINDEX   PINDEX   TYEAR
                         0.950    0.900   1988
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DO YOU WISH TO ENTER ANY CHANGES (Y/N):

Input data from WBS 201 (221-T Containment systems Test Facility)
EXCMX factor applied to new quantity

W206
ENTER ECONOMIC FILENAME:

FILENAME: W206 DATE: WED, APR 12 198? 10:17:46
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 206 DATE: WED, APR 12 1989 10:17:47
LOCATION: HANFORD FILENAME: W206
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT		
FASTE		10,029.881*
TENVLE(FASTE)		FAS.0.365*

***** INPUT DATA *****

	ESCAL	GECON		FPER	LCURVE		CMULT
PRJGLOB	1.000	1988		12. D	0.960*		1,000.
	TYPE	SYSTEM		RERUN	REMBOX		
FILE	D	0		0	0		
	ALL	COST	UNCERT	LCHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.100	100.000	1.00D	1988			
	WT	WTFAC		VOL	VOLFAC		
WTVOL	331,079.56*	7,338.3		8,646.32*	100.00		
	PMX	MXTYPE		ELWT	ELMX	STWT	STMX
MXLINE	1.000*	4.315*		0.0	0.000	0.0	0.000
	PCOST			PQTY	PECON	FOAK	
PCOST	2,472.20			1.	1988	1.000	
	PSTART	PFIN		PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	SEP.1989*		100.00	4.314*	1988*	NONE
	CONTIN	ADD					
END	1	0					

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

FILENAME: W206 DATE: WED, APR 12 1989 10:16:17

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 206 DATE: WED, APR 12 1989 10:16:17
LOCATION: HANFORD FILENAME: W206
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

#UNITS =	1,000 BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	7,748.89	0.00	7,748.89

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 33,881.273*
TENVLE(FASTE) FAS.0.357*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
7,748.89K	7,748.89K	7,748.89K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	80.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	331,079.56R	8,758.1*	8,646.32R	109.21*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	5.091*	0.0	0.000	0.0	0.000
	PCOST	PQTY	PECON	PDAK		
PCOST	7,748.89*	1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	MAR.1990*	100.00	3.580*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

FAST-C
CALCMX PROGRAM

NAME 207

PROJECT 241-Z Treatment Facility

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SJBKSF

9212498070 0

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	241Z Pit	1	Ea	310,000	1952	
2 =				3,100	1956	
3 =				33,900	1964	
4 =				9,000	1965	
5 =				5,900	1966	
6 =				197,300	1973	
7 =				14,000	1975	
8 =				635,900	1981	
9 =				57,300	1982	
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

1,234.8

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

207

PROJECT : 241Z TREATMENT FACILITY
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=PIT.241Z 1 EA 310000 1952
2=TWO 1 EA 3100 1956
3=THREE 1 EA 33900 1964
4=FOUR 1 EA 9000 1965
5=FIVE 1 EA 5900 1966
6=SIX 1 EA 197300 1973
7=SEVEN 1 EA 14000 1975
8=EIGHT 1 EA 635900 1981
9=NINE 1 EA 51300 1982
10=

***** FAST-C CALCMX PROGRAM *****

NAME: 207 DATE: WED, APR 05 1989 17:19:11
PROJECT: 241Z TREATMENT FACILITY ECONFILE:

EXCMX	BAMT	BASE
251,439.781*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
4,074.40*	4,074,403.50*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	PIT.241Z	1.0	EA	310,000.00	1952	133,096.531*
2=	TWO	1.0	EA	3,100.00	1956	735.448*
3=	THREE	1.0	EA	33,900.00	1964	6,808.790*
4=	FOUR	1.0	EA	9,000.00	1965	1,527.244*
5=	FIVE	1.0	EA	5,900.00	1966	918.335*
6=	SIX	1.0	EA	197,300.00	1973	29,599.605*
7=	SEVEN	1.0	EA	14,000.00	1975	1,395.785*
8=	EIGHT	1.0	EA	635,900.00	1981	48,106.852*
9=	NINE	1.0	EA	51,300.00	1982	2,863.092*

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207
 ENTER ECONOMIC FILENAME:

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 FILENAME: W207                              DATE: THU, APR 13 1989  16:01:14
 ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                          ***** FAST-E *****

 PROJECT:  207                               DATE: THU, APR 13 1989  16:01:15
 LOCATION: HANFORD                           FILENAME: W207
 ITEM:     ACQUISITION COST                  ECONFILE:

                          ***** DETAIL ITEM *****


                        ***** CHARACTERISTICS *****

                FASTE EQUIVALENT
                FASTE                            18,950.738*
                  TENVLE(FASTE)                   FAS.0.364*

                           ***** INPUT DATA *****

                  ESCAL      GECON      FPER      LCURVE        CMULT
  PRJGLOB         1.000      1988       12. D      0.960*      1,000.
                  TYPE       SYSTEM     RERUN     REMBOX
  FILE            D           0         0          0
                  ALL     COST     UNCERT   LOHMAT   INPUT     FGRAPH    FDET
  FORMAT           0       0        0         0       1          0        0

                  PLTFM    ENTYPE  MATVAL   TYEAR
  GLOB            1.100    90.000    1.00D  1988

                  WT         WTFAC          VOL          VOLFAC
  WTVOL      367,239.63*    8,340.0       9,191.10*      100.00
                  PMX        MXTYPE       ELWT      ELMX           STWT     STMX
  MXLINE          1.001*     4.583*        0.0       0.000          0.0    0.000

                  PCOST                   PQTY      PECON      FOAK
  PCOST         4,074.40                    1.        1988      1.000
                  PSTART     PFIN         PSCHDX    PRDMX      PYEARC     PDISC
  PSCHD           JAN.1988   SEP.1989*    100.00    4.583*       1988*     NONE
                  CONTIN     ADD
  END              1          0


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 DO YOU WISH TO MAKE CHANGES (Y/N): N
 DO YOU WISH TO STORE DATA (Y/N): N

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ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

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***** FAST-E *****

PROJECT: 207 DATE: THU, APR 13 1989 16:01:39
LOCATION: HANFORD FILENAME: W207
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

#UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	5,210.53	0.00	5,210.53

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	18,950.738*
TENVLE(FASTE)	FAS.0.364*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
5,210.53K	5,210.53K	5,210.53K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12.	0.960	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.300	90.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	367,239.63R	8,340.0*	9,191.10R	100.00*			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001R	4.759*	0.0	0.000	0.0	0.000	
	PCOST	PQTY	PECON	FOAK			
PCOST	[redacted]	1.	1988	1.000			
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	MAR.1990*	100.00	2.983*	1988*	NONE	
	CONTIN	ADD					
END	0	0					

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DO YOU WISH TO MAKE CHANGES (Y/N):

fps

FAST-C
CALCMX PROGRAM

(1)

NAME 208

PROJECT B-Plant

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	B463	1	Ea	3,900,000	1989	
2 =	B455			3,300,000	1989	
3 =	B479			900,000	1988	
4 =	B625			1,100,000	1988	
5 =	W004			800,000	1990	
6 =	W008			1,000,000	1990	
7 =	5WD 203			200,000	1988	
8 =	W007			14,700,000	1988	
9 =	W002			12,600,000	1989	
10 =	W010			3,500,000	1990	
11 =						
12 =	212B			21,900	1952/44	
13 =				10,000	1952/49	
14 =				509,300	1969	
15 =				9,300	1971	
16 =				75,700	1985	
17 =						
18 =						
19 =						
20 =						

Cont'd

1989

FPS-14 ** 30-8:

FAST-C
CALCMX PROGRAM

(2)

NAME 208

PROJECT

ECON YEAR — YEAR

BASE AMOUNT (BAMT) — KSF, KLF, CYD, ACRES

MX TYPE — MXTYPE

GLOBAL DATA — SINDEX, PINDEX, TYEAR

PLATFORM DATA — SEISM, TORNAD, RADIAT, BLDUSE, PLTFM

FACTOR DATA — AVHT, KCUFT, TRNPSF, NLEVEL, SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	221-B	1	Ea	43,626,600	1952/43/44/45	
2 =				389,800	1952	
3 =				157,800	1954	
4 =				256,000	1955	
5 =				9,700	1962	
6 =				1,148,500	1963	
7 =				14,200	1965	
8 =				1,687,000	1967	
9 =				123,200	1968	
10 =				87,100	1969	
11 =				258,200	1970	
12 =				275,700	1971	
13 =				1,959,200	1973	
14 =				180,700	1974	
15 =				103,500	1976	
16 =				302,800	1977	
17 =				520,100	1978	
18 =				59,400	1979	
19 =				164,300	1980	
20 =				223,700	1981	

51,547,500

9 2 1 2 4 9 8 0 7 0 5

FAST-C
CALCMX PROGRAM

(3)

NAME 208

PROJECT

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KOUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	221-B					
2 =	221-B	1	EA	714,800	1983	
3 =				198,200	1984	
4 =				290,500	1985	
5 =				4300,700	1986	
6 =				1,392,500	1987	
7 =				203,400	1988	
8 =	221-BA			6,100	1967	
9 =				123,900	1987	
10 =	221-BB			5,800	1962	
11 =				1,200	1967	
12 =				26,600	1968	
13 =				2,500	1973	
14 =				62,400	1985	
15 =				7,200	1987	
16 =	221-BE			7,400	1971	
17 =	271-B			2,400,000	1952/44	
18 =				20,400	1952/51	52/53
19 =				166,100	1955	
20 =				35,600	1963	

9212498307 06

PPS-16 11 30-8

FAST-C
CALCMX PROGRAM

(4)

NAME 208

PROJECT

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	~~27~~					
2 =	271-B	1	Ea	50,100	1967	
3 =				146,600	1970	
4 =				35600	1980	
5 =				434,100	1982	
6 =				110,900	1983	
7 =				199,300	1985	
8 =				1,925,300	1986	
9 =				1,127,900	1987	
10 =				53,400	1988	
11 =	272-B			25000	1960	
12 =				27,500	1969	
13 =				12,800	1973	
14 =				24,600	1980	
15 =				87,500	1985	
16 =	272-BA			24,400	1971	
17 =	272-BB			21,600	1972	
18 =	272-BC			24,500	1974	
19 =	276-B			7,400	1952/44	
20 =				68,000	1967	

9 2 1 2 4 9 8 0 7 0 7

FPS-16 30-8

fps

FAST-C
CALCMX PROGRAM

(E)

NAME 208

PROJECT

ECON YEAR — YEAR

BASE AMOUNT (BAMT) — KSF, KLF, CYD, ACRES

MX TYPE — MXTYPE

GLOBAL DATA — SINDEX, PINDEX, TYEAR

PLATFORM DATA — SEISM, TORNAD, RADIAT, BLDUSE, PLTFM

FACTOR DATA — AVHT, KCUFT, TRNPSF, NLEVEL, SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1						
2	282-B	1	Ea	56,600	1952/44	
3				20,800	1963	
4				1,200	1970	
5	282-BA	1	Ea	10,600	1967	
6				48,200	1973	
7	291-B	1	Ea	408,500	1952/44	
8				325,000	1952/49	
9				104,800	1963	
10				347,900	1968	
11				415,800	1970	
12				139,600	1972	
13				11,000	1973	
14				18,600	1982	
15				439,200	1987	
16	291-BB			10,400	1968	
17	291-BD			17,100	1970	
18				2,500	1973	
19	292-B			21,000	1952	
20				20,200	1963	

fps

FAST-U

CALCMX PROGRAM

NAME 208

PROJECT B Plant Summary

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	Sht 1	1	EA	44,145,600.	1988	
2 =	2			348,733,800.		
3 =	3			27,195,200.		
4 =	4			5,898,700.		
5 =	5			10,536,700		
6 =						
7 =				436,510,000		
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

FPS-16 20-0

```
)8
   PROJECT           : B-PLANT
    ECON. FILENAME :

   ECON YEAR (YEAR): 1988

   BASE              KSF  KLF  CYD  ACRES
   BASE AMT. (BAMT): 0 0 1

   MX TYPE (MXTYPE): EXCMX

                     SINDEX PINDEX TYEAR
   GLOBAL DATA     : .95 .9 1988

   ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=B463 1 EA 3900000 1988
 2=B455 3300000 1988
   UYEAR(2) IS INCORRECT
   RE-ENTER TOTAL LINE
 2=B455 1 EA 3300000 1988
 3=B479 1 EA 900000 1988
 4=B625 1 EA 1100000 1988
 5=W004 1 EA 800000 1988
 6=W008 100000?W008 1 EA 1000000 1988
 7=SWD203 200000?SWD203 1 EA 200000 1988
 8=W007 1 EA 14700000 1988
 9=W002 1 EA 12600000 1988
10=W010 1 EA 3500000 1988
11=B212 219"""1 EA 21900 1952
12=N 1 EA 10000 1952
13=N 1 EA 509300 1969
14=N 1 EA 93-- 1971
  INPUT ERROR
14=N 1 EA 93000" 1971
15=N 1 EA 75700 1985
16=
```

```
                    ***** FAST-C CALCMX PROGRAM *****

 NAME:      208                          DATE: WED, APR 05 1989   17:35:44
 PROJECT:   B-PLANT                      ECONFILE:

                 EXCMX                    BAMT          BASE
         3,383,234.500*                    1.0          CYD

                 TCOST($1000    )        UCOST/CYD      YEAR
                     44,145.63*  44,145,632.00*        1988

                          ***** INPUT DATA *****

                           SINDEX   PINDEX   TYEAR
                            0.950    0.900   1988

     (X) ITEM()         AMT() UNIT()        UCOST() UYEAR()        UMX()
      1= B463             1.0 EA      3,900,000.00   1988 239,721.219*
```

2=	B455	1.0 EA	3,300,000.00	1988	199,784.000*
3=	B479	1.0 EA	900,000.00	1988	48,416.313*
4=	B625	1.0 EA	1,100,000.00	1988	60,264.969*
5=	W004	1.0 EA	800,000.00	1988	42,578.344*
6=	W008	1.0 EA	1,000,000.00	1988	54,313.625*
7=	SWD203	1.0 EA	200,000.00	1988	9,384.188*
8=	W007	1.0 EA	14,700,000.00	1988	**********
9=	W002	1.0 EA	12,600,000.00	1988	861,614.000*
10=	W010	1.0 EA	3,500,000.00	1988	213,028.531*
11=	B212	1.0 EA	21,900.00	1952	7,389.598*
12=	N	1.0 EA	10,000.00	1952	3,142.158*
13=	N	1.0 EA	509,300.00	1969	102,943.203*
14=	N	1.0 EA	9,300.00	1971	1,186.790*
15=	N	1.0 EA	75,700.00	1985	3,670.887*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

8

```
PROJECT            : PAGE 2
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=B221 1 EA 43626600 1952
 2=TWO 1 EA 389800 1952
 3=THREE 1 EA 157800 1954
 4=FOUR 1 EA 256000 1955
 5=FIVE 1 EA 9700 1962
 6=SIX 1 EA 1148500 1963
 7=SEVEN 1 EA 14200 1965
 8=EIGHT 1 EA 1687000 1967
 9=NINE 1 EA 123200 1968
10=TEN 1 EA 87100 1969
11=ELEV 1 EA 258200 1970
12=TE"WEL 1 EA 275700 1971
13=THIR 1 EA 1959200 1973
14=FOUR 1 EA 180700 1974
15=FIF 1 EA 103500 1976
16=SIX 1 EA 302800 1977
17=SEV 1 EA 520100 1978
18=NIN 1 EA 164300 1980
19=TWEN 1 EA 223700 1981
20=
```

```
                  *****  FAST-C CALCMX PROGRAM *****

NAME:      208                          DATE: WED, APR 05 1989  17:52:30
PROJECT:   PAGE 2                       ECONFILE:

            EXCMX                 BAMT            BASE
      **************                1.0            CYD

           TCOST($1000    )      UCOST/CYD       YEAR
              348,733.81*    **************      1988

                  ***** INPUT DATA *****

                   SINDEX   PINDEX   TYEAR
                    0.950    0.900   1988


    (X) ITEM()        AMT() UNIT()       UCOST() UYEAR()       UMX()
     1= B221            1.0 EA     43,626,600.00  1952 ************
     2= TWO             1.0 EA        389,800.00  1952 170,880,156*
```

3=	THREE	1.0 EA	157,800.00	1954	58,862.844*
4=	FOUR	1.0 EA	256,000.00	1955	95,177.797*
5=	FIVE	1.0 EA	9,700.00	1962	1,913.946*
6=	SIX	1.0 EA	1,148,500.00	1963	333,373.188*
7=	SEVEN	1.0 EA	14,200.00	1965	2,511.644*
8=	EIGHT	1.0 EA	1,687,000.00	1967	418,518.063*
9=	NINE	1.0 EA	123,200.00	1968	22,964.012*
10=	TEN	1.0 EA	87,100.00	1969	14,994.070*
11=	ELEV	1.0 EA	258,200.00	1970	46,764.438*
12=	TWEL	1.0 EA	275,700.00	1971	47,878.438*
13=	THIR	1.0 EA	1,959,200.00	1973	362,133.813*
14=	FOUR	1.0 EA	180,700.00	1974	25,083.156*
15=	FIF	1.0 EA	103,500.00	1976	11,364.465*
16=	SIX	1.0 EA	302,800.00	1977	33,830.781*
17=	SEV	1.0 EA	520,100.00	1978	56,195.523*
18=	NIN	1.0 EA	164,300.00	1980	12,355.377*
19=	TWEN	1.0 EA	223,700.00	1981	15,389.941*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

08

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PROJECT            : PAGE 3
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=B221 1 EA 714800 1983
 2=N 1 EA 198200 1984
 3=N 1 EA 290500 1985
 4=N 1 EA 4300700 1986
 5=N 1 EA 1392500 1987
 6=N 1 EA 203400 1988
 7=BA.221 1 EA 6100 1967
 8=N 1 EA 123900 1987
 9=BB.221 1 EA 5800 1962
10=N 1 EA 1200 1967
11=N 1 EA 26600 1969"8
12=N 1 EA 2500 1973
13=N 1 EA 62400 1985
14=N 1 EA 7200 1987
15=BE.221 1 EA 7400 1971
16=B271 2400000 1952
  UYEAR(16) IS INCORRECT
 — RE-ENTER TOTAL LINE
16=B271 1 EA 2400000 1952
17=N 1 EA 20400 1952
18=N 1 EA 166100 1955
19=N 1 EA 35600 1953
20=
```

***** FAST-C CALCMX PROGRAM *****

```
NAME:      208                        DATE: WED, APR 05 1989  18:08:24
PROJECT:   PAGE 3                     ECONFILE:

              EXCMX                  BAMT          BASE
       1,994,385.500*                 1.0          CYD

           TCOST($1000    )       UCOST/CYD        YEAR
              27,195.19*    27,195,192.00*        1988

                  ***** INPUT DATA *****

                    SINDEX   PINDEX   TYEAR
                     0.950    0.900   1988
```

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	B221	1.0	EA	714,800.00	1983	47,356.680*
2=	N	1.0	EA	198,200.00	1984	11,025.002*
3=	N	1.0	EA	290,500.00	1985	15,919.016*
4=	N	1.0	EA	4,300,700.00	1986	288,341.813*
5=	N	1.0	EA	1,392,500.00	1987	81,440.625*
6=	N	1.0	EA	203,400.00	1988	9,558.348*
7=	BA.221	1.0	EA	6,100.00	1967	907.716*
8=	N	1.0	EA	123,900.00	1987	5,815.639*
9=	BB.221	1.0	EA	5,800.00	1962	1,092.151*
10=	N	1.0	EA	1,200.00	1967	154.030*
11=	N	1.0	EA	26,600.00	1968	4,313.177*
12=	N	1.0	EA	2,500.00	1973	252.132*
13=	N	1.0	EA	62,400.00	1985	2,973.252*
14=	N	1.0	EA	7,200.00	1987	260.928*
15=	BE.221	1.0	EA	7,400.00	1971	924.909*
16=	B271	1.0	EA	2,400,000.00	1952	**********
17=	N	1.0	EA	20,400.00	1952	6,839.202*
18=	N	1.0	EA	166,100.00	1955	59,372.586*
19=	N	1.0	EA	35,600.00	1953	12,067.104*

DO YOU WISH TO ENTER ANY CHANGES (Y/N): N

208

```
   PROJECT           : PAGE 4
    ECON. FILENAME :

   ECON YEAR (YEAR): 1988

   BASE              KSF  KLF  CYD  ACRES
   BASE AMT. (BAMT): 0 0 1

   MX TYPE (MXTYPE): EXCMX

                     SINDEX PINDEX TYEAR
   GLOBAL DATA     : .95 .9 1988

   ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=B271 1 EA 50100 1967
 2=N 1 EA 146600 1970
 3=N 1 EA 35600 1980
 4=N 1 EA 423""34100 1982
 5=N 1 EA 110900 1983
 6=N 1 EA 199300 1985
 7=N 1 EA 1925300 1986
 8=N 1 EA 1127900 1987
 9=N 1 EA 53400 1988
10=B272 1 EA 25000 1960
11=N 1 EA 27500 1969
12=N 1 EA 12800 1973
13=N 1 EA 24600 1980
14=N 1 EA 87500 1985
15=BA272 24400 1971
   UYEAR(15) IS INCORRECT
   RE-ENTER TOTAL LINE
15=BA272 1 EA 24400 1971
16=BB272 1 EA 21600 1972
17=BC272 24"" 1 EA 24500 1974
18=B276 1 EA 7400 1952
19=N 1 EA 68000 1967
20=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 208 | DATE: THU, APR 06 1989 09:57:18
PROJECT: PAGE 4 | ECONFILE:

EXCMX	BAMT	BASE
376,471.813*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
5,898.67*	5,898,672.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	B271	1.0	EA	50,100.00	1967	9,028.066*
2=	N	1.0	EA	146,600.00	1970	25,220.055*
3=	N	1.0	EA	35,600.00	1980	2,329.638*
4=	N	1.0	EA	434,100.00	1982	29,418.664*
5=	N	1.0	EA	110,900.00	1983	6,202.403*
6=	N	1.0	EA	199,300.00	1985	10,553.629*
7=	N	1.0	EA	1,925,300.00	1986	119,987.766*
8=	N	1.0	EA	1,127,900.00	1987	64,713.664*
9=	N	1.0	EA	53,400.00	1988	2,222.150*
10=	B272	1.0	EA	25,000.00	1960	5,917.879*
11=	N	1.0	EA	27,500.00	1969	4,263.017*
12=	N	1.0	EA	12,800.00	1973	1,497.537*
13=	N	1.0	EA	24,600.00	1980	1,556.615*
14=	N	1.0	EA	87,500.00	1985	4,299.348*
15=	BA272	1.0	EA	24,400.00	1971	3,399.083*
16=	BB272	1.0	EA	21,600.00	1972	2,809.535*
17=	BC272	1.0	EA	24,500.00	1974	2,835.960*
18=	B276	1.0	EA	7,400.00	1952	2,262.415*
19=	N	1.0	EA	68,000.00	1967	12,598.729*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
PROJECT          : PAGE 5
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=B "282 1 EA 56600 1952
2=N 1 EA 20800 1963
3=N 1 EA 1200 1970
4=BA282 1 EA 10600 1967
5=N 1 EA 48200 1973
6=N"B291 1 EA 408500 1952
7=N 1 EA 325000 1952
8=N 1 EA 104800 1963
9=N 1 EA 347900 1968
10=N 1 EA 415800 1970
11=N 1 EA 139600 1972
12=N 1 EA 11000 1973
13=N 1 EA 18600 1982
14=N 1 EA 439200 1987
15=BB291 1 EA 10400 1968
16=BD291 1 EA 17100 1970
17=N 1 EA 2500 1973
18=B292 1 EA 21000 1952
19=N 1 EA 20200 1963
20=
```

```
                  ***** FAST-C CALCMX PROGRAM *****

NAME:      208                          DATE: THU, APR 06 1989  10:08:46
PROJECT:   PAGE 5                       ECONFILE:


            EXCMX                 BAMT            BASE
       708,892.375*                1.0            CYD

          TCOST($1000    )      UCOST/CYD       YEAR
              10,536.54*    10,536,542.00*      1988

                  ***** INPUT DATA *****

                   SINDEX  PINDEX  TYEAR
                    0.950   0.900   1988


    (X) ITEM()       AMT() UNIT()       UCOST() UYEAR()       UMX()
     1= B282           1.0 EA          56,600.00  1952   20,820.047*
     2= N              1.0 EA          20,800.00  1963    4,192.680*
```

3=	N	1.0	EA	1,200.00	1970	133.374*
4=	BA282	1.0	EA	10,600.00	1967	1,658.603*
5=	N	1.0	EA	48,200.00	1973	6,361.540*
6=	B291	1.0	EA	408,500.00	1952	179,842.094*
7=	N	1.0	EA	325,000.00	1952	140,137.625*
8=	N	1.0	EA	104,800.00	1963	24,470.148*
9=	N	1.0	EA	347,900.00	1968	71,264.844*
10=	N	1.0	EA	415,800.00	1970	78,642.172*
11=	N	1.0	EA	139,600.00	1972	21,514.992*
12=	N	1.0	EA	11,000.00	1973	1,269.336*
13=	N	1.0	EA	18,600.00	1982	946.622*
14=	N	1.0	EA	439,200.00	1987	23,128.695*
15=	BB291	1.0	EA	10,400.00	1968	1,548.362*
16=	BD291	1.0	EA	17,100.00	1970	2,419.795*
17=	N	1.0	EA	2,500.00	1973	252.132*
18=	B292	1.0	EA	21,000.00	1952	7,058.941*
19=	N	1.0	EA	20,200.00	1963	4,060.930*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

208

PROJECT : B PLANT SUMMARY
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=PAGE.1 1 EA 44145600 1988
2=PAGE.2 1 EA 348733800 1988
3=PAGE.3 1 EA 27195200 1988
4=PAGE.4 1 EA 5898700 1988
5=PAGE.5 1 EA 10536700 1988
6=

***** FAST-C CALCMX PROGRAM *****

NAME: 208 DATE: THU, APR 06 1989 10:52:05
PROJECT: B PLANT SUMMARY ECONFILE:

EXCMX	BAMT	BASE
**************	1.0	CYD
TCOST($1000)	UCOST/CYD	YEAR
436,509.81*	**************	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	PAGE.1	1.0	EA	44,145,600.00	1988	************
2=	PAGE.2	1.0	EA	*************	1988	************
3=	PAGE.3	1.0	EA	27,195,200.00	1988	************
4=	PAGE.4	1.0	EA	5,898,700.00	1988	376,473.813*
5=	PAGE.5	1.0	EA	10,536,700.00	1988	708,903.625*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

9 2 1 2 4 9 8 0 7 2 0

E208
ENTER ECONOMIC FILENAME:

FILENAME: E208 DATE: THU, APR 20 1989 13:10:09
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 208 DATE: THU, APR 20 1989 13:10:09
LOCATION: HANFORD FILENAME: E208
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 4,518,959.000*
TENVLE(FASTE) FAS.0.509*

***** INPLT DATA *****

	ESCAL	GECON	FPER	LCURVE		CMULT	
PRJGLOB	1.000	1988	12. D	0.960*		1,000.	
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
SLOB	1.200	90.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	119,544,560.00*	95,202.0	2,991,904.00*	100.00			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001*	4.674*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	FOAK		
PCOST	436,509.80		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	MAY.1992*	100.00	4.673*	1988*	NONE	
	CONTIN	ADD					
END	1	0					

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

FILENAME: E208 DATE: THU, APR 20 1989 17:10:33
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

~~~~~~

***** FAST-E *****

PROJECT: 208 DATE: THU, APR 20 1989 17:10:33
LOCATION: HANFORD FILENAME: E208
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

#UNITS = 1,000	BASIC COST	BCHD PENALTY	TOTAL COST
PRODUCTION	1,668,573.50	0.00	1,668,573.50

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 37,030,136.000*
TENVLE(FASTE) FAS.0.496*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
1,668.57M	1,668.57M	1,668.57M

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PROJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	70.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	119,544,560.00R	129,509.4*	2,991,904.00R	109.94*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001R	5.496*	0.0	0.000	0.0	0.000
	PCOST	PQTY	PECON	FOAK		
PCOST	1,668,573.50*	1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JAN.1993*	100.00	3.579*	1988*	NONE
	CONTIN	ADD				
END	0	0				

~~~~~~

DO YOU WISH TO MAKE CHANGES (Y/N):

FAST-C
CALCMX PROGRAM

NAME 209

PROJECT 222-S Lab (219-S)

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	219-S	1	Ea	254,300	1952	
2 =				92,800	1955	
3 =				2,300	1957	
4 =	222-SD Pad	1	Ea	15,000	1987	
5 =	Connex	2	Ea	8,000	1987	
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9212498072 23

09

PROJECT : 222-S LAB (219-S)
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=S219 1 EA 254300 1952
2=N 1 EA 92800 1955
3=N 1 EA 2300 1957
4=SD222.PAD 1 EA 15000 1987
5=CONNEX 2 EA 8000 1987
6=

***** FAST-C CALCMX PROGRAM *****

NAME: 209 DATE: THU, APR 06 1989 10:15:11
PROJECT: 222-S LAB (219-S) ECONFILE:

EXCMX	BAMT	BASE
148,725.531*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
2,517.79*	2,517,793.50*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	S219	1.0	EA	254,300.00	1952	107,233.750*
2=	N	1.0	EA	92,800.00	1955	31,461.613*
3=	N	1.0	EA	2,300.00	1957	506.161*
4=	SD222.PA	1.0	EA	15,000.00	1987	581.107*
5=	CONNEX	2.0	EA	8,000.00	1987	311.748*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
209
 ENTER ECONOMIC FILENAME:

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 FILENAME: W209                                   DATE: THU, APR 13 1989  16:04:00
 ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                          ***** FAST-E *****

 PROJECT:   209                                   DATE: THU, APR 13 1989  16:04:01
 LOCATION: HANFORD                                FILENAME: W209
 ITEM:      ACQUISITION COST                      ECONFILE:

                          ***** DETAIL ITEM *****

                        ***** CHARACTERISTICS *****

                FASTE EQUIVALENT
                FASTE                                 10,583.293*
                  TENVLE(FASTE)                        FAS.0.348*

                           ***** INPUT DATA *****

                  ESCAL      GECON      FPER       LCURVE        CMULT
  PRJGLOB         1.000      1988       12.  D      0.960*     1,000.
                  TYPE       SYSTEM     RERUN      REMBOX
  FILE            D           0         0            0
                  ALL     COST     UNCERT   LOHMAT   INPUT    FGRAPH    FDET
  FORMAT           0        0         0        0       1         0        0

                  PLTFM    ENTYPE MATVAL   TYEAR
  GLOB            1.100    90.000   1.00D  1988

                  WT           WTFAC              VOL          VOLFAC
  WTVOL       198,407.91*     6,436.2          4,965.66*      100.00
                  PMX          MXTYPE            ELWT       ELMX         STWT     STMX
  MXLINE          1.001*       4.583*             0.0      0.000          0.0    0.000

                  PCOST                       PQTY       PECON       FOAK
  PCOST         2,517.80                         1.        1988       1.000
                  PSTART       PFIN           PSCHDX     PRDMX       PYEARC      PDISC
  PSCHD           JAN.1988     JUL.1989*      100.00     4.583*        1988*      NONE
                  CONTIN       ADD
  END              1            0

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 DO YOU WISH TO MAKE CHANGES (Y/N): N
 DO YOU WISH TO STORE DATA (Y/N): N

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ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 209 DATE: THU, APR 13 1989 16:07:00
LOCATION: HANFORD FILENAME: W209
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

$UNITS =	1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION		3,203.99	0.00	3,203.99

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	10,583.293*
TENVLE(FASTE)	FAS.0.348*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
3,203.99K	3,203.99K	3,203.99K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.760	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	90.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	198,407.91R	6,436.2*	4,965.66R	100.00*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001R	4.759*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	FOAK	
PCOST	[redacted]		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JAN.1990*	100.00	3.077*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

FAST-C
CALCMX PROGRAM

NAME 210

PROJECT 204 AR Unloading Station

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	B551	1	Ea	1,000,000	1988	
2 =				2380600	1982	
3 =				2,000	1983	
4 =				98,400	1984	
5 =				24,000	1985	
6 =				13,000	1986	
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

2,517.7

FPS-14 ·· 304:

PROJECT : 204AR UNLOADING STATION
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=B551 1 EA 1000000 1988
2=N 1 EA 2380600 1982
3=N 1 EA 2000 1983
4=N 1 EA 98400 1984
5=N 1 EA 24000 1985
6=N 1 EA 13000 1986
7=

***** FAST-C CALCMX PROGRAM *****

NAME: 210 DATE: THU, APR 06 1989 10:19:11
PROJECT: 204AR UNLOADING STATION ECONFILE:

EXCMX	BAMT	BASE
265,611.625*	1.0	CYD
TCOST($1000)	UCOST/CYD	YEAR
[redacted]	4,284,432.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	B551	1.0	EA	1,000,000.00	1988	54,313.625*
2=	N	1.0	EA	2,380,600.00	1982	188,326.000*
3=	N	1.0	EA	2,000.00	1983	77.647*
4=	N	1.0	EA	98,400.00	1984	5,135.985*
5=	N	1.0	EA	24,000.00	1985	1,048.417*
6=	N	1.0	EA	13,000.00	1986	514.350*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

210
ENTER ECONOMIC FILENAME:

FILENAME: E210 DATE: TUE, APR 18 1989 13:34:23
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 210 DATE: TUE, APR 18 1989 13:34:23
LOCATION: HANFORD FILENAME: E210
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 15,012.973*
TENVLE(FASTE) FAS.0.358*

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMLLT	
PRJGLOB	1.000	1988	12. D	0.960*	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	90.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	287,103.25*	7,519.2	7,185.46*	100.00		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001*	4.759*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	FOAK	
PCOST	4,284.40		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	FEB.1990*	100.00	4.758*	1988*	NONE
	CONTIN	ADD				
END	1	0				

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

9 2 1 2 4 9 8 0 7 2 9

FILENAME: E210
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 210
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: TUE, APR 18 1989 15:34:47
FILENAME: E210
ECONFILE:

***** DETAIL ITEM *****

		BASIC COST	SCHD PENALTY	TOTAL COST
$UNITS =	1,000			
PRODUCTION		6,910.66	0.00	6,910.66

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	29,455.402*
TENVLE(FASTE)	FAS.0.354*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
6,910.66K	6,910.66K	6,910.66K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	80.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	287,103.25R	8,237.6*	7,185.48R	104.66*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001R	5.091*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	PQAK	
PCOST	6,910.66*		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	FEB.1990*	100.00	3.599*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

fps

FAST-C
CALCMX PROGRAM

(1)

NAME 211

PROJECT PUREX COMPLEX

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	B383	1	Ea	9,300,000	1988	
2 =	W012/013			1,900,000	1988	
3 =	B669			1,000,000	1988	
4 =	202A	1	Ea	191,400	1952/Unk	
5 =				25,000	1952/43	
6 =				15,000	1952/44	
7 =				10,000	1952/48	
8 =				21,300	1952	
9 =				6,700	1954	
10 =				63,757,900	1955	
11 =				185,100	1956	
12 =				523,700	1957	
13 =				640,300	1958	
14 =				217,100	59	
15 =				36,400	60	
16 =				258,100	61	
17 =				1,414,800	62	
18 =				110,200	63	
19 =				462,600	64	
20 =				1,681,300	65	

81,754,910

fps

FAST-C
CALCMX PROGRAM

(2)

NAME 211

PROJECT PUREX COMPLEX

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	202 A	1	EA	802,800	1966	
2 =				1,207,800	67	
3 =				746,000	68	
4 =				522,200	69	
5 =				443,100	70	
6 =				1,478,300	71	
7 =				322,100	72	
8 =				17,000	73	
9 =				172,400	74	
10 =				1,570,200	75	
11 =				10,600	76	
12 =				38,400	77	
13 =				429,700	78	
14 =				527,500	79	
15 =				1500,900	80	
16 =				1,439,800	81	
17 =				17,419,000	82	
18 =				10,679,100	83	
19 =				6,191,200	84	
20 =				13,689,700	85	

9 2 1 2 4 9 8 0 7 3 2

fps

FAST-C
CALCMX PROGRAM

(3)

NAME 211

PROJECT PUREX Complex

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )	
1 =	202A	1	Ea	4,325,100	1986		
2 =				2,682,300	87		
3 =				1,023,400	88		136,771,614
4 =	211A			15,000	1952/49		
5 =				1,134,700	1955		
6 =				1,100	56		
7 =				1,300	57		
8 =				93,600	1960		
9 =				54,500	'62		
10 =				1,900	64		
11 =				2,400	67		
12 =				10,500	68		
13 =				273,400	84		1,586,100
14 =	212A			25,900	1960		
15 =				1,400	63		
16 =				37,500	86		
17 =	213A			13,800	1961		
18 =				1,400	63		
19 =	291A			688,100	1955		
20 =				681,500	1965		
				24,700	1966		1394300

FAST-C
CALCMX PROGRAM

(4)

NAME 211

PROJECT PUREX COMPLEX

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )	
1 =	291AD	1	Ea	695000	1979		695,000
2 =	293A	1	Ea	168,300	1955		
3 =				648,100	57		
4 =				22,000	58		
5 =				11,900	66		
6 =				2,100	68		
7 =				1,200	84		
8 =				30,600	85		896,735
9 =	293AA			798,000	1985		797,985
10 =	2714-A			60,200	1955		
11 =	2701AB			778,400	82		
12 =				755600	83		
13 =				561,800	84		
14 =	292A			58,900	1955		
15 =	294A			14,600	1955		
16 =				33,000	63		
17 =	295A			8,600	1968		
18 =				510,700	81		
19 =	295AD			145,600	84		
20 =				92,700	85		

PPS-16 11 30-8

fps

FAST-C
CALCMX PROGRAM

(5)

NAME 211

PROJECT Purex

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	295AB	1	Ea	499400	1981	
2 =	275 EA	1	Ea	33,500	1955	
3 =				173,600	55	
4 =				5,000	72	
5 =				13,000	86	
6 =	203A	1	Ea	13,000	1952/43	
7 =				11,400	1952/44	
8 =				15,700	1952	
9 =				1,038,100	55	
10 =				1200	56	
11 =				86,300	58	
12 =				7000	62	
13 =				4000	67	
14 =				3500	68	
15 =	205A			2400	1960	
16 =						
17 =						
18 =						
19 =						
20 =						

11

```
PROJECT            : PUREX COMPLEX PG.1
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=B383 1 EA 9300000 1988
 2=W012.013 1 EA 1900000 1988
 3=B669 1 EA 1000000 1988
 4=B669 1 EA?A202 1 EA 191400 1952
 5=N 1 EA 25000 1952
 6=N 1 EA 15000 1952
 7=N 1 EA 10000 1952
 8=N 1 EA 21300 1952
 9=N 1 EA 6700 1954
10=N 1 EA 63757900 1955
11=N 1 EA 185100 1956
12= 1 EA 523700 1957
13=N 1 EA 640300 1958
14=N 1 EA 217100 1959
15=N 1 EA 36400 1960
16=N 1 EA 258100 1961
17=N 1 EA 1414800 1962
18=N 1 EA 110200 1963
19=N 1 EA 462600 1964
20=N 1 EA 1681300 1965
21=
```

******* FAST-C CALCMX PROGRAM *******

NAME: 211 | DATE: THU, APR 06 1989 10:43:17

PROJECT: PUREX COMPLEX PG.1 | ECONFILE:

EXCMX	BAMT	BASE
**************	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
457,712.56*	**************	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X) ITEM()	AMT() UNIT()	UCOST()	UYEAR()	UMX()
1= B383	1.0 EA	9,300,000.00	1988	618,637.625*

2=	W012.013	1.0 EA	1,900,000.00	1988	109,396.578*
3=	B669	1.0 EA	1,000,000.00	1988	54,313.625*
4=	A202	1.0 EA	191,400.00	1952	78,651.953*
5=	N	1.0 EA	25,000.00	1952	8,537.752*
6=	N	1.0 EA	15,000.00	1952	4,890.201*
7=	N	1.0 EA	10,000.00	1952	3,142.158*
8=	N	1.0 EA	21,300.00	1952	7,169.027*
9=	N	1.0 EA	6,700.00	1954	1,875.339*
10=	N	1.0 EA	63,757,896.00	1955	**********
11=	N	1.0 EA	185,100.00	1956	63,687.430*
12=	N	1.0 EA	523,700.00	1957	188,776.219*
13=	N	1.0 EA	640,300.00	1958	224,046.875*
14=	N	1.0 EA	217,100.00	1959	65,624.953*
15=	N	1.0 EA	36,400.00	1960	8,915.811*
16=	N	1.0 EA	258,100.00	1961	72,000.688*
17=	N	1.0 EA	1,414,800.00	1962	439,109.313*
18=	N	1.0 EA	110,200.00	1963	25,848.773*
19=	N	1.0 EA	462,600.00	1964	117,830.328*
20=	N	1.0 EA	1,681,300.00	1965	458,988.250*

2124980737

11

```
PROJECT           : PUREX COMPLEX PG.2
 ECON. FILENAME :

ECON YEAR (YEAR): RL88?1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=A202 1 EA 802800 1966
 2=N 1 EA 1207800 1967
 3=N 1 EA 746000 1968
 4=N 1 EA 522200 1969
 5=N 1 EA 443100 1970
 6=N 1 EA 1478300 1971
 7=N 1 EA 322100 1972
 8=N 1 EA 17000 1973
 9=N 1 EA 172400 1974
10=N 1 EA 1570200 1975
11=N 1 EA 10600 1976
12=N 1 EA 38400 1977
13=N 1 EA 429700 1978
14=N 1 EA 527500 1979
15=N 1 EA 1500900 198-"0
16=N 1 EA 1439800 1981
17=N 1 EA 17419000 1982
18=N 1 EA 10679100 1983
19=N 1 EA 6191200 1984
20=N 1 EA 13689700 1985
21=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 211 — DATE: THU, APR 06 1989 11:07:33

PROJECT: PUREX COMPLEX PG.2 — ECONFILE:

EXCMX	BAMT	BASE
7,272,815.000*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
89,034.98*	89,034,976.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	A202	1.0	EA	802,800.00	1966	195,313.938*

2=	N	1.0	EA	1,207,800.00	1967 290,671.188*
3=	N	1.0	EA	746,000.00	1968 163,786.031*
4=	N	1.0	EA	522,200.00	1969 105,790.953*
5=	N	1.0	EA	443,100.00	1970 84,291.406*
6=	N	1.0	EA	1,478,300.00	1971 299,067.000*
7=	N	1.0	EA	322,100.00	1972 53,561.820*
8=	N	1.0	EA	17,000.00	1973 2,040.891*
9=	N	1.0	EA	172,400.00	1974 23,828.922*
10=	N	1.0	EA	1,570,200.00	1975 240,432.219*
11=	N	1.0	EA	10,600.00	1976 946.126*
12=	N	1.0	EA	38,400.00	1977 3,555.971*
13=	N	1.0	EA	429,700.00	1978 45,629.039*
14=	N	1.0	EA	527,500.00	1979 50,741.219*
15=	N	1.0	EA	1,500,900.00	1980 138,008.875*
16=	N	1.0	EA	1,439,800.00	1981 117,323.578*
17=	N	1.0	EA	17,419,000.00	1982 **********
18=	N	1.0	EA	10,679,100.00	1983 904,670.500*
19=	N	1.0	EA	6,191,200.00	1984 470,899.063*
20=	N	1.0	EA	13,689,700.00	1985 **********

2124980739

```
PROJECT            : PUREX COMPLEX PG.3
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=A202 1 EA 4325100 1986
 2=N 1 EA 2682300 1987
 3=N 1 EA 1023400 1988
 4=A211 1 EA 15000 1952
 5=N 1 EA 1134700 1955
 6=N 1 EA 1100 1956
 7=N 1 EA 1300 1957
 8=N 1 EA 93600 1960
 9=N 1 EA 54500 1962
10=N 1 EA 1900 1964
11=N 1 EA 2400 1967
12=N 1 EA 10500 1968
13=N 1 EA 273400 1984
14=A212 1 EA 25900 1960
15=N 1 EA 1400 1963
16=N 1 EA 37500 1986
17=N"A313 1 EA 13800 1961
18=N 1 EA 14 "00 1963
19=A291A 1 EA 688100 1955
20=N 1 EA 681500 1965
21=N 1 EA 24700 1966
22=
```

```
                    ***** FAST-C CALCMX PROGRAM *****

NAME:       211                          DATE: THU, APR 06 1989   11:35:51
PROJECT:    PUREX COMPLEX PG.3           ECONFILE:

              EXCMX                     BAMT          BASE
        1,807,280.250*                   1.0           CYD

            TCOST($1000    )        UCOST/CYD        YEAR
              24,847.01*       24,847,008.00*       1988

                        ***** INPUT DATA *****

                        SINDEX  PINDEX  TYEAR
                         0.950   0.900   1988

    (X) ITEM()       AMT() UNIT()       UCOST() UYEAR()      UMX()
```

1=	A202	1.0	EA	4,325,100.00	1986	290,127.563*
2=	N	1.0	EA	2,682,300.00	1987	166,508.656*
3=	N	1.0	EA	1,023,400.00	1988	55,701.641*
4=	A211	1.0	EA	15,000.00	1952	4,890.201*
5=	N	1.0	EA	1,134,700.00	1955	483,018.000*
6=	N	1.0	EA	1,100.00	1956	237.507*
7=	N	1.0	EA	1,300.00	1957	271.630*
8=	N	1.0	EA	93,600.00	1960	24,981.785*
9=	N	1.0	EA	54,500.00	1962	12,580.586*
10=	N	1.0	EA	1,900.00	1964	293.668*
11=	N	1.0	EA	2,400.00	1967	328.097*
12=	N	1.0	EA	10,500.00	1968	1,564.612*
13=	N	1.0	EA	273,400.00	1984	15,659.301*
14=	A212	1.0	EA	25,900.00	1960	6,150.673*
15=	N	1.0	EA	1,400.00	1963	220.810*
16=	N	1.0	EA	37,500.00	1986	1,633.704*
17=	A313	1.0	EA	13,800.00	1961	2,949.854*
18=	N	1.0	EA	1,400.00	1963	220.810*
19=	A291A	1.0	EA	688,100.00	1955	279,888.688*
20=	N	1.0	EA	681,500.00	1965	171,383.344*
21=	N	1.0	EA	24,700.00	1966	4,379.023*

2124980741

211

```
PROJECT            : PUREX COMPLEX;PG.4
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 2"1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=AD291 1 EA 695000 1979
 2=A293 1 EA 168300 1955
 3=N 1 EA 648100 1957
 4=N 1 EA 22000 1958
 5=N 1 EA 11900 1966
 6=N 1 EA 2100 1968
 7=N 1 EA 1200 1984
 8=N 1 EA 30600 1985
 9=AA293 1 EA 798000 1985
10=A2714 1 EA 60200 1955
11=AB2701 1 EA 778400 1982
12=N 1 EA 755600 1983
13=N 1 EA 561800 1984
14=A292 1 EA 58900 1955
15=A294 1 EA 14600 1955
16=N 1 EA 33000 1963
17=A295 1 EA 8600 1968
18=N 1 EA 510700 1981
19=AD295 1 EA 145600 1984
20=N 1 EA 92700 1985
21=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 211 DATE: THU, APR 06 1989 12:40:42
PROJECT: PUREX COMPLEX;PG.4 ECONFILE:

EXCMX	BAMT	BASE
815,782.375*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
11,984.22*	11,984,216.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	AD291	1.0	EA	695,000.00	1979	68,550.531*

2=	A293	1.0	EA	168,300.00	1955	60,231.031*
3=	N	1.0	EA	648,100.00	1957	238,189.031*
4=	N	1.0	EA	22,000.00	1958	5,666.201*
5=	N	1.0	EA	11,900.00	1966	1,974.220*
6=	N	1.0	EA	2,100.00	1968	270.330*
7=	N	1.0	EA	1,200.00	1984	41.959*
8=	N	1.0	EA	30,600.00	1985	1,366.583*
9=	AA293	1.0	EA	798,000.00	1985	47,936.836*
10=	A2714	1.0	EA	60,200.00	1955	19,622.008*
11=	AB2701	1.0	EA	778,400.00	1982	55,627.750*
12=	N	1.0	EA	755,600.00	1983	50,313.031*
13=	N	1.0	EA	561,800.00	1984	34,355.109*
14=	A292	1.0	EA	58,900.00	1955	19,160.188*
15=	A294	1.0	EA	14,600.00	1955	4,183.775*
16=	N	1.0	EA	33,000.00	1963	6,936.923*
17=	A295	1.0	EA	8,600.00	1968	1,258.446*
18=	N	1.0	EA	510,700.00	1981	37,872.875*
19=	AD295	1.0	EA	145,600.00	1984	7,875.163*
20=	N	1.0	EA	92,700.00	1985	4,578.822*

211

```
PROJECT            : PUREX COMPLEX PG.5
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=AB295 1 EA 499400 1981
 2=EA275 1 EA 33500 1955
 3=N 1 EA 173600 1955
 4=N 1 EA 5000 1972
 5=N 1 EA 13000 1986
 6=A203 1 EA 13000 1952
 7=N 1 EA 11400 1952
 8=N 1 EA 15700 1952
 9=N 1 EA 1038100 1955
10=N 1 EA 1200 1956
11=N 1 EA 86300 1958
12=N 1 EA 7000 1962
13=N 1 EA 4000 1967
14=N 1 EA 3500 1968
15=A205 1 EA 2400 1960
16=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 211 DATE: THU, APR 06 1989 13:27:36
PROJECT: PUREX COMPLEX PG.5 ECONFILE:

EXCMX	BAMT	BASE
650,382.125*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
9,736.54*	9,736,538.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	AB295	1.0	EA	499,400.00	1981	36,959.664*
2=	EA275	1.0	EA	33,500.00	1955	10,352.627*
3=	N	1.0	EA	173,600.00	1955	62,303.133*
4=	N	1.0	EA	5,000.00	1972	569.350*
5=	N	1.0	EA	13,000.00	1986	514.350*
6=	A203	1.0	EA	13,000.00	1952	4,183.405*

7=	N	1.0	EA	11,400.00	1952	3,624.979*
8=	N	1.0	EA	15,700.00	1952	5,139.681*
9=	N	1.0	EA	1,038,100.00	1955	438,336.688*
10=	N	1.0	EA	1,200.00	1956	261.156*
11=	N	1.0	EA	86,300.00	1958	25,167.629*
12=	N	1.0	EA	7,000.00	1962	1,340.840*
13=	N	1.0	EA	4,000.00	1967	572.821*
14=	N	1.0	EA	3,500.00	1968	471.966*
15=	A205	1.0	EA	2,400.00	1960	459.111*

FAST-C
CALCMX PROGRAM

NAME 211

PROJECT PUREX Summary

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	Page 1	1	Ea	457,712,600	1988	
2 =	2			89,035,000		
3 =	3			24,847,000		
4 =	4			11,984,200		
5 =	5			9,736,500		
6 =						
7 =						
8 =				593,315,3		
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

FPS-14 11-30-83

3-23-89

Purex Canyon Position

Cell	Posins Avail	TSD Posins
A	3	
B	3	
C	3	
D	5	
E	6	1
F	18	4
G	2	1
H	6	
J	9	
K	10	
L	4	
M	1	
U	8	2
	78	8

Ref: Cell Arrangement H2-53500 thru -53530

Percentage of Purex Canyon used for TSD is 8/78 x100 = 10.3%

211

```
PROJECT            : PUREX SUMMARY
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=PAGE.1 1 EA 457712600 1988
2=PAGE.2 1 EA 89035000 1988
3=PAGE.3 24847000 1988
  UYEAR(3) IS INCORRECT
  RE-ENTER TOTAL LINE
3=PAGE.3 1 EA 24847000 1988
4=PAGE.4 1 EA 11984200 1988
5=PAGE.5 1 EA 9736500 1988
6=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 211 DATE: THU, APR 06 1989 14:28:40
PROJECT: PUREX SUMMARY ECONFILE:

EXCMX	BAMT	BASE
**************	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
593,315.00*	**************	1988

X .103 = $ 61.1

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	PAGE.1	1.0	EA	*************	1988	************
2=	PAGE.2	1.0	EA	89,034,992.00	1988	************
3=	PAGE.3	1.0	EA	24,847,000.00	1988	************
4=	PAGE.4	1.0	EA	11,984,200.00	1988	815,780.250*
5=	PAGE.5	1.0	EA	9,736,500.00	1988	650,380.375*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

FILENAME: **E211** DATE: TUE, APR 18 1989 13:33:50
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 211 DATE: TUE, APR 18 1989 13:33:50
LOCATION: HANFORD FILENAME: E211
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 423,687.813*
TENVLE(FASTE) FAS.0.446*

***** INPUT DATA *****

	EBCAL	GECON	FPER	LCURVE		CMULT	
PRJGLOB	1.000	1988	12. D	0.960*		1,000.	
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.200	90.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	9,796,966.00*	33,219.4	245,193.78*	100.00			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001*	4.674*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	PDAK		
PCOST	61,100.00		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	FEB.1991*	100.00	4.673*	1988*	NONE	
	CONTIN	ADD					
END	1	0					

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

FILENAME: E211 DATE: TUE, APR 18 1989 13:36:13

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-2 *****

PROJECT: 211 DATE: TUE, APR 18 1989 10:36:14
LOCATION: HANFORD FILENAME: E211
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	157,601.09	0.00	157,601.09

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 1,550,280,750*
TENVLE(FASTE) FAS.0.438*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL PPCOST
157,601.09K	157,601.09K	157,601.09K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	FEMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	75.000	1.00D	1986		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	9,796,966.00R	40,155.9*	245,193.78R	107.21*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001R	5.283*	0.0	0.000	0.0	0.000
	PCOST	PQTY	PECON	FOAK		
PCOST	157,601.09*	1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JUL.1991*	100.00	3.482*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

NOT INCLUDED IN PRICE TOTAL. FACILITY NOT BUILT AT TIME OF STUDY.

fps

CALCMX PROGRAM

NAME 212

PROJECT 2727-$ Storage Fac

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	2727-$	1	Ea	30,000	1988	
2 =						
3 =	Facility not in RLPS					
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

PPS-16 ** 30-0

CALCMX

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME                 : 212
PROJECT              : 2727-S STORAGE FACILITY
 ECON. FILENAME      :

ECON YEAR (YEAR):      1988

BASE                   KSF  KLF  CYD  ACRES
BASE AMT. (BAMT):      0 0 1

MX TYPE (MXTYPE):      EXCMX

                       SINDEX PINDEX TYEAR
GLOBAL DATA          : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=S2727 1 EA 30000 1988
2=
```

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME:      212                          DATE: THU, APR 06 1989  14:00:06
PROJECT:   2727-S STORAGE FACILITY      ECONFILE:

                 EXCMX                  BAMT             BASE
              1,184.645*                 1.0             CYD

               TCOST($1000    )         UCOST/CYD        YEAR
                        30.00*          30,000.00*       1988

                          ***** INPUT DATA *****

                          SINDEX   PINDEX   TYEAR
                           0.950    0.900   1988

    (X)  ITEM()        AMT() UNIT()       UCOST() UYEAR()      UMX()
     1=  S2727           1.0 EA          30,000.00   1988    1,184.645*
```

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

USE $.1M

```
W212
 ENTER ECONOMIC FILENAME:

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FILENAME: W212                               DATE: THU, APR 13 1989  16:08:27
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                          ***** FAST-E *****

PROJECT:   212                               DATE: THU, APR 13 1989  16:08:28
LOCATION:  HANFORD                           FILENAME: W212
ITEM:      ACQUISITION COST                  ECONFILE:

                          ***** DETAIL ITEM *****

                        ***** CHARACTERISTICS *****

                FASTE EQUIVALENT
                FASTE                                   215.176*
                  TENVLE(FASTE)                        FAS.0.258*

                           ***** INPUT DATA *****

                  ESCAL      GECON      FPER      LCURVE         CMULT
  PROGLOB         1.000      1988       12. D      0.960*       1,000.
                  TYPE       SYSTEM     RERUN     REMBOX
  FILE            D           0         0           0
                  ALL    COST    UNCERT   LOHMAT   INPUT     FGRAPH    FDET
  FORMAT           0      0        0        0        1         0         0

                  PLTFM   ENTYPE MATVAL   TYEAR
  GLOB            1.100  100.000   1.00D  1988

                  WT          WTFAC          VOL        VOLFAC
  WTVOL        5,087.68*     1,309.9         132.87*     100.00
                  PMX         MXTYPE      ELWT      ELMX           STWT     STMX
  MXLINE          1.001*      4.315*       0.0      0.000            0.0    0.000

                  PCOST                    PQTY      PECON     FOAK
  PCOST           100.00                    1.         1988     1.000
                  PSTART      PFIN         PSCHDX    PRDMX     PYEARC    PDISC
  PSCHD           JAN.1988    DEC.1988*    100.00    4.314*     1988*     NONE
                  CONTIN      ADD
  END              1           0

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DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

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```

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: **212** DATE: THU, APR 13 1989 16:08:51
LOCATION: HANFORD FILENAME: W212
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

$UNITS =	1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION		100.12	0.00	100.12

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 215.176*
TENVLE(FASTE) FAS.0.258*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
100,116.44	100,116.44	100,116.44

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	**1.100**	**100.000**	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	5,087.68R	1,309.9*	132.87R	100.00*			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001R	4.315*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	FOAK		
PCOST	[redacted]		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	DEC.1988*	100.00	2.928*	1988*	NONE	
	CONTIN	ADD					
END	0	0					

DO YOU WISH TO MAKE CHANGES (Y/N):

FAST-C
CALCMX PROGRAM

NAME: 213A

PROJECT: 241 AN Double Shell Tank Farm

ECON YEAR: 1988 (YEAR)

BASE AMOUNT (BAMT): KSF ____ KLF ____ CYD 7 ACRES ____

MX TYPE: TRS (MXTYPE)

GLOBAL DATA: SINDEX ____ PINDEX ____ TYEAR ____

PLATFORM DATA: SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM ____

FACTOR DATA: AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SJBKSF ____

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =		1	EC	5100	1980	
2 =				22,213,900	1981	
3 =				36,700	1982	
4 =				5,800	1984	
5 =				10,300	1985	
6 =				101,800	1986	
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

2 4 9 3 0 7 5 6

FAST-C
CALCMX PROGRAM

NAME 213 B

PROJECT 241 AP Double Shell Tank Fusion

ECON YEAR	YEAR				
BASE AMOUNT (BAMT)	KSF	KLF	~~CYD~~ 8 TKs	ACRES	
MX TYPE	MXTYPE				
GLOBAL DATA	SINDEX	PINDEX	TYEAR		
PLATFORM DATA	SEISM	TORNAD	RADIAT	BLDUSE	PLTFM
FACTOR DATA	AVHT	KCUFT	TRNPSF	NLEVEL	SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =		1	Ea	87,200	1985	
2 =				34,305,600	1986	
3 =				11,707,200	1987	
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

2 1 2 4 9 8 0 7 3 7

FAST-C
CALCMX PROGRAM

NAME 213C

PROJECT 241 AW Double Shell Tank Farm

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF ~~EXP.~~ TKs 6 ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =		1	Ea	2,500	1973	
2 =				148,300	1975	
3 =				8,400	1978	
4 =				22,691,600	1981	
5 =				267,100	1982	
6 =				2,805,900	1983	
7 =				8400	1984	
8 =				119,300	1985	
9 =				23,400	1988	
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

FPS-14 ** 30-8:

FAST-C
CALCMX PROGRAM

NAME: 213D

PROJECT: 241-SY Double Shell Tank Farm

ECON YEAR: 1988 (YEAR)

BASE AMOUNT (BAMT): KSF ____ KLF ____ CYD 3 (Tanks) ACRES ____

MX TYPE: MXTYPE ____

GLOBAL DATA: SINDEX ____ PINDEX ____ TYEAR ____

PLATFORM DATA: SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM ____

FACTOR DATA: AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF ____

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ($)	UYEAR ( )	UMX ( )
1 =	—	1	Ea	15300	1977	
2 =				11500	1978	
3 =				9,186,600	1979	
4 =				235,900	1981	
5 =				13,000	1982	
6 =				41,400	1985	
7 =				183,800	1986	
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

1 2 1 2 4 9 8 0 7 9

FAST-C
CALCMX PROGRAM

NAME 213 E

PROJECT 241-AY Double Shell Tank Farm

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF ~~CYD~~ 2 TKs ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =		1	Ea	1800 -	1970	
2 =				2577,700	1971	
3 =				50,700 -	1976	
4 =				10,700 -	1978	
5 =				54,500 -	1980	
6 =				8600 -	1982	
7 =				25,500 -	1984	
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

PPS-16 11 30-8

27 Hour

FAST-C
CALCMX PROGRAM

AME: 213 F

PROJECT: 241-AZ Double Shell Tank Farm

ECON YEAR	YEAR				
BASE AMOUNT (BAMT)	KSF	KLF	~~CYD~~ 2	ACRES	
MX TYPE	MXTYPE				
GLOBAL DATA	SINDEX	PINDEX	TYEAR		
PLATFORM DATA	SEISM	TORNAD	RADIAT	BLDUSE	PLTFM
FACTOR DATA	AVHT	KCUFT	TRNPSF	NLEVEL	SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =		1	Ea	14,900	1970	
2 =				4,977,600	1973	
3 =				37,700	1976	
4 =				7,700	1977	
5 =				1,613,000	1978	
6 =				695,900	1980	
7 =				44,400	1985	
8 =				7,551,900	1986	
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

PPS-16 ** 20-8

FAST-C
CALCMX PROGRAM

NAME 244 AR

PROJECT NEW COST

ECON YEAR 1988 (YEAR)

BASE AMOUNT (BAMT) 3.5 (KSF) ___ (KLF) ___ (CYD) ___ (ACRES)

MX TYPE BLDMX (MXTYPE)

GLOBAL DATA .95 (SINDEX) .9 (PINDEX) 1988 (TYEAR)

PLATFORM DATA 0 (SEISM) 0 (TORNAD) 0 (RADIAT) 0 (BLDUSE) 1.5 (PLTFM)

FACTOR DATA 0 (AVHT) 130 (KCUFT) 25 (TRNPSF) 2 (NLEVEL) 2 (SUBKSF)

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	ONE	1	EA	11000	1944	
2 =	TWO	1	EA	2700	1952	
3 =	THREE	1	EA	20200	1955	
4 =	FOUR	1	EA	6400	1963	
5 =	FIVE	1	EA	20800	1967	
6 =	SIX	1	EA	1898200	1968	
7 =	SEVEN	1	EA	6200	1969	
8 =	EIGHT	1	EA	11800	1970	
9 =	NINE	1	EA	27300	1971	
10 =	TEN	1	EA	2900	1972	
11 =	ELEV.	1	EA	85200	1973	
12 =	TWEL	1	EA	30100	1974	
13 =	THIR	1	EA	11800	1975	
14 =	FOUR	1	EA	133700	1976	
15 =	FIF	1	EA	125200	1977	
16 =	SIX	1	EA	4200	1978	
17 =	SEV	1	EA	9900	1980	
18 =	EIGHT	1	EA	23600	1981	
19 =	NIN	1	EA	190000	1982	
20 =	TWEN	1	EA	8700	1984	
21	T ONE	1	EA	140400	1985	
22	T.TWO	1	EA	2285400	1987	

FPS-14 11-30-83

1 2 1 2 4 9 8 0 7 2

tpi

CALCMX PROGRAM

NAME 213

PROJECT DSTF

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	244-CR	1	Ea	393,500	1952	
2 =				5,000	1961	
3 =				6,300	67	
4 =				17,700	72	
5 =				12,400	76	
6 =				14,900	79	
7 =				39,500	80	
8 =				40,600	81	
9 =				62,400	85	
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

PPS-16 ** 30-8:

fpi

CALCMX PROGRAM

NAME 213

PROJECT DSTF

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD / ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	241 EW	1	Ea	100,000	1960	
2 =						
3 =	Not listed in	RLPS				
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

PPS-16 30-0

CALCMX PROGRAM

NAME 213

PROJECT DSTF

ECON YEAR YEAR

BASE AMOUNT (BAMT) ESF ELF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAC RADIAT BLDUSE PLTFM

FACTOR DATA AVNT KCUFT TRNPSF NLEVEL SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1	244A	1	Ea	5000	1977	
2				3000	77	
3				10300	78	
4				60400	85	
5						
6						
7	Check PRN FRPIS17					
8	O Acq Cost Sum					
9						
10						
11	244-BX	1	Ea	4,400	1978	
12				3721,600	82	
13						
14	244-S	1	Ea	2,975,100	1981	
15						
16				46,000	1985	
17						
18	244-TX			3,851,600	1982	
19				41,300	87	
20						
	244-U			3,721,600	1982	
				18,800	86	

fps

FAST-C

CALCMX PROGRAM

NAME 213

PROJECT Double Shell Tank Farms (Projects)

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVWT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	B673	1	Ea	1,100,000	1988	
2 =	W020			6,700,000		
3 =	B551			1,000,000		
4 =	B234			4,400,000		
5 =	~~B340~~			~~46,100,000~~		
6 =	W030			24,600,000		
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

1 2 1 2 4 9 8 0 7 6

PPS-16 30-8

FAST-C
CALCMX PROGRAM

NAME 213

PROJECT Double Shell Tank Farm Summary

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	AN 241	1	Ea	31,439,260	1988	
2 =	AP 241			49,132,860		
3 =	AW 241			36,300,080		
4 =	SY 241			17,010,590		
5 =	AY 241			8,599,570		
6 =	AZ 241			26,724,160		
7 =	AR 244			11,287,300		
8 =	CR 244			3,232,580		
9 =	A, BX, S, TX, U			16,224,100		
10 =	EW 241			524,260		
11 =	Projects			37,799,980		
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

```
213
    PROJECT           : DOUBLE SHELL TK.FARM SUMMARY
     ECON. FILENAME :

    ECON YEAR (YEAR): 1988

    BASE              KSF  KLF  CYD  ACRES
    BASE AMT. (BAMT): 0 0 1

    MX TYPE (MXTYPE): EXCMX

                      SINDEX PINDEX TYEAR
    GLOBAL DATA     : .95 .9 1988

    ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

  1=AN241 1 EA 31439260 1988
  2=AP.241 1 EA 49132860 1988
  3=AW.241 1 EA 36300080 1988
  4=SY.241 1 EA 17010590 1988
  5=AY.241 1 EA 8599510
    ERROR! UYEAR MUST BE ENTERED
    RE-ENTER TOTAL LINE
  5=AY241 1 EA 8599510 1988
  6=AZ.241 1 EA 26724160
    ERROR! UYEAR MUST BE ENTERED
    RE-ENTER TOTAL LINE
  6=AZ.241 1 EA 26724160 1988
  7=AR.244 1 EA 11287300 1988
  8=EW.241 1 EA 524260 1988
  9=A.BX.S.TX.U 1 EA 16224100 1988
 10=CR.244 1 EA 3232580 1988
 11=PROJECTS 1 EA 37799980 1988
   INPUT ERROR
 11=PROJECTS 1 EA 37799980 1988
   INPUT ERROR
 11=PROJ. 1 EA 37799980 1988
 12=
```

```
                  *****  FAST-C CALCMX PROGRAM *****

 NAME:      213                          DATE: FRI, APR 07 1989  09:12:18
 PROJECT:   DOUBLE SHELL TK.FARM SUM     ECONFILE:

              EXCMX                   BAMT            BASE
         **************               1.0             CYD

                TCOST($1000    )      UCOST/CYD       YEAR
                  238,274.44*      **************     1988

                        ***** INPUT DATA *****

                         SINDEX  PINDEX  TYEAR
                          0.950   0.900  1988

      (X) ITEM()      AMT() UNIT()      UCOST() UYEAR()      UMX()
```

1=	AN241	1.0 EA	31,439,260.00	1988	**********
2=	AP.241	1.0 EA	49,132,856.00	1988	**********
3=	AW.241	1.0 EA	36,300,080.00	1988	**********
4=	SY.241	1.0 EA	17,010,588.00	1988	**********
5=	AY241	1.0 EA	8,599,510.00	1988	567,983.625*
6=	AZ.241	1.0 EA	26,724,160.00	1988	**********
7=	AR.244	1.0 EA	11,287,300.00	1988	764,169.500*
8=	EW.241	1.0 EA	524,260.00	1988	26,851.000*
9=	A.BX.S.TX.U	1.0 EA	16,224,100.00	1988	**********
10=	CR.244	1.0 EA	3,232,580.00	1988	195,335.625*
11=	PROJ.	1.0 EA	37,799,976.00	1988	**********

213A

```
PROJECT            : 241AN DSTF
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 7

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()   UNIT()   UCOST()   UYEAR()   UMX()

1=ONE 1 EA 5100 1980
2=TWO 1 EA 22213900
  ERROR! UYEAR MUST BE ENTERED
  RE-ENTER TOTAL LINE
2=TWO 1 EA 22213900 1981
3=THREE 1 EA 36700 1982
4=FOR"UR 1 EA 5800 1984
5=FIVE 1 EA 10300 1985
6=SIX 101"""1 EA 101800 1986
7=
```

~~~~~~

***** FAST-C CALCMX PROGRAM *****

```
NAME:      213A                        DATE: WED, APR 05 1989   11:08:08
PROJECT:   241AN DSTF                  ECONFILE:
```

EXCMX	BAMT	BASE
333,746.875*	7.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
31,439.26*	4,491,322.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	ONE	1.0	EA	5,100.00	1980	279.700*
2=	TWO	1.0	EA	22,213,900.00	1981	************
3=	THREE	1.0	EA	36,700.00	1982	1,986.833*
4=	FOUR	1.0	EA	5,800.00	1984	234.034*
5=	FIVE	1.0	EA	10,300.00	1985	416.642*
6=	SIX	1.0	EA	101,800.00	1986	4,856.446*

~~~~~~

DO YOU WISH TO ENTER ANY CHANGES (Y/N): N

```
***** FAST-C CALCMX PROGRAM *****

NAME                : 213B
PROJECT             : 241AP DSTF
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                 KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 8

MX TYPE (MXTYPE): EXCMX

                     SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=ONE 1 EA 87200 1985
 2=TWO 1 EA 34305600 1986
 3=THREE 1 EA 11707200 1987
 4=
```

```
***** FAST-C CALCMX PROGRAM *****

NAME:       213B                    DATE: WED, APR 05 1989  10:59:09
PROJECT:    241AP DSTF              ECONFILE:

            EXCMX                   BAMT            BASE
        475,283.500*                8.0             CYD

       TCOST($1000    )         UCOST/CYD           YEAR
          49,132.86*        6,141,607.00*           1988

              ***** INPUT DATA *****

              SINDEX   PINDEX   TYEAR
               0.950    0.900    1988

 (X) ITEM()       AMT() UNIT()       UCOST() UYEAR()         UMX()
  1= ONE            1.0 EA         87,200.00  1985     4,283.270*
  2= TWO            1.0 EA     34,305,600.00  1986  ************
  3= THREE          1.0 EA     11,707,200.00  1987  830,919.000*
```

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

213C

PROJECT : 241AW DSTF

ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES

BASE AMT. (BAMT): 0 0 6

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR

GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=ONE 1 EA 2500 1973
2=TWO 1 EA 148300 1975
3=THREE 1 EA 8400 1978
4=FOUR 1 EA 22691600 1981
5=FIVE 1 EA 267100 1982
6=SIX 1 EA 2805900 1983
7=SEVEN 1 EA 8400 1984
8=EIGHT 1 EA 119300 1985
9=NINE 1 EA 23400 1988
10=

~~~~~~

***** FAST-C CALCMX PROGRAM *****

NAME: 213C DATE: WED, APR 05 1989 11:13:25

PROJECT: 241AW DSTF ECONFILE:

EXCMX	BAMT	BASE
455,486.500*	6.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
36,300.08*	6,050,013.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	ONE	1.0	EA	2,500.00	1973	252.132*
2=	TWO	1.0	EA	148,300.00	1975	18,323.738*
3=	THREE	1.0	EA	8,400.00	1978	623.739*
4=	FOUR	1.0	EA	22,691,600.00	1981	************
5=	FIVE	1.0	EA	267,100.00	1982	17,319.395*
6=	SIX	1.0	EA	2,805,900.00	1983	210,503.250*
7=	SEVEN	1.0	EA	8,400.00	1984	350.552*
8=	EIGHT	1.0	EA	119,300.00	1985	6,029.397*
9=	NINE	1.0	EA	23,400.00	1988	903.386*

~~~~~~

***** FAST-C CALCMX PROGRAM *****

NAME: 213D
PROJECT: **241SY DSTF**

DATE: WED, APR 05 1989 11:20:11
ECONFILE:

EXCMX	BAMT	BASE
398,465.063*	3.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
17,010.59*	**5,670,196.00***	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	ONE	1.0	EA	15,300.00	1977	1,303.131*
2=	TWO	1.0	EA	11,500.00	1978	878.665*
3=	THREE	1.0	EA	9,186,600.00	1979	**********
4=	FOUR	1.0	EA	235,900.00	1981	16,307.820*
5=	FIVE	1.0	EA	13,000.00	1982	640.418*
6=	SIX	1.0	EA	41,400.00	1985	1,900.421*
7=	SIX	1.0	EA	183,800.00	1986	9,252.139*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME                : 213E
PROJECT             : 241AY SHELL DOUBLE
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                  KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 2

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

 ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=ONE 1 EA 1800 1970
2=TWO 1 EA 2577700 1971
3=THREE 1 EA 50700 1976
4=FOUR 1 EA 10700 1978
5=FIVE 1 EA 54500 1980
6=SIX 1 EA 8600 1982
7=SEVEN 1 EA 25500 1984
8=
```

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME:      213E                          DATE: WED, APR 05 1989  11:25:03
PROJECT:   241AY SHELL DOUBLE            ECONFILE:

                EXCMX                BAMT            BASE
          283,991.813*                2.0            CYD

            TCOST($1000    )       UCOST/CYD       YEAR
                 8,599.51*     4,299,755.00*       1988

                  ***** INPUT DATA *****

                   SINDEX   PINDEX   TYEAR
                    0.950    0.900   1988

(X) ITEM()        AMT() UNIT()       UCOST() UYEAR()       UMX()
 1= ONE             1.0 EA            1,800.00  1970      207.573*
 2= TWO             1.0 EA        2,577,700.00  1971  548,517.375*
 3= THREE           1.0 EA           50,700.00  1976    5,217.255*
 4= FOUR            1.0 EA           10,700.00  1978      812.199*
 5= FIVE            1.0 EA           54,500.00  1980    3,707.217*
 6= SIX             1.0 EA            8,600.00  1982      408.043*
 7= SEVEN           1.0 EA           25,500.00  1984    1,177.213*
```

213F

```
PROJECT          : 241AZ DSTF
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE              KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 2

MX TYPE (MXTYPE): EXCMX

                  SINDEX PINDEX TYEAR
GLOBAL DATA     : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=ONE 1 EA 14900 1970
 2=WO 1 EA 4977600 1973
3=THREE 1 EA 37700 1976
  4=UR 1 EA 7700 1977
5=FIVE 1 EA 1613000 1978
6=SIX 1 EA 695900 1986
7=SEC"VEN 1 EA 44400 1985
8=EIGHT 1 EA 7551900 1986
9=
```

***** FAST-C CALCMX PROGRAM *****

```
NAME:      213F                      DATE: WED, APR 05 1989  11:33:54
PROJECT:   241AZ DSTF                ECONFILE:
```

EXCMX	BAMT	BASE
978,367.250*	2.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
26,724.16*	13,362,078.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	ONE	1.0	EA	14,900.00	1970	2,082.242*
2=	TWO	1.0	EA	4,977,600.00	1973	************
3=	THREE	1.0	EA	37,700.00	1976	3,776.408*
4=	FOUR	1.0	EA	7,700.00	1977	616.138*
5=	FIVE	1.0	EA	1,613,000.00	1978	193,168.125*
6=	SIX	1.0	EA	695,900.00	1986	39,537.422*
7=	SEVEN	1.0	EA	44,400.00	1985	2,051.135*
8=	EIGHT	1.0	EA	7,551,900.00	1986	532,910.125*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

244AR

PROJECT : NEW COST
ECON. FILENAME :

CYD = TK

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 3.5

MX TYPE (MXTYPE): BLDMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

SEISM TORNAD RADIAT BLDUSE PLTFM
PLATFORM DATA : 0 0 0 0 1.5

AVHT KCUFT TRNPSF NLEVEL SUBKSF
FACTOR DATA : 0 130 25 2 2

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=ONW 1 EA 11000 1952
2=TWO 1 EA 2700 1952
3=THREE 1 EA 20200 1955
4=FOUR 1 EA 6400 1963
5=FIVE 1 EA 20800 1967
6=SIX 1 EA 1898200 1968
7=SEVEN 1 EA 6200 1969
8=EIGHT 1 EA 11800 1970
9=NINE 1 EA 27300 1971
10=TEN 1 EA 2900 1972
11=ELEV 1 EA 85200 1973
12=TWEL 1 EA 30100 1974
13=THIR 1 EA 11800 1975
14=FOUR 1 EA 133700 1976
15=FIF 1 EA 125200 1977
16=SIX 1 EA 4200 1978
17=SEV 1 EA 9900 1980
18=EIGHT 1 EA 23600 1981
19=NINE 1 EA 23600"""""190000 1982
20=TWEN 1 EA 8700 1984
21=TONE 1 EA 140400 1985
22=TTWO 1 EA 2285400 1987
23=

***** FAST-C CALCMX PROGRAM *****

NAME: 244AR DATE: TUE, APR 04 1989 12:04:24
PROJECT: NEW COST ECONFILE:

BLDMX	BAMT	BASE
114.691*	3.5	KSF

TCOST ($1000)	UCOST/SFT	YEAR
~~11,287.30*~~ 16,000	3,224.94*	1988

2124987076

**** [illegible] DATA ****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

SEISM	TORNAD	RADIAT	BLDUSE	PLTFM
0.000	0.000	0.000	0.000	1.500

AVHT	KCUFT	TRNPSF	NLEVEL	SUBKSF
0.	130.0	25.	2.	2.

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	ONW	1.0	EA	11,000.00	1952	1,831.430*
2=	TWO	1.0	EA	2,700.00	1952	395.644*
3=	THREE	1.0	EA	20,200.00	1955	3,131.783*
4=	FOUR	1.0	EA	6,400.00	1963	608.811*
5=	FIVE	1.0	EA	20,800.00	1967	1,817.693*
6=	SIX	1.0	EA	1,898,200.00	1968	238,319.875*
7=	SEVEN	1.0	EA	6,200.00	1969	440.931*
8=	EIGHT	1.0	EA	11,800.00	1970	848.056*
9=	NINE	1.0	EA	27,300.00	1971	2,018.256*
10=	TEN	1.0	EA	2,900.00	1972	165.085*
11=	ELEV	1.0	EA	85,200.00	1973	6,220.875*
12=	TWEL	1.0	EA	30,100.00	1974	1,864.811*
13=	THIR	1.0	EA	11,800.00	1975	608.457*
14=	FOUR	1.0	EA	133,700.00	1976	7,893.240*
15=	FIF	1.0	EA	125,200.00	1977	6,781.078*
16=	SIX	1.0	EA	4,200.00	1978	153.820*
17=	SEV	1.0	EA	9,900.00	1980	302.937*
18=	EIGHT	1.0	EA	23,600.00	1981	695.176*
19=	NINE	1.0	EA	190,000.00	1982	6,274.407*
20=	TWEN	1.0	EA	8,700.00	1984	191.331*
21=	TONE	1.0	EA	140,400.00	1985	3,783.010*
22=	TTWO	1.0	EA	2,285,400.00	1987	73,447.375*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

3

PROJECT : DSTF
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=CR.244 1 EA 393500 1952
2=N 1 EA 5000 1961
3=N 1 EA 6300 1967
4=N 1 EA 17700 1972
5=N 1 EA 12400 1976
6=N 1 EA 14900 1979
7=N 1 EA 38500 1980
8=N 1 EA 40600 1981
9=N 1 EA 62400 1985
10=

~~~~~~

***** FAST-C CALCMX PROGRAM *****

NAME: 213 DATE: THU, APR 06 1989 18:44:41
PROJECT: DSTF ECONFILE:

EXCMX	BAMT	BASE
195,335.625*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
3,232.58*	3,232,583.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	CR.244	1.0	EA	393,500.00	1952	172,650.063*
2=	N	1.0	EA	5,000.00	1961	974.562*
3=	N	1.0	EA	6,300.00	1967	940.231*
4=	N	1.0	EA	17,700.00	1972	2,260.959*
5=	N	1.0	EA	12,400.00	1976	1,122.684*
6=	N	1.0	EA	14,900.00	1979	1,036.344*
7=	N	1.0	EA	38,500.00	1980	2,537.410*
8=	N	1.0	EA	40,600.00	1981	2,391.780*
9=	N	1.0	EA	62,400.00	1985	2,973.252*

~~~~~~

PROJECT : DSTF
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=A244 1 EA 5000 1977
2=N 1 EA 3000 1977
3=N 1 EA 10300 1978
4=N 1 EA 60400 1985
5=BX.244 1 EA 4400 1978
6=N 1 EA 3721600 1982
7=S.244 1 EA 2975100 1981
8=N 1 EA 46000 1985
9=TX.244 1 EA 3851600 1982
10=N 1 EA 41300 1987
11=U.244 1 EA 3721600 1982
12=N 1 EA 18800 1986
13=

***** FAST-C CALCMX PROGRAM *****

NAME: 213 DATE: THU, APR 06 1989 18:58:16
PROJECT: DSTF ECONFILE:

EXCMX	BAMT	BASE
1,360,665.500*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
16,224.10*	16,224,100.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	A244	1.0	EA	5,000.00	1977	384.690*
2=	N	1.0	EA	3,000.00	1977	220.340*
3=	N	1.0	EA	10,300.00	1978	779.134*
4=	N	1.0	EA	60,400.00	1985	3,179.845*
5=	BX.244	1.0	EA	4,400.00	1978	308.068*
6=	N	1.0	EA	3,721,600.00	1982	304,053.625*
7=	S.244	1.0	EA	2,975,100.00	1981	258,963.844*
8=	N	1.0	EA	46,000.00	1985	2,362.519*
9=	TX.244	1.0	EA	3,851,600.00	1982	315,658.500*

10= N	1.0 EA	41,300.00	1987	2,087.343*
11= U.244	1.0 EA	3,721,600.00	1982	304,053.625*
12= N	1.0 EA	18,800.00	1986	887.458*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

13

```
PROJECT            : DSTF
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=EW.241 1 EA 100000 1960
2=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 213 DATE: THU, APR 06 1989 18:47:28

PROJECT: DSTF ECONFILE:

EXCMX	BAMT	BASE
26,850.930*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
524.26*	524,258.06*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	EW.241	1.0	EA	100,000.00	1960	26,850.930*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

9 2 1 2 4 9 8 0 7 8

13

```
PROJECT          : DOUBLE SHELL TK.FARM (PROJECTS)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE              KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                  SINDEX PINDEX TYEAR
GLOBAL DATA     : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=B673 1 EA 1100000 1988
 2=W020 1 EA 6700000 1988
 3=B551 1 EA 1000000 1988
 4=B234 1 EA 4400000 1988
 5=W030 1 EA 24600000 1988
 6=
```

```
                 *****  FAST-C CALCMX PROGRAM *****

NAME:      213                          DATE: FRI, APR 07 1989  08:57:07
PROJECT:   DOUBLE SHELL TK.FARM (PR     ECONFILE:

               EXCMX                   BAMT          BASE
        2,856,331.500*                  1.0          CYD

              TCOST($1000    )       UCOST/CYD       YEAR
                  37,799.98*   37,799,984.00*      1988

                        ***** INPUT DATA *****

                         SINDEX  PINDEX  TYEAR
                          0.950   0.900  1988

     (X)  ITEM()        AMT() UNIT()        UCOST() UYEAR()       UMX()
      1=  B673             1.0 EA      1,100,000.00  1988  60,264.969*
      2=  W020             1.0 EA      6,700,000.00  1988 432,594.563*
      3=  B551             1.0 EA      1,000,000.00  1988  54,313.625*
      4=  B234             1.0 EA      4,400,000.00  1988 273,436.813*
      5=  W030             1.0 EA     24,600,000.00  1988 ************
```

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

See E213

W213
ENTER ECONOMIC FILENAME:

FILENAME: W213 DATE: TUE, APR 18 1989 10:38:54
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 213 DATE: TUE, APR 18 1989 10:38:55
LOCATION: HANFORD FILENAME: W213
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 225,908.219*
TENVLE(FASTE) FAS.0.451*

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12. D	0.960*	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.200	100.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	9,773,446.00*	29,667.4	255,238.72*	100.00		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001*	4.400*	0.0	0.000	0.0	0.000
	PCOST	PQTY	PECON	FOAK		
PCOST	38,300.00	1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	FEB.1991*	100.00	4.399*	1988*	NONE
	CONTIN	ADD				
END	1	0				

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

FILENAME: W213 DATE: TUE, APR 19 1988 [illegible]
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 213 DATE: TUE, APR 19 1988 [illegible]
LOCATION: HANFORD FILENAME: W213
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

#UNITS =	1,000 BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	69,573.52	0.00	69,573.52

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	422,725.438*
TENVLE(FASTE)	FAS.0.446*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
69,573.52K	69,573.52K	69,573.52K

***** INPUT DATA *****

	ESCAL	SECON	FPER	LCURVE	CMLLT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	90.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	9,773,446.00R	33,185.8*	255,238.72R	104.35*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001R	4.759*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	PDAK	
PCOST	69,573.52*		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JUL.1991*	100.00	2.463*	1980*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

DO YOU WISH TO MAKE CHANGES (Y.N): E213
ENTER ECONOMIC FILENAME:

FILENAME: **E213** DATE: TUE, APR 18 1989 13:38:40
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 213 DATE: TUE, APR 18 1989 13:38:47
LOCATION: HANFORD FILENAME: E213
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	1,616,941.250*
TENVLE(FASTE)	FAS.0.506*

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12. D	0.960*	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0

	PLTFM	ENTYPE	MATVAL	TYEAR
GLOB	**1.200**	**100.000**	1.000	1988

	WT	WTFAC	VOL	VOLFAC		
WTVOL	82,993,968.00*	71,722.7	2,167,431.50*	100.00		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000*	4.400*	0.0	0.000	0.0	0.000

	PCOST		PQTY	PECON	FOAK	
PCOST	**200,000.00**		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	MAR.1992*	100.00	4.399*	1988*	NONE
	CONTIN	ADD				
END	1	0				

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

FILENAME: E213 DATE: TUE, APR 18 1989 [illegible]
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

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***** FAST-E *****

PROJECT: 213 DATE: TUE, APR 18 1989 10:39:06
LOCATION: HANFORD FILENAME: E213
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	376,860.94	0.00	376,860.94

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 3,199,467.000*
TENVLE(FASTE) FAS.0.500*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
376,860.94K	376,860.94K	376,860.94K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	90.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	82,993,968.00R	81,647.9*	2,167,431.50R	104.35*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	4.759*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	FOAK	
PCOST	376,860.94*		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	OCT.1992*	100.00	2.121*	1988*	NONE
	CONTIN	ADD				
END	0	0				

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DO YOU WISH TO MAKE CHANGES (Y/N): E216
ENTER ECONOMIC FILENAME:

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2498076
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fps

FAST-C
CALCMX PROGRAM

NAME 214

PROJECT 276-S Hexone Storage

ECON YEAR YEAR

BASE AMOUNT (BAMT) BSF ELF EYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVNT ECUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	276-S	1	Ea	532,600	1952	
2 =				4,300	53	
3 =				3,100	54	
4 =				5,900	55	
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

FPS-16 30-0

:14

PROJECT : 276-S HEXONE STORAGE
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .94"5 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=S.276 1 EA 532600 1952
2=N 1 EA 4300 1953
3=N 1 EA 3100 1954
4=N 1 EA 5900 1955
5=

***** FAST-C CALCMX PROGRAM *****

NAME: 214 DATE: THU, APR 06 1989 19:02:49
PROJECT: 276-S HEXONE STORAGE ECONFILE:

EXCMX	BAMT	BASE
246,250.469*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
3,385.71*	3,385,714.50*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	S.276	1.0	EA	532,600.00	1952	240,200.906*
2=	N	1.0	EA	4,300.00	1953	1,202.735*
3=	N	1.0	EA	3,100.00	1954	808.981*
4=	N	1.0	EA	5,900.00	1955	1,557.024*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

9 1 2 1 2 4 9 8 0 7 8 8

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214
ENTER ECONOMIC FILENAME:

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FILENAME: W214                                   DATE: THU, APR 20 1989  11:02:10
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                          ***** FAST-E *****

PROJECT:   214                                   DATE: THU, APR 20 1989  11:02:10
LOCATION:  HANFORD                               FILENAME: W214
ITEM:      ACQUISITION COST                      ECONFILE:

                          ***** DETAIL ITEM *****

                        ***** CHARACTERISTICS *****

                FASTE EQUIVALENT
                FASTE                                 14,617.035*
                  TENVLE(FASTE)                        FAS.0.375*

                          ***** INPUT DATA *****

                  ESCAL      GECON      FPER       LCURVE        CMULT
 PRJGLOB          1.000      1988       12. D       0.960*       1,000.
                  TYPE       SYSTEM     RERUN      REMBOX
 FILE             D           0         0           0
                  ALL    COST    UNCERT LOHMAT  INPUT    FGRAPH    FDET
 FORMAT            0      0       0       0       1        0         0

                  PLTFM   ENTYPE MATVAL  TYEAR
 GLOB             1.100   100.000  1.00D  1988

                  WT         WTFAC          VOL         VOLFAC
 WTVOL       498,542.38*    8,688.8     13,019.70*     100.00
                  PMX        MXTYPE      ELWT       ELMX         STWT      STMX
 MXLINE           1.001*     4.315*       0.0       0.000         0.0     0.000

                  PCOST                  PQTY       PECON      FOAK
 PCOST          3,385.70                   1.        1988      1.000
                  PSTART     PFIN        PSCHDX     PRDMX      PYEARC     PDISC
 PSCHD            JAN.1988   OCT.1989*   100.00     4.314*       1988*     NONE
                  CONTIN     ADD
 END               1          0

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DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

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FILENAME: W214 DATE: THU, APR 20 1989
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 214 DATE: THU, APR 20 1989 11:02:34
LOCATION: HANFORD FILENAME: W214
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	10,766.75	0.00	10,766.75

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 50,649.133*
TENVLE(FASTE) FAS.0.367*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
10,766.75K	10,766.75K	10,766.75K

***** INPUT DATA *****

	ESCAL	GECON		FPER	LCURVE		CMULT
PRJGLOB	1.000	1988		12.	0.960		1,000.
	TYPE	SYSTEM		RERUN	REMBOX		
FILE	D	0		0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.300	80.000	1.00D	1988			
	WT	WTFAC		VOL	VOLFAC		
WTVOL	498,542.38R	10,443.2*		13,019.70R	109.21*		
	PMX	MXTYPE		ELWT	ELMX	STWT	STMX
MXLINE	1.001R	5.091*		0.0	0.000	0.0	0.000
	PCOST			PQTY	PECON	FOAK	
PCOST	10,766.75*			1.	1988	1.000	
	PSTART	PFIN		PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	MAY.1990*		100.00	3.526*	1988*	NONE
	CONTIN	ADD					
END	0	0					

DO YOU WISH TO MAKE CHANGES (Y/N):

NOT INCLUDED IN PRICE TOTAL. PART A PERMIT APPLICATION WITHDRAWAN.

0 2 1 2 4 9 8 0 7 9 1

fps

CALCMX PROGRAM

NAME 216

PROJECT Purex Tunnels

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KOUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1	F168286	1	Ea	53,700	1955	
2						
3						
4	For reference only					
5						
6						
7						
8	F222339	1	Ea	1,160,500	1965	
9						
10						
11	For reference only					
12						
13						
14						
15						
16						
17						
18						
19						
20						

FPS-16 30-87

```
16
   PROJECT            : PUREX TUNNELS
    ECON. FILENAME :

   ECON YEAR (YEAR): 1988

   BASE                KSF  KLF  CYD  ACRES
   BASE AMT. (BAMT): 0 0 1

   MX TYPE (MXTYPE): EXCMX

                       SINDEX PINDEX TYEAR
   GLOBAL DATA       : .95 .9 1988

   ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=F168286 1 EA 53700 1955
 2=F222339 1 EA 1160500 1965
 3=
```

```
                    ***** FAST-C CALCMX PROGRAM *****

 NAME:      216                         DATE: THU, APR 06 1989  19:07:55
 PROJECT:   PUREX TUNNELS               ECONFILE:


                 EXCMX                  BAMT          BASE
             330,397.438*                1.0          CYD

                TCOST($1000    )      UCOST/CYD      YEAR
                      4,432.74*    4,432,740.00*     1988

                         ***** INPUT DATA *****

                           SINDEX  PINDEX  TYEAR
                            0.950   0.900  1988


      (X) ITEM()        AMT() UNIT()        UCOST() UYEAR()       UMX()
       1= F168286         1.0 EA          53,700.00  1955   17,322.461*
       2= F222339         1.0 EA       1,160,500.00  1965  306,313.063*
```

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   DO YOU WISH TO ENTER ANY CHANGES (Y/N):
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FILENAME: E216                                         DATE: TUE, APR 18 1989  13:40:00
ITEM NOW UNDER PROCESS IS: ACQUISITION COST
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                              ***** FAST-E *****

PROJECT:  216                                          DATE: TUE, APR 18 1989  13:40:00
LOCATION: HANFORD                                      FILENAME: E216
ITEM:     ACQUISITION COST                             ECONFILE:

                              ***** DETAIL ITEM *****

                            ***** CHARACTERISTICS *****

                 FASTE EQUIVALENT
                 FASTE                                        23,864.168*
                   TENVLE(FASTE)                               FAS.0.389*

                               ***** INPUT DATA *****

                   ESCAL        GECON        PPER       LCURVE          CMULT
PROJGLOB           1.000        1988         12. D       0.960*        1,000.
                   TYPE         SYSTEM       RERUN      REMBOX
FILE               D             0           0            0
                   ALL      COST     UNCERT  LOHMAT    INPUT     PGRAPH     PDET
FORMAT              0        0         0        0        1          0          0

                   PLTFM    ENTYPE  MATVAL   TYEAR
GLOB               1.000   100.000   1.00D   1988

                   WT           WTFAC            VOL          VOLFAC
WTVOL      849,336.13*      10,825.4       22,180.86*       100.00
                   PMX          MXTYPE        ELWT       ELMX         STWT      STMX
MXLINE             1.000*       4.224*         0.0       0.000         0.0     0.000

                   PCOST                      PQTY       PECON        FOAK
PCOST            4,432.70                       1.         1988        1.000
                   PSTART       PFIN          PSCHDX     PRDMX        PYEARC      PDISC
PSCHD              JAN.1988     AUG.1989*     100.00     4.223*         1988*      NONE
                   CONTIN       ADD
END                 1            0
```

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DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N
```

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```
FILENAME: E216                                         DATE: TUE, APR 18 1989  13:40:26
 TEM NOW UNDER PROCESS IS: REPLACEMENT COST
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                              ***** FAST-E *****
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PROJECT: 216 DATE: [illegible]
LOCATION: HANFORD FILENAME: E216
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	16,519.71	0.00	16,519.71

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	85,475.109*
TENVLE(FASTE)	FAS.0.381*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
16,519.71K	16,519.71K	16,519.71K

***** INPUT DATA *****

	ESCAL	GECON	FFER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		

	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0

	PLTFM	ENTYPE	MATVAL	TYEAR
GLOB	1.300	80.000	1.00D	1988

	WT	WTFAC	VOL	VOLFAC		
WTVOL	849,336.13R	13,131.2*	22,180.86R	109.21*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	5.091*	0.0	0.000	0.0	0.000

	PCOST		PQTY	PECON	FOAK	
PCOST	16,519.71*		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JUL.1990*	100.00	3.454*	1988*	NONE
	CONTIN	ADD				
END	0	0				

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DO YOU WISH TO MAKE CHANGES (Y/N):
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CALCMX PROGRAM

NAME 217

PROJECT TRUSAF (224-T)

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	224T	1	EA	872,000	1952/44	
2 =				1,077,800	72	
3 =				1,900	76	
4 =				55,500	81	
5 =				5,700	83	
6 =				18,700	84	
7 =				224,700	86	
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

1 2 1 2 4 9 8 0 7 9 0

17

```
PROJECT             : TRUSAF (224-7"T)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=T.244 1 EA 872000 1952
 2=N 1 EA 1077800 1972
 3=N 1 EA 1900 1976
 4=N 1 EA 55500 1981
 5=N 1 EA 5700 1983
 6=N 1 EA 18700 1984
 7=N 1 EA 224700 1986
 8=
```

***** FAST-C CALCMX PROGRAM *****

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NAME:      217                    DATE: THU, APR 06 1989  19:11:05
PROJECT:   TRUSAF (224-T)         ECONFILE:
```

EXCMX	BAMT	BASE
676,073.750*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
8,545.09*	8,545,088.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	T.244	1.0	EA	872,000.00	1952	411,296.188*
2=	N	1.0	EA	1,077,800.00	1972	200,027.156*
3=	N	1.0	EA	1,900.00	1976	145.054*
4=	N	1.0	EA	55,500.00	1981	3,363.807*
5=	N	1.0	EA	5,700.00	1983	250.843*
6=	N	1.0	EA	18,700.00	1984	887.411*
7=	N	1.0	EA	224,700.00	1986	13,290.525*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

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217
ENTER ECONOMIC FILENAME:

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FILENAME: W217                                    DATE: THU, APR 13 1989  16:13:56
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                             ***** FAST-E *****

PROJECT:   217                                    DATE: THU, APR 13 1989  16:13:57
LOCATION:  HANFORD                                FILENAME: W217
ITEM:      ACQUISITION COST                       ECONFILE:

                             ***** DETAIL ITEM *****

                         ***** CHARACTERISTICS *****

                 FASTE EQUIVALENT
                 FASTE                                 52,649.336*
                   TENVLE(FASTE)                        FAS.0.411*

                            ***** INPUT DATA *****

                   ESCAL       GECON       FPER       LCURVE          CMULT
 PROJGLOB          1.000       1988        12. D       0.960*         1,000.
                   TYPE        SYSTEM      RERUN      REMBOX
 FILE              D             0         0            0
                   ALL    COST    UNCERT   LOHMAT   INPUT    FGRAPH    FDET
 FORMAT             0      0        0        0        1        0         0

                   PLTFM   ENTYPE  MATVAL   TYEAR
 GLOB              1.000  100.000   1.00D   1988

                   WT          WTFAC          VOL          VOLFAC
 WTVOL     2,007,103.25*     15,437.3       52,416.56*      100.00
                   PMX         MXTYPE      ELWT       ELMX          STWT     STMX
 MXLINE            1.000*      4.224*       0.0       0.000          0.0    0.000

                   PCOST                   PQTY       PECON     FOAK
 PCOST           8,545.10                     1.        1988      1.000
                   PSTART      PFIN        PSCHDX     PRDMX     PYEARC      PDISC
 PSCHD             JAN.1988    NOV.1989*   100.00     4.223*     1988*      NONE
                   CONTIN      ADD
 END                1            0

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DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

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ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 217
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: THU, APR 13 1989 16:14:29
FILENAME: W217
ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	32,969.48:	0.00	32,969.48

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	198,927.438*
TENVLE(FASTE)	FAS.0.402*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
32,969.48K	32,969.48K	32,969.48K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	80.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	2,007,103.25R	19,005.1*	52,416.56R	109.21*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	5.091*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	PDAK	
PCOST	[redacted]		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	NOV.1990*	100.00	3.337*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

FACILITY PARTIALLY COMPLETED. COST OF THE COMPLETED PORTION IS ESTIMATED.

13 MIXED WASTE STORAGE UNITS ARE COMPLETED.
8 FLAMMABLE STORAGE UNITS ARE COMPLETED.

0 2 1 2 4 9 8 0 8 0 0

PCB/RMW STORAGE FACILITY

DATE 02/24/88

ESTIMATE SUMMARY BY CSI DIVISION

CSI DIV	DESCRIPTION	ESTIMATE DIRECT TOTAL	TOTAL INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	TOTAL
CONSTRUCTION							
02	SITEWORK	8401	0	8401	0.00	0	8401
03	CONCRETE	38102	0	38102	0.00	0	38102
05	METALS	12129	0	12129	0.00	0	12129
07	MOISTURE AND THERMAL CONTROL	4118	0	4118	0.00	0	4118
08	DOORS, WINDOWS AND GLASS	18886	0	18886	0.00	0	18886
09	FINISHES	11407	0	11407	0.00	0	11407
13	SPECIAL CONSTRUCTION	50370	0	50370	0.00	0	50370
15	MECHANICAL	17513	0	17513	0.00	0	17513
16	ELECTRICAL	25568	0	25568	0.00	0	25568
	TOTAL CONSTRUCTION	186494	0	186494	0.00	0	186494
PROJECT TOTAL		186,494	0	186,494	0.00	0	186,494

FY'89 LOW FLASHPOINT
STORAGE MODULE EST.

DESCRIPTION	COST PER MODULE	TOTAL FOR 9
SITE WORK	$2.3	$20.3 K
SET MODULES	1.3	11.3
ESCORTS	1.0	9.0
SITE ACCESS	4.8	43.6
DESIGN	1.1	10.1
MODULE PROCUREMENT	21.6	194.4
SUB TOTAL	32.1	288.5
STATE TAX	2.0	18.0
KEH MARK UP ON LAB. 99%	3.5	31.5
SUB TOTAL	37.6	338.0
ESCALATION 2%	0.8	6.8
SUB TOTAL	38.3	344.8
CONTINGENCY	13.4	120.7
TOT. CENRTC FUNDING REQD -->	$51.7	$465.5 K

fps

FAST-C
CALCMX PROGRAM

(1)

NAME 219

PROJECT Single Shell Tanks

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVWT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	241A	1	Ea	2800	1978	
2 =				76500	85	
3 =				56400	1952/44	
4 =				26,000	1952/50	
5 =				4,170,500	1955	
6 =				17,700	1958	
7 =				248,700	1959	
8 =				183,300	1961	
9 =				130,500	1963	
10 =				21,300	64	
11 =				13,400	66	
12 =				7,000	67	
13 =				173,800	68	
14 =				14300	69	
15 =				49,200	70	
16 =				68,600	72	
17 =				28400	73	
18 =				34800	74	
19 =				7700	75	
20 =				4,679,300	76	

2124980800

fps

FAST-C
CALCMX PROGRAM

(2)

NAME 219

PROJECT Single Shell Tanks

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SJBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	241A	1	Ea	60,600	1977	
2 =				22,300	78	
3 =				39,900	79	
4 =				503,200	80	
5 =				23600	81	
6 =				70,800	82	
7 =				181,000	82	
8 =				101,100	84	
9 =				242,800	85	
10 =				28,200	86	
11 =	241AX	1	Ea	4,500	1956	
12 =				2,378,800	65	
13 =				11,500	66	
14 =				19900	68	
15 =				398,300	72	
16 =				183,700	75	
17 =				482,000	76	
18 =				73,000	77	
19 =				29600	78	
20 =				640,500	80	
		1	EA	200,900	1982	
		1	EA	103,200	1984	

PRE-16 ..30d:
4,542,300

2 1 2 4 9 8 0 8 0 4

fps

FAST-C
CALCMX PROGRAM

(3)

NAME 219

PROJECT Single Shell Tanks

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )	
1 =							
2 =							
3 =	241 B	1	Ea	7,927,600	1952/44		
4 =				815,400	1952		
5 =				27,300	55		
6 =				17,200	61		
7 =				107,300	67		
8 =				10,400	71		
9 =				64,300	72		
10 =				186,600	73		
11 =				76,600	76		
12 =				26,600	81		
13 =				1,977,100	82		
14 =				13,100	84		7,285,673
15 =	241 BX	1	Ea	18,200	1952/44		
16 =				5,141,400	1952/48		
17 =				6,002,500	52		
18 =				7,300	69		
19 =				187,200	72		
20 =				118,200	74		

CONTINUES ON PG. 4

FPS-14 11-30-83

FAST-C
CALCMX PROGRAM

(4)

NAME 219

PROJECT SST

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

PG.3

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	241BX	1	Ea	12,100	1977	
2 =				1,440,400	82	
3 =	241.BY	1	Ea	378,800	1952/44	
4 =				2,500,000	1952/49	
5 =				1,444,500	1952	
6 =				2,800	1961	
7 =				473,900	1964	
8 =				548,100	68	
9 =				276,100	69	
10 =				138,600	70	
11 =				51,400	72	
12 =				23,900	74	
13 =				127,800	76	
14 =				115,200	80	
15 =				2,421,600	82	
16 =				127,600	84	
17 =	241C	1	Ea	8,128,200	1952/44	
18 =				2,016,000	1952	
19 =				46,400	1955	
20 =				65,800	1969-72	

FPS-14 11-30-83

FAST-C
CALCMX PROGRAM

5

NAME 219

PROJECT SST

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	241-C	1	Ea	36,500	1973	
2 =				65,100	75	
3 =				152,200	78	
4 =				365,800	84	
5 =				512,700	85	
6 =				97,700	88	
7 =	241S	1	Ea	5,067,800	1952	
8 =				77,400	55	
9 =				55,600	64	
10 =				34,200	68	
11 =				62,000	72	
12 =				1117,000	74	
13 =				91,100	75	
14 =				19,900	77	
15 =				785,000	78	
16 =				231,900	82	
17 =				220,800	84	
18 =				50,000	88	7,824,717
19 =						
20 =						

FPS-14 11-30-83

FAST-C
CALCMX PROGRAM

6

NAME 219

PROJECT SST

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )	
1 =	241-SX	1	Ea	81,000	1952		
2 =				3,136,600	55		
3 =				294,000	58		
4 =				231,100	62		
5 =				6,000	64		
6 =				35,500	69		
7 =				202,600	72		
8 =				467,700	74		
9 =				19,700	76		
10 =				454,000	78		
11 =				87,800	80		
12 =				756,300	84		
13 =				176,600	85		
14 =				1,023,300	86		
15 =				2,68,500	88		7,240,851
16 =							
17 =							
18 =							
19 =							
20 =							

FPS-14 11-30-83

FAST-C
CALCMX PROGRAM

7

NAME 219

PROJECT SST

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	241-T	1	Ea	8,810,500	1952/44	
2 =				1,452,600	1952	
3 =				94,800	55	
4 =				51,500	72	
5 =				25,500	75	
6 =				84,900	78	
7 =				68,900	81	
8 =	241 TX			4,500,000	1952/49	
9 =				3,485,700	1952	
10 =				26,600	69	
11 =				98,900	70	
12 =				620,600	72	
13 =				146,800	73	
14 =				18,600	75	
15 =				120,200	77	
16 =				391,300	80	
17 =				3,604,200	81	
18 =				308,800	82	
19 =				44,400	84	
20 =						

FAST-C
CALCMX PROGRAM

(8)

NAME 219

PROJECT SST

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )	
1 =	241-TY	1	Ea	2,198,100	1952		
2 =				50,600	55		
3 =				37,300	72		
4 =				108,100	73		
5 =				8,800	76		
6 =				18,500	81		
7 =				148,500	86		2,569,787
8 =	241 U	1	Ea	10,167,000	1952/44		
9 =				5,189,800	1952		
10 =				38,500	60		
11 =				66,300	72		
12 =				2,954,700	75		
13 =				315,900	78		
14 =				118,100	81		
15 =				133,000	85		
16 =							
17 =							
18 =							
19 =							
20 =							

fps

FAST-C
CALCMX PROGRAM

NAME 219

PROJECT Single Shell Tank Summary 2E/2W

ECON YEAR YEAR

BASE AMOUNT (BAMT) KSF KLF CYD ACRES

MX TYPE MXTYPE

GLOBAL DATA SINDEX PINDEX TYEAR

PLATFORM DATA SEISM TORNAD RADIAT BLDUSE PLTFM

FACTOR DATA AVHT KCUFT TRNPSF NLEVEL SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )	
1 =	A241	1	Ea	44,955,000	1988		6 Tks
2 =	AX241			6,918,000			4
3 =	B241			68,415,000			16
4 =	BX241			85,915,000			12
5 =	BY241			41,302,000			12
6 =	C 241			76,620,000			16
7 =	S 241			43,730,000			12
8 =	SX241			29,460,000			15
9 =	T 241			76,395,000			16
10 =	TX241			67,785,000			18
11 =	TY241			17,090,000			6
12 =	U 241			121,360,000			16
13 =							
14 =				679,945,000			149
15 =							
16 =							
17 =							
18 =							
19 =							
20 =							

FPS-1A 11-03-82

9

PROJECT : SINGLE SHELL TANK (241A)
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): XCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=PAGE.1 1 EA 43138230 1988
2=PAGE.2 1 EA 1816930 1988
3=

***** FAST-C CALCMX PROGRAM *****

NAME: 219 DATE: FRI, APR 07 1989 09:55:24
PROJECT: SINGLE SHELL TANK (241A) ECONFILE:

EXCMX	BAMT	BASE
3,450,970.000*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
44,955.14*	44,955,144.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	PAGE.1	1.0	EA	43,138,224.00	1988	************
2=	PAGE.2	1.0	EA	1,816,930.00	1988	104,189.453*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

9

```
PROJECT              : SINGLE SHELL TANKS PG.1
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                 KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                     SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=A241 1 EA 2800 1978
 2=N 1 EA 76500 1985
 3=N 1 EA 56400 1952
 4=N 1 EA 26000 1952
 5=N 1 EA 4170500 1955
 6=N 1 EA 17700 1958
 7=N 1 EA 248700 1988""59
 8=N 1 EA 183300 1961
 9=N 1 EA 130500 1963
10=N 1 EA 21300 1964
11=N 1 EA 13400 1966
12=N 1 EA 7000 1967
13=N 1 EA 173800 1968
14=N 1 EA 14300 1969
15=N 1 EA 49200 1970
16=N 1 EA 68600 1972
17=N 1 EA 28400 1973
18=N 1 EA 34800 1974
19=N 1 EA 7700 1975
20=N 1 EA 4679300 1976
21=
```

***** FAST-C CALCMX PROGRAM *****

```
NAME:      219                          DATE: FRI, APR 07 1989  09:34:12
PROJECT:   SINGLE SHELL TANKS PG.1      ECONFILE:
```

EXCMX	BAMT	BASE
3,299,099.000*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
43,138.23*	43,138,224.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	A241	1.0	EA	2,800.00	1978	188.151*

2=	N	1.0	EA	76,500.00	1985	3,713.231*
3=	N	1.0	EA	56,400.00	1952	20,739.801*
4=	N	1.0	EA	26,000.00	1952	8,910.990*
5=	N	1.0	EA	4,170,500.00	1955	**********
6=	N	1.0	EA	17,700.00	1958	4,469.472*
7=	N	1.0	EA	248,700.00	1959	76,111.344*
8=	N	1.0	EA	183,300.00	1961	49,567.758*
9=	N	1.0	EA	130,500.00	1963	31,084.590*
10=	N	1.0	EA	21,300.00	1964	4,101.120*
11=	N	1.0	EA	13,400.00	1966	2,247.194*
12=	N	1.0	EA	7,000.00	1967	1,054.756*
13=	N	1.0	EA	173,800.00	1968	33,425.055*
14=	N	1.0	EA	14,300.00	1969	2,088.829*
15=	N	1.0	EA	49,200.00	1970	7,664.278*
16=	N	1.0	EA	68,600.00	1972	9,911.271*
17=	N	1.0	EA	28,400.00	1973	3,572.313*
18=	N	1.0	EA	34,800.00	1974	4,158.805*
19=	N	1.0	EA	7,700.00	1975	727.072*
20=	N	1.0	EA	4,679,300.00	1976	726,552.125*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
PROJECT            : SINGLE SHELL TANKS PG.2
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=A241 1 EA 60600 1977
 2=N 1 EA 22300 1978
 3=N 1 EA 39900 1979
 4=N 1 EA 503200 1980
 5=N 1 EA 23600 1981
 6=N 1 EA 70800 1982
 7=N 1 EA 181000 1982
 8=N 1 EA 101100 1984
 9=N 1 EA 242800 1985
10=N 1 EA 28200 1986
11=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 219 DATE: FRI, APR 07 1989 09:43:14
PROJECT: SINGLE SHELL TANKS PG.2 ECONFILE:

EXCMX	BAMT	BASE
104,189.188*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
1,816.93*	1,816,927.50*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	A241	1.0	EA	60,600.00	1977	5,849.412*
2=	N	1.0	EA	22,300.00	1978	1,809.576*
3=	N	1.0	EA	39,900.00	1979	3,035.150*
4=	N	1.0	EA	503,200.00	1980	41,893.773*
5=	N	1.0	EA	23,600.00	1981	1,323.391*
6=	N	1.0	EA	70,800.00	1982	4,068.840*
7=	N	1.0	EA	181,000.00	1982	11,328.537*
8=	N	1.0	EA	101,100.00	1984	5,289.911*
9=	N	1.0	EA	242,800.00	1985	13,089.934*
10=	N	1.0	EA	28,200.00	1986	1,197.122*

9

PROJECT   : SHINGL219
PROJECT   : SINGLE SHELL TK.PG.2(241AX)
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE   KSF   KLF   CYD   ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA   : .95 .9 1988

ITEM()   AMT()   UNIT()   UCOST()   UYEAR()   UMX()

1=AX241 1 EA 4500 1956
2=N 1 EA 2378800 1988
3=N 1 EA 11500 1966
4=N 1 EA 19900 1968
5=N 1 EA 398300 1972
6=N 1 EA 183700 1975
7=N 1 EA 482000 1976
8=N 1 EA 73000 1977
9=N 1 EuA 29600 1978
10=N 1 EA 640500 1980
11=N 1 EA 200900 1982
12=N 1 EA 103200 1984
13=

***** FAST-C CALCMX PROGRAM *****

NAME: 219   DATE: FRI, APR 07 1989   10:09:03
PROJECT: SINGLE SHELL TK.PG.2(241   ECONFILE:

EXCMX	BAMT	BASE
447,957.500*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
6,917.79*	6,917,789.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	AX241	1.0	EA	4,500.00	1956	1,104.375*
2=	N	1.0	EA	2,378,800.00	1988	139,791.594*
3=	N	1.0	EA	11,500.00	1966	1,901.939*
4=	N	1.0	EA	19,900.00	1968	3,142.765*
5=	N	1.0	EA	398,300.00	1972	67,524.031*
6=	N	1.0	EA	183,700.00	1975	23,143.742*
7=	N	1.0	EA	482,000.00	1976	60,868.555*
8=	N	1.0	EA	73,000.00	1977	7,166.592*

9=	N	1.0	EA	29,600.00	1978	2,464.586*
10=	N	1.0	EA	640,500.00	1980	54,507.203*
11=	N	1.0	EA	200,900.00	1982	12,693.861*
12=	N	1.0	EA	103,200.00	1984	5,409.899*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
PROJECT             : SINGLE SHELL TK.PG.3(241B)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=B241 1 EA 7927600 1952
 2=N 1 EA 815400 1952
 3=N 1 EA 27300 1955
 4=N 1 EA 17200 1961
 5=N 1 EA 107300 1967
 6=N 1 EA 10400 1971
 7=N 1 EA 64300 1972
 8=N 1 EA 186600 1973
 9=N 1 EA 76600 1976
10=N 1 EA 26600 1981
11=N 1 EA 1977100 1982
12=N 1 EA 13100 1984
13=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 219 DATE: FRI, APR 07 1989 10:16:12

PROJECT: SINGLE SHELL TK.PG.3(241 ECONFILE:

EXCMX	BAMT	BASE
5,456,206.000*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
68,414.72*	68,414,720.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	B241	1.0	EA	7,927,600.00	1952	***********
2=	N	1.0	EA	815,400.00	1952	382,260.563*
3=	N	1.0	EA	27,300.00	1955	8,281.105*
4=	N	1.0	EA	17,200.00	1961	3,750.986*
5=	N	1.0	EA	107,300.00	1967	20,721.738*
6=	N	1.0	EA	10,400.00	1971	1,340.718*
7=	N	1.0	EA	64,300.00	1972	9,235.494*
8=	N	1.0	EA	186,600.00	1973	27,852.809*
9=	N	1.0	EA	76,600.00	1976	8,183.804*

10= N	1.0 EA	26,600.00	1981	1,507.936*
11= N	1.0 EA	1,977,100.00	1982	153,786.750*
12= N	1.0 EA	13,100.00	1984	569.232*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

.9

PROJECT : SINGLE SHELL TK.PG.3(241BX)
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

CMX

MX TYPE (MXTYPE):
SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=BX241 1 EA 18200 1952
2=N 1 EA 5141400 1952
3=N 1 EA 6002500 1952
4=N 1 EA 7300 1969
5=N 1 EA 187200 1972
6=N 1 EA 118200 1974
7=N 1 EA 12100 1977
8=N 1 EA 1440400 1977
9=

***** FAST-C CALCMX PROGRAM *****

NAME: 219 DATE: FRI, APR 07 1989 11:03:43
PROJECT: SINGLE SHELL TK.PG.3(241 ECONFILE:

EXCMX	BAMT	BASE
6,995,219.000*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
85,914.75*	85,914,752.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	BX241	1.0	EA	18,200.00	1952	6,038.676*
2=	N	1.0	EA	5,141,400.00	1952	************
3=	N	1.0	EA	6,002,500.00	1952	************
4=	N	1.0	EA	7,300.00	1969	1,003.098*
5=	N	1.0	EA	187,200.00	1972	29,630.969*
6=	N	1.0	EA	118,200.00	1974	15,786.412*
7=	N	1.0	EA	12,100.00	1977	1,008.830*
8=	N	1.0	EA	1,440,400.00	1977	185,444.656*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

19

```
PROJECT            : SINGLE SHELL TK.PG.4(241BY)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=BY241 1 EA 378800 1952
1 EA      2=2500000?N 1 EA 2500000 1952
  3=N 1 EA 1444500 1952
 -4=N 1 EA 2800 296"""1961
  5=N 1 EA 473900 1964
  6=N 1 EA 548100 1968
  7= 1 EA 276100 1969
  8= 1 EA 138600 1970
  9= 1 EA 51400 1972
 10=N 1 EA 23900 1974
 11=N 1 EA 128"7800 1976
 12=N 1 EA 115200 1980
  .13=1 EA 2421600 1982
 14=N 1 EA 127600 1984
 15=
```

```
                   ***** FAST-C CALCMX PROGRAM *****

NAME:      219                          DATE: FRI, APR 07 1989  11:46:16
PROJECT:  SINGLE SHELL TK.PG.4(241     ECONFILE:

              EXCMX                   BAMT            BASE
        3,146,281.500*                 1.0            CYD

              TCOST($1000    )      UCOST/CYD       YEAR
                 41,302.89*   41,302,888.00*       1988

                        ***** INPUT DATA *****

                       SINDEX  PINDEX  TYEAR
                        0.950   0.900  1988
```

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	BY241	1.0	EA	378,800.00	1952	165,626.031*
2=	N	1.0	EA	2,500,000.00	1952	************
3=	N	1.0	EA	1,444,500.00	1952	713,316.625*
4=	N	1.0	EA	2,800.00	1961	517.732*
5=	N	1.0	EA	473,900.00	1964	120,973.734*
6=	N	1.0	EA	548,100.00	1968	117,010.984*
7=	N	1.0	EA	276,100.00	1969	52,785.727*

8=	N	1.0	EA	138,600.00	1970	23,722.488*
9=	N	1.0	EA	51,400.00	1972	7,233.883*
10=	N	1.0	EA	23,900.00	1974	2,760.280*
11=	N	1.0	EA	127,800.00	1976	14,304.297*
12=	N	1.0	EA	115,200.00	1980	8,387.920*
13=	N	1.0	EA	2,421,600.00	1982	191,867.031*
14=	N	1.0	EA	127,600.00	1984	6,819.294*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

9

PROJECT : SINGLE SHELL TK.PG.4(241C)
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=C241 1 EA 8128200 1952
2=N 1 EA 2016000 1952
3=N 1 EA 46400 1955
4=N 1 EA 65800 1969
5=C241 1 EA 36500 1973
6=N 1 EA 65100 1975
7= 1 EA 152200 1978
8=N 1 EA 365800 1984
9=N 1 EA 512700 1985
10=N 1 EA 979"700 1988
11=

***** FAST-C CALCMX PROGRAM *****

NAME: 219 DATE: FRI, APR 07 1989 11:52:44
PROJECT: SINGLE SHELL TK.PG.4(241 ECONFILE:

EXCMX	BAMT	BASE
6,173,965.000*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
76,621.53*	76,621,520.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	C241	1.0	EA	8,128,200.00	1952	************
2=	N	1.0	EA	2,016,000.00	1952	************
3=	N	1.0	EA	46,400.00	1955	14,770.131*
4=	N	1.0	EA	65,800.00	1969	11,042.186*
5=	C241	1.0	EA	36,500.00	1973	4,697.108*
6=	N	1.0	EA	65,100.00	1975	7,463.599*
7=	N	1.0	EA	152,200.00	1978	14,706.668*
8=	N	1.0	EA	365,800.00	1984	21,513.598*
9=	N	1.0	EA	512,700.00	1985	29,584.426*
10=	N	1.0	EA	97,700.00	1988	4,295.133*

9

```
PROJECT            : SINGLE SHELL TK.PG.5(241S)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=S241 1 EA 5067800 1952
 2=N 1 EA 77400 1955
 3=N 1 EA 55600 1964
 4=N 1 EA 34200 1968
 5=N 1 EA 62000 1972
 6=N 1 EA 1117000 1974
 7=N 1 EA 91100 1975
 8=N 1 EA 19900 1977
 9=N 1 EA 785000 1978
10=N 1 EA 231900 1982
11=N 1 EA 220800 1984
12=N 1 EA 50000 1988
13=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 219 DATE: FRI, APR 07 1989 12:00:01
PROJECT: SINGLE SHELL TK.PG.5(241 ECONFILE:

EXCMX	BAMT	BASE
3,348,286.500*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
43,727.49*	43,727,488.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	S241	1.0	EA	5,067,800.00	1952	***********
2=	N	1.0	EA	77,400.00	1955	25,811.277*
3=	N	1.0	EA	55,600.00	1964	11,680.959*
4=	N	1.0	EA	34,200.00	1968	5,673.675*
5=	N	1.0	EA	62,000.00	1972	8,875.693*
6=	N	1.0	EA	1,117,000.00	1974	182,976.188*
7=	N	1.0	EA	91,100.00	1975	10,768.424*
8=	N	1.0	EA	19,900.00	1977	1,735.915*
9=	N	1.0	EA	785,000.00	1978	88,051.703*

10= N	1.0 EA	231,900.00	1982	14,845.012*
11= N	1.0 EA	220,800.00	1984	12,403.281*
12= N	1.0 EA	50,000.00	1988	2,068.257*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
PROJECT            : SINGLE SHELL TK.PG.6(241SX)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : 95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=SX241 1 EA 81000 1952
 2=N 1 EA 3136600 1955
 3=N 1 EA 294000 1958
 4=N 1 EA 231100 1962
 5=N 1 EA 6000 1964
 6=N 1 EA 35500 2"1969
 7=N 1 EA 202600 1972
 8=N 1 EA 467700 1974
 9=N 1 EA 19700 1976
10=N 1 EA 454000 1978
11=N 1 EA 87800 1980
12=N 1 EA 756300 1984
13=N 1 EA 176600 1985
14=N 1 EA 1023300 1986
15=N 1 EA 268500 1988
16=
```

```
                  *****  FAST-C CALCMX PROGRAM *****

NAME:      219                          DATE: FRI, APR 07 1989  12:07:06
PROJECT:   SINGLE SHELL TK.PG.6(241     ECONFILE:

              EXCMX                 BAMT            BASE
       2,176,037.500*                1.0            CYD

            TCOST($1000    )      UCOST/CYD       YEAR
                29,457.42*    29,457,420.00*      1988

                  ***** INPUT DATA *****

                   SINDEX  PINDEX  TYEAR
                    0.950   0.900   1988

    (X) ITEM()       AMT() UNIT()       UCOST() UYEAR()       UMX()
     1= SX241          1.0 EA          81,000.00  1952  30,782.367*
     2= N              1.0 EA       3,136,600.00  1955  ************
     3= N              1.0 EA         294,000.00  1958  95,845.781*
     4= N              1.0 EA         231,100.00  1962  60,833.242*
     5= N              1.0 EA           6,000.00  1964   1,029.565*
     6= N              1.0 EA          35,500.00  1969   5.632.413*
```

7=	N	1.0	EA	202,600.00	1972	32,299.859*
8=	N	1.0	EA	467,700.00	1974	70,784.266*
9=	N	1.0	EA	19,700.00	1976	1,860.281*
10=	N	1.0	EA	454,000.00	1978	48,451.148*
11=	N	1.0	EA	87,800.00	1980	6,236.964*
12=	N	1.0	EA	756,300.00	1984	47,515.977*
13=	N	1.0	EA	176,600.00	1985	9,249.338*
14=	N	1.0	EA	1,023,300.00	1986	60,212.563*
15=	N	1.0	EA	268,500.00	1988	12,940.168*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

19

```
PROJECT            : SINGLE SHELL TK.PG.7(241T)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): XCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=T241 1 EA 8810500 1952
2=N 1 EA 1452600 1952
3=N 1 EA 94800 1955
4=N 1 EA 51500 1972
5=N 1 EA 25500 1975
6=N 1 EA 84900 1978
7=N 1 EA 68900 1981
8=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 219 DATE: FRI, APR 07 1989 12:13:04

PROJECT: SINGLE SHELL TK.PG.7(241 ECONFILE:

EXCMX	BAMT	BASE
6,154,129.000*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
76,395.84*	76,395,840.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	T241	1.0	EA	8,810,500.00	1952	************
2=	N	1.0	EA	1,452,600.00	1952	717,683.125*
3=	N	1.0	EA	94,800.00	1955	32,202.047*
4=	N	1.0	EA	51,500.00	1972	7,249.249*
5=	N	1.0	EA	25,500.00	1975	2,684.756*
6=	N	1.0	EA	84,900.00	1978	7,779.658*
7=	N	1.0	EA	68,900.00	1981	4,258.882*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

.9

```
PROJECT          : SINGLE SHELL TK.PG.7(241TX)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=TX241 1 EA 4500000 1952
 2=N 1 EA 3485700 1952
 3=N 1 EA 26600 1969
 4=N 1 EA 98900 1970
 5=N 1 EA 620600 1972
 6= 1 E 146800 1973
 7=N 1 EA 18600 1975
 8=N 1 EA 120200 1977
 9=N 1 EA 391300 1980
10=N 1 EA 3604200 1981
11=N 1 EA 308800 1982
12=N 1 EA 44400 1984
13=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 219 DATE: FRI, APR 07 1989 12:18:48
PROJECT: SINGLE SHELL TK.PG.7(241 ECONFILE:

EXCMX	BAMT	BASE
5,401,401.000*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
67,784.50*	67,784,496.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	TX241	1.0	EA	4,500,000.00	1952	************
2=	N	1.0	EA	3,485,700.00	1952	************
3=	N	1.0	EA	26,600.00	1969	4,111.049*
4=	N	1.0	EA	98,900.00	1970	16,416.043*
5=	N	1.0	EA	620,600.00	1972	109,539.266*
6=	N	1.0	E	146,800.00	1973	21,439.406*
7=	N	1.0	EA	18,600.00	1975	1,902.920*
8=	N	1.0	EA	120,200.00	1977	12,347.621*
9=	N	1.0	EA	391,300.00	1980	31,841.230*

10= N	1.0 EA	3,604,200.00	1981	319,242:688*
11= N	1.0 EA	308,800.00	1982	20,289.164*
12= N	1.0 EA	44,400.00	1984	2,155.722*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
PROJECT          : SINGLE SHELL TK.PG.8(241TY)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE              KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): L"O O 1

MX TYPE (MXTYPE): EXCMX

                  SINDEX PINDEX TYEAR
GLOBAL DATA     : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=TY241 1 EA 2198100 1952
2=N 1 EA 50600 1955
3=N 1 EA 37300 1972
4=N 1 EA 108100 1973
5=N 1 EA 8800 1975
6=N 1 EA 18500 1981
7=N 1 EA 148500 1986
8=
```

***** FAST-C CALCMX PROGRAM *****

```
NAME:      219                          DATE: FRI, APR 07 1989  12:25:04
PROJECT:   SINGLE SHELL TK.PG.8(241     ECONFILE:
```

EXCMX	BAMT	BASE
1,201,609.500*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
17,091.62*	17,091,620.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	TY241	1.0	EA	2,198,100.00	1952	************
2=	N	1.0	EA	50,600.00	1955	16,234.488*
3=	N	1.0	EA	37,300.00	1972	5,098.681*
4=	N	1.0	EA	108,100.00	1973	15,354.295*
5=	N	1.0	EA	8,800.00	1975	841.089*
6=	N	1.0	EA	18,500.00	1981	1,014.694*
7=	N	1.0	EA	148,500.00	1986	7,331.687*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

9

```
PROJECT            : SINGLE SHELL TK.PG.8(241U)
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): .95 .9 1988?EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=U241 1 EA 10167000 1952
2=N 1 EA 5189800 1952
3=N 1 EA 38500 1960
4=N 1 EA 66300 1972
5=N 1 EA 2954700 1975
6=N 1 EA 315900 1978
7=N 1 EA 118100 1981
8=N 1 EA 133000 1985
9=
```

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME:      219                          DATE: FRI, APR 07 1989  12:29:14
PROJECT:   SINGLE SHELL TK.PG.8(241     ECONFILE:

              EXCMX                 BAMT            BASE
        **************                 1.0            CYD

              TCOST($1000    )      UCOST/CYD       YEAR
                 121,362.34*    **************      1988

                        ***** INPUT DATA *****

                         SINDEX  PINDEX  TYEAR
                          0.950   0.900   1988


     (X) ITEM()        AMT() UNIT()       UCOST() UYEAR()       UMX()
      1= U241            1.0 EA     10,167,000.00  1952 ************
      2= N               1.0 EA      5,189,800.00  1952 ************
      3= N               1.0 EA         38,500.00  1960   9,478.377*
      4= N               1.0 EA         66,300.00  1972   9,549.316*
      5= N               1.0 EA      2,954,700.00  1975 479,194.063*
      6= N               1.0 EA        315,900.00  1978  32,619.695*
      7= N               1.0 EA        118,100.00  1981   7,666.579*
      8= N               1.0 EA        133,000.00  1985   6,788.558*
```

```
DO YOU WISH TO ENTER ANY CHANGES (Y/N):
```

19

```
PROJECT            : SINGLE SHELL TK.SUMMARY 2E
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=A241 1 EA 44955000 1988
2=AX241 1 EA 6918000 1988
3=B241 1 EA 68415000 1988
4=BX241 1 EA 85915000 1988
5=BY241 1 EA 41302000 1988
6=C241 1 EA 76620000 1988
7=
```

```
                 ***** FAST-C CALCMX PROGRAM *****

NAME:      219                        DATE: FRI, APR 07 1989  16:25:24
PROJECT:   SINGLE SHELL TK.SUMMARY    ECONFILE:

                 EXCMX                  BAMT          BASE
           **************               1.0           CYD

             TCOST($1000    )        UCOST/CYD        YEAR
              324,124.88*        **************       1988

                      ***** INPUT DATA *****

                       SINDEX  PINDEX  TYEAR
                        0.950   0.900  1988
```

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	A241	1.0	EA	44,955,000.00	1988	************
2=	AX241	1.0	EA	6,918,000.00	1988	447,972.938*
3=	B241	1.0	EA	68,414,992.00	1988	************
4=	BX241	1.0	EA	85,914,992.00	1988	************
5=	BY241	1.0	EA	41,302,000.00	1988	************
6=	C241	1.0	EA	76,620,000.00	1988	************

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
19
   PROJECT          : SINGLE SHELL TK.SUMMARY 2W
    ECON. FILENAME :

   ECON YEAR (YEAR): 1988

   BASE              KSF  KLF  CYD  ACRES
   BASE AMT. (BAMT): 0 0 1

   MX TYPE (MXTYPE): EXCMX

                     SINDEX PINDEX TYEAR
   GLOBAL DATA     : .95 .9 1988

   ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=S241 43730000 1988
   UYEAR(1) IS INCORRECT
   RE-ENTER TOTAL LINE
 1=S242 1 EA 43730000 1988
 2=SX241 1 EA 29460000 1988
 3=T241 1 EA 76395000 1988
 4=TX241 1 EA 67785000 1988
 5=TY241 1 EA 17090000 1988
 6=U241 1 EA 121360000
   ERROR! UYEAR MUST BE ENTERED
   RE-ENTER TOTAL LINE
 6=U241 1 EA 121360000 1988
 7=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 219 DATE: FRI, APR 07 1989 16:30:17
PROJECT: SINGLE SHELL TK.SUMMARY ECONFILE:

EXCMX	BAMT	BASE
**************	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
355,819.88*	**************	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	S242	1.0	EA	43,730,000.00	1988	************
2=	SX241	1.0	EA	29,460,000.00	1988	************
3=	T241	1.0	EA	76,394,992.00	1988	************
4=	TX241	1.0	EA	67,784,992.00	1988	************
5=	TY241	1.0	EA	17,090,000.00	1988	************
6=	U241	1.0	EA	*************	1988	************

9212490834

See W219

219
ENTER ECONOMIC FILENAME:

FILENAME: E219 DATE: TUE, APR 18 1989 13:41:17
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 219 DATE: TUE, APR 18 1989 13:41:17
LOCATION: HANFORD FILENAME: E219
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 4,216,755.000*
TENVLE(FASTE) FAS.0.532*

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE		CMULT	
PROGLOB	1.000	1988	12. D	0.960*		1,000.	
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.000	100.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	235,225,152.00*	110,247.1	6,143,029.00*	100.00			
	PMX	MXTYPE	ELWT	ELMX		STWT	STMX
MXLINE	1.000*	4.224*	0.0	0.000		0.0	0.000
	PCOST		PQTY	PECON	PDAK		
PCOST	324,124.90		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC		PDISC
PSCHD	JAN.1988	AUG.1991*	100.00	4.223*	1988*		NONE
	CONTIN	ADD					
END	1	0					

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 219
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: TUE, APR 18 1989 13:41:42
FILENAME: E219
ECONFILE:

***** DETAIL ITEM *****

#UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	858,067.25	0.00	858,067.25

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	8,573,858.000*
TENVLE(FASTE)	FAS.0.526*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
858,067.25K	858,067.25K	858,067.25K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT
PRJGLOB	1.000	1988	12.	0.960	1,000.

	TYPE	SYSTEM	RERUN	REMBOX
FILE	D	0	0	0

	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0

	PLTFM	ENTYPE	MATVAL	TYEAR
GLOB	1.300	90.000	1.00D	1988

	WT	WTFAC	VOL	VOLFAC
WTVOL	235,225,152.00R	126,580.1*	6,143,029.00R	104.35*

	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	4.759*	0.0	0.000	0.0	0.000

	PCOST	PQTY	PECON	FOAK
PCOST	T858,067.25*	1.	1988	1.000

	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JUL.1993*	100.00	1.949*	1986*	NONE

	CONTIN	ADD
END	0	0

DO YOU WISH TO MAKE CHANGES (Y/N): E220
ENTER ECONOMIC FILENAME:

W219
ENTER ECONOMIC FILENAME:

~~~~~~

FILENAME: **W219** DATE: THU, APR 20 1989 10:59:39
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

~~~~~~

***** FAST-E *****

PROJECT:	219	DATE:	THU, APR 20 1989 10:59:40
LOCATION:	HANFORD	FILENAME:	W219
ITEM:	ACQUISITION COST	ECONFILE:	

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	4,718,706.000*
TENVLE(FASTE)	FAS.0.536*

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12. D	0.960*	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.000	100.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	265,810,784.00*	115,951.5	6,941,789.00*	100.00			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.000*	4.224*	0.0	0.000	0.0	0.000	
	PCOST	PQTY	PECON	FOAK			
PCOST	355,819.90	1.	1988	1.000			
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	AUG.1991*	100.00	4.223*	1988*	NONE	
	CONTIN	ADD					
END	1	0					

~~~~~~

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

~~~~~~

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 219	DATE: THU, APR 20 1989 11:00:06
LOCATION: HANFORD	FILENAME: W219
ITEM: REPLACEMENT COST	ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	945,041.38	0.00	945,041.38

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	9,625,238.000*
TENVLE(FASTE)	FAS.0.529*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
945,041.38K	945,041.38K	945,041.38K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12.	0.960	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.300	90.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	265,810,784.00R	133,262.3*	6,941,789.00R	104.35*			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.000R	4.759*	0.0	0.000	0.0	0.000	
	PCOST	PQTY	PECON	FOAK			
PCOST	$945,041.38*	1.	1988	1.000			
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	SEP.1993*	100.00	1.929*	1988*	NONE	
	CONTIN	ADD					
END	0	0					

DO YOU WISH TO MAKE CHANGES (Y/N):

LOW-LEVEL BURIAL GROUND DISPOSAL CAPACITY

Attached is a listing of the trenches and their volumes used to determine the mixed waste disposal capacity for the Low-Level Burial Grounds Permit Application.

Trenches include the mixed waste trenches exempt from liner leachate requirements (existing mixed waste trenches prior to November 23, 1987), trench 94 in 218-E-12b used for submarine reactor compartment disposal, and space for lined trenches in burial ground 218-W-5 and 218-W-6. The available burial ground disposal capacity is 950 acre-feet.

ACRE FEET OF BURIAL GROUND SPACE AVAILABLE
FOR MIXED WASTE.

218-W-005 LEACHATE LINER

LENGH	WIDTH	ACRE	DEPTH	ACRE FEET
961	200	4.412	25	110.31

218-W-006 LEACHATE LINER TRENCH

345	115	0.911	25	22.77

218-W-04C TRENCH 1

250	35	0.201	15	3.01

218-W-04C TRENCH 14

190	190	0.829	25	20.72

218-W-04C TRENCH 20

410	26	0.245	15	3.67

218-W-04C TRENCH 24

580	26	0.346	15	5.19

218-W-04C TRENCH 29

390	26	0.233	15	3.49

218-W-04C TRENCH 48

520	24	0.287	18	5.16

218-W-04C TRENCH 53

610	24	0.336	18	6.05

218-W-03A TRENCH S3

265	24	0.146	18	2.63

218-E 010 TRENCH 9

848	24	0.467	18	8.41

218-E-12B TRENCH 38

963	24	0.531	18	9.55

SUB TOTAL 200.96

218-E-12B TRENCH 94

1320	450	13.636.		
330	200	1.515		
180	110	0.455		
		15.606	48	749.09

SUB TOTAL 749.09

TOTAL ACRE FEET 950.05

9 2 1 2 4 9 8 0 8 4 0

CONCEPTUAL DESIGN REPORT

RADIOACTIVE MIXED WASTE DISPOSAL FACILITIES

I. INTRODUCTION

Radioactive mixed waste (RMW) is both generated at the Hanford Site and received from offsite generators for treatment, storage, and disposal. The RMW contains both radioactive and hazardous components as described by the Atomic Energy Act (AEA) and the Resource Conservation and Recovery Act (RCRA). The hazardous RMW components are further defined as dangerous or extremely hazardous under Washington State regulations.

Radioactive mixed waste is currently regulated by the Environmental Protection Agency (EPA) 40 CFR 260-265 and Washington State under WAC 173-303. Current burial practices at Hanford are not consistent with the requirements of RCRA, as amended by the Hazardous and Solid Waste Amendments (HSWA) in 1984, or the Washington Dangerous Waste Regulations pursuant to the Hazardous Waste Management Act of 1976. This report contains two separate projects that will provide environmentally safe disposal landfills for RMW at the Hanford Site. The first project will provide an RMW disposal landfill for non-drag-off wastes located in the 200 West Area of the Hanford Site; and the second project will provide a landfill for drag-off wastes stored in the Hanford Site's 200 East Area.

The conceptual project cost estimate summaries follow.

II. SUMMARY

The projects will be designed and constructed to provide environmentally safe disposal of approximately 110,600 ft^3 of RMW. The first project will provide a disposal landfill to hold up to 66,000 ft^3 of "non-drag-off" low-level radioactive waste. Non-drag-off waste is waste that can be handled with a truck or forklift. The second project will provide for disposal of approximately 44,600 ft^3 of "drag-off" waste. Drag-off waste is shipped in large containers and must be pulled into the landfill with heavy equipment. The containers for drag-off waste will be a maximum of 20 ft by 10 ft by 10 ft in size, and weigh a maximum of 60 tons.

The landfills at both facilities will be designed and constructed with double-liner systems, in accordance with the EPA/530-SW-85-014, to prevent the release of leachate to the environment. The design of the sand-protective barrier will prevent damage to the liners during construction or operation of the facilities. Leachate management systems will be provided to detect, collect, and remove leachate to downstream collection facilities. These downstream facilities are not part of the projects.

The layout of the landfills will allow for personnel and heavy equipment access to all required locations for transportation of waste into the landfill and for future construction activities will not interfere with ongoing operations. All components of the landfills, including liners and leachate collection and removal systems, will be designed to withstand the loads of the heavy equipment to be operated within the landfills and the long-term stresses imposed by the weight of the waste and cover materials.

Run-on and run-off drainage control, control benchmarks, leachate sampling capability, and groundwater monitoring wells will be provided for the landfills. The landfills will be designed to allow placement of a RCRA compliant cover, and the design will not prohibit future retrieval of the waste.

All aspects of design and construction will comply with RCRA and other appropriate federal and state regulations. Monitoring and inspection will be performed during construction and installation of system components.

9 2 1 2 4 9 8 0 8 4 2

NON DRAG-OFF RMW DISPOSAL FACILITY

DATE 04/01/88

PROJECT COST SUMMARY

DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
ENGINEERING	300,000	17	50,000	350,000
IMPROVEMENTS TO LAND	1,090,000	27	300,000	1,390,000
OTHER STRUCTURES	520,000	26	140,000	660,000
UTILITIES	60,000	24	10,000	70,000
PROJECT TOTAL	2,000,000	25	500,000	2,500,000

9 2 1 2 4 9 8 0 8 4 4

NON DRAG-OFF RMW DISPOSAL FACILITY
CONCEPTUAL
WORK BREAKDOWN STRUCTURE SUMMARY

DATE 04/01/88

WBS	DESCRIPTION	ESTIMATE DIRECT TOTAL	TOTAL INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
11100	GEOTECHNICAL REPORT	30000	0	30000	1.53	459	30459	15	4569	35028
11200	DETAILED DESIGN	151720	0	151720	1.53	2321	154041	15	23106	177148
	SUBTOTAL 11 DEFINITIVE DESIGN	181720	0	181720	1.53	2780	184500	15	27675	212175
12100	ACCEPTANCE INSPECTION	99662	0	99662	5.25	5232	104894	20	20979	125873
12200	WASTE/LINER TEST	11300	0	11300	5.25	593	11893	20	2379	14272
	SUBTOTAL 12 ENGINEERING/INSPECTION	110962	0	110962	5.25	5826	116788	20	23358	140145
	SUBTOTAL 1 ENGINEERING	292682	0	292682	2.94	8606	301288	17	51033	352320
31000	ESCORTS	45000	0	45000	4.87	2192	47192	20	9438	56630
	SUBTOTAL 31 ESCORTS	45000	0	45000	4.87	2192	47192	20	9438	56630
32101	TRENCH EXCAVATION & SITEWORK	262582	23632	286214	4.80	13738	299952	20	59990	359943
32102	STRUCTURAL BASE - BENTONITE	447231	89251	536482	4.80	25751	562233	35	196782	759015
	SUBTOTAL 321 STRUCTURAL/EXCAVATION	709813	112883	822696	4.80	39489	862185	30	256772	1118957
32201	LEACHATE SYSTEM	82739	7447	90186	4.80	4329	94515	22	20337	114852
32301	LINER SYSTEM	324684	29222	353906	4.80	16987	370893	30	110914	481807
32400	ELECTRICAL/INSTRUMENTATION	46588	4193	50781	4.80	2437	53218	25	13305	66523
	SUBTOTAL 32 FIXED PRICE CONSTRUCTION	1163824	153744	1317568	4.80	63243	1380812	29	401327	1782139
33000	WHC PROJECT MANAGEMENT	238946	0	238946	3.38	8071	247017	15	37052	284069
	SUBTOTAL 33 PROJECT MANAGEMENT O/C	238946	0	238946	3.38	8071	247017	15	37052	284069
	SUBTOTAL 3 CONSTRUCTION	1447770	153744	1601514	4.59	73505	1675020	27	447818	2122838
	PROJECT TOTAL	1,740,452	153,744	1,894,196	4.33	82,111	1,976,308	25	498,851	2,475,158

9 2 1 2 4 9 8 0 8 4 5

DRAG-OFF RMW DISPOSAL FACILITY

DATE 04/01/88

PROJECT COST SUMMARY

DESCRIPTION	ESCALATED TOTAL COST	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
ENGINEERING	470,000	17	80,000	550,000
IMPROVEMENTS TO LAND	1,900,000	27	520,000	2,420,000
OTHER STRUCTURES	1,080,000	26	280,000	1,360,000
UTILITIES	140,000	24	30,000	170,000
PROJECT TOTAL	3,600,000	26	900,000	4,500,000

DRAG-OFF RHW DISPOSAL FACILITY
CONCEPTUAL
WORK BREAKDOWN STRUCTURE SUMMARY

DATE 04/01/88

WBS	DESCRIPTION	ESTIMATE DIRECT TOTAL	TOTAL INDIRECTS	SUB TOTAL	ESCALATION %	ESCALATION TOTAL	SUB TOTAL	CONTINGENCY %	CONTINGENCY TOTAL	TOTAL DOLLARS
11100	GEOTECHNICAL REPORT	50000	0	50000	1.53	765	50765	15	7615	58380
11200	DETAILED DESIGN	229469	0	229469	1.53	3511	232980	15	34947	267927
	SUBTOTAL 11 DEFINITIVE DESIGN	279469	0	279469	1.53	4276	283745	15	42562	326307
12100	ACCEPTANCE INSPECTION	125939	0	125939	6.03	7594	133533	20	26707	160240
12200	WASTE/LINER TEST	51500	0	51500	6.03	3105	54605	20	10921	65527
	SUBTOTAL 12 ENGINEERING/INSPECTION	177439	0	177439	6.03	10700	188139	20	37628	225766
	SUBTOTAL 1 ENGINEERING	456908	0	456908	3.28	14975	471883	17	80189	552073
31000	ESCORTS	100800	0	100800	5.64	5685	106485	20	21297	127782
	SUBTOTAL 31 ESCORTS	100800	0	100800	5.64	5685	106485	20	21297	127782
32101	TRENCH EXCAVATION & SITEWORK	405122	36461	441583	5.25	23183	464766	20	92953	557719
32102	STRUCTURAL BASE - BENTONITE	744797	129032	873828	5.25	45876	919704	35	321897	1241601
	SUBTOTAL 321 STRUCTURAL/EXCAVATION	1149919	165493	1315411	5.25	69059	1384471	30	414850	1799320
32201	LEACHATE SYSTEM	387132	34842	421974	5.25	22154	444127	23	100238	544366
32301	LINER SYSTEM	659793	59381	719175	5.25	37757	756931	30	225693	982624
32400	ELECTRICAL/INSTRUMENTATION	109215	9829	119045	5.25	6250	125295	25	31324	156618
	SUBTOTAL 32 FIXED PRICE CONSTRUCTION	2306059	269545	2575605	5.25	135219	2710824	28	772104	3482928
33000	WHC PROJECT MANAGEMENT	296592	0	296592	4.10	12160	308752	15	46313	355065
	SUBTOTAL 33 PROJECT MANAGEMENT O/C	296592	0	296592	4.10	12160	308752	15	46313	355065
	SUBTOTAL 3 CONSTRUCTION	2703451	269545	2972997	5.15	153065	3126061	27	839714	3965775
	PROJECT TOTAL	3,160,359	269,545	3,429,905	4.90	168,040	3,597,945	26	919,904	4,517,848

COST CALCULATIONS FOR LOW-LEVEL BURIAL GROUND

Determination of the estimated replacement costs for disposing of mixed waste in a RCRA compliant burial ground is shown below.

"Non-drag-off" mixed waste - disposal for 66,000 cubic feet - for $ 2,500,000 or $ 37.88 per cubic foot.

"Drag-off" mixed waste - disposal for 44,600 cubic feet - for $ 4,500,000 or $ 100.90 per cubic foot.

Volume of "non-drag-off" mixed waste buried from 1970 to present 213,927 cubic feet (RSWIM Data Base).

Volume of "drag-off" mixed waste buried from 1970 to present 15,700 cubic feet (RSWIM Data Base).

Volume of submarine reactor compartments previously disposed is approximately 180,000 cubic feet (six compartments, approximately 30,000 cubic feet each).

Volume remaining in Low-Level Burial Ground for "non-drag-off" mixed waste is 8,387,478 cubic feet (Low-Level Burial Ground Permit Application).

Volume remaining in Low-Level Burial Ground for "drag-off" mixed waste is 366,339 cubic feet (Low-Level Burial Ground Permit Application).

Volume remaining in Low-Level Burial Ground for submarine reactor compartments is 32,630,360 cubic feet (Low-Level Burial Ground Permit Application).

Cost of "non-drag-off" mixed waste and submarine compartment trench is: (213,927 ft^3 + 180,000 ft^3 + 8,387,478 ft^3 + 32,630,360 ft^3) * ($ 37.88/ft^3) = $ 1,568,677,658.

Cost of "drag-off" mixed waste is: (15,700 ft^3 + 366,339 ft^3) * ($ 100.90/ft^3) = $ 38,547,735.

Total replacement cost equals $ 1,607.2 million.

9 2 1 2 4 9 8 0 8 4 7

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

9 2 1 2 4 9 8 0 8 4 8

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

9 2 1 2 4 9 8 0 8 4 9

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

9 2 1 2 4 9 8 0 8 5 2

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

fps

FAST-C
CALCMX PROGRAM

NAME 301

PROJECT 3718F Alkali Metal Trmt + Storeage Fac

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	3718F	1	Ea	48400	1952/46	
2 =				7800	65	
3 =				3700	68	
4 =				20,600	72	
5 =				20800	74	
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 8 5

FPS-14 11-03-82

01

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PROJECT          : 3718 ALKALI METAL TRMT.& STORAGE FACILITY
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE              KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                  SINDEX PINDEX TYEAR
GLOBAL DATA     : .95 .9 1988

ITEM()     AMT()   UNIT()   UCOST()   UYEAR()   UMX()

1=F3718 1 EA 48400 1952
2=N 1 EA 7800 1965
3=N 1 EA 3700 1968
4=N 1 EA 20600 1972
5=N 1 EA 20800 1974
6=
```

***** FAST-C CALCMX PROGRAM *****

```
NAME:      301                             DATE: MON, APR 10 1989   08:08:35
PROJECT:   3718 ALKALI METAL TRMT.&        ECONFILE:
```

EXCMX	BAMT	BASE
26,688.906*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
521.36*	521,358.13*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	F3718	1.0	EA	48,400.00	1952	17,552.188*
2=	N	1.0	EA	7,800.00	1965	1,306.504*
3=	N	1.0	EA	3,700.00	1968	501.462*
4=	N	1.0	EA	20,600.00	1972	2,667.942*
5=	N	1.0	EA	20,800.00	1974	2,372.102*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
A301
ENTER ECONOMIC FILENAME:

FILENAME: A301                                    DATE: WED, APR 19 1989  08:50:15
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

                          ***** FAST-E *****

PROJECT:   301                                    DATE: WED, APR 19 1989  08:50:26
LOCATION:  HANFORD                                FILENAME: A301
ITEM:      ACQUISITION COST                       ECONFILE:

                          ***** DETAIL ITEM *****

                       ***** CHARACTERISTICS *****

              FASTE EQUIVALENT
              FASTE                                   1,355.029*
                TENVLE(FASTE)                         FAS.0.309*

                          ***** INPUT DATA *****

                ESCAL       GECON       FPER       LCURVE          CMULT
PRJGLOB         1.000       1988        12. D       0.960*        1,000.
                TYPE        SYSTEM      RERUN      REMBOX
FILE            D            0          0           0
                ALL     COST    UNCERT  LOHMAT  INPUT    FGRAPH   FDET
FORMAT           0       0       0       0       1        0       0

                PLTFM   ENTYPE MATVAL  TYEAR
SCOB            1.200  100.000   1.00D  1988

                WT          WTFAC          VCL         VOLFAC
WTVOL       37,590.84*      2,990.0        981.70*     100.00
                FMX         MXTYPE      ELWT      ELMX        STWT     STMX
MXLINE          1.001*      4.400*       0.0      0.000        0.0     0.000

                PCOST                   PQTY      PECON      PCAK
PCOST           521.40                    1.       1988      1.000
                PSTART      PFIN        PSCHDX    PRDMX      PYEARC    PDISC
PSCHD           JAN.1988    MAY.1989*   100.00    4.399*      1988*    NONE
                CONTIN      ADD
END              1           0

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N
```

FILENAME: A301
ITEM NOW UNDER PROCESS 16: REPLACEMENT COST

***** FAST-E *****

PROJECT: 301
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: WED, APR 19 1989 08:50:54
FILENAME: A301
ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	1,349.03	0.00	1,349.03

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	3,996.471*
TENVLE(FASTE)	FAS.0.303*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
1,349.03K	1,349.03K	1,349.03K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PROGLOB	1.000	1986	12.	0.760	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	80.000	1.000	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	37,590.84R	3,437.3*	981.70R	109.21*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001R	5.091*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	PDAK	
PCOST	1,349.03*		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	AUG.1989*	100.00	3.865*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

fps

FAST-C
CALCMX PROGRAM

NAME 302

PROJECT 324 Pilot Plant

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	324 Bldg	1	Ea	5,400	1959	
2 =				14,700	66	
3 =				2,200	71	
4 =				25,800	72	
5 =				19,400	74	
6 =				75,800	75	
7 =				19,900	76	
8 =				127,000	77	
9 =				28,000	78	
10 =				65,600	79	
11 =				187,000	80	
12 =				16,800	81	
13 =				137,600	83	
14 =				10,000	84	
15 =				82,100	85	
16 =				88,200	86	
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 8 6

02

PROJECT : 324 PILOT PLANT
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=BLDG.324 1 EA 5400 1959
2=N 1 EA 14200 1966
3=N 1 3"EA 7200 1971
4=N 1 EA 25800 1972
5=N 1 EA 19400 1974
6=N 1 EA 75800 1975
7=N 1 EA 19900 1976
8=N 1 EA 127000 1977
9=N 1 EA 2800 1978
10=N 1 EA 65600 1979
11=N 1 EA 187000 1980
12=N 1 EA 16800 1981
13=N 1 EA 137600 1983
14=N 1 EA 10000 1984
15=N 1 EA 82100 1985
16=N 1 EA 88200 1986
17=

***** FAST-C CALCMX PROGRAM *****

NAME: 302 DATE: MON, APR 10 1989 08:14:07
PROJECT: 324 PILOT PLANT ECONFILE:

EXCMX	BAMT	BASE
87,931.891*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
1,555.25*	1,555,254.25*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	BLDG.324	1.0	EA	5,400.00	1959	1,166.707*
2=	N	1.0	EA	14,200.00	1966	2,393.941*
3=	N	1.0	EA	7,200.00	1971	897.673*
4=	N	1.0	EA	25,800.00	1972	3,410.481*
5=	N	1.0	EA	19,400.00	1974	2,198.472*

7=	N	1.0	EA	19,900.00	1976	1,880.894*
8=	N	1.0	EA	127,000.00	1977	13,111.566*
9=	N	1.0	EA	2,800.00	1978	188.151*
10=	N	1.0	EA	65,600.00	1979	5,220.850*
11=	N	1.0	EA	187,000.00	1980	14,228.850*
12=	N	1.0	EA	16,800.00	1981	913.413*
13=	N	1.0	EA	137,600.00	1983	7,848.098*
14=	N	1.0	EA	10,000.00	1984	423.991*
15=	N	1.0	EA	82,100.00	1985	4,010.728*
16=	N	1.0	EA	88,200.00	1986	4,153.146*

DO YOU WISH TO ENTER ANY CHANGES (Y/N): Y
ENTER CHANGES : UCOST(5)=2?UCOST(9)=28000

***** FAST-C CALCMX PROGRAM *****

NAME: 302 DATE: MON, APR 10 1989 08:18:35
PROJECT: 324 PILOT PLANT ECONFILE:

EXCMX	BAMT	BASE
91,019.750*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
1,605.24*	1,605,243.00*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	BLDG.324	1.0	EA	5,400.00	1959	1,166.707*
2=	N	1.0	EA	14,200.00	1966	2,393.941*
3=	N	1.0	EA	7,200.00	1971	897.673*
4=	N	1.0	EA	25,800.00	1972	3,410.481*
5=	N	1.0	EA	19,400.00	1974	2,198.472*
6=	N	1.0	EA	75,800.00	1975	8,811.400*
7=	N	1.0	EA	19,900.00	1976	1,880.894*
8=	N	1.0	EA	127,000.00	1977	13,111.566*
9=	N	1.0	EA	28,000.00	1978	2,319.619*
10=	N	1.0	EA	65,600.00	1979	5,220.850*
11=	N	1.0	EA	187,000.00	1980	14,228.850*
12=	N	1.0	EA	16,800.00	1981	913.413*
13=	N	1.0	EA	137,600.00	1983	7,848.098*
14=	N	1.0	EA	10,000.00	1984	423.991*
15=	N	1.0	EA	82,100.00	1985	4,010.728*
16=	N	1.0	EA	88,200.00	1986	4,153.146*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
02
ENTER ECONOMIC FILENAME:

FILENAME: A302                                   DATE: WED, APR 17 1989  08:51:44
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

                          ***** FAST-E *****

PROJECT:   V02                                   DATE: WED, APR 17 1989  08:51:04
LOCATION:  HANFORD                               FILENAME: A302
ITEM:      ACQUISITION COST                      ECONFILE:

                          ***** DETAIL ITEM *****

                       ***** CHARACTERISTICS *****

            FASTE EQUIVALENT
            FASTE                                4,765.740*
              TENVLE(FASTE)                      FAS.0.308*

                        ***** INPUT DATA *****

              ESCAL       BECON       FFER       LCURVE          CPULT
PROJSLOB      1.000       1988        12. D       0.960*        1,000.
              TYPE        SYSTEM      RERUN      REMBOX
FILE          0            0          0           0
              ALL     COST    UNCERT  LOHMAT  INPUT    FBRAPH    FDET
FORMAT         0       0       0       0       1        0        0

              PLTFM   ENTYPE MATVAL  TYEAR
GLOB          1.300   80.000  1.00D  1988

              WT          WTFAC          VOL        VOLFAC
WTVOL     44,946.67*      3,711.8      1,074.84*     100.00
              PMX         MXTYPE       ELWT       ELMX        ETWT     ETMX
MXLINE        1.001*      5.091*        0.0       0.000        0.0     0.000

              PCOST                    PCTY       PECON      PDAR
PCOST         1,555.30                    1.       1988       1.000
              PSTART      PFIN       PSCHDX      PRDMX      PYEARC     PDISC
PSCHD         JAN.1988    AUG.1989*  100.00      5.090*      1988*     NONE
              CONTIN      ADD
END            1           0

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N
```

FILENAME: ACO2
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 302
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: WED, APR 19 1989 09:57:10
FILENAME: ACO2
ECONFILE:

***** DETAIL ITEM *****

$UNITS =	1,000 BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	2,635.25	0.00	2,635.25

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 10,613.082*
TENVLE(FASTE) FAS.0.304*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
2,635.25K	2,635.25K	2,635.25K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE		CMULT
PROJGLOB	1.000	1988	12.	0.760		1,000.
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	FLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.300	70.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	44,946.67R	4,031.7*	1,074.84R	105.05*			
	PMX	MXTYPE	ELWT	ELMX	STAT	STMX	
MALINE	1.001R	5.496*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	PCAK		
PCOST	2,635.25*		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	AUG.1989*	100.00	4.479*	1988*	NONE	
	CONTIN	ADD					
END	0	0					

DO YOU WISH TO MAKE CHANGES (Y/N):

fps

FAST-C
CALCMX PROGRAM

NAME 303

PROJECT 304 Concretion Fac

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	304 Bldg	1	Ea	37,700	1954	
2 =				12,100	62	
3 =				7,900	78	
4 =				3,800	79	
5 =				1,400	80	
6 =				10,200	83	
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 8 6 6

FPS-14 11-22-82

03

```
PROJECT            : 304 CONCRETION FACILITY
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                 KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): .9?EXCMX

                     SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=BLDG.304 1 EA 37700 1954
2=N 1 EA 12100 1962
3=N 1 EA 7900 1978
4=N 1 EA 3800 1979
5=N 1 EA 1400 1980
6=N 1 EA 10200 1983
7=
```

***** FAST-C CALCMX PROGRAM *****

```
NAME:      303                          DATE: MON, APR 10 1989   10:21:38
PROJECT:   304 CONCRETION FACILITY      ECONFILE:
```

EXCMX	BAMT	BASE
17,414.105*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
352.50*	352,499.75*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	BLDG.304	1.0	EA	37,700.00	1954	12,346.723*
2=	N	1.0	EA	12,100.00	1962	2,435.969*
3=	N	1.0	EA	7,900.00	1978	583.348*
4=	N	1.0	EA	3,800.00	1979	233.430*
5=	N	1.0	EA	1,400.00	1980	68.267*
6=	N	1.0	EA	10,200.00	1983	459.216*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

FILENAME: A303 DATE: WED, APR 19 1989 08:54:58
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 303 DATE: WED, APR 19 1989 08:54:57
LOCATION: HANFORD FILENAME: A303
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 1,127.755*
TENVLE(FASTE) FAS.0.304*

***** INPUT DATA *****

	EBCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12. D	0.960*	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	FLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.000	100.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	30,791.00*	2,753.7	804.12*	100.00		
	FMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000*	4.224*	0.0	0.000	0.0	0.000
	FCOST	FQTY	FECON	FCAK		
FCOST	352.50	1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JAN.1989*	100.00	4.223*	1988*	NONE
	CONTIN	ADD				
END	1	0				

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

FILENAME: A303 DATE: WED, APR 19 1989 08:54:21

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 303
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: WED, APR 19 1989 08:56:21
FILENAME: A303
ECONFILE:

***** DETAIL ITEM *****

#UNITS =	1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION		735.55	0.00	735.55

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	1,815.583*
TENVLE(FASTE)	FAS.0.302*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
735,547.13	735,547.13	735,547.13

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	90.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	30,791.00R	2,438.2*	804.12R	104.35*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	4.759*	0.0	0.000	0.0	0.000
	PCOST	PQTY	PECON	PDAK		
PCOST	735.55*	1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	JUL.1989*	100.00	3.357*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

FAST-C
CALCMX PROGRAM

NAME 316

PROJECT 300 Area Solvent Evap Unit

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =						
2 =						
3 =						
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

No capital cost data in RLDS

9 2 1 2 4 9 8 0 8 6 9

316

```
PROJECT            : 300 AREA SOLVENT EVAP UNIT
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): XCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA      : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=INFO 1 EA 1 1988
2=
```

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME:      316                        DATE: MON, APR 10 1989  11:00:33
PROJECT:   300 AREA SOLVENT EVAP UN   ECONFILE:

                EXCMX               BAMT            BASE
                0.015*               1.0            CYD

               TCOST($1000    )     UCOST/CYD       YEAR
                        0.00*            1.00*      1988

                         ***** INPUT DATA *****

                          SINDEX  PINDEX  TYEAR
                           0.950   0.900  1988

     (X) ITEM()        AMT() UNIT()       UCOST() UYEAR()       UMX()
      1= INFO            1.0 EA              1.00   1988        0.015*
```

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

92124980870

fps

FAST-C
CALCMX PROGRAM

8/28/89

NAME 304

PROJECT 300 Area Waste Acid Treatment System.

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	Bldg 313	1	Ea	9.0	1952/43	
2 =		1	Ea	146.0	1952/44	
3 =		1	Ea	8.6	1955	
4 =		1	Ea	4.0	1958	
5 =		1	Ea	4.6	1961	
6 =		1	Ea	189.9	1985	
7 =	Bldg 334A	1	Ea	47.2	1959	
8 =		1	Ea	31.3	1975	
9 =		1	Ea	1.4	1986	
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 8 7

FPS-14 11-22-82

CALCMX

```
NAME              : 304
PROJECT           : 300 AREA WASTE ACID TREATMENT SYSTEM
 ECON. FILENAME : RL88
RATES READ FROM FILE RL88

THE CURRENCY CONVERSION RATE IS     1.000 $1000    PER ONE U.S. DOLLAR

ECON YEAR (YEAR): 1988

BASE               KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=BLDG.313 1 EA 9000 1952
 2=SAME 1 EA 146000 1952
 3=SAME 1 EA 8600 1955
 4=SAME 1 EA 4000 1958
 5=SAME 1 EA 4600 1961
 6=SAME 1 EA 189900 1985
 7=BLDG334A 1EA"" EA 47200 1959
 8=SAME 1 EA 31300 1975
 9=SAME 1 EA 1400 1986
10=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 304 DATE: MON, AUG 28 1989 16:23:42
PROJECT: 300 AREA WASTE ACID TREA ECONFILE: RL88

EXCMX	BAMT	BASE
103,797.344*	1.0	CYD
TCOST($1000)	UCOST/CYD	YEAR
1,533.65*	1,533,649.25*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	BLDG.313	1.0	EA	9,000.00	1952	2,800.986*
2=	SAME	1.0	EA	146,000.00	1952	58,536.906*
3=	SAME	1.0	EA	8,600.00	1955	2,348.650*
4=	SAME	1.0	EA	4,000.00	1958	882.315*
5=	SAME	1.0	EA	4,600.00	1961	889.825*
6=	SAME	1.0	EA	189,900.00	1985	11,094.822*
7=	BLDG334A	1.0	EA	47,200.00	1959	12,419.494*

8= SAME	1.0 EA	31,300.00	1975	3,357.369*
9= SAME	1.0 EA	1,400.00	1986	52.188*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

FILENAME: A304 DATE: MON, AUG 28 1989 16:30:47
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 304 DATE: MON, AUG 28 1989 16:30:47
LOCATION: HANFORD FILENAME: A304
ITEM: REPLACEMENT COST ECONFILE: RL88

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	1,535.42	0.00	1,535.42

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	6,907.336*
TENVLE(FASTE)	FAS.0.355*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
1,535.42K	1,535.42K	1,535.42K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PROJGLOB	1.000	1988	12.	0.960	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.100	100.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	220,738.63R	6,207.9*	5,764.71R	100.00*			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001R	4.315*	0.0	0.000	0.0	0.000	
	PCOST	PQTY	PECON	FOAK			
PCOST	1,535.42*	1.	1988	1.000			
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	AUG.1989*	100.00	2.256*	1988*	NONE	
	CONTIN	ADD					
END	0	0					

2124980874

```
ASTE

                          ***** FAST-E *****

ENTER INPUT FILENAME      : A304
ENTER ECONOMIC FILENAME: RL88
    RATES READ FROM FILE RL88


FILENAME: A304                                DATE: MON, AUG 28 1989   16:30:24
ITEM NOW UNDER PROCESS IS: ACQUISITION COST


                          ***** FAST-E *****

PROJECT:   304                                DATE: MON, AUG 28 1989   16:30:25
LOCATION:  HANFORD                            FILENAME: A304
ITEM:      ACQUISITION COST                   ECONFILE: RL88

                          ***** DETAIL ITEM *****

                        ***** CHARACTERISTICS *****

                FASTE EQUIVALENT
                FASTE                                6,907.336*
                  TENVLE(FASTE)                      FAS.0.355*

                           ***** INPUT DATA *****

                  ESCAL      GECON      FPER       LCURVE          CMULT
 PRJGLOB          1.000      1988       12. D       0.960*         1,000.
                  TYPE       SYSTEM     RERUN      REMBOX
 FILE             D          0          0           0
                  ALL    COST    UNCERT  LOHMAT  INPUT    FGRAPH    FDET
 FORMAT            0       0       0       0      1         0        0

                  PLTFM   ENTYPE MATVAL   TYEAR
 GLOB             1.100   100.000  1.00D   1988

                  WT         WTFAC          VOL          VOLFAC
 WTVOL       220,738.63*   6,207.9       5,764.71*      100.00
                  PMX        MXTYPE       ELWT      ELMX           STWT     STMX
 MXLINE           1.001*     4.315*        0.0      0.000           0.0    0.000

                  PCOST                   PQTY      PECON        FOAK
 PCOST        1,533.65                      1.       1988        1.000
                  PSTART     PFIN         PSCHDX    PRDMX        PYEARC     PDISC
 PSCHD            JAN.1988   AUG.1989*    100.00    4.314*        1988*     NONE
                  CONTIN     ADD
 END               1          0
```

fps

FAST-C
CALCMX PROGRAM

NAME 305

PROJECT 303 M Oxide Facility

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	303M Bldg	1	Ea	34,000	1978	
2 =				99,000	82	
3 =				284,800	83	
4 =				49,200	88	
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 8 7

FPS-14 11-22-82

05

PROJECT : 303 M OXIDE FACILITY
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): EXCMX
ERROR! ONLY ONE BASE CAN BE ENTERED

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=BLDG.303M 1 EA 34000 1978
2=N 1 EA 99000 1982
3=N 1 EA 784800 1983
4=N 1 EA 49200 1988
5=

~~~~~~

***** FAST-C CALCMX PROGRAM *****

NAME: 305 DATE: MON, APR 10 1989 10:28:38
PROJECT: 303 M OXIDE FACILITY ECONFILE:

EXCMX	BAMT	BASE
67,166.109*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
1,214.94*	1,214,940.75*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	BLDG.303	1.0	EA	34,000.00	1978	2,866.834*
2=	N	1.0	EA	99,000.00	1982	5,865.559*
3=	N	1.0	EA	784,800.00	1983	52,437.742*
4=	N	1.0	EA	49,200.00	1988	2,032.184*

~~~~~~

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

305
ENTER ECONOMIC FILENAME:

FILENAME: A305 DATE: WED, APR 19 1989 09:01:27
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 305 DATE: WED, APR 19 1989 09:01:27
LOCATION: HANFORD FILENAME: A305
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 3,710.186*
TENVLE(FASTE) FAS.0.337*

***** INPUT DATA *****

	ESCAL	GECON	FFER	LCURVE	CMULT		
PROGLOB	1.000	1988	12. D	0.960*	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.200	100.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	112,336.67*	4,697.7	2,933.73*	100.00			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001*	4.400*	0.0	0.000	0.0	0.000	
	PCOST	PQTY	PECON	POAK			
PCOST	1,214.90	1.	1988	1.000			
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	AUG.1989*	100.00	4.399*	1988*	NONE	
	CONTIN	ADD					
END	1	0					

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

```
FILENAME: A305                                  DATE: WED, APR 19 1989  09:02:00
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST
```

```
                         ***** FAST-E *****

PROJECT:    305                                DATE: WED, APR 19 1989  09:02:01
LOCATION:  HANFORD                             FILENAME: A305
ITEM:      REPLACEMENT COST                    ECONFILE:

                       ***** DETAIL ITEM *****

     $UNITS  =   1,000 BASIC COST   SCHD PENALTY    TOTAL COST
       PRODUCTION        2,044.42          0.00       2,044.42


                     ***** CHARACTERISTICS *****

            FASTE EQUIVALENT
            FASTE                                  6,178.366*
              TENVLE(FASTE)                        FAS.0.334*

                  ***** PRODUCTION COST DATA *****

          AVERAGE UNIT COSTS BASED ON:
     TOTAL PRODUCTION COST   MANUFACTURING COST   THEORETICAL FPCOST
           2,044.42K               2,044.42K            2,044.42K

                        ***** INPUT DATA *****

            ESCAL       GECON       FPER       LCURVE        CMULT
PRJGLOB     1.000       1988        12.         0.960        1,000.
            TYPE        SYSTEM      RERUN      REMBOX
FILE        D             0         0            0
            ALL   COST   UNCERT     LOHMAT   INPUT    FGRAPH   FDET
FORMAT       0      1       0          0       1         0       0

            PLTFM   ENTYPE  MATVAL  TYEAR
GLOB        1.300   90.000   1.00D  1988

            WT             WTFAC          VOL         VOLFAC
WTVOL    112,336.67R      5,065.9*      2,933.73R     104.35*
            PMX            MXTYPE        ELWT      ELMX          STWT     STMX
MXLINE      1.001R         4.759*         0.0      0.000          0.0    0.000

            PCOST                         PQTY      PECON      FOAK
PCOST     2,044.42*                         1.       1988      1.000
            PSTART       PFIN             PSCHDX    PRDMX      PYEARC      PDISC
PSCHD       JAN.1988     NOV.1989*        100.00    3.163*      1988*      NONE
            CONTIN       ADD
END          0            0
```

```
DO YOU WISH TO MAKE CHANGES (Y/N):
```

fps

FAST-C
CALCMX PROGRAM

NAME 307

PROJECT 325 Waste Treatment Fac

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

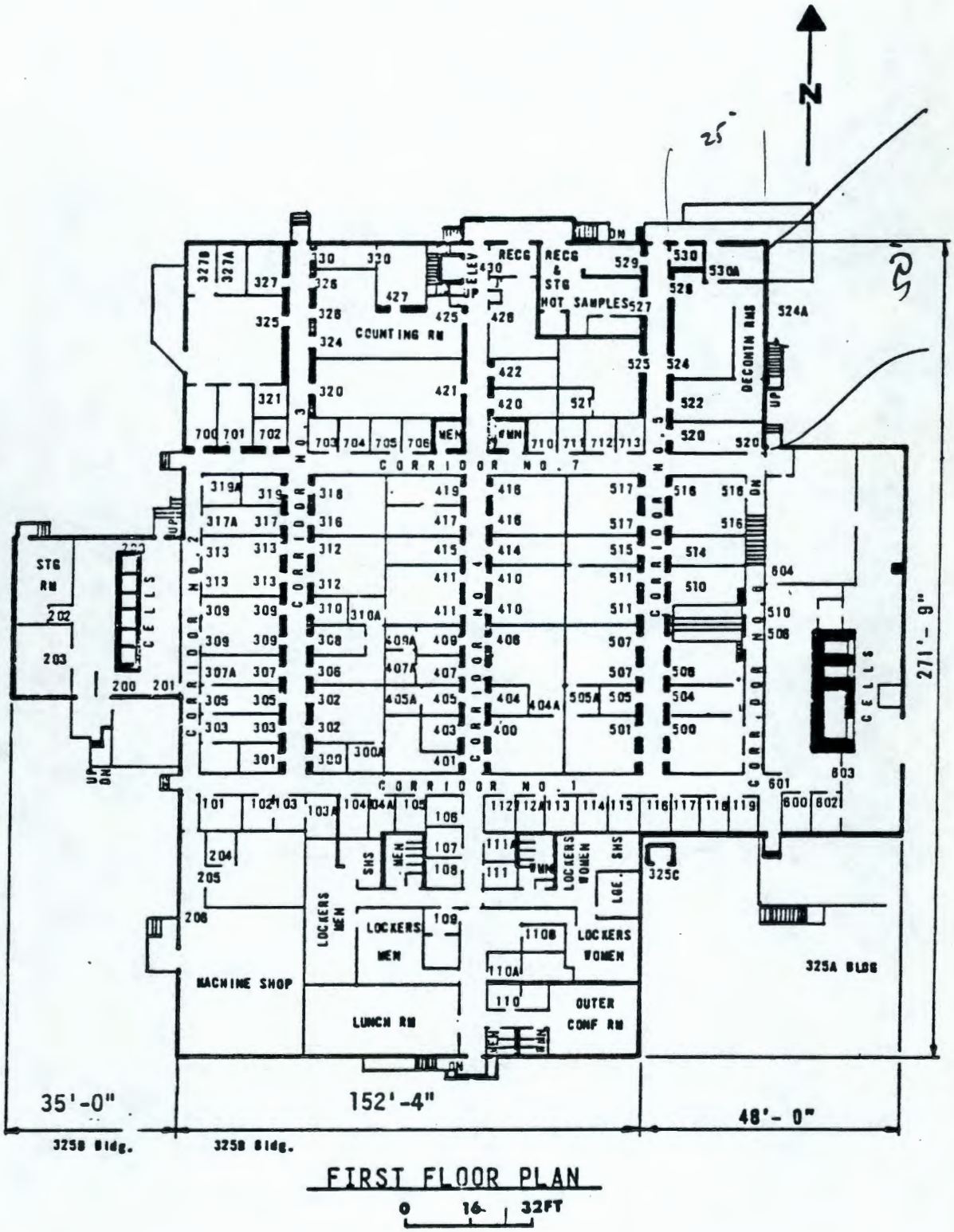
PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ SLDUSE ____ PLTEM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SLBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	325 Bldg	1	Ea	25,800	1952	
2 =				20,700	63	
3 =				8,100	67	
4 =				18,600	71	
5 =				15,300	75	
6 =				34,300	77	
7 =				59,900	78	
8 =				31,600	79	
9 =				107,800	80	
10 =				34,400	81	
11 =				13,200	82	
12 =				103,400	83	
13 =				76,800	86	
14 =				147,700	87	
15 =	Est Fac	1250	SFT	500	88	
16 =						
17 =						
18 =						
19 =						
20 =						

RLPS Data excludes facility cost

9 2 1 2 4 9 8 0 8 8 0



FIRST FLOOR PLAN

0 16 32FT

325 Building

Office	11450 SF	Trunk Area
Lab	56211	25' x 50'
Shop	3689	
Stor	4165	
Comm	63,630	1250 SF
TH	139,145	

~ 1% of Facility

07

```
PROJECT           : 325 WASTE TREATMENT FACILITY
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE              KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                  SINDEX PINDEX TYEAR
GLOBAL DATA     : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=BLDG.325 1 EA 25800 1952
 2=N 1 EA 20700 1963
 3=N 1 EA 8100 1967
 4=N 1 EA 18600 1971
 5=N 1 EA 15300 1975
 6=N 1 EA 34300 1977
 7=N 1 EA 59900 1978
 8=N 1 EA 31600 1979
 9=N 1 EA 107800 1980
10=N 1 EA 34400 1981
11=N 1 EA 13200 1982
12=N 1 EA 103400 1983
13=N 1 EA 76800 1986
14=N 1 EA 147700 1987
15=EST.FAC 1250 SFT 500 1988
16=
```

***** FAST-C CALCMX PROGRAM *****

NAME: 307 DATE: MON, APR 10 1989 10:37:58
PROJECT: 325 WASTE TREATMENT FACI ECONFILE:

EXCMX	BAMT	BASE
108,499.234*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
1,885.71*	1,885,706.75*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	BLDG.325	1.0	EA	25,800.00	1952	8,836.238*
2=	N	1.0	EA	20,700.00	1963	4,170.709*
3=	N	1.0	EA	8,100.00	1967	1,236.804*
4=	N	1.0	EA	18,600.00	1971	2,527.958*
5=	N	1.0	EA	15,300.00	1975	1,537.758*
6=	N	1.0	EA	34,300.00	1977	3,143.862*

7= N		1.0 EA	59,900.00	1978	5,317.518*
8= N		1.0 EA	31,600.00	1979	2,353.350*
9= N		1.0 EA	107,800.00	1980	7,801.876*
10= N		1.0 EA	34,400.00	1981	1,996.235*
11= N		1.0 EA	13,200.00	1982	651.175*
12= N		1.0 EA	103,400.00	1983	5,746.250*
13= N		1.0 EA	76,800.00	1986	3,571.127*
14= N		1.0 EA	147,700.00	1987	7,044.407*
15=	EST.FAC	1,250.0 SFT	500.00	1988	26.021*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
CO7
ENTER ECONOMIC FILENAME:

FILENAME: A307,                                   DATE: WED, APR 19 1989  09:03:07
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

                          ***** FAST-E *****

PROJECT:   307                                    DATE: WED, APR 19 1989  09:03:08
LOCATION:  HANFORD                                FILENAME: A307
ITEM:      ACQUISITION COST                       ECONFILE:

                          ***** DETAIL ITEM *****

                       ***** CHARACTERISTICS *****

              FASTE EQUIVALENT
              FASTE                                   7,251.368*
                TENVLE(FASTE)                         FAS.0.35s*

                          ***** INPUT DATA *****

                ESCAL       BECON       FRER       LCURVE          CMULT
PRJGLOB         1.000       1988        12. D       0.960*        1,000.
                TYPE        SYSTEM      RERUN      REMBOX
FILE            D            0          0           0
                ALL     COST    UNCERT  LOHMAT  INPUT    FGRAPH    FDET
FORMAT           0       0       0       0       1        0        0

                PLTFM   ENTYPE  MATVAL  TYEAR
GLOB            1.100   100.000  1.00D  1988

                WT          WTFAC          VOL          VOLFAC
WTVOL      232,720.56*      s,344.3      6,077.62*      100.30
                PMX         MXTYPE       ELWT       ELMX          STWT     STMX
MXLINE          1.000*      4.315*        0.0       0.000          0.0     0.000

                PCOST                    PQTY       PECON       FOAK
PCOST          1,885.70                    1.        1988       1.000
                PSTART      PFIN        PSCHDX     PRDMX       PYEARC     PDISC
PSCHD           JAN.1988    AUG.1989*   100.00     4.314*       1988*      NONE
                CONTIN      ADD
END              1           0

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N
```

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** PASTE *****

PROJECT: 307 DATE WED, APR 19 1989 04:03:37
LOCATION: HANFORD FILENAME: ADOT
ITEM: REPLACEMENT COST COMFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	2,394.78	1.00	2,394.78

***** CHARACTERISTICS *****

PASTE EQUIVALENT	
PASTE	7,251.868*
TENVLE(PASTE)	0.356*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL PPCOST
2 394.78K	2,394.78K	2,394.78K

***** INPUT DATA *****

	ESCAL	GECON	PPER	LCURVE	CMLLT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	PGRAPH	PCET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.300	100.000	1.000	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	232,720.56R	6,344.3*	6,077.62R	100.00*			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.000R	4.480*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	PDAN		
PCOST	2,394.78*		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1986	FEB.1990*	100.00	2.532*	1988*	NONE	
	CONTIN	ADD					
END	0	0					

DO YOU WISH TO MAKE CHANGES (Y/N):

NOT INCLUDED IN PRICE TOTAL. REPLACEMENT COST DETERMINED TO BE <.1 MILLION.

9 2 1 2 4 9 8 0 8 8 7

NOT INCLUDED IN PRICE TOTAL. REPLACEMENT COST DETERMINED TO BE <.1 MILLION.

9 2 1 2 4 9 8 0 8 8 8

FAST-C
CALCMX PROGRAM

NAME 310

PROJECT Thermal Treatment Test Fac

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTEM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	A310	1	Ea	3,300,000	1984	
2 =						
3 =						
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 8 8 9

See IL 4-19-89

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME              : 310
PROJECT           : THERMAL TREATMENT TEST FACILITY
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): XCMX
ERROR! ONLY ONE BASE CAN BE ENTERED

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=A310 1 EA 3300000 1984
2=
```

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME:      310                          DATE: THU, APR 20 1989  15:50:30
PROJECT:   THERMAL TREATMENT TEST F     ECONFILE:

                EXCMX                BAMT          BASE
          237,042.406*                1.0          CYD

             TCOST($1000 )       UCOST/CYD       YEAR
                 *3,860.02*    3,860,023.00*     1988

                    ***** INPUT DATA *****

                     SINDEX  PINDEX  TYEAR
                      0.950   0.900   1988

     (X) ITEM()       AMT() UNIT()       UCOST() UYEAR()       UMX()
      1= A310            1.0 EA      3,300,000.00  1984 237,042.406*
```

```
DO YOU WISH TO ENTER ANY CHANGES (Y/N):
```

```
A310
ENTER ECONOMIC FILENAME:

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FILENAME: A310                                 DATE: THU, APR 20 1989  15:53:16
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                           ***** FAST-E *****

PROJECT:   310                                 DATE: THU, APR 20 1989  15:53:17
LOCATION: HANFORD                              FILENAME: A310
ITEM:      ACQUISITION COST                    ECONFILE:

                           ***** DETAIL ITEM *****

                         ***** CHARACTERISTICS *****

                FASTE EQUIVALENT
                FASTE                                    13,249.367*
                  TENVLE(FASTE)                           FAS.0.354*

                           ***** INPUT DATA *****

                  ESCAL      GECON       FPER       LCURVE        CMULT
 PRJGLOB          1.000      1988        12. D       0.960*       1,000.
                  TYPE       SYSTEM      RERUN      REMBOX
 FILE             D           0          0           0
                  ALL     COST     UNCERT   LOHMAT   INPUT     FGRAPH    FDET
 FORMAT            0       0         0        0        1         0         0

                  FLTFM    ENTYPE  MATVAL   TYEAR
 GLOB             1.300    90.000    1.00D  1988

                  WT             WTFAC             VOL           VOLFAC
 WTVOL       251,582.13*        7,112.6        6,296.48*       100.00
                  FMX            MXTYPE         ELWT       ELMX           STWT     STMX
 MXLINE           1.001*         4.759*          0.0        0.000          0.0    0.000

                  PCOST                     PQTY       PECON       FOAK
 PCOST         3,860.00                      1.         1988       1.000
                  FSTART         PFIN       PSCHDX     PRDMX       PYEARC      PDISC
 PSCHD            JAN.1988    JAN.1990*     100.00     4.758*        1988*     NONE
                  CONTIN         ADD
 END               1              0

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

DO YOU WISH TO MAKE CHANGES (Y/N): N
 DO YOU WISH TO STORE DATA (Y/N):

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 310 DATE: THU, APR 20 1989 15:53:39
LOCATION: HANFORD FILENAME: A310
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	3,864.94	0.00	3,864.94

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	13,249.367*
TENVLE(FASTE)	FAS.0.354*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
3,864.94K	3,864.94K	3,864.94K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	ELTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.300	90.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	251,582.13R	7,112.6*	6,296.48R	100.00*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001R	4.759*	0.0	0.000	0.0	0.000
	PCOST	PQTY	PECON	FOAK		
PCOST	3,864.94*	1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	FEB.1990*	100.00	3.041*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

FAST-C
CALCMX PROGRAM

NAME: 311

PROJECT: 311 Tanks

ECON YEAR: YEAR

BASE AMOUNT (BAMT): KSF | KLF | CYD | ACRES

MX TYPE: MXTYPE

GLOBAL DATA: SINDEX | PINDEX | TYEAR

PLATFORM DATA: SEISM | TORNAD | RADIAT | BLDUSE | PLTFM

FACTOR DATA: AVHT | KCUFT | TRNPSF | NLEVEL | SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	311 Tk Farm	1	Ea	42,900	1955	
2 =				5,500	56	
3 =				10,300	61	
4 =				1,900	73	
5 =				20,100	77	
6 =				163,200	84	
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 8 9 3

311

PROJECT : 311 TANKS
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=TK.FARM.311 1 EA 42900 1955
2=N 1 EA 5500 1956
3=N 1 EA 10300 1961
4=N 1 EA 1900 1973
5=N 1 EA 20100 1977
6=N 1 EA 163200 1984
7=

~~~~~~

***** FAST-C CALCMX PROGRAM *****

NAME: 311 DATE: MON, APR 10 1989 10:50:21
PROJECT: 311 TANKS ECONFILE:

EXCMX	BAMT	BASE
31,433.797*	1.0	CYD

TCOST($1000)	UCOST/CYD	YEAR
605.73*	605,730.75*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	TK.FARM.	1.0	EA	42,900.00	1955	13,558.979*
2=	N	1.0	EA	5,500.00	1956	1,374.641*
3=	N	1.0	EA	10,300.00	1961	2,143.927*
4=	N	1.0	EA	1,900.00	1973	186.899*
5=	N	1.0	EA	20,100.00	1977	1,754.954*
6=	N	1.0	EA	163,200.00	1984	8,919.158*

~~~~~~

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

9 2 1 2 9 8 0 8 4

311
ENTER ECONOMIC FILENAME:

~~~~~~

FILENAME: A311 DATE: WED, APR 19 1989 09:09:14
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

~~~~~~

***** FAST-E *****

PROJECT: 311 DATE: WED, APR 19 1989 09:09:13
LOCATION: HANFORD FILENAME: A311
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	1,881.774*
TENVLE(FASTE)	FAS.0.333*

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12. D	0.960*	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	FLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.100	110.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	84,530.67*	3,905.6	2,297.93*	100.00			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.000*	4.086*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	FOAK		
PCOST	605.70		1.	1986	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	MAY.1989*	100.00	4.085*	1988*	NONE	
	CONTIN	ADD					
END	1	0					

~~~~~~

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

~~~~~~

FILENAME: A311
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 311
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: WED, APR 19 1989 09:09:52
FILENAME: A311
ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	976.37	0.00	976.37

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	2,856.003*
TENVLE(FASTE)	FAS.0.330*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
976,365.75	976,365.75	976,365.75

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.200	100.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	84,530.67R	4,177.5*	2,297.93R	104.09*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	4.400*	0.0	0.000	0.0	0.000
	PCOST	PQTY	PECON	PDAK		
PCOST	976.37*	1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	AUG.1989*	100.00	2.583*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

FAST-C
CALCMX PROGRAM

NAME 312

PROJECT 303K Storage Fac

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	303K Storage	1	Ea	68,000	1952/43	
2 =				8,600	79	
3 =				1,700	81	
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 8 9 9 7

312

PROJECT : 303K STORAGE FACILITY
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=STORAGE.303K 1 EA 68000 1952
2=N 1 EA 8600 1979
3=N 1 EA 1700 1981
4=

***** FAST-C CALCMX PROGRAM *****

NAME: 312 DATE: MON, APR 10 1989 10:53:36
PROJECT: 303K STORAGE FACILITY ECONFILE:

EXCMX	BAMT	BASE
26,420.863*	1.0	CYD
TCOST($1000)	UCOST/CYD	YEAR
516.56*	516,556.06*	1988

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	STORAGE.	1.0	EA	68,000.00	1952	25,434.254*
2=	N	1.0	EA	8,600.00	1979	569.007*
3=	N	1.0	EA	1,700.00	1981	75.053*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

9 2 1 2 4 9 7 0 8 0 9 8

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312
ENTER ECONOMIC FILENAME:

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FILENAME: A312                                  DATE: WED, APR 19 1989  09:14:33
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                          ***** FAST-E *****

PROJECT:   312                                  DATE: WED, APR 19 1989  09:13:01
LOCATION:  HANFORD                              FILENAME: A312
ITEM:      ACQUISITION COST                     ECONFILE:

                          ***** DETAIL ITEM *****

                        ***** CHARACTERISTICS *****

                FASTE EQUIVALENT
                FASTE                                1,340.190*
                  TENVLE(FASTE)                      FAS.0.309*

                          ***** INPUT DATA *****

                  ESCAL       GECON       FPER       LCURVE         CMULT
PRJGLOB           1.000       1988        12. D       0.960*       1,000.
                  TYPE        SYSTEM      RERUN      REMBOX
FILE              D            0          0           0
                  ALL     COST    UNCERT   LOHMAT   INPUT     FGRAPH    FDET
FORMAT             0       0        0        0        1         0        0

                  FLTFM   ENTYPE  MATVAL   TYEAR
GLOB              11200   100.000   1.00D   1988

                  WT          WTFAC            VOL          VOLFAC
WTVOL        37,143.60*      2,975.3          970.02*      100.00
                  PMX         MXTYPE       ELWT       ELMX            STWT     STMX
MXLINE            1.001*      4.400*        0.0        0.000           0.0    0.000

                  PCOST                   PQTY       PECON       FOAK
PCOST             516.60                    1.        1988       1.000
                  PSTART      PFIN        PSCHDX     PRDMX       PYEARC      PDISC
PSCHD             JAN.1988    MAY.1989*   100.00     4.399*        1988*      NONE
                  CONTIN      ADD
END                1           0

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DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

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FILENAME: A312

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 312
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: WED, APR 19 1989 09:18:00
FILENAME: A312
ECONFILE:

***** DETAIL ITEM *****

$UNITS =* 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	575.77	0.00	575.77

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	1,340.190*
TENVLE(FASTE)	FAS.0.309*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
575,767.38	575,767.38	575,767.38

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12.	0.960	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.300	100.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	37,143.60R	2,975.3*	970.02R	100.00*			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001R	4.480*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	FOAK		
PCOST	575.77*		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN. 1988	AUG. 1989*	100.00	2.862*	1988*	NONE	
	CONTIN	ADD					
END	0	0					

DO YOU WISH TO MAKE CHANGES (Y/N):

fps

FAST-C
CALCMX PROGRAM

NAME 313

PROJECT 305-B Storage Facility

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SLBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	Bldg 305-B	1	Ea	708700	1955	
2 =				2200	63	
3 =				19900	75	
4 =				8000	76	
5 =				7100	77	
6 =				68,600	81	
7 =				12900	83	
8 =				27600	83	
9 =				10000	85	
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 9 0 1

```
                    *****  FAST-C CALCMX PROGRAM *****

  NAME                : 313
  PROJECT             : 305-B STORAGE FACILITY
   ECON. FILENAME :

  ECON YEAR (YEAR): 1988

  BASE                  KSF  KLF  CYD  ACRES
  BASE AMT. (BAMT): 0 0 1

  MX TYPE (MXTYPE): EXCMX

                        SINDEX PINDEX TYEAR
  GLOBAL DATA         : .95 .9 1988

  ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

 1=BLDG.305.B 1 EA 708700 1955
 2=N 1 EA 2200 1963
 3=N 1 EA 19900 1975
 4=N 1 EA 8000 1976
 5=N 1 EA 7100 1977
 6=N 1 EA 68600 1981
 7=N 1 EA 12900 1983
 8=N 1 EA 27600 1983
 9=N 1 EA 10000 1985
10=
```

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME:      313                          DATE: TUE, APR 18 1989  17:43:36
PROJECT:   305-B STORAGE FACILITY       ECONFILE:

            EXCMX                 BAMT            BASE
        306,174.563*               1.0            CYD

            TCOST($1000    )     UCOST/CYD       YEAR
                 4,880.58*    4,880,583.00*      1988

                    ***** INPUT DATA *****

                     SINDEX  PINDEX  TYEAR
                      0.950   0.900   1988

    (X) ITEM()        AMT() UNIT()       UCOST() UYEAR()       UMX()
     1= BLDG.305        1.0 EA        708,700.00  1955 285,041.000*
     2= N               1.0 EA          2,200.00  1963     361.542*
     3= N               1.0 EA         19,900.00  1975   2,048.463*
     4= N               1.0 EA          8,000.00  1976     696.021*
     5= N               1.0 EA          7,100.00  1977     563.953*
     6= N               1.0 EA         68,600.00  1981   4,238.654*
     7= N               1.0 EA         12,900.00  1983     597.306*
```

8= N	1.0 EA	27,600.00	1983	1,360.277*
9= N	1.0 EA	10,000.00	1985	403.421*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

FILENAME: [illegible]
ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 313
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: WED, APR 19 1989 [illegible]
FILENAME: [illegible]
ECOFILE:

***** DETAIL ITEM *****

#UNITS	#	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	1,000	4,886.34	0.00	4,886.34

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	19,432.621*
TENVLE(FASTE)	FAS.0.383*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL PRCOST
4,886.34K	4,886.34K	4,886.34K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	0	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FSET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.200	100.000	1.000	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	9679,385.38R	9,872.5*	17,742.51R	100.00*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.001A	4.400*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	PDAK	
PCOST	4,886.34*		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	FEB.1990*	100.00	2.215*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

```
ENTER ECONOMIC FILENAME:

FILENAME: A313                                   DATE: WED. APR 19 1989  09:19:13
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

                          ***** FAST-E *****

PROJECT:   313                                   DATE: WED. APR 19 1989  09:19:13
LOCATION:  HANFORD                               FILENAME: A313
ITEM:      ACQUISITION COST                      ECONFILE:

                          ***** DETAIL ITEM *****

                       ***** CHARACTERISTICS *****

              FASTE EQUIVALENT
              FASTE                                  19,432.621*
                TENVLE(FASTE)                         FAS.0.363*

                          ***** INPUT DATA *****

                ESCAL       GECON       FPER       LCURVE          CMULT
PRJGLOB         1.000       1988        12. D       0.960*        1,000.
                TYPE        SYSTEM      RERUN      REMBOX
FILE            D            0          0           0
                ALL     COST    UNCERT  LOHMAT   INPUT    FGRAPH   FDET
FORMAT           0       0       0       0       1        0        0

                PLTFM   ENTYPE MATVAL  TYEAR
GLOB            1.200  100.000  1.00D  1988

                WT          WTFAC          VOL          VOLFAC
WTVOL     679,385.36*     9,872.5      17,742.51*      100.00
                PMX         MXTYPE      ELWT       ELMX          STWT     STMX
MXLINE          1.001*      4.400*       0.0       0.000          0.0     0.000

                PCOST                   PQTY       PECON      PFOAK
PCOST           4,880.60                  1.        1988       1.000
                PSTART      PFIN        PSCHDX     PRDMX      PYEARC     PDISC
PSCHD           JAN.1988    FEB.1990*   100.00     4.399*      1983*     NONE
                CONTIN      ADD
END              1           0

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N
```

NOT INCLUDED IN PRICE TOTAL. PART A PERMIT APPLICATION WITHDRAWAN.

9 2 1 2 4 9 8 0 9 0 6

REPLACEMENT COST DETERMINED FROM THE DOCUMENT, "ANNUAL STATUS REPORT OF THE PLAN AND SCHEDULE TO DISCONTINUE DISPOSAL OF CONTAMINATED LIQUIDS INTO THE SOIL COLUMN AT THE HANFORD SITE," WHC-EP-0196-2, 1989.

fps

FAST-C
CALCMX PROGRAM

NAME 401

PROJECT Bldg 437 MASF

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	437	1	Ea	1048300	1975	
2 =				156,900	77	
3 =				2,206,800	78	
4 =				326,300	79	
5 =				1,368,500	80	
6 =				1192500	81	
7 =				15,155,600	82	
8 =				283,300	83	
9 =				2910,400	84	
10 =				34700	85	
11 =				11,000	86	
12 =				268,600	87	
13 =				64,500	88	
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

25,191,900

9 2 1 2 4 9 8 0 9 0 8

FPS-14 11-03-83

01

```
PROJECT            : BLDG 437 MASF
 ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE                KSF  KLF  CYD  ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

                    SINDEX PINDEX TYEAR
GLOBAL DATA       : .95 .9 1988

ITEM()     AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=BLDG.437 1 EA 1048300 1975
2=N 1 EA 156900 1977
3=N 1 EA 2206800 1978
4=N 1 EA 326300 1979
5=N 1 EA 1368500 1980
6=N 1 EA 1192500 1981
7=N 1 EA 15155600 1981
8=N 1 EA 283300 1983
9=N 1 EA 2910400 1984
10=N 1 EA 34700 1985
11=N 1 EA 11000 1986
12=N 1 EA 268600 1987
13=N 1 EA 64500 1988
14=
```

```
                    *****  FAST-C CALCMX PROGRAM *****

NAME:       401                          DATE: MON, APR 10 1989  13:14:02
PROJECT:    BLDG 437 MASF                ECONFILE:

              EXCMX                 BAMT            BASE
        2,806,880.000*               1.0            CYD

            TCOST($1000    )      UCOST/CYD        YEAR
                37,199.58*     37,199,576.00*      1988

                    ***** INPUT DATA *****

                    SINDEX   PINDEX   TYEAR
                     0.950    0.900    1988

(X) ITEM()        AMT() UNIT()       UCOST() UYEAR()       UMX()
 1= BLDG.437        1.0 EA      1,048,300.00  1975 154,728.531*
 2= N               1.0 EA        156,900.00  1977  16,512.820*
 3= N               1.0 EA      2,206,800.00  1978 271,918.375*
 4= N               1.0 EA        326,300.00  1979  30,046.359*
 5= N               1.0 EA      1,368,500.00  1980 121,782.656*
 6= N               1.0 EA      1,192,500.00  1981  95,521.438*
 7= N               1.0 EA     15,155,600.00  1981 ************
 8= N               1.0 EA        283,300.00  1983  17,254.578*
```

9=	N	1.0 EA	2,910,400.00	1984	206,682.750*
10=	N	1.0 EA	34,700.00	1985	1,567.504*
11=	N	1.0 EA	11,000.00	1986	428.660*
12=	N	1.0 EA	268,600.00	1987	13,526.357*
13=	N	1.0 EA	64,500.00	1988	2,730.539*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

```
                         ***** FAST-E *****

PROJECT:   401                                DATE: WED, OCT 25 1989   18:38:40
LOCATION: HANFORD                             FILENAME: A401
ITEM:     REPLACEMENT COST                    ECONFILE: RL89

                         ***** DETAIL ITEM *****

      $UNITS  =     1,000 BASIC COST   SCHD PENALTY     TOTAL COST
        PRODUCTION       37,247.49           0.00      37,247.49

                       ***** CHARACTERISTICS *****

              FASTE EQUIVALENT
              FASTE                               247,590.813*
                TENVLE(FASTE)                       FAS.0.432*

                    ***** PRODUCTION COST DATA *****

            AVERAGE UNIT COSTS BASED ON:
      TOTAL PRODUCTION COST  MANUFACTURING COST  THEORETICAL FPCOST
             37,247.49K            37,247.49K          37,247.49K

                          ***** INPUT DATA *****

               ESCAL      GECON      FPER      LCURVE        CMULT
PRJGLOB        1.000      1988       12.        0.960       1,000.
               TYPE       SYSTEM     RERUN     REMBOX
FILE           D           0         0          0
               ALL    COST   UNCERT  LOHMAT  INPUT     FGRAPH   FDET
FORMAT          0      1       0       0       1          0       0

               PLTFM   ENTYPE MATVAL   TYEAR
GLOB           1.300   90.000   1.00D   1988

               WT            WTFAC         VOL         VOLFAC
WTVOL   5,552,826.00R     26,158.6*   138,973.44R    100.00*
               PMX           MXTYPE     ELWT       ELMX          STWT     STMX
MXLINE         1.001R        4.759*      0.0       0.000          0.0    0.000

               PCOST                    PQTY       PECON     FOAK
PCOST       37,247.49*                   1.         1988     1.000
               PSTART        PFIN       PSCHDX     PRDMX     PYEARC     PDISC
PSCHD          JAN.1988      APR.1991*  100.00     2.559*     1988*     NONE
               CONTIN        ADD
END             0             0
```

DO YOU WISH TO MAKE CHANGES (Y/N):

```
401
 ENTER ECONOMIC FILENAME: RL89
    RATES READ FROM FILE RL89

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FILENAME: A401                              DATE: WED, OCT 25 1989  18:38:06
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                           ***** FAST-E *****

PROJECT:  401                               DATE: WED, OCT 25 1989  18:38:07
LOCATION: HANFORD                           FILENAME: A401
ITEM:     ACQUISITION COST                  ECONFILE: RL89

                           ***** DETAIL ITEM *****

                         ***** CHARACTERISTICS *****

                FASTE EQUIVALENT
                FASTE                          247,590.813*
                  TENVLE(FASTE)                  FAS.0.432*

                            ***** INPUT DATA *****

                  ESCAL      GECON      FPER      LCURVE         CMULT
 PRJGLOB          1.000      1988       12. D      0.960*       1,000.
                  TYPE       SYSTEM     RERUN     REMBOX
 FILE             D           0         0          0
                  ALL    COST    UNCERT  LOHMAT  INPUT     FGRAPH   FDET
 FORMAT            0      0        0      0       1          0       0

                  PLTFM   ENTYPE MATVAL  TYEAR
 GLOB             1.300   90.000   1.00D  1988

                  WT          WTFAC          VOL         VOLFAC
 WTVOL   5,552,826.00*     26,158.6     138,973.44*     100.00
                  PMX         MXTYPE       ELWT      ELMX           STWT    STMX
 MXLINE           1.001*      4.759*        0.0      0.000           0.0    0.000

                  PCOST                    PQTY      PECON     FOAK
 PCOST        37,199.60                      1.       1988     1.000
                  PSTART      PFIN         PSCHDX    PRDMX     PYEARC     PDISC
 PSCHD            JAN.1988    MAR.1991*    100.00    4.758*     1988*      NONE
                  CONTIN      ADD
 END               1           0

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DO YOU WISH TO MAKE CHANGES (Y/N) ; N

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

fps

FAST-C
CALCMX PROGRAM

NAME 402

PROJECT Bldg 4843 Alkali Metal Storage Fac

ECON YEAR	YEAR				
BASE AMOUNT (BAMT)	KSF	KLF	CYD	ACRES	
MX TYPE	MXTYPE				
GLOBAL DATA	SINDEX	PINDEX	TYEAR		
PLATFORM DATA	SEISM	TORNAD	RADIAT	BLDUSE	PLTFM
FACTOR DATA	AVHT	KCUFT	TRNPSF	NLEVEL	SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	Bldg 4843	1600	SF	20.-	1988	
2 =						
3 =						
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

92124980913

FPS-14 11-03-82

PRN FA 13922 No Capital Cost in RLPS

02

PROJECT : BLDG 4843 ALKALI METAL STORAGE FACILITY
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=BLDG.4843 1600 SF 20 1988
2=

***** FAST-C CALCMX PROGRAM *****

NAME: 402 DATE: MON, APR 10 1989 13:18:33
PROJECT: BLDG 4843 ALKALI METAL S ECONFILE:

EXCMX	BAMT	BASE
1,271.057*	1.0	CYD
TCOST($1000)	UCOST/CYD	YEAR
32.00*	32,000.00*	1988

Use .1 ft

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X) ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1= BLDG.484	1,600.0	SF	20.00	1988	0.794*

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

```
402
 ENTER ECONOMIC FILENAME:

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

FILENAME: A402                              DATE: SAT, APR 15 1989  14:59:15
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

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                         ***** FAST-E *****

PROJECT:   402                              DATE: SAT, APR 15 1989  14:59:16
LOCATION:  HANFORD                          FILENAME: A402
ITEM:      ACQUISITION COST                 ECONFILE:

                         ***** DETAIL ITEM *****


                       ***** CHARACTERISTICS *****

               FASTE EQUIVALENT
               FASTE                                   246.933*
                 TENVLE(FASTE)                       FAS.0.262*

                          ***** INPUT DATA *****

                 ESCAL      GECON      FPER      LCURVE        CMULT
 PRJGLOB         1.000      1988       12. D      0.960*      1,000.
                 TYPE       SYSTEM     RERUN     REMBOX
 FILE            D           0         0           0
                 ALL    COST   UNCERT  LOHMAT  INPUT    FGRAPH   FDET
 FORMAT           0      0       0       0      1         0       0

                 PLTFM   ENTYPE MATVAL  TYEAR
 GLOB          1.000   100.000   1.00D  1988

                 WT         WTFAC          VOL        VOLFAC
 WTVOL       5,908.76*     1,393.3        154.31*    100.00
                 PMX        MXTYPE      ELWT     ELMX        STWT    STMX
 MXLINE          1.000*     4.224*       0.0     0.000        0.0    0.000

                 PCOST                 PQTY      PECON     FOAK
 PCOST          100.00                   1.       1988     1.000
                 PSTART     PFIN       PSCHDX    PRDMX     PYEARC    PDISC
 PSCHD           JAN.1988   OCT.1988*  100.00    4.223*     1988*    NONE
                 CONTIN     ADD
 END              1          0


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DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
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ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

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***** FAST-E *****

PROJECT: 402
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: SAT, APR 15 1989 14:39:39
FILENAME: 4402
ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	100.11	0.00	100.11

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	246.933*
TENVLE(FASTE)	FAS.0.262*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
100,113.69	100,113.69	100,113.69

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12.	0.960	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.000	100.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	5,908.76R	1,393.3*	154.31R	100.00*			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.000R	4.224*	0.0	0.000	0.0	0.000	
	PCOST	PQTY	PECON	FOAK			
PCOST	100.11*	1.	1988	1.000			
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	NOV.1988*	100.00	2.753*	1988*	NONE	
	CONTIN	ADD					
END	0	0					

~~~~~~

DO YOU WISH TO MAKE CHANGES (Y/N):

NOT INCLUDED IN PRICE TOTAL. REPLACEMENT COST DETERMINED TO BE <.1 MILLION.

fps

FAST-C
CALCMX PROGRAM

NAME 602

PROJECT Bldg 616 NRDWSF

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =	Bldg 616	1	Ea	926,000	1986	
2 =						
3 =						
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

9 2 1 2 4 9 8 0 9

FPS-14 11-03-83

02

```
 PROJECT            : BLDG 616 NRDWSF
  ECON. FILENAME :

 ECON YEAR (YEAR): 1988

 BASE               KSF  KLF  CYD  ACRES
 BASE AMT. (BAMT): 0 0 1

 MX TYPE (MXTYPE): .95 .9 1988
MXTYPE IS INCORRECT
 MX TYPE (MXTYPE): BLDG.616 1 EA 926000 1986
MXTYPE IS INCORRECT
 MX TYPE (MXTYPE): EXCMX

                   SINDEX PINDEX TYEAR
 GLOBAL DATA      : .95 .9 1988

 ITEM()    AMT()  UNIT()  UCOST()  UYEAR()  UMX()

1=BLDG.616 1 EA 926000 1986
2=
```

```
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

***** FAST-C CALCMX PROGRAM *****

```
NAME:      602                          DATE: MON, APR 10 1989   13:24:58
PROJECT:   BLDG 616 NRDWSF              ECONFILE:

            EXCMX                 BAMT           BASE
         53,994.602*              1.0            CYD

          TCOST($1000   )         UCOST/CYD      YEAR
                994.61*           994,612.75*    1988
```

***** INPUT DATA *****

```
                    SINDEX  PINDEX  TYEAR
                    0.950   0.900   1988

  (X) ITEM()       AMT() UNIT()      UCOST() UYEAR()        UMX()
   1= BLDG.616       1.0 EA       926,000.00   1986   53,994.602*
```

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```

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

602
ENTER ECONOMIC FILENAME:

~~~~~~

FILENAME: A602 DATE: SAT, APR 15 1989 15:01:05
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

~~~~~~

***** FAST-E *****

PROJECT: 602 DATE: SAT, APR 15 1989 15:01:06
LOCATION: HANFORD FILENAME: A602
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	3,370.396*
TENVLE(FASTE)	FAS.0.335*

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12. D	0.960*	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	0	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.100	100.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	101,200.81*	4,499.6	2,642.91*	100.00			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001*	4.315*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	FOAK		
PCOST	994.60		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	JUN.1989*	100.00	4.314*	1988*	NONE	
	CONTIN	ADD					
END	1	0					

~~~~~~

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

~~~~~~

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

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***** FAST-E *****

PROJECT: 602
LOCATION: HANFORD
ITEM: REPLACEMENT COST

DATE: SAT, APR 15 1989 15:01:54
FILENAME: A602
ECONFILE:

***** DETAIL ITEM *****

$UNITS = 1,000	BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	1,681.25	0.00	1,681.25

***** CHARACTERISTICS *****

FASTE EQUIVALENT	
FASTE	5,597.264*
TENVLE(FASTE)	FAS.0.331*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
1,681.25K	1,681.25K	1,681.25K

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT		
PRJGLOB	1.000	1988	12.	0.960	1,000.		
	TYPE	SYSTEM	RERUN	REMBOX			
FILE	D	0	0	0			
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR			
GLOB	1.200	90.000	1.00D	1988			
	WT	WTFAC	VOL	VOLFAC			
WTVOL	101,200.81R	4,848.1*	2,642.91R	104.35*			
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX	
MXLINE	1.001R	4.674*	0.0	0.000	0.0	0.000	
	PCOST		PQTY	PECON	FOAK		
PCOST	1,681.25*		1.	1988	1.000		
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC	
PSCHD	JAN.1988	AUG.1989*	100.00	3.034*	1988*	NONE	
	CONTIN	ADD					
END	0	0					

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DO YOU WISH TO MAKE CHANGES (Y/N):

fps

FAST-C
CALCMX PROGRAM

NAME 603

PROJECT Non-Radioactive Dangerous Waste Landfill

ECON YEAR ____ YEAR

BASE AMOUNT (BAMT) ____ KSF ____ KLF ____ CYD ____ ACRES

MX TYPE ____ MXTYPE

GLOBAL DATA ____ SINDEX ____ PINDEX ____ TYEAR

PLATFORM DATA ____ SEISM ____ TORNAD ____ RADIAT ____ BLDUSE ____ PLTFM

FACTOR DATA ____ AVHT ____ KCUFT ____ TRNPSF ____ NLEVEL ____ SUBKSF

	ITEM ( )	AMT ( )	UNIT ( )	UCOST ( )	UYEAR ( )	UMX ( )
1 =						
2 =						
3 =						
4 =						
5 =						
6 =						
7 =						
8 =						
9 =						
10 =						
11 =						
12 =						
13 =						
14 =						
15 =						
16 =						
17 =						
18 =						
19 =						
20 =						

FPS-14 11-23-82

No capital cost in RLPS

03

PROJECT : NON-RADIOACTIVE DANGEROUS WASTE LANDFILL
ECON. FILENAME :

ECON YEAR (YEAR): 1988

BASE KSF KLF CYD ACRES
BASE AMT. (BAMT): 0 0 1

MX TYPE (MXTYPE): EXCMX

SINDEX PINDEX TYEAR
GLOBAL DATA : .95 .9 1988

ITEM() AMT() UNIT() UCOST() UYEAR() UMX()

1=NONE 1 EA 0 1988
2=

***** FAST-C CALCMX PROGRAM *****

NAME: 603 DATE: MON, APR 10 1989 13:27:22
PROJECT: NON-RADIOACTIVE DANGEROU ECONFILE:

EXCMX	BAMT	BASE
0.000*	1.0	CYD
TCOST($1000)	UCOST/CYD	YEAR
0.00*	0.00*	1988

USE #1.0M

***** INPUT DATA *****

SINDEX	PINDEX	TYEAR
0.950	0.900	1988

(X)	ITEM()	AMT()	UNIT()	UCOST()	UYEAR()	UMX()
1=	NONE	1.0	EA	0.00*	1988	0.000

DO YOU WISH TO ENTER ANY CHANGES (Y/N):

9 2 1 2 4 9 8 0 9 2 3

603
ENTER ECONOMIC FILENAME:

FILENAME: A603 DATE: SAT. APR 15 1989 13:02:49
ITEM NOW UNDER PROCESS IS: ACQUISITION COST

***** FAST-E *****

PROJECT: 603 DATE: SAT, APR 15 1989 13:02:50
LOCATION: HANFORD FILENAME: A603
ITEM: ACQUISITION COST ECONFILE:

***** DETAIL ITEM *****

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 259.882*
TENVLE(FASTE) FAS.0.288*

***** INPUT DATA *****

```
                ESCAL      SECON      FPER      LCURVE      CMULT
PRJGLOB         1.000      1988       12. D      0.960*     1,000.
                TYPE       SYSTEM     RERUN     REMBOX
FILE            D           0         0           0
                ALL     COST    UNCERT  LOHMAT  INPUT   FGRAPH   FDET
FORMAT           0       0        0       0       1       0        0

                PLTFM   ENTYPE  MATVAL  TYEAR
GLOB            1.000  120.000   1.00D   1988

                WT            WTFAC           VOL         VOLFAC
WTVOL       13,522.23*       1,768.6         381.87*      100.00
                PMX           MXTYPE      ELWT       ELMX          STWT    STMX
MXLINE          1.000*        3.805*       0.0       0.000          0.0   0.000

                PCOST                     PQTY       PECON       FOAK
PCOST           100.00                     1.         1988       1.000
                PSTART        PFIN        PSCHDX     PRDMX       PYEARC    PDISC
PSCHD           JAN.1988      DEC.1988*   100.00     3.804*       1988*    NONE
                CONTIN        ADD
END              1             0
```

DO YOU WISH TO MAKE CHANGES (Y/N): N
DO YOU WISH TO STORE DATA (Y/N): N

ITEM NOW UNDER PROCESS IS: REPLACEMENT COST

***** FAST-E *****

PROJECT: 603 DATE: SAT APR 15 1989 15:03:16
LOCATION: HANFORD FILENAME: R603
ITEM: REPLACEMENT COST ECONFILE:

***** DETAIL ITEM *****

#UNITS =	1,000 BASIC COST	SCHD PENALTY	TOTAL COST
PRODUCTION	212.14	0.00	212.14

***** CHARACTERISTICS *****

FASTE EQUIVALENT
FASTE 528.932*
TENVLE(FASTE) FAS.0.283*

***** PRODUCTION COST DATA *****

AVERAGE UNIT COSTS BASED ON:

TOTAL PRODUCTION COST	MANUFACTURING COST	THEORETICAL FPCOST
212,137.44	212,137.44	212,137.44

***** INPUT DATA *****

	ESCAL	GECON	FPER	LCURVE	CMULT	
PRJGLOB	1.000	1988	12.	0.960	1,000.	
	TYPE	SYSTEM	RERUN	REMBOX		
FILE	D	0	0	0		
	ALL	COST	UNCERT	LOHMAT	INPUT	FGRAPH	FDET
FORMAT	0	1	0	0	1	0	0
	PLTFM	ENTYPE	MATVAL	TYEAR		
GLOB	1.100	100.000	1.00D	1988		
	WT	WTFAC	VOL	VOLFAC		
WTVOL	13,522.23R	1,960.8*	381.87R	108.13*		
	PMX	MXTYPE	ELWT	ELMX	STWT	STMX
MXLINE	1.000R	4.315*	0.0	0.000	0.0	0.000
	PCOST		PQTY	PECON	PDAK	
PCOST	212.14*		1.	1988	1.000	
	PSTART	PFIN	PSCHDX	PRDMX	PYEARC	PDISC
PSCHD	JAN.1988	FEB.1989*	100.00	2.757*	1988*	NONE
	CONTIN	ADD				
END	0	0				

DO YOU WISH TO MAKE CHANGES (Y/N):

NOT INCLUDED IN PRICE TOTAL. REPLACEMENT COST DETERMINED TO BE <.1 MILLION.

Section 2
FAST-E METHODOLOGY

2.1 INTRODUCTION

FAST-E, the equipment model of FAST (Freiman Analysis of Systems Technique) is a computerized parametric cost estimating system designed to calculate engineering, production, integration, installation and life cycle costs for a universe of equipments. FAST-E also calculates engineering and production costs for micro-circuits and development, integration and life cycle costs for software. Within the universe lie equipments and software from the commercial and industrial worlds including aerospace equipment manufacture, chemical processing, and power generation - both fossil and nuclear fueled.

As a computerized parametric cost estimating system, FAST-E uses the ability of the computer to handle large volumes of data and process many computations rapidly. The parameters used in FAST-E are the quantitative values of the specific variables used in the FAST-E methodology. Weight, for example, is one of the variables, its parameter could be 150 (pounds). Every variable used in FAST-E is associated with a specific parameter - it is this value that is input to or output from FAST-E.

FAST-E was designed to be universally applicable, that is, it has a series of mathematical routines that processes parameters of variables describing all types of equipment and software systems. These routines reflect all conditions of equipment, states-of-art, and industry and organizational variations. FAST-E outputs are consistent with management perceptions and with actual cost experiences.

Parametric cost estimating is increasingly the method of choice, particularly in the area of high technology.

This is so, because with the recent dynamic growth in technologies and expansion of states-of-art new equipments and systems have become more complex and sophisticated. Design alternatives to accomplish specific equipment performance have mushroomed. Traditional standards and "rules of thumb" that previously guided estimators have lessening validity. When

technological innovation spanned longer time periods, it permitted the accumulation of experience to adjust estimating standards and "rules". Today there is seldom sufficient time for data maturity. In the interval needed to stabilize information about a given technology a new technology will probably have replaced it. Technological life cycles are becoming increasingly shorter.

New technologies no longer permit the luxury of time-honored "bottoms up" parts accumulation and labor costing methods. These ways are too costly in time and dollars and increasingly lack the needed accuracy as viable management instruments. Although detail estimating methods are useful where technology has matured and experiences are available, the area of rapid technological growth increasingly relies on parametric methods.

Even in slow-growth industries detail estimates have become little more than rationalizations and primarily used to explain how a project will be accomplished in terms of material procurements, labor costs, tooling, etc. for a pre-specified cost. The emphasis of the FAST methodology is on the way costs are initially established.

2.2 REGRESSIONS

2.2.1 EARLY PARAMETRIC METHODS

In estimating costs, traditional parametric methods use a mathematical procedure known as regression. These are procedures that relate one or more variables to a specific set of corresponding values. For example, the relationship between height and weight can be expressed by a regression equation. The locus of points generated by this equation would be a curve of particular slope plotted on a height/weight chart.

Conventionally there are three (3) basic categories of costing regressions:

1. Equipment
2. Industry-wide
3. Organizational

<u>Equipment</u> regressions are for specific generic products or systems. For tens of thousands of generically different items there may be an equal number of

regressions. When technological improvements are not dynamic these regressions can be constructed from "actual" or known costs.

Industry-wide regressions are more gross than the generic type. They represent the "rules of thumb" that specific product industries have found useful. The cost per pound or cost per kilowatt, pounds per horsepower, etc. are some examples. Such regressions are technology-limited and are seldom capable of reflecting changes in the states-of-art.

Organizational regressions are specific to a particular enterprise. They represent unique attributes such as resources, tooling, skills, facilities, etc. These regressions can reflect productivities, and wage rates, and may include certain socio-economic and geo-cultural variations. Within a particular company, there can be major organizational differences. Organizational regressions may be used to estimate plant outputs such as barrels per day or tons per hour.

These regressions work best where the equipment, industry and organization undergo relatively slow change. However, they need a wealth of proven data to create valid regressions as well as to maintain them. Where an organization produces a multiplicity of equipment or systems and deals with many contractors the amount of regressions can become enormous. It's computerized system may be impractical, since the expense of development, maintenance and use of the thousands of sets of equations could be abnormally excessive. These equations are commonly of the form that does not provide for extrapolations or projection for costing new technologies.

2.2.2 THE FAST METHOD

Clearly, a system freed from such chains is needed. The FAST system is that system. FAST is a universal system that has a single series of mathematical routines that, operating on its unique data base, in effect, generates needed regressions as it goes along. FAST can synthesize the regressions from conceptually available parametric inputs and provide a cost output even though weight is not an input. It can do so because it can operate on an input of functional and performance parameters and process the data utilizing the concept that quantitizes the technological state-of-art.

For an explanation of how this is so let us stipulate that for every product there is a relationship that can be expressed as cost/pound; then, what are the components of costs and weight and how do they vary?

2.2.3 WHY COSTS VARY

Every system has a cost per pound which varies with its weight. Figure 2-1 portrays this relationship.

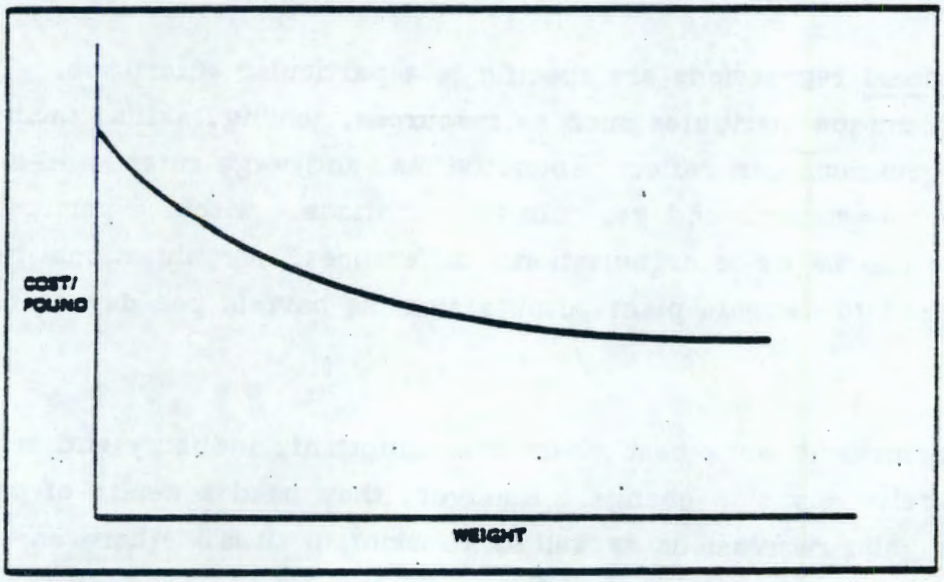


Figure 2-1. Cost-Weight Relationship

Based on the equipment's technology and other factors, all such relationships show comparable, if different regressions. See Figure 2-2.

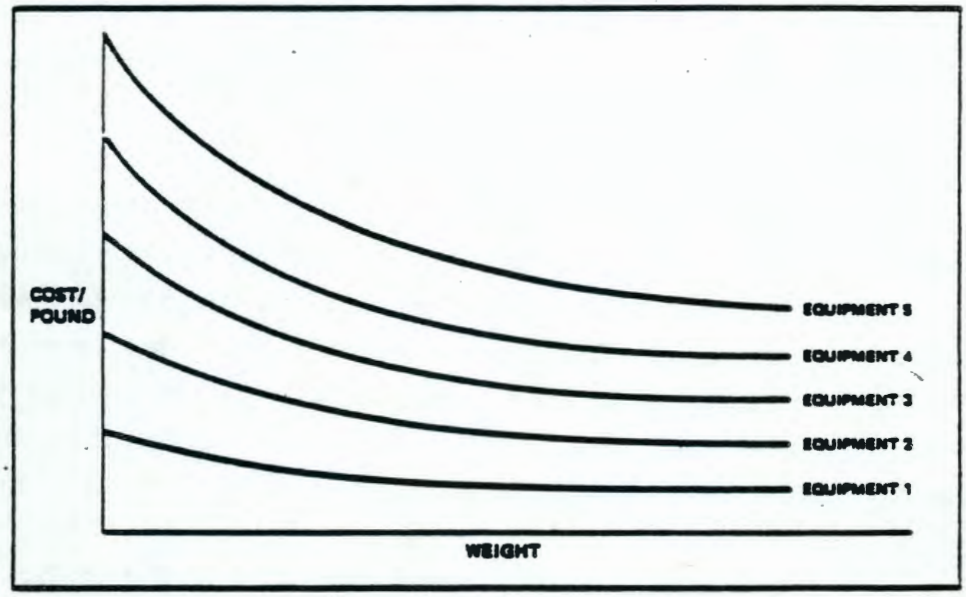


Figure 2-2. Cost-Weight Curves for Equipment

Their position, amplitude and curvature will vary with the curvature as a function of the amplitude.

A comprehensive analytical study showed that the following factors were the principal reasons for the variation:

1. Performance and functional features
2. State-of-art or technology
3. Design or physical geometry
4. Economic of production including
   - Quantities
   - Fiscal periods
5. Schedules
6. Quality, reliability, maintainability, safety requirements, etc. (serviceability)
7. Resources, skills and experience.

2.2.4 A UNIVERSAL APPROACH

If one then wishes to design a universal approach to finding a unique regression equation one would first require a method to quantitize the above

factors. This could lead to the use of such parameters in order to synthesize appropriate regression equations.

To this end, the performance features, equipment weights and costs were gathered for a great variety of products from commercial and industrial catalogs, military and aerospace costing information and chemical processing and energy industry data. Economic values were converted to constant (1972) dollars. Selling prices were recalculated to derive average production costs. Applicable industry pricing practices were used for the conversions. Average production costs were adjusted to theoretical first piece costs.

The data were reduced to a set of common curves as shown in Figure 2-3.

Our entire world was found to be uniform. Cost was shown to be a function of weight and product complexity. The phenomenon that costs vary as a function of product weight and complexity appeared to follow some basic behavior law. From these results one can therefore hypothesize that for all products (that is, universally) cost varies with weight and complexity. Many thousand of tests give overwhelming evidence of the truth of this hypothesis.

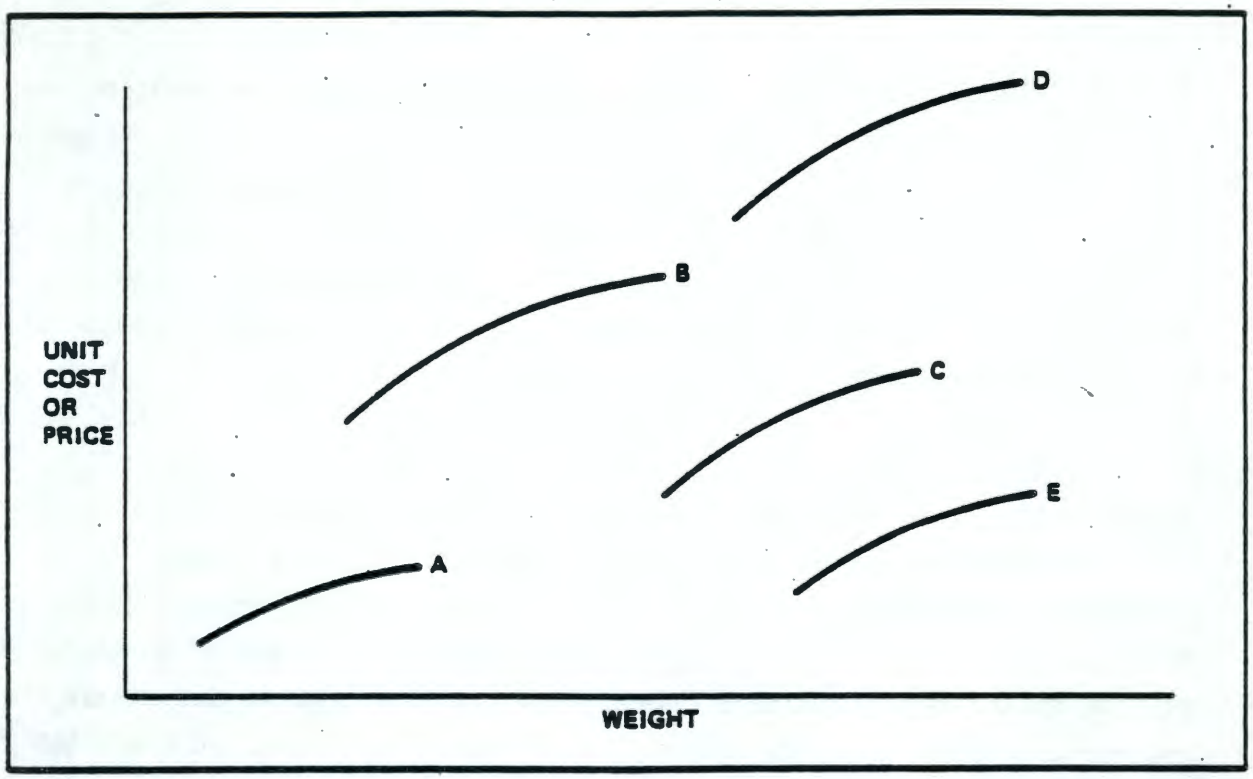


Figure 2-3. Cost-Weight Curves for a Variety of Products

2.3 COMPOSITE COMPLEXITY VARIABLE ESTABLISHED - MXTYPE

There will always be a characteristic curve that passes through a specific point set of unit weight and its cost per pound. The shape of the curve was found to be related to the amplitude. A mathematical scheme was devised establishing a variable MXTYPE whose parameter, which represents the composite complexity value for an equipment, could be used to generate the curve.

A factor analysis study of the MXTYPE variable shows that it is made up of three principal factors:

1. Technology or state-of-art
2. Product stability, including quality, reliability, maintainability, product safety and assurance, etc.
3. Organizational variations including design approach, resources, skills and experiences, productivity, etc.

The FAST methodology was designed to quantitize these three areas so that their parameters could be used to synthesize appropriate MXTYPE values. The method precludes the need to include each of the infinite equipment varieties otherwise necessary to create a universal modeling system. However, as a control, the methodology is still required to meet the challenge of reasonableness with respect to otherwise determined preconceptual costs as well as known "actual" or experienced costs.

2.3.1 QUANTITIZING TECHNOLOGY - ENTYPE

Technology, or state-of-art, requires a definitive description so that it may be quantitized for parametric analysis. A state-of-art is a measure of the performance capability of a unit of mass. The amount of energy, kinetic or potential, that a pound of equipment can handle is a measure of its technology. In other words, the more "work" a pound of equipment can handle the greater its technology. For example, a 10-horsepower motor weighing 300 pounds has a higher state-of-art than a 500-pound motor of the same horsepower.

Personal computers and especially hand calculators are vivid examples of technological growth. If a device can be designed to do the same work or more than its predecessor yet weigh far less, it will clearly be more advanced in its state-of-art.

In order to process or produce a system that represents a greater technology, more energy must be expended per unit of its mass (pound); therefore, it costs more to manufacture a pound of an advanced state-of-art. In spite of the increased costs there are functional and economic benefits. The advanced technology pound will do much more work or will require far less weight to accomplish the same performances. In the case of the advanced state-of-art the cost per unit of performance will be less. If there were no economic or functional benefits there would be no incentive to advance technology. There are many well-known examples that dramatically prove the hypothesis. Today's computer technology is an excellent example. Because of microprocessors, quartz wrist watches have many more functions, such as alarms, than their principal (timekeeping) functions. The size of hand-held calculators cannot be further reduced because of the practical limits imposed

by the input keyboard and the output display. Therefore, more performance is being built in. Today's hand-held calculators can function virtually as small computers.

In every case the unit mass or pound of advanced technology requires more energy and consequently more cost to produce.

The FAST methodology provides mathematical procedures that employ the hypothesis and methods for the parameterization of technology and performances.

Defining the technology of an equipment requires two steps. The first is a coarse, or macro, description and the second is its fine tuning. The macro approach uses the variable ENTYPE. ENTYPE, a significant factor of MXTYPE, indicates the average level of a system's technology, where the level of technology is the degree of equipment or system capability relative to weight.

The ENTYPE parameter is a measure of the mix of seven basic technological groups:

1. Electronic - where the mass involves changes to shape of electromagnetic waves
2. Electrical - where energy is converted from electricity to other forms such as heat, motion, sound, etc.
3. Heat - where energy in the form of heat is either generated or handled in some fashion such as heat sinks or heat exchangers
4. Motion - where masses are moved, such as conveyors
5. Mechanical Control - where actions control the movement of masses such as valves
6. Containment - where masses contain, or are contained, such as tanks, bottles, etc.
7. Supportive - where masses are concerned with sustaining, or supporting masses such as platforms, towers, etc.

The mix value, ENTYPE, is based on the volume or the space within an equipment or system each type of technological group requires. For example, the electronics may be 10% of the total volume. Obviously the technological allocations of the equipment are coarse and may not be the same between different observers. The variable PMX, which will be described later, is used to fine-tune the integrated set of factors so as to reflect design, observer, and other reasons for variations in the ENTYPE parameter.

The ENTYPE parameter is also used with performances, energy and functions to calculate weight. The fine tuning methods for more accurate weight calculations will be described later.

The ENTYPE parameter, which varies in value from 40 to 140, is a non-linear abstraction for the amount of design mass that is required to provide the equipment's functional requirements. Since less total mass is associated with high technology it suggests a lower ENTYPE value.

With experience, a user will be able to quickly associate ENTYPE values for the classes of equipments that are typically processed. Tables in the FAST-E Reference manual list established ENTYPE values for various commercial and industrial equipment. These values may be extrapolated for the ENTYPE's of unlisted items. When an ENTYPE value is entered there is no need to input the equipment's technological makeup using the volumes of the seven basic technological groups, i.e., electronic, electrical, etc.

2.3.2 QUANTITIZING PRODUCT STABILITY - PLTFM

Product stability, which includes its stability of performance, ease of use and maintainability and its operational environment conditions, is a significant factor of an equipment's composite complexity or MXTYPE. The variable used to convey the product stability parameter is called PLTFM (Platform). Since equipment design specifications can generate additional design efforts as well as inspections and tests, costs and schedules are clearly impacted.

The PLTFM value, which may range from 1.0 to 3.0 is a measure of the degree of severity of such product requirements. More stringent specifications have higher values. An equipment designed and produced for everyday

commercial use might be in the 1.0 to 1.2 range; however, this equipment would be unacceptable for use in a spacecraft where the PLTFM range may be 2.3 to 2.5.

Studies were made of sets of requirements that appear to delineate the following areas of equipment usages:

- o Commercial
- o Transportation Type
- o Shipborne
- o Airborne-Commercial
- o Airborne-Military
- o Unmanned Space and Manned Space

PLTFM parameters were established for each. They range from 1.0 to 2.5. FAST-E provides procedures that allow the user to develop unique PLTFM parameters based on varying sets of requirements, for example, radiation hardening.

2.3.3 FINE TUNING MXTYPE WITH MX FACTOR - PMX

The third significant factor of MXTYPE is MX. The PMX variable provides the means for the fine tuning of the MXTYPE value. The variable covers the following possible causes of cost variations:

1. Organizational - reflecting differences of resources, skills, experiences, productivity, etc.
2. Equipment design
3. Production methods - such as tooling and facilities
4. The uncertain perceptions and parametric assignments of:
   - o ENTYPE (Technology)
   - o PLTFM (Product Stability)

The assignment of ENTYPE and PLTFM values can be subjective. The uncertainties arising from this subjectivity are normalized through the calibration of the PMX variable which is, in essence, a balancing parameter.

The PMX was structured so that it may be calibrated, or modulated, by the user to cause the MXTYPE to reflect many other conditions such as soft tooling, destructive testing, special field or flight testing, etc. The PMX capability provides an extremely useful mechanism for various cost sensitivity studies. It permits a vast range of possible cost and schedule variation factors to be considered by the FAST methodology. For example, we may wish to use an historical, experienced project record when examining new program requirements. The project on record may have been cluttered with an abnormal set of problems, such as excessive design or production changes, schedule delays, considerably more rework and testing, etc. The PMX variable enables the user to remove these effects from the "actuals" prior to using the PMX as a calibration reference.

The PMX variable also serves as a means of testing the goodness or competence of "actual" costs and in some cases the reasonableness of new estimates. The PMX parameters for generically similar equipments for a particular organization have been found to have limited ranges. There are many cases of industry-wide PMX patterns. The FAST-E Reference manual includes equipment reference tables that show typical industry PMX values.

2.3.4 ATTRIBUTES OF MXTYPE

MXTYPE, which is a function of ENTYPE, PLTFM and PMX, is a complexity value that relates costs to weight. All products, no matter their design, purpose and usage environment, are measurable by appropriate MXTYPE parameters.

The MXTYPE parameter has several interesting attributes. A higher order value, say 7.5, represents a more complex product than a lower value such as 4.5. The cost effect of changing the product weight is not the same for equipments of different complexities.

As its weight increases, the more complex or the higher MXTYPE item tends to experience a decrease in its overall technological make-up. The more complex equipment, as it becomes larger, does not tend to lend toward more production automaticity. On the other hand, increasing the weight of less complex items does not significantly affect their overall technological make-up,

but does tend to contribute to its adaptability for production automaticity. These are among the principal reasons the variations in cost, as a function of weight, differ as their complexities vary.

2.3.5 USING MXTYPE AND ENTYPE TO CALCULATE WEIGHT

Once MXTYPE has been established, the weight parameter is needed to calculate a basic theoretical first piece cost. Why do weights vary? Weights of equipments vary because of their functions or purposes with respect to their inherent technologies. For the same performances a higher order technology will require less weight. When the same technologies are involved an increased level of work or functions will increase the product's weight. If a product is required to operate at increased environmental extremes its weight will be affected. Basically weight is a function of technology, performance and, in certain instances, product stability requirements.

The FAST methodology provides a quantitative way of using these relationships. As described before, the ENTYPE parameter is a measure of a product's state-of-art or technology. It is used to enable the model to develop the required design mass based on the functional descriptors. The descriptors must, therefore, be given as parameters. Studies were made to determine how specific functional or performance characteristics affect weight. The effects were different as the applicable ENTYPE parameter varied. At that time, the following characteristics were vigorously investigated and methods for their parametric use were developed.

Horsepower
Kilowatts
British Thermal Units
Tons (a capability, not weight)
Gallons per minute
Gallons
Cubic Feet
Square Feet
Feet
Pressure (PSI)
Temperature (F)

It is important to note that the FAST-E model has provisions that allow development of the means of using characteristics that are not listed.

The characteristics shown above are of three categories:

1. Energy related
2. Dimensional
3. Conditional

Energy-related characteristics are those that involve the use of some form of energy. The characteristic may reflect an energy input to a system, its output, or its dissipated energy. The methodology will accommodate the user's energy definition. Dimensional characteristics cover features that are indicative of equipment size, such as cubic feet, gallons, etc. (TONS is used as a measure of capacity, not the equipment's weight.)

Conditional characteristics cover features that involve environmental factors such as temperature, pressure, etc. They also include cosmetic designs and product identification details which organizations use to "label" their equipment.

The user is allowed to describe one primary characteristic and up to three secondary ones. Having more characteristic inputs dramatically increase the model's computations. The resultant increased computer time as well as its greater potential for error, will not in most studies add to the accuracy of the output.

The primary characteristic is the equipment's principal feature. Based on the primary characteristic and its parameter and the equipment's technological scenario, an appropriate design mass is calculated. The secondary descriptors are used to supplement the basic mass. As a result the model determines an estimated product weight. Since, at most, only four characteristics are used it will be necessary to adjust the calculated weight to have it reflect the product's remaining features.

2.4 USING WTFAC AND VOLFAC IN ESTABLISHING WEIGHTS

Obviously, the descriptors and their parameters will seldom cover all functional features. In addition, organizations may have other unique designs.

Therefore, the model's weight may not be the "actual" weight. To tune the "model's" weight a calibration step is provided. Comparisons between computed and actual weight and size values are expressed by the variables called WTFAC and VOLFAC. WTFAC and VOLFAC parameters have generic and organizational orientations. For a particular organization a generic equipment family will have relatively consistent sets of WTFAC and VOLFAC values.

WTFAC and VOLFAC are used to to convert the model's calculations to an "actual" estimate. This explains why is is possible to describe energy values such as kilowatts as either input, output, or dissipated energy as long as there is consistency with the WTFAC and VOLFAC parameters.

The VOLFAC factor, which adjusts the model's computed size or volume is not a significant FAST variable. FAST does not employ size as a cost factor. It computes the equipment size as a convenience.

It is no longer necessary to describe a systems or equipment by its weight of electronics and structure. The weight breakdown requirement permits faulty practices and abuse of the parametric analysis. The FAST use of the generic and organizational reference values minimizes misuse of the methodology.

The FAST methodology provides an additional advantage. It permits the calibration of an experienced situation even though the weight of the system is not determinable. It can be done without the need to describe its performance characteristics or features. Appropriate weights will be calculated by the model prior to its processing of given characteristic values. In such cases applicable WTFAC parameters will be rendered by the model.

Its method is relatively simple. Based on the given technological year, ENTYPE and PLTFM parameters, the model determines the most likely MXTYPE. The PMX value, of course, will be 1. Having the MXTYPE value and costs, the model will compute a weight as a function of their relationship. If characteristics are given, a design mass is also computed and compared to the calculated weight. The difference between the two weights will be reflected by the WTFAC parameter.

The capability of using methodology without the need for an input weight overcomes the most significant obstacle in the parametric analysis of large process equipments.

2.5 EXPANDED CAPABILITY WITH FASTE

The FAST methodology furnished a very unique capability of allowing the user to "size" a new system solely based on its total functionality. For example, one may wish to determine the costs and schedules for an equipment whose functional purpose, as an entity, may be 25% greater. The reference may be some known "actual" or a previous parametrically processed unit. An adjustment of the total set of functions which may not materially affect the equipment's use may lead to a more reasonable cost and schedule.

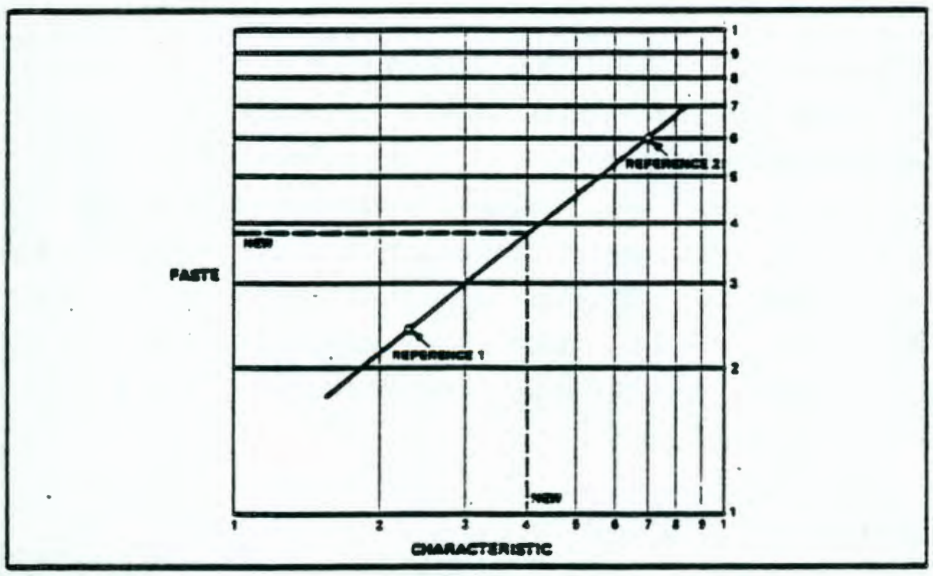
The FAST capability allows the user to employ a performance characteristic that does not appear on the current list of FAST-E characteristics. For example, the user may wish to use a "figure of merit" or an aircraft payload capacity or a product's such as barrels per day or gallons per hour, etc. There is a vast variety of functional characteristics of significant interest a user would wish to use as performance measures. In every FAST study the model will furnish a value called the FASTE equivalent.

Based on the total weight, PLTFM and ENTYPE, the model develops an equivalent energy value of FASTE which would be required for the same design mass. It would be the same as inputting a single characteristic for the computation of the same weight. The user may describe several characteristics - however, their integrated value will be represented by the FASTE parameter.

When no descriptive characteristics are given, the model calculates an appropriate design predicated on the technological year, ENTYPE, PLTFM, WTFAC, and the magnitude of the FASTE equivalent.

To use the FASTE technique to cover unlisted characteristics there must be a minimum of two known references whose characteristics of interest are different. In each FAST calibration case there will be a specific FASTE and a

WTFAC appropriate to a particular characteristic value. These can be plotted in Log/Log graph (see Figure 2-4).



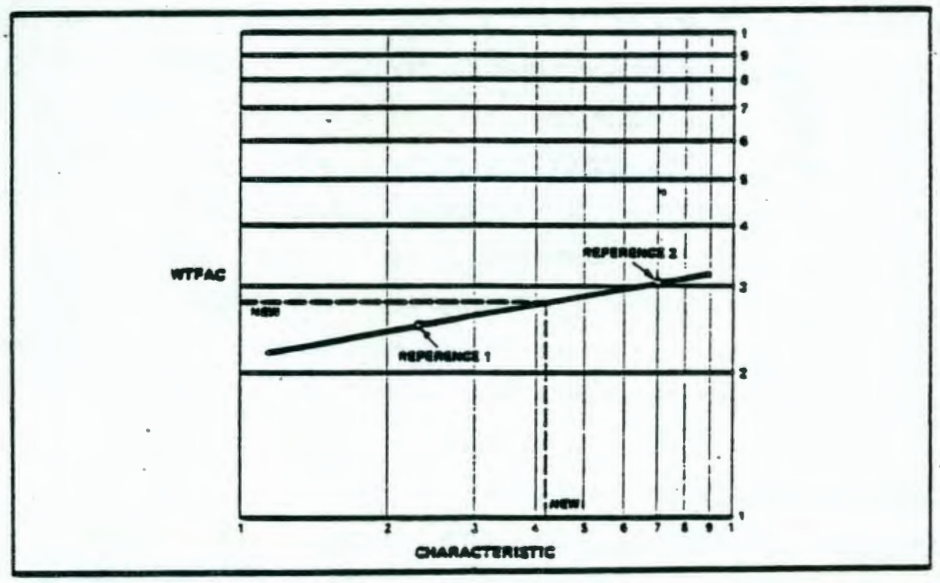


Figure 2-4. Determining Appropriate FASTE and WTFAC Values, for New Characteristic Value

For a new characteristic amount, one could determine the appropriate FASTE and WTFAC values.

2.6 CALCULATING ENGINEERING COSTS

The FAST methodology introduces several innovative techniques that allow more effective engineering costing. Principal cost driving factors can be calibrated to tailor the computations to conform to unique organizational differences. As in the case of production costing, weights of equipment are not required for either calibration or forward costing. In cases where prototype units are not involved, the FAST-E engineering processing can employ energy, performance and functional characteristics. The FASTE equivalent capability is also available.

2.6.1 DESIGN COST INPUTS

Engineering costing is based on two levels of activity: design and prototype. The design costs include appropriate system and engineering design and drafting charges. There is, also, a level of project management. As described later, there are procedures to modulate these and many other engineering activities for various costing purposes. Prototype costs materials, labor and overhead. The input prototype quantity can be a real number that may show partial quantities, for example, 1.5. Partial units are used to account for breadboarding, brassboarding or where only a portion of an equipment may be prototyped. Of course, such values may be subjective but in the course of conceptually estimating engineering and prototype efforts subjectivity cannot be avoided.

2.6.2 PROTOTYPE COST INPUTS

Prototype costs include inspection and testing. The PLTFM variable is used to convey the character of the required testing. If the user wishes to define other special efforts as, for example, prototype tooling or some unique resources, etc., there are FAST-E Procedures for the purpose.

Because, in most cases, engineering and prototype work are heavily integrated, the costs between the two may not be reasonably separated. The FAST-E model computes the engineering and prototype costs independently and their total is subsequently used for computative purposes.

2.6.3 USE OF EMX

The engineering costs are based on an equivalent MXTYPE type variable. Its factors include ENTYPE, PLTFM and EMX. The EMX variable replaces the production's PMX. The EMX variable is the calibration factor which is used to adjust for unique generic and organizational differences. It is also used to compensate for the subjective errors of the ENTYPE and PLTFM parameters. As in the case of the PMX variable, the EMX parameter can convey various other requirements such as tooling, testing, etc. (to be described later).

2.6.4 USE OF ENEW and ELEVEL

In addition to ENTYPE and PLTFM, engineering costings requires two other factors: ENEW and ELEVEL.

ENEW is the variable that conveys the degree of new design. In most cases the engineering effort does not require a totally new design. Many features are taken from previous designs or their modifications. The ENEW parameter indicates the anticipated new design percentage. Design redundancies are covered by the model's heuristics.

ELEVEL is the variable that conveys the character of the work to be done with respect to the "team" expected to do the work. If we are to have an experienced engineering group, in lieu of an inexperienced one, costs could be less. However, if the work is relatively straightforward and not as difficult, the cost difference may be insignificant. This means that the complexity of the engineering effort is a function of the character of the design effort with respect to the experience level of the team expected to do the work. Therefore, ELEVEL is the engineering complexity factor. Its parameter ranges from 0.3 to 3.0 with 1.0 as the average. The FAST user can use the ELEVEL table in the FAST-E Reference manual to select an appropriate parameter.

It is clear that various descriptive variables will have subjective parameters. These include ENTYPE, PLTFM, ENEW and ELEVEL. To neutralize the total effect and to calibrate to realistic total value, the EMX variable is provided. It serves in the same manner the PMX serves for production costs.

The engineering equivalent of MXTYPE is developed which operates with weight to calculate the design cost. It is adjusted by the ENEW parameter. If there are prototypes, an appropriate complexity factor will be developed in order to compute prototype costs. The two engineering computations are integrated. The PLTFM an ELEVEL variables are used with the calculated amount to determine performance schedules, which can further impact the total cost. The effects of economic escalations and technological year are independently analyzed. If the analysis was a calibration study, the results are compared with the input values to give the compensating EMX value.

Should the FAST-E study be a cost estimate, the calculated costs are adjusted by the EMX parameter.

Weights of equipment are not necessary inputs for engineering calibration r forward costing. If the reference costs have a mix of design and prototype charges, the model will iteratively find the weight that best fits the costs and other descriptive parameters such as ENTYPE, ENEW, ELEVEL, etc.

When engineering charges are processed without a given production cost, performance characteristics may be entered to enable the calculation of an appropriate weight, FASTE, WTFAC, and VOLFAC parameters. The user may input FASTE and WTFAC parameters in order to exercise a unique characteristic - on one that does not appear on the current list of twelve characteristics.

2.7 CALCULATING INTEGRATION COSTS

Integration is the effort required for the assembly, inspection and tests of subgroups of items into one operational system. This may involve electronic, electrical, mechanical, piping, and plumbing, etc., types of work as well as various additional minor equipments such as monitors, controls, switches, etc.

Some work may be simple attachments and some may require extensive interface activity. For example, an electronic match-up could mean circuitry alignments, tuning, impedance matching, etc. Mechanically there could be machining, welding, painting, etc. - or simple attachments with nuts and bolts.

The basic FAST-E model equipment costing algorithms use weight and associated complexity factors to calculate costs. Therefore, to develop integration costs their equivalents for weight and complexity are necessary.

As each item is processed, the INTFAC and INTQTY variables are examined by the model. They indicate the degree of the item's integration as well as their number which are to be assembled to the higher order group. The INTFAC parameter can be established through the use of the INTFAC reference table in the FAST-E Reference manual, which covers a wide range of integration activities.

Based on the INTFAC and INTQTY values, in addition to the parameters of PLTFM, ENTYPE and, if available, the MXTYPE, the model synthesizes an appropriate integration weight and complexity factor. These are accumulated with the equivalent parameters of other items that are to be integrated.

After the last item is processed the accumulations are reprocessed to arrive at a total integration weight and its appropriate complexity factor. The complexity factor with the governing PLTFM value is used to generate a MXTYPE value. Having the integration weight and its MXTYPE, the basic integration cost can be calculated.

Integration costs, as in the case of engineering costs, are also a function of the character of the work and the "team" that will be doing it. There may be a difficult integration effort to be accomplished by a novice group - or it may involve simple efforts with an experienced team. The variable SLEVEL is used to convey the parameter to represent the situation. The SLEVEL value can be selected from the SLEVEL reference table in the FAST-E Reference manual.

The INTFAC, SLEVEL, and PLTFM parameters are, to some degree, subjective. Their necessary adjustment factor is determined by a calibration procedure.

The calibration process requires the knowledge of a system whose costs for integration, inspection and tests are known. The costs are entered as inputs

in the system's "integration box". The given costs are used to measure the variance of the model's estimated integration charges. The variance adjustment is expressed by the SMX variable which is an output. Therefore, the SMX parameter, as a calibration factor, tailors the FAST-E Integration cost output to remove the errors of the subjective factors.

The SMX value can also be generated by exercising cost sensitivity studies. The SMX value may be varied until the generated integration costs appear to be reasonable.

The SMX variable can be arithmetically modulated to provide for various other integrations requirements such as special tooling, field, flight or other types of testing, etc. The adjustment factors in the PMX and EMX reference table in the FAST-E Reference manual are applicable to the SMX variable.

2.8 CALCULATING INSTALLATION COSTS

Installation is the effort necessary to mount and hook-up an equipment or system that may require electrical, mechanical, piping, plumbing or similar interfaces. For the purpose of FAST-E, installation does not include the stands, foundations or other surfaces to which an equipment is attached - unless, of course, such areas are covered by other items or "boxes". The installation charges cover only the immediate interface elements and labor. For example, if a pile or an electric line must be laid for some extended distance to mate with the equipment, it is not included; however, their immediate connections are covered. If a concrete foundation must be prepared its cost is not part of the installation costs; however, the bolting of the equipments to the base is part of the installation costs.

The FAST-E model has heuristics for installation costing which were predicated on many actual costs. It is an equivalent MXTYPE costing scheme. The MXTYPE method relates an equipment weight to its costs. Their curvilinear relationships can be expressed by a complexity factor such as - MXTYPE.

Installation costs, as in engineering and integration costs, are affected by the character of the installation work and the "team" that will be doing it. A

complicated installation may be required of an inexperience group. The variable ILEVEL is used to convey the parameter to represent the situation.

The ILEVEL value may be selected from the FAST-E Reference manual (as for ELEVEL and SLEVEL).

Because SLEVEL, PLTFM values are subjective the developed installation complexity factor must be tailored, which is accomplished by the IMX variable.

The IMX parameter is determined through a calibration procedure. Known installation costs are inputted and the output will furnish appropriate IMX parameters.

The IMX value is used to adjust the internal computations in order to be consistent with experience. One could generate an IMX through forward costs sensitivity studies by varying the IMX value until the output appears to be reasonable.

As in the case of the PMX, EMX and SMX, the IMX value can be arithmetically modulated. This permits the user to use IMX to cover values for special tooling, testing and other special conditions. The adjustment factors are set forth in the PMX, EMX, SMX, IMX reference tables in the FAST-E Reference manual.

2.9 COMPUTING SCHEDULING EFFECTS

When estimating charges, performance schedules cannot be ignored. There may be reasons for program acceleration or causing the same work to take more time. In both cases there can be more costs.

If economics are to be considered, schedules are obviously important. Costs pro-rated over shorter or longer time periods will have different economic impacts. The FAST methodology uses annual escalation rates which are allocated on a month-to-month basis. Every month has a given economic or escalation rate. The same basic cost spread over longer periods of time will have greater "as spent" costs. The spread of charges across the total

performance period is not linear because every month may not have equal expenditure rates. The monthly allocation of costs are based on beta-function distributions. For example a typical performance may have sixty percent (60%) of its costs spent and/or committed at the forty percent (40%) point of the schedule.

2.9.1 DEVELOPING SCHEDULE COMPLEXITY FACTORS - SCHDX

The FAST methodology has algorithms, comparable to those used for costing, to calculate the months necessary to complete an effort.

Based on considerable histories the following universal curvilinear relationships were discovered.

Curves A and B of Figure 2-5 represent two typical but generically different classes of equipment. Their amplitudes and curvatures are functions of the following variables: ENTYPE, PLTFM, PMX and WT (Weight). They are used to develop an internal schedule complexity factor which governs the formulation of an appropriate curve. The curve's equation with quantity as its independent variable generates the number of schedule months.

Each costing area, such as production, engineering, integration and installation, has its unique but similar curvilinear relationships. Their schedule complexity factors are different.

FAST-E procedures were designed to be universal so that equipments, no matter their generic classification, state-of-art and size, can be processed. But organizations are different; resources, skills, experiences and geo-cultural variations will affect schedules. The FAST system provides methods for the appropriate tailoring.

The model has variables that are used to tune the generated schedules to conform to the unique or patterned conditions. This requires a calibration. The user can describe an experienced situation and its schedule. The calibration output renders SCHDX parameters which are used to tailor the estimated schedules. The following are the appropriate factors:

Production - PSCHDX
Engineering - ESCHDX
Integration - SSCHDX
Installation - ISCHDX

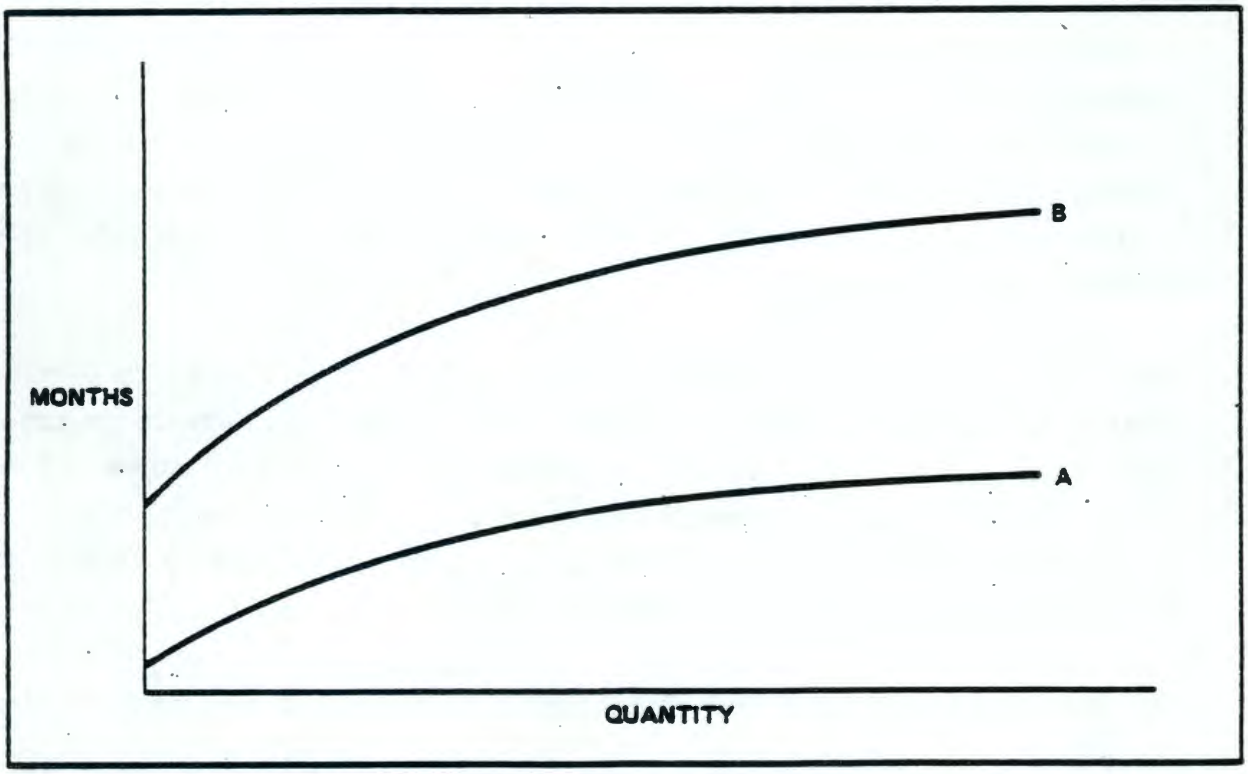


Figure 2-5. Schedule-Quantity Curves Showing Universal Curvilinear Relationship

2.9.2 COMPUTING PENALTY COSTS

When costs are calculated, their schedules are examined for project accelerations extensions. The user may enter specific completion dates without the input of the appropriate SCHDX parameter. In such cases the model assumes the indicated schedule to be normal; and will render its conforming SCHDX parameter. However, if the user, in addition to specifying and end date, enters the applicable SCHDX parameter the model will compute a schedule and compare it to the given date. Should the input completion date indicate an acceleration or protraction, a cost penalty computation will be made.

There is, however, a forgiveness period that may vary depending upon other performance factors such as PLTFM, ENTYPE and MXTYPE.

Accelerations and protractions necessitate different beta-function cost distributions. The expected normal distribution would be predicated on the appropriate SCHDX factor. Therefore, under accelerations or protractions, monthly expenditures and commitments will be different. Changes from th "normal" pattern will cause additional costs. Acceleration creates expenses such as overtime, increasing the number of shifts, resources, etc. with their resulting inefficiencies. Protraction means loss of efficiencies, rework, changes to the performance tempo. Based on considerable analysis and many "Delphi" studies, changes to the expenditure densities were translated into penalty costs.

The FAST methodology uniquely computes the penalty expense if calibration costs includes such additional charges. For example, a reference or experienced situation may have extra costs because of a schedule problem. Such costs should be removed from the total prior to its use for calibration. Otherwise, the abnormal costs could lead to erroneous reference factors which would serve to perpetuate the cost problem.

In the case of calibration the elimination of schedule problem costs requires the user to enter the appropriate SCHDX factor - as well as the actual schedule dates. If the SCHDX is not entered, it would mean that the given performance schedule is normal and as a result, the SCHDX parameter will be calculated and outputted.

There may be situations when the completion date of an actual experience may not be known. The input of a SCHDX factor, in these situations, will, cause the model to generate an appropriate performance period to enable the calibrations studies.

As in the cases of PMX, EMX, SMX and IMX the various SCHDX factors were design so that they would be generically and organizationally uniform. This means that for a specific product family and for a particular organization there will be relatively uniform sets of SCHDX factors. Organizations having

varying resources and skills, experiences, etc., will have different performance schedules for the same scope of work.

2.10 ECONOMICS AND FAST METHODOLOGY

Economics plays a crucial role in the FAST methodology. Costs can have distorted meanings if their economics are not stipulated. Costs used as reference could also be misleading if their economics are not defined. This is particularly significant when a large area of experiences covering many varying time segments are to be used for generic or organizational calibrations.

The FAST methodology offers a great versatility for it allows the economic structuring of costs from a menu of arrangements. Basically all costs can be specified in terms of:

- Present Value
- Final Value
- Constant Year Value

2.10.1 PRESENT VALUE

Present Value costs are those which have been leveled to the economic conditions prevalent at the start of the program. Present value costs may be calculated from final or escalated (as spent) costs by using a specific discount rate or a set of annual inflation rates.

2.10.2 FINAL VALUE

Final Value costs are those that have been escalated or forward priced. During the course of an effort, costs are expended and committed in some distributed fashion. Appropriate monthly economic rates are applied to the expenditures as they are incurred. Their total is called the Final Value cost.

2.10.3 CONSTANT YEAR VALUE

Constant Year costs are those that have been escalated as if they had been expended and/or committed at a specific year's end.

2.10.4 ECONOMIC RATE CALCULATIONS - ESCAL AND ECON

The FAST-E model has economic rates for each year from 1952 through 2025. It breaks down the annual rates into monthly compoundable segments. This means that about 900 monthly economic rates are generated with January 1972 as the pivot month with an economic parameter of 1.0.

The ESCAL value between 0 and 1, for example 0.1, means a constant annual economic rate as set by the parameter. It will be applied from the project start year through 2025 as a recurring escalation rate. It is equivalent to a discount rate.

The user can input specific annual rates for the years from 1982 through 2025. This is accomplished by means of the ECONFILE procedure. If an economic file is not entered, the model will use the rates that have been built in as default values.

Annual rates prior to 1982 are not adjustable to assure reference factor consistency. If such annual economic rates were allowed to vary they could cause variations of the computed reference parameters. Furthermore, such rates are less judgemental as compared to future economic values.

The FAST-E model enables the user to specify the economic condition of the costs. Each cost area, such as engineering or production, has an appropriate economic variable such as EECON, PECON, etc. Their parameters indicate the economics of the cost (Present Value, Final Value, or Constant Year). For example, one may know an actual cost, for calibration purposes, that may be either a present, a final or a constant year value. Based on its input economic parameter, the model will be aware of its character and will appropriately process the data.

There is an overall economic control variable called GECON. It is used to gradually direct the economics of all computed project costs. There is no sense to accumulate item costs where each have different economic forms. Should the user violate the rules, the model will reset the economics to conform to the GECON parameter. When this is done there will be an appropriate message to the user.

2.11 LEARNING CURVE/COST IMPROVEMENT FACTORS - LCURVE

A commonly accepted fact is that as one produces or purchases a greater quantity one can expect lower average costs. There are many reasons such improvements can be anticipated. Some may attribute it to a a degree of "learning" which is, in essence, the gradual improvement of skills leading to greater efficiencies; but here are many other reasons why cost improvements occur. For example, cost improvement can be achieved through more efficient resources such as tooling, production and inspection processes, etc.

The variable LCURVE is used to convey the degree of cost improvement that is relative to a quantity. The model initially calculates a theoretical first-piece cost. Relative to the quantity and the learning curve, a production cost multiplier is determined. The total cost is the theoretical first-piece cost extended by the multiplier.

The normal or default learning curve parameter is 0.9 or 90%. As an input it may range from 0.75 to 0.975. If a 90% is used it means that each time we double a lot size its average cost will be 90% of the previous lot average cost. For example, if the average cost of a lot of 100 is $50, the next group of 200 will have an average cost of $45. Therefore, the total cost of the 300 units will be based on 100 @ $50 and 200 @ $45, or $14,000, with an average cost of $46.67.

In actual practice the average cost of $46.67 will be achieved because as an estimate it governs project planning. Resources, tooling, processes, methods, etc., will be formulated and scheduled to assure the achievement of the $46.67 cost. It does not mean that the first 100 pieces will average $50. However, it does mean that, predicated on 90% learning, the 300 units can be produced with an average cost of $46.67

2.12 REMAINING (OR MISSING) BOX - REMBOX AND REMFAC

FAST-E provides the ability to cover costs associated with groups of miscellaneous items that, in addition to the principal equipments, are necessary for the total project. This may include items as cables, hydraulic lines, piping control devices, etc. They could be excessively numerous to detail for parametric analysis. As individual sub-items their costs may not be

significant but their total can have a major impact. For these reasons FAST-E provides methods to handle such estimates without resorting to their details.

The procedure requires the use of project references whose costs are known and are generically similar. Knowledge of their physical descriptors is not mandatory. The entire reference system is described by the Project Total Input procedure. The principal components or items are processed as individual calibration boxes. The miscellaneous group of sub-items, which cannot be detailed, is called the "Remaining Box". However, the user may be able to describe some of its features by the use of the ENTYPE or the TECH line mix. As an alternate, the box may be described by the volume mix of the following: piping, electrical, mechanical and miscellaneous equipments. For example, piping may be about 10% of the area and electric cabling, by comparison, may be twice the volume or 20%. The space occupied by the mechanical gear such as supports, braces, etc. may be 30%.

Based on the total project file information, the model will generate parametric values that will enable the use of one of three methods for specifying the Remaining Box of a new system. They are:

1. The weight, volume, MXTYPE, ENTYPE, and PMX of the reference box. The user may size the new box as a function of the reference weight. Volumes are not significant.

2. The FASTE equivalents may be given. The user may functionally size the new remaining box. If the user wishes to indicate the new box to be more or less functionally capable than the reference unit, the FASTE equivalents are appropriately adjusted. In this application the WTFAC, ENTYPE and PMX parameters will not be changed. The ENTYPE and PMX values can be replaced with an appropriate MXTYPE parameter.

3. The REMFAC parameter can be furnished. The REMFAC variable is used when the user wishes to describe the remaining box contents as a function of the previously described principal sub-items. Larger sub-items or their number will cause a greater Remaining Box.

The FAST-E procedures permits the integration of the principal sub-items prior to the processing of the Remaining Box for either calibration or forward cost estimating.

The Remaining Box which is processed as a normal project item will be included in the project summary totals as well as in the project "one box" calibration box.

2.13 PROJECT SUMMARY AND INTEGRATION OF PROJECTS

FAST-E provides a method for the accumulation of all project cost segments and their principal descriptors. The Engineering, Production, Integration and Installation for each project equipment can be cumulated so that their total may be rendered as an output. The user can specify which project item is to be included in the accumulation by the use of the ADD variable.

The accumulated uncertainties are purely arithmetic totals. They do not represent a statistically reprocessed analysis.

FAST-E has the capability of using the total accumulations and processing the project as if it were one item or "box". For the purpose, there are cumulations of weights, sizes FASTE equivalents, schedules, etc. Should the user request a one "box" summary output the model will, in turn, request inputs for PLTFM and VOLUME. The accumulated volumes may not be correct since certain equipments may be enclosed within others. If the user does not enter a volume parameter, the model will use the cumulated total size. With the two requested parameters, there will be sufficient information to process the project as one calibration box.

The Summary "one box" capability has many useful advantages among which are:

1. Two or more projects may be integrated by representing each as one item of an overall group. This precludes the need to "stack" and reprocess every project box.

2. Enables the rapid study of the effect on the total project of varying economic conditions since each sub-item is not reprocessed.

3. Enables the study of varying resources and schedules on the project total costs. The summary box will retain the sub-item schedule penalty assessments.

2.14 COST DISTRIBUTION RANGE, UNCERTAINTY FACTORS

There is no "one" correct project estimated cost. Reasonably accurate

estimates will vary. There are, unfortunately, various judgemental factors that can impact costs. Schedules and economic considerations, PLTFM and MXTYPE factors, descriptive features such as weight or performance characteristics each have some element of uncertainty. They all can cause estimates to vary, but estimates do have statistical density distributions. If hundreds of competent and experienced estimates were independently assigned to a specific project detailed estimating task, their results would clearly vary. But there bill be a small range of costs that will have the greatest concentration.

What is a good estimate? A good estimate is an achievable one. It is one that can guide the directions of planning, subcontracting, resourcing, tooling, manning, scheduling, etc. to allow the specified work to be performed for a pre-determined cost. A different cost may require other, possible viable, alternative project planning measures.

Based on a vast accumulation of comparable estimates with their associated descriptive parameters which may be considered judgemental, a method was developed to generate a range of cost distributions and their densities. The principal considerations include the project's magnitude (unit weight), its complexity (MXTYPE - as a function of its PLTFM and ENTYPE) and, when characteristics or functions are used, the degree of the variation of the new system relative to the reference system. Where Engineering, Integration and Installation costs are concerned their equivalent MXTYPE factors are also considered.

The uncertainty outputs are shown in three ranges: 70%, 80% and 90%. Each range has two costs. The lower cost at the 70% level means that 70% of all costs will be higher, or 70% of the costs will be lower than the greater 70% cost, or 40% of all estimates will probably be between the two 70% values.

At the 90% range only 10% of estimates will be more than the higher cost and 10% of the estimates will be less than the lower 90% amount; or 80% of all estimates will be between the two points. See Figure 2-6 indicating a typical uncertainty density distribution.

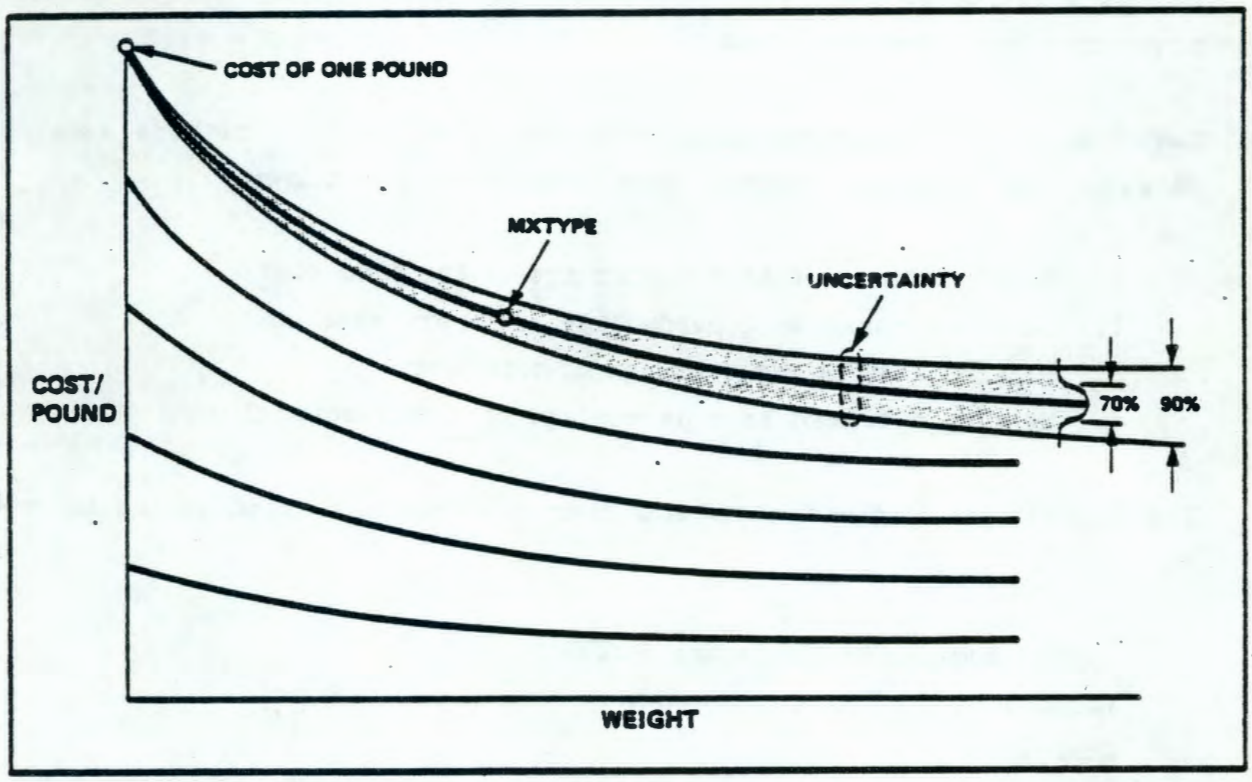


Figure 2-6. Typical Uncertainty Density Distribution

Therefore a cost that has a variation of less than 10% from the most likely estimate cannot be seriously taken as unreasonable and unachievable.

The risks or uncertainties outputs of FAST-E can be further used as a way of measuring contingencies as well as profit factors.

2.15 LABOR, MATERIAL AND OVERHEAD COST BREAKDOWN

Upon request, the FAST-E model will provide a breakdown of segment costs into their labor, labor overhead, material and material overhead components. The allocations do not require the user to specify the character of each or all of the breakdown areas. The user may request a cost breakdown without any allocation specifics such as overhead rates, etc.

Cost breakdowns are available for Engineering, Production, Integration and Installation. Their allocation procedures are independent.

If certain allocation specifics are known for a particular cost segment they may be given as inputs - for example one may know nothing more than the production labor overhead rate.

Based on a considerable wealth of reference data, heuristic methods were developed for each cost segment area to calculate the following:

1. Direct Labor cost as a percentage of the total cost
2. Labor overhead as a percentage of direct labor cost
3. Material cost as a percentage of total cost
4. Material overhead as a percentage of direct material cost.

The percentages of direct costs and their overhead are based on the following:

System complexity (including PLTFM)
Magnitude of effort (unit weight)
Quantities
Schedules (as an indication of resources)

Whenever the user enters specific allocation factors, but not their total, the model will calculate the missing values. In cases where their total is not a unity, that is, not equal to 1, the model will adjust the most variant factor - such as the material cost. Whenever adjustments to user inputs are necessary the model will give an appropriate message.

The user may negate the application of a factor. For example, there may be no material overhead in spite of its material charges. A parameter of N or NONE will preclude the variable's use.

The model will convert labor cost into hours only if the average rates are given. There are no heuristics for average labor rates. It is a simple procedure that merely divides the total labor cost by the average labor rate.

2.16 FUNDING ANALYSIS

The manner in which a project is funded can materially affect costs and schedules. A production effort may require several years. Under normal conditions costs would be expended and committed in a distributed fashion to assure performance compliance. However, if a project is insufficiently funded during any period of the work effort, the planned expenditure rates must be altered. The basic principle is that expenses cannot exceed the funded authorizations - unless the operating unit wishes to accept financial risks. Normally, insufficient funded programs suffer delays and increased costs.

While there is a FAST-F model that can process the funding analysis, the FAST-E model, upon the user's request, can render a project funding analysis. There are three portions to the output. The first is a graphic display showing the cumulative expense and commitment curve; its horizontal scale is time and the vertical is costs. The scaling of curves is automatically set by the model. The distribution is based on an algorithm that uses Beta-function distributions for cost spreading. There is also an heuristic method for the determination of Beta-function values that control the character of the distribution.

The second output group shows the periodic fundings that will be required to support the scheduled performance.

The time period (in months) between fundings is a user input by mens of the variable FPER (Funding Period). In most cases FPER will be 12.

The third group is a display showing the monthly fundings and cumulative expenditures. Because programs may involve several years, provisions are

made to shorten the display by outputting every third or fourth month. However, the user may request an output that displays every month.

2.17 HUMAN ENGINEERING FACTORS

The FAST-E model introduces a new era of parametric cost analysis techniques. It embodies a considerable number of human engineering concepts that serve to minimize input errors and computer process time:

1. Input files are simpler to enter, to read and to edit. Each input line has a signature word that identifies it.

2. Most input lines can be entered in a random fashion, and if not required, they are not entered.

3. If input lines are inadvertently omitted or duplicated the user will be given an appropriate message. If a necessary line is omitted a real-time input will be requested and the processing of the project file will go on. The user will not be required to break out the processing in order to go back to the system editor and revise the input file. If the box being processed is among a large input file this feature is clearly most helpful. If input lines are duplicated the first entry will probably be used, with appropriate messages, without stopping the computative process.

If there are inconsistencies between input parameters, missing values, or abnormal inputs the model will notify the user. On a real-time basis there will be an opportunity to correct the problem. Should the user require additional information at that point, the input of HELP will cause the output of more explanatory information and corrective alternatives.

In this way human errors causing erroneous processing or analysis as well as unnecessary computer time and expense can be avoided. It also minimizes the need for parametric consultants or technical support.

At the end of each study the user may enter new parameter values for specific variables or re-enter total input lines. Whenever this is done all inputs are examined for their consistency and logical reasonableness since they may conflict with other descriptors. If conflicts are detected, additional error statements will be provided as well as opportunities for their corrections. Here HELP routines are also available.

If identification problems are caused by a misspelled line signature word, FAST-E uses its built-in dictionary to correct the most likely misspelling of signature words.

SECTION 3
PREPARATION OF INPUTS

3.1 LEARNING TO PREPARE THE INPUT FORMS

The successful use of the FAST-E model depends upon knowledgeable preparation of the input data as well as proper computer terminal operation. The user must become familiar with and understand the variables employed in the model if maximum benefit is to be gained from its use.

There are specific rules which must be followed, their violation will cause responding error messages. Although all the FAST models are extremely flexible, and certain input lines may be omitted if data are not needed for a given situation, and although most may be entered in a random sequence, some are mandatory and must be in a given sequence. These rules are given in this section.

There are eight input forms employed in gathering and preparing data for processing through FAST-E. They are:

Title and Use

EQUIPMENT PROJECT TOTAL OR DETAIL INPUT. Two copies are used for each item (or box) of equipment in a project for acquisition and life cycle. The Total Project may be entered using this form in order to process a Remaining Box.

EQUIPMENT INTEGRATION & INSTALLATION INPUT. Only one of these may be entered for each project.

EQUIPMENT REMAINING BOX INPUT. This form is used to define, as much as possible, that portion of a project which cannot be defined as clearly as those portions described by using the Detail Input. REMBOX is the difference between the Total Project and the sum of the Detail box inputs.

RERUN and ECONOMIC FILE INPUTS. This form is essentially two forms on one page. If a box is to be rerun with some parameters and/or name changes, the upper portion is completed. The lower portion of the form is used to prepare the Economic File.

MICRO-CIRCUITRY INPUT. One copy is used for each Micro-Circuit item (or box) of equipment in a project for acquisition costing.

SOFTWARE DETAIL INPUT. One copy is used for each Software item (or box) in a project for acquisition costing.

SOFTWARE SYSTEM INTEGRATION INPUT. Only one may be entered for each project.

The FAST models do not require structured sequences, since most lines may be entered in a random order. If an input line is not appropriate, it is not entered. With few exceptions, - those concerning PROJECT, LOCATION, PRJGLOB, ITEM, FILE and END - input lines can be sequentially entered as the user chooses. Most potential errors in generating or editing files are virtually precluded.

Each input file line has a signature word. This must be the first entry on the line. It is to indicate the nature of the adjacent values. A signature word does not require quotations to show that it is an alphabetical input. Every input line has its unique signature word, and the spelling of that word should be as proper as possible. However, if it is misspelled, the model has a built in dictionary to identify the word and correct its spelling.

3.2 THE INPUT VARIABLES DEFINED

The following section defines the input variables and provides the rules for their entry and use. It is basically a glossary of the FAST-E variables given in the sequence in which they appear on the FAST-E input forms which are reproduced in this Section. Section 6, the Glossary/Index presents the same information in alphabetical order.

DETAIL INPUT SHEET - Individual Items (Equip. Acq.)..... Page 3-5
DETAIL INPUT SHEET - GFE Items (Equip.)..... Page 3-33
DETAIL INPUT SHEET - Purchased Items (Equip.)..... Page 3-35
SYSTEM INTEG. & INSTALLATION INPUT SHEET (Equip.)..... Page 3-38
RERUN BOX INPUT SHEET..... Page 3-45
PROJECT TOTAL INPUT SHEET (Equip.)..... Page 3-47
REMAINING BOX INPUT SHEET (Equip.)..... Page 3-48
DETAIL INPUT SHEET WITH REMFAC (Equip.)..... Page 3-49
DETAIL INPUT SHEET (Detail Equipment Costs)..... Page 3-56
DETAIL INPUT SHEET (Equipment Life Cycle)..... Page 3-69
MICRO-CIRCUITRY INPUT SHEET (Acquisition)..... Page 3-76
SOFTWARE DETAIL INPUT SHEET (Acquisition and Life Cycle). Page 3-85
SOFTWARE SYSTEM INTEGRATION INPUT SHEET..... Page 3-96
SOFTWARE DETAIL INPUT SHEET - GFE Items..... Page 3-101
SOFTWARE DETAIL INPUT SHEET - Purchased Items..... Page 3-103

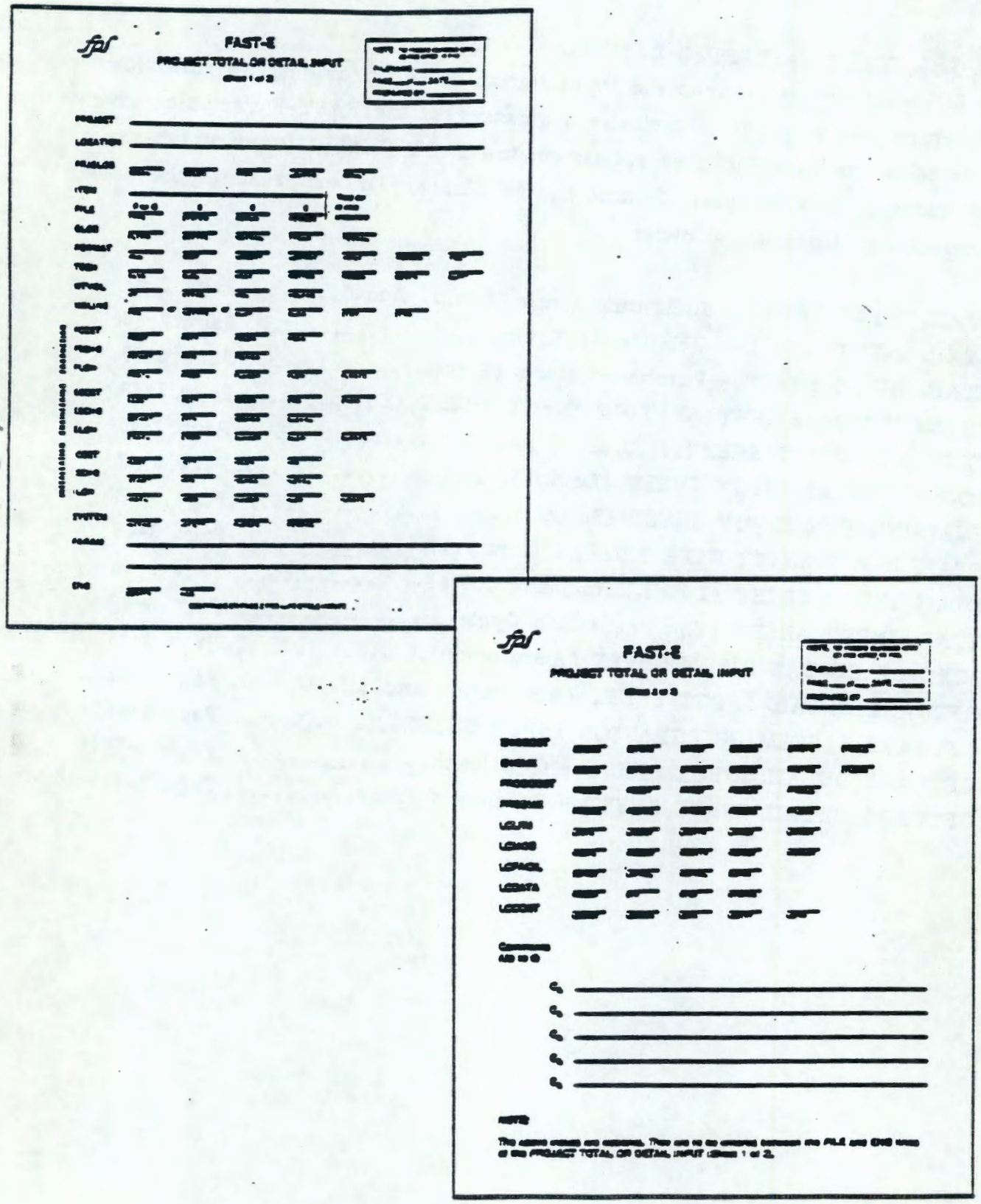


Figure 3-1. FAST-E DETAIL INPUT Forms

FAST-E

PROJECT TOTAL OR DETAIL INPUT

(Sheet 1 of 2)

NOTE: for record purpose only do not enter in file.
FILENAME: BASIC.EXAMPLE
PAGE 1 of 2 DATE 6/21/84
PREPARED BY CVM

PROJECT: SAMPLE

LOCATION: CHERRY HILL, N.J.

PRJGLOB	1 (ESCAL)	F (GSCON)	12 (PPER)	.9 (LCURVE)	1000 (CMULT)		
ITEM	SAMPLE ITEM #1						
FILE	P or D (TYPE)	0 (SYSTEM)	0 (RERUN)	0 (REMBOX)			
GLOB	1.3 (PLTPM)	0 (ENTYPE)	1 (MATVAL)	1983 (TYEAR)	(TENVAL)		
FORMAT	0 (ALL)	1 (COST)	1 (UNCERT)	1 (LONMAT)	1 (INPUT)	(PGRAPH)	(FOET)
TECH	30 (ELNC)	25 (ELCL)	25 (HEAT)	0 (MOTION)	0 (MECON)	20 (CONTN)	(SUPPT)
WTVOL	(WT)	(WTFAC)	(VOL)	(VOLFAC)			
MXLINE	(PMX) or	(MXTYPE) or	(ELWT)	(ELMX)	(STWT)	(STMX)	
PRODUCTION PCOST	50 (PCOST)	5 (PQTY)	F (PECON)	1 (PQAK)			
PSCHD	MAY.80 (PSTART)	APR.82 (PFIN)	(PSCHDX)				
PLOH	.3 (PMATL)	N (PMOH)	0 (PLABOR)	0 (PLOH)	10.5 (PLRATE)		
ENGINEERING ECOST	450 (ECOST)	1.2 (EQTY)	F (EECON)	0 (EMX)	.7 (ENEW)		
ESCHD	SEP.79 (ESTART)	MAR.80 (EFIN)	100 (ESCHDX)	.7 (ELEVEL)			
ELOH	.4 (EMATL)	N (EMOH)	0 (ELABOR)	0 (ELOH)	15 (ELRATE)		
INSTALLATION ICOST	50 (ICOST)	5 (IQTY)	F (IECON)	(IMX)			
ISCHD	JAN.82 (ISTART)	JUN.82 (IFIN)	0 (ISCHDX)	1 (ILEVEL)			
ILOH	.28 (IMATL)	0 (IMOH)	.3 (ILABOR)	0 (ILOH)	11.7 (ILRATE)		
SYSTEM	(INTPAC)	(INTQTY)	(PURGFE)	(REMFAC)			
PARAM	PKW=150, SPRESS=50, STEMP=125, SBTU=100						
END	(CONTIN)	(ADD)					

Must be in this sequence.

CONTINUED ON PAGE 2 FOR LIFE CYCLE INPUTS

7 2 1 2 4 9 8 0 9 6 8

3.2.1 DETAIL INPUT SHEET (Equipment Acquisition)

The variables defined here are for the Equipment Detail Input Sheet. The Project Total Input Sheet is defined later in this Section.

The PROJECT, LOCATION and PRJGLOB lines are entered once per Project, in this sequence, and must be the first three lines in a file. Individual Detail boxes are then entered for each Project. There may be as many Projects per file as desired.

PROJECT - Up to 32 characters may be entered for run identification. The next 32 characters after the signature word PROJECT and one space will be used as the PROJECT name. This line is entered once per Project. The PROJECT line is a mandatory first input line for each Project in a file.

LOCATION - Up to 32 characters may be entered for run identification. The next 32 characters after the signature word LOCATION and one space will be used as the LOCATION. This line is entered once per Project. The LOCATION line is a mandatory second input line for each Project in a file.

PRJGLOB - Project Global line.
The PRJGLOB line is entered once per Project. The PRJGLOB line is a mandatory third input line for each Project in a file. The variables on the PRJGLOB are defined as follows:

ESCAL - Escalation factor.

0 - Costs are inflated using the built in economic rates or the rates from a user defined Economic file up to January 1 of the earliest Start Year between Engineering, Production and Installation. Costs are not inflated after that point. Costs are then in Constant Year dollars as of the earliest Start Year. How to list the Default Inflation Rates is described in Section 4.

1 - Use the built in economic rates or the rates from a user defined Economic file to escalate costs throughout the entire schedule or up to the Year entered in GECON.

0.XX - Use the built in economic rates or the rates from a user defined Economic file up to January 1 of the earliest Start Year. Use a constant annual inflation rate of 0.XX through the entire schedule or up to the Year entered in GECON. 0.XX is entered as

the decimal equivalent of the annual inflation rate greater than 0 and less than 1. An annual inflation rate of 8% is entered as .08.

GECON - General Economic factor to define all output costs for Cost Studies.

Enter a Constant Year - i.e., 1983, to denote Constant Year economics for the end of a specific Year. This may be a different year than the earliest Start Year. Enter F for Final or As Spent economics. In this case, costs will be escalated throughout the entire schedule. Enter P for Present value economics as of the earliest Month and Year schedule date.

The default value is F if GECON is entered as 0.

FPER - Funding period in months for the Production Fund Graph.

Enter 1 to 60 months. The default value is 12 if FPER is entered as 0.

LCURVE - Cumulative Average Learning Curve. Estimated by a Simpson Approximation method.

Enter a value from 0 to 1. The default value is .9 if LCURVE is entered as 0.

CMULT - Cost multiplying Factor to define input and calculated costs in Single Unit dollars to Millions of dollars.

CMULT consists of two multiplier components.

The first component indicates cost ranges such as:

UNITS	1.0
TENS	10.0
HUNDREDS	100.0
THOUSANDS	1000.0
.	
.	
MILLIONS	1000000.0

The second component indicates the mark-up factors or multiplier that may range from 1.0 to 1.9. For example, a G&A and profit mark-up of 35% (in single units) would be a 1.35 factor.

RANGE	(WITH MARK-UP FACTORS) MIN	MAX
UNITS	1.0	1.9
TENS	10.0	19.0
HUNDREDS	100.0	190.0
THOUSANDS	1000.0	1900.0
.		
.		
MILLIONS	1000000.0	1900000.0

A cost in thousands with a 25% mark-up factor would have a value of1250.0.

The default value is 1000 if CMULT is entered as 0.

There may be as many Items in a Project as desired. Each Item is defined by a Box starting with an ITEM line and ending with an END Line. Each Project may have one Equipment System Integration/Installation Box and Summary Calibration Box.

ITEM - Up to 24 characters may be entered for run identification. The next 24 characters after the signature word ITEM and one space will be used as the ITEM name. The ITEM line must be the first line in an ITEM box. The ITEM line is a mandatory input line for each Item in a file.

FILE - Box definition line for each Item.
The FILE line must be entered in sequence after the ITEM line. The FILE line is a mandatory input line for each Item in a file. The variables on the FILE line are defined as follows:

TYPE - Defines this box as an Equipment Detail, Project Total, System Integration/Installation, Rerun or Remaining Box. TYPE also defines a box as a Micro-Circuitry or Software Detail box.

Enter a D to define this Item as a Detail box to be used for Calibration or a Cost Study for Engineering, Production and/or Installation. A Detail box is also used to process Purchased items, Modified items or Government Furnished Equipment. If a D is entered, all other values on this line must be entered as 0 or left blank.

Enter a P to define this Item as a Project Total box defined under PROJECT TOTAL INPUT Sheet in this Section. If a P is entered all other values on this line must be entered as 0 or left blank.

Enter a 0 to define this Item as a SYSTEM, RERUN or REMBOX as defined on this line.

SYSTEM - Defines this Item as an Equipment or Software System Integration and/or Installation Box. This box is defined under SYSTEM INPUT SHEET in this Section.

Enter a 1 if this is an Equipment System Integration and/or Installation box. TYPE must be 0 and all remaining values must be 0 or left blank.

Enter 0 if this is not a System box.

RERUN - Defines this Item as a RERUN box of a previous box. This allows PARAM line data changes of desired variables of the previous box. This box is defined under RERUN INPUT SHEET in this Section.

Enter a 1 if this is a RERUN box. TYPE and SYSTEM must be 0 and REMBOX must be 0 or left blank.

REMBOX - Defines this box as the Equipment Remaining box of a Project Total group of boxes. This box is defined under PROJECT TOTAL INPUT SHEET in this Section.

Enter a 1 if this is a Remaining Box. If this is not a Remaining Box, 0 or blank may be used.

Enter 0 or leave blank if this is not a Remaining Box.

GLOB - Item Global line.
The GLOB line may appear anywhere between the FILE and END line. The GLOB line is a mandatory input line for each Item in a file. The variables on the GLOB line are defined as follows:

PLTFM - The Platform variable represents the cost of additional effort necessitated by special application, quality and environmental requirements. These conditions usually affect the equipment's reliability, maintainability, safety and performance under various stress conditions. These conditions also lengthen schedules. Table 3-1 shows the relative point value of several principal class of various tasks. From the table, the total point value may be summed for special requirements. The total point value is extended by the Special Multipliers. Only one multiplier may be used.

TABLE 3-1. PLATFORM REFERENCE TABLE

Platform Curve Point Values

	Average	High
Reliability	50	75
Maintainability	30	45
Product Safety	20	30
Human Factors	10	15
Product Evaluation	30	45
Product Test	50	75
Electromagnetic Interference (EMI)	10	15
TOTAL	200	300

Special Multipliers

Ground	.5X	1.0X
Seismic Analysis and Evaluation	1.5X	3.0X
Motion, Vibration and Shipborne	2.0X	3.0X
Airborne	5.0X	6.0X
Unmanned Space	9.0X	10.0X
Manned Space	17.0X	17.0X

The adjusted point value is then used to determine the appropriate Platform values by finding the total Point value on the vertical scale and reading the Platform value under the corresponding point on the curve in Figure 3-2. Typical PLTFM values are defined as follows:

1.0 - Commercial.
1.3 - Nuclear.
1.4 - Mobile, Shipborne.
1.7 - Commercial Airborne.
1.8 - Mil. Spec. Airborne.
1.9 - Nuclear Hardened Avionics.
2.0 - Unmanned Space.
2.5 - Manned Space.

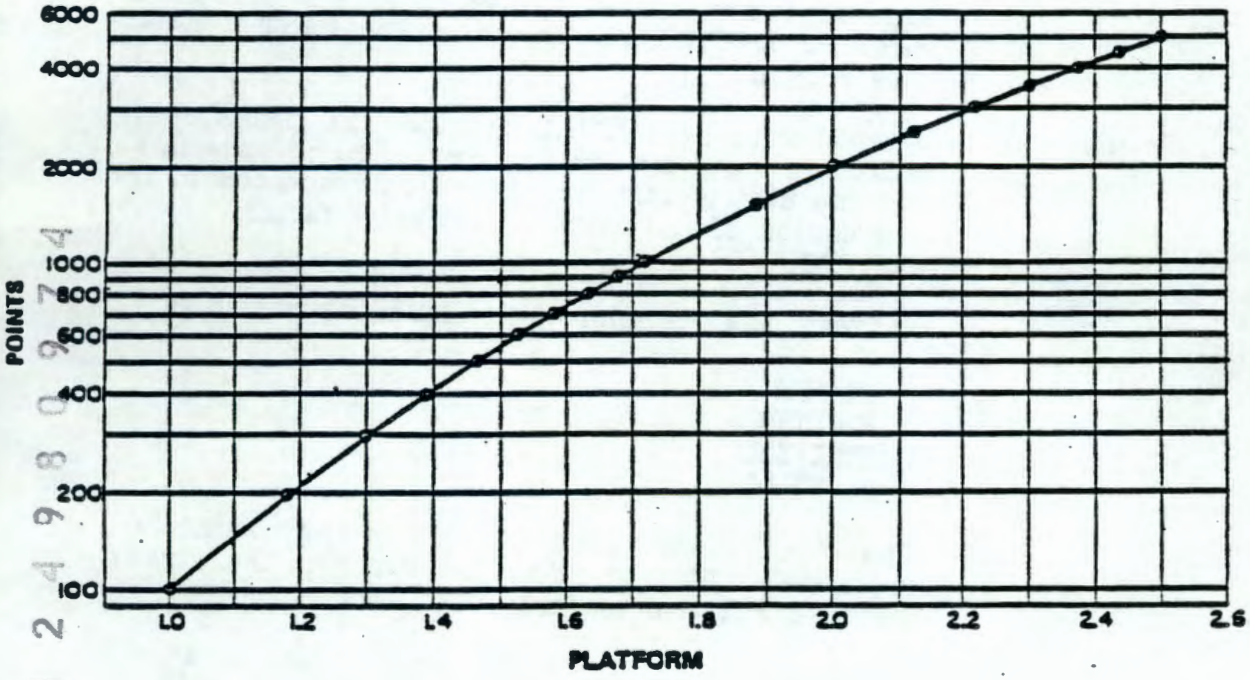


Figure 3-2. Platform (PLTFM) Reference Curve

ENTYPE - Energy Type. This value defines level of Technology. This value may entered, with PMX or MXTYPE, if known or entered as 0 and calculated by entering the Technology Line. ENTYPE values range from 40 which indicate High Technology items which require low mass for Energy Application to 140 which indicate low Technology items which require more mass for Energy Application.

Representative values of Electronics and Structural Items for ENTYPE are shown in The FAST-E Reference manual.

MATVAL - Material value. MATVAL provides the means of reflecting variations in the cost of basic materials and the cost of different fabrication methods in the composition of the overall complexity factor MXTYPE.

MXTYPE is a function of the following variables:

PLTFM
ENTYPE
PMX/EMX
MATVAL

The effect of changing MATVAL is approximately the same as EMX or PMX. As MATVAL increases, MXTYPE will also increase.

In calibration studies a greater MATVAL input will cause a relative reduction of the resulting PMX and/or EMX. During the calibration process MXTYPE is calculated based on costs and weight. Since PLTFM, ENTYPE and MATVAL are entered, PMX and/or EMX are the parameters that will be adjusted. In costs studies MATVAL will independently affect the computation of MXTYPE.

Therefore, when MATVAL is to be used, MXTYPE must not be given. MATVAL, ENTYPE and PMX are entered to calculate MXTYPE.

The MATVAL procedure is designed to reflect cost differences as well as the cost effect of fabrication methods from a reference. MTYPE is the ratio of the material cost of a new material compared to a reference material. FTYPE similarly is the ratio of a fabrication cost of a new material to that of a reference material. If brass at $2.50 per pound for the type and quantity used is the new material replacing cold rolled steel at $0.80, MTYPE is 2.50/0.80 or 3.125. If the Fabrication costs of the brass replacing cold rolled steel is 40% less and the

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reference FTYPE of cold rolled steel of 1, then FTYPE would be 0.60.

To apply MTYPE and FTYPE values, the relative basic material cost to the total cost (MVALUE) must be determined and subsequently the relative fabrication cost to the total cost (FVALUE) are determined. Table 3-2, MVALUE and FVALUE TABLE, is provided for this purpose. A MVALUE of 0.35 means that 35% of the total costs is predicated on the raw material cost. The remaining amount or 0.65 (65%) is caused by the fabrication cost.

TABLE 3-2. MVALUE and FVALUE TABLE

STRUCTURAL MVALUE

MXTYPE	HIGH	AVERAGE	LOW
3.0	.780	.615	.450
3.5	.716	.558	.400
4.0	.665	.514	.362
4.5	.623	.477	.331
5.0	.588	.447	.305
5.5	.557	.421	.284
6.0	.531	.399	.266
6.5	.508	.379	.249
7.0	.488	.362	.236
7.5	.469	.347	.224
8.0	.453	.333	.213
8.5	.438	.321	.204
9.0	.424	.310	.195
9.5	.411	.299	.187
10.0	.400	.290	.180
10.5	.389	.281	.173
11.0	.379	.273	.167
11.5	.370	.266	.162
12.0	.362	.260	.157
12.5	.353	.253	.152

FVALUE = (1.0 - MVALUE)

NOTE: Electronic MVALUES are typically 40% of the above Structural MVALUES.

As PLTFM increases there are greater fabrication efforts as well as more intensive testing and quality control. As a result the basic raw material impact becomes less as MXTYPE increases. Since FVALUE is 1 - MVALUE, the level of fabrication cost increases. Table F10.0 of the FAST-E Reference User Guide may be used to select appropriate MXTYPE values.

Table 3-2 shows a statistical range of MVALUE values that represent an approximate +/- 1.0 deviation about the center or about 68% of the total expected set of values. The high range values are the ones that indicate relatively less fabrication efforts. The Low values cover items that have more than average fabrication activities or a greater degree of machining, etc.

Table 3-2 represents STRUCTURAL items. If the product is primarily ELECTRONIC the MVALUE parameters are about 40% of the structural parameters. If there is a mix of structural and electronic sub-assemblies a weighted average procedure may be used to determine MVALUE.

MTYPE and FTYPE are multipliers of MVALUE and FVALUE respectively. MCLASS is the parameter that that represents the total effect of MTYPE, FTYPE, MVALUE and FVALUE.

MCLASS=(MTYPE x MVALUE) + (FTYPE x FVALUE)

If there is only one material involved, MCLASS is MATVAL. However, if more than one material type is involved the procedure set forth in the MATVAL PREPARATION FORMS 1 & 2 may be used to determine MATVAL.

MATVAL PREPARATION FORM NO. 1 is used to calculate the MCLASS parameter for the various materials to be considered.

MATVAL PREPARATION FORM NO. 2 provides for the development of MATVAL parameter using a weighted average method. The MCLASS of each material is extended by it's weight to calculate MCWT which is summed and divided by the total weight to render a MATVAL value.

Therefore MATVAL represents the effects of both material cost differences and fabrication cost variations. It must be noted that certain changes, for example between Cold Rolled Steel and Brass, may not be the same for all varieties of equipments. Therefore the MCLASS of each material will vary between equipment types.

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MATVAL PROCEDURE

PROJECT TEST FILENAME TEST.1

ITEM SAMPLE DATE 1/16/95

MVALUE = 0.421

FVALUE = (1.0 - MVALUE) = (1.0 - 0.421) = 0.579

MATERIAL		MTYPE		MVALUE		FTYPE		FVALUE		MCLASS	
Brass	(1)	(3.10	x	0.421)	+	(0.69	x	0.579)	=	1.681	(1)
Bronze	(2)	(3.95	x	0.421)	+	(0.90	x	0.579)	=	2.184	(2)
Stainless	(3)	(2.70	x	0.421)	+	(1.40	x	0.579)	=	1.947	(3)
Plastic	(4)	(4.10	x	0.421)	+	(0.29	x	0.579)	=	1.917	(4)
CRS*	(5)	(1.00	x	0.421)	+	(1.00	x	0.579)	=	1.000	(5)
	(6)	(	x	)	+	(	x	)	=		(6)
	(7)	(	x	)	+	(	x	)	=		(7)
	(8)	(	x	)	+	(	x	)	=		(8)
	(9)	(	x	)	+	(	x	)	=		(9)
	(10)	(	x	)	+	(	x	)	=		(10)

* Cold Rolled Steel - Reference Material

MATVAL PREPARATION FORM NO. 1

MATVAL PROCEDURE

PROJECT TEST FILENAME TEST.1

ITEM SAMPLE DATE 1/16/85

1.0

MATERIAL		MCLASS		WT		MCWT	
Brass	(1)	1.681	x	30	=	50.43	(1)
Bronze	(2)	2.184	x	10	=	21.84	(2)
Stainless	(3)	1.947	x	150	=	292.05	(3)
Plastic	(4)	1.917	x	5	=	9.59	(4)
CRS	(5)	1.000	x	500	=	500.00	(5)
	(6)		x		=		(6)
	(7)		x		=		(7)
	(8)		x		=		(8)
	(9)		x		=		(9)
	(10)		x		=		(10)

TWT = 695 TMCWT = 873.91

MATVAL = TMCWT/TWT = 1.257*

*873.91/695 = 1.257

MATVAL PREPARATION FORM NO. 2

MATVAL PREPARATION FORM NO. 2

TYEAR - Technological year.
Enter a Year, i.e., 1983 to define the year of Technology used. This typically is the year the item is designed. The default value is earliest Start Date Year between Engineering, Production or Installation if TYEAR is entered as 0. TYEAR may be entered as a year before Engineering or Production starts to represent use of an older technology.

TENVAL - Total Energy Value. TENVAL is calculated from Performance Characteristics if they are entered in a Calibration box. Therefore, TENVAL is entered as 0 for Calibration studies. If Performance Characteristics are used in Cost studies, the TENVAL value from the Calibration study must be entered. This allows the model to check that the same Performance Characteristics are being used in the Cost study that were used in the Calibration run. It also allows the model to check that the Cost study Characteristics are in a permissible range in comparison to the Calibration Performance Characteristics. If no Performance Characteristics are used, TENVAL is always entered as 0.

All variables may be entered as R to repeat values from a previous box.

FORMAT - Output FORMAT line.
Defines the user desired output format. The FORMAT line may appear anywhere between the FILE and END lines. The FORMAT line is an optional line for each Item in the file. If it is not input, the default output format will be the full Cost, Uncertainty and Input data output formats. The variables on the FORMAT line are defined as follows:

ALL - Print all output formats. This includes the full Cost, Uncertainty or Risk Detail, Labor, Material and Overhead, Input Data, Funding Graph and Detail output.

Enter a 1 to print all output formats.

Enter a 0 to select any combination of the following desired output formats.

COST - Print the Basic and Schedule Penalty costs for Engineering, Production and/or Installation.

Enter a 0 for no Cost output.

Enter a 1 for Cost output by Engineering, Production, Installation and Total.

Enter a 2 for Total (Bottom Line) cost output only.

UNCERT - Print a 70%-80%-90% uncertainty (risk) distribution output. The 70% range shows that 30% of the time, costs will be lower than the FROM amount, and that 30% of the time, costs will be higher than the TO amount. Therefore, 40% of the time, costs will be between the FROM and TO range. The 80% range shows that 20% of the time, costs will be lower than the FROM amount, and that 20% of the time, costs will be higher than the TO amount. Therefore, 60% of the time, costs will be between the FROM and TO range. The 90% range shows that 10% of the time, costs will be lower than the FROM amount, and that 10% of the time, costs will be higher than the TO amount. Therefore, 80% of the time, costs will be between the FROM and TO range.

Enter a 0 for no Risk Distribution output.

Enter a 1 for Risk Distribution output by Engineering, Production, Installation, Life Cycle and Total.

Enter a G for a graphic display of the Risk Distribution output by Engineering, Production, Installation, Life Cycle and Total.

Enter a 2 for Total Risk (Bottom line) output only.

LOHMAT - Print Labor, Overhead and Material costs for Engineering, Production and/or Installation. If any combination of Labor, Material and Overhead percentages for Engineering, Production and Installation are input in the LOH lines, they will be used. Those which are not input will be calculated. The Labor, Material and Overhead percentage input lines are not required to print the LOHMAT output.

Enter a 0 for no Labor, Material and Overhead output.

Enter a 1 to print the Labor, Material and Overhead output.

INPUT - Print the Input data showing all input and calculated values.

Enter a 0 for no Input data output.

Enter a 1 to print the Input data.

FGRAPH - Print a Funding Graph for Production Costs showing a model generated Expenditure curve with the appropriate funding amounts based on the funding period variable, FPER. See the PRJGLOB line.

Enter a 0 for no Funding Graph output.

Enter a 1 for the Funding Graph output.

FDET - Print the Detail for the Funding Graph showing the Cumulative Fundings and Expenditures on a monthly or periodic basis depending on the length of the Production schedule.

Enter a 0 for no Funding Detail output.

Enter a 1 for a Short Form Detail output on a periodic basis showing, at maximum, 20 lines of output.

Enter a 2 for the Full Detail output on a monthly basis for the entire Production schedule.

All variables may be entered as R to repeat values from a previous box.

TECH - Technology line.
Defines the Technological Mix of equipment by percentage volume of each type of technology to the total volume. This line is only entered to calculate ENTYPE when ENTYPE is entered as 0. The TECH line is an optional line. It is not entered if ENTYPE or MXTYPE are entered. All seven values should sum to either 1.00 or 100.

ELNC - Represents the Electronic technology. Electronic systems are ones usually associated with the use of electro-magnetic frequencies rather than technologies involving electromagnetic energy conversions such as wave shapes, frequencies and amplitudes.

Enter 0 to 100.

ELCL - Represents the electrical technology. Electrical devices are ones associated with electrical power frequencies involving conversion to other energy forms such as heat, motion and so on.

Enter 0 to 100.

HEAT - Represents technology that is concerned with the generation, exchange, handling and disposition of heat energy.

Enter 0 to 100.

MOTION - Represents the technology that is concerned with the movement of mechanical masses. Motion involves the transmission of the form of energy necessary to move, position or reposition bodies of material. This

is true whether or not they are part of the assembly. Linkages, belts, rods, transmissions, fans, etc., are examples of motion types of technology.

Enter 0 to 100.

MECON - Represents Mechanical Control technology. The use of such a technology controls the performance of other technologies such as heat, motion and electrical. MECON initially requires some energy to establish a particular state of control which remains static until energy is again used to change its state. Examples of mechanical control devices are valves, switches, gates, etc.

Enter 0 to 100.

CONTN - Represents the technology concerned with the containment of masses and materials. It is a passive form of technology that does not require the use of energy. Examples are containers, tanks, reservoirs, etc.

Enter 0 to 100.

SUPPT - Represents the technology concerned with the support of masses and materials. It is a form of technology that does not use energy. Examples are towers, tables, stabilizers, supports, rails, etc.

Enter 0 to 100.

WTVOL - Weight and Volume line.
Defines Weight and Volume. WT and VOL may be input or calculated. The WTVOL line is an optional line. It is not input in a Calibration run when Weight and Volume are not known. It will always be printed out showing computed values even if it was not entered.

METRIC VALUES: WT and VOL may be converted to Kilograms and Cubic Meters by setting the variable METRIC=1 on the PARAM line. This would typically be done in the first box of a project.

WT - The Total Weight of the assembly in pounds. Enter the weight if known, or enter 0 to have the model calculate the weight in either a calibration or cost study. Weight can be calculated from cost, PLTFM, TYEAR, Performance Characteristics (if any) and ENTYPE in a calibration run or from WTFAC in a cost study. WT and WTFAC may not simultaneously be entered.

WTFAC - Reference Weight Factor used in cost studies to calculate weight. WTFAC is always entered as 0 in calibration runs. The normal value of WTFAC is 100. WTFAC and WT may not simultaneously be entered.

VOL - The Total Volume of the assembly in cubic feet. Enter the volume if known or enter 0 to have the model calculate volume in either a calibration or cost study. Volume can be calculated from cost and ENTYPE in a calibration run or from VOLFAC in a cost study. VOL and VOLFAC may not simultaneously be entered.

VOLFAC - Reference Volume Factor used in cost studies to calculate volume. VOLFAC is always entered as 0 in calibration runs. VOLFAC and VOL may not simultaneously be entered.

All variables may be entered as R to repeat values from a previous box.

MXLINE - Complexity Line.
The MXLINE line is an optional line. It is not input in a Calibration run when PMX and MXTYPE are not known. This line will always be printed out showing computed values even if it was not input.

PMX - Production reference factor. Enter 0 in a Calibration run. In a Cost study, if MXTYPE is used, enter 0. PMX and MXTYPE may not simultaneously be entered.

PMX is the calibration factor for various equipment and organizational differences.

Representative values, for recurring costs only, and adjustment factors for Tooling and Test and Engineering follow-on are shown in the FAST-E Reference manual.

MXTYPE - Composite Equipment Complexity value for total weight. Enter reference value or 0 to be calculated from ELMX and STMX. MXTYPE must not be entered if PMX is used. In such cases, MXTYPE will be calculated for output.

Representative values of MXTYPE are shown in The FAST-E Reference manual.

ELWT - Reference weight of Electronics. Entered if ELMX is used to calculate MXTYPE. ELWT represents the reference weight of electronics appropriate to ELMX. ELWT and STWT need not sum to the total

weight of the assembly. ELWT must be entered if ELMX is given.

ELMX - Reference Complexity of Electronics. Enter reference value if Electronic Complexity is to be used with ELWT to calculate MXTYPE. ELMX must be input if ELWT is given.

STWT - Reference weight of Structure. Entered if STMX is used to calculate MXTYPE. STWT represents the reference weight of structure appropriate to STMX. STWT and ELWT need not sum to the total weight of the assembly. STWT must be entered if STMX is given.

STMX - Reference Complexity of Structure. Enter reference value if Structural Complexity is to be used with STWT to calculate MXTYPE. STMX must be input is STWT is given.

NOTE: The ELWT and STWT may not be the description of the item under process but may represent a comparable reference item for which weights and complexity factors are known since the item under processing may not have a known weight.

All variables may be entered as R to repeat values from a previous box.

PCOST - Production Cost line.
PCOST is an optional line. It is only entered if a Production effort is to be calibrated or costed. It must be entered if the PSCHD line is entered.

PCOST - Total Production Cost.
Enter the Total Production Cost for calibration or 0 if it is to be calculated. PCOST must be in terms of the CMULT value. See Section 3.3.2 and 3.3.4 regarding PRODUC and PCOST.

PQTY - Production Quantity.
Enter a whole number value greater than 0.

PECON - Production Economics of PCOST.
Enter a value for Production calibration. PECON defines the economics of the PCOST amount as Present Value, Final Value or Constant Year dollars. In Cost studies, if PECON is different from GECON, it will be reset to the GECON parameter.

Enter P for Present Value or constant dollars as of the Month and Year in PSTART.

Enter F for Final Value (As Spent) dollars.

Enter a year, i.e. 1984, for Constant Year dollars.

FOAK - First Of A Kind Multiplier.
Enter a value greater than 0. FOAK is a direct multiplier to Production costs to allow for uncertainty or contingencies when producing an item for the first time. The default value is 1 which indicates no such effect.

All variables may be input as R to repeat values from a previous box.

PSCHD - Production Schedule line.
PSCHD is an optional line. It is only entered if a Production effort is to be calibrated or costed. It must be entered if the PCOST line is entered.

PSTART - Production Start date. PSTART is entered in MMM.YYYY format. MMM are the first three letters of the month and YYYY is the year. The period,'.', is mandatory. PSTART may be entered as JAN.1983 or JAN.83. PSTART is a mandatory input.

PFIN - Production Finish date.
PFIN is entered in MMM.YYYY format or as 0. MMM are the first three letters of the month and YYYY is the year. The period,'.', is mandatory. PFIN may be entered as JUL.1985 or JUL.85. Either PFIN or PSCHDX must be input. If PFIN is entered and PSCHDX is entered as 0, a PSCHDX reference value appropriate to the schedule length will be calculated. If a value for PSCHDX is entered and PFIN is 0, a most likely Production Finish date will be computed based on the PSCHDX value. If both are input, the model will internally calculate the most likely schedule and assess penalties against the input schedule if there is apparent schedule acceleration or stretch-out. This is true in both calibration runs and cost studies.

PSCHDX - Production Schedule reference factor.
Enter reference value or 0. Either PFIN or PSCHDX must be entered. See PFIN for explanation of inputting PFIN and PSCHDX. The nominal value for PSCHDX is 100.

All variables may be entered as R to repeat values from a previous box.

PLOH - Production Labor and Overhead line.
PLOH is an optional line. It is only input to enter specific percentage values. If LOHMAT = 1 and the PLOH line is not input, the Labor, Material and OH costs will be calculated by the model. Any combination of known values may be entered. Any values that are not known will be calculated by the model.

PMATL - Percentage, in decimal equivalent, of Production Material to the Total Production Cost.

Enter 0 to 1. If entered as 0, the model will calculate the percentage.

PMOH - Percentage, in decimal equivalent, of Production Material Overhead to Production Material.

Enter a value or 0 to have model calculate.

Enter an N to indicate that there is no Production Material Overhead.

PLABOR - Percentage, in decimal equivalent, of Direct Production Labor to the Total Production Cost.

Enter 0 to 1. If entered as 0, the model will calculate the percentage.

PLOH - Percentage, in decimal equivalent, of Production Labor Overhead to Production Labor.

Enter a value or 0. If entered as 0, the model will calculate a percentage.

PLRATE - Production labor rate in dollars per hour. Enter labor cost per hour. This will cause the model to calculate Production labor hours. If entered as 0, Production Labor hours will not be calculated.

Note: All values are decimal equivalents, for example:
A 125% OH rate is entered as 1.25.
A 8% MATL rate is entered as .08.

All variables may be entered as R to repeat values from a previous box.

ECOST - Engineering Cost line.
ECOST is an optional line. It is only entered if an Engineering effort is to be calibrated or costed. It must be entered if the ESCHD line is entered.

ECOST - Total Engineering Cost.
Enter the Total Engineering Cost for calibration or 0 if it is to be calculated. ECOST must be in terms of the CMULT value. See Section 3.3.1 and 3.3.3 regarding EDESGN and ECOST.

EQTY - Engineering Prototype Quantity.
Enter value of 0 or greater. EQTY may be entered as a decimal equivalent of a prototype.

EECON - Engineering Economics of ECOST.
Enter a value for Engineering Calibration. EECON defines the economics of the ECOST amount as Present Value, Final Value or Constant Year

dollars. In Cost studies, if EECON is different from GECON, it will be reset to the GECON parameter.

Enter P for Present Value or constant dollars as of the Month and Year in ESTART.

Enter F for Final Value (As Spent) dollars.

Enter a year, i.e. 1985, for Constant Year dollars.

EMX - Engineering reference factor.
EMX must be entered as 0 in calibration runs to calculate a reference value. In a Cost study, a reference value of EMX must be entered.

The nominal value of EMX is 1. This includes Design, Drafting, Systems Engineering and Prototype costs. No other non-recurring costs are included.

ENEW - Percentage of New Design.
Enter a value of 0 or greater in decimal equivalent. 100% New Design is entered as 1.0.

All variables may be entered as R to repeat values from a previous box.

ESCHD - Engineering Schedule line.
ESCHD is an optional line. It is only entered if an Engineering effort is to calibrated or costed. It must be entered if the ECOST line is entered.

ESTART - Engineering Start date. ESTART is entered in MMM.YYYY format or as 0. MMM are the first three letters of the month and YYYY is the year. The period,'.', is mandatory. ESTART may be entered as AUG.1983 or AUG.83. ESTART is a mandatory input.

EFIN - Engineering Finish date.
EFIN is entered in MMM.YYYY format or as 0. MMM are the first three letters of the month and YYYY is the year. The period,'.', is mandatory. EFIN may be entered as JUL.1985 or JUL.85. Either EFIN or ESCHDX must be input. If EFIN is entered and ESCHDX is entered as 0, a ESCHDX reference value appropriate to the schedule length will be calculated. If a value for ESCHDX is entered and EFIN is 0, a most likely Engineering Finish date will be computed based on the ESCHDX value. If both are input, the model will internally calculate the most likely schedule and assess penalties against the input schedule if there is apparent schedule acceleration or stretch-out. This is true in both calibration runs and cost studies.

ESCHDX - Engineering Schedule reference factor.
Enter reference value or 0. Either EFIN or ESCHDX must be entered. See EFIN for explanation of inputting EFIN and ESCHDX. The nominal value for ESCHDX is 100.

ELEVEL - Level of Engineering effort.
Enter a value in decimal equivalent. See The FAST-E Reference manual for values of ELEVEL. The nominal value of ELEVEL is 1.

All variables may be entered as R to repeat values from a previous box.

ELOH - Engineering Labor and Overhead line.
ELOH is an optional line. It is only input to enter specific percentage values. If LOHMAT = 1 and the ELOH line is not input, the Labor, Material and OH costs will be calculated by the model. Any combination of known values may be entered. Any values that are not known will be calculated by the model.

EMATL - Percentage, in decimal equivalent, of Engineering Material to the Total Engineering cost.

Enter 0 to 1. If entered as 0, the model will calculate late the percentage.

Enter an N to indicate no Engineering Material costs.

EMOH - Percentage, in decimal equivalent, of Engineering Material Overhead to Engineering Material.

Enter a value or 0 to have model calculate.

Enter an N to indicate no Engineering Material Overhead.

ELABOR - Percentage, in decimal equivalent, of Engineering Labor to the Total Engineering Cost.

Enter 0 to 1. If entered as 0, the model will calculate the percentage.

ELOH - Percentage, in decimal equivalent, of Engineering Labor Overhead to Engineering Labor.

Enter a value or 0. If entered as 0, the model will calculate a percentage.

ELRATE - Engineering labor rate in dollars per hour.
Enter labor cost per hour. This will cause the model to calculate Engineering labor hours. If entered as 0, Engineering Labor hours will not be calculated.

Note: All values are decimal equivalents, for example:
A 125% OH rate is entered as 1.25.
A 8% MATL rate is entered as .08.

All variables may be entered as R to repeat values from a previous box.

ICOST - Installation Cost line.
ICOST is only entered in a Detail Item box if Installation effort is to be calibrated or costed on a box by box basis. If Installation is to be determined on a System basis, a System Box is necessary to calibrate or cost Installation efforts. Installation effort can only be determined if Production effort exists. ICOST must be entered if the ISCHD line is entered.

ICOST - Total Installation Cost.
Enter the Total Installation Cost calibration or 0 for Cost study. ICOST must be in terms of the CMULT value.

IQTY - Installation Quantity.
Enter a value greater than 0 in a whole number.

IECON - Installation Economics of ICOST.
Enter a value for Installation calibration. IECON defines the economics of the ICOST amount as Present Value, Final Value or Constant Year dollars. In Cost studies, if IECON is different from GECON, it will be reset to the GECON parameter.

Enter P for Present Value or constant dollars as of the Month and Year in ISTART.

Enter F for Final Value (As Spent) dollars.

Enter a year, i.e. 1985, for Constant Year dollars.

IMX - Installation reference factor.
Must be entered as 0 for calibration run to calculate a reference value. In a Cost study, a reference value of IMX must be entered. See the FAST-E Reference manual for adjustment factors to IMX. The nominal value of IMX is 1.

All variables may be entered as R to repeat values from a previous box.

The ICOST, ISCHD and ILOH lines may be entered in a DETAIL or SYSTEM Box. Detail boxes with System Integration effort defined, should not have Installation lines. Installation for Projects with System I & T effort should be processed in the SYSTEM box.

SCHD - Installation Schedule line.
ISCHD is only entered in a Detail Item box if Installation effort is to be calculated or costed on a box by box basis. If Installation is to be determined on a System basis, a System box is necessary to calibrate or cost Installation efforts. Installation effort can only be determined if Production effort exists. ISCHD must be entered if the ICOST line is entered.

ISTART - Installation Start date. ISTART is entered in MMM.YYYY format or as 0. MMM are the first three letters of the month and YYYY is the year. The periods,'.', is mandatory. ISTART may be entered as SEP.1986 or SEP.86. ISTART is a mandatory input.

IFIN - Installation Finish date.
IFIN is entered in MMM.YYYY format or as 0. MMM are the first three letters of the month and YYYY is the year. The period,'.', is mandatory. IFIN may be entered as JUL.1985 or JUL.85. Either IFIN or ISCHDX must be input. If IFIN is entered and ISCHDX is entered as 0, a ISCHDX reference value appropriate to the schedule length will be calculated. If a value for ISCHDX is entered and IFIN is 0, a most likely Installation Finish date will be computed based on the ISCHDX value. If both are input, the model will internally calculate the most likely schedule and assess penalties against the input schedule if there is apparent schedule acceleration or stretch-out. This is true in both calibration runs and cost studies.

ISCHDX - Installation Schedule reference factor.
Enter reference value or 0. Either IFIN or ISCHDX must be entered. See IFIN for explanation of inputting IFIN and ISCHDX. The nominal value for ISCHDX is 100.

ILEVEL - Level of Installation Effort.
Enter value in decimal equivalent. See the FAST-E Reference manual for values of ILEVEL. The nominal value of ILEVEL is 1.

All variables may be entered as R to repeat values from a previous box.

ILOH - Installation Labor and Overhead line.
ILOH is an optional line. It is only input to enter specific percentage values. If LOHMAT = 1 and the ILOH line is not input, the Labor, Material and OH costs will be calculated by the model. Any combination of known values may be entered. Any values that are not known will be calculated by the model.

IMATL - Percentage, in decimal equivalent, of Installation Material to the total Installation cost.

Enter 0 to 1. If entered as 0, the model will calculate the percentage.

Enter an N to indicate no Installation Material costs.

IMOH - Percentage, in decimal equivalent, of Installation Material overhead to Installation Material.

Enter a value or 0 to have model calculate.

Enter an N to indicate no Installation Material Overhead.

ILABOR - Percentage, in decimal equivalent, of Installation Labor to the Total Installation Cost.

Enter 0 to 1. If entered as 0, the model will calculate the percentage.

ILOH - Percentage, in decimal equivalent, of Installation Labor Overhead to Installation Labor.

Enter a value or 0. If entered as 0, the model will calculate a percentage.

ILRATE - Installation labor rate in dollars per hour. Enter labor cost per hour. This will cause the model to calculate Installation labor hours. If entered as 0, Installation Labor hours will not be calculated.

Note: All values are decimal equivalents, for example:
A 125% OH rate is entered as 1.25.
A 8% MATL rate is entered as .08.

All variables may be entered as R to repeat values from a previous box.

SYSTEM - System Integration factor, Purchased Item, GFE, Remaining Factor identification line. System Integration and/or Installation efforts are calibrated or costed by a SYSTEM Box. See SYSTEM INPUT SHEET in this Section for further explanation.

INTFAC - System Integration factor. Enter a value from the INTFAC table in the the FAST-E Reference manual to describe the Integration effort for this item. Enter a 0 if no Integration effort is required.

INTQTY - Quantity of Production or Prototype items to be integrated per next higher assembly. SQTY on the I & T input sheet multiplies INTFAC to define the

total numbers of items integrated. Enter a value or 0 if no integration is desired.

PURGFE - Defines this box as a Purchased or Government Furnished equipment box.

Enter a 0 if this is not a Purchased Item or GFE item.

Enter P or PUR if this is a Purchased Item. See PURCHASED ITEMS in Section 3.2.3 for further explanation of entering a Purchased Item input sheet.

Enter G or GFE if this is a Government Furnished Item. See GFE ITEMS in Section 3.2.2 for further explanation of entering a GFE item input.

REMFAC - Remaining box factor.
Enter a reference REMFAC value calibrated from a Remaining Box to indicate this box is a remaining box cost study. Otherwise enter 0. See PROJECT TOTAL INPUT SHEET in this Section for further explanation of REMFAC.

All variables may be entered as R to repeat values from a previous box except REMFAC.

PARAM - Allows for free format addition or changes to any input variables as needed. The PARAM line is an optional line. It is primarily used to input Performance Characteristics and the SKIP and METRIC variables. One Primary characteristic and up to three Secondary characteristics may be entered. When FASTE is used as an input Performance Characteristic, no other characteristics may be entered. Values are entered in the Variable=Value method with a comma between entries. More than one line of entries may be made by ending a line with a comma to indicate that more changes are to be made. The signature word PARAM need only be entered on the first line. The last line of changes must not end with a comma. The following is a list of Primary and Secondary Performance Characteristics:

PRIMARY/SECONDARY CHARACTERISTICS

PHP	SHP	- Horse Power.
PKW	SKW	- Kilowatts.
PBTU	SBTU	- British Thermal Units.
PTONS	STONS	- Tons.
PGPM	SGPM	- Gallons Per Minute.
PCFM	SCFM	- Cubic Feet Per Minute.
PGAL	SGAL	- Gallons.
PFT3	SFT3	- Cubic Feet.
PFT2	SFT2	- Square Feet.
PFT	SFT	- Linear Feet.
FASTE		- FAST Energy Equivalent.
	SPRESS	- Pressure (PSI).
	STEMP	- Temperature (F).

C - COMMENT line.
Up to five COMMENT lines of 72 characters each are allowed per box between the FILE and END lines. Each COMMENT line must begin with a signature word of C followed by a space. COMMENT lines will be printed out at the end of all output as requested on the FORMAT line. The COMMENT line is an optional input line.

END - Signifies the End of item box.
The END line is a Mandatory line at end of each ITEM Box. It indicates if another box is to follow and whether or not to accumulate the results of this Item to the System Total.

CONTIN - Indicates whether or not to continue processing of the next box under this Project.

Enter a 0 to indicate that this is the last Item in the current Project.

Enter a 1 to indicate that there is another Item to follow for this Project.

ADD - Indicates whether or not to accumulate the results of this Item into the System Total.

Enter a 0 to indicate that the results of this box are not to be added to the System Total.

Enter a 1 to indicate that the results of this box are to be added to the System Total.

NOTE: In-File comments or documentation may be entered anywhere within a file by entering an asterisk,'*', as the first character on a line. Any line that begins with an * will be ignored by the model as it processes the file.

FAST-E

PROJECT TOTAL OR DETAIL INPUT

(Sheet 1 of 2)

NOTE: for record purpose only do not enter in file.
FILENAME: EXAMPLE
PAGE 1 of 1 DATE 1/20/84
PREPARED BY CVM

PROJECT: SAMPLE

LOCATION: CHERRY HILL, N.J.

PRJGLOB	1 (ESCAL)	F (GECON)	12 (PPER)	.9 (LCURVE)	1000 (CMULT)		
ITEM	GEE ITEM						
FILE	P or (D) (TYPE)	0 (SYSTEM)	0 (RERUN)	0 (REMBOX)			
GLOB	1.8 (PLTPM)	50 (ENTYPE)	1 (MATVAL)	1984 (TYEAR)	(TENVAL.)		
FORMAT	1 (ALL)	(COST)	(UNCERT)	(LOHMAT)	(INPUT)	(PGRAPH)	(POET)
TECH	(ELNC)	(ELCL)	(HEAT)	(MOTION)	(MECON)	(CONTN)	(SUPPT)
WTVOL	25 (WT)	0 (WTPAC)	.5 (VOL)	0 (VOLPAC)			
MXLINE	(PMX) or	(MXTYPE) or	(ELWT)	(ELMX)	(STWT)	(STMX)	
PCOST	0 (PCOST)	S (PQTY)	F (PECON)	1 (PQAK)			
PSCHO	JAN.84 (PSTART)	DEC.84 (PFIN)	(PSCHGX)				
PLOH	(PMATL)	(PMOH)	(PLABOR)	(PLOH)	(PLRATE)		
ECOST	(ECOST)	(EQTY)	(ECON)	(EMX)	(ENEW)		
ESCHO	(ESTART)	(EFIN)	(ESCHGX)	(ELEVEL)			
ELOH	(EMATL)	(EMOH)	(ELABOR)	(ELOH)	(ELRATE)		
ICOST	(ICOST)	(IQTY)	(ICON)	(IMX)			
ISCHO	(ISTART)	(IFIN)	(ISCHGX)	(ILEVEL)			
ILOH	(IMATL)	(IMOH)	(ILABOR)	(ILOH)	(ILRATE)		
SYSTEM	.5 (INTPAC)	S (INTQTY)	GEE (PURGFE)	(REMPAC)			

Must be in this sequence.

PARAM: _____

END: 0 (CONTIN) 0 (AGO)

CONTINUED ON PAGE 2 FOR LIFE CYCLE INPUTS

INSTALLATION ENGINEERING PRODUCTION 9 2 1 2 4 9 8 0 9 9 9 6

3.2.2 DETAIL INPUT SHEET - GFE ITEMS (GOVERNMENT FURNISHED EQUIPMENT)

A GFE Item is defined as an item for which no cost was paid to acquire the item. The purpose of processing a GFE item is to estimate the cost to integrate and/or install such a piece of equipment.

System Integration costs for a GFE item are calibrated or calculated by a SYSTEM box. System Integration factors for each GFE Item are entered on the SYSTEM line of the DETAIL Input Sheet.

Installation costs for a GFE item may be calibrated or calculated by using the ICOST and ISCHD lines in the Detail Item box or at the System level by the ICOST and ISCHD lines of a SYSTEM box.

A GFE Item is identified by entering G or GFE in PURGFE on the SYSTEM line of a Detail Input Sheet. Both Production units and Prototypes may be processed as GFE Items.

Weight (WT), must be input for a GFE item unless a Production or Engineering cost is input. If cost is input, it is only used to calculate weight and is not added to the Total System cost. Either ENTYPE or MXTYPE must be input. ENTYPE may be calculated from the Technology line and MXTYPE may be calculated from reference values of ELMX and STMX.

All other input variables are input according to their definitions and rules as described under the DETAIL INPUT SHEET in this Section.

FAST-E

PROJECT TOTAL OR DETAIL INPUT

(Sheet 1 of 2)

NOTE: for record purpose only do not enter in file.
FILENAME: EXAMPLE
PAGE 1 of 1 DATE 6/20/84
PREPARED BY CVM

PROJECT: SAMPLE

LOCATION: CHERRY HILL, N.J.

PRJGLOB	0 (ESCAL)	P (GECON)	0 (FPER)	.95 (LCURVE)	1000 (CMULT)

ITEM: PURCHASED ITEM

FILE	P or D (TYPE)	0 (SYSTEM)	0 (RERUN)	0 (REMBOX)	

Must be in this sequence.

GLOB	1.4 (PLTPM)	50 (ENTYPE)	1 (MATVAL)	1980 (TYEAR)	(TENVAL)		
FORMAT	0 (ALL)	1 (COST)	0 (UNCERT)	0 (LCHMAT)	1 (INPUT)	(FGRAPH)	(FDET)
TECH	(ELNC)	(ELCL)	(HEAT)	(MOTION)	(MECON)	(CONTN)	(SUPPT)
WTVOL	25 (WT)	0 (WTFAC)	.5 (VOL)	0 (VOLFAC)			
MXLINE	(FMX) or	(MXTYPE) or	(ELWT)	(ELMX)	(STWT)	(STMX)	
PCOST	80 (PCOST)	5 (PQTY)	P (PECON)	1 (PQAK)			
PSCHD	JAN.80 (PSTART)	JAN.81 (PFIN)	(PSCHOX)				
PLOH	(PMATL)	(PMOH)	(PLABOR)	(PLOH)	(PLRATE)		
ECOST	(ECOST)	(EQTY)	(EECON)	(EMX)	(ENEW)		
ESCHD	(ESTART)	(EFIN)	(ESCHOX)	(ELEVEL)			
ELOH	(EMATL)	(EMOH)	(ELABOR)	(ELOH)	(ELRATE)		
ICOST	(ICOST)	(IQTY)	(IECON)	(IMX)			
ISCHD	(ISTART)	(IFIN)	(ISCHOX)	(ILEVEL)			
ILOH	(IMATL)	(IMOH)	(ILABOR)	(ILOH)	(ILRATE)		
SYSTEM	.7 (INTPAC)	5 (INTQTY)	PUR (PURGFE)	(REMFAC)			

PARAM:

END: (CONTIN) (ADD)

CONTINUED ON PAGE 2 FOR LIFE CYCLE INPUTS

PRODUCTION ENGINEERING INSTALLATION

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3.2.3 DETAIL INPUT SHEET - PURCHASED EQUIPMENT ITEMS

The purpose of processing Purchased Equipment Items is to include their cost in the Total System cost as well as to estimate the cost to integrate and/or install these items into the entire System.

System Integration costs for a Purchased Item are calibrated or calculated by a SYSTEM box. System Integration factors for each Purchased Item are entered on the SYSTEM line of the Detail Input Sheet.

Installation costs for a Purchased Item may be calibrated or calculated by using the ICOST and ISCHD lines in the Detail box or at the System level by using the ICOST and ISCHD lines of a SYSTEM box.

A Purchased Item is identified by entering P or PUR in PURGFE on the SYSTEM line of a Detail Input Sheet. Both Production units and Prototypes may be processed as Purchased items.

If Weight (WT) is not known, either ENTYPE or MXTYPE must be input for a Purchased Item. ENTYPE may be calculated from the Technology Line and MXTYPE may be calculated from reference values of ELMX and STMX.

All other input variables are input according to their definitions and rules as described under the DETAIL INPUT SHEET in this Section.

The FAST-E model assumes a 25% markup of cost is included in the purchase price. Therefore the model divides the input purchased cost by 1.25 before processing the item.

Either PCOST or ECOST must be entered. A purchased item study will not consider schedule acceleration or extension. Therefore both the finish date and the appropriate SCHDX factor cannot both be entered.

.2.4 DETAIL INPUT SHEET - MODIFIED ITEMS

odified Items, whether purchased or produced, are processed by multiplying the reference PMX or EMX value of the Item by the percentage of modification. If the reference PMX value of the Item is 1.23 and 50% of it is to be modified, process the Item as a Detail Item with a PMX of 0.615.

FAST-E
SYSTEM INTEGRATION & INSTALLATION INPUT

NOTE: for record purpose only do not enter in file.
FILENAME: EXAMPLE
PAGE 4 of 4 DATE 6/20/94
PREPARED BY CVM

PROJECT

LOCATION

PRJGLOB: ESCAL | GSCON | PPER | LCURVE | CMULT

ITEM: SYSTEM I & T BOX

FILE: TYPE 0 | SYSTEM 1 | RERUN 0 | REMBOX 0

GLOB: PLTPM 1.0 | ENTYPE 0 | MATVAL 1 | TYEAR 1994 | TENVAL 0

FORMAT: ALL 0 | COST 1 | UNCERT 1 | LONMAT 0 | INPUT 1 | PGRAPH | PCET

SYSTEM

SCOST: SCOST 0 | SCTY 1 | SCON F | SMX 1.103

SSCHO: SSTART APR.95 | SFIN 0 | SSCHOX 91.35 | SLEVEL 1

SLOH: SMATL | SMOH | SLABOR | SLOH | SLRATE

INSTALLATION

ICOST: ICOST 0 | ICTY 1 | ICON F | IMX 1.057

ISCHO: ISTART JAN.96 | IFIN 0 | ISCHOX 99.36 | ILEVEL 1

ILOH: IMATL | IMOH | ILABOR | ILOH | ILRATE

INST. & INTEG. ENGINEERING

ECOST: ECOST 140 | ECTY 1 | ECON F | EMX 0 | ENEW 1

ESCHO: ESTART JAN.95 | EFIN NOV.95 | ESCHOX 0 | ELEVEL 1

ELOH: EMATL | EMOH | ELABOR | ELOH | ELRATE

PARAM

COMMENTS:

C_1

C_2

C_3

END: CONTIN 0 | ADD 1

FPS-25 5/83

9 2 1 2 4 9 8 1 0 0 1

7.2.5 SYSTEM INPUT SHEET - EQUIPMENT SYSTEM INTEGRATION & INSTALLATION INPUTS

The System Integration & Installation Input sheet has the same input variables as the Detail Input Sheet except that the Production Cost, Schedule and Labor, Material and OH Input lines are replaced with System Cost, Schedule and Labor, Material and OH Input lines. The SYSTEM line is not required. The System Cost, Schedule, Labor, Material and OH lines are defined as follows:

NOTE: System Integration and Test costs can be calculated for both prototypes and production units. However, if prototypes and production items are processed in the same box, the integration and test effort would only apply to the production units.

SCOST - System Integration Cost line.
SCOST is an optional line. It is only entered if a System Integration and Test effort is to be calibrated or costed. It must be entered if the SSCHD is entered.

SCOST - System Integration Cost.
Enter the total System Integration and Test cost for calibration or 0 if it is to be calculated. SCOST must be in terms of the CMULT value.

SQTY - System Integration Quantity.
Enter a value which represents the total number of Systems to be Integrated. INTQTY from a Detail box indicates the number of Items per System. SQTY represents a multiplier to that figure. Enter a whole number greater than or equal to 1.

SECON - System Integration Economics of SCOST.
Enter a value for System Integration calibration. SECON defines the economics of the SCOST amount as Present Value, Final Value or Constant Year dollars. In Cost studies, if SECON is different from GECON, it will be reset to the GECON parameter.

Enter P for Present Value or constant dollars as of the Month and Year in SSTART.

Enter F for Final Value (As Spent) dollars.

Enter a year, i.e. 1984, for Constant Year dollars.

SMX - System Integration reference factor.
Enter a value in decimal equivalent. See the FAST-E Reference manual for adjustment values of SMX. The nominal value of SMX is 1.

All variables may be entered as R to repeat values from a previous box.

SSCHD - System Integration Schedule Line.
SSCHD is an optional line. It is only entered if a System Integration and Test effort is to be calibrated or costed. It must be entered if the SCOST line is entered.

SSTART - System Integration Start date.
SSTART is entered in MMM.YYYY format or as 0. MMM are the first three letters of the month and YYYY is the year. The period,'.', is mandatory. SSTART may be entered as NOV.1986 or NOV.86. SSTART is a mandatory input.

SFIN System Integration Finish date.
SFIN is entered in MMM.YYYY format or as 0. MMM are the first three letters of the month and YYYY is the year. The period,'.', is mandatory. SFIN may be entered as JUL.1985 or JUL.85. Either SFIN or SSCHDX must be input. If SFIN is entered and SSCHDX is entered as 0, a SSCHDX reference value appropriate to the schedule length will be calculated. If a value for SSCHDX is entered and SFIN is 0, a most likely System Integration Finish date will be computed based on the SSCHDX value. If both are input, the model will internally calculate the most likely schedule and assess penalties against the input schedule if there is apparent schedule acceleration or stretch-out. This is true in both calibration runs and cost studies.

SSCHDX - System Integration reference factor.
Enter reference value or 0. Either SFIN or SSCHDX must be entered. See SFIN for explanation of inputting SFIN and SSCHDX. The nominal value for SSCHDX is 100.

SLEVEL - Level of System Integration Effort.
Enter value in decimal equivalent. See the FAST-E Reference manual for values of SLEVEL. The nominal value of SLEVEL is 1.

All variables may be entered as R to repeat values from a previous box.

SLOH - System Integration Labor and Overhead line.
SLOH is an optional line. It is only input to enter specific percentage values. If LOHMAT = 1 and the SLOH line is not input, the Labor, Material and OH costs will be calculated by the model. Any combination of known values may be entered. Any values that are not known will be calculated by the model.

SMATL - Percentage, in decimal equivalent, of System Integration Material to the Total System Integration cost.

Enter 0 to 1. If entered as 0, the model will calculate the percentage.

Enter an N to indicate no Engineering Material costs.

SMOH - Percentage, in decimal equivalent, of System Integration Material Overhead to System Integration Material.

Enter a value or 0 to have model calculate.

Enter an N to indicate no System Integration Material Overhead

SLABOR - Percentage, in decimal equivalent, of System Integration Labor to Total System Integration Cost.

Enter 0 to 1. If entered as 0, the model will calculate the percentage.

SLOH - Percentage, in decimal equivalent, of System Integration Labor Overhead System Integration Labor.

Enter a value or 0. If entered as 0, the model will calculate a percentage.

SLRATE - System Integration labor rate in dollars per hour. Enter labor cost per hour. This will cause the model to calculate System Integration labor hours. If entered as 0, System Integration labor hours will not be calculated.

Note: All values are decimal equivalents, for example:
A 125% OH rate is entered as 1.25.
A 8% MATL rate is entered as .08.

All variables may be entered as R to repeat values from a previous box.

3.2.5.1 PROCESSING SYSTEM INTEGRATION AND COST FOR EQUIPMENTS

Equipment System Integration and Test is dependant on processing both individual Item boxes with INTFAC and INTQTY factors and ADD=1, plus the SCOST and SSCHD lines of a SYSTEM box. The SLOH line is only entered to indicate specific percentages for the System I & T Labor, Material and OH output. Either System I & T or Installation effort is required to process a SYSTEM box.

The INTFAC and INTQTY factors of the individual Item boxes indicate the number of items per System and their effect on the System I & T cost and schedule. The SCOST and SSCHD lines of the SYSTEM box describe the I & T effort itself. If SCOST is input, a calibration reference value of SMX is calculated. This value may be adjusted using the reference factors shown in the TABLES Section. Using the calibrated or nominal value, SMX is used to calculate System I & T costs. The SSCHD line is used to calibrate a System I & T schedule reference factor, SSCHDX, or its use as the reference or nominal value of SSCHDX, to estimate the System I & T schedule.

There must be at least one Detail box with INTFAC and INTQTY factors and ADD=1 to calculate System I & T costs in a SYSTEM box.

The SYSTEM Box need not be the last box in the Project. If a SYSTEM box is read and CONTIN=1 indicating that there are more boxes to be processed, the SYSTEM box will be held aside and only processed after the last box of the Project has been processed. The last box of a Project is indicated by CONTIN=0.

3.2.5.2 PROCESSING SYSTEM INSTALLATION

Installation costs or calibration may be processed on an individual Detail box basis, or at the System level in the SYSTEM box. Processing Installation on a box by box basis in discussed under DETAIL INPUT SHEET in this Section. When processing Installation effort at the System level, the effort will include all Detail boxes with ADD=1. Either System I & T or Installation effort is required to process a SYSTEM box.

The ICOST and ISCHD lines in a SYSTEM box are used to calibrate or calculate cost at the System level. The ILOH line is only used to indicate specific percentages for the Installation Labor, Material and OH output. If a known ICOST is input, a calibration reference value of IMX is calculated. This value may be adjusted using the factors shown in the FAST-E Reference manual. The reference or nominal value of IMX can then be used to calculate Installation costs. The ISCHD line is used to calibrate a reference schedule factor, ISCHDX, or use the reference or nominal value of ISCHDX to calculate an Installation schedule.

There must be at least one Detail box with ADD=1 to calculate Installation costs in a SYSTEM box.

The SYSTEM Box need not be the last box in the Project. If a SYSTEM box is read and CONTIN=1 indicating that there are more boxes to be processed, the SYSTEM box will be held aside and only processed after the last box of the Project has been processed. The last box of a Project is indicated by CONTIN=0.

3.2.5.3 PROCESSING INSTALLATION AND INTEGRATION ENGINEERING

The ECOST and ESCHD lines of the SYSTEM box are used to process Engineering calibration or costs for the Engineering effort required for System I &T effort, Installation effort, or both. The ELOH line is only used to indicate specific percentages for Engineering Labor, Material and OH output. These lines are optional. If no Installation and Integration Engineering effort is required, the ECOST, ESCHD and ELOH lines are not input.

If a known ECOST is input, a calibration reference value of EMX is calculated. This value may be adjusted using the factors shown in the TABLES Section. The reference or nominal value of EMX can then be used to calculate Integration and/or Installation Engineering costs. The ESCHD line is used to calibrate a reference schedule factor, ESCHDX, or use the reference or nominal value of ESCHDX to calculate an Integration and/or Installation Engineering schedule.

Either System Integration or System Installation is required to process Installation and Integration Engineering in the SYSTEM box.

The SYSTEM Box need not be the last box in the Project. If a SYSTEM box is read and ADD=1 indicating that there are more boxes to be processed, the SYSTEM box will be held aside and only processed after the last box of the Project has been processed. The last box of a Project is indicated by ADD=0.

9 2 1 2 4 9 8 1 0 0 7

FAST-E
RERUN AND ECONOMIC FILE INPUTS

RERUN BOX INPUT

NOTE: for record purpose only do not enter in file.
FILENAME: EXAMPLE
PAGE 2 of 2 DATE 4/20/94
PREPARED BY CVM

ITEM: RERUN OF BOX #1

FILE: 0 (TYPE) 0 (SYSTEM) 1 (RERUN) 0 (REMBOX)

PARAM: PKW=200, SPRESS=100,
PSTART='JUN.1987',
ESTART='JAN.1986'

END: 0 (CONTIN) 0 (ADD)

ECONOMIC FILE INPUT

NOTE: for record purpose only do not enter in file.
FILENAME: _____
PAGE __ of __ DATE _____
PREPARED BY _____

YR82-86	1982	1983	1984	1985	1986
YR87-91	1987	1988	1989	1990	1991
YR92-96	1992	1993	1994	1995	1996
YR97-01	1997	1998	1999	2000	2001
YR02-06	2002	2003	2004	2005	2006
YR07-11	2007	2008	2009	2010	2011
YR12-16	2012	2013	2014	2015	2016
YR17-21	2017	2018	2019	2020	2021
YR22-25	2022	2023	2024	2025	

FPS-28 Std

9 2 1 2 4 9 3 1 0 0 8

3.2.6 RERUN INPUT SHEET

A RERUN box is used to change any variable from any previous box including the Item name. The input lines to a RERUN box are defined as follows:

ITEM - Up to 24 characters may be entered for run identification. The next 24 characters after the signature word ITEM and one space will be used as the ITEM name. The ITEM line must be the first line in the RERUN box.

FILE - Box definition line.
The FILE line must be entered in sequence after the ITEM line. The variables on the FILE line for a RERUN box are input as follows:

TYPE is entered as 0.
SYSTEM is entered as 0.
RERUN is entered as 1.
REMBOX is left blank or entered as 0.

PARAM - Allows for free format addition or changes to any input variables. Values are entered in the Variable=Value method with a comma between entries. More than one line of entries may be made by ending a line with a comma to indicate more changes are to be made. The signature word PARAM need only be entered on the first line. The last line of changes must not end with a comma.

This is the method used to change only the variables desired to re-run a previous box. The previous box will or will not be added to the System Total depending on the value of ADD in that box.

END - Signifies the End of RERUN box.
The END line is a Mandatory line at end of each RERUN Box. It indicates if another box is to follow and whether or not to accumulate the results of this RERUN box to the System Total.

CONTIN - Indicates whether or not to continue processing of the next box under this Project.

Enter a 0 to indicate that this is the last Item in the current Project.
Enter a 1 to indicate that there is another Item to follow for this Project.

ADD - Indicates whether or not to accumulate the results of this RERUN box Item into the System Total.

Enter a 0 to indicate that the results of this box are not to be added to the System Total.
Enter a 1 to indicate that the results of this box are to be added to the System Total.

FAST-E

PROJECT TOTAL OR DETAIL INPUT

(Sheet 1 of 2)

NOTE: for record purpose only do not enter in file.
FILENAME: EXAMPLE
PAGE 1 of 4 DATE 6/20/84
PREPARED BY CVM

PROJECT: SAMPLE

LOCATION: CHERRY HILL, N.J.

PRJGLOB	1 (ESCAL)	P (GECON)	12 (FPER)	.9 (LCURVE)	1000 (CMULT)

ITEM: PROJECT TOTAL BOX

Must be in this sequence.

FILE	P or D (TYPE)	0 (SYSTEM)	0 (RERUN)	0 (REMBOX)

GLOB	2.0 (PLTFM)	0 (ENTYPE)	1 (MATVAL)	1993 (TYEAR)	(TENVAL)		
FORMAT	0 (ALL)	1 (COST)	0 (UNCERT)	0 (LONMAT)	1 (INPUT)	1 (PGRAPH)	(PDET)
TECH	(ELNC)	(ELCL)	(HEAT)	(MOTION)	(MECON)	(CONTN)	(SUPPT)
WTVOL	(WT)	(WTFAC)	(VOL)	(VOLFAC)			
MXLINE	(PMX) or	(MXTYPE) or	(ELWT)	(ELMX)	(STWT)	(STMX)	

PRODUCTION

PCOST	350 (PCOST)	1 (PQTY)	P (PECON)	(PQAK)	
PSCHD	JAN. 80 (PSTART)	JAN. 81 (PFIN)	(PSCHOX)		
PLOH	(PMATL)	(PMON)	(PLABOR)	(PLOH)	(PLRATE)

ENGINEERING

ECOST	1100 (ECOST)	1 (EQTY)	P (EECON)	0 (EMX)	1 (ENEW)
ESCHD	AUG. 79 (ESTART)	DEC. 81 (EFIN)	0 (ESCHOX)	1 (ELEVEL)	
ELOH	(EMATL)	(EMON)	(ELABOR)	(ELOH)	(ELRATE)

INSTALLATION

ICOST	250 (ICOST)	1 (IQTY)	P (IECON)	(IMX)	
ISCHD	JAN 81 (ISTART)	JUN. 81 (IFIN)	0 (ISCHOX)	1 (ILEVEL)	
ILOH	(IMATL)	(IMON)	(ILABOR)	(ILOH)	(ILRATE)

SYSTEM	(INTFAC)	(INTQTY)	(PURGFE)	(REMFAC)

PARAM:

END	1 (CONTIN)	0 (ADD)

CONTINUED ON PAGE 2 FOR LIFE CYCLE INPUTS

9 2 1 2 4 9 8 1 0 1 0

FAST-E
REMAINING BOX INPUT
(Limited to one per Project)

NOTE: for record purposes only do not enter in file.
FILENAME ____
PAGE ___ of ___ DATE ____
PREPARED BY ____

PROJECT ____

LOCATION ____

PRJGLOS: ESCAL | GECON | FPER | LCURVE | CMULT

ITEM: REMAINING BOX

FILE: 0 (TYPE) | 0 (SYSTEM) | 0 (RERUN) | 1 (REMBOX) — Must be in this sequence.

GLOS: 2.0 (PLTRN) | 0 (ENTYPE) | 1 (MATVAL) | 1983 (TYEAR) | TENVAL

FORMAT: ALL | COST | UNCERT | LONMAT | INPUT | PGRAPH | POET

TECH: ELNC | ELCL | HEAT | MOTION | MECON | CONTN | SUPP

WTVOL: WT | WTPAC | VOL | VOLPAC

MXLINE: PMX or MXTYPE or ELMT | ELMX | STWT | STMX

INSTALLATION ENGINEERING PRODUCTION

PCOST: 0 (PCOST) | 1 (PQTY) | P (PECON) | PGAK

PSCHO: SEP.30 (PSTART) | SEP.30 (PFIN) | PSCHOX

PLOH: PMATL | PMOH | PLABOR | PLOH | PLRATE

ECOST: 0 (ECOST) | 0 (EQTY) | P (EECON) | 0 (EMX) | .5 (ENEW)

ESCHO: SEP.30 (ESTART) | JUN.31 (EFIN) | 0 (ESCHOX) | 1 (ELEVEL)

ELOH: EMATL | EMOH | ELABOR | ELOH | ELRATE

ICOST: 0 (ICOST) | 1 (IQTY) | P (IECON) | IMX

ISCHO: JAN.31 (ISTART) | JUL.31 (IFIN) | 0 (ISCHOX) | 1 (ILEVEL)

ILOH: IMATL | IMOH | ILABOR | ILOH | ILRATE

REMBOX: .25 (PIPING) | .40 (ELECT) | .25 (MECH) | .10 (EQUIP)

PARAM ____

COMMENTS: THIS BOX REPRESENTS THE CALIBRATION OF THE REMAINING $700,000.

END: 1 (CONTIN) | 1 (ADD)

FPS-37

9 2 1 2 4 9 8 1 0 1 1

FAST-E

PROJECT TOTAL OR DETAIL INPUT

(Sheet 1 of 2)

NOTE: for record purpose only do not enter in file.
FILENAME: EXAMPLE
PAGE 2 of 3 DATE 6/20/84
PREPARED BY CVM

PROJECT

LOCATION

PRJGLOB	ESCAL	GECON	FPER	LCURVE	CMULT		
ITEM	REMFAC ITEM						
FILE	P or D / TYPE	0 / SYSTEM	0 / RERUN	0 / REMBOX	*Must be in this sequence.*		
GLOB	2.0 / PLTFM	88.2 / ENTYPE	1 / MATVAL	1984 / TYEAR	TENVAL		
FORMAT	0 / ALL	1 / COST	0 / UNCERT	0 / LOHMAT	1 / INPUT	FGRAPH	FDET
TECH	ELNC	ELCL	HEAT	MOTION	MECON	CONTN	SUPPT
WTVOL	WT	WTFAC	VOL	VOLFAC			
MXLINE	1 / FMX or	MXTYPE or	ELWT	ELMX	STWT	STMX	
PRODUCTION PCOST	0 / PCOST	1 / PQTY	1984 / PECON	FOAK			
PSCHD	FEB.84 / PSTART	0 / PFIN	50 / PSCHOX				
PLOH	PMATL	PMOH	PLABOR	PLOH	PLRATE		
ENGINEERING ECOST	0 / ECOST	0 / EQTY	1984 / EECON	1.364 / EMX	.5 / ENEW		
ESCHD	JAN.84 / ESTART	0 / EFIN	67 / ESCHOX	1 / ELEVEL			
ELOH	EMATL	EMOH	ELABOR	ELOH	ELRATE		
INSTALLATION ICOST	0 / ICOST	1 / IQTY	1984 / IECON	3.4 / IMX			
ISCHD	JAN.85 / ISTART	0 / IFIN	85 / ISCHOX	1 / ILEVEL			
ILOH	IMATL	IMOH	ILABOR	ILOH	ILRATE		
SYSTEM	0 / INTPAC	0 / INTQTY	0 / PURGFE	7215 / REMPAC			
PARAM							
END	0 / CONTIN	1 / ADD					

CONTINUED ON PAGE 2 FOR LIFE CYCLE INPUTS

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3.2.7 PROJECT TOTAL INPUT SHEET
REMAINING BOX INPUT SHEET
DETAIL INPUT SHEET WITH REMFAC

The Project Total, Remaining Box and Detail Input Sheet with REMFAC are intended to be used to assist the user in calibrating and subsequently being able to calculate cost for those areas of an Equipment System for which cost is expended, weight may not be known, and it is impossible to describe these areas of cost by conventional methods. These areas, however, can be defined and processed in terms of their volume as Piping, Electrical or Mechanical systems, or other Equipments. The REMFAC procedure variable which is explained in detail in Section F13.0 of the Reference Manual provides the parametric mechanism for the costing of the unidentifiable areas. The REMFAC parameter can be calculated using the PROJECT TOTAL procedure, explained below, or by it's synthesis as described in the Reference Manual. The synthetic procedure enables the REMFAC application in situations wherein prior PROJECT TOTAL actuals or experiences are not available as in the case of new projects or systems to be assessed.

3.2.7.1 CALIBRATION

In order to calibrate these areas, the Total Project Cost must be known, calibration or cost studies processed for the items that are known, and the information about Piping, Electrical, Mechanical and other Equipment entered for the remaining areas.

The information about the Total Project Cost in terms of Engineering, Production and Installation is entered on the PROJECT TOTAL Input Sheet. The information about the Items that are known is filled out on DETAIL and SYSTEM Input Sheets. The information about the remaining Piping, Electrical, Mechanical and other Equipment is filled out on a REMAINING BOX Input Sheet. The model looks at the entire System and calculates reference values for REMFAC, Remaining Factor, and FASTE, Primary Performance Characteristic, and are printed out in the REMAINING BOX output.

3.2.7.2 COST STUDIES

The reference values of ENTYPE, PMX, REMFAC and FASTE can be used for cost studies to estimate similar areas of cost for new Systems.

The REMFAC value, when entered in a Detail cost study, will size the Remaining area for the new System proportionally to the reference System. The REMFAC value may also be adjusted linearly. This would allow, for example, for a 50% reduction of the new remaining area, but still keep it in proportion to the reference System.

The FASTE value with it's associated WTFAC parameter could be used as a Primary Performance Characteristic in a Detail cost study to estimate that exact same cost and weight of the remaining area for the new System as the reference System. The FASTE value can also be adjusted linearly. This would allow, for example, to estimate double functionally, the new remaining area as in the reference System.

In Cost Studies, the PROJECT TOTAL and REMAINING BOX Input Sheets are not used. The normal Detail and System input sheets are input followed by a Detail Input Sheet using either REMFAC or FASTE to calculate the remaining area cost and schedule.

3.2.7.3 FILLING OUT THE PROJECT TOTAL INPUT SHEET

The PROJECT TOTAL Input Sheet is only used in calibration of a REMFAC, FASTE and WTFAC values for the Remaining area of Equipment systems. This input sheet is the same as the Detail Input Sheet. When used, the PROJECT TOTAL box must be the first box in the Project.

TYPE is entered as P on the FILE line to indicate that this is a PROJECT TOTAL Input Sheet. All other values are left blank or entered as 0.

If Production is included in the total Project cost, the total Production cost is entered on the PCOST line. PQTY is entered as 1. PECON and FOAK are entered as appropriate. The PSCHD line is entered with the schedule for the entire Project.

If Engineering is included in the total Project cost, the total Engineering cost is entered on the ECOST line. EQTY is entered as 1. EECON is entered as appropriate. EMX is entered as 0 and ENEW is entered for the entire system. The ESCHD line is entered with the schedule for the entire Project.

** Installation is included in the total Project cost, the total Installation cost entered on the ICOST line. IQTY is entered as 1. IECON is entered as appropriate. IMX is entered as 0 or left blank. The ISCHD line is entered with the schedule for the entire Project.

The ELOH, PLOH and ILOH lines may be entered as desired.

The SYSTEM line is not required.

If the total System weight is known, it is entered on the WTVOL line.

All other variables are entered according to their definitions and rules. However, all other variables now refer to the total system.

The PROJECT TOTAL Input sheet must be entered as the first box of a Project.

The PROJECT TOTAL Box will only be processed as the Summary Calibration box at the end of all other boxes within the Project. Each individual box's cost and weight will be subtracted from the total cost and weight, if input, as they are processed. If this results in negative values, appropriate error messages will be printed. If the total weight and volume are not entered in the PROJECT TOTAL Input Sheet, they will be calculated when the Remaining Box is processed.

3.2.7.4 FILLING OUT THE REMAINING BOX INPUT SHEET

The Remaining Box Input Sheet is used to enter the percentage volumes of Piping, Electrical and Mechanical Systems and other Equipment to the total remaining volume. These values are entered on the REMBOX Line. The Remaining box may be entered anywhere in the Project after the PROJECT TOTAL box. When read, it will be held aside and processed after all other boxes have been processed.

The FILE Line is entered as follows:

TYPE is entered as 0.

SYSTEM is entered as 0.

RERUN is entered as 0.

REMBOX is entered as 1.

REMBOX - Remaining Box line.
Defines the Remaining area in terms of volume as Piping, Electrical, Mechanical and/or other Equipment in decimal equivalent. All four values must sum to 1 or 100.

PIPING - Enter the percentage volume, in decimal equivalent, of the Remaining area which involves Piping.

ELECT - Enter the percentage volume, in decimal equivalent, of the Remaining area which involves Electrical systems.

MECH - Enter the percentage volume, in decimal equivalent, of the Remaining area which involves Mechanical systems.

EQUIP - Enter the percentage volume, in decimal equivalent, of the Remaining area which involves other Equipment.

WT, VOLUME, ENTYPE, PMX and MXTYPE are not required inputs. Cost inputs are determined by the model from the PROJECT TOTAL costs and subsequent Item boxes.

If Production is included for the remaining area, both the PCOST and PSCHD lines are required. PCOST is entered as 0. PQTY is entered as 1. PECON and FOAK are entered as appropriate for the remaining costs. The PSCHD line is entered for the remaining area only. The PLOH line is only used to enter specific percentages for Production Labor, Material and OH.

If Engineering is included for the remaining area, both the ECOST and ESCHD lines are required. ECOST is entered as 0. EQTY is entered as 1. EECON is entered as appropriate for the remaining costs. EMX is entered as 0. ENEW is entered as appropriate for the remaining area. The ELOH line is only used to enter specific percentages for Engineering Labor, Material and OH.

If Installation is included for the remaining area, both the ICOST and ISCHD lines are required. ICOST is entered as 0. IQTY is entered as 1. IECON is entered as appropriate for the remaining costs. IMX is entered as 0. The ISCHD line is entered as appropriate for the remaining area. The ILOH line is only used to enters specific percentages for Installation Labor, Material and OH.

The calculated values for ENTYPE, PMX, REMFAC and FASTE will be printed in the Remaining Box output.

All other variables are input according to their definitions and rules as described under the DETAIL INPUT SHEET in this Section.

3.2.7.5 FILLING OUT A DETAIL INPUT SHEET WITH REMFAC

The REMFAC value, when entered in a Detail cost study, will size the Remaining area for the new Equipment System proportionally to the reference System. The REMFAC value may also be adjusted linearly. This would allow, for example, for a 50% reduction of the new remaining area, but still keep it in proportion to the reference System. The Detail Input box with REMFAC must be entered as the last box in the PROJECT.

A Detail Input Sheet is used with the calibrated REMFAC value entered on the SYSTEM line. The calibrated values of ENTYPE, PMX, EMX, IMX, PSCHDX, ESCHDX and ISCHDX are also entered. WT, Weight, is not entered.

All other variables are entered according to their definitions and rules as described in the DETAIL INPUT SHEET Section.

3.2.7.6 FILLING OUT A DETAIL INPUT SHEET WITH FASTE

The FASTE value could be used as a Primary Performance Characteristic in a Detail cost study to estimate that exact same cost and weight of the remaining area for the new Equipment System as the reference System. The FASTE value can also be adjusted linearly. This would allow, for example, to estimate double the new remaining area as in the reference System.

A Detail Input Sheet is used with FASTE as the only Performance Characteristic entered on the PARAM line. The calibrated values of ENTYPE, PMX, EMX, IMX, PSCHDX, ESCHDX and ISCHDX are also entered.
WTFAC and VOLFAC must also be entered. WT, Weight, is not entered.

3.2.7.7 FILLING OUT A DETAIL INPUT SHEET WITH WEIGHT

The reference WT, ENTYPE, PMX and/or EMX and PLTFM values may be used in a Detail cost study to estimate the the exact cost of the remaining area for the new Equipment System as the reference system. A new WT can also be entered for the new system, if known, to directly adjust the weight of the new remaining area.

9 2 1 2 4 9 8 1 0 1 8

FAST-E

PROJECT TOTAL OR DETAIL INPUT

(Sheet 2 of 2)

NOTE: for record purpose only do not enter in file.

FILENAME: _____

PAGE ___ of ___ . DATE _____

PREPARED BY _____

ENGCOST	200 EDESGN	0 ESYSTM	15 EPRUCT	0 EDOCUM	0 EPROTO	N ETOOLS
ENGMX	0 EDESMX	1.2 ESYSMX	0 EPRUMX	.4 EDOCMX	PROTMX	ETLGMX
PRODCOST	0 PRODUC	5 PESUPT	0 PPRUCT	0 PDOCUM	N PTOOLS	
PRODMX	1 PRODMX	0 PESPMX	0 PPRUMX	.8 PDOCMX	PTLGMX	
LCLRU	LRSYS	LRCOST	LRMTTR	LRRCST	LRRAMT	
LCMOD	MOSYS	MOCOST	MOMTTR	MORCST	MORAMT	
LCFACIL	SUPCST	LRFACL	MOFACL	SUPMX		
LCDATA	NEQUIP	OTP	MTBF	MTBFMX		
LCCOST	LCCOST	LCBCON	LCMX	LCSTRT	LCFIN	

Comments
(Up to 5)

C_1 _____

C_2 _____

C_3 _____

C_4 _____

C_5 _____

NOTE:

The above inputs are optional. They are to be entered between the FILE and END lines of the PROJECT TOTAL OR DETAIL INPUT (Sheet 1 of 2).

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3.3 EQUIPMENT ACQUISITION DETAIL COST BREAKOUT

FAST-E provides the option of printing costs for Engineering and/or Production as a total value for the Basic Cost. Schedule Penalty and Total Cost or to have Engineering and/or Production costs detailed for the Basic Cost, Schedule Penalty and Total Cost.

The detailed costs for Engineering are:

Drafting & Design
Systems Engineering
Project Management
Data & Documentation
Prototype(s) fabrication and testing
Tooling and Test equipment (for prototypes).

The detailed costs for Production are:

Production (Manufacturing)
Engineering Support
Project Management
Data & Documentation
Tooling and Test equipment.

The ENGCOST and ENGMX lines (FAST-E Detail Input Sheet 2 of 2) are used to process the detail cost breakouts for Engineering. The PRODCOST and PRODMX lines (FAST-E Detail Input Sheet 2 of 2) are used to process the detail cost breakouts for Production. If these lines are not used, FAST-E will render the Engineering and Productions costs as a total as defined by EMX and PMX.

COST must be entered as 1 on the FORMAT line to print the detailed cost breakout by Basic Cost, Schedule Penalty Cost and Total Cost. If a production effort is processed, the Average Unit Costs based on the Total Production Cost and Manufacturing Cost will be printed. The Theoretical First Piece Cost for production items will also be printed.

The ENGCOST, ENGMX, PRODCOST, PRODMX lines allow each cost element to be calibrated or to be estimated using the individual MX values. Default MX values may be used to allow the model to allocate costs among the detailed elements.

3.3.1 DETAILED COSTS IN AN ENGINEERING CALIBRATION

Detailed engineering element calibration is processed by entering the total engineering cost in ECOST and/or the Design & Drafting cost in EDESGN. Any of the individual engineering costs may also be entered on the ENGCOST line. Elements for which there are no costs are denoted by entering an N for that element on the ENGCOST line.

The ENGMX line is input with 0's entered for the MX values to calibrate values from corresponding input cost values on the ENGCOST line.

When ECOST and/or EDESGN are entered, individual cost elements can be calibrated by entering the costs on the ENGCOST line and 0 in the corresponding MX values on the ENGMX line. Individual costs may also be calculated by entering 0 on the ENGCOST line and a value for the corresponding MX value.

Both ECOST and individual engineering costs may be entered. If the total cost and all of the individual costs are entered, the model will check to see that all of the individual or detail costs agree with the total cost entered in ECOST. If not, an appropriate error message will be issued.

For example, if the total Engineering cost is entered in ECOST, the ENGCOST and ENGMX lines are entered to have the model allocate the breakout of engineering costs and calibrate the MX values as follows:

```
ENGCOST 0 0 0 0 0 0
ENGMX   0 0 0 0 0 0
```

NOTE: Trailing zeros need not be entered so only the signature words need be entered for the above example.

If the total Engineering cost is not known, at a minimum the (EDESGN) Design & Drafting cost must be entered. FAST-E will allocate appropriate costs to the remaining elements. The ENGCOST and ENGMX lines would then be input as follows:

```
ENGCOST 200 0 0 0 0 0
ENGMX     0 0 0 0 0 0
```

If there is no cost for a particular element it is entered as N as follows:

```
ENGCOST 200 0 0 0 0 N
ENGMX     0 0 0 0 0 0
```

The MX for the cost element of N will be 0.

All of the detailed costs may be entered to calibrate each detail MX value. The total engineering cost need not be entered.

```
ENGCOST 200 10 15 5 6 12
ENGMX
```

This example shows where some elements are calibrated, some are defaulted, some are set to 0 by entering N while others are calculated as follows:

```
ENGCOST 200 0 15  0 0 N
ENGMX     0 1.2 0 .8 0 0
```

The EMX parameter controls the total Engineering cost. The Cost details are breakdowns of the total. The allocations are controlled by the appropriate detail MX values. If certain detail costs are given as inputs they will be used to determine the applicable MX values. The remaining cost, of the total engineering, will be allocated to the other details in accordance with the given MX parameters. The above is true for the calibration and cost studies.

3.3.2 DETAILED COSTS IN A PRODUCTION CALIBRATION

Detailed production element calibration is processed by entering the total production cost in PCOST and/or the Production (manufacturing) cost in PRODUC. Any of the individual production costs may also be entered on the PRODCOST line. Elements for which there are no costs are denoted by entering an N for that element on the PRODCOST line.

The PRODMX line is input with 0's entered for the MX values to calibrate values from corresponding input cost values on the PRODCOST line.

When PCOST and/or PRODUC are entered, individual cost elements can be calibrated by entering the costs on the PRODCOST line and 0 in the corresponding MX values on the PRODMX line. Individual costs may also be calculated by entering 0 on the PRODCOST line and a value for the corresponding MX value.

Both PCOST and individual production costs may be entered. If the total cost and all of the individual costs are entered, the model will check to see that the sum of the individual costs agree with the total cost entered in PCOST. If not, an appropriate error message will be issued.

For example, if the total Production cost is entered in PCOST, the PRODCOST and PRODMX lines may be entered to have the model allocate the breakout of production costs and calibrate the MX values as follows:

```
PRODCOST 0 0 0 0 0
PRODMX   0 0 0 0 0
```

NOTE: Trailing zeros need not be entered so only the signature words need be entered for the above example.

If the total Production cost is not known, at a minimum the Production (manufacturing) cost, PRODUC, must be entered. FAST-E will allocate appropriate costs to the remaining elements. The PRODCOST and PRODMX lines would then be input as follows:

```
PRODCOST 200 0 0 0 0
PRODMX     0 0 0 0 0
```

If there is no cost for a particular element it is entered as N as follows:

```
PRODCOST 200 0 0 0 N
PRODMX     0 0 0 0 0
```

The MX for the cost element of N will be 0.

This example shows where some elements are calibrated, some are defaulted, some are set to 0 by entering N while others are calculated as follows:

```
PRODCOST 200 0 15  0 N
PRODMX     0 1.2 0 .8 0
```

All of the detailed costs may be entered to calibrate each detail MX value. The total production cost need not be entered.

```
PRODCOST 200 10 15 5 6
PRODMX
```

The PMX parameter controls the PRODUC cost only. PRODUC is the Manufacturing cost. PRODMX is merely a PMX multiplier - normally it should be set to 1.0. The MX values of the other production details are used to

develop costs in addition to the PRODUC cost. Therefore, if PMX is synthesized it should not include detail factors when such breakouts are to be computed or used.

It should be noted that the EMX in Engineering controls the total Engineering cost - HOWEVER -the PMX in Production covers PRODUC only.

3.3.3 DETAILED COSTS IN AN ENGINEERING COST STUDY

Detailed engineering element cost studies are processed by entering an EMX value for the total engineering cost and entering, at a minimum, the EDESMX value. Any of the individual MX values may also be entered on the ENGMX line. Elements for which there are no costs are denoted by entering an N for that element on the ENGCOST line.

When EDESMX is entered, individual cost elements can be calculated by entering MX values on the ENGMX line and 0 in the corresponding elements on the ENGCOST line. Individual costs may also be calibrated by entering costs on the ENGCOST line and 0's on the corresponding values of the ENGMX line.

For example when EMX is entered, the ENGCOST and ENGMX lines may be entered to have the model allocate the breakout of engineering costs as follows:

```
ENGCOST  0 0 0 0 0 0
ENGMX    1 0 0 0 0 0
```

NOTE: Trailing zeros need not be entered. Therefore only the signature word ENGCOST need be entered. The trailing zeros on the ENGMX line will default to 1's.

When EMX is entered, individual cost elements may be calculated or input to calibrate corresponding MX values on the ENGMX line as follows:

```
ENGCOST 0 5
ENGMX   1
```

Also, with EMX entered, elements may be defaulted, calculated, calibrated or set to N to denote no cost for a particular element:

```
ENGCOST 0 5 0  0 0 N
ENGMX   1 0 0 .8
```

All of the MX values may be entered to calculate detailed engineering costs. EMX must also be entered.

```
ENGCOST
ENGMX   1 .8 1.2 1 .95 2
```

The EMX parameter controls the total Engineering cost. The Cost details are breakdowns of the total. The allocations are controlled by the appropriate detail MX values. If certain detail costs are given as inputs they will be used to determine the applicable MX values. The remaining cost, of the total engineering, will be allocated to the other details in accordance with the given MX parameters. The above is true for the calibration and cost studies.

3.3.4 DETAILED COSTS IN A PRODUCTION COST STUDY

Detailed production element cost studies are processed by entering an PMX value for the Production (manufacturing) cost and entering the PRODMX value. Any of the individual MX values may also be entered on the PRODMX line. Elements for which there are no costs are denoted by entering an N for that element on the PRODCOST line.

When PRODMX and PMX are entered, individual cost elements can be calculated by entering MX values on the PRODMX line and 0 in the corresponding elements on the PRODCOST line. Individual costs may also be calibrated by entering costs on the PRODCOST line and 0's on the corresponding values of the PRODMX line.

For example when PMX is entered, the PRODCOST and PRODMX lines may be entered to have the model allocate the breakout of production costs as follows:

```
PRODCOST  0 0 0 0 0
PRODMX    1 0 0 0 0
```

NOTE: Trailing zeros need not be entered. Therefore only the signature word PRODCOST need be entered. The trailing zeros on the PRODMX line will default to 1's.

When PMX is entered, individual cost elements may be calculated or input to calibrate corresponding MX values on the PRODMX line as follows:

```
PRODCOST 0 5
PRODMX   1
```

Also, with PMX entered, elements may be defaulted, calculated, calibrated or set to N to denote no cost for a particular element:

```
PRODCOST 0 5 0  0 N
PRODMX   1 0 0 .8
```

All of the MX values may be entered to calculate detailed production costs. PMX must also be entered.

```
PRODCOST
PRODMX   1 .8 1.2 1 .95
```

The PMX parameter controls the PRODUC cost only. PRODUC is the Manufacturing cost. PRODMX is merely a PMX multiplier - normally it should be set to 1.0. The MX values of the other production details are used to develop costs <u>in addition</u> to the PRODUC cost. Therefore, if PMX is synthesized it should not include detail factors when such breakouts are to be computed or used.

It should be noted that the EMX in Engineering controls the total Engineering cost - <u>however</u> -the PMX in Production covers PRODUC only.

3.3.5 EQUIPMENT DETAIL INPUT VARIABLES

The Detail input lines, ENGCOST, ENGMX, PRODCOST and PRODMX are optional input lines used to generate detailed element cost breakouts for engineering and/or production as shown for an equipment detail item. They are used in conjunction with the COST=1 print option on the FORMAT input line. When used they are input between the FILE and END lines of a PROJECT TOTAL or DETAIL INPUT Sheet.

ENGCOST - Detail Engineering Cost Line.
Enter costs to calibrate the corresponding MX values on the ENGMX line or enter zero to calculate a cost from the corresponding MX value on the ENGMX line. If the ENGCOST line is entered the ENGMX line should also be entered.

EDESGN - Engineering Drafting and Design cost.
Enter a cost to calibrate a value for EDESMX or a 0 to calculate a cost from EDESMX.

ESYSTM - Engineering System Engineering cost.
Enter a cost to calibrate a value for ESYSMX or a 0 to calculate a cost from ESYSMX. An N is entered to denote no Systems Engineering cost. ESYSTM may be entered or calculated independently of other variables on this line.

EPRJCT - Engineering Project Management cost.
Enter a cost to calibrate a value for EPRJMX or a 0 to calculate a cost from EPRJMX. An N is entered to denote no Project Management cost. EPRJCT may be entered or calculated independently of other variables on this line.

EDOCUM - Engineering Data and Documentation costs.
Enter a cost to calibrate a value for EDOCMX or a 0 to calculate a cost from EDOCMX. An N is entered to denote no Data and Documentation cost. EDOCUM may be entered or calculated independently of other variables on this line.

EPROTO - Engineering Prototype fabrication cost.
Enter a cost to calibrate a value for PROTMX or a 0 to calculate a cost from PROTMX. EPROTO may be entered or calculated independently of other variables on this line. If EQTY is 0, there will be no EPROTO cost nor PROTMX.

ETOOLG - Engineering Tooling and Test equipment cost.
Enter a cost to calibrate a value for ETLGMX or a 0 to calculate a cost from ETLGMX. An N is entered

to denote no Tooling and Test equipment cost. If EQTY is entered as 0, ETOOLG must be entered as 0. ETOOLG may be entered or calculated independently of other variables on this line.

All variables may be entered as R to repeat values from a previous box.

ENGMX - Detail Engineering MX line.
Enter values to calculate cost for corresponding variables on the ENGCOST line or zeros to calibrate MX values from the corresponding costs on the ENGCOST line. If the ENGMX line is entered the ENGCOST line should also be entered.

EDESMX - Engineering Design and Drafting MX value.
EDESMX is an calibration/adjustment factor to EMX. Enter a value to calculate a cost for EDESGN or a 0 to calibrate a value from EDSEGN. If both EDESGN and EDESMX are input as 0, EDESMX will default to an appropriate value to calculate a cost for EDESGN. ENGMX must be entered if any MX values are entered on this line.

ESYSMX - Engineering System Engineering MX value.
ESYSMX is a calibration/adjustment factor to the ESYSMX variable. Enter a value to calculate a cost for ESYSTM or a 0 to calibrate a value from ESYSTM. If both ESYSTM and ESYSMX are input as 0, ESYSMX will default to an appropriate value to calculate a cost for ESYSTM. ESYSMX may be calibrated or entered independently of any other variable on this line.

EPRJMX - Engineering Project Management MX value.
EPRJMX is a calibration/adjustment factor to the EPRJCT variable. Enter a value to calculate a cost for EPRJCT or a 0 to calibrate a value from EPRJCT. If both EPRJCT and EPRJMX are input as 0, EPRJMX will default to an appropriate value to calculate a cost for EPRJCT. EPRJMX may be calibrated or entered independently of any other variable on this line.

EDOCMX - Engineering Data and Documentation MX value.
EDOCMX is a calibration/adjustment factor to the EDOCUM variable. Enter a value to calculate a cost for EDOCUM or a 0 to calibrate a value from EDOCUM. If both EDOCUM and EDOCMX are input as 0, EDOCMX will default to an appropriate value to calculate a cost for EDOCUM. EDOCMX may be calibrated or entered independently of any other variable on this line.

PROTMX - Engineering Prototype fabrication MX value. PROTMX is a calibration/adjustment factor to the EPROTO variable. Enter a value to calculate a cost for EPROTO or a 0 to calibrate a value from EPROTO. If both EPROTO and PROTMX are input as 0, PROTMX will default to an appropriate value to calculate a cost for EPROTO. PROTMX may be calibrated or entered independently of any other variable on this line. Note: If EQTY is 0, PROTMX will be set to 0.

ETLGMX - Engineering Tooling and Test Equipment MX value. ETLGMX is a calibration/adjustment factor to the ETOOLG variable. Enter a value to calculate a cost for ETOOLG or a 0 to calibrate a value from ETOOLG. If both ETOOLG and ETLGMX are input as 0, ETLGMX will default to an appropriate value to calculate a cost for ETOOLG. ETLGMX may be calibrated or entered independently of any other variable on this line.

All variables may be entered as R to repeat values from a previous box.

PRODCOST- Detail Production Cost Line.
Enter costs to calibrate the corresponding MX values on the PRODMX line or enter zero to calculate a cost from the corresponding MX value on the PRODMX line. If the PRODCOST line is entered the PRODMX line should also be entered.

PRODUC - Production (manufacturing) cost.
Enter a cost to calibrate a value for PRODMX or a 0 to calculate a cost from PRODMX.

PESUPT - Production Engineering Support cost.
Enter a cost to calibrate a value for PESPMX or a 0 to calculate a cost from PESPMX. An N is entered to denote no Engineering Support cost. PESUPT may be entered or calculated independently of other variables on this line.

PPRJCT - Production Project Management cost.
Enter a cost to calibrate a value for PPRJMX or a 0 to calculate a cost from PPRJMX. An N is entered to denote no Project Management cost. PPRJCT may be entered or calculated independently of other variables on this line.

PDOCUM - Production Data and Documentation costs.
Enter a cost to calibrate a value for PDOCMX or a 0 to calculate a cost from PDOCMX. An N is entered to denote no Data and Documentation cost. PDOCUM may be entered or calculated independently of other variables on this line.

PTOOLG - Production Tooling and Test equipment cost. Enter a cost to calibrate a value for PTLGMX or a 0 to calculate a cost from PTLGMX. An N is entered to denote no Tooling and Test equipment cost. PTOOLG may be entered or calculated independently of other variables on this line.

All variables may be entered as R to repeat values from a previous box.

PRODMX - Detail Production MX line. Enter values to calculate cost for corresponding variables on the PRODCOST line or zeros to calibrate MX values from the corresponding costs on the PRODCOST line. If the PRODMX line is entered the PRODCOST line should also be entered.

PRODMX - Production (manufacturing) MX value. PRODMX is an calibration/adjustment factor to PMX. Enter a value to calculate a cost for PRODUC or a 0 to calibrate a value from PRODUC. If both PRODUC and PRODMX are input as 0, PRODMX will default to an appropriate value to calculate a cost for PRODUC. PRODMX must be entered if any MX values are entered on this line.

PESPMX - Production Engineering Support MX value. PESPMX is a calibration/adjustment factor to the PESUPT variable. Enter a value to calculate a cost for PESUPT or a 0 to calibrate a value from PESUPT. If both PESUPT and PESPMX are input as 0, PESPMX will default to an appropriate value to calculate a cost for PESUPT. PESPMX may be calibrated or entered independently of any other variable on this line.

PPRJMX - Production Project Management MX value. PPRJMX is a calibration/adjustment factor to the PPRJCT variable. Enter a value to calculate a cost for PPRJCT or a 0 to calibrate a value from PPRJCT. If both PPRJCT and PPRJMX are input as 0, PPRJMX will default to an appropriate value to calculate a cost for PPRJCT. PPRJMX may be calibrated or entered independently of any other variable on this line.

PDOCMX - Production Data and Documentation MX value. PDOCMX is a calibration/adjustment factor to the PDOCUM variable. Enter a value to calculate a cost for PDOCUM or a 0 to calibrate a value from PDOCUM. If both PDOCUM and PDOCMX are input as 0, PDOCMX will default to an appropriate value to calculate a cost for PDOCUM. PDOCMX may be calibrated or entered independently of any other variable on this line.

FAST·E

PROJECT TOTAL OR DETAIL INPUT

(Sheet 2 of 2)

NOTE: for record purpose only do not enter in file.

FILENAME: [illegible]

PAGE 1 of 7 DATE [illegible]

PREPARED BY CVM

ENGCOST	EDESIGN	ESYSTM	EPROC	EDOCUM	EPROTO	ETOOLG
ENGMX	EDESMX	ESYSMX	EPROMX	EDOCMX	PROTMX	ETLGMX
PRODCOST	PRODUC	PESUPP	PPROC	PDOCUM	PTOOLG	
PRODMX	PRODMX	PESPMX	PPRMX	PDOCMX	PTLGMX	
LCLRU	1 LRSYS	207.28 LRCOST	5.26 LRMTTR	14.26 LRACST	0.31 LRAMT	
LCMOD	4 MOSYS	41.63 MOCOST	5.12 MOMTTR	14.57 MORCST	0.69 MORAMT	
LCFACIL	0 SUPCST	3 LRFACL	5 MOFACL	.7 SUPMX		
LCDATA	5 NRCHIP	0.1 CTF	0 MTBF	.5 MTBFMX		
LCCOST	0 LCCOST	F LCBASIN	.25 LCMX	TAU 1997 LCSTAT	DEC 2003 LCFIN	

Comments
(Up to 5)

C1 THIS IS A DEMONSTRATION BOX TO ILLUSTRATE A SIMULATED REFERENCE

C2 ITEM COST STUDY PREDICTED ON USING ALL ITEM'S REFERENCE

C3 CHARACTERISTICS AND NO GIVEN INPUT WEIGHT. REPLICATION COSTS

C4 INCLUDING ENGINEERING, REPLICATION AND INSTALLATION, AS

C5 WELL AS LIFE CYCLE COSTS ARE CALCULATED.

NOTE:

The above inputs are optional. They are to be entered between the FILE and END lines of the PROJECT TOTAL OR DETAIL INPUT (Sheet 1 of 2).

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PTLGMX - Production Tooling and Test Equipment MX value. PTLGMX is a calibration/adjustment factor to the PTOOLG variable. Enter a value to calculate a cost for PTOOLG or a 0 to calibrate a value from PTOOLG. If both PTOOLG and PTLGMX are input as 0, PTLGMX will default to an appropriate value to calculate a cost for PTOOLG. PTLGMX may be calibrated or entered independently of any other variable on this line.

All variables may be entered as R to repeat values from a previous box.

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'.4 EQUIPMENT LIFE CYCLE INPUT SHEET

.ife Cycle costs for Equipments are determined by entering the required Life .ycle input lines in the same input file 'box' for processing equipment acquisition. As with the Detail box input lines, the Life Cycle input lines may be entered anywhere between the FILE and END lines. All other input rules must be followed for a Detail box. Either Engineering or Production must be processed in order to process Life Cycle costs. Equipment Life Cycle costs cannot be processed for Micro-Circuit boxes.

There are a total of five possible Life Cycle input lines. Only two, the LCDATA and LCCOST lines are mandatory to process equipment Life Cycle costs. The other three, the LCLRU, LCMOD and LCFACIL lines are optional. The LCLRU and LCMOD lines, which describe the Line or Least Replaceable Unit, (LRU) and Modules, (MOD) will always be output with values computed for those variables that had not been given input values. The LCFACIL line is used only when Support Equipment costs are desired. Support costs, when computed or calibrated, are added into the total Life Cycle costs shown on the LCCOST line.

Support costs, total Life Cycle costs and the Mean Time Between Failure (MTBF) value may be calculated or calibrated via the SUPMX, LCMX and MTBFMX factors respectively. If the costs, MTBF and the three MX values are not input, the MX values will default to 1, causing costs and the MTBF value to be calculated accordingly.

'CLRU - The LCLRU line is an optional input line. All values which are not input will be calculated by the model. Therefore, if no values are known, the line is not input. The LCLRU line will always be rendered. The line describes the number of LRU's per system, the cost of the replacement LRU (LRCOST), the LRU Mean Time To Repair (LRMTTR), the costs to repair a defective LRU (LRRCST) and the percentage of time repairs are made to the LRU (LRRAMT) relative to the total repair calls, including false no-go events.

LRSYS - LRSYS is the unique number of LRU's per system because only unique LRU's are spared. LRSYS may be entered an N to denote there are no LRU's in this equipment, defining the system as made up of modules only. A value of 0 indicates that the value is to be calculated by the model. If a value is entered, it must be a whole number such as 10 - and not 10.2.

If LRSYS is entered as N, no other line values are required. When LRSYS is N, LRFACL, the number of LRU repair facilities on the LCFACIL line, must be entered as 0 and MDRAMT, the percentage of time that modules are repaired on the LCMOD line, must also be 1.0.

LRSYS and MDSYS cannot both be entered as N. When LRSYS is greater than 0, or calculated, and

the LCFACIL line is input, LCFACL, the number of LRU repair facilities may be entered.

LRCOST - is the average replacement cost of a LRU. If it is known, it can be given as an input; if not a value of 0 will cause its calculation. LRCOST includes average costs for packaging, packing, shipping, stocking, handling, documentation, etc. Costs reflect the benefits of quantities and the effects of the specified economics.

If there are no LRU's, as when LRSYS = N, the LRCOST can be omitted along with all other variables in the LCLRU line.

LRMTTR - is the mean time to repair a LRU failure event. If it is known, it can be given as an input. Decimal hours are acceptable. If it is not known, an input of 0 will cause it to be calculated. The LRMTTR time reflects the average time to process a failure attributable to a LRU. It includes problem determination and resolution.

It there are no LRU's, such as when LRSYS = N, the LRMTTR can be omitted as with all other remaining variables in the LCLRU line.

LRRCST - is the average cost to repair an LRU. If it is known, it can be entered as an input. If unknown, an input of 0 will cause its computation. The cost includes parts, materials, testing, etc. or all activities necessary to repair, redeliver and stock the LRU. In addition, costs for false no-go's are pro-rated. Based on the LRU failures, the model determines the relative number of LRU's that will be repaired or replaced.

LRRCST should not be entered if there are no equipment LRU's or when LRSYS = N.

LRRAMT - is the decimal equivalent of the percentage of failures that will be LRU situations - with the remaining being module events. If it is known, it may be entered - however, an input of 0 will cause the model to compute an appropriate value.

If LRSYS = N, meaning there are no LRU's, the LRRAMT can be 0 or omitted.

The LRRAMT and the MDRAMT, the comparable value for Module, must total 1. If there are no modules, or when MDSYS = N, the LRRAMT must be 1.

All variables may be entered as R to repeat values from a previous box.

LCMOD - The LCMOD line is an optional input line. All values which are not input will be calculated by the model. Therefore, if no values are known, the line is not input. The LCMOD line will always be printed out. The line describes the number of unique modules per system, the cost of a replacement module, the Mean Time To Repair a module, the costs to repair a defective module and the percentage of time repairs are made to a module as opposed to an LRU.

MDSYS - MDSYS defines the number of unique modules per system equipment - not the number per LRU, or necessarily the total number per system because only unique modules are spared. MDSYS may be entered an N to denote there are no modules in this equipment. This defines the system as only made up of LRU's. a value of 0 indicates that a value is to be calculated by the model. If a value is entered, it is entered as a whole number.

If MDSYS is entered as N, no other values are required on the line. In addition, MDFACL, the number of module repair facilities on the LCFACIL line, must be entered as 0 and LRRAMT, the percentage of time that LRU's are repaired on the LCLRU line, must also be 1.

MDSYS and LRSYS cannot both be entered as N. When MDSYS is greater than 0, or calculated, and the LCFACIL line is input, MDFACL, the number of module repair facilities may be entered.

MDCOST - is the average module replacement cost. If the MDCOST is known, it can be given as an input; if not, a value of 0 will cause its calculation. MDCOST includes average costs for packaging, packing, shipping, stocking, handling, documentation, etc. Costs reflect the benefits of quantities and the effects of the specified economics.

If there are no modules, as when MDSYS = N, the MDCOST can be omitted along with all other variables in the LCMOD line.

MDMTTR - is the mean time to repair a module failure event. If it is known, it can be given as an input. Decimal hours are acceptable. If it is not known an input of 0 will cause it to be calculated. The MDMTTR time reflects the average time to process a failure attributable to a module. It includes problem determination and resolution.

If there are no modules, such as when MDSYS = N, the MDMTTR can be omitted as with all other remaining variables in the LCMOD line.

MDRCST - is the average cost to repair a module. If it is known, it can be entered as an input. If unknown, an input of 0 will cause its computation. The cost includes parts, materials, testing, or all activities necessary to repair, redeliver and stock the module. Cost for false no-go's are pro-rated. Based on the module failures, the model determines the relative number of modules that will be repaired or replaced.

MDRCST should not be entered if there are no equipment modules - or when MDSYS = N.

MDRAMT - is the decimal equivalent of the percentage of failures that will be module situations - with the remaining being LRU events. If it is known, it may be entered as an input - an input of 0 will cause the model to compute an appropriate value.

If MDSYS = N, meaning there are no modules, the MDRAMT can be 0 or omitted.

The MDRAMT and the LRRAMT, the comparable value for LRU, must total 1. If there are no LRU's, or LRSYS = N, the MDRAMT must be 1.

All variables may be entered as R to repeat values from a previous box.

LCFACIL - The LCFACIL line is an optional line. It is entered when support equipment costs are desired. The LRFACL and MDFACL variables are required inputs for either LRU's or MODULES. The total support cost, SUPCST, may be calculated or used to calibrate the SUPMX variable.

SUPCST - is the total support equipment cost. That includes all special equipments necessary to repair and test LRU's and modules. Included are costs for their maintenance and support. SUPCST does not include their engineering charges.

SUPCST can be entered as an input to cause the calculation of the SUPMX reference factor. If SUPMX is used, as an input, SUPCST must be entered as 0.

LRFACL - LRFACL is the number of sets of LRU repair equipment. For example, if there are three (3) facilities having a total of 5 sets of LRU repair equipments, the LRFACL = 5. A value must be entered when the LCFACIL line is input and there are LRU's in the system. A value of 0 maybe entered when the LCFACIL line is input and there is no LRU support equipment to be costed.

MDFACL - MDFACL is the number of sets of module repair equipment. For example, if there are three (3) facilities having a total of 5 sets of module repair equipments, the MDFACL = 5. A value may be entered when the LCFACIL line is input and there are modules in the system. A value of 0 is entered when the LCFACIL line is input and there are no modules in the system.

SUPMX - SUPMX is the support cost calibration factor. It is entered as 0 to calibrate a value from an input value of SUPCST. SUPMX and SUPCST cannot both be entered with values more than 0.

SUPMX can be arithmetically adjusted as with all other MX factors - see Reference Manual.

All variables may be entered as R to repeat values from a previous box.

LCDATA - The LCDATA is a mandatory input line to process equipment Life Cycle Costs. It describes the number of equipments to be deployed, the On Time Fraction and the Mean Time Between Failures. The Mean Time Between Failures value may be calculated or used to calibrate its reference factor.

NEQUIP - NEQUIP is the number of equipments to be deployed and supported. It is a mandatory input and must be a whole number.

OTF - OTF is the operational On Time Fraction. It is a mandatory input and is the decimal equivalent of the percentage such as the average hours per day of time or days/month the equipment is expected to be used. Values must be greater than 0 and less than or equal to 1.

MTBF - MTBF is the field Mean Time Between Failures in hours. It may be given as an input or used to calibrate the value of MTBFMX. If entered as 0, it will be calculated based on the MTBFMX. If MTBF is entered, MTBFMX must be 0. If both MTBF and MTBFMX are entered as 0, MTBFMX is defaulted to 1 and MTBF is calculated accordingly. MTBF and MTBFMX cannot both be entered with values greater than 0.

MTBFMX - MTBFMX is the MTBF calibration factor. It is entered as 0 when MTBF is given to cause its calculation. A non-zero value of MTBFMX is entered to cause the calculation of MTBF. If both are entered as 0, MTBFMX is defaulted to 1 and a value is calculated for MTBF accordingly. MTBFMX and MTBF cannot both be entered with values more than 0.

All variables may be entered as R to repeat values from a previous box.

LCCOST - The LCCOST line is a mandatory input line to process equipment Life Cycle costs. It describes the total Life Cycle cost, the economics of that cost and the support time period.

LCCOST - LCCOST is the total Life Cycle cost which includes the support equipment cost. When support equipment cost is processed, LCCOST includes the maintenance of the support equipment. It may be entered, in CMULT units, to calibrate a value for LCMX. It is entered as 0 to be calculated from the reference factor LCMX.

LCECON - LCECON defines the economics of the values of the total Life Cycle costs. It is a mandatory input when either LCCOST or SUPCST are input. When LCCOST or SUPCST are entered as inputs the LCECON defines their economics. If LCECON is entered as 0, it will be defaulted to the GECON value.

Enter a year, i.e., 1985, to denote a Constant Year economics. This may be a different year from the start date. Enter F for Final or As Spent monetary units. In this case, costs will be escalated throughout the given schedule. Enter P for Present value economics which would be the start month and year as shown by LCSTRT.

LCMX - is the life cycle cost reference factor. It is used to adjust the calculated life cycle costs predicated on the reference used. It is entered a 0 to cause its calculation based on an input value of LCCOST. When LCMX is intered, LCCOST must be 0. LCMX and LCCOST cannot both be entered with values greater than 0.

LCSTRT - LCSTRT defines the start date of the support period. It is a mandatory input value. LCSTRT is entered in MMM.YYYY format. MMM are the first three letters of the month and YYYY is the year. The period (.) is mandatory. LCSTRT may be entered as JAN.1985 or JAN.85.

LCFIN - LCFIN defines the end date of the support period. It is a mandatory input value. LCFIN is entered in MMM.YYYY format. MMM are the first three letters of the month and YYYY is the year. The period (.) is mandatory. LCFIN may be entered as JAN.1985 or JAN.85.

All variables may be entered as R to repeat values from a previous box.

9 2 1 2 4 9 8 1 0 3 8

FAST-E

MICRO-CIRCUITRY INPUT

NOTE: for record purpose only do not enter in file.
FILENAME: 3LL.IN.ONE
PAGE 1 of 7 DATE 1/22/84
PREPARED BY CVM

PROJECT: SAMPLE

LOCATION: CHERRY HILL, N.J.

PRJGLOB: 1 (ECAL) | F (GECON) | 12 (FPER) | 0.9 (LCURVE) | 1000 (CMULT)

ITEM: MICRO-CIRCUIT BOX

Must be in this sequence.

FILE: M (TYPE)

GLOB: 1.2 (PLTFM) | ANALOG (MCLASS) | DIP CRM (MPRC) | (EYIELD) | (FYIELD) | (YEAR)

FORMAT: 0 (ALL) | 1 (COST) | G (UNCERT) | 1 (INPUT)

MCSIZE: 250 (WIDTH) | 250 (LENGTH) | 3150 (GATES) | 64 (LEADS) | 10 (CMPNTS)

MXLINE: 2.5 (MAX) | (MCTYPE)

PCOST: 0 (PCOST) | 1500 (PQTY) | F (PECON) | 1 (PQAK)

PSCHO: JAN/1983 (PSTART) | 0 (PFIN) | 1.5 (PSCHOX)

ECOST: 0 (ECOST) | 20 (EQTY) | F (EECON) | 2.0 (EAK) | 0.6 (ENEW)

ESCHO: DEC.1982 (ESTART) | OCT.1983 (EFIN.) | 0 (ESCHOX) | 0.7 (ELEVEL)

PARAM:

Comments (Up to 5)

C1 THIS ILLUSTRATES THE COMPUTATION OF THE
C2 ENGINEERING AND PRODUCTION COSTS OF AN
C3 ANALOG PROCESSOR.
C4
C5

END: 0 (CONTIN) | 1 (ACC)

92124981 0039

3.5 MICRO-CIRCUIT INPUT SHEET

A Micro-Circuit item is processed to cost or calibrate all varieties of Micro-Circuit devices. Life Cycle costs are not processed for Micro-Circuit items.

The PROJECT, LOCATION and PRJGLOB lines are entered once per Project, in this sequence, and must be the first three lines in a file. They are only entered for a Micro-Circuit item if the Micro-Circuit item is the first box in the input file. The PROJECT and LOCATION are 32 characters each as defined for Detail items.

The definitions for the PRJGLOB line are the same as in a Detail item except that FPER and LCURVE are entered as 0. If a file contains more than Micro-Circuit boxes, the FPER and LCURVE values are entered as necessary; however, they will be ignored and printed out as 0 for Micro-Circuit items.

The ITEM line is mandatory and entered with 24 characters as defined for Detail items.

FILE - Defines this box as a Micro-Circuit item. It must follow the ITEM line.

TYPE - TYPE is entered as M to define this item as a Micro-Circuit item.

FORMAT - The FORMAT line defines the user desired output format. The FORMAT line may appear anywhere between the FILE and END lines. The FORMAT line is an optional line for each item in the file. If it is not input, the default output format will be the full Cost, Uncertainty, and Input data output formats. The variables on the FORMAT line are defined as follows unless otherwise indicated, inputs are either 0 (meaning no) or 1 (meaning yes):

ALL - Print all output formats. This includes the full Cost, non-graph Uncertainty or Risk, and Input data output.

COST - Print the Basic and Schedule Penalty costs for Engineering and/or Production.

Enter a 0 for no Cost output.

Enter a 1 for Cost output for Engineering and/or Production.
Enter a 2 for Total (Bottom Line) costs output only.

UNCERT - Print a 70%-80%-90% uncertainty (risk) distribution output. The definitions are the same as defined for a Detail box.

Enter 0 for no Risk Distribution output.

Enter a 1 for the detail Risk Distribution by Engineering and/or Production.

Enter a 2 for Total (Bottom Line) output only.

Enter a G to print the risk distribution for Engineering and/or Production in a graphic format.

INPUT - Print the input data showing all input and calculated values.

Enter a 0 for no Input data output.

Enter a 1 to print the Input data.

All variables may be entered as R to repeat values from a previous box.

GLOB - The Item Global line, GLOB, may appear anywhere between the FILE and END lines. The GLOB line is a mandatory input line for each Item in a file. The variables on the GLOB line are defined as follows:

PLTFM - PLTFM (Platform) represents the cost of additional design and fabrication efforts necessitated by special application, quality and environmental requirements. The calculation of a PLTFM value is the same as defined in the Detail input sheet. PLTFM is a mandatory input.

MCLASS - MCLASS is the type of Micro-Circuit item to be costed or calibrated. If MCLASS is entered as 0, MCTYPE must be entered. The following are the inputs and definitions of the input values: (Note: MCTYPE is the composite factor representing MCLASS and MPKG. MCTYPE is equivalent to the ENTYPE of hardware items.)

UNARRAY : Universal Array
DIGIT4M : Digital 4 micron
DIGIT3M : Digital 3 micron
DIGIT1M : Digital 1.1 micron
LINEAR
ANALOG
MEMORY
LOPOWER : Low Frequency
HIPOWER : High Frequency
CUSARRAY : Customized array

MPKG - MPKG is the type of packaging used for the Micro-Circuit. MPKG may be input as 0 if it is not known. The following are the inputs and definitions of the input values:

TOCAN : TO-type cans
DIP.PLS : Dual In-Line package - plastic
DIP.CRM : Dual In-Line package - ceramic
FLT.PLS : Flat Pack - plastic
FLT.CRM : Flat Pack - ceramic
CHP.PLS : Chip Carrier - plastic
CHP.CRM : Chip Carrier - ceramic
CER.DIP : Slampack

EYIELD - EYIELD is the engineering fabrication yield of the prototypes. It is entered as decimal equivalents such as 0.1 to 1.0. If not known, 0 may be entered which will cause its computation.

PYIELD - PYIELD is the production fabrication yield. It is be entered as decimal equivalents such as from 0.1 to 1.00. If not known, 0 may be entered which will cause its computation.

TYEAR - TYEAR is the year of Technology to be used. It is typically the year the item is designed or produced. The default value, if entered as 0, is the earliest start year between Engineering and Production. TYEAR may be entered as a year before the start of Engineering or Production to represent use of an older technology.

All variables may be entered as R to repeat values from a previous box.

MCSIZE - The MCSIZE input line defines the size and characteristics of the Micro-Circuit. It is a mandatory input line. The variables on the MCSIZE line are defined as follows:

WIDTH - WIDTH is the width of the Micro-Circuit in mils (one thousandth of an inch). WIDTH is a mandatory input.

LENGTH - LENGTH is the length of the Micro-Circuit in mils. LENGTH is a mandatory input.

GATES - GATES is the number of gates or their equivalent circuitries on the Micro-Circuit. GATES would include the number of equivalent transistors if the the transistors are printed, etched, doped on the micro-circuit device. GATES is a mandatory input.

LEADS - LEADS is the number of leads on the Micro-Circuit. LEADS is a mandatory input.

CMPNTS - CMPNTS is the number of discrete components, such as unit transistors, capacitors, chokes, coils, etc. on the Micro-Circuit. CMPNTS is an optional input and may be input as 0.

All variables may be entered as R to repeat values from a previous box.

MXLINE - MXLINE is an optional input line. It will always be printed out showing the calculated values for variables with no input. It is not input in calibration studies when MCLASS is input. It is input in cost studies. The variables on the MXLINE are defined as follows:

PMX - PMX is the production reference factor. Enter 0 in a calibration study. PMX and MCTYPE can both be entered. (See MCTYPE)

PMX factors are adjustable to reflect many scope-of-work variations. See the FAST-E Reference Manual for procedural methods.

MCTYPE - MCTYPE is the composite Micro-Circuit complexity factor. It represents the integrated value of MCLASS and MPKG. MCTYPE is equivalent to the ENTYPE for hardware items.

Calibration studies are used to produce values for MCTYPE and PMX.

In calibration studies, MCTYPE and PMX must be 0 and MCLASS must be entered. MPKG is optional.

In cost studies, MCLASS and MPKG may be entered to calculate MCTYPE.

MCTYPE and PMX may be entered, or MCLASS and MPKG may be entered in cost studies.

In cost studies when MCTYPE is 0, MCLASS and PMX must be given. MPKG is optional.

All variables may be entered as R to repeat values from a previous box.

PCOST - PCOST is an optional line. It is only entered if a production effort is to be calibrated or costed. It must be entered if the PSCHD line is entered.

PCOST - Total Production Cost. Enter the total production cost for calibration or 0 to be calculated in a cost study. PCOST must be in terms of the units defined by CMULT. If PCOST is entered, PMX must be entered as 0.

PQTY - Production quantity produced. PYIELD internally generates the number started. PQTY is a mandatory input. Enter a whole number.

PECON - Production Economics of PCOST. Enter a value for Production calibration. PECON defines the economics of the PCOST amount as Present Value, Final Value or Constant Year dollars. In cost studies, if PECON is different from GECON, it will be reset to GECON.

Enter P for Present Value or constant dollars as of the month and year in PSTART.

Enter F for Final Value (as spent) dollars.

Enter a year, i.e., 1985, for Constant Year dollars.

FOAK - First Of A Kind multiplier. Enter a value greater than 0. FOAK is a direct multiplier to production costs to allow for uncertainty or contingencies when producing an item for the first time. The default value is 1 which indicates no effect.

All variables may be entered as R to repeat values from a previous box.

PSCHD - Production Schedule line. PSCHD is an optional line. It is only entered if a production effort is to be calibrated or costed. It must be entered if the PCOST line is entered.

PSTART - Production Start date. PSTART is entered in MMM.YYYY format. MMM are the first three letters of the month and YYYY is the year. The period (.) is mandatory. PSTART may be entered as JAN.1985 or JAN.85. PSTART is a mandatory input.

PFIN - Production Finish date. PFIN is entered in MMM.YYYY format or as 0. MMM are the first three letters of the month and YYYY is the year. The period (.) is mandatory. PFIN may be entered as JUNE.1988 or JUN.88. Either PFIN or PSCHDX must be entered. If PFIN is entered and PSCHDX is entered as 0, a PSCHDX reference value appropriate to the schedule length will be calculated. If a value for PSCHDX is entered and PFIN is 0, a most likely Production Finish date will be computed based on the PSCHDX value. If both are input, the model will internally calculate the most likely schedule and assess penalties against the input schedue if there is an apparent schedule acceleration or stretch-out. This is true in both calibration runs and cost studies. In calibration studies such penalty costs, if any, are removed prior to processing the reference values.

PSCHDX - Production Schedule reference factor. Enter reference value or 0. Either PFIN or PSCHDX must be entered. See PFIN for explanation of inputting PFIN and PSCHDX. The nominal value for PSCHDX is 100.

All variables may be entered as R to repeat values from a previous box.

ECOST - Total Engineering Cost. ECOST Is an optional line. It is only entered if an Engineering effort is to be calibrated or costed. It must be entered if the ESCHD line is entered.

ECOST - Total Engineering Cost. Enter the total engineering cost for calibration or 0 to be calculated in a cost study. ECOST must be in terms of the units defined by CMULT. If ECOST Is entered, EMX must be entered as 0.

EQTY - Engineering Prototype quantity produced. EYIELD internally generates the number started. Enter a value of 0 or greater. EQTY may be entered as a decimal equivalent of a prototype.

EECON - Engineering Economics of ECOST. Enter a value for engineering calibration. EECON defines the economics of the ECOST amount as Present Value or Constant Year dollars. In cost studies, if EECON is different from GECON, it will be reset to GECON.

Enter P for Present Value or the dollar amount as of the month and year in ESTART.

Enter F for Final Value (as spent) dollars.

Enter a year, i.e., 1985, for Constant Year dollars.

EMX - Engineering reference factor. EMX must be entered as 0 in calibration runs to calculate the reference value. In a cost study, a reference value of EMX must be entered.

The value of EMX nominally covers the design, drafting, systems engineering and prototype efforts, if any.

EMX operates with PLTFM and MCLASS to develop an internal engineering complexity factor. If MCTYPE is used, EMX replaces the PMX component for the same purpose.

EMX values my be modified to reflect many scope-of-work variations such as computer-aided design, design repeats, etc.

ENEW - Percentage of New Design. Enter a value of 0 or greater in decimal equivalent. 100% new design is entered as 1.0.

All variables may be entered as R to repeat values from a previous box.

ESCHD - Engineering Schedule line. ESCHD is an optional line. It is only entered if an Engineering effort is to be calibrated or costed. It must be entered if the ECOST Line is entered.

ESTART - Engineering Start date. ESTART is entered in MMM.YYYY format. MMM are the first three letters of the month and YYYY is the year. The period (.) is mandatory. ESTART may be entered as JAN.1985 or JAN.85. ESTART is a mandatory input.

EFIN - Engineering Finish date. EFIN is entered in MMM.YYYY format or as 0. MMM are the first three letters of the month and YYYY is the year. The period (.) is mandatory. EFIN may be entered as JUNE.1988 or JUN.88. Either EFIN or ESCHDX must be entered. If EFIN is entered and ESCHDX is entered as 0, an ESCHDX reference value appropriate to the schedule length will be calculated. If a value for ESCHDX is entered and EFIN is 0, a most likely Engineering Finish date will be computed based on the ESCHDX value. If both are input, the model will internally calculate the most likely schedule and assess penalties against the input schedule if there is an apparent schedule acceleration or stretch-out. This is true in both calibration runs and cost studies.

ESCHDX - Engineering Schedule reference factor. Enter reference value or 0. Either EFIN or ESCHDX must be entered. See EFIN for explanation of inputting EFIN and ESCHDX. The nominal value for ESCHDX is 100.

ELEVEL - Level of Engineering effort or the measure of the difficulty of the work with respect to engineering to engineering team assigned to the task. Enter a value in decimal equivalent. See the FAST-E Reference Manual for values of ELEVEL. The nominal value of ELEVEL is 1.

All variables may be entered as R to repeat values from a previous box.

C - COMMENT line. Up to five COMMENT Lines of 72 characters each are allowed per box between the FILE and END Lines. Each COMMENT Line must begin with a signature word of C followed by a space. COMMENT lines will be printed out at the end of all output requested on the FORMAT line. The COMMENT line is an optional input line.

9 2 1 2 4 9 8 1 0 4 6

END - Signifies the End of an Item box. The END line is a mandatory line at the end of each Item box. It indicates if another box is to follow and whether or not to accumulate the results of the Item to the System Total.

CONTIN - Indicates whether or not to continue processing of the next box under this Project.

Enter a 0 to indicate that this is the last Item in the current Project.

Enter a 1 to indicate that there is another Item to follow for this Project.

ADD - Indicates whether or not to accumulate the results of this Item into the System Total.

Enter a 0 to indicate that the results of this box are <u>not</u> to be added to the System Total.

Enter a 1 to indicate that the results of this box are to be added to the System Total.

All variables may be entered as R to repeat values from a previous box.

FAST—E

SOFTWARE DETAIL INPUT

NOTE: for reports or notes only do not enter in file.
FILENAME: ALL.TV.DAVE
PAGE 1 of 7 DATE 12/1/
PREPARED BY CVM

PROJECT SAMPLE

LOCATION CHERRY HILL, N.J.

PRJGLOB	1 GEAL	F GECON	0 PER	0 LCURVE	1000 CMULT	
ITEM	SOFTWARE BOX #1					
FILE	5 TYPE	0 SYSTEM	0 RERUN	0 REMBOX		
SOFTGLOB	1.8 PLTFM	0 SOFTYP	1984 TYEAR	0.7 WNGES	0.6 WNGESS	0.9 SLEVEL
FORMAT	0 ALL	1 COST	G UNCERT	1 INPUT		
SOFTTECH	0.3 DATA	0.4 SIGNAL	0 INTERP	0 COMMUN	0.3 CSTL	SCTL
SOFTCOST	0 OCOST	0 METATE	F DECON	1.7 SOFTMX		
SOFTSIZI	INPVAR	INPMX				
SOFTSIZM	32 WCSIZE	1.0 OPTIME	256 OMEM	0.7 UTIL	32 MEMMX	
SOFTSCHO	JAN.1984 OSTART	0 OPIN	1.5 OSCHOX			
SOFTSYST	1.1 INTPAC	0 PURGFE	8.5 USELVL	0.9 CNGLVL	DEC.1994 SLOPIN	

Comments (Up to 5)

C1 THIS ILLUSTRATES THE CALCULATION OF A SOFTWARE REQUIREMENT
C2 THE MODEL CALCULATES THE NUMBER OF STATEMENTS BASED ON
C3 A CALIBRATION FACTOR OF 32 (MEMORY), DEVELOPMENT COST
C4 ON THE SOFTMX AND LIFE CYCLE COSTS
C5

END 1 CONTIN 1 ADD

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Section 2

FAST-C METHODOLOGY

2.1 WHAT IS FAST-C?

FAST-C is a computerized system of models that was designed to calculate the costs, schedules, and risks of all types of civil engineering or construction programs. FAST-C is capable of processing efforts such as sitework, construction projects, buildings, and utilities as well as their appropriate performance schedules. Applicable engineering and project management charges and schedules can be processed.

2.2 HOW DOES FAST-C DIFFER FROM OTHER MODELS?

Information describing the job requirements can be totally macro, or as detailed as necessary. For example, a building may be defined to be a certain size and similar to a building with a know cost experience. Detailed descriptions can go as far as defining each and every structural component such as the superstructure, windows, floors, roofing, etc. FAST-C is able to process information that may represent any degree of mix between the two extremes of macro and micro. For example, a new building may be the same type as that of a completed reference except for the piping. However, the new piping may only be described in terms of types, sizes and lengths. The other details such as hangers, bends, installations, insulations, tests, etc., may not be known. FAST-C provides a parametric procedure for this sort of input limitation.

For the macro method of describing job requirements, relating a new situation to an acceptable or comparative reference may present a problem: there may be no such known experience. FAST-C provides procedures that allow the user to modify or synthesize experiences or references. Within FAST-C there are various self-check routines that test the reasonableness of synthetic (as well as generated) data to minimize rendering misleading or faulty outputs. In every unacceptable situation FAST-C will render an appropriate error message. An unusual feature of FAST-C allows the user to correct the data on a real-time basis without the need to edit the inputs and restart the program.

2.3 HOW DOES FAST-C WORK?

Sitework may be described in may ways. One can cover all total efforts in terms of the total work to be done for a defined area in acres. Sitework can also be described in unit macro areas such as:

Demolition
Excavation
Trenches
Drains
Clearing
Landscaping
Walks
Curbs
Gutters
Fences
Roads
Parking
Special units (e.g., bridges, culverts)

Each of the above units can be defined in either of two macro ways, or in specific detail. Trenches, for example, can be described in a macro sense by comparing the trench effort with a similar or reference trench work for either a certain amount of acres or in terms of total linear feet. This would be a macro parametric method. However, the trench effort could be defined in detail. The size, depth, etc., of each type of trench may be known. There is a procedure that allows the computation of input appropriate factors. In another case, certain aspects of trench work may be definable whereas it may not be possible to describe other aspects. Again, there is a procedure to cover, in a macro manner, those areas that cannot be detailed but are necessary for the project.

In processing sitework it is not necessary to include all of the described sub-areas in a FAST-C input. The user's input file will have only those elements that are in the scope of the work. As more information becomes known input lines can be added without any concern with respect to their sequence in the file. For example, a trench input can proceed or follow any other sub-area input.

Buildings and constructions can cover all types of projects -- residential homes, commercial and industrial buildings, power and processing plants, nuclear facilities as well as dams, bridges, highways, etc. As in the case of

sitework, each type of effort can be described in macro terms or by parametric references to comparable known experiences. In the event that detailed information is known, FAST-C provides procedures that allow the micro description of the work. There can be any mix between the macro reference and the micro detail. Available procedures permit the description of a building in the following detailed areas:

1. Excavation
2. Structure
   a. External Structure (wall faces, roofing, connecting walls, windows)
   b. Superstructure (including floor decking)
   c. Internal Structure
      - Type of room usage
      - Interior finishes
        - Walls
        - Ceilings
        - Floors
        - Partitions
        - Doors, etc.
3. Heat, ventilation, and air conditioning
4. Electromechanical
   a. Electrical Work
   b. Plumbing
   c. Piping
   d. Mechanical Work
   e. Specialties, such as
      - Escalators
      - Conveyors
      - Elevators
      - Connecting bridges, etc.

This feature provides a simple way of adding work requirements without being concerned with a structured input data sequence. If for any reason a data line is incorrect, has been incorrectly repeated, or is in conflict with other information, a real-time message will be given. The user will then have an opportunity to re-enter the correct inputs without the need to restart the program processing.

Some buildings may consist of various types of structures gathered into one major structure. For example, one structure may consist of an administrative type of building with an adjoining office building. Behind the second there may be a connecting industrial-type unit. Alongside there may also be a warehouse or "Butler" type unit with an adjacent railroad siding. On the other side of the administrative building there may be a research laboratory,

etc. Each structure may have different building compositions and varying connecting wall situations. Each section of the total building can be independently described in either a macro or micro detail (or any mix thereof). It is not necessary to process all buildings in the same way. As mentioned earlier, for macro descriptive purposes, the FAST-C system can assist the user in synthesizing comparative references for macro input purposes.

Utilities can cover a wide range of systems. These may include areas such as railroads, water and power lines, sewers, substations, etc. Utilities may also be described in a macro as well as in a micro manner, or any mix of the two. For example, the length of a railroad track may be known, whereas all other associated items such as railroad equipment, controls, lights, etc., may be describable only in a macro parametric manner. FAST-C provides the necessary capability of handling the situation. As in previous situations, FAST-C provides the capability of synthesizing appropriate comparative references.

2.4 TRADITIONAL COST ESTIMATING PITFALLS

The historic methods of costing (cost/square foot, etc.) have several pitfalls that could cause erroneous answers. A specific cost/unit area for a specific effort, such as floors or structure, must be related to several other conditions. When such costs are established they must be predicated on a certain area or volume of work. For example, the costs per foot for a structure will vary with the size of the structure. There is an economy of scale. As the structure size becomes smaller the costs tend to increase; conversely, a larger structure tends to have a lower cost per unit area for the same type of effort.

Second, the cost/unit area is also influenced by the yearly economy or econometrics. Therefore, unit costs will vary as the economy changes, so every unit cost must be related to a specific year or year rate.

Another shortcoming of the standard procedure is that the cost/unit area may be influenced by various site and productivity indices. To be useful, such costs must eliminate the effect of such indices. Most records of actual costs seldom are related to the indices that were experienced. Their use without appropriate adjustments could easily lead to erroneous results.

Other factors influence actual costs that reflect into cost per unit area. The effects of seismic, tornado, and radiation conditions have significant impact on such costs. Unless such impacts can be normalized so that the new effects can be applied, the use of "experienced values" could be very misleading. Technological status is a factor that is seldom given true credit. The rate of technology can be very important and could influence costs significantly. Conventionally prepared costs/unit areas are virtually never associated with their technological position. For example, the costs for constructing a concrete wall in 1960 as compared with 1980 are quite different. The effect of inflation on the economy do not account for all of the difference; there have been technological advancements. Recognition must be given to the technological status of each cost of a unit type of work.

2.5 AUXILIARY MODELS AND MX/CX FACTORS

A unique operational feature of the FAST-C model system is the MX and CX factor procedure. These factors replace the industry-common cost references such as cost/square foot, cost/linear foot, etc.

The FAST-C methodology provides a convenient way of stripping away all the factors that cause cost variations. MX and CX factors represent values that are "clean" or "neat." An MX factor based on a certain size of effort, when applied to an effort of a different size, will render correct economy of scale computation. In addition, new indices representing site and productivity as well as seismic, tornado and radiation, can be directly applied. Technological status effects can also be properly considered. FAST-C introduces a new concept regarding building usage. Every building is initially designed for a specific purpose. There are varieties of rooms and uses of areas; offices, conference rooms, laboratories, power equipment sections, industrial, warehouse areas, etc. Because of their specific requirements certain building design are needed. However, if the same building structure were outfitted for a different arrangement of usages or rooms or areas, there would be a cost difference. FAST-C provides a mechanism to compute such variations. There are over 30 types of room or areas usage within the FAST-C library. They include offices, administrative sections, laboratories, (such a biological, chemical, nuclear), industrial sections for light and heavy equipments, restaurants, dorms, infirmaries, etc. Each type has its typical building needs

such as electrical outlets, plumbing, heat and ventilation, etc. These have been tabulated. An auxiliary FAST-C model, BLDUSE/RADIAT, allows the user to compute an appropriate building use (BLDUSE) platform factor that reflects a particular building organization. Its structural costs are adjusted accordingly. The same structure with a different BLDUSE factor will have a different appropriate cost. BLDUSE/RADIAT can also compute the applicable RADIATION platform parameter. This factor, in a similar manner as BLDUSE, adjusts the building structure costs to reflect the additional costs attributable to the incorporation of radiation influences.

The RADIATION, SEISMIC and TORNADO factors do not cause the computation of structural redesign. For example, the model will not calculate that a four-inch wall should be increased to six inches because of certain seismic or tornado conditions. The user must develop input factors for the structural, heating, ventilation, etc., redesigns. The FAST-C platform parameters will enable the model to compute the additional costs attributable to the increased construction labor, inspection, tests, quality control, etc., that are associated with the increased requirements. This, of course, can work in the opposite direction as well. One could use a more demanding structure, with seismic and/or tornado conditions, as a reference to compute the costs of a less severe comparable structure.

To enable rapid computation of all such MX or CX factors as well as the various platform parameters, eight auxiliary FAST-C models are available. These can be used to generate synthetic values to represent unique mixtures of reference systems or a modification of such values.

The eight auxiliary models are:

1. SEITORN - A model to compute appropriate seismic and tornado platform parameters.

2. BLDRAD - A model to compute appropriate building use and radiation platform parameters.

3. CALCMX - A model that is used to compute appropriate MX or CX factors that represent particular mixtures of work efforts or costs. CALCMX can be used to compute utilities and sitework factors.

4. COSTMX - A model that is used to compute appropriate MX or CX values for a particular unit of work or costs.

5. INTMX - A model that is used to compute the factor representing a particular mix of a building's interior arrangement, such as walls, floors, doors, ceilings, partitions, etc.

6. EXTMX - A model that is used to compute the factor representing a particular mixture of a building exterior such as its walls, roofing, connecting walls, etc.

7. EMMX - A model that is used to compute the factor representing a particular mixture of electromechanical features of a building - such as its piping, plumbing, electrical work - as well as its specialties such as elevators, escalators, conveyors, etc.

8. STRMX - A model that is used to compute the factor representing a particular mixture of structural features of a building. This includes its internal mix, external mix, and its superstructure.

2.6 EXPLANATION, GENERATION AND USE OF CX AND MX FACTORS

CX and MX factors are the FAST-C reference variables. References are used to convey cost experiences or values to new situations. They are referred to as CX and MX factors because the variables are suffixed by the letters CX or MX - such as FENCX or INTMX.

In a broad sense, the reference factors are similar to the conventional estimating standards that are associated with the terms COST/SFT or COST/CYD, etc. For example, a FAST-C factor - BLDMX - with a value of 4.81 is roughly equivalent to the 1982 cost of a 100,000 SFT building having a cost of $65/SFT.

There are many reasons for the different approach. The CX and MX variables were designed so they could be effectively used in a universal parametric system. Hence, they must be capable of simple modification to reflect changes to the scope of work as well as to an assortment of cost-affecting economic, technology and environmental conditions. This also means that the factor must be "neat" or "clean" - i.e., stripped of the cost effects of such varying conditions. Because conventional references are in most cases loaded with conditional cost impacts, they have significant parametric limitations.

Aside from the basic scope of work, the most significant conditions affecting the character of reference cost experiences are described as follows:

1. Economics - The years in which the work was performed can play a major role in costs. There is a continuous annual inflation picture that must be considered. In recent years the annual rates have become crucially significant. Therefore, cost must be associated with economic time cycle.

2. Economy of Scale - Costs will vary depending upon the size of a project. As a project becomes larger the cost/SFT of the same type of work will tend to become less. For example, the flooring in a 10,000 SFT building will tend to have a greater cost/SFT than the same flooring in a 100,000 SFT building. Cost references must be associated with their scaling basis.

3. Site and Productivity Indices - Where the project was or is to be performed can materially affect costs. Every site location has a unique index of labor and material costs. Some may be remote that will cause greater transportation costs for both material as well as labor. Certain areas are subject to local or union type of economic controls. Site areas can also have varying productivities. Some projects may involve highly radiated areas where workers may be limited to one or two hours of work per day - and yet will be paid for a full day. Other site areas will have productivity variations due to local union contract arrangements. Therefore, reference costs can be greatly influenced by site and productivity factors or indices.

4. Environmental Conditions - These conditions include seismic, tornado and radiation. To meet the construction requirements generated by such conditions involves greater cost expenditures. Beyond increased specific construction details there are other areas of cost increases: Tests, inspections, quality control of the construction effort will become more demanding as the environmental conditions become more severe. Cost impacts for such factors can be very significant. Therefore, cost references must be identified with the character of the prevailing environmental conditions. Without such identification the use of the associated references could be very misleading.

5. Operation Use of a Building - A building cost may vary because of the intended purposes of its rooms or internal areas. There are many types of building areas; for example, offices, conference rooms, lobbies, industrial sections, warehouse units, etc. The BLDRAD program, an auxiliary model, contains features and their integrated effects that can significantly cause cost to vary. Therefore, a reference building cost must be identified with the character of internal area allocations.

6. Year of Technology - In the natural course of events there is a continuing process of improvements to the state of construction technology. There are new and innovative tools and equipments, as well as construction materials and techniques. In the construction industry such improvements are relatively slight over a short span of years. However, a span of ten or more years has begun to have a significant impact on costs. Therefore, the year of technology can

be an important factor when employing historical cost experiences. Conversely, in projecting future programs, technological advancements should be taken into account.

7. Factor Data - Building costs vary because of differences in their average ceiling heights, the number of floors or levels and the design features that are necessary to cope with the various degrees of potential tornado pressures.

   Such costs can vary significantly. Their impact will differ between the various building structural components such as the exterior walls, windows, HVAC, electromechanical systems, etc.

   Parametrically, it is necessary to normalize these effects so that the applicable MX values could be capable of being modulated to reflect variations of such descriptors. The reference MX values represent those which have been normalized to reflect a FAST-C standard design base.

   The average height (AVHT) is the average ceiling height. It can alternatively determined by relating the total cubic area of building to the total floor space (SF). When the average height increases, there will also be increased costs for such features as walls, HVAC, electromechanical subsystems, etc. However, the effects will not be the same degree for all building subsystems. The greater number of floors or levels will similarly increase certain structural costs. In addition there will be greater costs for electromechanical subsystems as well as other areas. Here again, the impacts may not be of the same degree for various subsystems.

   Potential tornado pressures will clearly affect the design features and costs for such areas as the exterior walls, windows, roofs, etc. It concerns all structural areas which may be subject to wind damage as well as the effects of wind blown debris, trees, etc. Such "missiles" can cause havoc with exposed structural details. The degree of damage is a function of the potential tornado pressure. There are published meteorological maps that indicate such tornado possibilities and their most likely maximum pressures. One is included in this User manual. Obviously, underground areas are not vulnerable. Therefore, if such areas exist, these must be precluded from cost considerations. The amount underground areas is indicated by the value SUBKSF.

CX and MX factors were designed to represent references or cost experiences after being normalized to remove the effects of the conditions just described. This means that CX and MX factors can be used along with new economic performance periods, environmental conditions, project sizes and area allocations without the need to know the equivalent conditions that were associated with the experience reference. It is this capability that enables the parametric universality of the FAST-C program.

Not all CX and MX factors are subject to the above conditions. The economics of the performance periods and the GLOBAL type of data (SINDEX, PINDEX and TYEAR) will affect all reference factors.

PLATFORM type of variables SEISM, TORNAD, RADIAT, BLDUSE, or PLTFM, are appropriate only to building type of reference factors. They do not apply to sitework and utilities. It will be noticed that when using the COSTMX or CALCMX auxiliary models, the PLATFORM data will not be requested when processing sitework or utility reference factors.

Whenever the FAST-C program or one of its auxiliary models generates a CX or MX factor it will be a "neat" or "clean" parameter. This means that it will be a normalized value from which the effects of the above described conditions have been removed.

2.6.1 THE CX FACTORS

Except for ENCX and PRCX all CX types of factors cover various sitework efforts - with respect to a base area of acres.

Sitework CX factors are presented in Table 2-1.

TABLE 2-1. SITEWORK CX FACTORS

CX Factor	Area of Work	Measure Variable
CLRCX	Clearing (shrubs, trees, etc.)	(CLRACR)
CURBCX	Cubs (for walks, roads, etc.)	(CRBACR)
DEMCX	Demolition (building, roads, etc.)	(DEMACR)
DRNCX	Drains	(DRNACR)
EXCCX	Excavations	(EXCACR)
FENCX	Fences	(FENACR)
GUTCX	Gutters	(GUTACR)
LNDCX	Landscaping	(LNDACR)
PRKCX	Parking areas	(PRKACR)
RDCX	Roads	(RDACR)
SPCCX	Special items (bridges, culverts, etc.)	(SPCACR)
TRNCX	Trenches	(TRNACR)
WLKCX	Walks	(WLKACR)

ENCX is a reference factor that covers the engineering effort with respect to the total scope of work which includes sitework, construction and utilities.

PRCX is a reference factor that covers the Project Management effort with respect to the project total scope of work, including engineering.

2.6.2 THE MX FACTORS

MX factors are reference variables that are associated with specific dimensions such as square feet, linear feet or cubic yards. They include sitework construction and utility efforts. The sitework MX factors, with their dimensions, are shown in Table 2-2.

TABLE 2-2. SITEWORK MX FACTORS

MX Factors	Area of Work	Measure	Variable
CLRMX	Clearing	KSF	(CLRKSF)
CURBMX	Curbs	KLF	(CRBKLF)
DEMMX	Demolition	KSF	(DEMKSF)
DRNMX	Drains	KLF	(DRNKLF)
EXCMX	Excavation	CYD	(EXCCYD)
FENMX	Fences	KLF	(FENKLF)
GUTMX	Gutters	KLF	(GUTKLF)
LNDMX	Landscaping	KSF	(LNDKSF)
PRKMX	Parking	KSF	(PRKKSF)
RDMX	Roads	KSF	(RDKSF)

KSF = Thousands of square feet
KLF = Thousands of linear feet
CYD = Cubic yards

All building, construction and utility MX factors have thousands of square feet (KSF) as their dimensions. They are all suffixed with the letters MX except for FLOORS, WALL, CEILING and PART which have all the properties of MX factors.

Certain MX references are composed of subsidiary MX factors - for example BLDMX is the integrated value of STRMX, HVMX and EMMX.

Table 2-3 is a breakdown of the building MX factors and their second order references. Except for STRMX, HVMX and EMMX the secondary references do not have assigned variables for their dimensions. These are all processed by the FAST-C auxiliary models which do not use input files.

STRMX, INTMX, EXTMX and EMMX are also auxiliary programs. These are used to generate the factors for which they were named. Their inputs are then second order factors: for example, EWLLMX, ROOFMX and CWLLMX are used to develop EXTMX.

All CX and MX factors, except for ENCX and PRCX, can be generated by the COSTMX and CALCMX programs. COSTMX can convert a unit effort cost, with dimensions, economic, GLOBAL data and, if appropriate, PLATFORM data to produce the applicable CX or MX factor. COSTMX can be used to convert factors into costs.

CALCMX can be used to integrate two or more cost areas into a specific cost factor. Economic, GLOBAL and PLATFORM data is also used.

The use of all models, including the auxiliary models, requires strict adherence to the following rules!

1. When costs are entered or given as inputs they will be considered to have been affected or impacted by the given economic, GLOBAL and PLATFORM types of data.

2. When costs are generated by the models they will have been affected or impacted by the given economic, GLOBAL and PLATFORM types of data.

In the first case all models will initially calculate the economic, GLOBAL and PLATFORM impacts on costs. The input costs are then adjusted prior to their use in the computational routines.

In the second case all models will initially compute the "neat" or "clean" costs. The costs are then adjusted to reflect the economic, GLOBAL and PLATFORM impacts. It is the final cost computation that is displayed in the output.

TABLE 2-3. BUILDING MX FACTORS

MX Factor	Area of Work	Measure	Variable
BLDMX	Total Building	KSF	(BKSF)
STRMX	Total Structure	KSF	(STRKSF)
SUPSTR	Superstructure	KSF	-
INTMX	Interior Mix	KSF	-
FLOORS	Floors	KSF	-
WALLS	Walls	KSF	-
CEILING	Ceilings	KSF	-
PART	Partitions	KSF	-
EXTMX	Exterior Mix	KSF	-
EWLLMX	Exterior Walls	KSF	-
ROOFMX	Roofing	KSF	-
CWLLMX	Connecting Walls	KSF	-
HVMX	Heat Ventilation and Air Conditioning	KSF	(HVKSF)
EMMX	Electromechanical	KSF	(EMKSF)
ELECMX	Electrical	KSF	-
MECHMX	Mechanical	KSF	-
PLUMMX	Plumbing	KSF	-
PIPMX	Piping	KSF	-
SPECMX	Special items such as Escalators, Security Systems	KSF	-
UTMX	Utilities	KSF	(UTKSF)

KSF = Thousands of square feet

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The CALCMX program allows the inputting of more than one item line in order to generate a specific overall CX or MX factor. Each item can be given a unit cost or its equivalent unit MX value. If costs are to be given they must be at the same level of impacted cost as would be suggested by the program's economic, GLOBAL and PLATFORM data variables. Several line items may present a problem with a line unit costs inputs. In most cases there is a great likelihood that the individual costs were predicated on different basis.

Their use in the CALCMX program will violate the above stated rule. There is, however, a simple procedural solution. In such cases the individual line items must be virtually processed through the COSTMX program. In COSTMX, the specific basis of the costs can be entered which would result in the output of an appropriate MX value for the line item. When all line cost items have been processed they can then be used in the CALCMX program. In CALCMX the individual line MX values will be used in lieu of line or unit costs. It must be remembered that the unit MX values are stripped of "impact costs and are "neat" or "clean."

The CALCMX program will generate a composite CX or MX value that results from the integration of all its line items. In addition, the program will output total and unit costs. Such costs would have been calculated predicated on the use of the integrated CX or MX factor toward the given total base area (such as thousands of square feet). The costs will include the various effects of the economic, GLOBAL and PLATFORM data. The integrated CX or MX factor is a "neat" or "clean" value. Another set of cost impact factors will result in different computed costs.

CALCMX will also output additional cost information. Whenever a line item is entered with its unit MX value, the output will show the line item unit cost (which will be suffixed with an asterisk to show that it was calculated). The computed line item unit cost will have been impacted by the CALCMX program's economic, GLOBAL and PLATFORM data.

The costs computed and outputted by all the FAST-C and auxiliary programs are impacted costs. Costs shown in the auxiliary models' outputs are for reference purpose. They provide a way for the user to assess the

procedural outcome. When questionable costs are obtained the user must examine the input details to insure the correct entries.

CALCMX and COSTMX can generate specific CX or MX factors or Unit MX factors for every part or cost item. A cost item may be a particular form of material or it may be defined work effort. A work effort may include labor and material. The CX or MX factor is another way of describing the COST/SFT or COST/CYD, etc. (COSTMX is used to convert individual item or work effort costs to their CX or MX factor, or the converse.)

CALCMX and COSTMX require the use of a defined CX or MX factor which they will be required to compute, such as INTMX, STRMX, etc. These are known as MXTYPE. This should not be confused with the CALCMX line item UMX variable.

While in the CALCMX or COSTMX program a HELP response to the MXTYPE query will cause the program to print out all available MXTYPES.

The user must indicate an MXTYPE variable that will ultimately contain the factor that is to be computed. For example, a factor associated with fences will have an MXTYPE of FENMX or FENCX, depending upon the base area to be used. Or, if an external building material is to be processed, its MXTYPE may be EWLLMX. The procedure is necessary to minimize user errors. As indicated earlier, each CX or MX type is predicated on a specific type of base area. For example, FENMX requires KLF whereas EXCMX requires CYD. The use of the correct MXTYPE will ensure that the program's inputs are proper. If an MXTYPE factor requires KSF as an input, the program will reject all other inputs. For example, if during the "changes" session the MXTYPE is changed from EXCCX to EXCMX, it will be necessary to change the BASE from "ACRE" to "CYD" - and obviously the BAMT must also be changed. For example, change from 10 acres (BAMT=10) to 1000 CYD (BAMT=1000).

In addition not all CX or MX factors require PLATFORM data inputs - nor should their costs be impacted by virtue of such given information. The MXTYPE variable will control such procedures.

Therefore, the MXTYPE variable is a very significant feature of the COSTMX and CALCMX programs.

The CALCMX program is used to compose a unit effort factor. The inputs may have more than one type of material or work effort. The program computes the cost effect of each line item. These are accumulated to a total cost. Predicated on the described base area (BASE and BAMT), the total cost is converted into the appropriate factor.

It is important to note that as each line item (1=, 2=, etc.) is entered it is processed to compute its "neat" cost. If a line unit cost is entered it will be adjusted to remove its impact costs. That is why the UYEAR must be entered when UCOST is given. The "neat" cost is used to extend the amount (AMT) to a total cost. If, in lieu of UCOST, the line item's UMX is given, the UYEAR is not necessary. UMX is a "neat" value and therefore does not need cost impact adjustments. The UMX is used with the amount (AMT) to compute the line item's cost. This cost will be adjusted by the program's economic, GLOBAL and PLATFORM data to generate an equivalent UCOST. Therefore, UYEAR has no meaning when UMX is given.

Once a CX or MX factor is computed it can be adjusted to reflect increases or decreases in a units's work content.

There are two ways to increase the work content represented by a CX or MX factor. If the increase is a matter of degree - for example changing a wall thickness from 4" to 6" - the factor can be multiplied by 1.5 for a new value. This does not mean that the costs will be increased in the same way. The economy of scale factor is taken into account. Another example may be when it is considered that the new work content is 25% greater - in this case the factor should be multiplied by 1.25.

The second method involves the situation when the additional effort(s) can be described as line items in the CALCMX program. The original CX or MX factor can be entered as the first line item. The ITEM name will be the name of factor - or its MXTYPE. The amount (AMT) will be the same as the BASE area. Its UMX will be the existing value for the CX or MX factor. The

additional line items can be entered in the conventional way. Upon completion of inputting the CALCMX output will provide the revised factor.

The following method can be used to decrease the work content of a reference factor. The original factor with its BASE and cost impact values should be processed through the COSTMX program. This will provide its equivalent total costs. The work areas to be deleted should be processed through the CALCMX program. This will also establish the total cost to yield a remaining total cost. The remaining total cost can then be processed through the COSTMX program to obtain its equivalent and adjusted reference factor.

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Section 3

PREPARATION OF INPUTS

3.1 GENERAL INPUT RULES

Inputs to the FAST-C model are made by means of a computer file. Computer files are generated by the use of the EDITOR.

Inputs to the auxiliary models do not require computer files. Input to these models are entered as prompted for during execution of each model.

There are six input forms employed in gathering and preparing data for processing data through FAST-C. They are:

<u>Title and Use</u>

SITE DETAIL INPUT (Form FPS-7). This input form covers Sitework in detail. It covers thirteen varieties of site work from demolition to special features such as culvert bridges. Each site type of work can be related to either the acreage involved or the appropriate sizing value for the particular effort.

SITE TOTAL INPUT (Form FPS-8). This input form covers Sitework described in a total or macro manner. The sitework effort is related to the total acres that are involved. It's schedules are also covered.

BUILDING DETAIL INPUT (Form FPS-9). This form is used to process a Building/Construction effort and/or Utilities. The building effort is described by four principal elements: excavation; structure; heat, ventilation and air conditioning; and electromechanical systems.

BUILDING TOTAL INPUT (Form FPS-10). This form is used to process the total Building Construction effort and/or Utilities.

ENGINEERING AND PROJECT MANAGEMENT INPUT (Form FPS-11). This form is used to process Engineering and Project Management efforts. The engineering costs and project management costs are based on the total scope of work, which includes sitework, buildings and utilities.

TOTAL PROJECT INPUT (Form FPS-12). This input form covers a total project for Sitework, Buildings, Utilities, Engineering, Project Management and all Schedules.

FAST-C files may involve numerous items, such as various site work, constructions, utilities, and building items. Some items, because of available descriptive detail may require many input lines. Others may have relatively few inputs. The FAST-C input files are unique for they were designed to

minimize user problems and errors by avoiding the use of a structured sequence. If an input line is not appropriate it is simply not entered. With few exceptions - those concerning PROJECT, LOCATION, ITEM, FILETYPE and END - input lines can be entered in any random sequence. Thus, potential errors in generating, reading, and editing files are minimized.

Each input file line has a signature word. This is always the first entry on the line. It is to indicate the nature of the adjacent values. A signature word does not require quotations to show that it is an alphabetic input. Every input line shown in FPS forms 7 through 12 has its signature word. The spelling of the signature word must be exact. It is good practice to separate the signature word and the first input on the line with a single space.

There are several specific file structure rules and input lines which are the same for each input sheet. These are delineated below.

1. PROJECT and LOCATION lines must be entered only one time for a particular program or project. There may be as many Projects per file as desired.

2. ITEM must be entered as the first line of an item to be processed. There may be as many individual item boxes as desired per Project.

3. FILETYPE must always be entered following an ITEM line. It is used to indicate, to the program, the type of item that is to follow. If omitted, an error statement will be issued and, in most cases, a real time recovery input will be possible.

4. The FACTOR line is a mandatory line on the Building Detail, Building Total and Total Project input forms. It is required when Buildings are processed.

5. The GLOBAL line is entered for each input sheet except the ENGINEERING and PROJECT MANAGEMENT input sheet.

6. The PLATFORM line is only applicable to Building Construction. It is not used for Utilities or Sitework.

7. Engineering and Project Management Items are processed as the last item of a project. Then calculations are based on the cumulations of all items processed under the project. Therefore, it is normal to expect its END line to have a CONTIN parameter of 0. But there may be additional items, under the same project, subsequent to the Engineering Item. In this case the CONTIN value (Eng. Item) will be 1. In such cases the Eng. Item will be read by the program and its

inputs set in memory until the last item is processed. At that time the Eng. Item will be processed. When such program actions are made, appropriate messages will be given to the user.

8. END must be last line of ITEM input sheet. It is used to indicate that the previous input lines are all the inputs available for the appropriate item.

As each item is read by the program, a message will notify the user which item is under process. Following the notification, the program will send statements regarding any input error. Every input line is checked to insure correct values. Misspelling or values that cannot be read or are improper will cause an input error comment with an indication of the line creating the problem. When this occurs the user will be given an opportunity to re-enter the total input line (including its signature word).

NOTE: Trailing zeros refers to the condition where all remaining values of a line are 0.

For example:

CLEARING 15.0 3.0 0 0 0

may be entered in an input file as

CLEARING 15.0 3.0

When input file lines are inadvertently duplicated the model will issue warning statements. It will use the first entry.

In many cases the model will detect missing input lines. These are principally PLATFORM, FACTOR, END, schedule and cost lines. For example, if a work scope is entered without an appropriate schedule line, the missing line will be requested: e.g., if UTILCOST is given the model will expect to see a UTSCHD line. Similarly, if a schedule line is given, FAST-C will expect appropriate cost lines. Wherever such errors are detected, error messages will be given along with an opportunity to enter the missing line inputs.

NOTE: The input of error recovery lines will not revise the input file. This must be done by the user in the EDITOR. FAST-C will, however, print out the corrected version of the inputs as part of the unit's output. If there are too many problems the program session may be terminated by using the word STOP at any point of the input.

3.1.1 MX, CX and SCHDX FACTORS

MX or CX reference factors of all types may be used in all procedures - calibration and cost studies. A reference situation can be synthesized by the use of appropriate reference factors. These may be MX or CX factors generated by various calibration studies or through the use of the auxiliary models.

The use of reference factors in calibration studies will cause FAST-C to compute appropriate costs. These will serve as the basis to compute other references that maybe required. Schedule reference factors may be used as calibration procedure inputs. However, during calibration the model will not accept an input schedule along with a SCHDX reference factor.

During cost studies, inputs may include specified schedules as well as the SCHDX reference factors. When this occurs the calculated schedule is compared with the given schedule to determine schedule penalty costs. Accelerated activities as well as protected efforts will cause additional costs. Penalty costs are shown in the item's output. In addition, a separate output display will indicate the basis of the penalty computation. It will show the calculated months with respect to the input months. If a schedule is given as an input without a reference factor (SCHDX) the model will process the data. However, it will not be able to compute penalty costs (if any). Where this occurs the model will render an appropriate message regarding its limitation.

Whenever a schedule input line is given, the model will check the consistency between the start and finish dates.

The user may enter cost inputs during cost studies. There may be known cost inputs for various aspects whereas others may be computed from reference and size factors. In such cases the model will compute their appropriate MX or CX factors which will be displayed in the output. Costs given in cost studies must be consistent with the input value of GECON.

3.2 The "R" INPUT

The letter R may be used as a value to various variables and all reference factors. It is a way of saying ditto or repeat. A variable whose input is "R"

will be given a numerical value representing the last value that particular variable and in a previous study. In the previous study the value may have been computed or given as an input.

When FAST-C is initially exercised, or at the time it is given a filename, all variable values are set to 0. As values are given or calculated they are associated with their appropriate R designations. This means that each time a variable value is changed its R value is changed accordingly and will remain the same until it is changed again. For example, if BLDMX for Item No. 1 is set to 3.2 - and if there are no BLDMX changes or usages until Item No. 10 - the R value of BLDMX will still be 3.2.

The use of "R" provides several advantages. Its principal benefit is that it allows a cost study file to immediately follow a calibration item under the same filename. It also serves to reduce input preparation time. Calibration and cost study file may both use the "R" capability. It must be remembered that to use "R" the variable must have given a computed or input value in a previous item under the same project.

The "R" factor is usable only for the following types of variables:

SINDEX	PINDEX	ESCAL	TYEAR	
SEISM	TORNAD	RADIAT	BLDUSE	PLTFM

It must be noted that "R" is equivalent to a value, and the ground rules regarding PLATFORM inputs remain.

All CX and MX factors

All SCHDX factors

"R" inputs are <u>not</u> allowed for:

1. FACTOR line.
2. Cost inputs and size inputs (KLF, KSF, ACR, etc.)
3. Start date or Finish date
4. END line

As each input line is described in this section, it will be noted which variables may use the "R" designation as an input.

The FAST-C output will show all input variables, their given values, as well as their computed parameters. When an input has a "R" designation, the output will show the actual value that was caused to be copied. These will be suffixed with the letter R to show its basis - for example: 10.70R.

3.3 The "*" INDICATION

All FAST-C outputs will show the data that was given as inputs as well as line data that may have been computed.

Those values that were calculated will be suffixed with an asterisk (*). For example, 10.70*.

Even though asterisked data may be shown in the input data section it must not be taken for input information.

3.4 The INPUT VARIABLES DEFINED

The remainder of this section defines the input variables and provides the rules for their entry and use both for the FAST-C model and the eight auxiliary models. It is basically a glossary of the variables given in the sequence in which they appear on the FAST-C input forms and the order in which they are prompted for by the auxiliary models. Section 6, the Glossary/Index presents the same information in alphabetical order.

FAST-C MODEL INPUTS.....3-1

SITE DETAIL INPUT SHEET.....3-8
SITE TOTAL INPUT SHEET.....3-28
BUILDING DETAIL INPUT SHEET.....3-35
BUILDING TOTAL INPUT SHEET.....3-48
ENGINEERING AND PROJECT MANAGEMENT INPUT SHEET.....3-58
TOTAL PROJECT INPUT SHEET.....3-66
RERUN.....3-80

AUXILIARY MODEL INPUTS.....3-84

SEITORN - SEISMIC/TORNADO FACTOR CALCULATION PROGRAM.....3-88

BLDRAD -
BUILDING USE/RADIATION FACTOR CALCULATION PROGRAM..... 3-91
CALCMX -
MX/CX CALCULATION PROGRAM (Based on many items).....3-96
COSTMX - MX/CX CALCULATION PROGRAM (Based on a single item)..3-103
EXTMX - EXTERIOR MX CALCULATION PROGRAM.....3-109
INTMX - INTERIOR MX CALCULATION PROGRAM.....3-115
STRMX - STRUCTURE MX CALCULATION PROGRAM.....3-121
EMMX - ELECTRICAL/MECHANICAL MX CALCULATION PROGRAM... 3-126

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FAST-C
SITE DETAIL INPUT

PROJECT: TEST UNIT 2
LOCATION: CHERRY HILL, N.J.
ITEM: SITE2

FILETYPE	0 (TOTAL)	0 (SITE)	0 (BLDG)	0 (ENG)	
FORMAT	1 (ALL)	(COST)	(UNCOST)	(INPUT)	
GLOBAL	1 (SINDEX)	0.9 (PINDEX)	1 (SCAL)	F (SECON)	1983 (TYEAR)
SITESCHD	JUN. 1982 (SSTART)	JUL 1983 (SFIN)	(SSCHDX)		
DEMOL	0 (DEMCST)	150 (DEMACR)	10.31 (DEMCX)	(DEMKSF)	(DEMMX)
EXCAV	0 (EXCCST)	10 (EXCACR)	5.19 (EXCCX)	(EXCCYD.)	(EXCMX)
TRENCH	500 (TRNCST)	0 (TRNACR)	0 (TRNCX)	50 (TRNKLF)	(TRNMX)
DRAIN	100 (DRNCST)	5 (DRNACR)	(DRNCX)	(DRNKLF)	(DRNMX)
CLEARING	0 (CLRCST)	10 (CLRACR)	7.52 (CLRCX)	(CLRKSF)	(CLRMX)
LANDSCPE	95 (LNDCST)	0 (LNDACR)	0 (LNDCX)	66.7 (LNDKSF)	(LNDMX)
WALK	0 (WLKCST)	0 (WLKACR)	0 (WLKCX)	31 (WLKKSF)	8.12 (WLKMX)
CURB	15.5 (CRBCST)	2 (CRBACR)	(CRBCX)	(CRBKLF)	(CRBMX)
GUTTER	0 (GUTCST)	0 (GUTACR)	0 (GUTCX)	45 (GUTKLF)	6.58 (GUTMX)
FENCE	45 (FENCST)	5 (FENACR)	(FENCX)	(FENKLF)	(FENMX)
ROAD	0 (RDCST)	0 (RDACR)	0 (RDCX)	15 (RDKSF)	6.71 (RDMX)
PARK	109 (PRKCST)	0 (PRKACR)	0 (PRKCX)	65 (PRKKSF)	(PRKMX)
SPECIAL	110 (SPCCST)	3 (SPCACR)	(SPCCX)	(SPCCSF)	(SPCMX)
END	1 (CONTIN)	1 (ADD)			

Note: Based areas indicate assessment area dominant and their CX or MX factor.

Figure 3-1. Site Detail Input

3.5 FAST-C - SITE DETAIL INPUT (Form FPS-7)

This input form covers Sitework in Detail. It covers thirteen varieties of site work from demolition to special features such as culvert bridges. Each site type of work can be related to either the acreage involved or a sizing value for the particular effort; for example the amount of fences per acre or the total linear feet of fences.

The SITE DETAIL input can be used to generate reference factors as well as costs and schedules. It also can be used to accumulate site costs.

It is not necessary to use a SITE DETAIL input to compute reference factors. All SITE DETAIL scope of work reference factors - either of the CX or MX types - can be calculated or adjusted with two of the auxiliary models, CALCMX and COSTMX. These models can be used to modify or generate all reference factors. For example, the CALCMX procedure can furnish an appropriate FENCX or FENMX factor with respect to a defined or detailed description of all fencing work. Use of these factors can also modify a computed reference if any specific change is to be made to a known actual experience. It is not necessary to enter a line input for each of the thirteen work areas. Only those that apply are used.

The ITEM, FILETYPE, GLOBAL and SITESCHD lines are mandatory inputs. The FILETYPE line must follow the ITEM line.

Each work type (DEMOL, EXCAV, etc.) can be sized using two applicable variables:

1. ACRES
2. Areas, Lengths, Volumes (KSF, KLF, CYD)

Reference factors appropriate to ACRES will have a CX suffix (such as LNDCX).

Factors appropriate to KSF, KLF, CYD will have a MX suffix (such as LNDMX).

There may be cases where the costing problem may center about the acreage. In other cases, there may be specific work type measures - such as the length of a fence or the square feet of a road. FAST-C is capable of processing both.

In calibration or when costs are given as inputs, both sizing variables may be entered. The output will provide both CX and MX type of factors.

In cost studies, or when costs are not given, only one sizing variable may be used along with the appropriate CX or MX factor.

All sitework CX and MX type factors can be calculated and measured by the auxiliary models COSTMX and CALCMX. Each sitework input line is independent of the others. In one case costs may be given as inputs whereas others require costs to be computed by the model.

Work areas that are not part of the project are totally omitted from the input file.

Work effort lines can be entered into an input file in any sequential manner after the FILETYPE line and before the END line.

The PROJECT and LOCATION lines must be entered only one time for a particular program or project. Each may have up to 24 characters including spaces. There may be as many Projects per file as desired. For example:

PROJECT TEST PROGRAM NO. 1

LOCATION CHERRY HILL, NEW JERSEY

The ITEM line must be entered as the first line of an item to be processed. It can be descriptive and may have up to 24 characters, including spaces. There may be as many individual item boxes as desired per Project.

ITEM SAMPLE ITEM NO. 1

The FILETYPE line must always be entered following an ITEM line. It is used to indicate, to the program, the type of item that is to follow. If omitted, an error statement will be issued and, in most cases, a real time recovery input will be possible.

The Filetype (FILETYPE) line inputs are:

TOTAL	1 = TOTAL PROJECT INPUT (FPS-12)	
	0 = NOT APPLICABLE	(Use for this input sheet)
SITE	T = SITE TOTAL INPUT (FPS-8)	
	D = SITE DETAIL INPUT (FPS-7)	(Use for this input sheet)
	0 = NOT APPLICABLE	
BLDG	T = BLDG TOTAL INPUT (FPS-10)	
	D = BLDG DETAIL INPUT (FPS-9)	
	0 = NOT APPLICABLE	
ENG	1 = ENG AND PROJECT MANAGEMENT INPUT (FPS-11)	
	0 = NOT APPLICABLE	

The Output Format (FORMAT) line inputs are:

ALL	1 = Print all possible outputs for this Item. These include the Cost, Uncertainty and Input variables.
	0 = Choose the desired outputs from the following options.
COST	1 = Print the Calculated or Input Costs.
	0 = Do not print the Calculated or Input Costs.
UNCERT	1 = Print the Uncertainty or Risk output.
	0 = Do not print the Uncertainty or Risk output.
INPUT	1 = Print the Input Variables showing the Input, Calculated and Repeat values.
	0 = Do not print the Input Variables.

The Global (GLOBAL) line inputs are:

SINDEX

SINDEX is the site index factor. It is used to indicate the adjustments that must be made to labor and material costs because of the locale of the work. Because of its location, each area will have unique costs adjustments attributable to costs of transportation, area labor supplies, environmental factors, etc. There are many published tables reflecting such site factors with respect to a standard such as Middletown, USA or New York. SINDEX is a decimal value input such as 0.95. See Table 4-15.

PINDEX

PINDEX is the productivity index. It is used to indicate the level of labor productivity or additional costs attributable to site local conditions. Its value is the decimal equivalent of a normal eight (8) hour compensation. For example, extra travel time costs, a limited radiation working area, working conditions or labor unrest may affect the productivity index. A normal eight hour work day is entered as 1. If workers are paid eight hours for four hours of actual work, the productivity index would be 0.5.

ESCAL

ESCAL is the economic factor that specifies the inflation values to be applied to costs. ESCAL has two ranges of values, 0 or 1. The value 0 means no escalation from the first of the year when the work was started; 1 means that the standard yearly rates that are built into the model or read from an Economic file should be applied. An ESCAL value that is greater than 0 and less than 1 for example, 0.10 means that the decimal value is a constant economic rate to be applied for all performance years commencing with the engineering start year, ESTART.

GECON

GECON is used to define costs as of a Constant year, Present value or Final value. An entry of a Year, ie 1984, will cause the costs to be computed as of the end of the year. An entry of P will cause the costs to be computed as of the start month and year, ie MAY.1984, with no subsequent escalation. F is entered to escalate costs through the end of each schedule.

TYEAR

TYEAR is the technological year. It is used to indicate the technological currency of the techniques such as equipments and resources that will be used. More current methods may improve costs.

All variables may be entered as R to repeat values from a previous box.

The Site Schedule (SITESCHD) line inputs are:

SSTART

SSTART is the starting date of sitework. SSTART is a mandatory input for all calculation and cost studies. SSTART is input in MMM.YYYY form where MMM is the first three letters of the month and YYYY is the Year. SSTART may be input as MAY.1984 or MAY.84.

SFIN

SFIN is the date which sitework was or is expected to be finished. SFIN is entered in the same format as SSTART. During calibration SFIN must be given if GECON is F. SSTART and SFIN will be used to calculate SSCHDX whenever SSCHDX is entered as 0. If SSCHDX has a parametric

value, SFIN is an optional input. IF SFIN and SSCHDX are input in a cost study, FAST-C will render appropriate schedule penalties for apparent accelerations or stretch-outs. However, if SSCHDX or SFIN are not given, cost studies will not be able to compute penalty costs.

SSCHDX

SSCHDX is the sitework schedule factor. It is used to adjust the FAST-C schedule computation so that it will agree with schedules suggested by the references. If a performance schedule is input and SSCHDX = 0, the SSCHDX value will be calculated. If a finish date is not entered, the SSCHDX value must be entered. SSCHDX set to 100 will render a FAST-C schedule without adjustments. When both performance schedules and SSCHDX are entered in a cost study, the model will be able to calculate schedule penalty costs. In cost studies where performance schedules are given and SSCHDX = 0, the model will print a message that it will not be able to compute penalty costs.

SSCHDX may be entered as R to repeat a value from a previous box.

The Demolition (DEMOL) line inputs are:

DEMCST

DEMCST is the demolition cost of a sitework effort. As an input is is used to compute either DEMCX or DEMMX depending on the described work area inputs. If DEMCX or DEMMX is not given, DEMCST is a mandatory input.

DEMACR

DEMACR is the area in acres which was or is expected to be demolished. DEMACR is used with DEMCST and DEMCX. For example, if DEMACR and DEMCX are given, DEMCST will be computed. During calibration if cost is given, either DEMACR and/or DEMKSF can be entered. During cost studies or whenever costs are to be calculated and demolition area must be defined by either DEMACR or DEMKSF, but not both! They may cause inconsistent costs.

DEMCX

DEMCX is the demolition factor that is associated with the area to be demolished. DEMCX is used with DEMACR and DEMCST. If DEMCX and DEMACR are given DEMCST will be computed. Conversely, if DEMCST is entered DEMCX will be rendered. DEMCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated DEMCX or DEMMX must be entered, but not both! They may cause inconsistent costs.

DEMKSF

DEMKSF is the area in thousands of square feet of the demolition which was or is expected to be required in the sitework effort. DEMKSF is used

with DEMCST and DEMMX. The DEMKSF and costs are used to compute the DEMMX. Conversely the DEMMX and DEMKSF are used to compute costs. During calibration if cost is given either DEMKSF and/or DEMACR may be entered. During cost studies or whenever costs are to be calculated the demolition area must be defined by either DEMACR or DEMKSF but not both! They may cause inconsistent costs.

DEMMX

DEMMX is the demolition factor that is associated with the area of demolition as set forth in DEMKSF. DEMMX is used with DEMCST and DEMKSF. If DEMMX and DEMKSF are given DEMCST will be computed. Conversely, if DEMCST is entered DEMMX will be rendered. DEMMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated DEMMX or DEMCX must be entered but not both! They may cause inconsistent costs.

DEMCX and DEMMX may be entered as R to repeat values from a previous box.

The Excavation (EXCAV) line inputs are:

EXCCST

EXCCST is the EXCAVATION cost of a sitework effort. As an input EXCCST is used to compute either EXCCX and/or EXCMX depending on the described work area inputs. If EXCCX or EXCMX is not given, EXCCST is a mandatory input.

EXCACR

EXCACR is the area in acres which was or is expected to be excavated. EXCACR is used with EXCCST and EXCCX. For example if EXCACR and EXCCX are given, EXCCST will be computed. During calibration, if cost is given either EXCACR and/or EXCCYD can be entered. During cost studies or whenever costs are to be calculated the excavated area must be defined by either EXCACR or EXCCYD, but not both! They may cause inconsistent costs.

EXCCX

EXCCX is the excavation factor to be used with the EXCAV. EXCCX is used with EXCACR and EXCCST. If EXCCST and EXCACR are given EXCCST will be computed. Conversely, if EXCCST is entered EXCCX will be rendered. EXCCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated EXCCX or EXCMX must be entered but not both! They may cause inconsistent costs.

EXCCYD

EXCCYD is the volume to be excavated in cubic yards. EXCCYD is used in the computation of the excavation costs whether for buildings or sitework. EXCCYD is used with EXCMX to compute EXCCST or with EXCCST to compute EXCMX.

EXCMX

EXCMX is the EXCAVATION factor to be used with the volume defined by EXCCYD. EXCMX is used with EXCCST and EXCCYD. If EXCMX and EXCCYD are given EXCCST will be computed. Conversely, if EXCCST is entered EXCMX will be printed out. EXCMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated EXCMX or EXCCX must be entered but not both! They may cause inconsistent costs.

EXCCX and EXCMX may be entered as R to repeat values from a previous box.

The Trench (TRENCH) line inputs are:

TRNCST

TRNCST is the cost of a sitework trenching effort. As an input TRNCST is used to compute either TRNCX or TRNMX depending on the described work area inputs. If TRNCX or TRNMX is not given, TRNCST is a mandatory input.

TRNACR

TRNACR is the area in acres which was or is expected to be trenched. TRNACR is used with TRNCST and TRNCX. For example, if TRNACR and TRNCX are given, TRNCST will be computed. During calibration if cost is given either TRNACR or TRNKLF can be entered. During cost studies or whenever costs are to be calculated the trenched area must be defined by either TRNACR or TRNKLF but not both! They may cause inconsistent costs.

TRNCX

TRNCX is the trenching factor that is associated with TRNACR. TRNCX is used with TRNACR and TRNCST. If TRNCX and TRNACR are given TRNCST will be computed. Conversely, if TRNCST is entered TRNCX will be printed out. TRNCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated TRNCX or TRNMX must be entered but not both! They may cause inconsistent costs.

TRNKLF

TRNKLF is the measure of trenching, in thousands of linear feet, which was or is expected to be required of the sitework effort. TRNKLF is used with TRNCST and TRNMX. The TRNKLF and costs are used to compute the TRNMX. Conversely, the TRNMX and TRNKLF are used to compute costs. During calibration, if cost is given either TRNKLF and/or TRNACR may be entered. During cost studies or whenever costs are to be calculated the amount of the trenched area must be defined by either TRNKLF or TRNACR but not both! They may cause inconsistent costs.

TRNMX

TRNMX is the trenching factor that is associated with the TRNKLF. TRNMX is used with TRNCST and TRNKLF. If TRNMX and TRNKLF are given TRNCST will be computed. Conversely, if TRNCST is entered TRNMX will be calculated. TRNMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated TRNMX or TRNCX must be entered but not both! They may cause inconsistent costs.

TRNCX and TRNMX may be entered as R to repeat values from a previous box.

The Drain (DRAIN) line inputs are:

DRNCST

DRNCST is the drainage cost of a sitework effort. As an input it is used to compute either DRNCX and/or DRNMX depending on the described work areas. If DRNCX or DRNMX is not given, DRNCST is a mandatory input.

DRNACR

DRNACR is the area in acres which was or is expected to involve drainage. DRNACR is used with DRNCST and DRNCX. For example, if DRNACR and DRNMX are given, DRNCST will be computed. During calibration if cost is given, either DRNACR and/or DRNKLF can be entered. During cost studies or whenever costs are to be calculated the drainage area must be defined by either DRNACR or DRNKLF but not both! They may cause inconsistent costs.

DRNCX

DRNCX is the drainage complexity factor that is associated with the acreage defined by DRNACR. DRNCX is used with DRNACR and DRNCST. If DRNCX and DRNACR are given, DRNCST will be computed. Conversely, if DRNCST is entered, DRNCX will be rendered. DRNCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated, DRNCX or DRNMX must be entered but not both! They may cause inconsistent results.

DRNKLF

DRNKLF is the linear measure in thousands of square feet of the drains which were or are to be required in the sitework effort. DRNKLF is used with DRNCST and DRNMX. The DRNKLF and costs are used to compute the DRNMX. Conversely, the DRNMX and DRNKLF are used to compute costs. During calibration, if cost is given, either DRNKLF and/or DRNACR may be entered. During cost studies or whenever costs are to be calculated the drainage area must be defined by either DRNKLF or DRNACR but not both! They may cause inconsistent answers.

DRNMX

DRNMX is the factor that defines the nature of the drainage effort and is associated with the measure of quantity set forth in DRNKLF. DRNMX is used with DRNKLF and DRNCST. If DRNMX and DRNKLF are given, DRNCST will be computed. Conversely, if DRNCST is entered, DRNMX will be rendered. DRNMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated, DRNMX or DRNCX must be entered but not both! They may cause inconsistent costs.

DRNCX and DRNMX may be entered as R to repeat values from a previous box.

The Clearing (CLEARING) line inputs are:

CLRCST

CLRCST is the clearing cost of a sitework effort. As an input it is used to compute either CLRCX and/or CLRMX depending on the described work area inputs. If CLRCX or CLRMX is not given, CLRCST is a mandatory input.

CLRACR

CLRACR is the area in acres which was or is expected to be cleared. CLRACR is used with CLRCST and CLRCX. For example, if CLRACR and CLRCX are given, CLRCST will be computed. During calibration if cost is given, either CLRACR or CLRKSF can be entered. During cost studies or whenever costs are to be calculated the area to be cleared must be defined by either CLRACR or CLRKSF, but not both! They may cause inconsistent costs.

CLRCX

CLRCX is the factor that is associated with clearing the acreage. CLRCX is used with CLRACR and CLRCST. If CLRCX and CLRACR are give, CLRCST will be computed. Conversely, if CLRCST is entered CLRCX will be calculated. CLRCX can also be calculated by using the auxiliary models COSTMX and/or CALCMX. When costs are to be calculated CLRCX or CLRMX must be entered, but not both! They may cause inconsistent costs.

CLRKSF

CLRKSF is the area, in thousands of square feet, of clearing which was or is expected to be required in the sitework effort. CLRKSF is used with CLRCST and CLRMX. CLRKSF and costs are used to compute the CLRMX factor. Conversely, the CLRMX and CLRKSF are used to compute costs. During calibration, if cost is given either CLRKSF and/or CLRACR may be entered. During cost studies or whenever costs are to be calculated the amount of clearing area must be defined by either CLRKSF or CLRACR, but not both! They may cause inconsistent costs.

CLRMX

CLRMX is the clearing factor which identifies the nature of the clearing effort. It is associated with the measure of quantity as set forth in CLRKSF. It appears in the CLEARING Input file line. CLRMX is used with CLRKSF and CLRCST. If CLRMX and CLRKSF are given, CLRCST will be computed. Conversely, if CLRCST is entered, CLRMX will be calculated and printed out.

CLRMX can also be calculated by using the auxiliary models COSTMX and/or CALCMX. When costs are to be calculated, CLRMX or CLRCX must be entered, but not both!. They may cause inconsistent costs.

CLRCX and CLRMX may be entered as R to repeat values from a previous box.

The Landscape (LANDSCAPE) Line inputs are:

LNDCST

LNDCST is the landscaping cost of a sitework effort. As an input it is used to compute either LNDCX and/or LNDMX depending on the described work area inputs. If LNDCX or LNDMX is not given, LNDCST is a mandatory input.

LNDACR

LNDACR is the area in acres which was or is expected to be landscaped. LNDACR is used with LNDCST and LNDCX. For example, if LNDACR and LNDCX are given, LNDCST will be computed. During calibration if cost is given either LNDACR or LNDKSF can be entered. During cost studies or whenever costs are to be calculated the landscaped area must be defined by either LNDACR or LNDKSF but not both! They may cause inconsistent costs.

LNDCX

LNDCX is the LANDSCAPE factor that is associated with the area when input in acres. It is used with LNDACR and LNDCST. If LNDCX and LNDACR are given LNDCST will be computed. Conversely, if LNDCST is entered LNDCX will be printed out. LNDCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated LNDCX or LNDMX must be entered but not both! They may cause inconsistent costs.

LNDKSF

LNDKSF is the landscaped area in thousands of square feet, which was or is expected to be part of the sitework effort. It is used with LNDCST and LNDMX. The LNDMX and costs are used to compute the LNDMX. Conversely, the LNDMX and LNDKSF are used to compute costs. During calibration, if cost is given either LNDKSF and/or LNDACR may be entered. During cost studies or whenever costs are to be calculated the

landscaped area must be defined by either LNDKSF or LNDACR but not both! They may cause inconsistent costs.

LNDMX

LNDMX is the factor that is associated with the landscaped area as set forth in LNDKSF. It is used with LNDKSF and LNDCST. If LNDMX and LNDKSF are given LNDCST will be computed. Conversely, if LNDCST is entered LNDMX will be calculated. LNDMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated LNDMX or LNDCX must be entered but not both! They may cause inconsistent costs.

LNDCX and LNDMX may be entered as R to repeat values from a previous box.

The Walk (WALK) Line inputs are:

WLKCST

WLKCST is the cost of walks in a sitework effort. As an input it is used to compute either WLKCX and/or WLKMX depending on the described work area inputs. If WLKCX or WLKMX is not given, WLKCST is a mandatory input.

WLKACR

WLKACR is the area in acres which was or is expected to be covered with walks. WLKACR is used with WLKCST and WLKCX. For example, if WLKACR and WLKCX are given, WLKCST will be computed. During calibration if cost is given either WLKACR or WLKKSF can be entered.. During cost studies or whenever costs are to be calculated the WALK area must be defined by either WLKACR or WLKKSF but not both! They may cause inconsistent costs.

WLKCX

WLKCX is the walk factor that is associated with WLKACR. It is used with WLKACR and WLKCST. If WLKCX and WLKACR are given WLKCST will be computed. Conversely, if WLKCST is entered WLKCX will be calculated. WLKCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated WLKCX or WLKMX must be entered but not both! They may cause inconsistent costs.

WLKKSF

WLKKSF is the area in thousands of square feet where walks are expected to be required of the sitework effort. It is used with WLKCST and WLKMX. The WLKKSF and costs are used to compute the WLKMX. Conversely, the WLKMX and WLKKSF are used to compute costs. During calibration if cost is given either WLKKSF or WLKACR may be entered. During cost studies or whenever costs are to be calculated the amount of walk area must be defined by either WLKKSF or WLKACR but not both! They may cause inconsistent costs.

WLKMX

WLKMX is the walks factor that is associated with the measure of quantity as set forth in WLKKSF. It is used with WLKKSF and WLKCST. If WLKMX and WLKKSF are given WLKCST will be computed. Conversely, if WLKCST is entered WLKMX will be calculated. WLKMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated WLKMX or WLKCX must be entered but not both! They may cause inconsistent costs.

WLKCX and WLKMX may be entered as R to repeat values from a previous box.

The Curb (CURB) line inputs are:

CRBCST

CRBCST is the curbing cost of a sitework effort. As an input it is used to compute either CRBCX and/or CRBMX depending on the described work area inputs. If CRBCX or CRBMX is not given, CRBCST is a mandatory input.

CRBACR

CRBACR is the acreage area which was or is expected to be covered with curbs. CRBACR is used with CRBCST and CRBCX. For example, if CRBACR and CRBCX are given, CRBCST will be computed. During calibration, if cost is given, either CRBACR and/or CRBKLF can be entered. During cost studies or whenever costs are to be calculated the curbed area must be defined by either CRBACR or CRBKLF, but not both! They may cause inconsistent costs.

CRBCX

CRBCX is the curbing factor that is associated with the acreage. It appears in the CURB input file line. CRBCX is used with CRBACR and CRBCST. If CRBCX and CRBACR are given, CRBCST will be computed. Conversely, CRBCST is entered, CRBCX will be rendered. CRBCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated, CRBCX or CRBMX must be entered, but not both! They may cause inconsistent costs.

CRBKLF

CRBKLF is the measure of the amount of curbing in thousand of linear feet which was or is expected to be required in the sitework effort. CRBKLF is used with CRBCST (cost) and CRBMX. The CRBKLF and costs are used to compute the CRBMX factor. Conversely, the CRBMX and CRBKLF are used to compute costs. During calibration, if cost is given, either CRBKLF or CRBACR may be entered. During cost studies or whenever costs are to be calculated, the amount of curbing must be defined by either CRBKLF or CRBACR, but not both! They may cause inconsistent costs.

CRBMX

CRBMX is the curbing factor that is used with the length of curbing as set forth in CRBKLF. CRBMX is used with CRBKLF and CRBCST. If CRBMX and CRBKLF are given, CRBCST will be computed. Conversely, if CRBCST is entered CRBMX will be rendered. CRBMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated, CRBMX or CRBCX must be entered, but not both! They may cause inconsistent costs.

CRBCX and CRBMX may be entered as R to repeat values from a previous box.

The Gutter (GUTTER) Line inputs are:

GUTCST

GUTCST is the gutters cost of a sitework effort. As an input it is used to compute either GUTCX or GUTMX depending on the described work area inputs. If GUTCX or GUTMX is not given, GUTCST is a mandatory input.

GUTACR

GUTACR is the acreage area which was or is expected to have gutters. GUTACR is used with GUTCST and GUTCX. For example, if GUTACR and GUTCX are given, GUTCST will be computed. During calibration, if cost is given either GUTACR and/or GUTKLF can be entered. During cost studies or whenever costs are to be calculated the amount of gutters must be defined by either GUTACR or GUTKLF but not both! They may cause inconsistent costs.

GUTCX

GUTCX is the gutter factor that is associated with area. It is used with GUTACR and GUTCST. If GUTCX and GUTACR are given GUTCST will be computed. Conversely, if GUTCST is entered GUTCX will be calculated. GUTCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated GUTCX or GUTMX must be entered but not both! They may cause inconsistent costs.

GUTKLF

GUTKLF is the length of gutters, in thousands of feet, which was or is expected to be required of the sitework effort. It is used with GUTCST (cost) and GUTMX. The GUTKLF and costs are used to compute the GUTMX factor. Conversely, the GUTMX and GUTKLF are used to compute costs. During calibration, if cost is given either GUTKLF and/or GUTACR may be entered. During cost studies or whenever costs are to be calculated the amount of gutters must be defined by either GUTKLF or GUTACR but not both! They may cause inconsistent costs.

GUTMX

GUTMX is the gutter factor that is associated with the linear measure of gutters set forth in GUTKLF. It is used with GUTKLF and GUTCST. If GUTMX and GUTKLF are given GUTCST will be computed. Conversely, if GUTCST is entered GUTMX will be calculated. GUTMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated GUTMX or GUTCX must be entered but not both! They may cause inconsistent costs.

GUTCX and GUTMX may be entered as R to repeat values from a previous box.

The Fence (FENCE) line inputs are:

FENCST

FENCST is the fencing cost of a sitework effort. As an input it is used to compute either FENCE and/or FENMX depending on the described work area inputs. If FENCX or FENMX is not given, FENCST is a mandatory input.

FENACR

FENACR is the area in acres which was or is expected to be fenced. FENACR is used with FENCST and FENCX. For example, if FENACR and FENCX are given, FENCST will be computed. During calibration if cost is given, either FENACR and/or FENKLF can be entered. During cost studies or whenever costs are to be calculated the fenced area must be defined by either FENACR or FENKLF but not both! They may cause inconsistent costs.

FENCX

FENCX is the FENCING factor that is associated with the area to be fenced. It is used with FENACR and FENCST. If FENCX and FENACR are given FENCST will be computed. Conversely, if FENCST is entered FENCX will be printed out. FENCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated FENCX or FENMX must be entered but not both! They may cause inconsistent costs.

FENKLF

FENKLF is the amount of fencing in thousands of linear feet, which was or is expected to be required of the sitework effort. It is used with FENCST and FENMX. The FENKLF and costs are used to compute the FENMX factor. Conversely, the FENMX and FENKLF are used to compute costs. During calibration, if cost is given either FENKLF and/or FENACR may be entered. During cost studies or whenever costs are to be calculated the amount of fencing must be defined by either FENKLF or FENACR but not both! They may cause inconsistent costs.

FENMX

FENMX is the fencing factor that is associated with the linear measure of fencing given in FENKLF. It is used with FENKLF and FENCST. If FENMX and FENKLF are given FENCST will be computed. Conversely, if FENCST is entered FENMX will be calculated. FENMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated FENMX or FENCX must be entered but not both! They may cause inconsistent costs.

FENCX and FENMX may be entered as R to repeat values from a previous box.

The Road (ROAD) line inputs are:

RDCST

RDCST is the roads cost of a sitework effort. As an input it is used to compute either RDCX and/or RDMX depending on the described work area inputs. If RDCX or RDMX is not given, RDCST is a mandatory input.

RDACR

RDACR is the area in acres which was or is expected to be covered with roads. RDACR is used with RDCST and RDCX. For example, if RDACR and RDCX are given, RDCST will be computed. During calibration if cost is given either RDACR or RDKSF can be entered. During cost studies or whenever costs are to be calculated the road area must be defined by either RDACR or RDKSF but not both! They may cause inconsistent costs.

RDCX

RDCX is the road complexity factor that is associated with the area in acres. It is used with RDACR and RDCST. If RDCX and RDACR are given RDCST will be computed. Conversely, if RDCST is entered RDCX will be calculated. RDCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated RDCX or RDMX must be entered but not both! They may cause inconsistent costs.

RDKSF

RDKSF is the road area, in thousands of linear feet, which was or is expected to be required of the sitework effort. RDKSF is used with RDCST and RDMX. RDKSF and costs are used to compute the RDMX. Conversely, the RDMX and RDKSF are used to compute costs. During calibration, if cost is given either RDKSF or RDACR may be entered. During cost studies or whenever costs are to be calculated the amount of road area must be defined by either RDKSF or RDACR but not both! They may cause inconsistent costs.

RDMX

RDMX is the factor that is associated with the area given by RDKSF. It is used with RDKSF and RDCST. If RDMX and RDKSF are given RDCST will be computed. Conversely, if RDCST is entered RDMX will be calculated. RDMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated RDMX or RDCX must be entered but not both! They may cause inconsistent costs.

RDCX and RDMX may be entered as R to repeat values from a previous box.

The Park (PARK) line inputs are:

PRKCST

PRKCST is the parking area cost of a sitework effort. As an input it is used to compute either PRKCX and/or PRKMX depending on the described work area inputs. If PRKCX or PRKMX is not ENTERED, PRKCST is a mandatory input.

PRKACR

PRKACR is the parking area cost of a sitework effort. PRKACR is used with PRKCST and PRKCX. For example, if PRKACR and PRKCX are ENTERED, PRKCST will be computed. During calibration if cost is given either PRKACR or PRKKSF can be entered. During cost studies or whenever costs are to be calculated the AMOUNT OF PARKING AREA must be defined by either PRKACR or PRKKSF but not both! They may cause inconsistent costs.

PRKCX

PRKCX is the parking factor that is associated with the area when it is in acres. It is used with PRKACR and PRKCST. If PRKCX and PRKACR are given PRKCST will be computed. Conversely, if PRKCST is entered PRKCX will be calculated. PRKCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated PRKCX or PRKMX must be entered but not both! They may cause inconsistent costs.

PRKKSF

PRKKSF is the parking area in thousands of square feet which was or is expected to be required as part of the sitework effort. It is used with PRKCST (cost) and PRKMX. The PRKKSF and costs are used to compute the PRKMX (factor). Conversely, the PRKMX and PRKKSF are used to compute costs. During calibration, if cost is given either PRKKSF and/or PRKACR may be entered. During cost studies or whenever costs are to be calculated the amount of parking area must be defined by either PRKKSF or PRKACR but not both! They may cause inconsistent costs.

PRKMX

PRKMX is the parking factor that is associated with the area given by PRKKSF. It is used with PRKKSF and PRKCST. If PRKMX and PRKKSF are given PRKCST will be computed. Conversely, if PRKCST is entered PRKMX will be calculated. PRKMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated PRKMX or PRKCX must be entered but not both! They may cause inconsistent costs.

PRKCX and PRKMX may be entered as R to repeat values from a previous box.

The Special (SPECIAL) line inputs are:

SPCCST

SPCCST is the cost of special sitework effort. As an input it is used to compute either SPCCX or SPCMX depending on the described work area inputs. If SPCCX or SPCMX is not given, SPCCST is a mandatory input.

SPCACR

SPCACR is the area in acres which was or is expected to involve special sitework efforts such as small bridges, culverts, etc. SPCACR is used with SPCCST and SPCCX. For example, if SPCACR and SPCCX are given, SPCCST will be computed. During calibration if cost is given either SPCACR or SPCKSF can be entered. During cost studies or whenever costs are to be calculated the area requiring special work must be defined by either SPCACR or SPCKSF but not both! They may cause inconsistent costs.

SPCCX

SPCCX is the factor that is associated with special site effort when the area is entered in acres. It is used with SPCACR and SPCCST. If SPCCX and SPCACR are given SPCCST will be computed. Conversely, if SPCCST is entered SPCCX will be calculated. SPCCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated SPCCX or SPCMX must be entered but not both! They may cause inconsistent costs.

SPCKSF

SPCKSF is the area involving special items which was or is expected to be required in the sitework effort. It is used with SPCCST and SPCMX. The SPCKSF and costs are used to compute the SPCMX. Conversely, SPCMX and SPCKSF are used to compute costs. During calibration, if costs are given, either SPCKSF or SPCACR may be entered. During costs studies or whenever costs are to be calculated, the special areas must be defined by either SPCKSF or SPCACR but not both! They may cause inconsistent results.

SPCMX

SPCMX is the factor that is associated with special site effort when the area is entered in square feet. It is used with SPCKSF and SPCCST. If SPCMX and SPCKSF are given SPCCST will be computed. Conversely, if SPCCST is entered SPCMX will be calculated. SPCMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated SPCMX or SPCCX must be entered but not both! They may cause inconsistent costs.

SPCCX and SPCMX may be entered as R to repeat values from a previous box.

The Comment (COMMENT) input lines are:

Up to five COMMENT Lines of 72 characters each are allowed per ITEM between the FILETYPE and END Lines. Each COMMENT Line must begin with a signature word of C followed by a space. COMMENT lines will be printed out at the end of all output requested on the FORMAT line. The COMMENT line is an optional input line.

The End (END) line inputs are:

CONTIN	1 =	There are additional items under the current PROJECT.
	0 =	There are no additional items in the current PROJECT.
ADD	1 =	Item to be accumulated under the PROJECT total.
	0 =	No unit accumulation.

Figure 3-1 is an example of a Site Detail Input form.

Figure 3-2 is an example of a Site Detail output.

***** FAST-C *****

PROJECT: TEST.UNIT.2
LOCATION: CHERRY HILL,N.J.
ITEM: SITE2
SEE COMMENTS

DATE: WED, APR 17 1985 13:59:0
FILENAME: TEST.83
ECONFILE:

***** ITEM COST *****

UNITS= $1000	BASIC	SCHED PENALTY	TOTAL COST
SITEWORK	10,427.2	0.0	10,427.2

***** COST UNCERTAINTY DISTRIBUTION *****

	-FROM-	70% -TO-	-FROM-	80% -TO-	-FROM-	90% -TO-
SITE	9,482	11,373	8,929	11,926	8,144	12,711

***** INPUT DATA *****

	TOTAL	SITE	BLDG	ENG	
FILETYPE	O	D	O	O	
	AL	COST	UNCERT	INPUT	
FORMAT	:	O	O	O	
	SI DEX	PINDEX	ESCAL	GECON	TYEAR
GLOBAL	1.000	0.900	1.000	F	1983
	SSTART	SFIN	SSCHDX	SYEARC	SDISC
SITESCHD	JUN.1982	JUL.1983	61.782*	1983*	0.066*
	DEMCST	DEMACR	DEMCX	DEMKSF	DEMMX
DEMOL	34.1*	150.00	10.310	0	0.000
	EXCCST	EXCACR	EXCCX	EXCCYD	EXCMX
EXCAV	1.5*	10.00	5.190	0	0.000
	TRNCST	TRNACR	TRNCX	TRNKLF	TRNMX
TRENCH	500.0	0.00	0.000	50	0.579*
	DRNCST	DRNACR	DRNCX	DRNKLF	DRNMX
DRAIN	100.0	5.00	999.863*	0	0.000
	CLRCST	CLRACR	CLRCX	CLRKSF	CLRMX
CLEARING	2.1*	10.00	7.520	0	0.000
	LNDCST	LNDACR	LNDCX	LNDKSF	LNDMX
LANDSCPE	95.0	0.00	0.000	67	0.071*
	WLKCST	WLKACR	WLKCX	WLKKSF	WLKMX
WALK	3,632.2*	0.00	0.000	31	8.120
	CRBCST	CRBACR	CRBCX	CRBKLF	CRBMX
CURB	15.5	2.00	327.045*	0	0.000
	GUTCST	GUTACR	GUTCX	GUTKLF	GUTMX
GUTTER	4,215.1*	0.00	0.000	45	6.580
	FENCST	FENACR	FENCX	FENKLF	FENMX
FENCE	45.0	5.00	418.435*	0	0.000
	RDCST	RDACR	RDCX	RDKSF	RDMX
ROAD	1,567.6*	0.00	0.000	15	6.710
	PRKCST	PRKACR	PRKCX	PRKKSF	PRKMX
PARK	109.0	0.00	0.000	65	0.084*
	SPCCST	SPCACR	SPCCX	SPCKSF	SPCMX
SPECIAL	110.0	3.00	1,849.037*	0	0.000
	CONTIN	ADD			
END	1	1			

***** COMMENTS *****

SITE DETAIL INPUT SHEET EXAMPLE

Figure 3-2 Site Detail Output

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***** FAST-C *****

PROJECT: TEST.UNIT.2
LOCATION: CHERRY HILL.N.J.
ITEM: SITE2
SEE COMMENTS

DATE: TUE. AUG 14 1984 14:02:08
FILENAME: TEST.83
ECONFILE:

***** ITEM COST *****

UNITS- $1000	BASIC	SCHED PENALTY	TOTAL COST
SITEWORK	10,427.2	0.C	10,427.2

***** COST UNCERTAINTY DISTRIBUTION *****

	-FROM-	70% -TO-	-FROM-	80% -TO-	-FROM-	90% -TO-
SITE	9,482	11,373	8,929	11,926	8,144	12,711

***** INPUT DATA *****

	TOTAL	SITE	BLDG	ENG	
FILETYPE	0	D	0	0	
	ALL	COST	UNCERT	INPUT	
FORMAT	1	C	C	C	
	SINDEX	PINDEX	ESCAL	GECON	TYEAR
GLOBAL	1.00	C.90	1.0C	F	1983
	SSTART	SFIN	SSCHDX	SYEARC	
SITESCHD	JUN.1982	JUL.1983	61.782*	1983*	
	DEMCST	DEMACR	DEMCX	DEMKSF	DEMMX
DEMOL	34.1*	150.0C	1C.31C	0.0C	0.000
	EXCCST	EXCACR	EXCCX	EXCCYD	EXCMX
EXCAV	1.5*	10.0C	5.19C	0.0C	0.000
	TRNCST	TRNACR	TRNCX	TRNKLF	TRNMX
TRENCH	500.C	0.0C	C.00C	50.0C	0.579*
	DRNCST	DRNACR	DRNCX	DRNKLF	DRNMX
DRAIN	100.C	5.0C	999.863*	0.0C	0.000
	CLRCST	CLRACR	CLRCX	CLRKSF	CLRMX
CLEAR	2.1*	10.0C	7.52C	0.0C	0.000
	LNDCST	LNDACR	LNDCX	LNDKSF	LNDMX
LANDSCPE	95.C	0.0C	C.00C	66.7C	0.071*
	WLKCST	WLKACR	WLKCX	WLKKSF	WLKMX
WALK	3,632.2*	0.0C	C.00C	31.0C	8.120
	CRBCST	CRBACR	CRBCX	CRBKLF	CRBMX
CURB	15.5	2.0C	327.045*	0.0C	0.000
	GUTCST	GUTACR	GUTCX	GUTKLF	GUTMX
GUTTER	4,215.1*	0.0C	C.00C	45.0C	6.580
	FENCST	FENACR	FENCX	FENKLF	FENMX
FENCE	45.C	5.0C	418.435*	0.0C	0.000
	RDCST	RDACR	RDCX	RDKSF	RDMX
ROAD	1,567.6*	0.0C	C.00C	15.0C	6.710
	PRKCST	PRKACR	PRKCX	PRKKSF	PRKMX
PARK	109.C	0.0C	C.00C	65.0C	0.084*
	SPCCST	SPCACR	SPCCX	SPCKSF	SPCMX
SPECIAL	110.C	3.0C	1,849.037*	0.0C	0.000
	CONTIN	ADD			
END	1	1			

***** COMMENTS *****

SITE DETAIL INPUT SHEET EXAMPLE

Figure 3-2. Site Detail Output

FAST-C
SITE TOTAL INPUT

PROJECT TEST UNIT 2
LOCATION CHERRY HILL, N.J.
ITEM SITE FOR BLDG 2

FILETYPE	0 (TOTAL)	T (SITE)	0 (BLDG)	0 (BNG)	
FORMAT	1 (ALL)	(COST)	(UNCERT)	(INPUT)	
GLOBAL	1 (BINDEX)	1 (PINDEX)	1 (ESCAL)	F (GECON)	1983 (TYEAR)
SITECOST	0 (SCOST)	110 (SACRES)	109.45 (SITEMX)		
SITESCHD	JUN. 1982 (SSTART)	0 (SFIN)	124.5 (SSCHDX)		
END	1 (CONTIN)	1 (ADD)			

Figure 3-3. Site Total Input

3.6 FAST-C SITE TOTAL INPUT (Form FPS-8)

This input form covers Sitework described in a total or macro manner. The sitework effort is related to the total acres that are involved. It's schedules are also covered. It is used to compute sitework reference factors or site costs and schedules that may be variant due to scope of work changes. It can exercise the global and economic factors to show their effects on costs and schedules. The SITE TOTAL form can be used to accumulate a specific sitework effort.

All input lines after PROJECT and LOCATION are mandatory.

Site areas are measured in terms of ACRES only. Therefore only SITEMX can be used.

Except for the ITEM, FILETYPE and END lines, the FORMAT, GLOBAL, SITECOST and SITESCHD lines can be entered in a random or unsequenced fashion.

SITEMX can be generated by a calibration process or through the use of the auxiliary models COSTMX and/or CALCMX.

The PROJECT and LOCATION lines must be entered only one time for a particular program or project. Each may have up to 24 characters including spaces. There may be as many Projects per file as desired. For example:

PROJECT TEST PROGRAM NO. 1

LOCATION CHERRY HILL, NEW JERSEY

The ITEM line must be entered as the first line of an item to be processed. It can be descriptive and may have up to 24 characters, including spaces. There may be as many individual item boxes as desired per Project.

ITEM SAMPLE ITEM NO. 1

The FILETYPE line must always be entered following an ITEM line. It is used to indicate, to the program, the type of item that is to follow. If omitted, an error statement will be issued and, in most cases, a real time recovery input will be possible.

The Filetype (FILETYPE) line inputs are:

TOTAL	1 = TOTAL PROJECT INPUT (FPS-12)	
	0 = NOT APPLICABLE	(Use for this input sheet)
SITE	T = SITE TOTAL INPUT (FPS-8)	(Use for this input sheet)
	D = SITE DETAIL INPUT (FPS-7)	
	0 = NOT APPLICABLE	
BLDG	T = BLDG TOTAL INPUT (FPS-10)	
	D = BLDG DETAIL INPUT (FPS-9)	
	0 = NOT APPLICABLE	
ENG	1 = ENG AND PROJECT MANAGEMENT INPUT (FPS-11)	
	0 = NOT APPLICABLE	

The Output Format (FORMAT) line inputs are:

ALL	1 = Print all possible outputs for this Item. These include the Cost, Uncertainty and Input variables.
	0 = Choose the desired outputs from the following options.
COST	1 = Print the Calculated or Input Costs.
	0 = Do not print the Calculated or Input Costs.
UNCERT	1 = Print the Uncertainty or Risk output.
	0 = Do not print the Uncertainty or Risk output.
INPUT	1 = Print the Input Variables showing the Input, Calculated and Repeat values.
	0 = Do not print the Input Variables.

The Global (GLOBAL) line inputs are:

SINDEX

SINDEX is the site index factor. It is used to indicate the adjustments that must be made to labor and material costs because of the locale of the work. Because of its location, each area will have unique costs adjustments attributable to costs of transportation, area labor supplies, environmental factors, etc. There are many published tables reflecting such site factors with respect to a standard such as Middletown, USA or New York. SINDEX is a decimal value input such as 0.95. See Table 4-15.

PINDEX

PINDEX is the productivity index. It is used to indicate the level of labor productivity or additional costs attributable to site local conditions. Its value is the decimal equivalent of a normal eight (8) hour compensation. For example, extra travel time costs, a limited radiation working area, working conditions or labor unrest may affect the productivity index. A normal eight hour work day is entered as 1. If workers are paid eight hours for four hours of actual work, the productivity index would be 0.5.

ESCAL

ESCAL is the economic factor that specifies the inflation values to be applied to costs. ESCAL has two ranges of values, 0 or 1. The value 0 means no escalation from the first of the year when the work was started; 1 means that the standard yearly rates that are built into the model or read from an Economic file should be applied. An ESCAL value that is greater than 0 and less than 1 for example, 0.10 means that the decimal value is a constant economic rate to be applied for all performance years commencing with the engineering start year, ESTART.

GECON

GECON is used to define costs as of a Constant year, Present value or Final value. An entry of a Year, ie 1984, will cause the costs to be computed as of the end of the year. An entry of P will cause the costs to be computed as of the start month and year, ie MAY.1984, with no subsequent escalation. F is entered to escalate costs through the end of each schedule.

TYEAR

TYEAR is the technological year. It is used to indicate the technological currency of the techniques such as equipments and resources that will be used. More current methods may improve costs.

All variables may be entered as R to repeat values from a previous box.

The Site Cost (SITECOST) line inputs are:

SCOST

SCOST is the sitework total cost in thousands of dollars. As an input it is used to compute the SITEMX factor. If it is not entered (=0) it is computed by the use of SITEMX and the site acres SACRES. SCOST is a mandatory input when SITEMX is not known.

SACRES

SACRES is the size of the sitework area in acres. It is used for the computation of SCOST or SITEMX. SACRES is always a mandatory input. It may have a decimal value.

SITEMX

SITEMX is the sitework complexity factor. SITEMX is used with the site area size (SACRES) to compute the total sitework cost. SITEMX can be calculated in several ways - using the main model FAST-C or the auxiliary models COSTMX or CALCMX. SITEMX must be 0 if SCOST is entered and must be entered if SCOST is not given.

SITEMX may be entered as R to repeat a value from a previous box.

The Site Schedule (SITESCHD) line inputs are:

SSTART

SSTART is the start date of sitework effort. SSTART is a mandatory input for all calculation and cost studies. SSTART is input in MMM.YYYY form where MMM is the first three letters of the month and YYYY is the Year. SSTART may be input as MAY.1984 or MAY.84.

SFIN

SFIN is the date which sitework was or is expected to be finished. SFIN is entered in the same format as SSTART. During calibration SFIN must be given if GECON is F. SSTART and SFIN will be used to calculate SSCHDX whenever SSCHDX is entered as 0. If SSCHDX has a parametric value, SFIN is an optional input. IF SFIN and SSCHDX are input in a cost study, FAST-C will render appropriate schedule penalties for apparent accelerations or stretch-outs. However, if SSCHDX or SFIN is not given, cost studies will not be able to compute penalty costs.

SSCHDX

SSCHDX is the sitework schedule factor. It is used to adjust the FAST-C schedule computation so that it will agree with schedules suggested by empirical references. If a performance schedule is input and SSCHDX = 0, the SSCHDX value will be calculated. If a finish date is not entered, the SSCHDX value must be entered. SSCHDX set to 100 will render a FAST-C schedule without empirical adjustments. When both performance schedules and SSCHDX are entered in a cost study, the model will be able to calculate schedule penalty costs. In cost studies where performance schedules are given and SSCHDX = 0, the model will print a message that it will not be able to compute penalty costs.

SSCHDX may be entered as R to repeat a value from a previous box.

The Comment (COMMENT) input lines are:

Up to five COMMENT Lines of 72 characters each are allowed per ITEM between the FILETYPE and END Lines. Each COMMENT Line must begin with a signature word of C followed by a space. COMMENT lines will be printed out at the end of all output requested on the FORMAT line. The COMMENT line is an optional input line.

The End (END) line inputs are:

CONTIN 1 = There are additional items under the current PROJECT.

0 = There are no additional items in the current PROJECT.

ADD 1 = Item to be accumulated under the PROJECT total.

0 = No unit accumulation.

Figure 3-3 is an example of a Site Total input form.

Figure 3-4 is an example of a Site Total output.

1 2 1 2 4 9 8 1 1 0 2

```
                          ***** FAST-C *****

PROJECT:  TEST.UNIT.2                          DATE: TUE, AUG 14 1984  14:01
LOCATION: CHERRY HILL,N.J.                     FILENAME: TEST.83
ITEM:     SITE FOR BLDG2                       ECONFILE:
          SEE COMMENTS

                          ***** ITEM COST *****

 UNITS= $1000                    BASIC  SCHED PENALTY      TOTAL COST
   SITEWORK                      218.6          0.0            218.6

                  ***** COST UNCERTAINTY DISTRIBUTION *****

          -FROM-  70% -TO-        -FROM-  80% -TO-        -FROM-  90% -TO-
SITE        214        223          211        226          208        230

                          ***** INPUT DATA *****

                   TOTAL        SITE         BLDG         ENG
 FILETYPE           0            T            0            0
                   ALL          COST         UNCERT       INPUT
 FORMAT             1            C            C            C
                   SINDEX       PINDEX       ESCAL        GECON        TYEAR
 GLOBAL            1.00         1.00         1.00         F            1983
                   SCOST        SACRES       SITEMX
 SITECOST          218.6*       118.000      109.450
                   SSTART       SFIN         SSCHDX       SYEARC
 SITESCHD        JUN.1982     AUG.1983*      124.500      1983*
                   CONTIN       ADD
 END                    1            1

                          ***** COMMENTS *****

SITE TOTAL INPUT SHEET EXAMPLE
```

Figure 3-4. Site Total Output

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```
                          ***** FAST-C *****

PROJECT:   TEST.UNIT.2                          DATE: WED. APR 17 1985   13:58:36
LOCATION:  CHERRY HILL,N.J.                     FILENAME: TEST.83
ITEM:      SITE FOR BLDG2                       ECONFILE:
           SEE COMMENTS

                          ***** ITEM COST *****

  UNITS= $1000                      BASIC  SCHED PENALTY     TOTAL COST
    SITEWORK                        218.6            0.0          218.6

                  ***** COST UNCERTAINTY DISTRIBUTION *****

          -FROM-  70% -TO-        -FROM-  80% -TO-        -FROM-  90% -TO-
SITE        214        223          211        226          208        230

                          ***** INPUT DATA *****

                    TOTAL        SITE         BLDG         ENG
  FILETYPE           0            T            0            0
                    ALL          COST         UNCERT       INPUT
  FORMAT             1            0            0            0
                    SINDEX       PINDEX       ESCAL        GECON        TYEAR
  GLOBAL            1.000        1.000         1.000        F           1983
                    SCOST        SACRES       SITEMX
  SITECOST           218.6*      110.000      109.450
                    SSTART       SFIN         SSCHDX       SYEARC       SDISC
  SITESCHD        JUN.1982    AUG.1983*       124.500       1983*       0.066*
                    CONTIN       ADD
  END                    1          1

                          ***** COMMENTS *****

SITE TOTAL INPUT SHEET EXAMPLE
```

Figure 3-4 Site Total Output

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FAST-C
BUILDING DETAIL INPUT

PROJECT: TEST UNIT 2
LOCATION: CHERRY HILL, NJ
ITEM: BUILDING 1

FILETYPE	0 TOTAL	0 SITE	D BLDG	0 ENG	
FORMAT	1 ALL	COST	UNCERT	INPUT	
FACTOR	12 AVHT	0 KCUFT	30 TRNPSF	5 NLEVEL	10 SUBKSF
GLOBAL	0.9 SINDEX	1.2 PINDEX	1 ESCAL	F GECON	1983 TYEAR
PLATFORM	1 SEISM	1.1 TORNAD	1.02 RADIAT	1.12 BLDUSE	PLTFM
EXCAV	0 EXCCST	10 EXCACR	7.1 EXCCX	EXCCYD	EXCMX
STRUCT	0 STRCST	100 STRKSF	6.71 STRMX		
HVAC	0 HVCST	50 HVKSF	3.79 HVMX		
ELMECH	150 EMCST	100 EMKSF	EMMX		
BLDSCHD	JUN. 1983 BSTART	0 BFIN	100 BSCHDX		
UTILCOST	0 UTCOST	50 UTKSF	7.36 UTMX		
UTSCHD	JUN. 1983 USTART	JUL. 1985 UFIN	USCHDX		
END	1 CONTIN	1 ADD			

Figure 3-5. Building Detail Input

3.7 FAST-C BUILDING DETAIL INPUT (Form FPS-9)

This form is used to process a building/construction effort and/or utilities. The building effort is described by four principal elements: excavation; structure; heat, ventilation and air conditioning; and electromechanical systems. The procedure can be used to generate applicable reference factors as well as to compute costs and schedules. The form can also be used to cause the accumulation of its costs with other project items.

The reference factors used in BUILDING DETAIL can be detailed to a finer degree through the use of one or more of the following auxiliary models.

COSTMX - Calculate a specified factor for a described input effort or cost.

CALCMX - Calculate a specific factor for a group of desired effort or costs, including the superstructure.

INTMX - Calculate an MX factor that represents the interior finishes of a building such as floors, walls, ceilings, partition, etc.

EXTMX - Calculate an MX factor that represents the exterior finishes of a building such as exterior walls, roofing, and connecting walls. Factors representing varying mixtures of exterior walls, roofs, etc., can be generated using CALCMX.

STRMX - Calculate the structure MX factor through the integration of MX factors representing the superstructure, interior mix and exterior mix.

EMMX - Calculate the electromechanical MX factor through the integration of factors that represent the following components:

a. Electrical mix (ELECMX)

b. Mechanical mix (MECHMX)

c. Plumbing mix (PLUMMX)

d. Piping mix (PIPMX)

e. Special mix (SPECMX)

Sub-items(a) through (e) are generated through the use of CALCMX and/or COSTMX.

The SPECMX factor covers building features such as escalators, elevators, conveyors, etc.

The FILETYPE, FACTOR, GLOBAL and PLATFORM lines are mandatory inputs. If building elements are all not entered the PLATFORM and FACTOR lines may be omitted.

The FILETYPE line must follow the ITEM Line.

When building elements are entered, the BLDSCHD line must be given.

If UTCOST line is entered the UTSCHD line must be given.

When not applicable, work element lines can be omitted. They also may be entered into the file in random sequence between the FILETYPE and END lines.

The CX and MX factors can be generated or modified by the use of the auxiliary models COSTMX and CALCMX.

The PROJECT and LOCATION lines must be entered only one time for a particular program or project. Each may have up to 24 characters including spaces. There may be as many Projects per file as desired. For example:

PROJECT	TEST PROGRAM NO. 1
LOCATION	CHERRY HILL, NEW JERSEY

The ITEM line must be entered as the first line of an item to be processed. It can be descriptive and may have up to 24 characters, including spaces. There may be as many individual item boxes as desired per Project.

ITEM	SAMPLE ITEM NO. 1

The FILETYPE line must always be entered following an ITEM line. It is used to indicate, to the program, the type of item that is to follow. If omitted, an error statement will be issued and, in most cases, a real time recovery input will be possible.

The Filetype (FILETYPE) line inputs are:

TOTAL	1 = TOTAL PROJECT INPUT (FPS-12)	
	0 = NOT APPLICABLE	(Use for this input sheet)
SITE	T = SITE TOTAL INPUT (FPS-8)	
	D = SITE DETAIL INPUT (FPS-7)	
	0 = NOT APPLICABLE	(Use for this input sheet)

BLDG T = BLDG TOTAL INPUT (FPS-10)
D = BLDG DETAIL INPUT (FPS-9) (Use for this input sheet)
0 = NOT APPLICABLE

ENG 1 = ENG AND PROJECT MANAGEMENT INPUT (FPS-11)
0 = NOT APPLICABLE

The Output Format (FORMAT) line inputs are:

ALL 1 = Print all possible outputs for this Item. These include the Cost, Uncertainty and Input variables.

0 = Choose the desired outputs from the following options.

COST 1 = Print the Calculated or Input Costs.

0 = Do not print the Calculated or Input Costs.

UNCERT 1 = Print the Uncertainty or Risk output.

0 = Do not print the Uncertainty or Risk output.

INPUT 1 = Print the Input Variables showing the Input, Calculated and Repeat values.

0 = Do not print the Input Variables.

The Factor (FACTOR) line inputs are:

AVHT

AVHT is the average height, in feet, of the room areas of a building. It represents the dimension between floor decks - that does not include plenums or false floors or false ceilings. AVHT may be calculated by dividing the total building cubic volume by its total floor area (SFT).

AVHT is used to develop a "MX" value that eliminates the effect of room heights on a building's cost or its applicable MX factor (a normalized value of 10 feet is assumed for the MX).

KCUFT

KCUFT is the total volume of a building in thousands of cubic feet. It is used with the size of the building (square feet) to determine the average room height. Its purpose or use is the same as described for AVHT. If AVHT and KCUFT are both given values, the AVHT will govern.

TRNPSF

TRNPSF is the tornado or wind pressure in pounds per square foot. It represents the forces that affect the exterior surfaces of a building as a function of the resulting inward and outward pressures. It also involves protection from "missile" penetrations such as debris tossed about by the winds. TRNPSF provides for the introduction of such design and costing considerations.

TRNPSF is used to develop a "MX" value that strips away the effect of tornado or wind pressures on external surfaces. A normalized value of 10 pounds per square foot is assumed for the MX.

TRNPSF can be determined as follows:

1. Examine the map in Table 4-11 to determine the geographical section where the project will be located.

2. From the map determine the appropriate wind pressure.

3. Use Tables 4-5 through 4-7 as appropriate to adjust the wind pressure based on the:

   building size
   building shape
   whether the structure is a radio tower or trussed towers.

For example: a hexagonal tower that is 125 feet high is located in Kansas.

Kansas (PSF) (Map in Table 4-11) = 30
Building Height Factor (Table 4-5) = 45
Horizontal Section (Hexagonal) (Table 4-6) = 0.80

Therefore TRNPSF = 45 x 0.80 = 36

NLEVEL

NLEVEL is the number of floors or levels of a building including its sub-basements. It conveys the construction effort involved without affecting the total floor area. NLEVEL is used to develop a "MX" value that strips away the effect on costs because of the number of floors or levels. A normalized value of "1" is assumed for the MX.

NLEVEL is an optional input.

SUBKSF

SUBKSF is the number of thousands of square feet below surface level. It indicates the amount of area not affected by Tornado (PSF). SUBKSF is used to develop a "MX" value that strips away the effect on costs by virtue of the square feet below the surface level. If SUBKSF is not input, a value of 0 is assumed.

The Global (GLOBAL) line inputs are:

SINDEX

SINDEX is the site index factor. It is used to indicate the adjustments that must be made to labor and material costs because of the locale of the work. Because of its location, each area will have unique costs adjustments attributable to costs of transportation, area labor supplies, environmental factors, etc. There are many published tables reflecting such site factors with respect to a standard such as Middletown, USA or New York. SINDEX is a decimal value input such as 0.95. See Table 4-15.

PINDEX

PINDEX is the productivity index. It is used to indicate the level of labor productivity or additional costs attributable to site local conditions. Its value is the decimal equivalent of a normal eight (8) hour compensation. For example, extra travel time costs, a limited radiation working area, working conditions or labor unrest may affect the productivity index. A normal eight hour work day is entered as 1. If workers are paid eight hours for four hours of actual work, the productivity index would be 0.5.

ESCAL

ESCAL is the economic factor that specifies the inflation values to be applied to costs. ESCAL has two ranges of values, 0 or 1. The value 0 means no escalation from the first of the year when the work was started; 1 means that the standard yearly rates that are built into the model or read from an Economic file should be applied. An ESCAL value that is greater than 0 and less than 1 for example, 0.10 means that the decimal value is a constant economic rate to be applied for all performance years commencing with the engineering start year, ESTART.

GECON

GECON is used to define costs as of a Constant year, Present value or Final value. An entry of a Year, ie 1984, will cause the costs to be computed as of the end of the year. An entry of P will cause the costs to be computed as of the start month and year, ie MAY.1984, with no subsequent escalation. F is entered to escalate costs through the end of each schedule.

TYEAR

TYEAR is the technological year. It is used to indicate the technological currency of the techniques such as equipments and resources that will be used. More current methods may improve costs.

All variables may be entered as R to repeat values from a previous box.

The Platform (PLATFORM) line variables are:

SEISM TORNAD RADIAT BLDUSE PLTFM

If PLTFM is given (not equal to 0) it must have a value that is greater or equal to 1.0. It must not have a value greater than 2.0 For such cases, all other PLATFORM variables must be set to 0. For example:

PLATFORM 0 0 0 0 1.1

A violation will result in an error message, with a recovery opportunity.

If PLTFM is not known or equal to 0, all other variables (SEISM, TORNAD, RADIAT and BLDUSE) must have a value of at least 1.0. For example:

PLATFORM 1.05 1.1 1.12 1.075

It is important to note that the SEISM, TORNAD, and RADIAT values are computed parameters and not the values of environmental conditions. BLDRAD and SEITORN models must be used to calculate their appropriate factors.

All variables may be entered as R to repeat values from a previous box.

The Excavation (EXCAV) line inputs are:

EXCCST

EXCCST is the excavation cost of a sitework effort. As an input EXCCST is used to compute either EXCCX and/or EXCMX depending on the described work area inputs. If EXCCX or EXCMX is not given, EXCCST is a mandatory input.

EXCACR

EXCACR is the area in acres which was or is expected to be excavated. EXCACR is used with EXCCST (cost) and EXCCX (factor). For example if EXCACR and EXCCX are given, EXCCST will be computed. During calibration, if cost is given either EXCACR and/or EXCCYD can be entered. During cost studies or whenever costs are to be calculated the excavated area must be defined by either EXCACR or EXCCYD, but not both! They may cause inconsistent costs.

EXCCX

EXCCX is the excavation factor to be used with the EXCAV. EXCCX is used with EXCACR and EXCCST. If EXCCST and EXCACR are given EXCCST will be computed. Conversely, if EXCCST is entered EXCCX will be rendered. EXCCX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated EXCCX or EXCMX must be entered but not both! They may cause inconsistent costs.

EXCCYD

EXCCYD is the volume to be excavated in cubic yards. EXCCYD is used in the computation of the excavation costs whether for buildings or sitework. EXCCYD is used with EXCMX to compute EXCCST or with EXCCST to compute EXCMX.

EXCMX

EXCMX is the EXCAVATION factor to be used with the volume defined by EXCCYD. EXCMX is used with EXCCST and EXCCYD. If EXCMX and EXCCYD are given EXCCST will be computed. Conversely, if EXCCST is entered EXCMX will be printed out. EXCMX can also be calculated by using the auxiliary models COSTMX or CALCMX. When costs are to be calculated EXCMX or EXCCX must be entered but not both! They may cause inconsistent costs.

EXXCX and EXCMX may be entered as R to repeat values from a previous box.

The Structure (STRUCT) Line inputs are:

STRCST

STRCST is the cost of a building's structures in thousands of dollars. As an input it is used to compute the STRMX factor. If it is not entered (=0) it is computed by the use of the appropriate building area (STRKSF) and the STRMX factor. (Note: other variables such as PLTFM, FACTOR, GLOBAL, etc. will affect the calculated STRCST and STRMX.) STRCST is a mandatory input when STRMX is not known. Alternatively, either STRCST or STRMX may be 0 during calibration or cost studies.

STRKSF

STRKSF is the building area, in thousands of square feet, applicable to structural costs and factors. When STRUCT is used, STRKSF is a mandatory input and it may have a decimal value.

STRMX

STRMX is the building's structural complexity factor. It is also the name of the auxiliary model that is used to generate the STRMX value from "macro" and "micro" details. In FACT-C, STRMX is used with the appropriate building area (STRKSF) to compute the structural costs. If STRCST is not given - STRMX is a mandatory input. The STRMX auxiliary model integrates three factors, INTMX (Interior), EXTMX (Exterior) and SUPSTR (Superstructure), to generate the STRMX parameter.

STRMX may be entered as R to repeat a value from a previous box.

The Heat, Ventilation and Air Conditioning (HVAC) Line inputs are:

HVCST

HVCST is the cost of building's heating, ventilating and air conditioning in thousands of dollars. As an input it is used to compute the HVMX factor. If it is not entered (=0) it is computed by the use of the appropriate building area HVKSF and the HVMX factor. Note: other variables such as PLTFM, FACTOR, GLOBAL, etc. will affect the calculated HVMX and HVCST value. HVCST is a mandatory input when HVMX is not known. Alternatively, either HVMX or HVCST may be 0 during calibration or cost studies.

HVKSF

HVKSF is the building area in thousands of square feet applicable to the heating, ventilating and air conditioning costs and factors. When HVAC is used, HVKSF is a mandatory input and it may have a decimal value.

HVMX

HVMX is the heating, ventilating and air conditioning complexity factor. It is used with HVKSF (the appropriate building area) to compute the HVAC costs (other variables, such as PLTFM, FACTOR, SINDEX, PINDEX, etc., can affect the cost computation). HVMX can be computed through FAST-C calibration or through the use of the COSTMX and/or CALCMX auxiliary models.

HVMX may be entered as R to repeat a value from a previous box.

The Electromechanical (ELMECH) line inputs are: .

EMCST

EMCST is the cost of a building's electromechanical construction in thousands of dollars. As an input value it is used to compute the EMMX factor. If it is not entered (=0) it is computed by the use of the applicable building area EMKSF and the EMMX factor.

EMKSF

EMKSF is the building area in thousands of square feet which the electromechanical aspects are applicable. EMKSF is used with EMCST and/or EMMX to calculate costs or the reference factor. EMKSF is a mandatory input.

EMMX

EMMX is the building electromechanical complexity factor. It also is the name of the auxiliary model that is used to generate the EMMX value from macro and micro details. In FAST-C EMMX is used with the appropriate building area (EMKSF) to compute electromechanical costs. If EMCST is not given, EMMX is a mandatory input. The EMMX auxiliary model integrates five factors to generate the EMMX parameters. These are

electrical (ELECMX), mechanical (MECHMX), plumbing (PLUMMX), piping (PIPMX) and special (SPECMX).

EMMX may be entered as R to repeat a value from a previous box.

The Building Schedule (BLDSCHD) line inputs are:

BSTART

BSTART is the start date of a Building's construction. BSTART is a mandatory input for all calculation and cost studies. BSTART is input in MMM.YYYY form where MMM is the first three letters of the month and YYYY is the Year. BSTART may be input as MAY.1984 or MAY.84.

BFIN

BFIN is the date which building construction was or is expected to be finished. BFIN is entered in the same format as BSTART. During calibration BFIN must be given if GECON is F. BSTART and BFIN will be used to calculate BSCHDX whenever BSCHDX is entered as 0. In cost studies if BSCHDX has a parametric value, BFIN is an optional input. If BFIN and BSCHDX are input in a cost study, FAST-C will render appropriate schedule penalties for apparent accelerations or stretch-outs. However, if BSCHDX or BFIN are not given, cost studies will not be able to compute penalty costs.

BSCHDX

BSCHDX is the building construction schedule factor. It is used to adjust the FAST-C schedule computation so that it will agree with schedules suggested by empirical references. If a performance schedule is input and BSCHDX = 0, the BSCHDX value will be calculated. If a finish date is not entered, the BSCHDX value must be entered. BSCHDX set to 100 will render a FAST-C schedule without empirical adjustments. When both performance schedules and BSCHDX are entered in a cost study, the model will be able to calculate schedule penalty costs. In cost studies where performance schedules are given and BSCHDX = 0, the model will print a message that it will not be able to compute penalty costs.

BSCHDX may be entered as R to repeat a value from a previous box.

The Utility Cost (UTILCOST) line inputs are:

UTCOST

UTCOST is the cost of utilities. As an input, UTCOST is used to compute the UTMX factor. If it is not entered (=0), it is computed by the use of the appropriate sizing value, UTKSF and reference factor UTMX. UTCOST is a mandatory input when UTMX is not known. Alternatively, either UTCOST or UTMX may be 0 during calibration or cost studies.

UTKSF

UTKSF is the area, in thousands of square feet toward which the

utilities are applicable. UTKSF could the total building or construction area which caused the need for the utilities. UTKSF is a mandatory input when utilities are to be processed. It may have a decimal value.

UTMX

UTMX is the utilities complexity factor. It is used with UTKSF (the appropriate construction area) to compute the cost of utilities. UTMX can be calculated by the FAST-C calibration procedures or through the use of the auxiliary models COSTMX or CALCMX. UTMX is a mandatory input whenever UTCOST = 0.

UTMX may be entered as R to repeat a value from a previous box.

The Utility Schedule (UTSCHD) line inputs are:

USTART

USTART is the start date of Utility construction. USTART is a mandatory input for all calculation and cost studies. USTART is input in MMM.YYYY form where MMM is the first three letters of the month and YYYY is the Year. USTART may be input as MAY.1984 or MAY.84.

UFIN

UFIN is the date which utility construction was or is expected to be finished. UFIN is entered in the same format as USTART. During calibration UFIN must be given if GECON is F. USTART and UFIN will be used to calculate USCHDX whenever USCHDX is entered as 0. If USCHDX has a parametric value, UFIN is an optional input. IF UFIN and USCHDX are input in a cost study, FAST-C will render appropriate schedule penalties for apparent accelerations or stretch-outs. However, if USCHDX or UFIN are not given, cost studies will not be able to compute penalty costs.

USCHDX

USCHDX is the utility construction schedule factor. It is used to adjust the FAST-C schedule computation so that it will agree with schedules suggested by empirical references. If a performance schedule is input and USCHDX = 0, the USCHDX value will be calculated. If a finish date is not entered, the USCHDX value must be entered. USCHDX set to 100 will render a FAST-C schedule without empirical adjustments. When both performance schedules and USCHDX are entered in a cost study, the model will be able to calculate schedule penalty costs. In cost studies where performance schedules are given and USCHDX = 0, the model will print a message that it will not be able to compute penalty costs.

USCHDX may be entered as R to repeat a value from a previous box.

The Comment (COMMENT) input lines are:

Up to five COMMENT Lines of 72 characters each are allowed per ITEM between the FILETYPE and END Lines. Each COMMENT Line must begin

with a signature word of C followed by a space. COMMENT lines will be printed out at the end of all output requested on the FORMAT line. The COMMENT line is an optional input line.

The End (END) line inputs are:

CONTIN	1 =	There are additional items under the current PROJECT.
	0 =	There are no additional items in the current PROJECT.
ADD	1 =	Item to be accumulated under the PROJECT total.
	0 =	No unit accumulation.

Figure 3-5 is an example of a Building Detail Input form.

Figure 3-6 is a Building Detail output example.