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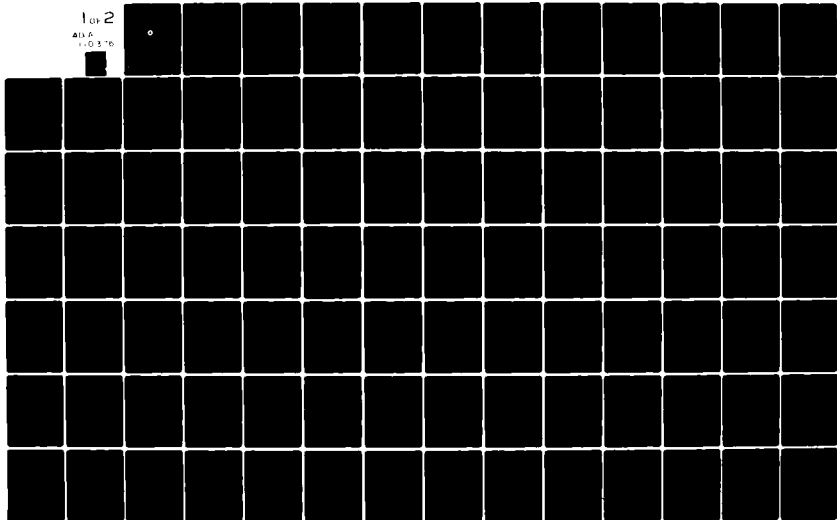
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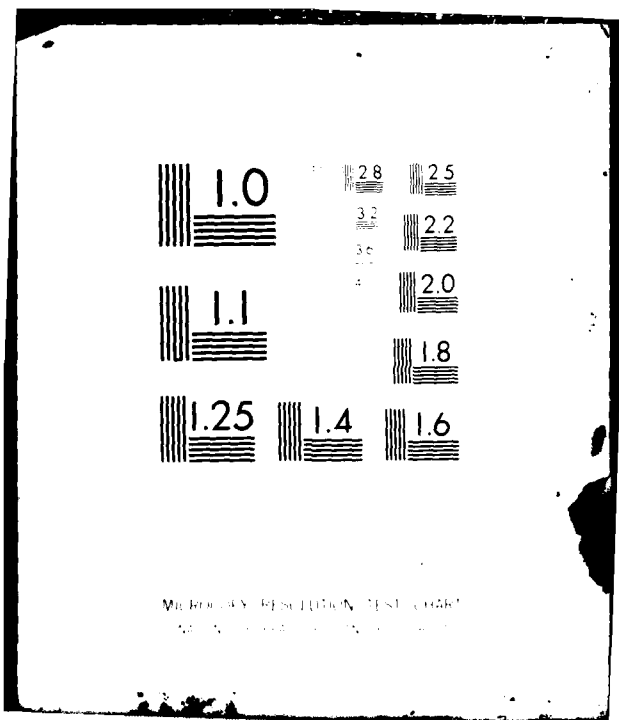
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HAZARD ASSESSMENT COMPUTER SYSTEM

HACS/UIM

USERS' OPERATION MANUAL



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VOLUME II

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**DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD**

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16. Abstract HACS/UIM USERS' OPERATION MANUAL The Hazard Assessment Computer System (HACS) is one of six major components of the U.S. Coast Guard's Chemical Hazards Response Information System (CHRIS). HACS is a computerized system consisting of chemical spill models and containing all necessary physical and chemical property data to permit hazard assessments to be performed for 900 commonly shipped chemicals. The User Interface Module (UIM) provides for fully interactive operation of HACS with remote access for users to the central computer facility by means of terminals. User interaction with HACS is controlled by the UIM through a question and answer dialog. The Users' Operation Manual provides HACS/UIM users with information and instructions to run the programs, to select processing sequences, to enter requested or required input data, and then to interpret the output results. This report is primarily a reference manual contains three sections: an overview of HACS/UIM capabilities, detailed description of internal operations, and a detailed guide for making hazard assessment runs. Individual sub-sections for each different assessment procedure are given, each with comprehensive descriptions of the use of HACS data items and assessment model concepts and limitations. Appendices to the user manual contain further detailed reference information.			
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HAZARD ASSESSMENT
COMPUTER SYSTEM

HACS/UIM
USERS' OPERATION MANUAL

VOLUME II
APPENDICES

30 September 1981

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APPENDIX A. CHEMICAL RECOGNITION CODE LIST

Listed on the following pages are the compound recognition codes and names, in alphabetical order by code, for the 900 compounds incorporated in the current version of HACS.

An index of synonyms may be found in Section 8 of COMDTINST M16465.12 and also in COMDTINST M16465.11. Also, a separate set of computer programs have been developed and used to prepare a full set of cross-reference indices among recognition codes, names, reactivity groups and synonyms for the full set of 900 compounds. These indices, published in a separate volume, are particularly useful to obtain a chemical recognition code for use with HACS given either a compound or synonym name.

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
AAC	ACETIC ACID
AAD	ACETALDEHYDE
AAM	ACRYLAMIDE
AAN	N-AMYL ALCOHOL
AAT	AMMONIUM ACETATE
ABC	AMMONIUM BICARBONATE
ABF	AMMONIUM BIFLUORIDE
ABM	ACETYL BROMIDE
ABR	ALLYL BROMIDE
ABS	ALKYLBENZENESULFONIC ACIDS
ABZ	AMMONIUM BENZOATE
ACA	ACETIC ANHYDRIDE
ACB	AMMONIUM CARBONATE
ACC	ACETYL CHLORIDE
ACD	ACRIDINE
ACE	ACETYLENE
ACF	ALLYL CHLOROFORMATE
ACI	AMMONIUM CITRATE
ACL	ALUMINUM CHLORIDE
ACN	ACRYLONITRILE
ACP	ACETOPHENONE
ACR	ACRYLIC ACID
ACT	ACETONE
ACY	ACETONE CYANOHYDRIN
ADA	ADIPIC ACID
ADN	ADIPONITRILE
AEA	AMINOETHYLETHANOLAMINE
AFM	AMMONIUM FORMATE
AFR	AMMONIUM FLUORIDE
AGC	AMMONIUM GLUCONATE
AID	AMMONIUM IODIDE
ALA	ALLYL ALCOHOL
ALC	ALLYL CHLORIDE
ALD	ALDRIN
ALF	ALUMINUM FLUORIDE
ALM	ALUMINUM SULFATE
ALN	ALUMINUM NITRATE
ALS	AMMONIUM LAURYL SULFATE
ALT	AMMONIUM LACTATE
AMA	AMMONIA ANHYDROUS
AMB	AMMONIUM MOLYBDATE
AMC	AMMONIUM CHLORIDE
AMD	AMMONIUM DICHROMATE
AMF	AMMONIUM SULFITE
AMH	AMMONIUM HYDROXIDE
AMK	N-AMYL METHYL KETONE
AML	AMYL ACETATE
AMM	N-AMYL MERCAPTAN
AMN	AMMONIUM NITRATE
AMP	AMMONIUM PERCHLORATE
AMR	AMMONIUM STEARATE
AMS	AMMONIUM SULFATE
AMT	AMMONIUM THIOCYANATE
AMY	N-AMYL CHLORIDE
ANI	ISO-AMYL NITRITE
ANL	ANILINE
ANP	AMMONIUM NITRATE-PHOSPHATE MIXTURE
ANS	AMMONIUM NITRATE-SULFATE MIXTURE
ANT	N-AMYL NITRATE
ANU	AMMONIUM NITRATE-UREA SOLUTION
AOL	AMMONIUM OLEATE
AOX	AMMONIUM OXALATE
APB	AMMONIUM PENTABORATE
APC	ANTIMONY PENTACHLORIDE
APE	AMMONIUM PERSULFATE
APF	ANTIMONY PENTAFLUORIDE

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
APP	AMMONIUM PHOSPHATE
APS	ACETYL PEROXIDE SOLUTION
APT	ANTIMONY POTASSIUM TARTRATE
ARD	ARSENIC DISULFIDE
ARF	ASPHALT BLENDING STOCK:ROOFERS FLUX
ARL	ACROLEIN
ART	ARSENIC TRISULFIDE
ASA	ARSENIC ACID
ASC	ANISOYL CHLORIDE
ASF	AMMONIUM SULFIDE
ASL	AMMONIUM SILICOFLUORIDE
ASM	AMMONIUM SULFAMATE
ASP	ASPHALT
ASR	ASPHALT BLEND STOCK:STRAIGHT RUN RESIDUE
AST	ARSENIC TRICHLORIDE
ATA	ACETYLACETONE
ATC	ALLYLTRICHLOROSILANE
ATF	AMMONIUM THIOSULFATE
ATH	ANTHRACENE
ATM	ANTIMONY TRICHLORIDE
ATN	ACETONITRILE
ATO	ARSENIC TRIOXIDE
ATR	AMMONIUM TARTRATE
ATS	N-AMYLTRICHLOROSILANE
ATT	ANTIMONY TRIFLUORIDE
ATX	ANTIMONY TRIOXIDE
ATZ	ATRAZINE
AZM	AZINPHOSMETHYL
BAC	BORIC ACID
BAD	ISO-BUTYRALDEHYDE
BAI	ISO-BUTYL ACRYLATE
BAL	BENZYL ALCOHOL
BAM	N-BUTYLAMINE
BAN	N-BUTYL ALCOHOL
BAS	SEC-BUTYL ALCOHOL
BAT	TERT-BUTYL ALCOHOL
BBP	BENZYL N-BUTYL PHTHALATE
BBR	BENZYL BROMIDE
BBZ	BROMOBENZENE
BCF	BENZYL CHLOROFORMATE
BCL	BENZYL CHLORIDE
BCN	N-BUTYL ACETATE
BCP	BOILER COMPOUND, LIQUID
BCR	BARIUM CHLORATE
BCS	BUTYLTRICHLOROSILANE
BDE	BISPHENOL A DIGLYCIDYL ETHER
BDI	BUTADIENE, INHIBITED
BDO	1,4-BUTANEDIOL
BEC	BERYLLIUM CHLORIDE
BEF	BERYLLIUM FLUORIDE
BEM	BERYLLIUM, METALLIC
BEN	BERYLLIUM NITRATE
BEQ	BERYLLIUM OXIDE
BES	BERYLLIUM SULFATE
BHC	BENZENE HEXACHLORIDE
BHP	TERT-BUTYL HYDROPEROXIDE
BMA	BENZYLTRIMETHYLAMMONIUM CHLORIDE
BMN	N-BUTYL METHACRYLATE
BNT	BARIUM NITRATE
BNZ	BENZENE
BOC	BISMUTH OXYCHLORIDE
BPA	BISPHENOL A
BPC	BARIUM PERCHLORATE
BPD	BENZENE PHOSPHORUS DICHLORIDE
BPF	BROMINE PENTAFLUORIDE
BPM	BARIUM PERMANGANATE

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

BFO	BARIIUM PEROXIDE
BPT	BENZENE PHOSPHORUS THIODICHLORIDE
BRA	N-BUTYRIC ACID
BRC	BARIIUM CARBONATE
BRT	BORON TRICHLORIDE
BRU	BRUCINE
BRX	BROMINE
BTA	SEC-BUTYL ACETATE
BTB	BORON TRIBROMIDE
BTC	N-BUTYL ACRYLATE
BTD	1,4-BUTYNEEDIOL
BTF	BROMINE TRIFLUORIDE
BTL	SEC-BUTYLAMINE
BTM	N-BUTYL MERCAPTAN
BTN	BUTYLENE
BTO	BUTYLENE OXIDE
BTP	P-TERT-BUTYLPHENOL
BTR	N-BUTYRALDEHYDE
BUA	TERT-BUTYLAMINE
BUD	1,4-BUTENEDIOL
BUT	BUTANE
BZA	BENZOIC ACID
BZC	BENZOYL CHLORIDE
BZD	BENZALDEHYDE
BZM	BENZYLAMINE
BZN	BENZONITRILE
BZD	BENZYLDIMETHYLOCTADECYLAMMONIUM CHLORIDE
BZP	BENZOPHENONE
CAA	COPPER ACETOARSENITE
CAC	CHLOROACETYL CHLORIDE
CAF	CALCIUM FLUORIDE
CAH	CALCIUM HYDROXIDE
CAL	CALCIUM PHOSPHATE
CAM	CALCIUM, METALLIC
CAO	CALCIUM OXIDE
CAP	P-CHLOROANILINE
CAR	CARENE
CAT	CADMIUM ACETATE
CBA	COBALT ACETATE
CBB	CARBON BISULFIDE
CBC	COBALT CHLORIDE
CBN	4-CHLOROBUTYRONITRILE
CBO	CARBOLIC OIL
CBR	CYANOGEN BROMIDE
CBS	COBALT SULFATE
CBT	CARBON TETRACHLORIDE
CBY	CARBARYL
CCA	CALCIUM ARSENATE
CCB	CALCIUM CARBIDE
CCC	CALCIUM CHLORATE
CCH	CYCLOHEXANONE
CCL	CYANOGEN CHLORIDE
CCN	CALCIUM CYANIDE
CCP	CALCIUM PEROXIDE
CCR	CALCIUM CHROMATE
CCT	CREOSOTE, COAL TAR
CCY	COPPER CYANIDE
CDA	CACODYLIC ACID
CDC	CADMIUM CHLORIDE
CDN	CHLORDANE
CDO	CARBON DIOXIDE
CES	CUPRIETHYLENEDIAMINE SOLUTION
CFB	CADMIUM FLUORORORATE
CGE	CRESYL GLYCIDYL ETHER
CHA	CYCLOHEXYLAMINE
CHC	CHARCOAL

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
CHD	CHLOROHYDRINS (CRUDE)
CNN	CYCLOHEXANOL
CHP	CYCLOHEXANONE PEROXIDE
CHT	CYCLOHEXENYLTRICHLOROSILANE
CHX	CYCLOHEXANE
CHY	CALCIUM HYPOCHLORITE
CID	COPPER IODIDE
CIT	CITRIC ACID
CLC	CALCIUM CHLORIDE
CLD	COLLODION
CLS	CAPROLACTAM, LIQUID
CLX	CHLORINE
CMA	CHROMIC ANHYDRIDE
CMB	CADMIUM BROMIDE
CMC	CHROMYL CHLORIDE
CME	CHLOROMETHYL METHYL ETHER
CMH	CUMENE HYDROPEROXIDE
CMN	CADMIUM NITRATE
CMO	CARBON MONOXIDE
CMP	P-CYME
CMS	CADMIUM SULFATE
CNI	COPPER NITRATE
CNN	COPPER NAPHTHENATE
CNT	CALCIUM NITRATE
COL	COPPER OXALATE
CON	COBALT NITRATE
COP	COPPER ACETATE
COU	COUMAPHOS
COX	CADMIUM OXIDE
CPA	COPPER ARSENITE
CPB	COPPER BROMIDE
CPC	COPPER CHLORIDE
CPF	COPPER FLUOROBORATE
CPH	CAMPENE
CPL	CHLOROPICRIN, LIQUID
CPN	P-CHLOROPHENOL
CPD	CAMPHOR OIL
CPP	CALCIUM PHOSPHIDE
CPR	CYCLOPROPANE
CPS	CAUSTIC POTASH SOLUTION
CPT	CAPTAN
CRA	CHLOROACETOPHENONE
CRB	CHLOROBENZENE
CRE	CALCIUM RESINATE
CRF	CHLOROFORM
CRS	CRESOLS
CSA	CHLOROSULFONIC ACID
CSF	COPPER SULFATE
CSS	CAUSTIC SODA SOLUTION
CSY	CORN SYRUP
CTA	CROTONALDEHYDE
CTC	CATECHOL
CTD	4-CHLORO-O-TOLUIDINE
CTF	CHLORINE TRIFLUORIDE
CUM	CUMENE
CYA	CYANOACETIC ACID
CYG	CYANOGEN
CYP	CYCLOPENTANE
DAA	DIACETONE ALCOHOL
DAC	DIMETHYLACETAMIDE
DAI	DODECYL BENZENESULFONIC ACID, ISOPROPYLAM-
DAL	DECALDEHYDE
DAM	DIPHENYLAMINE
DAN	N-DECYL ALCOHOL
DAP	DI-N-AMYL PHTHALATE
DBA	DI-N-BUTYLAMINE

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
DBC	DIISOBUTYLCARBINOL
DBE	DI-N-BUTYL ETHER
DBK	DI-N-BUTYL KETONE
DBL	DIISOBUTYLENE
DBO	O-DICHLOROBENZENE
DBP	P-DICHLOROBENZENE
DBR	DECABORANE
DBS	DODECYLBENZENESULFONIC ACID, TRIETHANOLA-
DBT	DIBUTYLPHENOL
DBZ	N-DECYLBENZENE
DCA	2,4-DICHLOROPHOXYACETIC ACID
DCB	DICHLOROBUTENE
DCE	1-DECENE
DCF	DICHLORODIFLUOROMETHANE
DCM	DICHLOROMETHANE
DCP	2,4-DICHLOROPHENOL
DCS	DODECYLBENZENESULFONIC ACID, CALCIUM SALT
ddb	DODECYLBENZENE
DDC	1-DODECENE
DDD	DDD
DDN	DODECANOL
DDS	DODECYL SULFATE, SODIUM SALT
DDT	DDT
DDW	DIMETHYLHEXANE DIHYDROPEROXIDE, WET
DEA	DIETHANOLAMINE
DEB	DIETHYLBENZENE
DEC	DIETHYL CARBONATE
DED	DIELDRIN
DEE	DICHLOROETHYL ETHER
DEG	DIETHYLENE GLYCOL
DEL	1,2-DICHLOROETHYLENE
DEM	DIETHYLENE GLYCOL MONOBUTYL ETHER ACETA-
DEN	DIETHYLAMINE
DEP	DI-(2-ETHYLHEXYL) PHOSPHORIC ACID
DES	2,4-D ESTERS
DET	DIETHYLENETRIAMINE
DEZ	DIETHYLZINC
DFA	DIFLUOROPHOSPHORIC ACID, ANHYDROUS
DFE	1,1-DIFLUOROETHANE
DFP	DISTILLATE: FLASHED FEED STOCKS
DGD	DIETHYLENE GLYCOL DIMETHYL ETHER
DGE	DIETHYLENE GLYCOL MONOETHYL ETHER
DGM	DIETHYLENE GLYCOL MONOMETHYL ETHER
DHN	DECAHYDRONAPHTHALENE
DHP	DIHEPTYL PHTHALATE
DIA	DIISOPROPYLAMINE
DID	DIISODECYL PHTHALATE
DIH	DIISOPROPYLBENZENE HYDROPEROXIDE
DIK	DIISOBUTYL KETONE
DIM	DIMETHYL ETHER
DIP	DIISOPROPANOLAMINE
DLP	DALAPON
DMA	DIMETHYLAMINE
DMD	DIMETHYLDICHLOROSILANE
DME	DIETHYLENE GLYCOL MONOBUTYL ETHER
DMF	DIMETHYLFORMAMIDE
DMH	1,1-DIMETHYLHYDRAZINE
DMP	DIMETHYL POLYSILOXANE
DMS	DIMETHYL SULFOXIDE
DMT	DIMETHYL TEREPHTHALATE
DMZ	DIMETHYLZINC
DNA	DI-N-PROPYLAMINE
DNB	M-DINITROBENZENE
DNC	DINITROCRESOLS
DNP	2,4-DINITROPHENOL
DNT	2,4-DINITROANILINE

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
DOA	DIOCTYL ADIPATE
DOD	DODECENE
DOP	DIOCTYL PHTHALATE
DOX	1,4-DIOXANE
DPA	DIBUTYL PHTHALATE
DPD	DIPHENYLDICHLOROSILANE
DPE	DIPHENYL ETHER
DPG	DIPROPYLENE GLYCOL
DPH	DIETHYL PHTHALATE
DFM	DIPHENYLMETHANEDIISOCYANATE (MDI)
DFN	DIFENTENE
DFD	DIBENZOYL PEROXIDE
DPP	DICHLOROPROPANE
DPR	DICHLOROPROPENE
DPT	DICYCLOPENTADIENE
DSD	DODECYL SULFATE, DIETHANOLAMINE SALT
DSF	DIMETHYL SULFATE
DSL	DIMETHYL SULFIDE
DSM	DODECYL SULFATE, MAGNESIUM SALT
DSR	DISTILLATE:STRAIGHT RUN
DSS	DIOCTYL SODIUM SULFOSUCCINATE
DST	DODECYL SULFATE, TRIETHANOLAMINE SALT
DTC	DODECYLTRICHLOROSILANE
DTH	DOWTHERM
DTM	4,4'-DICHLORO-ALPHA-TRICHLORO-METHYLBEN-
DTN	DEMETON
DTS	DEXTRSE SOLUTION
DTT	2,4-DINITROTOLUENE
DZN	DIAZINON
DZP	DI-(P-CHLOROBENZOYL) PEROXIDE
EAA	ETHYL ACETOACETATE
EAC	ETHYL ACRYLATE
EAD	ETHYLALUMINUM DICHLORIDE
EAI	2-ETHYLHEXYL ACRYLATE,INHIBITED
EAL	ETHYL ALCOHOL
EAM	ETHYLAMINE
EAS	ETHYLALUMINUM SESQUICHLORIDE
EBR	ETHYL BUTYRATE
EBT	ETHYL BUTANOL
ECA	ETHYL CHLOROACETATE
ECF	ETHYL CHLOROFORMATE
ECH	ETHYLENE CHLOROHYDRIN
ECL	ETHYL CHLORIDE
ECS	ETHYLDICHLOROSILANE
EDA	ETHYLENEDIAMINE
EDB	ETHYLENE DIBROMIDE
EDC	ETHYLENE DICHLORIDE
EDR	ENDRIN
EDT	ETHYLENEDIAMINE TETRACETIC ACID
EEE	ETHYLENE GLYCOL DIETHYL ETHER
EET	ETHYL ETHER
EFM	ETHYL FORMATE
EGA	ETHYLENE GLYCOL MONOETHYL ETHER ACETATE
EGD	ETHYLENE GLYCOL DIMETHYL ETHER
EGE	ETHYLENE GLYCOL MONOETHYL ETHER
EGL	ETHYLENE GLYCOL
EGM	ETHYLENE GLYCOL MONOBUTYL ETHER
EGY	ETHYLENE GLYCOL DIACETATE
EHA	ETHYLHEXALDEHYDE
EHP	ETHOXYDIHYDROPYRAN
EHT	ETHYL HEXYL TALLATE
EHX	2-ETHYL HEXANOL
ELT	ETHYL LACTATE
EMA	ETHYLENE GLYCOL MONOBUTYL ETHER ACETATE
EMC	ETHYL MERCAPTAN
ENE	ETHYLENE GLYCOL MONOMETHYL ETHER

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
ENB	ETHYLIDENENORBORNENE
ENP	ETHOXYLATED NONYLPHENOL
EOO	ETHOXYLATED DODECANOL
EOP	ETHOXYLATED PENTADECANOL
EOT	ETHOXYLATED TETRADECANOL
EOX	ETHYLENE OXIDE
EPA	2-ETHYL-3-PROPYLACROLEIN
EPC	EPICHLOROHYDRIN
EPD	ETHYL PHOSPHONOTHIOIC DICHLORIDE, ANHYD-
EPP	ETHYL PHOSPHORODICHLORIDATE
EPS	ETHYL PHENYLDICHLOROSILANE
ESC	ETHYL SILICATE
ETA	ETHYL ACETATE
ETB	ETHYLBENZENE
ETC	ETHYLENE CYANOHYDRIN
ETD	ETHOXYLATED TRIDECANOL
ETG	ETHOXY TRIGLYCOL
ETH	ETHANE
ETI	ETHYLENEIMINE
ETL	ETHYLENE
ETM	ETHYL METHACRYLATE
ETN	ETHYL NITRITE
ETS	ETHYLTRICHLOROSILANE
EVO	EPOXIDIZED VEGETABLE OILS
FAC	FERRIC AMMONIUM CITRATE
FAL	FURFURYL ALCOHOL
FAO	FERRIC AMMONIUM OXALATE
FAS	FERROUS AMMONIUM SULFATE
FCL	FERRIC CHLORIDE
FCP	FERRIC GLYCEROPHOSPHATE
FEC	FERROUS CHLORIDE
FFA	FURFURAL
FFB	FERROUS FLUOROBORATE
FMA	FORMIC ACID
FMS	FORMALDEHYDE SOLUTION
FNT	FERRIC NITRATE
FOX	FERROUS OXALATE
FRS	FERROUS SULFATE
FSA	FLUOSULFONIC ACID
FSF	FERRIC SULFATE
FSL	FLUOSILICIC ACID
FUM	FUMARIC ACID
FXX	FLUORINE
GAK	GASOLINE BLENDING STOCKS: ALKYLATES
GAT	GASOLINE: AUTOMOTIVE ()4.23G LEAD/GAL.)
GAV	GASOLINE: AVIATION ()4.86G LEAD/GAL.)
GCM	GLYCIDYL METHACRYLATE
GCR	GLYCERINE
GCS	GASOLINE: CASINGHEAD
GLA	GALLIC ACID
GOC	GAS OIL: CRACKED
GOS	GLYOXAL, 40% SOLUTION
GPL	GASOLINE: POLYMER
GRF	GASOLINE BLENDING STOCKS: REFORMATES
GSR	GASOLINE: STRAIGHT RUN
GTA	GLUTARALDEHYDE SOLUTION
HAC	HEXADECYLTRIMETHYLAMMONIUM CHLORIDE
HAI	2-HYDROXYETHYL ACRYLATE, INHIBITED
HAL	N-HEXALDEHYDE
HAS	HYDROXYLAMINE SULFATE
HBR	HYDROGEN BROMIDE
HCC	HEXACHLOROCYCLOPENTADIENE
HCL	HYDROCHLORIC ACID
HCN	HYDROGEN CYANIDE
HDC	HYDROGEN CHLORIDE
HQQ	HYDROQUINONE

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
HDS	HYDROGEN SULFIDE
HDZ	HYDRAZINE
HFA	HYDROFLUORIC ACID
HFX	HYDROGEN FLUORIDE
HMD	HEXAMETHYLENEDIAMINE
HMI	HEXAMETHYLENEIMINE
HMT	HEXAMETHYLENETETRAMINE
HPA	HYDROXYPROPYL ACRYLATE
HPM	HYDROXYPROPYL METHACRYLATE
HPO	HYDROGEN PEROXIDE
HPT	HEPTANE
HSS	HEXADECYL SULFATE, SODIUM SALT
HTC	HEPTACHLOR
HTE	1-HEPTENE
HTN	HEPTANOL
HXA	HEXANE
HXE	1-HEXENE
HXG	HEXYLENE GLYCOL
HXN	HEXANOL
HXX	HYDROGEN, LIQUEFIED
IAA	ISOAMYL ALCOHOL
IAC	ISOPROPYL ACETATE
IAI	ISODECYL ACRYLATE, INHIBITED
IAL	ISOBUTYL ALCOHOL
IAM	ISOBUTYLAMINE
IBA	ISOBUTYL ACETATE
IBL	ISOBUTYLENE
IBN	ISOBUTYRONITRILE
IBR	ISOBUTYRIC ACID
IBT	ISOBUTANE
IDA	ISODECALDEHYDE
IHA	ISOHEXANE
IOA	ISOOCYL ALCOHOL
IOC	ISOOCALDEHYDE
IPA	ISOPROPYL ALCOHOL
IPC	ISOPROPYL PERCARBONATE
IPE	ISOPROPYL ETHER
IPH	ISOPHORONE
IPL	ISOPHTHALIC ACID
IPM	ISOPROPYL MERCAPTAN
IPP	ISOPROPYLAMINE
IPR	ISOPRENE
IPT	ISOPENTANE
ISA	ISODECYL ALCOHOL
IVA	ISOVALERALDEHYDE
JPF	JET FUEL: JP-4
JPO	JET FUEL: JP-1(KEROSENE)
JPT	JET FUEL: JP-3
JPV	JET FUEL: JP-5(KEROSENE, HEAVY)
KRS	KEROSENE
LAC	LEAD ACETATE
LAH	LITHIUM ALUMINUM HYDRIDE
LAL	LINEAR ALCOHOLS (12-15 CARBONS)
LAR	LEAD ARSENATE
LFB	LEAD FLUOROBORATE
LFR	LEAD FLUORIDE
LHD	LITHIUM HYDRIDE
LID	LEAD IODIDE
LLS	LATEX, LIQUID SYNTHETIC
LNG	LIQUEFIED NATURAL GAS (LNG)
LNT	LEAD NITRATE
LPG	LIQUEFIED PETROLEUM GAS (LPG)
LPO	LAUROYL PEROXIDE
LRM	LAURYL MERCAPTAN
LTA	LACTIC ACID
LTC	LEAD THIOCYANATE

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

LTH	LITHARGE
LTM	LITHIUM, METALLIC
LTT	LEAD TETRAACETATE
MAA	METHYL AMYL ALCOHOL
MAC	METHYL AMYL ACETATE
MAL	METHYL ALCOHOL
MAM	METHYL ACRYLATE
MAN	N-METHYLANILINE
MAP	METHYLACETYLENE - PROPADIENE MIXTURE
MAT	MERCURIC ACETATE
MBK	METHYL N-BUTYL KETONE
MCA	MONOCHLOROACETIC ACID
MCC	MERCURIC AMMONIUM CHLORIDE
MCF	MONOCHLORODIFLUOROMETHANE
MCH	METHYL CHLOROFORMATE
MCL	METHALLYL CHLORIDE
MCN	MERCURIC CYANIDE
MCP	METHYLCYCLOPENTANE
MCR	MERCURY
MCS	METHYLDICHLOROSILANE
MCT	METHYLCYCLOPENTADIENYLMANGANESE TRICARB-
MEA	MONOETHANOLAMINE
MEK	METHYL ETHYL KETONE
MEP	METHYLETHYLPYRIDINE
MFA	MOTOR FUEL ANTI-KNOCK COMPOUNDS CONTAINI
MFM	METHYL FORMATE
MGX	MAGNESIUM
MHZ	METHYLHYDRAZINE
MIC	METHYL ISOBUTYL CARBINOL
MID	MERCURIC IODIDE
MIK	METHYL ISOBUTYL KETONE
MLA	MALEIC ANHYDRIDE
MLH	MALEIC HYDRAZIDE
MLI	MALEIC ACID
MLT	MALATHION
MMC	METHYL MERCAPTAN
MMM	METHYL METHACRYLATE
MNS	MINERAL SPIRITS
MNT	MERCURIC NITRATE
MOC	METHOXYCHLOR
MOX	MERCURIC OXIDE
MPA	MONOISOPROPANOLAMINE
MPC	MAGNESIUM PERCHLORATE
MPD	METHYL PHOSPHONOTHIOIC DICHLORIDE (ANHYD)
MPK	METHYL ISOPROPENYL KETONE, INHIBITED
MPL	MORPHOLINE
MPT	METHYL PARATHION
MPY	1-METHYLPYRROLIDONE
MRC	MERCURIC CHLORIDE
MRN	MERCUROUS NITRATE
MRR	MERCUROUS CHLORIDE
MSA	METHANEARSONIC ACID, SODIUM SALTS
MSF	MERCURIC SULFIDE
MSO	MESITYL OXIDE
MSR	ALPHA-METHYLSTYRENE
MTA	METHYLAMINE
MTB	METHYL BROMIDE
MTC	METHYL CHLORIDE
MTF	METHYL FORMAL
MTH	METHANE
MTD	MOLYBDIC TRIOXIDE
MTS	METHYLTRICHLOROSILANE
MTT	METHYL ACETATE
MVK	METHYL VINYL KETONE
NAA	NITRILOTRIACETIC ACID AND SALTS
NAB	NABAM

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

NAC	NITRIC ACID
NAL	4-NITROANILINE
NAN	NONANE
NAO	1-NAPHTHYLAMINE
NAS	NICKEL AMMONIUM SULFATE
NBR	NICKEL BROMIDE
NCL	NICKEL CHLORIDE
NCN	NICKEL CYANIDE
NCS	NICOTINE SULFATE
NCT	NAPHTHA COAL TAR
NFB	NICKEL FLUOROBORATE
NFM	NICKEL FORMATE
NHX	NEOHXANE
NIC	NICOTINE
NKA	NICKEL ACETATE
NKC	NICKEL CARBONYL
NKS	NICKEL SULFATE
NMT	NITROMETHANE
NNE	1-NONENE
NNN	NONANOL
NNP	NONYLPHENOL
NNT	NICKEL NITRATE
NON	NONENE
NOX	NITROGEN TETROXIDE
NPH	4-NITROPHENOL
NPP	2-NITROPROPANE
NSS	NAPHTHA STODDARD SOLVENT
NSV	NAPHTHA SOLVENT
NTA	2-NITROANILINE
NTB	NITROBENZENE
NTC	NITROSYL CHLORIDE
NTE	NITROETHANE
NTI	NAPHTHENIC ACIDS
NTL	NITRALIN
NTM	NAPHTHALENE, MOLTEN
NTO	NITROUS OXIDE
NTP	2-NITROPHENOL
NTX	NITRIC OXIDE
NVM	NAPHTHA VM + P (75(NAPHTHA)
NXX	NITROGEN, LIQUEFIED
OAC	OLEIC ACID, SODIUM SALT
OAN	OCTANE
OAP	OLEIC ACID, POTASSIUM SALT
OAS	OIL: ABSORPTION
OCA	OIL: CASTOR
OCC	OILS EDIBLE: COCONUT
OCF	OIL: CLARIFIED
OCR	OILS MISCELLANEOUS: CROTON
OCS	OIL: COTTONSEED
OCT	OIL: COAL TAR
ODS	OIL: DIESEL
OET	OCTYL EPOXY TALLATE
OFR	FUEL OIL: 4
OFS	OIL: FISH
OFV	FUEL OIL: 5
OIL	OIL: CRUDE
OLA	OLEIC ACID
OLB	OIL: LUBRICATING
OLD	OILS EDIBIE: LARD
OLM	OLEUM
OLS	OILS MISCELLANEOUS: LINSEED
OMN	OIL: MINERAL
OMS	OIL: MINERAL SEAL
OMT	OIL: MOTOR
ONF	OIL: NEATSFOOT
OOD	FUEL OIL: 1-D

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
QOL	OIL: OLIVE
QON	FUEL OIL: NO 1(KEROSENE)
OPM	OILS EDIBLE: PALM
OPN	OIL: PEANUT
OPT	OIL: PENETRATING
ORD	OIL: ROAD
ORG	OIL: RANGE
ORN	OIL: ROSIN
ORS	OIL: RESIN
OSB	OIL: SOYA BEAN
OSD	OIL: SPINDLE
OSF	OILS EDIBLE: SAFFLOWER
OSF	OIL: SPERM
OSX	FUEL OIL: 6
OSY	OIL: SPRAY
OTA	OCTANOL
OTB	OILS MISCELLANEOUS: TURBINE
OTC	OILS EDIBLE: TUCUM
OTD	FUEL OIL: 2-D
OTE	1-OCTENE
OTF	OIL: TRANSFORMER
OTL	OIL: TALL
OTN	OIL: TANNER'S
OTW	FUEL OIL: 2
OVG	OIL: VEGETABLE
OXA	OXALIC ACID
OXY	OXYGEN, LIQUEFIED
PAA	PERACETIC ACID
PAC	PHOSPHORIC ACID
PAD	PROFIONALDEHYDE
PAH	PROPIONIC ANHYDRIDE
PAL	N-PROPYL ALCOHOL
PAN	PHTHALIC ANHYDRIDE
PAS	POTASSIUM ARSENATE
PAT	N-PROPYL ACETATE
PBO	POTASSIUM BINOXALATE
PBP	PROPYLENE BUTYLENE POLYMER
PBR	PHOSPHORUS TRIBROMIDE
PCB	POLYCHLORINATED BIPHENYL (PCB)
PCH	POTASSIUM CHROMATE
PCL	PERCHLORIC ACID
PCM	PERCHLOROMETHYL MERCAPTAN
PCP	PENTACHLOROPHENOL
PCR	POTASSIUM CHLORATE
PDC	PENTADECANOL
PDL	PHENYLDICHLOROARSINE, LIQUID
PDT	POTASSIUM DICHLORO-S-TRIAZINETRIONE
PET	PENTAERYTHRITOL
PFA	PARAFORMALDEHYDE
PGA	PYROGALLIC ACID
PGC	POLYPROPYLENE GLYCOL
PGM	POLYPROPYLENE GLYCOL METHYL ETHER
PHG	PHOSGENE
PHH	PHENYLHYDRAZINE HYDROCHLORIDE
PHN	PHENOL
PII	PROPYLENEIMINE, INHIBITED
PLB	POLYBUTENE
PLP	POLYPROPYLENE
PLT	BETA-PROPIOLACTONE
PME	PROPYLENE GLYCOL METHYL ETHER
PMN	N-PROPYL MERCAPTAN
PNA	PROPIONIC ACID
POP	POTASSIUM PEROXIDE
POX	PROPYLENE OXIDE
PPA	POLYPHOSPHORIC ACID
PPG	PROPYLENE GYLCOL

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
PPI	POLYMETHYLENE POLYPHENYL ISOCYANATE
PPL	PROPYLENE
PPO	PHOSPHORUS OXYCHLORIDE
PPP	PHOSPHORUS PENTASULFIDE
PPR	PHOSPHORUS, RED
PPT	PHOSPHORUS TRICHLORIDE
PFW	PHOSPHORUS, WHITE
PFZ	PIPERAZINE
PRD	PYRIDINE
PRP	PROPANE
PTA	PENTANE
PTB	PENTABORANE
PTC	POTASSIUM CYANIDE
PTD	POTASSIUM DICHROMATE
PTE	1-PENTENE
PTH	POTASSIUM HYDROXIDE
PTI	POTASSIUM IODIDE
PTL	PETROLATUM
PTM	POTASSIUM, METALLIC
PTN	PETROLEUM NAPHTHA
PTO	PARATHION, LIQUID
PTP	POTASSIUM PERMANGANATE
PTS	POTASSIUM OXALATE
PTT	PROPYLENE TETRAMER
QNL	QUINOLINE
RSC	RESORCINOL
SAB	SODIUM ALKYL BENZENESULFONATES
SAC	SULFURIC ACID, SPENT
SAM	SODIUM AMIDE
SAR	SODIUM ARSENITE
SAS	SODIUM ALKYL SULFATES
SAZ	SODIUM AZIDE
SBH	SODIUM BOROHYDRIDE
SBS	SODIUM BISULFITE
SBT	SORBITOL
SCD	SODIUM CACODYLATE
SCH	SODIUM CHROMATE
SCL	SULFURYL CHLORIDE
SCN	SODIUM CYANIDE
SCR	SODIUM DICHROMATE
SCY	SODIUM THIOCYANATE
SDA	SODIUM ARSENATE
SDB	SODIUM BORATE
SDC	SODIUM CHLORATE
SDF	SODIUM FLUORIDE
SDH	SODIUM HYDRIDE
SDS	SODIUM SULFIDE
SDT	SODIUM DICHLORO-S-TRIAZINETRIONE
SDU	SODIUM
SFA	SULFURIC ACID
SFC	SODIUM FERROCYANIDE
SFD	SULFUR DIOXIDE
SFL	SULFOLANE
SFM	SULFUR MONOCHLORIDE
SFR	SODIUM SILICOFLUORIDE
SHC	SODIUM HYPOCHLORITE
SHD	SODIUM HYDROXIDE
SHS	SODIUM HYDROSULFIDE SOLUTION
SLA	SALICYLIC ACID
SLD	SELENIUM DIOXIDE
SHL	SODIUM METHYLATE
SNT	SODIUM NITRITE
SOX	SODIUM OXALATE
SPP	SODIUM PHOSPHATE
SRA	STEARIC ACID
SRS	SUCROSE

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
SSC	SODIUM SILICATE
SSF	SODIUM SULFITE
STC	SILICON TETRACHLORIDE
STO	SELENIUM TRIOXIDE
STY	STYRENE
SVA	SILVER ACETATE
SVC	SILVER CARBONATE
SVF	SILVER FLUORIDE
SVI	SILVER IODATE
SVN	SILVER NITRATE
SVO	SILVER OXIDE
SVS	SILVER SULFATE
SXX	SULFUR (LIQUID)
TAL	TRIETHYLALUMINUM
TAP	P-TOLUENESULFONIC ACID
TBT	TETRABUTYL TITANATE
TCA	2,4,5-TRICHLOROPHENOXYACETIC ACID
TCE	TRICHLOROETHANE
TCF	TRICHLOROFLUOROMETHANE
TCL	TRICHLOROETHYLENE
TCP	TRICRESYL PHOSPHATE
TCS	TRICHLOROSILANE
TCT	TRICHLORO-S-TRIAZINETRIONE
TDB	TETRADECYLBENZENE
TDC	1-TRIDECENE
TDI	TOLUENE 2,4-DIISOCYANATE (TDI)
TDN	TRIDECANOL
TEA	TRIETHANOLAMINE
TEB	TRIETHYLBENZENE
TEC	TETRACHLOROETHANE
TED	TETRAETHYL DITHIOPYROPHOSPHATE
TEG	TRIETHYLENE GLYCOL
TEL	TETRAETHYL LEAD
TEN	TRIETHYLAMINE
TEP	TETRAETHYL PYROPHOSPHATE
TES	2,4,5-T (ESTERS)
TET	TRIETHYLENETETRAMINE
TFA	TALLOW FATTY ALCOHOL
TFC	TRIFLUOROCHLOROETHYLENE
TFE	TETRAFLUOROETHYLENE, INHIBITED
TFR	TRIFLURALIN
TGC	TRIPROPYLENE GLYCOL
THF	TETRAHYDROFURAN
THN	TETRAHYDRONAPHTHALENE
THR	THIRAM
TIA	TRIISOBUTYLALUMINUM
TLI	O-TOLUIDINE
TLO	TALLOW
TMA	TRIMETHYLAMINE
TMC	TRIMETHYLCHLOROSILANE
TML	TETRAMETHYL LEAD
TNA	TANNIC ACID
TOL	TOLUENE
TPG	THIOPHOSGENE
TPH	TRICHLOROPHENOL
TPO	TRIS(AZIRIDINYL)PHOSPHINE OXIDE
TPT	TURPENTINE
TRN	THORIUM NITRATE
TTD	1-TETRADECENE
TTE	TETRACHLOROETHYLENE
TIG	TETRAETHYLENE GLYCOL
TIN	TETRADECANOL
TIP	TETRAETHYLENEPENTAMINE
TTT	TITANIUM TETRACHLORIDE
TXP	TOXAPHENE
UAN	URANYL NITRATE

CHEMICAL
RECOGNITION
CODE

CHEMICAL NAME

CHEMICAL RECOGNITION CODE	CHEMICAL NAME
UDB	N-UNDECYLBENZENE
UDC	1-UNDECENE
UND	UNDECANOL
UPO	UREA PEROXIDE
URA	URANYL ACETATE
URE	UREA
URS	URANYL SULFATE
VAL	VALERALDEHYDE
VAH	VINYL ACETATE
VCI	VINYLDENECHLORIDE, INHIBITED
VCM	VINYL CHLORIDE
VFI	VINYL FLUORIDE, INHIBITED
VME	VINYL METHYL ETHER, INHIBITED
VNT	VINYLTOLUENE
VOT	VANADIUM OXYTRICHLORIDE
VOX	VANADIUM PENTOXIDE
VSF	VANADYL SULFATE
VTS	VINYLTRICHLOROSILANE
WCA	WAXES: CARNAUBA
WPF	WAXES: PARAFFIN
XLH	M-XYLENE
XLO	O-XYLENE
XLP	P-XYLENE
XYL	XYLENOL
ZAC	ZINC AMMONIUM CHLORIDE
ZAR	ZINC ARSENATE
ZBO	ZINC BORATE
ZBR	ZINC BROMIDE
ZCA	ZIRCONIUM ACETATE
ZCL	ZINC CHLORIDE
ZCO	ZIRCONIUM OXYCHLORIDE
ZCR	ZINC CHROMATE
ZCS	ZIRCONIUM SULFATE
ZDP	ZINC DIALKYLDITHIOPHOSPHATE
ZFB	ZINC FLUOROBORATE
ZIR	ZIRCONIUM NITRATE
ZNA	ZINC ACETATE
ZNT	ZINC NITRATE
ZPP	ZINC PHOSPHIDE
ZPS	ZINC PHENOLSULFONATE
ZSF	ZINC SULFATE
ZSL	ZINC SILICOFLUORIDE

APPENDIX B. HACS SYSTEMS AND ERROR MESSAGES

Given below are identifications and descriptions of diagnostic and informative messages incorporated in the overall HACS system structure for user input data processing, state file interactions, assessment model sequencing and output data production. Additional messages specific to the assessment operations of individual rate models are described in Section 3.3. Messages produced by the UIM in the dialogue with the user are described in Section 3.1 and 3.2, and are omitted from this appendix.

A substantial number of the messages listed in this section still appear in the HACS program code, however, the functions for which they were originally used have been modified by the UIM. In general, with the UIM, most error conditions no longer cause program termination, but instead a prompt message is repeated for the user to re-enter corrected input.

HACS messages described below are given in both normal and abnormal processing. Most error conditions, or warning messages for potential errors, are denoted by a string of five (5) asterisks printed at the start of the message. Where appropriate each message below indicates using lower case typing specific information included by HACS under program control depending on the conditions under which the message is generated.

AN ERROR WAS MADE IN READING THE DATA BASE -- model code. EXECUTION OF MODEL code IS TERMINATED.

The message, given with the appropriate rate model designation inserted, indicates that, during the transfer of field data values from the state file for input to the requested rate model, at least one and possibly more errors were encountered. This condition is completely program controlled, and an error in the user input data cards is not indicated. The sequence of model input operations is explicitly defined by the program code written for each rate model, and the error condition indicates either an incorrect modification of the program code, or that a field required by a rate model has not been defined in the HACS default file.

Specifically this condition will occur if a rate model attempts to use a field for which the field number has not been entered in the default file, or, if the rate model code requests a type of value (real or integer) which is inconsistent with the type of value (real or integer) of the field entered in the default file. All remaining model operations which would otherwise normally be performed are terminated; HACS will however continue to attempt to execute the next model requested.

COMPUTATION OF FUNCTIONS OF TEMPERATURE FOLLOW USING TEMPERATURES OF ...

This message proceeds a display of the ambient and boiling temperatures that are used in computations of functions of temperature during the transfer of chemical data from the property file to the HACS state file.

COMPUTATION OF identification ...

A header message used to indicate HACS is computing values of the identified function of temperature at both ambient and boiling temperatures. Messages following indicate values obtained as well as any abnormal conditions.

COMPUTATION USES TEMPERATURE AT LIMIT OF RANGE

Additional message, following warning condition, indicating that a chemical property function of temperature is being computed at an over-riding range limit, and not at the value of ambient or boiling temperature specified.

END OF HACS RUN

Message is written by HACS on printed output to indicate completion of user requested operations. May be given either on completion of all user requests or on abnormal conditions causing program controlled premature termination of processing.

*****ERROR - COMPUTATION OF FUNCTION VALUE UNABLE TO PROCEED

A data base recall error occurred during the collection of temperature function coefficients. This error is caused by program inconsistencies in calls to subroutine COEF and is not a user error.

*****ERROR*****DIVIDE FAULT OCCURRED DURING EXECUTION OF OVERLAY n
*****ERROR*****EXPONENT OVERFLOW OCCURRED DURING EXECUTION OF OVERLAY n
*****ERROR*****ARITHMETIC FAULT OCCURRED DURING EXECUTION OF OVERLAY n

Following completion of the execution of any program overlay, HACS uses a number of system routines to test for the possible occurrence of an arithmetic fault condition and may issue one or more of the above messages with the identification of the appropriate overlay inserted. (Functionally, HACS program overlay definitions are based on groupings of rate model programs.) HACS sample test cases producing these error messages have been reviewed and contain correct assessment results. However, the causes underlying these error conditions have not been fully diagnosed at this time.

The format and content of these messages will vary depending on the computer installation used to operate HACS. The initial version of HACS operating on the Prime 750 does not provide this capability.

*****ERROR - FIELD NUMBER n REQUESTED FOR RECALL HAS NOT BEEN DEFINED
*****ERROR - FIELD NUMBER n REQUESTED FOR SAVE HAS NOT BEEN DEFINED

An operation to recall (or save) a data value from (in) the HACS state file has requested a value for a field number (inserted in the message) which is *undefined*. Either a program modification has been made to a rate model using an incorrect field number, or the definition of the field is missing from the HACS default file.

*****ERROR - ILLEGAL FIELD NUMBER NOT IN RANGE 1 to 9998 or 9999

On input to define the contents of a default file, only field numbers in the range 1 to 9998 are permitted for data items, and 9999 is used to control input termination. Since field numbers used to identify input for normal assessment runs are first compared to the definitions in the default file, these also must be in the range 1 to 9998. Field number 1001 is reserved for use in entering the chemical recognition code, and is treated separately.

*****ERROR - REAL RECALL REQUESTED FOR INTEGER FIELD number name
*****ERROR - REAL SAVE REQUESTED FOR INTEGER FIELD number name
*****ERROR - INTEGER RECALL REQUESTED FOR REAL FIELD number name
*****ERROR - INTEGER SAVE REQUESTED FOR REAL FIELD number name

The use of data value in the state file is controlled by the type of program operation coded within an assessment rate model, and a data type indicator (integer, real) included as part of the data item definition in the HACS default file. These error messages, which should not occur during normal HACS operation, indicate either an improperly coded data base operation request within a rate model, or an incorrect, or inconsistent, data type definition in the HACS default file for the field identified in the message. Default file definitions must not be changed without considerable caution due to the use of individual data fields by multiple routines.

*****ERROR - UNABLE TO FIND CHEMICAL. SEARCH TERMINATED AFTER PASSING EXPECTED ALPHABETICAL POSITION.

The search of the property file has passed the location expected for the requested chemical compound data, and the HACS run is terminated. The recognition code specified by the user is not defined on the version of the property file being used.

*****ERROR - UNABLE TO FIND CHEMICAL. SEARCH TERMINATED BY END OF FILE.

A search of the property was completed without finding the requested chemical, and the HACS run is terminated. The recognition code specified by the user is not defined on the version of the property file being used.

*****ERROR - UNABLE TO READ HACS PROPERTY FILE

The HACS property file could not be read past the header record, and the HACS run is terminated. The most likely cause is an error identifying the file in the procedure file used to invoke HACS, or an inadvertent purging of the on-line file.

*****ERROR - UNDEFINED FIELD NUMBER = (n)

The field number entered as a user input has not been defined by an entry in the HACS default file. Note that in addition to default field values, the HACS default file is the basis for the definition of all fields used in the HACS state file by the assessment models. For normal assessment runs, further processing of the input causing the error is skipped; remaining input is read and the requested rate models will be executed.

FILE CONTAINS identifier VALUES

Where identifier is given as EMPTY, DEFAULT, USER or COMPUTED to describe the highest type of data item contained in the state file to be displayed. If the state file is empty, the listing is suppressed and instead the following message is given:

STATE FILE IS UNDEFINED - OUTPUT HAS BEEN SUPPRESSED.

For all other identifiers, the state file label is displayed, followed by a listing of the contents of the file.

FUNCTION VALUE COMPUTED AT TEMPERATURE OF value DEG. C IS ...

Where value is either ambient temperature, or the boiling temperature of the compound and the message is followed by a line giving the HACS state file field number, value, etc., for the function of temperature.

HACS STATE FILE INITIALIZED WITH identifier VALUES, FILE LABEL FOLLOWS - label

Prior to processing user input, the HACS state file is initialized as determined by previous operations during the run, and the options specified by the user operations card. The identifier inserted in the message will be EMPTY, DEFAULT, USER or COMPUTED as appropriate, followed by a listing of the label of the state file on initialization.

HAZARD ASSESSMENT COMPUTER SYSTEM (HACS) -- DATEnn/nn/nnTIMEnn/nn/nnPAGEnnn

A standard message is used as a page header to label all HACS printed output. Date gives the calendar date for the run as determined at the start of execution via a system utility routine. Time gives the time of day at which the display for each page header is produced, and page gives a consecutive page number for the output generated for the complete run. Since the time of day is also obtained using a system utility which requires initialization (not via HACS), the time of day displayed may not always correspond to the actual time of day; differences however will accurately reflect elapsed times.

*****INPUT CONTAINS UNRECOGNIZABLE RATE MODEL CODE

A rate model code entered by the user is not A to Z, 11, RR, or SS.

INSUFFICIENT DATA AVAILABLE - COMPUTATION USES REQUESTED TEMPERATURE

In the event a user specifies coefficients for a temperature function but default values are used for the bounds of the equation, the computation proceeds using the specified value of ambient or boiling temperature even though the apparent limits have been exceeded.

INSUFFICIENT DATA AVAILABLE TO EXECUTE MODEL code. EXECUTION OF MODEL code IS TERMINATED

This condition indicates an attempt was made during execution of a rate model to use an undefined field value (i.e., no values, not even default, existed for the requested field). All remaining model operations which would normally be performed are terminated; HACS will however continue to attempt to execute the next model requested. It should not be possible for this error condition to occur during normal processing; the most likely cause is an incorrect or inconsistent modification to internal HACS program code.

MODEL code IS NOW BEING EXECUTED. THE INPUTS REQUIRED FOR THIS RATE MODEL ARE ...

The message is printed with the appropriate rate model designation at the start of the execution of the requested model. The message is then followed by a listing of all input data required by the rate model for execution, produced as each item is retrieved from the HACS state file and transferred to the rate model.

*****MODEL CODES NOT GIVEN IN CORRECT ASSESSMENT SEQUENCE

The structure, and construction, of the paths in the HACS assessment tree require that the rate model executions be performed in valid sequences which define an acceptable path along the tree. The same path code may not appear more than once, and the path codes which are given (except for rate models O, Z, II, RR and SS) must appear in alphabetical order (A to Z). The exceptions (O, Z, II, RR and SS) may be given in any order, but may not appear more than once.

*****NOTE - VALUE IN STATE FILE OF value unit IS A identifier VALUE AND WAS NOT REPLACED

A data base save operation, displayed previously, was attempted, but the value to be stored had a lower source code than the existing value. The value shown in the above message remains unchanged in the HACS state file.

Number Name = value unit, IS A identifier VALUE

Where the elements in the message are inserted by HACS as:

Number = data item field number
Name = field name defined by entry in the default file for the corresponding field number
Value = numeric value currently associated with the field number, either being retrieved from the HACS state file for use in model computations, or being stored in the HACS state file following completion of the model execution
Unit = label for the pre-selected unit or dimension of the value displayed. User options may be selected for displaying units in a single system, or for displaying field values in each different unit of measure for all systems. For this latter option, each different value and unit combination is displayed on additional lines.
Identifier = defines the type or status code of the data value as:
MISSING
DEFAULT
ESTIMATE
CHM PROP
COMPUTED
USER
SYSTEM

A priority value is associated with each of these types in ascending sequence in the order of the above list, to govern the replacement of different values for the same field. For example, a user value entered for a field will override a value computed by HACS, and a second computed value will replace a value computed previously by HACS. New values replace existing values in the state file during model executions, only if the source code associated with the new value is not lower than the source code associated with the existing value.

*****OVERLAY TRACE, NOW EXECUTING OVERLAY m. SEGMENT n
*****OVERLAY TRACE, FINISHED OVERLAY m. SEGMENT n

These messages are controlled by HACS subroutine TRACE and can be used to track the sequence of internal HACS operations through the overlay structure in which individual rate models are incorporated. The HACS overlay structure is transparent to users, and the installed version of subroutine TRACE has been modified to suppress these messages.

PHYSICAL PROPERTY DATA RETRIEVED FOR CHEMICAL code

Followed by a listing of the compound name, path codes, shipping state and late toxicity as read from the property file. This message is displayed to give a listing of chemical property data which are not transferred to the HACS state file. It is given when the data for the specified chemical recognition code has been found, and precedes the actual transfer of data values into the HACS state file.

*****RUN TERMINATED

Error message issued during user input processing, following a preceding error message, to indicate that the HACS run is unable to proceed due to errors in user input data.

STARTING SEARCH OF HACS FILE FOR PHYSICAL PROPERTIES OF CHEMICAL code ...

Where code gives the chemical recognition code requested on user input. This message is displayed at the start of a search of the property file, identified by a following display of the property file header (identification, creation date, version number and back-up).

TEMPERATURE FUNCTION IS UNDEFINED

All coefficients for a function of temperature are either missing or default values. Further computations to obtain a value are skipped, as the only result would also be a default value. The state file data priority structure would cause this value to be ignored.

THE EXECUTION OF MODEL code IS COMPLETED

The message is printed with the appropriate rate model designation inserted on completion of the model execution, and prior to initiating the next requested model execution. The results of the model execution as indicated on the printed output will have been saved in the HACS state file for use as necessary in subsequent calculations.

THE RESULTS OF MODEL code ARE ...

This message follows the completion of the execution of a rate model (*designation inserted*) and precedes the *display of model outputs*.

TRANSFER OF EXACT OR ESTIMATED PROPERTY VALUES TO HACS STATE FILE
FOLLOWS ...

All numeric field values, defined as exact or estimate values, are transferred from the chemical property file to the HACS state file, and are listed individually as entered in the state file. If a value has already been entered in the state file with a higher source code, the property value is listed with additional messages to indicate the value is not saved. Any default or "missing" data existing on the property file for the compound is not transferred, and is omitted on the HACS listing.

*****WARNING - CONVERSION OF INTEGER FIELD VALUES NOT APPLICABLE

Message incorporated in the event that different unit labels are provided for the same integer fields in different systems of units. This condition should not occur with the currently installed version of HACS.

*****WARNING/ERROR - FIELD VALUE NOT IN RANGE min TO max unit

Where min, max and unit are inserted by HACS. After conversion to internal CGS units, if necessary, all field values are compared to the nominal range limits. During normal assessment runs, a warning condition occurs if either limit is exceeded by the user value.

WARNING - MODEL code IS USING DEFAULT VALUES

If during immediately preceding transfer of data values from the HACS state file to an assessment rate model, one or more default values were transferred, this message is given at the conclusion of the entire data transfer sequence. Users are cautioned to carefully review all input data listings and to ensure the "reasonableness" of any default values in terms of the actual spill situation being assessed. This review may be used as a preliminary check to identify additional field data to be prepared for HACS input by the user.

*****WARNING - REQUESTED TEMPERATURE OF value IS NOT WITHIN RANGE value TO value

Where values are inserted by HACS. This condition may occur in the transfer of chemical property data from the property file to HACS during the computation of properties which are functions of temperature. Either the ambient or boiling temperature, at which the values of the temperature function are computed, is not within the range of the function as defined on the property file. The computation of the function value proceeds using a value of temperature constrained to the appropriate limit. In addition, if the function value would otherwise have been assigned an "exact" source code, the source code is revised to indicate an estimated function value.

*****WARNING - VALUE OF FIELD number name REQUESTED TO BE SAVED EXCEEDS NOMINAL LIMITS OF value TO value unit SUBSEQUENT CALCULATIONS MAY NOT BE VALID

The value of the field identified is displayed previously and was found to be outside the nominal range (min, max) limits shown in the message. This is a warning condition only and is intended to serve as an indicator for user review and possible input revision. A likely source of error is the use of unintended input units or dimensions. Also, during the transfer of chemical data from the property file to HACS, all defined property

data including functions of temperature are stored in the state file since distinctions as to whether or not any data item is actually necessary are made only during the execution of each rate model. In these cases, the message is only pertinent if the particular data item is actually used in any subsequent model computations.

APPENDIX C. HACS DEFAULT FILE

Introduction

Every input or output data value which may be stored in the HACS State File has a "default" value which is stored in the HACS Default File. These default values have the lowest source or priority code. They are utilized by HACS and presented to the user during the course of a hazard assessment run only if no other values are supplied to replace them. Sources of replacement values include the Chemical Properties File, values input by the user, and values computed or estimated by individual hazard assessment models.

The HACS Default File serves two functions: (a) to define the elements of the HACS State File, and (b) to provide "reasonable" estimates of numeric field values to be used only in the absence of any other data. Default file items defining the structure of the HACS state file are field number, storage type (I/R) and quantity type; these items can not generally be changed without accompanying revisions or modification of HACS program code.

Values from the Default File are used to automatically fill any or all data gaps which may occur, for any of a number of reasons, while HACS is being executed. Indications in output that default values were used can be interpreted as warnings to users that additional data may be necessary for a complete and accurate assessment of hazards. This action allows users the option of specifying better values for default data or accepting results "as is" if the default data are acceptable.

Contents of the Default File

Besides the field number for each input/output data item and a default or "field" value for each item, the Default File contains other information utilized by HACS internally. These data are described directly below. A listing of the contents of the Default File itself is presented in the following pages.

<u>Item</u>	<u>Definition</u>
<u>Field Number</u>	Each input/output data item in HACS is assigned a four-digit number for reference purposes. These "field numbers" are used to prepare input data and they also appear before each input/output data item in HACS output.
<u>Field Value</u>	These are the default values assigned to each Field Number.
<u>Unit</u>	The unit label for each data field appears here. The system of units shown is CGS.
<u>I = 0</u> <u>R = 1</u>	A flag indicating to HACS whether the data field normally contains an integer or real number. Integer = 0; real = 1.
<u>MIN</u> <u>MAX</u>	This indicator is used to control the status of nominal minimum and maximum values entered in the default file for each data field, and is actually used for input purposes only. A default file can only be created with an indicator code of 3, that is, both minimum and maximum limits must be supplied. Existing default range limits may be changed, however, by entering on input cards the codes, <ul style="list-style-type: none"> 0 if neither minimum or maximum value is to be changed 1 to indicate a new minimum value is being entered 2 to indicate a new maximum value is being entered 3 for replacing both range limits. Further discussion on this topic appears below.
<u>Nominal Minimum</u>	This is the minimum value HACS expects for the data field.
<u>Nominal Maximum</u>	The maximum value HACS expects for the data field.
<u>Type</u>	A numerical code indicating the unit type for the field.
<u>Field Name</u>	The name of the field. It appears on all HACS output including the field.

COLUMN TITLE

Definition

Comment

This column gives a reference code indicating the source of each value in the HACS state file which will be obtained from the physical property file in the absence of a user input value. These codes define the correspondence between the HACS state file field numbers, and the property file field numbers. For example, the value of HACS field 1003 for BOIL TEM LIQ is obtained from field 5 (P05) on the property file. Detailed reference material regarding property file item definitions is included in the user and technical documentation for the property file update program.

The second type of reference code is used to identify those HACS fields for which values are obtained as computed functions of temperature using data retrieved from the property file. For example, the reference code F03 for field 1006 indicates that the value for field 1006 is obtained from a function of temperature, using a specific temperature value. Complete identification of these functions is given on the following page.

Note on Minimum and Maximum Field Values

The range limits defined by the nominal minimum and maximum values stored in the default file are used by HACS to test the "reasonableness" of any data value before it is stored in the HACS state file. If a single field value lies outside the nominal range given in the default file, HACS will issue a warning message but will also store and use the value as given. This procedure helps to ensure that potential data, or computed value, errors are noted for user review but does not prohibit situations which may require or produce results beyond the nominal limits entered in the default file.

An exception to this general warning procedure occurs for temperature functions which are constrained over a fixed temperature range; each bound, lower and upper limit, is defined by a separate field in the state file. The bounds themselves are of course subject to the nominal range checks described above. If an attempt is made to generate a computed function of temperature at a temperature which is not within the range over which the function is defined, HACS will return a function value at the appro-

prate temperature limit with an accompanying diagnostic message. Also, if the computed value would otherwise be returned with a source code for "exact", the code is automatically adjusted to "estimate".

FUNCTIONS OF TEMPERATURE COMPUTED FROM PROPERTY FILE DATA

<u>Function Number</u>	<u>HACS Field Number</u>	<u>Description</u>
F01	1004	Saturated liquid density at ambient temperature.
F02	1021	Saturated liquid density at boiling point.
F03	1006	Liquid viscosity at ambient temperature.
F04	1005	Liquid viscosity at boiling point.
F05	1081	Liquid thermal conductivity at ambient temperature.
F06	1082	Liquid thermal conductivity at boiling temperature.
F07	1007	Liquid heat capacity at ambient temperature.
F08	1083	Liquid heat capacity at boiling point.
F09	1084	Solubility at ambient temperature.
F10	1085	Solubility at boiling temperature.
F11	1086	Saturated vapor pressure at ambient temperature.
F12	1087	Saturated vapor pressure at boiling point.
F13	1013	Vapor heat capacity at ambient temperature.
F14	1088	Vapor heat capacity at boiling point.

FIELD NUMBER	FIELD NAME	DEFAULT VALUE	UNIT	NOMINAL MINIMUM	NOMINAL MAXIMUM
1002	MOLEC WEIGHT	200.0	G/GM	10.00	1400.
1003	BOIL TEM LIQ	282.0	C	-263.0	3000.
1004	DENS LIQ AMB	0.8700	G/CM3	0.0000	470.0
1005	VISCOSITY-BP	0.2620	DS/CM2	0.1000E-03	20.00
1006	VISCOSITY-AM	1.970	DS/CM2	0.1000E-03	20.00
1007	HT CAP LQ-AM	0.6000	CL/GC	0.2389E-01	2.389
1008	SURF TENSION	20.00	D/CM	1.000	500.0
1009	DEN FUEL VPR	0.1000E-02	G/CM3	-1.000	1.000
1010	VPE COEFF A	7.800	LOG FCN	-1.125	17.88
1011	VPE COEFF B	1440.	C	50.00	5265.
1012	VPE COEFF C	273.0	C	173.0	283.0
1013	HT CAP VP-AM	0.1000	CL/GMC	0.0000	100.0
1014	HEAT OF VPR	136.0	CL/G	2.300	480.0
1015	BURNING RATE	4.000	CM/S	0.0000	5.000
1016	AD FLME TEMP	2200.	C	500.0	5000.
1017	MOLAR RATIO	0.5000	ND	0.1000	5.000
1018	STO AIR/FUEL	2.500	ND	2.000	60.00
1019	FLAME TEMP	800.0	C	500.0	4500.
1020	MOLE FRACTN	0.1000E-01	ND	0.0000	1.000
1021	LIQ DENS BP	0.8700	G/CM3	0.0000	470.0
1025	CRIT TEMP	263.0	C	-243.0	5000.
1026	SOLUBILITY	0.0000	G/HG	0.0000	1000.
1027	SOLUB-TEMP	0.0000	C	-25.00	130.0
1028	SOL EQ COEF1	0.0000	G/HG	-0.2930E+05	0.2830E+05
1029	SOL EQ COEF2	0.0000	G/HGC	-100.0	100.0
1031	INTRFACE TEN	32.80	D/CM	1.000	500.0
1032	INTF TNS-TMP	20.00	C	-265.0	230.0
1033	NORM FREZ PT	-29.00	C	-263.0	3000.
1034	CRIT PRES	0.8447E+09	D/CM2	0.1000E+07	0.1688E+10
1035	DENSITY-DATA	0.8700	G/CM3	0.1000E-01	15.00
1036	DENSITY TEMP	20.00	C	-265.0	330.0
1038	SLD COF ARHO	0.8500	G/CM3	-6.500	91.40
1039	SLD COF BRHO	0.0000	G/CM3C	-0.4000E-01	0.5600

FIELD NUMBER	FIELD NAME	DEFAULT VALUE	UNIT	NOMINAL MINIMUM	NOMINAL MAXIMUM
1040	SLD COF CRHD	0.0000	G/CM3C2	-0.5000E-04	0.1000E-02
1041	SLD UPR BND	30.00	C	-265.0	330.0
1042	SLD LWR BND	10.00	C	-265.0	330.0
1043	LQ VIS-POINT	0.2000E-01	DS/CM2	0.1000E-03	20.00
1044	LQ VIS-TEMP	20.00	C	-265.0	330.0
1045	LQ VIS CF A	-8.220	LN FCN	-27.70	-4.600
1046	LQ VIS CF B	1261.	C	100.0	6000.
1047	LQVS UPR BND	100.0	C	-265.0	330.0
1048	LQVS LWR BND	-20.00	C	-265.0	160.0
1049	LQ THR CN-PT	0.3100E-03	CL/CMSC	0.2400E-04	0.1200E-02
1050	LQ THR CN-TM	20.00	C	-265.0	330.0
1051	L THR CN CFA	0.3161E-03	CL/CMSC	-3.276	0.2334E-01
1052	L THR CN CFB	-0.1242E-06	CL/CMSC2	-0.1200E-01	0.2400E-05
1053	LTC UPR BND	50.00	C	-265.0	330.0
1054	LTC LWR BND	0.0000	C	-265.0	160.0
1055	LQ HT CAP-PT	0.4700	CL/GC	0.2389E-01	2.389
1056	LQ HT CAP-TM	20.00	C	-265.0	330.0
1057	L HT CAP CFA	0.4260	CL/GC	-4.800	3.699
1058	L HT CAP CFB	0.8072E-03	CL/GC2	0.0000	0.4800E-02
1059	LHC UPR BND	40.00	C	-265.0	330.0
1060	LHC LWR BND	10.00	C	-265.0	160.0
1061	SURF TNS-TMP	20.00	C	-265.0	230.0
1062	SVP UPR BND	100.0	C	-265.0	545.0
1063	SVP LWR BND	20.00	C	-270.0	530.0
1064	V HT CAP-CFA	0.0000	CL/GMC	-55.00	0.1300E+05
1065	V HT CAP-CFB	0.0000	CL/GMC2	-0.4000	0.1410E+08
1066	V HT CAP-CFC	0.0000	CL/GMC3	-0.1500E-02	0.5200E+05
1067	V HT CAP-CFD	0.0000	CL/GMC4	-0.1000E-05	65.00
1068	VHC UPR BND	0.0000	C	-265.0	650.0
1069	VHC LWR BND	0.0000	C	-265.0	630.0
1070	HT OF FUSION	1.200	CL/G	1.200	10.00
1071	HT OF COMB	-0.1000E+05	CL/G	-0.1435E+05	0.0000
1072	HT OF DECOMP	0.0000	CL/G	-7200.	0.0000

FIELD NUMBER	FIELD NAME	DEFAULT VALUE	UNIT	NOMINAL MINIMUM	NOMINAL MAXIMUM
1073	HT OF SOLN	0.0000	CL/G	-960.0	240.0
1074	HT OF REACTN	0.0000	CL/G	-7200.	0.0000
1075	HT OF POLYMR	0.0000	CL/G	-7200.	0.0000
1076	UPR FLAM LIM	0.0000	PERCENT	0.0000	105.0
1077	ST INHAL LIM	0.0000	PPM	0.0000	5250.
1078	ST INHAL TIM	0.0000	S	0.0000	0.1512E+05
1079	LWR TOX INGS	0.5000E-02	G/G	0.0000	0.2000E-01
1080	UPR TOX INGS	0.1500E-01	G/G	0.0000	0.2000E-01
1081	L THR CON-AM	0.3159E-03	CL/CMSC	0.2400E-04	0.1200E-02
1082	L THR CON-BP	0.2811E-03	CL/CMSC	0.2400E-04	0.1200E-02
1083	HT CAP LQ-BP	0.6000	CL/GC	0.2389E-01	2.389
1084	SOLUBLTY-AM	0.0000	G/HG	0.0000	1000.
1085	SOLUBLTY-BP	0.0000	G/HG	0.0000	1000.
1086	S VPR PRS-AM	794.3	MM HG	0.0000	0.1000E+06
1087	S VPR PRS-BP	0.1585E+05	MM HG	0.0000	0.1000E+06
1088	HT CAP VP-BP	0.1000	CL/GMC	0.0000	100.0
2001	TANK VOLUME	0.1000E+08	CM3	0.0000	0.1000E+14
2002	TANK HEIGHT	1000.	CM	0.0000	0.1000E+06
2003	HOLE HEIGHT	0.0000	CM	0.0000	0.1000E+06
2004	TEMP START	20.00	C	-273.0	900.0
2005	TANK PRESS	0.1013E+07	D/CM2	0.0000	0.1000E+14
2006	ADBT OR ISO	1	ND	-1	1
2007	INITIAL MASS	0.9080E+07	G	0.0000	0.1000E+14
2008	HOLE DIAM	50.00	CM	0.0000	0.1000E+14
2009	NUM MASS INC	100	ND	5	151
2010	RAD FLUX	0.0000	CL/CM2S	0.0000	0.1000E+14
2011	EL TM - CONC	0.3600E+05	S	0.0000	0.1000E+08
2012	COORD X	0.1000E+06	CM	0.0000	0.1000E+14
2013	COORD Y	0.0000	CM	0.0000	0.1000E+09
2014	COORD Z	100.0	CM	0.0000	0.1000E+07
2015	HOLE HEIGHT	0.0000	CM	0.0000	0.1000E+06
2016	WIND VELOC	200.0	CM/S	0.0000	7000.
2017	ATMOS COND	6	ND	0	6

FIELD NUMBER	FIELD NAME	DEFAULT VALUE	UNIT	NOMINAL MINIMUM	NOMINAL MAXIMUM
2018	DIM FLAG	2	ND	-1	10
2019	DIM SPILL	5000.	CM	0.0000	0.1000E+15
2020	CHAN L WIDTH	0.1000E+06	CM	0.0000	0.1000E+13
2021	SPILL DEPTH	0.0000	CM	0.0000	0.1000E+14
2022	FLUX VAR	0	ND	0	5
2023	WATER TEMP	15.00	C	-10.00	100.0
2024	HEAT FLUX	2.000	CL/CM2S	0.0000	0.1000E+09
2025	CRIT. FLAG	2	ND	0	3
2026	POOL SIZE TM	600.0	S	0.0000	0.1000E+07
2027	EVAP TIME	600.0	S	0.0000	0.1000E+07
2028	WAT TYPE P/R	2	ND	-1	10
2029	SPILL TYPE P	0	ND	-1	1
2030	MIN DIST HFM	0.0000	CM	0.0000	0.1000E+09
2031	MAX DISTANCE	0.0000	CM	0.0000	0.1000E+14
2032	LOW TOX LIM	0.0000	PPM	0.0000	5250.
2033	LOW FLAM LIM	0.0000	PERCENT	0.0000	25.00
2034	MIN HAZ ZONE	0.0000	CM	0.0000	0.1000E+09
2035	MAX HAZ ZONE	0.1000E+07	CM	0.0000	0.1000E+09
2036	TEMP LIQUID	15.00	C	-273.0	900.0
2037	MAX TME CONC	0.3600E+05	S	0.0000	0.1000E+07
2038	AVR RATE MS	0.1000E+06	G/S	0.0000	0.1000E+15
2039	CONC PT X	0.1000E+06	CM	0.0000	0.1000E+14
2040	CONC PT Y	0.0000	CM	0.0000	0.1000E+14
2041	CONC PT Z	0.0000	CM	0.0000	0.1000E+14
2042	TIME CONC PT	600.0	S	0.0000	0.1000E+07
2043	DIF COEF H2O	0.1300E-04	CM2/S	0.0000	0.1000E+14
2044	RIVER DEPTH	0.1000E+05	CM	0.0000	0.1000E+07
2045	RIVER WIDTH	0.1000E+06	CM	0.0000	0.1000E+08
2046	OFF DIST	0.0000	CM	0.0000	0.1000E+15
2047	STREAM VEL	100.0	CM/S	0.0000	0.1000E+07
2048	TIDAL VEL	50.00	CM/S	0.0000	0.1000E+06
2049	TIDAL PERIOD	0.4320E+05	S	0.0000	0.1000E+14
2050	PHASE LAG	0.0000	S	0.0000	0.1000E+15

FIELD NUMBER	FIELD NAME	DEFAULT VALUE	UNIT	NOMINAL MINIMUM	NOMINAL MAXIMUM
2051	DECAY COEFF	0.0000	/S	0.0000	0.1000E+05
2052	MANNING FACT	0.3000E-01	ND	0.2000E-01	0.1500
2053	DIF COEF V-A	0.1000	CM2/S	0.0000	0.1000E+15
2054	AIR TEMP	15.00	C	-50.00	150.0
2055	TIME LIQ SPR	0.3600E+05	S	0.0000	0.1000E+07
2056	LIQ SPR TIME	0.3600E+05	S	0.0000	0.1000E+07
2057	TIM SPL COND	0.3600E+05	S	0.0000	0.1000E+07
2058	SPILL TYPE T	0	ND	-1	1
2059	HOLE HGT UP	100.0	CM	0.0000	0.1000E+14
2060	SPILL TYPE D	0	ND	-1	1
2061	SPILL TYPE C	0	ND	-1	1
2062	TANK DIAM	449.6	CM	0.0000	0.1000E+14
2063	WALL THICKNS	3.810	CM	0.0000	0.1000E+14
2064	ULLAGE FRCTN	0.8000E-01	ND	0.0000	1.000
2065	RLF VALV SET	0.1793E+08	D/CM2	0.0000	0.1000E+14
2066	HEAT FLUX	2.260	CL/CM2S	0.2000E-01	4.000
2067	THR CNC 0 DG	0.1030	CL/CMSC	0.0000	0.1000E+14
2068	THR CND 400	0.9920E-01	CL/CMSC	0.0000	0.1000E+14
2069	THR CND 800	0.9300E-01	CL/CMSC	0.0000	0.1000E+14
2070	THR CND 1200	0.8060E-01	CL/CMSC	0.0000	0.1000E+14
2071	THR CND 1600	0.4550E-01	CL/CMSC	0.0000	0.1000E+14
2072	SPEC HT 0 DG	0.1000	CL/GC	0.0000	0.1000E+14
2073	SPEC HT 400	0.1310	CL/GC	0.0000	0.1000E+14
2074	SPEC HT 800	0.1471	CL/GC	0.0000	0.1000E+14
2075	SPEC HT 1200	0.1885	CL/GC	0.0000	0.1000E+14
2076	SPEC HT 1600	0.3100	CL/GC	0.0000	0.1000E+14
2077	TNS STR 0 DG	0.4276E+10	D/CM2	0.0000	0.1000E+14
2078	TNS STR 400	0.4897E+10	D/CM2	0.0000	0.1000E+14
2079	TNS STR 800	0.3449E+10	D/CM2	0.0000	0.1000E+14
2080	TNS STR 1200	0.7587E+09	D/CM2	0.0000	0.1000E+14
2081	TNS STR 1600	0.0000	D/CM2	0.0000	0.1000E+14
2082	TNK HEAT FLG	0	ND	0	2
2083	TNK-FIRE DIS	0.3048E+05	CM	0.0000	0.1000E+14

FIELD NUMBER	FIELD NAME	DEFAULT VALUE	UNIT	NOMINAL MINIMUM	NOMINAL MAXIMUM
2084	MODK FLAG		1 ND	0	2
2085	GAS FRACTION	0.1000	ND	0.0000	1.010
2086	MODEL TYPE-T		0 ND	0	3
3001	TABLE FLAG A		0 ND	-1	1
3002	PLOT OFFLINE		0 ND	0	1
3003	PLOT FLG B/E		0 ND	-1	2
3004	PLOT FLAG C		0 ND	-1	3
3005	TABLE FLAG C		0 ND	-1	3
3006	PLOT FLAG D		0 ND	-1	1
3007	PLOT FLAG I		0 ND	-1	1
3008	PLOT FLAG P		0 ND	-1	4
3009	PLOT FLAG T		0 ND	-1	4
3010	PLDT FLAG V		0 ND	-1	2
3011	READ PROP		1 ND	0	1
3012	TABLE FLAG X		0 ND	-1	10
3013	TABLE FLAG D		0 ND	-1	10
3014	TABLE FLAG U		0 ND	-1	10
3015	TABLE FLAG P		0 ND	-1	10
3016	TABLE FLAG I		0 ND	-1	10
3017	TABLE FLAG T		0 ND	-1	9
3018	PROP REPORT		0 ND	0	1
3019	UNIT SELECT		1 ND	0	4
4001	TOT MASS GAS	0.0000	G	0.0000	0.1000E+14
4002	TOT MASS LIQ	0.0000	G	0.0000	0.1000E+14
4003	TOT VOL LIQ	0.0000	CM3	0.0000	0.1000E+14
4004	TIME OF REL	0.0000	S	-0.1000E+14	0.1000E+15
4005	MX TEMP TANK	0.0000	C	-0.1000E+14	0.1000E+15
4006	FLAME LENGTH	0.0000	CM	0.0000	0.1000E+14
4007	DIAM FLAME	0.0000	CM	0.0000	0.1000E+14
4008	FLAME ANGLE	0.0000	RAD	0.0000	1.580
4009	SAF SEP WOOD	0.0000	CM	0.0000	0.1000E+14
4010	MAX DIST FIR	0.0000	CM	0.0000	0.1000E+14
4011	1/2 HAZ ZONE	0.0000	CM	-0.1000E+14	0.1000E+15

FIELD NUMBER	FIELD NAME	DEFAULT VALUE	UNIT	NOMINAL MINIMUM	NOMINAL MAXIMUM
4012	DUR HAZ CLD	0.0000	S	-0.1000E+14	0.1000E+15
4013	ARRL TME HAZ	0.0000	S	-0.1000E+14	0.1000E+15
4014	IN OR OUT	0	ND	-1	1
4015	SAF SEP SKIN	0.0000	CM	0.0000	0.1000E+14
4016	TIME LQ EVAP	0.0000	S	0.0000	0.1000E+14
4017	SAF SEP PBRN	0.0000	CM	0.0000	0.1000E+14
4018	POOL FLM HGT	0.0000	CM	0.0000	0.1000E+14
4019	REMAIN LIQ	0.0000	CM3	-0.1000E+14	0.1000E+15
4020	TOT EVP RATE	0.0000	G/S	-0.1000E+14	0.1000E+15
4021	EVAP TIME LQ	0.0000	S	-0.1000E+14	0.1000E+15
4022	LIQ-H2O CONC	0.0000	G/CM3	-0.1000E+14	0.1000E+15
4023	MASS VAP LIB	0.0000	G	-0.1000E+14	0.1000E+15
4024	SAFE DIST	0.0000	CM	-0.1000E+14	0.1000E+15
4025	POOL SZ HBTL	0.0000	CM	-0.1000E+14	0.1000E+15
4026	VOL REM HVPL	0.0000	CM3	-0.1000E+14	0.1000E+15
4027	SPL SZE HVPL	0.0000	CM	-0.1000E+14	0.1000E+15
4028	TEMP HVPL	0.0000	C	-0.1000E+14	0.1000E+15
4029	EVAP RT HVPL	0.0000	G/CM2S	-0.1000E+14	0.1000E+15
4030	EVP TIM HVPL	0.0000	S	-0.1000E+14	0.1000E+15
4031	AREA HVPL	0.0000	CM2	-0.1000E+14	0.1000E+15
4032	SINK TIME	0.0000	S	-0.1000E+14	0.1000E+15
4033	DIST TRAV	0.0000	CM	-0.1000E+14	0.1000E+15
4034	SAF SEP USER	0.0000	CM	0.0000	0.1000E+14
4036	DISOLVE RATE	0.0000	G/S	0.0000	0.1000E+14
4037	DISOLVE TIME	0.0000	S	0.0000	0.1000E+14
4038	POOL AREA	0.0000	CM2	0.0000	0.1000E+14
4039	POOL LENGTH	0.0000	CM	0.0000	0.1000E+14
4040	SPRD TIME	0.0000	S	0.0000	0.1000E+14
4041	CLEAR TIME	0.0000	S	0.0000	0.1000E+14
4042	CONC AT XYZ	0.0000	G/CM3	0.0000	14.00
4043	MAX DIST TOX	0.0000	CM	0.0000	0.1000E+14
4044	AVG VAP RATE	0.0000	G/S	0.0000	0.1000E+14
4045	EVOLVE TIME	0.0000	S	0.0000	0.1000E+14

FIELD NUMBER	FIELD NAME	DEFAULT VALUE	UNIT	NOMINAL MINIMUM	NOMINAL MAXIMUM
4046	CRIT DEPTH	0.0000	CM	0.0000	0.1000E+14
4047	GAS FLWRATE	0.0000	G/S	0.0000	0.1000E+14
4048	GAS FLW TIME	0.0000	S	0.0000	0.1000E+14
4049	LIQ FLWRATE	0.0000	G/S	0.0000	0.1000E+14
4050	LIQ FLW TIME	0.0000	S	0.0000	0.1000E+14
4051	OUT FAIL STR	0.0000	D/CM2	0.0000	0.1000E+14
4052	OUT WALL TMP	0.0000	C	0.0000	0.1000E+14
4053	IN FAIL STRS	0.0000	D/CM2	0.0000	0.1000E+14
4054	IN WALL TEMP	0.0000	C	0.0000	0.1000E+14
4055	FAILURE TIME	0.0000	S	0.0000	0.1000E+14
4056	MASS VAP LIB	0.0000	G	0.0000	0.1000E+14
4057	SAFE DIST	0.0000	CM	0.0000	0.1000E+14
4058	DIM SPILL	0.0000	CM	0.0000	0.1000E+14
4059	AVG VAP RATE	0.0000	G/S	0.0000	0.1000E+14
4060	EVOLVE TIME	0.0000	S	0.0000	0.1000E+14
4061	DISOLVE RATE	0.0000	G/CM2S	0.0000	0.1000E+14
4062	DISOLVE TIME	0.0000	S	0.0000	0.1000E+14
4063	POOL CENT X	0.0000	CM	0.0000	0.1000E+14
4064	CONC AT XYZ	0.0000	G/CM3	0.0000	14.00
4065	1/2 HAZ ZONE	0.0000	CM	0.0000	0.1000E+14
4066	DUR HAZ CLD	0.0000	S	0.0000	0.1000E+14
4067	ARRL TME HAZ	0.0000	S	0.0000	0.1000E+14
4068	AVG GAS TEMP	20.00	C	-500.0	1000.
4069	VP DEN RATIO	0.0000	ND	0.0000	300.0

APPENDIX D. INDEX TO HACS DATA FIELDS BY FIELD NUMBER

FIELD NUMBER	FIELD NAME	FIELD NUMBER	FIELD NAME
1002	MOLEC WEIGHT	1040	SLD COF CRHO
1003	BOIL TEM LIQ	1041	SLD UPR BND
1004	DENS LIQ AMB	1042	SLD LWR BND
1005	VISCOSITY-BP	1043	LQ VIS-POINT
1006	VISCOSITY-AM	1044	LQ VIS-TEMP
1007	HT CAP LQ-AM	1045	LQ VIS CF A
1008	SURF TENSION	1046	LQ VIS CF B
1009	DEN FUEL VPR	1047	LQVS UPR BND
1010	VPE COEFF A	1048	LQVS LWR BND
1011	VPE COEFF B	1049	LQ THR CN-PT
1012	VPE COEFF C	1050	LQ THR CN-TM
1013	HT CAP VP-AM	1051	L THR CN CFA
1014	HEAT OF VPR	1052	L THR CN CFB
1015	BURNING RATE	1053	LTC UPR BND
1016	AD FLME TEMP	1054	LTC LWR BND
1017	MOLAR RATIO	1055	LQ HT CAP-PT
1018	STO AIR/FUEL	1056	LQ HT CAP-TM
1019	FLAME TEMP	1057	L HT CAP CFA
1020	MOLE FRACTN	1058	L HT CAP CFB
1021	LIQ DENS BP	1059	LHC UPR BND
1025	CRIT TEMP	1060	LHC LWR BND
1026	SOLUBILITY	1061	SURF TNS-TMP
1027	SOLUB-TEMP	1062	SVP UPR BND
1028	SOL EQ COEF1	1063	SVP LWR BND
1029	SOL EQ COEF2	1064	V HT CAP-CFA
1031	INTRFACE TEN	1065	V HT CAP-CFB
1032	INTF TNS-TMP	1066	V HT CAP-CFC
1033	NORM FREZ PT	1067	V HT CAP-CFD
1034	CRIT PRES	1068	VHC UPR BND
1035	DENSITY-DATA	1069	VHC LWR BND
1036	DENSITY TEMP	1070	HT OF FUSION
1038	SLD COF ARHO	1071	HT OF COMB
1039	SLD COF BRHO	1072	HT OF DECOMP

<u>FIELD NUMBER</u>	<u>FIELD NAME</u>	<u>FIELD NUMBER</u>	<u>FIELD NAME</u>
1073	HT OF SOLN	2018	DIM FLAG
1074	HT OF REACTN	2019	DIM SPILL
1075	HT OF POLYMR	2020	CHAN L WIDTH
1076	UPR FLAM LIM	2021	SPILL DEPTH
1077	ST INHAL LIM	2022	FLUX VAR
1078	ST INHAL TIM	2023	WATER TEMP
1079	LWR TOX INGS	2024	HEAT FLUX
1080	UPR TOX INGS	2025	CRIT. FLAG
1081	L THR CON-AM	2026	POOL SIZE TM
1082	L THR CON-BP	2027	EVAP TIME
1083	HT CAP LQ-BP	2028	WAT TYPE P/R
1084	SOLUBLTY-AM	2029	SPILL TYPE P
1085	SOLUBLTY-BP	2030	MIN DIST HFM
1086	S VPR PRS-AM	2031	MAX DISTANCE
1087	S VPR PRS-BP	2032	LOW TOX LIM
1088	HT CAP VP-BP	2033	LOW FLAM LIM
2001	TANK VOLUME	2034	MIN HAZ ZONE
2002	TANK HEIGHT	2035	MAX HAZ ZONE
2003	HOLE HEIGHT	2036	TEMP LIQUID
2004	TEMP START	2037	MAX TME CONC
2005	TANK PRESS	2038	AVR RATE MS
2006	ADBT OR ISO	2039	CONC PT X
2007	INITIAL MASS	2040	CONC PT Y
2008	HOLE DIAM	2041	CONC PT Z
2009	NUM MASS INC	2042	TIME CONC PT
2010	RAD FLUX	2043	DIF COEF H2O
2011	EL TM - CONC	2044	RIVER DEPTH
2012	COORD X	2045	RIVER WIDTH
2013	COORD Y	2046	OFF DIST
2014	COORD Z	2047	STREAM VEL
2015	HOLE HEIGHT	2048	TIDAL VEL
2016	WIND VELOC	2049	TIDAL PERIOD
2017	ATMOS COND	2050	PHASE LAG

<u>FIELD NUMBER</u>	<u>FIELD NAME</u>	<u>FIELD NUMBER</u>	<u>FIELD NAME</u>
2051	DECAY COEFF	2084	MODK FLAG
2052	MANNING FACT	2085	GAS FRACTION
2053	DIF COEF V-A	2086	MODEL TYPE-T
2054	AIR TEMP	3001	TABLE FLAG A
2055	TIME LIQ SPR	3002	PLOT OFFLINE
2056	LIQ SPR TIME	3003	PLOT FLG B/E
2057	TIM SPL COND	3004	PLOT FLAG C
2058	SPILL TYPE T	3005	TABLE FLAG C
2059	HOLE HGT UP	3006	PLOT FLAG D
2060	SPILL TYPE D	3007	PLOT FLAG I
2061	SPILL TYPE C	3008	PLOT FLAG P
2062	TANK DIAM	3009	PLOT FLAG T
2063	WALL THICKNS	3010	PLOT FLAG V
2064	ULLAGE FRCTN	3011	READ PROP
2065	RLF VALV SET	3012	TABLE FLAG X
2066	HEAT FLUX	3013	TABLE FLAG D
2067	THR CNC 0 DG	3014	TABLE FLAG V
2068	THR CND 400	3015	TABLE FLAG P
2069	THR CND 800	3016	TABLE FLAG I
2070	THR CND 1200	3017	TABLE FLAG T
2071	THR CND 1600	3018	PROP REPORT
2072	SPEC HT 0 DG	3019	UNIT SELECT
2073	SPEC HT 400	4001	TOT MASS GAS
2074	SPEC HT 800	4002	TOT MASS LIQ
2075	SPEC HT 1200	4003	TOT VOL LIQ
2076	SPEC HT 1600	4004	TIME OF REL
2077	TNS STR 0 DG	4005	MX TEMP TANK
2078	TNS STR 400	4006	FLAME LENGTH
2079	TNS STR 800	4007	DIAM FLAME
2080	TNS STR 1200	4008	FLAME ANGLE
2081	TNS STR 1600	4009	SAF SEP WOOD
2082	TNK HEAT FLG	4010	MAX DIST FIR
2083	TNK-FIRE DIS	4011	1/2 HAZ ZONE

<u>FIELD NUMBER</u>	<u>FIELD NAME</u>	<u>FIELD NUMBER</u>	<u>FIELD NAME</u>
4012	DUR HAZ CLD	4046	CRIT DEPTH
4013	ARRL TME HAZ	4047	GAS FLWRATE
4014	IN OR OUT	4048	GAS FLW TIME
4015	SAF SEP SKIN	4049	LIQ FLWRATE
4016	TIME LQ EVAP	4050	LIQ FLW TIME
4017	SAF SEP PBRN	4051	OUT FAIL STR
4018	POOL FLM HGT	4052	OUT WALL TMP
4019	REMAIN LIQ	4053	IN FAIL STRS
4020	TOT EVP RATE	4054	IN WALL TEMP
4021	EVAP TIME LQ	4055	FAILURE TIME
4022	LIQ-H2O CONC	4056	MASS VAP LIB
4023	MASS VAP LIB	4057	SAFE DIST
4024	SAFE DIST	4058	DIM SPILL
4025	POOL SZ HBTL	4059	AVG VAP RATE
4026	VOL REM HVPL	4060	EVOLVE TIME
4027	SPL SZE HVPL	4061	DISOLVE RATE
4028	TEMP HVPL	4062	DISOLVE TIME
4029	EVAP RT HVPL	4063	POOL CENT X
4030	EVP TIM HVPL	4064	CONC AT XYZ
4031	AREA HVPL	4065	1/2 HAZ ZONE
4032	SINK TIME	4066	DUR HAZ CLD
4033	DIST TRAV	4067	ARRL TME HAZ
4034	SAF SEP USER	4068	AVG GAS TEMP
4036	DISOLVE RATE	4069	VP DEN RATIO
4037	DISOLVE TIME		
4038	POOL AREA		
4039	POOL LENGTH		
4040	SPRD TIME		
4041	CLEAR TIME		
4042	CONC AT XYZ		
4043	MAX DIST TOX		
4044	AVG VAP RATE		
4045	EVOLVE TIME		

APPENDIX E. INDEX TO HACS DATA FIELDS BY FIELD NAME

<u>FIELD NAME</u>	<u>FIELD NUMBER</u>	<u>FIELD NAME</u>	<u>FIELD NUMBER</u>
ADBT OR ISO	2006	DIF COEF H2O	2043
AD FLME TEMP	1016	DIF COEF V-A	2053
AIR TEMP	2054	DIM FLAG	2018
AREA HVPL	4031	DIM SPILL	2019
ARRL TME HAZ	4013	DIM SPILL	4058
ARRL TME HAZ	4067	DISOLVE RATE	4036
ATMOS COND	2017	DISOLVE RATE	4061
AVG GAS TEMP	4068	DISOLVE TIME	4037
AVG VAP RATE	4044	DISOLVE TIME	4062
AVG VAP RATE	4059	DIST TRAV	4033
AVR RATE MS	2038	DUR HAZ CLD	4012
BOIL TEM LIQ	1003	DUR HAZ CLD	4066
BURNING RATE	1015	EL TM - CONC	2011
CHAN L WIDTH	2020	EVAP RT HVPL	4029
CLEAR TIME	4041	EVAP TIME	2027
CONC AT XYZ	4042	EVAP TIME LQ	4021
CONC AT XYZ	4064	EVOLVE TIME	4045
CONC PT X	2039	EVOLVE TIME	4060
CONC PT Y	2040	EVP TIM HVPL	4030
CONC PT Z	2041	FAILURE TIME	4055
COORD X	2012	FLAME ANGLE	4008
COORD Y	2013	FLAME LENGTH	4006
COORD Z	2014	FLAME TEMP	1019
CRIT DEPTH	4046	FLUX VAR	2022
CRIT. FLAG	2025	GAS FLWRATE	4047
CRIT PRES	1034	GAS FLW TIME	4048
CRIT TEMP	1025	GAS FRACTION	2085
DECAY COEFF	2051	HEAT FLUX	2024
DEN FUEL VPR	1009	HEAT FLUX	2066
DENSITY-DATA	1035	HEAT OF VPR	1014
DENSITY TEMP	1036	HOLE DIAM	2008
DENS LIQ AMB	1004	HOLE HEIGHT	2003
DIAM FLAME	4007	HOLE HEIGHT	2015

<u>FIELD NAME</u>	<u>FIELD NUMBER</u>	<u>FIELD NAME</u>	<u>FIELD NUMBER</u>
HOLE HGT UP	2059	LQ VIS CF B	1046
HT CAP VP-AM	1013	LQ VIS-POINT	1043
HT CAP VP-BP	1088	LQ VIS-TEMP	1044
HT CAP LQ-AM	1007	LQVS LWR BND	1048
HT CAP LQ-BP	1083	LQVS UPR BND	1047
HT OF COMB	1071	LTC LWR BND	1054
HT OF DECOMP	1072	LTC UPR BND	1053
HT OF FUSION	1070	L THR CN CFA	1051
HT OF POLYMR	1075	L THR CN CFB	1052
HT OF REACTN	1074	L THR CON-AM	1081
HT OF SOLN	1073	L THR CON-BP	1082
IN FAIL STRS	4053	LWR TOX INGS	1079
INITIAL MASS	2007	MANNING FACT	2052
IN OR OUT	4014	MASS VAP LIB	4023
INTF TNS-TMP	1032	MASS VAP LIB	4056
INTRFACE TEN	1031	MAX DISTANCE	2031
IN WALL TEMP	4054	MAX DIST FIR	4010
L HT CAP CFA	1057	MAX DIST TOX	4043
L HT CAP CFB	1058	MAX HAZ ZONE	2035
LHC LWR BND	1060	MAX TME CONC	2037
LHC UPR BND	1059	MIN DIST HFM	2030
LIQ DENS BP	1021	MIN HAZ ZONE	2034
LIQ FLWRATE	4049	MODEL TYPE-T	2086
LIQ FLW TIME	4050	MODK FLAG	2084
LIQ-H2O CONC	4022	MOLAR RATIO	1017
LIQ SPR TIME	2056	MOLEC WEIGHT	1002
LOW FLAM LIM	2033	MOLE FRACTN	1020
LOW TOX LIM	2032	MX TEMP TANK	4005
LQ HT CAP-PT	1055	NORM FREZ PT	1033
LQ HT CAP-TM	1056	NUM MASS INC	2009
LQ THR CN-PT	1049	1/2 HAZ ZONE	4011
LQ THR CN-TM	1050	1/2 HAZ ZONE	4065
LQ VIS CF A	1045	OFF DIST	2046

<u>FIELD NAME</u>	<u>FIELD NUMBER</u>	<u>FIELD NAME</u>	<u>FIELD NUMBER</u>
OUT FAIL STR	4051	SLD COF CRHO	1040
OUT WALL TMP	4052	SLD LWR BND	1042
PHASE LAG	2050	SLD UPR BND	1041
PLOT FLAG C	3004	SOL EQ COEF1	1028
PLOT FLAG D	3006	SOL EQ COEF2	1029
PLOT FLAG I	3007	SOLUBILITY	1026
PLOT FLAG P	3008	SOLUBLTY-AM	1084
PLOT FLAG T	3009	SOLUBLTY-BP	1085
PLOT FLAG V	3010	SOLUB-TEMP	1027
PLOT FLG B/E	3003	SPEC HT 0 DG	2072
PLOT OFFLINE	3002	SPEC HT 400	2073
POOL AREA	4038	SPEC HT 800	2074
POOL CENT X	4063	SPEC HT 1200	2075
POOL FLM HGT	4018	SPEC HT 1600	2076
POOL LENGTH	4039	SPILL DEPTH	2021
POOL SIZE TM	2026	SPILL TYPE C	2061
POOL SZ HBTL	4025	SPILL TYPE D	2060
PROP REPORT	3018	SPILL TYPE P	2029
RAD FLUX	2010	SPILL TYPE T	2058
READ PROP	3011	SPL SZE HVPL	4027
REMAIN LIQ	4019	SPRD TIME	4040
RIVER DEPTH	2044	ST INHAL LIM	1077
RIVER WIDTH	2045	ST INHAL TIM	1078
RLF VALV SET	2065	STD AIR/FUEL	1018
SAFE DIST	4024	STREAM VEL	2047
SAFE DIST	4057	SURF TENSION	1008
SAF SEP PBRN	4017	SURF TNS-TMP	1061
SAF SEP SKIN	4015	SUP LWR BND	1063
SAF SEP USER	4034	S VPR PRS-AM	1086
SAF SEP WOOD	4009	S VPR PRS-BP	1087
SINK TIME	4032	SVP UPR BND	1062
SLD COF ARHO	1038	TABLE FLAG A	3001
SLD COF BRHO	1039	TABLE FLAG C	3005

<u>FIELD NAME</u>	<u>FIELD NUMBER</u>	<u>FIELD NAME</u>	<u>FIELD NUMBER</u>
TABLE FLAG D	3013	TOT MASS GAS	4001
TABLE FLAG I	3016	TOT MASS LIQ	4002
TABLE FLAG P	3015	TOT VOL LIQ	4003
TABLE FLAG T	3017	ULLAGE FRCTN	2064
TABLE FLAG V	3014	UNIT SELECT	3019
TABLE FLAG X	3012	UPR FLAM LIM	1076
TANK DIAM	2062	UPR TOX INGS	1080
TANK HEIGHT	2002	VHC LWR BND	1069
TANK PRESS	2005	VHC UPR BND	1068
TANK VOLUME	2001	V HT CAP-CFA	1064
TEMP HVPL	4028	V HT CAP-CFB	1065
TEMP LIQUID	2036	V HT CAP-CFC	1066
TEMP START	2004	V HT CAP-CFD	1067
THR CNC 0 DG	2067	VISCOSITY-AM	1006
THR CND 400	2068	VISCOSITY-BP	1005
THR CND 800	2069	VOL REM HVPL	4026
THR CND 1200	2070	VP DEN RATIO	4069
THR CND 1600	2071	VPE COEFF A	1010
TIDAL VEL	2048	VPE COEFF B	1011
TIDAL PERIOD	2049	VPE COEFF C	1012
TIME CONC PT	2042	WALL THICKNS	2063
TIME LIQ SPR	2055	WATER TEMP	2023
TIME LQ EVAP	4016	WAT TYPE P/R	2028
TIME OF REL	4004	WIND VELOC	2016
TIM SPL COND	2057		
TNK-FIRE DIS	2083		
TNK HEAT FLG	2082		
TNS STR 0 DG	2077		
TNS STR 400	2078		
TNS STR 800	2079		
TNS STR 1200	2080		
TNS STR 1600	2081		
TOT EVP RATE	4020		

APPENDIX F. HACS FIELD NUMBER AND ASSESSMENT MODEL CROSS REFERENCE

Section 3.3 of the user manual provides a series of tables for each of the assessment models defining for each model the applicable fields in the HACS State file. The index given below defines for each HACS field the rate models in which the field is currently used for either input or output.

Fields 1020, 1027 and 1032 to 1088 are used only to store values transferred from the property file, and are not accessed by any HACS rate model. Fields 1001, 3002, 3011, 3018 and 3019 are used only by the HACS system routines and not individual rate models. Field 2016 is used both by HACS and the rate models. Fields 2011, 2025, 2027, 2030, 2034, 2038, 4004, 4005, 4014, 4019 and 4020 appear to be completely obsolete for the current version of HACS.

<u>Field Number</u>	<u>Usage</u>	<u>Field Number</u>	<u>Usage</u>
1001	Chemical recognition code (HACS only)	1018	B1
1002	A, B1, C1, C2, E2, K, P, R, T, V, X	1019	B2
1003	D, E2, I, K, P, R, T, X	1020	Property transfer only
1004	A, P, R, T, V, W, X	1021	A, D, E1, I, K, L, N, P, R, T, V, X
1005	D	1025	K, P, R, T, X
1006	T, V	1026	K, T, X
1007	A, V	1027	Property transfer only
1008	I, T	1028	K, T, X
1009	E2	1029	K, T, X
1010	A, B3, I, K, R, V	1031	T, V, X
1011	A, B3, I, K, R, V	1032 to	
1012	A, B3, I, K, R, V	1036	Property transfer only
1013	A	1038 to	
1014	A, D, I, V	1088	Property transfer only
1015	E1	2001	A
1016	B1	2002	A
1017	B1	2003	A
		2004	A, K, V
		2005	A

<u>Field Number</u>	<u>Usage</u>	<u>Field Number</u>	<u>Usage</u>
2006	A	2037	P
2007	A, K	2038	Not used
2008	A, B1, D, T	2039	P, T, X
2009	A	2040	P, T, X
2010	B2	2041	P, T, X
2011	Not used	2042	P, T
2012	C1, C2	2043	K, P, R, T, X
2013	C1, C2	2044	P, R, T, X
2014	C1	2045	P, R, X
2015	C1, C2	2046	P
2016	C1, C2, E2, HACS	2047	P, R, T, X
2017	C1, C2	2048	P
2018	C1, C2, D, I, N, R, V	2049	P
2019	C1, C2, D, I, N, R, W	2050	P
2020	C1, C2, D, T, V	2051	P
2021	K, L, N, X	2052	P, R, T, X
2022	D	2053	R, V
2023	D, I, K, P, R, T, V, X	2054	C1, R, V
2024	D	2055	T
2025	Not used	2056	T
2026	D	2057	V
2027	Not used	2058	A, T
2028	P, R	2059	D, T
2029	A, K, P	2060	A, D
2030	Not used	2061	A, C1, C2, D, G, I, J, M, R, V, W
2031	X	2062	B3
2032	C1, C2, R	2063	B3
2033	C1, C2, R, V	2064	B3
2034	Not used	2065	B3
2035	C1, C2	2066	B2, B3
2036	I	2067	B3

<u>Field Number</u>	<u>Usage</u>	<u>Field Number</u>	<u>Usage</u>
2068	B3	3014	V
2069	B3	3015	P
2070	B3	3016	I
2071	B3	3017	T
2072	B3	3018	HACS option
2073	B3	3019	HACS option
2074	B3	4001	A, C1, C2, G, J, K, N, R, W
2075	B3	4002	A, D, G, I, J, K, N, P, R, T, V, X
2076	B3	4003	A, D, H, K, L, N, Q, V, W
2077	B3	4004	Not used
2078	B3	4005	Not used
2079	B3	4006	B1, B2, H, L, Q, U
2080	B3	4007	B1, B2, D, E1, E2, H, L, Q, T
2081	B3	4008	B2, E2
2082	B2	4009	B2
2083	B2	4010	C1
2084	K, M, N	4011	C2
2085	N	4012	C2
2086	T	4013	C2
3001	A	4014	Not used
3002	HACS option	4015	B2
3003	B2	4016	D
3004	C1	4017	B2
3005	C1, C2	4018	B2, E1, H, L, Q, U
3006	D	4019	Not used
3007	I	4020	Not used
3008	P	4021	I
3009	T	4022	P
3010	V	4023	R
3011	HACS option	4024	R
3012	X		
3013	D		

<u>Field Number</u>	<u>Usage</u>	<u>Field Number</u>	<u>Usage</u>
4025	T	4048	A
4026	W, V	4049	A, D, P, T
4027	V, W	4050	A, D, I, T
4028	V	4051	B3
4029	V	4052	B3
4030	V	4053	B3
4031	V	4054	B3
4032	X	4055	B3
4033	X	4056	R
4034	B2	4057	R
4036	X	4058	R
4037	X	4059	R
4038	X	4060	R
4039	X	4061	T
4040	X	4062	T
4041	X	4063	T
4042	X	4064	T
4043	C1	4065	C2
4044	A, C1, C2, D, I, R, V	4066	C2
4045	A, C1, C2, D, I, R, V	4067	C2
4046	I, K	4068	A, C1, D, I, K, R, V
4047	A	4069	C1

APPENDIX G. SAMPLE PROBLEM AND OUTPUT

HAZARD ASSESSMENT COMPUTER SYSTEM
EXECUTION STARTED ON 81/09/23. AT 15.47.47

ENTER RUN REQUEST, OPTIONS ARE (RUN/RERUN/CONTINUE/END)
? RUN
ENTER OUTPUT UNITS SELECTION (0-4):
? ?

THE AVAILABLE OPTIONS ARE -
0 FOR ALL UNITS,
1 FOR CGS UNITS,
2 FOR SI UNITS,
3 FOR ENGLISH UNITS, AND
4 FOR MIXED UNITS

ENTER OUTPUT UNITS SELECTION (0-4):
? 1
ENTER CHEMICAL RECOGNITION CODE:
? LNG

PHYSICAL PROPERTY DATA RETRIEVED FOR CHEMICAL LNG
NAME = LIQUEFIED NATURAL GAS (LNG)
SHIPPING STATE = L

ENTER ASSESSMENT MODEL LETTER CODES (A-Z/II/RR/SS):
?

APPROPRIATE HAZARD ASSESSMENT MODELS ARE : A B C D E F G

DO YOU NEED DESCRIPTIONS OF THE MODELS?

? NO
ENTER ASSESSMENT MODEL LETTER CODES (A-Z/II/RR/SS):
? A C
A C

DO YOU NEED DESCRIPTIONS OF THE MODELS?

? NO
FOR EXECUTION OF MODEL A,
PREVIOUSLY UNSPECIFIED INPUT DATA, IF ANY, ARE REQUESTED BELOW...

ENTER REAL VALUE FOR HT CAP LQ-AM IN CL/GC ,J/KGK ,BT/LBF ,CL/GK
? 0.864 CL/GC
ENTER REAL VALUE FOR HT CAP VP-AM IN CL/GMC ,J/KGMK ,BT/LBMF ,CL/GMK
? 8.02
ENTER REAL VALUE FOR TANK VOLUME IN CM3 ,M3 ,FT3 ,GALS
? 0.125E+10
ENTER REAL VALUE FOR TANK HEIGHT IN CM ,M ,FT ,MI
? 500.0
ENTER REAL VALUE FOR HOLE HEIGHT IN CM ,M ,FT ,MI
? 500.0
ENTER REAL VALUE FOR TEMP START IN C ,K ,F ,K
? -151.0
ENTER REAL VALUE FOR TANK PRESS IN D/CM2 ,N/M2 ,PSI ,MM HG
? 0.2199E+7
ENTER REAL VALUE FOR LIQ DENS BP IN G/CM3 ,KG/M3 ,LB/FT3 ,G/CM3
? 0.424
ENTER INTEGER VALUE FOR ADBT OR ISO
? ?

INTEGER FLAG INDICATING WHETHER VENTING IS ADIABATIC OR ISOTHERMAL.
ADIABATIC IS SELECTED WHEN THE TANK IS INSULATED IN SOME WAY. ISO-
THERMAL IS SELECTED WHEN THE TANK IS NOT INSULATED.
(0=ISOTHERMAL, 1=ADIABATIC)

ENTER INTEGER VALUE FOR ADBT OR ISO

? 1
ENTER REAL VALUE FOR INITIAL MASS IN G ,KG ,LB ,TN
? 0.51E9
ENTER REAL VALUE FOR HOLE DIAM IN CM ,M ,FT ,MI
? 9.097
ENTER INTEGER VALUE FOR NUM MASS INC
?

2009 NUM MASS INC = 100 ND , IS A DEFAULT VALUE

DO YOU WISH TO USE THIS VALUE?
 ? NO
 ENTER INTEGER VALUE FOR NUM MASS INC
 ? 50
 ENTER INTEGER VALUE FOR TABLE FLAG A
 ? 0
 FOR EXECUTION OF MODEL A ,
 THE SUMMARY OF INPUT DATA FOLLOWS...

1002 MOLEC WEIGHT	=	17.00	G/GM	,	IS A	ESTIMATE	VALUE
1007 HT CAP LQ-AM	=	.8640	CL/GC	,	IS A	USER	VALUE
1010 VPE COEFF A	=	6.612	LOG FCN	,	IS A	CHM PROP	VALUE
1011 VPE COEFF B	=	389.9	C	,	IS A	CHM PROP	VALUE
1012 VPE COEFF C	=	266.0	C	,	IS A	CHM PROP	VALUE
1013 HT CAP VP-AM	=	8.020	CL/GMC	,	IS A	USER	VALUE
1014 HEAT OF VPR	=	121.8	CL/G	,	IS A	ESTIMATE	VALUE
2001 TANK VOLUME	=	.1250E+10	CM3	,	IS A	USER	VALUE
2002 TANK HEIGHT	=	500.0	CM	,	IS A	USER	VALUE
2003 HOLE HEIGHT	=	500.0	CM	,	IS A	USER	VALUE
2004 TEMP START	=	-151.0	C	,	IS A	USER	VALUE
2005 TANK PRESS	=	.2199E+07	D/CM2	,	IS A	USER	VALUE
1021 LIQ DENS BP	=	.4240	G/CM3	,	IS A	USER	VALUE
2006 ADBT OR ISO	=	1	ND	,	IS A	USER	VALUE
2007 INITIAL MASS	=	.5100E+09	G	,	IS A	USER	VALUE
2008 HOLE DIAM	=	9.097	CM	,	IS A	USER	VALUE
2009 NUM MASS INC	=	50	ND	,	IS A	USER	VALUE
3001 TABLE FLAG A	=	0	ND	,	IS A	USER	VALUE

DO YOU WISH TO CHANGE ANY MODEL INPUTS?
 ? NO

THE RESULTS OF MODEL A ARE...

FOR GAS VENTING

4001 TOT MASS GAS	=	.3060E+08	G	,	IS A	COMPUTED	VALUE
4047 GAS FLWRATE	=	2090.	G/S	,	IS A	COMPUTED	VALUE
4048 GAS FLW TIME	=	.1464E+05	S	,	IS A	COMPUTED	VALUE
4068 AVG GAS TEMP	=	-157.0	C	,	IS A	ESTIMATE	VALUE

FOR LIQUID VENTING

4002 TOT MASS LIQ	=	0.	G	,	IS A	COMPUTED	VALUE
4003 TOT VOL LIQ	=	0.	CM3	,	IS A	COMPUTED	VALUE
4049 LIQ FLWRATE	=	0.	G/S	,	IS A	COMPUTED	VALUE
4050 LIQ FLW TIME	=	0.	S	,	IS A	COMPUTED	VALUE

IN CASE MODEL C DIRECTLY FOLLOWS, THE VAPOR DISCHARGE DURATION INDICATOR IS ESTIMATED AS-

2061 SPILL TYPE C	=	1	ND	,	IS A	ESTIMATE	VALUE
4044 AVG VAP RATE	=	2090.	G/S	,	IS A	ESTIMATE	VALUE
4045 EVOLVE TIME	=	.1464E+05	S	,	IS A	ESTIMATE	VALUE

THE EXECUTION OF MODEL A IS COMPLETED.
DO YOU WANT TO RE-RUN THIS MODEL?

? NO

FOR EXECUTION OF MODEL C1,
PREVIOUSLY UNSPECIFIED INPUT DATA, IF ANY, ARE REQUESTED BELOW...

ENTER REAL VALUE FOR COORD X	IN CM	,M	,FT	,MI
? 9144.				
ENTER REAL VALUE FOR COORD Y	IN CM	,M	,FT	,MI
? 0.0				
ENTER REAL VALUE FOR COORD Z	IN CM	,M	,FT	,MI
? 0.0				
ENTER REAL VALUE FOR HOLE HEIGHT	IN CM	,M	,FT	,MI
? 2015 HOLE HEIGHT	= 0.	CM	,	IS A DEFAULT VALUE

DO YOU WISH TO USE THIS VALUE?

? NO

ENTER REAL VALUE FOR HOLE HEIGHT	IN CM	,M	,FT	,MI
? 500.0				
ENTER REAL VALUE FOR WIND VELOC	IN CM/S	,M/S	,MPH	,KNOTS
? 223.5				
ENTER INTEGER VALUE FOR ATMOS COND				
? 4				
ENTER INTEGER VALUE FOR DIM FLAG				
? 2				
ENTER REAL VALUE FOR DIM SPILL	IN CM	,M	,FT	,MI
? 9.097				
ENTER REAL VALUE FOR LOW TOX LIM	IN PPM	,PPM	,PPM	,PPM
? 1000.0				
ENTER REAL VALUE FOR AIR TEMP	IN C	,K	,F	,K
? 15.				
ENTER INTEGER VALUE FOR PLOT FLAG C				
? 3				
ENTER INTEGER VALUE FOR TABLE FLAG C				
? 3				
ENTER REAL VALUE FOR MAX HAZ ZONE	IN CM	,M	,FT	,MI
? .6096E5				

FOR EXECUTION OF MODEL C1,
THE SUMMARY OF INPUT DATA FOLLOWS...

2061 SPILL TYPE C	=	1	ND	,	IS A	ESTIMATE	VALUE
1002 MOLEC WEIGHT	=	17.00	G/GM	,	IS A	ESTIMATE	VALUE
2012 COORD X	=	9144.	CM	,	IS A	USER	VALUE
2013 COORD Y	=	0.	CM	,	IS A	USER	VALUE
2014 COORD Z	=	0.	CM	,	IS A	USER	VALUE
2015 HOLE HEIGHT	=	500.0	CM	,	IS A	USER	VALUE
2016 WIND VELOC	=	223.5	CM/S	,	IS A	USER	VALUE
2017 ATMOS COND	=	4	ND	,	IS A	USER	VALUE
2018 DIM FLAG	=	2	ND	,	IS A	USER	VALUE
2019 DIM SPILL	=	9.097	CM	,	IS A	USER	VALUE
2032 LOW TOX LIM	=	1000.	PPM	,	IS A	USER	VALUE

2033	LOW FLAM LIM	=	5.300	PERCENT	,	IS A	CHM PROP	VALUE
2054	AIR TEMP	=	15.00	C	,	IS A	USER	VALUE
4044	AVG VAP RATE	=	2090.	G/S	,	IS A	ESTIMATE	VALUE
4045	EVOLVE TIME	=	.1464E+05	S	,	IS A	ESTIMATE	VALUE
4068	AVG GAS TEMP	=	-157.0	C	,	IS A	ESTIMATE	VALUE
3004	PLOT FLAG C	=	3	ND	,	IS A	USER	VALUE
3005	TABLE FLAG C	=	3	ND	,	IS A	USER	VALUE
2035	MAX HAZ ZONE	=	.6096E+05	CM	,	IS A	USER	VALUE

DO YOU WISH TO CHANGE ANY MODEL INPUTS?

? YES

ENTER FIELD NUMBER:

? 2033

ENTER REAL VALUE FOR LOW FLAM LIM IN PERCENT ,PERCENT ,PERCENT ,PERCENT

? 15.13

ENTER FIELD NUMBER OR 9999 TO EXIT

? 9999

FOR EXECUTION OF MODEL C1 ,
THE SUMMARY OF INPUT DATA FOLLOWS...

2061	SPILL TYPE C	=	1	ND	,	IS A	ESTIMATE	VALUE
1002	MOLEC WEIGHT	=	17.00	G/GM	,	IS A	ESTIMATE	VALUE
2012	COORD X	=	9144.	CM	,	IS A	USER	VALUE
2013	COORD Y	=	0.	CM	,	IS A	USER	VALUE
2014	COORD Z	=	0.	CM	,	IS A	USER	VALUE
2015	HOLE HEIGHT	=	500.0	CM	,	IS A	USER	VALUE
2016	WIND VELOC	=	223.5	CM/S	,	IS A	USER	VALUE
2017	ATMOS COND	=	4	ND	,	IS A	USER	VALUE
2018	DIM FLAG	=	2	ND	,	IS A	USER	VALUE
2019	DIM SPILL	=	9.097	CM	,	IS A	USER	VALUE
2032	LOW TOX LIM	=	1000.	PPM	,	IS A	USER	VALUE
2033	LOW FLAM LIM	=	15.13	PERCENT	,	IS A	USER	VALUE
2054	AIR TEMP	=	15.00	C	,	IS A	USER	VALUE
4044	AVG VAP RATE	=	2090.	G/S	,	IS A	ESTIMATE	VALUE
4045	EVOLVE TIME	=	.1464E+05	S	,	IS A	ESTIMATE	VALUE
4068	AVG GAS TEMP	=	-157.0	C	,	IS A	ESTIMATE	VALUE
3004	PLOT FLAG C	=	3	ND	,	IS A	USER	VALUE
3005	TABLE FLAG C	=	3	ND	,	IS A	USER	VALUE
2035	MAX HAZ ZONE	=	.6096E+05	CM	,	IS A	USER	VALUE

DO YOU WISH TO CHANGE ANY MODEL INPUTS?

? NO

THE RESULTS OF MODEL C1 ARE...

4010	MAX DIST FIR	=	305.0	CM	,	IS A	COMPUTED	VALUE
------	--------------	---	-------	----	---	------	----------	-------

4043 MAX DIST TOX = .3565E+05 CM , IS A COMPUTED VALUE
4069 VP DEN RATIO = 1.458 ND , IS A COMPUTED VALUE

*** THE MINIMUM ANSWER HACS CAN GIVE IS 305 CM OR 10 FEET WHEN
THE LOWER FLAMMABLE LIMIT CONCENTRATION IS GREATER THAN ZERO.

THE EXECUTION OF MODEL C1 IS COMPLETED.
TABLE OF CONCENTRATION VS TIME AT USER SPECIFIED POINT

TIME (MINS)	TIME (HRS)	VAP CONC (PPM)	VAP CONC (MOL P)
.699E+00	.116E-01	.602E+04	.602E+00

THE DISCHARGE IS CONTINUOUS. THE STEADY-STATE CONCENTRATION
WILL THEREFORE AVERAGE THAT SHOWN UNTIL 244.7 MINUTES AFTER
THE DISCHARGE STOPS.

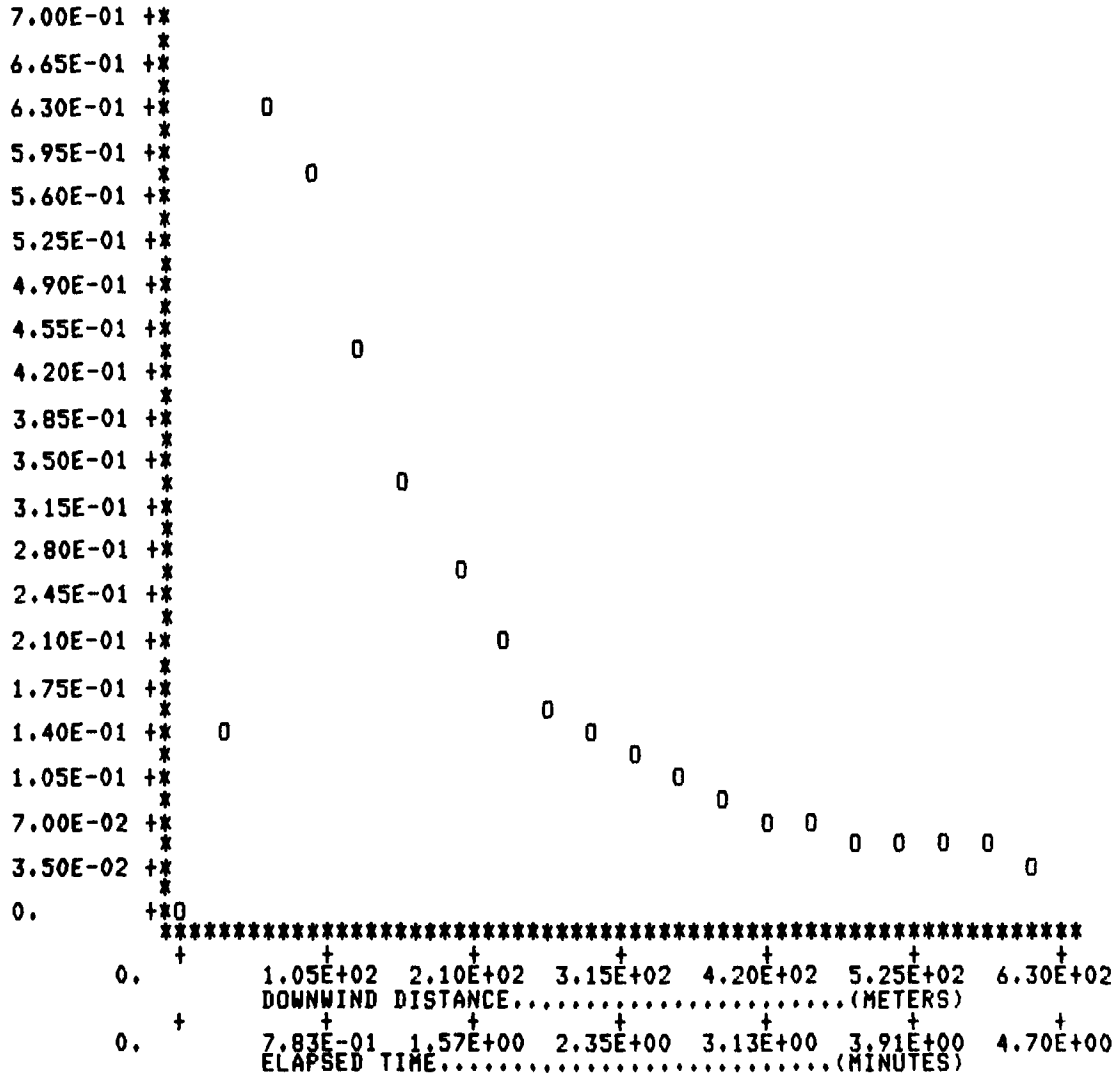
THE LOCATION COORDINATES FOR THIS TABLE ARE-

2012 COORD X	=	9144.	CM	, IS A	USER	VALUE
2013 COORD Y	=	0.	CM	, IS A	USER	VALUE
2014 COORD Z	=	0.	CM	, IS A	USER	VALUE

**** SINCE A PLOT OF CONCENTRATION VS TIME WOULD NOT SHOW ****
**** ADDITIONAL INFORMATION, ONE IS NOT PRODUCED. ****

MAXIMUM
CONCENTRATION
(MOLE PERCENT)

MAX GROUND CONC VS TIME/DISTANCE - MODEL C



***** RESULTS IN UNITS OF MOLE PERCENT
MULTIPLIED BY 10,000 *****
***** GIVE ANSWERS IN UNITS OF PPM *****

FOR EXECUTION OF MODEL C2 ,
PREVIOUSLY UNSPECIFIED INPUT DATA, IF ANY, ARE REQUESTED BELOW...

FOR EXECUTION OF MODEL C2 ,
THE SUMMARY OF INPUT DATA FOLLOWS...

2061 SPILL TYPE C	=	1	ND	,	IS A	ESTIMATE	VALUE
1002 MOLEC WEIGHT	=	17.00	G/GM	,	IS A	ESTIMATE	VALUE
2012 COORD X	=	9144.	CM	,	IS A	USER	VALUE
2013 COORD Y	=	0.	CM	,	IS A	USER	VALUE
2015 HOLE HEIGHT	=	500.0	CM	,	IS A	USER	VALUE
2016 WIND VELOC	=	223.5	CM/S	,	IS A	USER	VALUE
2017 ATMOS COND	=	4	ND	,	IS A	USER	VALUE
2018 DIM FLAG	=	2	ND	,	IS A	USER	VALUE
2019 DIM SPILL	=	9.097	CM	,	IS A	USER	VALUE
2032 LOW TOX LIM	=	1000.	PPM	,	IS A	USER	VALUE
2033 LOW FLAM LIM	=	15.13	PERCENT	,	IS A	USER	VALUE
4044 AVG VAP RATE	=	2090.	G/S	,	IS A	ESTIMATE	VALUE
4045 EVOLVE TIME	=	.1464E+05	S	,	IS A	ESTIMATE	VALUE
3005 TABLE FLAG C	=	3	ND	,	IS A	USER	VALUE
2035 MAX HAZ ZONE	=	.6096E+05	CM	,	IS A	USER	VALUE

DO YOU WISH TO CHANGE ANY MODEL INPUTS?
? NO

THE RESULTS OF MODEL C2 ARE...

FOR THE TOXIC CONCENTRATION.

AT THE USER SPECIFIED POINT.

4011 1/2 HAZ ZONE	=	1464.	CM	,	IS A	COMPUTED	VALUE
4012 DUR HAZ CLD	=	.1468E+05	S	,	IS A	COMPUTED	VALUE
4013 ARRL TME HAZ	=	40.91	S	,	IS A	COMPUTED	VALUE

THE RESULTS OF MODEL C2 ARE...

FOR THE LOWER FLAMMABLE LIMIT CONCENTRATION.

AT THE USER SPECIFIED POINT.

4065 1/2 HAZ ZONE	=	0.	CM	,	IS A	COMPUTED	VALUE
4066 DUR HAZ CLD	=	0.	S	,	IS A	COMPUTED	VALUE
4067 ARRL TME HAZ	=	0.	S	,	IS A	COMPUTED	VALUE

THE EXECUTION OF MODEL C2 IS COMPLETED.

TOXIC VAPOR CLOUD HAZARD TABLE - MODEL C2

X-DISTANCE (METERS)	X-DISTANCE (FEET)	ARRIV TIME (MINUTES)	1/2 HAZ ZONE (METERS)	1/2 HAZ ZONE (FEET)	DURATION (MINUTES)
3.048	10.00	0.	0.	0.	0.
34.97	114.7	.2608	2.394	7.854	244.2
66.90	219.5	.4988	11.20	36.73	244.5
98.82	324.2	.7369	15.48	50.78	244.7
130.7	428.9	.9750	18.33	60.15	245.0
162.7	533.7	1.213	20.16	66.14	245.2
194.6	638.4	1.451	21.08	69.15	245.4
226.5	743.2	1.689	21.09	69.19	245.7
258.4	847.9	1.927	20.10	65.96	245.9
290.4	952.6	2.165	17.87	58.63	246.2
322.3	1057.	2.403	13.70	44.95	246.4
354.2	1162.	2.641	2.629	8.625	246.6
386.1	1267.	0.	0.	0.	0.
418.1	1372.	0.	0.	0.	0.
450.0	1476.	0.	0.	0.	0.
481.9	1581.	0.	0.	0.	0.
513.8	1686.	0.	0.	0.	0.
545.8	1791.	0.	0.	0.	0.
577.7	1895.	0.	0.	0.	0.
609.6	2000.	0.	0.	0.	0.

THE Y COORDINATE = 0. M = 0. FT.
 THE Z COORDINATE IS FIXED AT GROUNDLEVEL.

AN ARRIVAL TIME, HALF WIDTH, AND DURATION OF 0.0 INDICATES THE
 HAZARDOUS CONCENTRATION NEVER REACHES THE GIVENLOCATION.

FLAMMABLE VAPOR CLOUD HAZARD TABLE - MODEL C2

X-DISTANCE (METERS)	X-DISTANCE (FEET)	ARRIV TIME (MINUTES)	1/2 HAZ ZONE (METERS)	1/2 HAZ ZONE (FEET)	DURATION (MINUTES)
3.048	10.00	0.	0.	0.	0.
34.97	114.7	0.	0.	0.	0.
66.90	219.5	0.	0.	0.	0.
98.82	324.2	0.	0.	0.	0.
130.7	428.9	0.	0.	0.	0.
162.7	533.7	0.	0.	0.	0.
194.6	638.4	0.	0.	0.	0.
226.5	743.2	0.	0.	0.	0.
258.4	847.9	0.	0.	0.	0.
290.4	952.6	0.	0.	0.	0.
322.3	1057.	0.	0.	0.	0.
354.2	1162.	0.	0.	0.	0.
386.1	1267.	0.	0.	0.	0.
418.1	1372.	0.	0.	0.	0.
450.0	1476.	0.	0.	0.	0.
481.9	1581.	0.	0.	0.	0.
513.8	1686.	0.	0.	0.	0.
545.8	1791.	0.	0.	0.	0.
577.7	1895.	0.	0.	0.	0.
609.6	2000.	0.	0.	0.	0.

THE Y COORDINATE = 0. M = 0. FT.
 THE Z COORDINATE IS FIXED AT GROUNDLEVEL.

AN ARRIVAL TIME, HALF WIDTH, AND DURATION OF 0.0 INDICATES THE
 HAZARDOUS CONCENTRATION NEVER REACHES THE GIVENLOCATION.

DO YOU WANT TO RE-RUN THIS MODEL?
? NO

DO YOU WANT TO PRINT A SUMMARY OF THESE RESULTS?
? YES

WHICH OF THE FOLLOWING DO YOU WANT?

SCENARIO CODES?
? YES

WITH TEXT DESCRIPTIONS?
? N

MODEL CODES?
? Y

WITH TEXT DESCRIPTIONS?
? N

USER FIELD VALUES?
? Y

WITH TEXT DESCRIPTIONS?
? N

COMPUTED FIELD VALUES?
? Y

WITH TEXT DESCRIPTIONS?
? N

CHEMICAL PROPERTY FIELDS?
? N

SUMMARY OF HAZARD ASSESSMENT RUN FOR CHEMICAL LNG

APPROPRIATE HAZARD ASSESSMENT SCENARIOS ARE:

- A B
- A C
- A B C
- A D E
- A D F G
- A D E F G

HAZARD ASSESSMENT MODELS UTILIZED IN THIS RUN WERE:

- A
- C

USER INPUT DATA FOR THIS RUN WERE:

1001	=	*****	NA	,	IS A	USER	VALUE
1007 HT CAP LQ-AM	=	.8640	CL/GC	,	IS A	USER	VALUE
1013 HT CAP VP-AM	=	8.020	CL/GMC	,	IS A	USER	VALUE
1021 LIQ DENS BP	=	.4240	G/CM3	,	IS A	USER	VALUE
2001 TANK VOLUME	=	.1250E+10	CM3	,	IS A	USER	VALUE
2002 TANK HEIGHT	=	500.0	CM	,	IS A	USER	VALUE
2003 HOLE HEIGHT	=	500.0	CM	,	IS A	USER	VALUE
2004 TEMP START	=	-151.0	C	,	IS A	USER	VALUE
2005 TANK PRESS	=	.2199E+07	D/CM2	,	IS A	USER	VALUE
2006 ADBT DR ISO	=	1	ND	,	IS A	USER	VALUE
2007 INITIAL MASS	=	.5100E+09	G	,	IS A	USER	VALUE
2008 HOLE DIAM	=	9.097	CM	,	IS A	USER	VALUE

2009 NUM MASS INC	=	50	ND	,	IS A	USER	VALUE
2012 COORD X	=	9144.	CM	,	IS A	USER	VALUE
2013 COORD Y	=	0.	CM	,	IS A	USER	VALUE
2014 COORD Z	=	0.	CM	,	IS A	USER	VALUE
2015 HOLE HEIGHT	=	500.0	CM	,	IS A	USER	VALUE
2016 WIND VELOC	=	223.5	CM/S	,	IS A	USER	VALUE
2017 ATMOS COND	=	4	ND	,	IS A	USER	VALUE
2018 DIM FLAG	=	2	ND	,	IS A	USER	VALUE
2019 DIM SPILL	=	9.097	CM	,	IS A	USER	VALUE
2032 LOW TOX LIM	=	1000.	PPM	,	IS A	USER	VALUE
2033 LOW FLAM LIM	=	15.13	PERCENT	,	IS A	USER	VALUE
2035 MAX HAZ ZONE	=	.6096E+05	CM	,	IS A	USER	VALUE
2054 AIR TEMP	=	15.00	C	,	IS A	USER	VALUE
3001 TABLE FLAG A	=	0	ND	,	IS A	USER	VALUE
3004 PLOT FLAG C	=	3	ND	,	IS A	USER	VALUE
3005 TABLE FLAG C	=	3	ND	,	IS A	USER	VALUE

COMPUTED RESULTS OBTAINED WERE:

2061 SPILL TYPE C	=	1	ND	,	IS A	ESTIMATE	VALUE
4001 TOT MASS GAS	=	.3060E+08	G	,	IS A	COMPUTED	VALUE
4002 TOT MASS LIQ	=	0.	G	,	IS A	COMPUTED	VALUE
4003 TOT VOL LIQ	=	0.	CM3	,	IS A	COMPUTED	VALUE
4010 MAX DIST FIR	=	305.0	CM	,	IS A	COMPUTED	VALUE
4011 1/2 HAZ ZONE	=	1464.	CM	,	IS A	COMPUTED	VALUE
4012 DUR HAZ CLD	=	.1468E+05	S	,	IS A	COMPUTED	VALUE
4013 ARRL TME HAZ	=	40.91	S	,	IS A	COMPUTED	VALUE
4043 MAX DIST TOX	=	.3565E+05	CM	,	IS A	COMPUTED	VALUE
4044 AVG VAP RATE	=	2090.	G/S	,	IS A	ESTIMATE	VALUE
4045 EVOLVE TIME	=	.1464E+05	S	,	IS A	ESTIMATE	VALUE
4047 GAS FLWRATE	=	2090.	G/S	,	IS A	COMPUTED	VALUE
4048 GAS FLW TIME	=	.1464E+05	S	,	IS A	COMPUTED	VALUE
4049 LIQ FLWRATE	=	0.	G/S	,	IS A	COMPUTED	VALUE
4050 LIQ FLW TIME	=	0.	S	,	IS A	COMPUTED	VALUE
4065 1/2 HAZ ZONE	=	0.	CM	,	IS A	COMPUTED	VALUE

4066 DUR HAZ CLD = 0. S , IS A COMPUTED VALUE
4067 ARRL TME HAZ = 0. S , IS A COMPUTED VALUE
4068 AVG GAS TEMP = -157.0 C , IS A ESTIMATE VALUE
4069 VP DEN RATIO = 1.458 ND , IS A COMPUTED VALUE

END OF REQUESTED SUMMARY

ENTER RUN REQUEST, OPTIONS ARE (RUN/RERUN/CONTINUE/END)
? END

END OF HACS RUN

APPENDIX H. HACS UNIT TYPE CODES,
LABELS AND CONVERSION FACTORS

HACS data unit labeling and conversions are governed by type codes associated with each of the data fields defined by the HACS default file. A total of 47 type codes are defined to reference 47 different series of unit labels and conversion factors in four systems of units (CGS, SI, ENG for English and MXD for mixed). Due to differences in unit labels and conversion equations for similar quantities, the type code structure does not necessarily represent the actual type of physical quantity. Also, integer data, used for example to select output options, is non-dimensional, and unit conversion logic does not apply.

Appendix H contains the definitions of each of the type codes, unit labels and conversion factors in each system. Appendix I is provided for user reference, and displays the allowable unit labels for each of the individual HACS data fields.

Conversions of all HACS data quantities (except for temperatures), for either input or output, are linear and use the scale factors shown on the following pages. All data is represented internally in CGS units, and the conversion factors give scales between the unit in the specified system and the CGS unit. All temperature fields are defined as type 6 quantities, and these conversions are performed using additional logic to add or subtract a constant which is defined as needed. In general, conversions of coefficients of temperature functions are non-linear (i.e., conversion equations involve all coefficient values), and, as a result of the HACS user input procedure for loading data items one at a time into the state file, a mechanism does not exist to collect all changed coefficient values to apply the non-linear conversion equations. For this reason, unit labels for all coefficients are identical in each system, limiting the user in effect to entering values of temperature function coefficients in CGS units only. Note that full conversion capabilities are provided by the separate property file update and retrieval programs.

Unit label abbreviations are standardized, and, if given by the user, must appear exactly as shown in the attached table. Up to eight spaces are allowed for each label. The abbreviations used are defined below:

<u>Unit Label</u>	<u>Description</u>
BT/FT2H	BTU per square foot-hour
BT/FTHF	BTU per foot-hour-degree Fahrenheit
BT/LB	BTU per pound
BT/LBF	BTU per pound-degree Fahrenheit

<u>Unit Label</u>	<u>Description</u>
BT/LBMF	BTU per pound-mole-degree Fahrenheit
C	degrees Centigrade
CL/CM2S	calorie per square centimeter-second
CL/CMSC	calorie per centimeter-second-degree- Centigrade
CL/CMSC2	calorie per centimeter-second-°C-°C
CL/G	calorie per gram
CL/GC	calorie per gram - °C
CL/GC2	calorie per gram - °C-°C
CL/GK	calorie per gram-degree Kelvin
CL/GMC	calorie per gram mole-°C
CL/GMC2	calorie per gram mole-°C-°C
CL/GMC3	calorie per gram mole-°C-°C-°C
CL/GMC4	calorie per gram mole-°C-°C-°C-°C
CL/GMK	calorie per gram mole-°K
CM	centimeter
CM2	square centimeter
CM3	cubic centimeter
CM/S	centimeter per second
CM2/S	square centimeters per second
CP	centipoise
D/CM	dynes per centimeter
D/CM2	dynes per square centimeter
DEG	degree (angular)
DS/CM2	dyne-seconds per square centimeter
F	degrees Fahrenheit
FT	feet
FT2	square feet
FT3	cubic feet
FT2/S	square feet per second
G	grams
GALS	gallons

<u>Unit Label</u>	<u>Description</u>
G/CM2S	grams per square centimeter-second
G/CM3	grams per cubic centimeter
G/CM3C	grams per cubic centimeter-°C
G/CM3C2	grams per cubic centimeter-°C-°C
G/G	grams per gram
G/GM	grams per gram mole
G/HG	grams per 100 grams
G/HGC	grams per 100 grams-°C
G/KG	grams per kilogram
G/S	grams per second
HR	hour
/HR	per hour
IN/MIN	inches per minute
J/KG	joules per kilogram
J/KGK	joules per kilogram-°K
J/KGMK	joules per kilogram mole-°K
K	degrees Kelvin
KC/M2H	kilo-calories per square meter-hour
KC/MHK	kilo-calories per meter-hour-°K
KG	kilogram
KG/HKG	kilograms per 100 kilograms
KG/KG	kilograms per kilograms
KG/KGM	kilograms per kilogram mole
KG/M2S	kilograms per square meter-second
KG/M3	kilograms per cubic meter
KG/S	kilograms per second
KNOTS	knots
LB	pound
LB/FT3	pounds per cubic foot
LB/FT2S	pounds per square foot-second
LB/HLB	pounds per 100 pounds
LB/LB	pounds per pound

<u>Unit Label</u>	<u>Description</u>
LB/LBM	pounds per pound mole
LB/S	pounds per second
LB/S ²	pounds per second-second
LN FCN	reserved for coefficient A of liquid viscosity equation
LOG FCN	reserved for coefficient A of vapor pressure equation
M	meter
M ²	square meter
M ³	cubic meter
MI	miles
MIN	minute
/MIN	per minute
MM HG	millimeters of mercury
MM/MIN	millimeters per minute
MN/M ²	mega-newtons per square meter
MPH	miles per hour
M/S	meters per second
M ² /S	square meters per second
NA	not applicable (for non-numeric quantities)
ND	non dimensional
N/M	newtons per meter
N/M ²	newtons per square meter
NS/M ²	newtons-seconds per square meter
PERCENT	percent
PPM	parts per million
PSI	pounds per square inch
RAD	radians
S	second
/S	per second
TN	tons
TN/HR	tons per hour
W/M ²	watts per square meter
W/MK	watts per meter-°K

UNIT TYPE CODE	SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
1	ND	ND 1.00000	ND 1.00000	ND 1.00000
2	CM	M 100.000	FT 30.4800	MI 160900.
3	CM3	M3 0.100000E+07	FT3 28317.0	GALS 3786.09
4	G/CM3	KG/M3 0.100000E-02	LB/FT3 0.160200E-01	G/CM3 1.00000
5	D/CM2	N/M2 10.0000	PSI 68950.0	MM HG 1333.00
6	C	K 273.150	F 32.0000	K 273.150
7	CM2	M2 10000.0	FT2 929.030	M2 10000.0
8	G	KG 1000.00	LB 453.600	TN 907200.
9	CL/GC	J/KGK 0.238900E-03	BT/LBF 1.00000	CL/GK 1.00000
10	CL/G	J/KG 0.238900E-03	BT/LB 0.555560	J/KG 0.238900E-03
11	S	S 1.00000	MIN 60.0000	HR 3600.00
12	G/S	KG/S 1000.00	LB/S 453.600	TN/HR 252.000
13	RAD	RAD 1.00000	DEG 0.174500E-01	DEG 0.174500E-01
14	CL/CM2S	W/M2 0.238900E-04	BT/FT2H 0.753000E-04	KC/M2H 0.277800E-04
15	CM/S	M/S 100.000	MPH 44.7000	KNOTS 51.4400
16	PPM	PPM 1.00000	PPM 1.00000	PPM 1.00000

UNIT CONVERSIONS, EXCEPT FOR TYPE 06, ARE PERFORMED BY MULTIPLYING OR DIVIDING FIELD VALUES BY THE ABOVE SCALE FACTORS FOR INTERNAL OR EXTERNAL REPRESENTATION, RESPECTIVELY. TEMPERATURES, TYPE 06 QUANTITIES, ARE CONVERTED TO INTERNAL UNITS BY (X-A)/B WHERE THE CONVERSION FACTOR A IS GIVEN ABOVE. CORRESPONDING VALUES OF THE ADDITIONAL FACTOR B ARE 1.0, 1.8 AND 1.0.

UNIT TYPE CODE	SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
17	CL/CMSC	W/MK 0.238900E-02	BT/FTHF 0.413400E-02	KC/MHK 0.277800E-02
18	D/CM	N/M 1000.00	LB/S2 453.600	N/M 1000.00
19	CM2/S	M2/S 10000.0	FT2/S 929.030	M2/S 10000.0
20	/S	/S 1.00000	/MIN 0.166700E-01	/HR 0.277800E-03
21	G/HG	KG/HKG 1.00000	LB/HLB 1.00000	G/HG 1.00000
22	DS/CM2	NS/M2 10.0000	CP 0.100000E-01	CP 0.100000E-01
23	G/GM	KG/KGM 1.00000	LB/LBM 1.00000	KG/KGM 1.00000
24	LOG FCN	LOG FCN 1.00000	LOG FCN 1.00000	LOG FCN 1.00000
25	G/CM2S	KG/M2S 0.100000	LB/FT2S 0.488300	KG/M2S 0.100000
26	PERCENT	PERCENT 1.00000	PERCENT 1.00000	PERCENT 1.00000
27	G/G	KG/KG 1.00000	LB/LB 1.00000	G/KG 0.100000E-02
28	CL/GMC	J/KGMK 0.238900E-03	BT/LBMF 1.00000	CL/GMK 1.00000
29	G/CM3	G/CM3 1.00000	G/CM3 1.00000	G/CM3 1.00000
30	G/CM3C	G/CM3C 1.00000	G/CM3C 1.00000	G/CM3C 1.00000
31	G/CM3C2	G/CM3C2 1.00000	G/CM3C2 1.00000	G/CM3C2 1.00000
32	LN FCN	LN FCN 1.00000	LN FCN 1.00000	LN FCN 1.00000

UNIT TYPE CODE	SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
33	C	C 1.00000	C 1.00000	C 1.00000
34	CL/CMSC	CL/CMSC 1.00000	CL/CMSC 1.00000	CL/CMSC 1.00000
35	CL/CMSC2	CL/CMSC2 1.00000	CL/CMSC2 1.00000	CL/CMSC2 1.00000
36	CL/GC	CL/GC 1.00000	CL/GC 1.00000	CL/GC 1.00000
37	CL/GC2	CL/GC2 1.00000	CL/GC2 1.00000	CL/GC2 1.00000
38	G/HG	G/HG 1.00000	G/HG 1.00000	G/HG 1.00000
39	G/HGC	G/HGC 1.00000	G/HGC 1.00000	G/HGC 1.00000
40	CL/GMC	CL/GMC 1.00000	CL/GMC 1.00000	CL/GMC 1.00000
41	CL/GMC2	CL/GMC2 1.00000	CL/GMC2 1.00000	CL/GMC2 1.00000
42	CL/GMC3	CL/GMC3 1.00000	CL/GMC3 1.00000	CL/GMC3 1.00000
43	CL/GMC4	CL/GMC4 1.00000	CL/GMC4 1.00000	CL/GMC4 1.00000
44	MM HG	N/M2 0.750000E-02	PSI 51.7250	D/CM2 0.750000E-03
45	D/CM2	N/M2 10.0000	PSI 68950.0	MM/M2 0.100000E+08
46	NA	NA 1.00000	NA 1.00000	NA 1.00000
47	CM/S	M/S 100.000	IN/MIN 0.423330E-01	MM/MIN 0.166700E-02

APPENDIX I. ALLOWABLE UNIT LABELS FOR EACH HACS DATA FIELD

FIELD NUMBER	FIELD NAME	UNIT TYPE CODE	-----ALLOWABLE UNIT LABELS-----			
			SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
1002	MOLEC WEIGHT	23	G/GM	KG/KGM	LB/LBM	KG/KGM
1003	BOIL TEM LIQ	6	C	K	F	K
1004	DENS LIQ AMP	4	G/CM3	KG/M3	LB/FT3	G/CM3
1005	VISCOSITY-RP	22	DS/CM2	NS/M2	CP	CP
1006	VISCOSITY-AM	22	DS/CM2	NS/M2	CP	CP
1007	HT CAP LQ-AM	9	CL/GC	J/KGK	BT/LBF	CL/GK
1008	SURF TENSION	18	D/CM	N/M	LB/S2	N/M
1009	DEN FUEL VPR	4	G/CM3	KG/M3	LB/FT3	G/CM3
1010	VPE COEFF A	24	LOG FCN	LOG FCN	LOG FCN	LOG FCN
1011	VPE COEFF B	33	C	C	C	C
1012	VPE COEFF C	33	C	C	C	C
1013	HT CAP VP-AM	28	CL/GMC	J/KGMK	BT/LBMF	CL/GMK
1014	HEAT OF VPR	10	CL/G	J/KG	BT/LB	J/KG
1015	BURNING RATE	47	CM/S	M/S	IN/MIN	MM/MIN
1016	AD FLME TEMP	6	C	K	F	K
1017	MOLAR RATIO	1	ND	ND	ND	ND
1018	STO AIR/FUEL	1	ND	ND	ND	ND
1019	FLAME TEMP	6	C	K	F	K
1020	MOLE FRACTN	1	ND	ND	ND	ND
1021	LIQ DENS RP	4	G/CM3	KG/M3	LB/FT3	G/CM3
1025	CRIT TEMP	6	C	K	F	K
1026	SOLUBILITY	21	G/HG	KG/HKG	LB/HLB	G/HG
1027	SOLUB-TEMP	6	C	K	F	K
1028	SOL EQ COEF1	38	G/HG	G/HG	G/HG	G/HG
1029	SOL EQ COEF2	39	G/HGC	G/HGC	G/HGC	G/HGC
1031	INTRFACE TEN	18	D/CM	N/M	LB/S2	N/M
1032	INTF TNS-TMP	6	C	K	F	K
1033	NORM FREZ PT	6	C	K	F	K
1034	CRIT PRES	45	D/CM2	N/M2	PSI	MM/M2
1035	DENSITY-DATA	4	G/CM3	KG/M3	LB/FT3	G/CM3
1036	DENSITY TEMP	6	C	K	F	K
1038	SLD COF ARHO	29	G/CM3	G/CM3	G/CM3	G/CM3
1039	SLD COF BRHO	30	G/CM3C	G/CM3C	G/CM3C	G/CM3C

FIELD NUMBER	FIELD NAME	UNIT TYPE CODE	-----ALLOWABLE UNIT LABELS-----			
			SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
1040	SLD COF CRHO	31	G/CM3C2	G/CM3C2	G/CM3C2	G/CM3C2
1041	SLD UPR BND	6	C	K	F	K
1042	SLD LWR BND	6	C	K	F	K
1043	LQ VIS-POINT	22	DS/CM2	NS/M2	CP	CP
1044	LQ VIS-TEMP	6	C	K	F	K
1045	LQ VIS CF A	32	LN FCN	LN FCN	LN FCN	LN FCN
1046	LQ VIS CF B	33	C	C	C	C
1047	LQVS UPR BND	6	C	K	F	K
1048	LQVS LWR BND	6	C	K	F	K
1049	LQ THR CN-PT	17	CL/CMSC	W/MK	BT/FTHF	KC/MHK
1050	LQ THR CN-TM	6	C	K	F	K
1051	L THR CN CFA	34	CL/CMSC	CL/CMSC	CL/CMSC	CL/CMSC
1052	L THR CN CFB	35	CL/CMSC2	CL/CMSC2	CL/CMSC2	CL/CMSC2
1053	LTC UPR BND	6	C	K	F	K
1054	LTC LWR BND	6	C	K	F	K
1055	LQ HT CAP-PT	9	CL/GC	J/KGK	BT/LBF	CL/GK
1056	LQ HT CAP-TM	6	C	K	F	K
1057	L HT CAP CFA	36	CL/GC	CL/GC	CL/GC	CL/GC
1058	L HT CAP CFB	37	CL/GC2	CL/GC2	CL/GC2	CL/GC2
1059	LHC UPR BND	6	C	K	F	K
1060	LHC LWR BND	6	C	K	F	K
1061	SURF TNS-TMP	6	C	K	F	K
1062	SVP UPR BND	6	C	K	F	K
1063	SVP LWR BND	6	C	K	F	K
1064	V HT CAP-CFA	40	CL/GMC	CL/GMC	CL/GMC	CL/GMC
1065	V HT CAP-CFB	41	CL/GMC2	CL/GMC2	CL/GMC2	CL/GMC2
1066	V HT CAP-CFC	42	CL/GMC3	CL/GMC3	CL/GMC3	CL/GMC3
1067	V HT CAP-CFD	43	CL/GMC4	CL/GMC4	CL/GMC4	CL/GMC4
1068	VHC UPR BND	6	C	K	F	K
1069	VHC LWR BND	6	C	K	F	K
1070	HT OF FUSION	10	CL/G	J/KG	BT/LB	J/KG
1071	HT OF COMB	10	CL/G	J/KG	BT/LB	J/KG
1072	HT OF DECOMP	10	CL/G	J/KG	BT/LB	J/KG

FIELD NUMBER	FIELD NAME	UNIT TYPE CODE	-----ALLOWABLE UNIT LABELS-----			
			SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
1073	HT OF SOLN	10	CL/G	J/KG	BT/LB	J/KG
1074	HT OF REACTN	10	CL/G	J/KG	BT/LB	J/KG
1075	HT OF POLYMR	10	CL/G	J/KG	BT/LB	J/KG
1076	UPR FLAM LIM	26	PERCENT	PERCENT	PERCENT	PERCENT
1077	ST INHAL LIM	16	PPM	PPM	PPM	PPM
1078	ST INHAL TIM	11	S	S	MIN	HR
1079	LWR TOX INGS	27	G/G	KG/KG	LB/LB	G/KG
1080	UPR TOX INGS	27	G/G	KG/KG	LB/LB	G/KG
1081	L THR CON-AM	17	CL/CMSC	W/MK	BT/FTHF	KC/MHK
1082	L THR CON-BP	17	CL/CMSC	W/MK	BT/FTHF	KC/MHK
1083	HT CAP LQ-BP	9	CL/GC	J/KGK	BT/LBF	CL/GK
1084	SOLUBLTY-AM	21	G/HG	KG/HKG	LB/HLB	G/HG
1085	SOLUBLTY-BP	21	G/HG	KG/HKG	LB/HLB	G/HG
1086	S VPR PRS-AM	44	MM HG	N/M2	PSI	D/CM2
1087	S VPR PRS-BP	44	MM HG	N/M2	PSI	D/CM2
1088	HT CAP VP-BP	28	CL/GMC	J/KGMK	BT/LBMF	CL/GMK
2001	TANK VOLUME	3	CM3	M3	FT3	GALS
2002	TANK HEIGHT	2	CM	M	FT	MI
2003	HOLE HEIGHT	2	CM	M	FT	MI
2004	TEMP START	6	C	K	F	K
2005	TANK PRESS	5	D/CM2	N/M2	PSI	MM HG
2006	ADBT OR ISO	1	ND	ND	ND	ND
2007	INITIAL MASS	8	G	KG	LB	TN
2008	HOLE DIAM	2	CM	M	FT	MI
2009	NUM MASS INC	1	ND	ND	ND	ND
2010	RAD FLUX	14	CL/CM2S	W/M2	BT/FT2H	KC/M2H
2011	EL TM - CONC	11	S	S	MIN	HR
2012	COORD X	2	CM	M	FT	MI
2013	COORD Y	2	CM	M	FT	MI
2014	COORD Z	2	CM	M	FT	MI
2015	HOLE HEIGHT	2	CM	M	FT	MI
2016	WIND VELOC	15	CM/S	M/S	MPH	KNOTS
2017	ATMOS COND	1	ND	ND	ND	ND

FIELD NUMBER	FIELD NAME	UNIT TYPE CODE	-----ALLOWABLE UNIT LABELS-----			
			SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
2018	DIM FLAG	1	ND	ND	ND	ND
2019	DIM SPILL	2	CM	M	FT	MI
2020	CHAN L WIDTH	2	CM	M	FT	MI
2021	SPILL DEPTH	2	CM	M	FT	MI
2022	FLUX VAR	1	ND	ND	ND	ND
2023	WATER TEMP	6	C	K	F	K
2024	HEAT FLUX	14	CL/CM2S	W/M2	BT/FT2H	KC/M2H
2025	CRIT. FLAG	1	ND	ND	ND	ND
2026	POOL SIZE TM	11	S	S	MIN	HR
2027	EVAP TIME	11	S	S	MIN	HR
2028	WAT TYPE P/R	1	ND	ND	ND	ND
2029	SPILL TYPE P	1	ND	ND	ND	ND
2030	MIN DIST HFM	2	CM	M	FT	MI
2031	MAX DISTANCE	2	CM	M	FT	MI
2032	LOW TOX LIM	16	PPM	PPM	PPM	PPM
2033	LOW FLAM LIM	26	PERCENT	PERCENT	PERCENT	PERCENT
2034	MIN HAZ ZONE	2	CM	M	FT	MI
2035	MAX HAZ ZONE	2	CM	M	FT	MI
2036	TEMP LIQUID	6	C	K	F	K
2037	MAX TME CONC	11	S	S	MIN	HR
2038	AVR RATE MS	12	G/S	KG/S	LB/S	TN/HR
2039	CONC PT X	2	CM	M	FT	MI
2040	CONC PT Y	2	CM	M	FT	MI
2041	CONC PT Z	2	CM	M	FT	MI
2042	TIME CONC PT	11	S	S	MIN	HR
2043	DIF COEF H2O	19	CM2/S	M2/S	FT2/S	M2/S
2044	RIVER DEPTH	2	CM	M	FT	MI
2045	RIVER WIDTH	2	CM	M	FT	MI
2046	OFF DIST	2	CM	M	FT	MI
2047	STREAM VEL	15	CM/S	M/S	MPH	KNOTS
2048	TIDAL VEL	15	CM/S	M/S	MPH	KNOTS
2049	TIDAL PERIOD	11	S	S	MIN	HR
2050	PHASE LAG	11	S	S	MIN	HR

FIELD NUMBER	FIELD NAME	UNIT TYPE CODE	-----ALLOWABLE UNIT LABELS-----			
			SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
2051	DECAY COEFF	20	/S	/S	/MIN	/HR
2052	MANNING FACT	1	ND	ND	ND	ND
2053	DIF COEF V-A	19	CM2/S	M2/S	FT2/S	M2/S
2054	AIR TEMP	6	C	K	F	K
2055	TIME LIQ SPR	11	S	S	MIN	HR
2056	LIQ SPR TIME	11	S	S	MIN	HR
2057	TIM SPL COND	11	S	S	MIN	HR
2058	SPILL TYPE T	1	ND	ND	ND	ND
2059	HOLE HGT UP	2	CM	M	FT	MI
2060	SPILL TYPE D	1	ND	ND	ND	ND
2061	SPILL TYPE C	1	ND	ND	ND	ND
2062	TANK DIAM	2	CM	M	FT	MI
2063	WALL THICKNS	2	CM	M	FT	MI
2064	ULLAGE FRCTN	1	ND	ND	ND	ND
2065	RLF VALV SET	5	D/CM2	N/M2	PSI	MM HG
2066	HEAT FLUX	14	CL/CM2S	W/M2	BT/FT2H	KC/M2H
2067	THR CNC 0 DG	17	CL/CMSC	W/MK	BT/FTHF	KC/MHK
2068	THR CND 400	17	CL/CMSC	W/MK	BT/FTHF	KC/MHK
2069	THR CND 800	17	CL/CMSC	W/MK	BT/FTHF	KC/MHK
2070	THR CND 1200	17	CL/CMSC	W/MK	BT/FTHF	KC/MHK
2071	THR CND 1600	17	CL/CMSC	W/MK	BT/FTHF	KC/MHK
2072	SPEC HT 0 DG	9	CL/GC	J/KGK	BT/LBF	CL/GK
2073	SPEC HT 400	9	CL/GC	J/KGK	BT/LBF	CL/GK
2074	SPEC HT 800	9	CL/GC	J/KGK	BT/LBF	CL/GK
2075	SPEC HT 1200	9	CL/GC	J/KGK	BT/LBF	CL/GK
2076	SPEC HT 1600	9	CL/GC	J/KGK	BT/LBF	CL/GK
2077	TNS STR 0 DG	5	D/CM2	N/M2	PSI	MM HG
2078	TNS STR 400	5	D/CM2	N/M2	PSI	MM HG
2079	TNS STR 800	5	D/CM2	N/M2	PSI	MM HG
2080	TNS STR 1200	5	D/CM2	N/M2	PSI	MM HG
2081	TNS STR 1600	5	D/CM2	N/M2	PSI	MM HG
2082	TNK HEAT FLG	1	ND	ND	ND	ND
2083	TNK-FIRE DIS	2	CM	M	FT	MI

FIELD NUMBER	FIELD NAME	UNIT TYPE CODE	-----ALLOWABLE UNIT LABELS-----			
			SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
2084	MODK FLAG	1	ND	ND	ND	ND
2085	GAS FRACTION	1	ND	ND	ND	ND
2086	MODEL TYPE-T	1	ND	ND	ND	ND
3001	TABLE FLAG A	1	ND	ND	ND	ND
3002	PLOT OFFLINE	1	ND	ND	ND	ND
3003	PLOT FLG B/E	1	ND	ND	ND	ND
3004	PLOT FLAG C	1	ND	ND	ND	ND
3005	TABLE FLAG C	1	ND	ND	ND	ND
3006	PLOT FLAG D	1	ND	ND	ND	ND
3007	PLOT FLAG I	1	ND	ND	ND	ND
3008	PLOT FLAG P	1	ND	ND	ND	ND
3009	PLOT FLAG T	1	ND	ND	ND	ND
3010	PLOT FLAG V	1	ND	ND	ND	ND
3011	READ PROP	1	ND	ND	ND	ND
3012	TABLE FLAG X	1	ND	ND	ND	ND
3013	TABLE FLAG D	1	ND	ND	ND	ND
3014	TABLE FLAG V	1	ND	ND	ND	ND
3015	TABLE FLAG P	1	ND	ND	ND	ND
3016	TABLE FLAG I	1	ND	ND	ND	ND
3017	TABLE FLAG T	1	ND	ND	ND	ND
3018	PROP REPORT	1	ND	ND	ND	ND
3019	UNIT SELECT	1	ND	ND	ND	ND
4001	TOT MASS GAS	8	G	KG	LB	TN
4002	TOT MASS LIQ	8	G	KG	LB	TN
4003	TOT VOL LIQ	3	CM3	M3	FT3	GALS
4004	TIME OF REL	11	S	S	MIN	HR
4005	MX TEMP TANK	6	C	K	F	K
4006	FLAME LENGTH	2	CM	M	FT	MI
4007	DIAM FLAME	2	CM	M	FT	MI
4008	FLAME ANGLE	13	RAD	RAD	DEG	DEG
4009	SAF SEP WOOD	2	CM	M	FT	MI
4010	MAX DIST FIR	2	CM	M	FT	MI
4011	1/2 HAZ ZONE	2	CM	M	FT	MI

FIELD NUMBER	FIELD NAME	UNIT TYPE CODE	-----ALLOWABLE UNIT LABELS-----			
			SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
4012	DUR HAZ CLD	11	S	S	MIN	HR
4013	ARRL TME HAZ	11	S	S	MIN	HR
4014	IN OR OUT	1	ND	ND	ND	ND
4015	SAF SEP SKIN	2	CM	M	FT	MI
4016	TIME LQ EVAP	11	S	S	MIN	HR
4017	SAF SEP PBRN	2	CM	M	FT	MI
4018	POOL FLM HGT	2	CM	M	FT	MI
4019	REMAIN LIQ	3	CM3	M3	FT3	GALS
4020	TOT EVP RATE	12	G/S	KG/S	LB/S	TN/HR
4021	EVAP TIME LQ	11	S	S	MIN	HR
4022	LIQ-H2O CONC	4	G/CM3	KG/M3	LB/FT3	G/CM3
4023	MASS VAP LIB	8	G	KG	LB	TN
4024	SAFE DIST	2	CM	M	FT	MI
4025	POOL SZ HBTL	2	CM	M	FT	MI
4026	VOL REM HVPL	3	CM3	M3	FT3	GALS
4027	SPL SZE HVPL	2	CM	M	FT	MI
4028	TEMP HVPL	6	C	K	F	K
4029	EVAP RT HVPL	25	G/CM2S	KG/M2S	LB/FT2S	KG/M2S
4030	EVP TIM HVPL	11	S	S	MIN	HR
4031	AREA HVPL	7	CM2	M2	FT2	M2
4032	SINK TIME	11	S	S	MIN	HR
4033	DIST TRAV	2	CM	M	FT	MI
4034	SAF SEP USER	2	CM	M	FT	MI
4036	DISOLVE RATE	12	G/S	KG/S	LB/S	TN/HR
4037	DISOLVE TIME	11	S	S	MIN	HR
4038	POOL AREA	7	CM2	M2	FT2	M2
4039	POOL LENGTH	2	CM	M	FT	MI
4040	SPRD TIME	11	S	S	MIN	HR
4041	CLEAR TIME	11	S	S	MIN	HR
4042	CONC AT XYZ	4	G/CM3	KG/M3	LB/FT3	G/CM3
4043	MAX DIST TOX	2	CM	M	FT	MI
4044	Avg JAF RATE	12	G/S	KG/S	LB/S	TN/HR
		11	S	S	MIN	HR

FIELD NUMBER	FIELD NAME	UNIT TYPE CODE	-----ALLOWABLE UNIT LABELS-----			
			SYSTEM 1 (CGS)	SYSTEM 2 (SI)	SYSTEM 3 (ENG)	SYSTEM 4 (MXD)
4046	CRIT DEPTH	2	CM	M	FT	MI
4047	GAS FLWRATE	12	G/S	KG/S	LB/S	TN/HR
4048	GAS FLW TIME	11	S	S	MIN	HR
4049	LIQ FLWRATE	12	G/S	KG/S	LB/S	TN/HR
4050	LIQ FLW TIME	11	S	S	MIN	HR
4051	OUT FAIL STR	5	D/CM2	N/M2	PSI	MM HG
4052	OUT WALL TMP	6	C	K	F	K
4053	IN FAIL STRS	5	D/CM2	N/M2	PSI	MM HG
4054	IN WALL TEMP	6	C	K	F	K
4055	FAILURE TIME	11	S	S	MIN	HR
4056	MASS VAP LIB	8	G	KG	LB	TN
4057	SAFE DIST	2	CM	M	FT	MI
4058	DIM SPILL	2	CM	M	FT	MI
4059	AVG VAP RATE	12	G/S	KG/S	LB/S	TN/HR
4060	EVOLVE TIME	11	S	S	MIN	HR
4061	DISOLVE RATE	25	G/CM2S	KG/M2S	LB/FT2S	KG/M2S
4062	DISOLVE TIME	11	S	S	MIN	HR
4063	POOL CENT X	2	CM	M	FT	MI
4064	CONC AT XYZ	4	G/CM3	KG/M3	LB/FT3	G/CM3
4065	1/2 HAZ ZONE	2	CM	M	FT	MI
4066	DUR HAZ CLD	11	S	S	MIN	HR
4067	ARRL TME HAZ	11	S	S	MIN	HR
4068	AVG GAS TEMP	6	C	K	F	K
4069	VP DEN RATIO	1	ND	ND	ND	ND

APPENDIX J. LIST OF CHEMICAL RECOGNITION CODES
BY HAZARD ASSESSMENT MODEL

The current version of HACS chemical data file contains physical property data for 900 hazardous substances. Included on this file are the appropriate hazard assessment model codes, and groupings of model codes into hazard assessment scenarios. For any chemical selected during a UIM run, the model codes and scenarios for that chemical as defined by the chemical data file can be displayed at the user terminal by means of a user request.

This appendix contains cross-reference information in which the chemical recognition codes are arranged in groups by hazard assessment model used. That is, 597 chemical recognition codes are listed for Model A, 39 for Model B, and so forth. Since most chemicals require more than one model, each recognition code may be listed more than once. There are a total of 2524 individual model references for the 900 chemicals.

The information in this appendix, together with Appendix K, can be used to identify chemicals having similar behavior, and partly establishes the importance of different models by frequency of reference. In some cases, chemicals having similar behavior may provide estimates of physical property data values which may not be available for the specific chemical of interest; users should carefully review the information tabulated in CHRIS Manual II to determine the reasonableness of any substitutions which may be attempted.

MODEL A HAS 597 REFERENCES, BY CHEMICALS:

AAC	AAD	AAM	AAN	ABM	ABR	ABS	ACA	ACC	ACE
ACF	ACN	ACP	ACR	ACT	ACY	ADN	AEA	ALA	ALC
ALS	AMA	AMH	AMK	AML	AMM	AMR	AMT	AMY	ANI
ANL	ANT	ANU	APC	APF	APS	ARF	ARL	ASC	ASF
ASP	ASR	AST	ATA	ATC	ATF	ATN	ATS	BAD	BAI
BAL	BAM	BAN	BAS	BAT	BBP	BBR	BBZ	BCF	BCL
BCN	BCP	BCS	BDE	BDI	BDO	BHP	BMA	BMN	BNZ
BPD	BPF	BPT	BRA	BRT	BRX	BTA	BTB	BTC	BTF
BTL	BTM	BTN	BTO	BTR	BUA	BUD	BUT	BZC	BZD
BZM	BZN	BZP	CAC	CAR	CBB	CBN	CBO	CBT	CCH
CCL	CCT	CDN	CDO	CES	CFB	CGE	CHA	CHD	CHN
CHP	CHT	CHX	CLD	CLS	CLX	CMC	CME	CMH	CMO
CMP	CNN	CPF	CPL	CPO	CPR	CPS	CRB	CRF	CRS
CSA	CSS	CSY	CTA	CTF	CUM	CYG	CYP	DAA	DAC
DAL	DAN	DAP	DBA	DBC	DBE	DBK	DBL	DBO	DBS
DBT	DBZ	DCB	DCE	DCF	DCM	DCS	DDB	DDC	DDN
DEA	DEB	DEC	DEE	DEG	DEL	DEM	DEN	DEP	DES
DET	DEZ	DFA	DFE	DFE	DGD	DGE	DGM	DHN	DHP
DIA	DID	DIH	DIK	DIM	DIP	DLP	DMA	DMD	DME
DMF	DMH	DMF	DMS	DMT	DMZ	DNA	DOA	DOD	DOP
DOX	DPA	DPD	DPE	DPG	DPH	DPN	DPP	DPR	DPT
DSD	DSF	DSL	DSM	DSR	DST	DTC	DTH	DTN	DTS
DTT	DZN	EAA	EAC	EAD	EAI	EAL	EAM	EAS	EBR
EBT	ECA	ECF	ECH	ECL	ECS	EDA	EDB	EDC	EEE
EET	EFM	EGA	EGD	EGE	EGL	EGM	EGY	EHA	EHP
EHT	EHX	ELT	EMA	EMC	EME	ENB	ENP	EOD	EOP
EOT	EOX	EPA	EPC	EPD	EPP	EPS	ESC	ETA	ETB
ETC	ETD	ETG	ETH	ETI	ETL	ETM	ETN	ETS	EVO
FAL	FFA	FFB	FMA	FMS	FSA	FSL	FXX	GAK	GAT
GAV	GCM	GCR	GCS	GOC	GOS	GPL	GRF	GSR	GTA

HAC	HAI	HAL	HBR	HCC	HCL	HCN	HDC	HDS	HDZ
HFA	HFX	HMD	HMI	HPA	HPM	HPO	HPT	HSS	HTE
HTN	HXA	HXE	HXG	HXN	HXX	IAA	IAC	IAI	IAL
IAM	IBA	IBL	IBN	IBR	IBT	IDA	IHA	IOA	IOC
IPA	IPE	IPH	IPM	IPP	IPR	IPT	ISA	IVA	JPF
JPO	JPT	JPV	KRS	LAL	LFB	LLS	LNG	LPG	LRM
LTA	MAA	MAC	MAL	MAM	MAN	MAP	MBK	MCA	MCF
MCH	MCL	MCP	MCR	MCS	MCT	MEA	MEK	MEP	MFA
MFM	MHZ	MIC	MIK	MLT	MMC	MMM	MNS	MPA	MPD
MPK	MPL	MPT	MPY	MSO	MSR	MTA	MTB	MTC	MTF
MTH	MTS	MTT	MVK	NAC	NAN	NCT	NFB	NHX	NIC
NKC	NMT	NNE	NNN	NNP	NON	NOX	NPP	NSS	NSV
NTB	NTC	NTE	NTI	NTM	NTO	NTX	NVM	NXX	OAN
OAP	OAS	OCA	OCC	OCF	OCR	OCS	OCT	ODS	DET
OFR	OFS	OFV	OIL	OLA	OLB	OLD	OLM	OLS	OMN
OMS	OMT	ONF	OOD	OOD	ODN	OPM	OPN	OPT	ORD
ORG	ORN	ORS	OSB	OSD	OSF	OSP	OSX	OSY	OTA
OTB	OTC	OTD	OTE	OTF	OTL	OTN	OTW	OVG	ODY
PAA	PAC	PAD	PAH	PAL	PAN	PAT	PBP	PBR	PCL
PCM	PDC	PDL	PGC	PGM	PHG	PHN	PII	PLB	PLT
PME	PMN	PMA	POX	PPA	PPG	PPI	PPL	PPD	PPT
PPZ	PRD	PRP	PTA	PTB	PTE	PTL	PTN	PTO	PTT
QNL	SAC	SBT	SCL	SFA	SFD	SFL	SFM	SHC	SHS
SSC	STC	STY	SXX	TAL	TBT	TCE	TCF	TCL	TCP
TCS	TDB	TDC	TDI	TDN	TEA	TEB	TEC	TED	TEG
TEL	TEN	TEP	TES	TET	TFC	TFE	TGC	THF	THN
TIA	TLI	TLO	TMA	TMC	TML	TOL	TPG	TPT	TTD
TTE	TTG	TTN	TTP	TTT	TXP	UDB	UDC	UND	VAL
VAM	VCI	VCM	VFI	VME	VNT	VOT	VTS	WCA	WPF
XLH	XLO	XLP	XYL	ZCA	ZDP	ZFB			

MODEL B HAS 39 REFERENCES, BY CHEMICALS:

AAD	ACE	AMA	BDI	BTN	BUT	CMO	CPR	CYG	DFE
DIM	DMA	EAM	ECL	EOX	ETH	ETL	ETN	HCN	HDS
HXX	IBL	IBT	LNG	LPG	MAP	MMC	MTA	MTB	MTC
MTH	PPL	PRP	TFC	TFE	TMA	VCM	VFI	VME	

MODEL C HAS 64 REFERENCES, BY CHEMICALS:

AAD	ACE	ACL	AMA	BDI	BRT	BTN	BUT	CCB	CCL
CDO	CLX	CMO	CPR	CTF	CYG	DCF	DFE	DIM	DMA
EAM	ECL	EOX	ETH	ETL	ETN	FXX	HBR	HCN	HDC
HDS	HFX	HXX	IBL	IBT	LAH	LNG	LPG	MAP	MCF
MMC	MTA	MTB	MTC	MTH	NTC	NTO	NTX	NXX	PFA
PHG	PPL	PPP	PRP	SBH	SDU	SFD	TCF	TFC	TFE
TMA	VCM	VFI	VME						

MODEL D HAS 25 REFERENCES, BY CHEMICALS:

BDI	BTN	BUT	CMO	CPR	DFE	ECL	ETH	ETL	ETN
HDS	HXX	IBL	IBT	LNG	LPG	MAP	MTC	MTH	NXX
PPL	PRP	VCM	VFI	VME					

MODEL E HAS 24 REFERENCES, BY CHEMICALS:

BDI	BTN	BUT	CMO	CPR	DFE	ECL	ETH	ETL	ETN
HDS	HXX	IBL	IBT	LNG	LPG	MAP	MTC	MTH	PPL
PRP	VCM	VFI	VME						

MODEL F HAS 25 REFERENCES, BY CHEMICALS:

BDI	BTN	BUT	CMO	CPR	DFE	ECL	ETH	ETL	ETN
HDS	HXX	IBL	IBT	LNG	LPG	MAP	MTC	MTH	NXX
PPL	PRP	VCM	VFI	VME					

MODEL G HAS 25 REFERENCES, BY CHEMICALS:

BDI	BTN	BUT	CMO	CPR	DFE	ECL	ETH	ETL	ETN
HDS	HXX	IBL	IBT	LNG	LPG	MAP	MTC	MTH	NXX
PPL	PRP	VCM	VFI	VME					

MODEL H HAS 1 REFERENCES, BY CHEMICALS:

TFC

MODEL I HAS 11 REFERENCES, BY CHEMICALS:

CCL	CLX	DCF	MCF	MTB	NOX	NTO	OXY	PHG	TCF
TFC									

MODEL J HAS 10 REFERENCES, BY CHEMICALS:

CCL	CLX	DCF	MCF	MTB	NOX	NTO	PHG	TCF	TFC
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MODEL K HAS 15 REFERENCES, BY CHEMICALS:

AAD	AMA	CYG	DIM	DMA	EAM	EOX	HBR	HCN	HDC
HFX	MMC	MTA	SFD	TMA					

MODEL L HAS 11 REFERENCES, BY CHEMICALS:

AAD	AMA	CYG	DIM	DMA	EAM	EOX	HCN	MMC	MTA
TMA									

MODEL M HAS 15 REFERENCES, BY CHEMICALS:

AAD	AMA	CYG	DIM	DMA	EAM	EOX	HBR	HCN	HDC
HFX	MMC	MTA	SFD	TMA					

MODEL N HAS 15 REFERENCES, BY CHEMICALS:

AAD	AMA	CYG	DIM	DMA	EAM	EOX	HBR	HCN	HDC
HFX	MMC	MTA	SFD	TMA					

MODEL O HAS 78 REFERENCES, BY CHEMICALS:

ABM	ACC	ACF	AMA	APC	APF	ASC	AST	ATC	ATS
BBR	BCF	BCL	BCS	BPD	BPF	BPT	BRT	BTB	BTf
BZC	CAC	CHT	CMC	CME	CSA	CTF	DEZ	DFA	DMD
DMZ	DPD	DTC	EAD	EAS	ECF	ECS	EPD	EPP	EPS
ESC	ETS	FSA	HBR	HDC	HFX	MCH	MCS	MPD	MTS
NOX	NTC	OLM	PAH	PBR	PCM	PDL	PHG	PII	PPA
PPI	PPD	PPT	PTB	PTD	SCL	SFA	SFM	STC	TAL
TBT	TCS	TIA	TMC	TPG	TTT	VOT	VTS		

MODEL P HAS 211 REFERENCES, BY CHEMICALS:

AAC	AAM	AAN	ABS	ACA	ACN	ACR	ACT	ACY	AEA
ALA	ALS	AMH	AMR	AMT	ANL	ANU	ARL	ASF	ATA
ATF	ATN	BAD	BAL	BAM	BAN	BAS	BAT	BCP	BDO
BHP	BMA	BRA	BRX	BTL	BTO	BTR	BUA	BUD	BZM
CBO	CCH	CES	CFB	CHA	CHD	CHN	CLS	CPF	CPS
CRS	CSS	CSY	CTA	DAA	DAC	DBS	DCM	DEA	DEE
DEG	DEM	DEN	DET	DGD	DGE	DGM	DIA	DIP	DLP
DME	DMF	DMH	DMS	DNA	DOX	DPG	DSD	DSF	DSL
DSM	DST	DTS	EAA	EAC	EAL	ECH	EDA	EEE	EET
EFM	EGA	EGD	EGE	EGL	EGM	EGY	ELT	EMA	EMC

EME	ENP	EOD	EOP	EOT	EPC	ETA	ETC	ETD	ETG
ETI	FAL	FFA	FFB	FMA	FMS	FSL	GCR	GOS	GTA
HAC	HAI	HCL	HDZ	HFA	HMD	HMI	HPA	HPM	HPO
HSS	HXG	IAA	IAC	IAL	IAM	IBR	IPA	IPE	IPH
IPM	IPP	LFB	LLS	LTA	MAA	MAL	MAM	MBK	MCA
MEA	MEK	MEP	MFM	MHZ	MIC	MIK	MMM	MPA	MPL
MPY	MSO	MTF	MTT	MVK	NAC	NFB	NIC	NMT	NPP
NTE	OAP	OLM	PAA	PAC	PAD	PAL	PAT	PCL	PGM
PHN	PII	PLT	PME	PNA	POX	PPA	PPG	PPZ	PRD
SAC	SBT	SFA	SFL	SHC	SHS	SSC	TEA	TEG	TEN
TEP	TET	TGC	THF	TLI	TTG	TTP	VAL	VAM	ZCA
ZFB									

MODEL Q HAS 158 REFERENCES, BY CHEMICALS:

AAC	AAN	ACA	ACN	ACR	ACT	ACY	AEA	ALA	ANL
ARL	ATA	ATN	BAD	BAM	BAN	BAS	BAT	BDO	BHP
BRA	BTL	BTO	BTR	BUA	BUD	BZM	CBO	CCH	CES
CHA	CHD	CHN	CLS	CRS	CTA	DAA	DAC	DEA	DEE
DEG	DEM	DEN	DET	DGD	DGE	DGM	DIA	DIP	DLP
DME	DMF	DMH	DMS	DNA	DOX	DPG	DSF	DSL	EAA
EAC	EAL	ECH	EDA	EEE	EET	EFM	EGA	EGD	EGE
EGL	EGM	EGY	ELT	EMA	ENC	EME	EOD	EOP	EOT
EPC	ETA	ETC	ETD	ETG	ETI	FAL	FFA	FMA	FMS
GCR	HAI	HDZ	HMD	HMI	HPA	HPM	HXG	IAA	IAC
IAL	IAM	IBR	IPA	IPE	IPH	IPM	IPP	MAA	MAL
MAM	MBK	MEA	MEK	MEP	MFM	MHZ	MIC	MIK	MMM
MPA	MPL	MPY	MSO	MTF	MTT	MVK	NIC	NMT	NPP
NTE	PAA	PAD	PAL	PAT	PGM	PHN	PII	PLT	PME
PNA	POX	PPG	PPZ	PRD	SBT	SFL	TEA	TEG	TEN
TET	TGC	THF	TLI	TTG	TTP	VAL	VAM		

MODEL R HAS 39 REFERENCES, BY CHEMICALS:

ACN	ACT	AMH	ARL	ATN	BAM	BAT	BTL	BTO	BUA
DEN	DIA	DMH	EAL	EET	EFM	EGD	ETI	IAC	IAM
IPA	IPM	IPP	MAL	MAM	MEK	MFM	MHZ	MMM	MTF
MTT	MVK	NMT	PII	POX	PRD	TEN	THF	VAM	

MODEL S HAS 39 REFERENCES, BY CHEMICALS:

ACN	ACT	AMH	ARL	ATN	BAM	BAT	BTL	BTO	BUA
DEN	DIA	DMH	EAL	EET	EFM	EGD	ETI	IAC	IAM
IPA	IPM	IPP	MAL	MAM	MEK	MFM	MHZ	MMM	MTF
MTT	MVK	NMT	PII	POX	PRD	TEN	THF	VAM	

MODEL T HAS 246 REFERENCES, BY CHEMICALS:

AAN	ACP	ADN	ALC	AMK	AML	AMM	AMY	ANI	ANL
ANT	ARF	ASP	ASR	BAI	BAL	BCN	BMN	BNZ	BTA
BTC	BTM	BZD	BZN	BZP	CAR	CCH	CCT	CGE	CHN
CHP	CHX	CLD	CME	CMH	CMP	CNN	CPO	CRB	CRS
CUM	CYP	DAL	DAN	DAP	DBA	DBC	DBE	DBK	DBL
DBT	DBZ	DCE	DCS	DOB	DDC	DDN	DEB	DEC	DEP
DFE	DHN	DHP	DID	DIH	DIK	DMP	DMT	DNA	DOA
DOD	DOP	DPA	DPE	DPN	DPT	DSL	DSR	DTH	EAC
EAI	EBR	EBT	EEE	EHA	EHP	EHT	EHX	EMA	EMC
ENB	EPA	ESC	ETB	ETM	EVD	GAK	GAT	GAU	GCM
GCS	GDC	GFL	GRF	GSR	HAL	HPT	HTE	HTN	HXA
HXE	HXN	IAA	IAI	IBA	IBN	IDA	IHA	IOA	IOC
IPE	IPH	IPR	IPT	ISA	IVA	JPF	JPO	JPT	JPV
KRS	LAL	LRM	MAA	MAC	MAN	MBK	MCL	MCP	MEP
MIC	MIK	MNS	MPK	MSO	MSR	NAN	NCT	NHX	NNE
NNN	NNP	NON	NPP	NSS	NSV	NTE	NTI	NTM	NVM
OAN	OAS	OCA	OCC	OCF	OCR	OCS	OCT	ODS	OET
OFR	OFS	OFV	OIL	OLA	OLB	OLD	OLS	OMN	OMS
OMT	ONF	OOD	OOL	OON	OPM	OPN	OPT	ORD	ORG
ORN	ORS	OSB	OSD	OSF	OSP	OSX	OSY	OTA	OTB
OTC	OTD	OTE	OTF	OTL	OTN	OTW	OVG	PAT	PBP
PDC	PGC	PLB	PMN	PTA	PTB	PTE	PTL	PTN	PTT
QNL	STY	TBT	TDB	TDC	TDN	TEB	THN	TLI	TLO
TOL	TPT	TTD	TTN	TXP	UDB	UDC	UND	VAL	VNT
WCA	WPF	XLM	XLO	XLP	XYL				

MODEL U HAS 243 REFERENCES, BY CHEMICALS:

AAN	ACP	ADN	ALC	AMK	AML	AMM	AMY	ANI	ANL
ANT	ARF	ASP	ASR	BAI	BCN	BMN	BNZ	BTA	BTC
BTM	BZD	CAR	CCH	CCT	CGE	CHN	CHP	CHX	CLD
CME	CMH	CMP	CNN	CPO	CRB	CRS	CUM	CYP	DAL
DAN	DAP	DBA	DBC	DBE	DBK	DBL	DBT	DBZ	DCE
DCS	DDB	DDC	DDN	DEB	DEC	DEP	DFE	DHN	DHP
DID	DIH	DIK	DMP	DMT	DNA	DOA	DOD	DOP	DPA
DPE	DPN	DPT	DSL	DSR	DTH	EAC	EAI	EBR	EBT
EEE	EHA	EHP	EHT	EHX	EMA	EMC	ENB	EPA	ESC
ETB	ETM	EVO	GAK	GAT	GAV	GCM	GCS	GOC	GPL
GRF	GSR	HAL	HPT	HTE	HTN	HXA	HXE	HXN	IAA
IAI	IBA	IBN	IDA	IHA	IOA	IOC	IPE	IPH	IPR
IPT	ISA	IVA	JPF	JPO	JPT	JPV	KRS	LAL	LRM
HAA	MAC	MAN	MBK	MCL	MCP	MEP	MIC	MIK	MNS
MPK	MSO	MSR	NAN	NCT	NHX	NNE	NNN	NNP	NON
NPP	NSS	NSV	NTE	NTI	NTM	NVM	OAN	OAS	OCA
OCC	OCF	OCR	DCS	OCT	ODS	DET	OFR	OFS	OFV
OIL	OLA	OLB	OLD	OLS	OMN	OMS	OMT	ONF	OOD
OOL	OON	OPM	OPN	OPT	ORD	ORG	ORN	ORS	OSB
OSD	OSF	OSP	OSX	OSY	OTA	OTB	OTC	OTD	OTE
OTF	OTL	OTN	DTW	DVG	PAT	PBP	PDC	PGC	PLB
PMN	PTA	PTB	PTE	PTL	PTN	PTT	QNL	STY	TBT
TDB	TDC	TDN	TEB	THN	TLI	TLO	TOL	TPT	TTD
TTN	TXP	UDB	UDC	UND	VAL	VNT	WCA	WPF	XML
XLO	XLP	XYL							

MODEL V HAS 42 REFERENCES, BY CHEMICALS:

ALC	ANI	BNZ	BTM	CHX	CLD	CME	CYP	DBL	DFE
DSL	DSR	EMC	GAK	GAT	GAV	GCS	GPL	GRF	GSR
HPT	HTE	HXA	HXE	IBN	IHA	IPE	IPR	IPT	IVA
MCL	MCP	MPK	NCT	NHX	NVM	OPT	PMN	PTA	PTB
PTE	PTN								

MODEL W HAS 42 REFERENCES, BY CHEMICALS:

ALC	ANI	BNZ	BTM	CHX	CLD	CME	CYP	DBL	DFE
DSL	DSR	EMC	GAK	GAT	GAV	GCS	GPL	GRF	GSR
HPT	HTE	HXA	HXE	IBN	IHA	IPE	IPR	IPT	IVA
MCL	MCP	MPK	NCT	NHX	NVM	OPT	PMN	PTA	PTB
PTE	PTN								

MODEL X HAS 100 REFERENCES, BY CHEMICALS:

ABR	ACF	ACP	ANL	ANT	APS	ASC	ASP	BAL	BBP
PBR	BBZ	BCF	BCL	BDE	BRX	BZC	BZD	BZN	BZP
CBB	CBN	CBT	CCL	CCT	CDN	CGE	CHP	CME	CMH
CNN	CPL	CRB	CRF	CRS	DBO	DCB	DCM	DEE	DEL
DES	DHP	DMP	DMT	DOP	DPA	DPE	DPH	DPP	DPR
DSF	DTH	DTN	DTT	DZN	ECA	ECF	EDB	EDC	EHT
ESC	GCM	HCC	MAN	MCH	MCR	MCT	MFA	MLT	MPT
NKC	NPP	NTB	NTE	NTM	PAH	PAN	PCM	PDL	PGC
PPI	PTO	QNL	SXX	TBT	TCE	TCL	TCP	TDI	TEC
TED	TEL	TES	TLI	TML	TPG	TTE	VCI	XYL	ZDP

MODEL Y HAS 79 REFERENCES, BY CHEMICALS:

ABR	ACF	ACP	ANL	ANT	APS	ASP	BBR	BBZ	BCF
BCL	BZC	BZD	CBB	CBN	CCT	CDN	CGE	CHP	CME
CMH	CNN	CRB	CRS	DBO	DCB	DEE	DEL	DES	DHP
DMP	DMT	DOP	DPA	DPE	DPH	DPP	DPR	DSF	DTH
DTN	DTT	DZN	ECA	ECF	EDC	EHT	ESC	GCM	MAN
MCH	MCT	MFA	MLT	MPT	NKC	NPP	NTB	NTE	PAH
PAN	PGC	PPI	PTO	QNL	SXX	TBT	TCE	TCL	TDI
TED	TEL	TES	TLI	TML	TPG	VCI	XYL	ZDP	

MODEL Z HAS 39 REFERENCES, BY CHEMICALS:

AAD	AAM	ACN	ACR	AMD	ARL	BAI	BDI	BHP	BPF
BTC	DEZ	DMZ	EAC	EAD	EAI	EAS	ETI	ETM	GCM
HAI	HPA	HPM	HPO	IAI	LPO	MAM	MMM	PII	STY
TAL	TFE	TIA	VAM	VCI	VCM	VFI	VME	VNT	

MODEL II HAS 126 REFERENCES, BY CHEMICALS:

ACD	ADA	ALD	ALF	ADX	ARD	ART	ATH	ATO	ATX
ATZ	AZM	BAC	BEM	BEO	BHC	BOC	BPA	BPO	BRC
BRU	BTP	BZA	CAA	CAF	CAH	CAM	CAP	CBR	CRY
CCA	CCP	CCY	CDO	CHC	CID	COL	COU	COX	CPA
CPH	CPN	CPT	CRA	CRE	CTD	DAM	DBP	DBR	DBT
DCA	DCP	DDD	DDT	DDW	DED	DMT	DNB	DNC	DNP
DNT	DPM	DPO	DSS	DTM	DTT	DZP	EDR	EDT	FOX
FUM	GLA	HTC	IPC	IPL	LAR	LFR	LID	LPO	LTC
LTH	MCC	MGX	MID	MLH	MOC	MOX	MRN	MRR	MSF
MTO	NAL	NAD	NCN	NPH	NTA	NTL	NTP	PAN	PBO

PCB	PCP	PLP	PPR	PPW	SFR	SLA	SOX	SRA	SVA
SVC	SVF	SVI	SVO	SVS	TCA	TCT	TFA	TFR	THR
TPH	TXP	VOX	ZAR	ZBO	ZPP				

MODEL RR HAS 24 REFERENCES, BY CHEMICALS:

ACL	ATH	BEC	CAM	CAO	CCB	CCP	CPP	CRA	DBR
LAH	LHD	LTM	LTT	MLA	PFA	POP	PPP	PTM	SAM
SBH	SDH	SDU	STO						

MODEL SS HAS 181 REFERENCES, BY CHEMICALS:

AAT	ABC	ABF	ABZ	ACB	ACI	ADA	AFM	AFR	AGC
AID	ALM	ALN	ALT	AMB	AMC	AMD	AMF	AMN	AMP
AMR	AMS	AMT	ANP	ANS	AOL	AOX	APB	APE	APP
APT	ASA	ASL	ASM	ATF	ATO	ATR	ATT	BAC	BCR
BEF	BEN	BES	BNT	BFC	BPM	BTD	BZO	CAA	CAL
CAT	CBA	CBC	CBS	CCC	CCN	CCR	CDA	CDC	CHY
CIT	CLC	CMA	CMB	CMN	CMS	CNI	CNT	CON	COP
CPB	CPC	CPN	CSF	CTC	CYA	DAI	DDS	DSS	FAC
FAO	FAS	FCL	FCP	FEC	FNT	FRS	FSF	GLA	HAS
HDQ	HMT	LAC	LNT	MAT	MCN	MLI	MNT	MPC	MRC
KSA	NAA	NAB	NAS	NBR	NCL	NCS	NFH	NKA	NKS
NNT	NPH	OAC	OXA	FAS	PBO	PCH	PCR	PDT	PET
PGA	PHH	PTC	PTD	PTH	PTI	PTP	PTS	RSC	SAB
SAR	SAS	SAZ	SBS	SCD	SCH	SCN	SCR	SCY	SDA
SDB	SDC	SDF	SDS	SDT	SFC	SHD	SLD	SML	SNT
SOX	SPP	SRS	SSF	SVA	SVF	SVN	SVS	TAP	TCT
TNA	TPO	TRN	UAN	UPO	URA	URE	URS	VSF	ZAC
ZBR	ZCL	ZCO	ZCR	ZCS	ZIR	ZNA	ZNT	ZPS	ZSF
ZSL									

APPENDIX K. LIST OF CHEMICAL RECOGNITION
CODES BY HAZARD ASSESSMENT PATH CODES

The current version of the HACS chemical data file contains physical property data for 900 hazardous substances. Included on this file are the appropriate hazard assessment model codes, and groupings of model codes into hazard assessment scenarios. For any chemical selected during a UIM run, the model codes and scenarios for that chemical as defined by the chemical data file can be displayed at the user terminal by means of a user request.

The hazard assessment path codes stored in the chemical data file give the letter code of each model appropriate to the chemical behavior. Most chemicals are associated with more than two codes, and these codes are arranged more or less alphabetically with the chemical record. The complete set of path codes for a particular chemical specifies one or more than one scenario or path through the hazard assessment tree.

This appendix contains a tabulation of cross-reference information in which the chemical recognition codes are listed by each different collection of path codes contained on the file. Since each chemical has only one set of path codes associated with it, no chemical recognition code appears more than once in these lists.

The table shows that there are 70 different sets of hazard assessment path codes associated with the 900 chemicals. However, the table was prepared using an exact character by character match, so that equivalent code groupings such as II-SS and SS-II are listed separately.

For use in the UIM, each set of model path codes is automatically translated into the appropriate sub-sets defining one or more applicable hazard assessment scenarios. Since more than one set of hazard assessment path codes may contain the same scenario as a sub-set, lists of chemical recognition codes for identical scenarios can be identified from entries at different locations in this table. For example, chemical recognition codes for scenario A B C are listed under hazard assessment path codes A B C, A B C D E F G, A B C D E F G Z, A B C H I J, A B C I J, A B C K L M N, A B C K L M N O, A B C K L M N Z, and A B C Z. The lists are arranged in alphabetical order by chemical recognition code, within hazard assessment path codes which are also listed alphabetically (II, RR, and SS after Z).

This appendix identifies the complete set of hazard assessment path codes contained on the file for the 900 chemicals from which the sub-sets defining individual scenarios are derived by the UIM. Chemicals having similar behavior can be identified from those chemicals listed, primarily within a single set of hazard assessment path codes, and, to a lesser extent, from within groups of chemicals giving the same sub-set of codes as a scenario.

1 OCCURRENCES OF PATH: A B C

ACE

20 OCCURRENCES OF PATH: A B C D E F G

BTN BUT CMO CPR DFE ECL ETH ETL ETN HDS
HXX IBL IBT LNG LPG MAP MTC MTH PPL PRP

4 OCCURRENCES OF PATH: A B C D E F G Z

BDI VCM VFI VME

1 OCCURRENCES OF PATH: A B C H I J

TFC

1 OCCURRENCES OF PATH: A B C I J

MTB

9 OCCURRENCES OF PATH: A B C K L M N

CYG DIM DMA EAM EOX HCN MMC MTA TMA

1 OCCURRENCES OF PATH: A B C K L M N O

AMA

1 OCCURRENCES OF PATH: A B C K L M N Z

AAD

AD-A110 376

LITTLE (ARTHUR D) INC CAMBRIDGE MA
HAZARD ASSESSMENT COMPUTER SYSTEM HAC5/UIM USERS' OPERATION MAN--ETC(U)
SEP 81 R POTTS

F/6 7/1

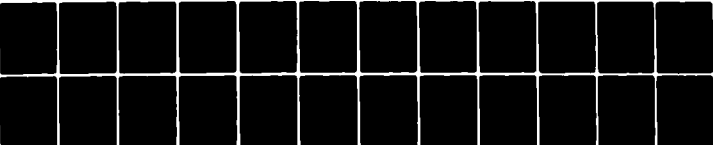
DOT-C6-941999-A
NL

UNCLASSIFIED

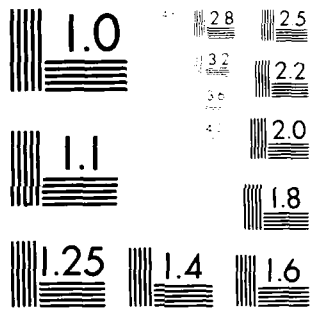
USCG-D-76-81

2 OF 2

AD-A
110 376



END
DATE
FILMED
12 82
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

1 OCCURRENCES OF PATH: A B C Z

TFE

2 OCCURRENCES OF PATH: A C

FXX NTX

1 OCCURRENCES OF PATH: A C D F G

NXX

5 OCCURRENCES OF PATH: A C I J

CLX DCF MCF NTO TCF

1 OCCURRENCES OF PATH: A C I J O

PHG

1 OCCURRENCES OF PATH: A C I J X

CCL

1 OCCURRENCES OF PATH: A C II

CDO

1 OCCURRENCES OF PATH: A C K M N

SFD

3 OCCURRENCES OF PATH: A C K M N O

HBR HDC HFX

3 OCCURRENCES OF PATH: A C O

BRT CTF NTC

1 OCCURRENCES OF PATH: A I

OXY

1 OCCURRENCES OF PATH: A I J O

NOX

40 OCCURRENCES OF PATH: A O

ABM	ACC	APC	APF	AST	ATC	ATS	BCS	BPD	BPT
BTB	BTF	CAC	CHT	CMC	CSA	DFA	DMD	DPD	DTC
ECS	EPD	EPP	EPS	ETS	FSA	MCS	MPD	MTS	PBR
PPD	PPT	SCL	SFM	STC	TCS	TMC	TTT	VOT	VTS

1 OCCURRENCES OF PATH: H O P

OLM

1 OCCURRENCES OF PATH: A O P Q R S Z

PII

1 OCCURRENCES OF PATH: A O T U V W

PTB

1 OCCURRENCES OF PATH: A O T U V W X Y

CME

2 OCCURRENCES OF PATH: A O T U X Y

ESC TBT

3 OCCURRENCES OF PATH: A O X

ASC PCM PDL

10 OCCURRENCES OF PATH: A O X Y

ACF BBR BCF BCL ECF MCH PAH PPI PTD TPG

7 OCCURRENCES OF PATH: A O Z

BPF DEZ DMZ EAD EAS TAL TIA

41 OCCURRENCES OF PATH: A P

ABS ALS ANU ASF BCP BMA CFB CPF CPS CSS
CSY DBS DSD DSM DST DTS ENP FFB FSL GDS
GTA HAC HCL HFA HSS LFB LLS LTA MCA NAC
NFB OAP PAC PCL SAC SHC SHS SSC TEP ZCA
ZFB

2 OCCURRENCES OF PATH: A P Q

PPA SFA

88 OCCURRENCES OF PATH: A P Q

AAC	ACA	ACY	AEA	ALA	ATA	BAD	BAN	BAS	BDO
BRA	BTR	BUD	BZH	CBO	CES	CHA	CHD	CLS	CTA
DAA	DAC	DEA	DEG	DEM	DET	DGD	DGE	DGM	DIP
DLP	DME	DMF	DMS	DOX	DPG	EAA	ECH	EDA	EGA
EGE	EGL	EGM	EGY	ELT	EME	EOD	EOP	EOT	EPC
ETA	ETC	ETD	ETG	FAL	FFA	FMA	FMS	GCR	HDZ
HMD	HMI	HXG	IAL	IBR	MEA	MPA	MPL	MPY	NIC
PAA	PAD	PAL	PGM	PHN	PLT	PME	PNA	PPG	PPZ
SBT	SFL	TEA	TEG	TET	TGC	TTG	TTP		

31 OCCURRENCES OF PATH: A P Q R S

ACT	ATN	BAM	BAT	BTL	BTO	BUA	DEN	DIA	DMH
EAL	EET	EFM	EGD	IAC	IAM	IPA	IPM	IPP	MAL
MEK	MFM	MHZ	MTF	MTT	MVK	NMT	POX	PRD	TEN
THF									

6 OCCURRENCES OF PATH: A P Q R S Z

ACN ARL ETI MAM MMM VAM

16 OCCURRENCES OF PATH: A P Q T U

AAN	CCH	CHN	DNA	EEE	EMA	IAA	IPH	MAA	MBK
MEP	MIC	MIK	MSO	PAT	VAL				

3 OCCURRENCES OF PATH: A P Q T U V W

DSL EMC IPE

5 OCCURRENCES OF PATH: A P Q T U X Y

ANL CRS NPP NTE TLI

1 OCCURRENCES OF PATH: A P Q T U Z

EAC

2 OCCURRENCES OF PATH: A P Q X Y

DEE DSF

5 OCCURRENCES OF PATH: A P Q Z

ACR BHP HAI HPA HPM

1 OCCURRENCES OF PATH: A P R S

AMH

1 OCCURRENCES OF PATH: A P T X

BAL

2 OCCURRENCES OF PATH: A P X

BRX DCM

2 OCCURRENCES OF PATH: A P Z

AAM HPO

3 OCCURRENCES OF PATH: A P SS

AMR AMT ATF

144 OCCURRENCES OF PATH: A T U

ADN	AMK	AML	AMM	AMY	ARF	ASR	BCN	BMN	BTA
CAR	CMF	CPD	CUM	DAL	DAN	DAP	DBA	DBC	DBE
DBK	DBZ	DCE	DCS	DDB	DDC	DDN	DEB	DEC	DEF
DHN	DID	DIH	DIK	DOA	DOD	DPN	DPT	EBR	EBT
EHA	EHP	EHX	ENB	EPA	ETB	EVD	GOC	HAL	HTN
HXN	IBA	IDA	IDA	IOC	ISA	JPF	JPD	JPT	JPV
KRS	LAL	LRM	MAC	MNS	MSR	NAN	NNE	NNN	NNP
NON	NSS	NSV	NTI	OAN	OAS	OCA	OCC	OCF	OCR
DCS	OCT	ODS	OET	OFR	OFF	OFV	OIL	OLA	OLB
OLD	OLS	OMN	OMS	OMT	ONF	OOD	OOL	OON	OPM
OPN	ORD	ORG	ORN	ORS	OSB	OSD	OSF	OSP	OSX
OSY	OTA	OTB	OTC	OTD	OTE	OTF	OTL	OTN	OTW
OVG	PBP	PDC	PLB	PTL	PTT	TDB	TDC	TDN	TEB
THN	TLO	TOL	TPT	TTD	TTN	UDB	UDC	UND	WCA
WPF	XLM	XLO	XLP						

37 OCCURRENCES OF PATH: A T U V W

ALC	ANI	BNZ	BTM	CHX	CLD	CYP	DBL	DFF	DSR
GAK	GAT	GAV	GCS	GPL	GRF	GSR	HPT	HTE	HXA
HXE	IBN	IHA	IPR	IPT	IVA	MCL	MCP	MPK	NCT
NHX	NUM	OPT	PMN	PTA	PTE	PTN			

1 OCCURRENCES OF PATH: A T U X

NTM

21 OCCURRENCES OF PATH: A T U X Y

ACP	ANT	ASP	BZD	CCT	CGE	CHP	CMH	CNN	CRB
DHP	DMP	DOP	DPA	DPE	DTH	EHT	MAN	PGC	QNL
XYL									

1 OCCURRENCES OF PATH: A T U X Y Z

GCH

1 OCCURRENCES OF PATH: A T U X Y II

DHT

7 OCCURRENCES OF PATH: A T U Z

BAI	BTC	EAI	ETH	IAI	STY	VNT
-----	-----	-----	-----	-----	-----	-----

1 OCCURRENCES OF PATH: A T U II

DBT

2 OCCURRENCES OF PATH: A T X

BZN BZP

11 OCCURRENCES OF PATH: A X

BBP BDE CBT CPL CRF EDB HCC MCR TCP TEC
TTE

32 OCCURRENCES OF PATH: A X Y

ABR APS BBZ CBB CBN CDN DBO DCB DEL DES
DPH DPP DPR DTN DZN ECA EDC HCT MFA MLT
MPT NKC NTB SXX TCE TCL TDI TED TEL TES
TML ZDP

1 OCCURRENCES OF PATH: A X Y O

BZC

1 OCCURRENCES OF PATH: A X Y Z

VCI

1 OCCURRENCES OF PATH: A X Y II

DTT

100 OCCURRENCES OF PATH: II

ACD	ALD	ALF	ARD	ART	ATH	ATX	ATZ	AZN	BEM
BEO	BHC	BOC	BPA	BPO	BRC	BRU	BTP	BZA	CAF
CAH	CAP	CBR	CBY	CCA	CCY	CHC	CID	COL	COU
COX	CPA	CPH	CPT	CRE	CTD	DAM	DBP	DCA	DCP
DDD	DDT	DDW	DED	DNB	DNC	DNP	DNT	DPH	DPO
DTM	DZP	EDR	EDT	FOX	FUM	HTC	IPC	IPL	LAR
LFR	LID	LTC	LTH	MCC	MGX	MID	MLH	MOC	NOX
MRN	MRR	MSF	MTO	NAL	NAO	NCN	NTA	NTL	NTP
PCB	PCP	PLP	PPR	PPW	SFR	SLA	SRA	SVC	SVI
SVD	TCA	TFA	TFR	THR	TPH	VOX	ZAR	ZBO	ZPP

1 OCCURRENCES OF PATH: II A T U

TXP

1 OCCURRENCES OF PATH: II A X Y

PAN

1 OCCURRENCES OF PATH: II Z

LPO

4 OCCURRENCES OF PATH: II RR

CAM CCP CRA DBR

13 OCCURRENCES OF PATH: II SS

ATO	BAC	CAA	CPN	DSS	GLA	NPH	PBO	SOX	SVA
SVF	SVS	TCT							

13 OCCURRENCES OF PATH: RR

ATM	BEC	CAO	CPP	LHD	LTM	LTT	MLA	POP	PTM
SAM	SDH	STO							

7 OCCURRENCES OF PATH: RR C

ACL	CCB	LAH	PFA	PPP	SBH	SDU			
-----	-----	-----	-----	-----	-----	-----	--	--	--

162 OCCURRENCES OF PATH: SS

AAT	ABC	ABF	ABZ	ACB	ACI	AFM	AFR	AGC	AID
ALM	ALN	ALT	AMB	AMC	AMF	AMN	AMP	AMS	ANP
ANS	AOL	APB	APE	APP	APT	ASA	ASL	ASH	ATR
ATT	BCR	BEF	BEN	BES	BNT	BPC	BPM	BTD	BZO
CAL	CAT	CBA	CBC	CBS	CCC	CCN	CCR	CDA	CDC
CHY	CIT	CLC	CHA	CHB	CMN	CMS	CNI	CNT	CON
COP	CPB	CPC	CSF	CTC	CYA	DAI	DDS	FAC	FAQ
FAS	FCL	FCP	FEC	FNT	FRS	FSF	HAS	HGQ	HMT
LAC	LNT	MAT	MCN	MLI	MNT	MPC	MRC	MSA	NAA
NAB	NAS	NBR	NCL	NCS	NFM	NKA	NKS	NNT	DAC
OXA	PAS	PCH	PCR	PDT	PET	PGA	PHH	PTC	PTD
PTH	PTI	PTP	PTS	RSC	SAB	SAR	SAS	SAZ	SBS
SCD	SCH	SCN	SCR	SCY	SDA	SDB	SDC	SDF	SDS
SDT	SFC	SHD	SLD	SML	SNT	SPP	SRS	SSF	SVN
TAP	TNA	TPO	TRN	UAN	UPO	URA	URE	URS	VSF
ZAC	ZBR	ZCL	ZCO	ZCR	ZCS	ZIR	ZNA	ZNT	ZPS
ZSF	ZSL								

1 OCCURRENCES OF PATH: SS Z

AMD

2 OCCURRENCES OF PATH: SS II

ADA AOX

APPENDIX L. DESCRIPTIONS OF HACS DATA FIELDS

If the HACS/UIM user enters a question mark in response to a UIM request for a value for a HACS data field, the UIM will automatically reference an external file of descriptive text. A brief message describing the particular field is retrieved from this file and displayed at the user terminal to provide the requested explanation. The UIM will next expect the user to provide the requested value, and an appropriate prompt message will be displayed.

Each of these messages which may be requested and displayed during a HACS/UIM run are reproduced on the following pages. They are listed in sequence by the HACS data field reference number, and the data field name is also given.

Most of the data fields which correspond to entries in the HACS chemical property file do not have individual descriptions, since in normal use input values will be supplied by the external property file and user values will not be requested. Instead, a standard message used for the field definition refers the user to CHRIS Manual II. Similarly, for a few data items used mainly for the transfer of model outputs to subsequent model inputs, a standard message refers the user to the HACS User's Reference Manual.

- 1002 MOLEC WEIGHT
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1003 BOIL TEM LIQ
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1004 DENS LIQ AMB
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1005 VISCOSITY-BP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1006 VISCOSITY-AM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1007 HT CAP LQ-AM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1008 SURF TENSION
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1009 DEN FUEL VPR
REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.
- 1010 VPE COEFF A
FIRST COEFFICIENT IN VAPOR PRESSURE EQUATION FOR COMPRESSED LIQUEFIED GAS IN TANK EXPOSED TO FIRE. SEE PAGE 65 OF USER'S MANUAL FOR VALUE.
- 1011 VPE COEFF B
SECOND COEFFICIENT IN VAPOR PRESSURE EQUATION FOR COMPRESSED LIQUEFIED GAS IN TANK EXPOSED TO FIRE. SEE PAGE 65 OF USER'S MANUAL FOR VALUE.
- 1012 VPE COEFF C
THIRD COEFFICIENT IN VAPOR PRESSURE EQUATION FOR COMPRESSED LIQUEFIED GAS IN TANK EXPOSED TO FIRE. SEE PAGE 65 OF USER'S MANUAL FOR VALUE.
- 1013 HT CAP VP-AM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1014 HEAT OF VPR
HEAT THAT MUST BE ADDED TO THE SPECIFIED WEIGHT OF LIQUID BEFORE IT CAN CHANGE TO A VAPOR
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1015 BURNING RATE
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1016 AD FLME TEMP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1017 MOLAR RATIO
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1018 STD AIR/FUEL
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1019 FLAME TEMP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1020 MOLE FRACTN
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1021 LIQ DENS BP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1025 CRIT TEMP
MAXIMUM TEMPERATURE AT WHICH A LIQUID CAN EXIST REGARDLESS
OF THE PRESSURE EXERTED UPON IT
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1026 SOLUBILITY
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1027 SOLUB-TEMP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1028 SOL EQ COEF1
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1029 SOL EQ COEF2
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1031 INTRFACE TEN
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1032 INTF TNS-TMP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1033 NORM FREZ PT
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1034 CRIT PRES
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1035 DENSITY-DATA
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1036 DENSITY TEMP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1038 SLD COF ARHO
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1039 SLD COF BRHO
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1040 SLD COF CRHO
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1041 SLD UPR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1042 SLD LWR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1043 LQ VIS-POINT
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1044 LQ VIS-TEMP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1045 LQ VIS CF A
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1046 LQ VIS CF B
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1047 LQVS UPR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1048 LQVS LWR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1049 LQ THR CN-PT
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1050 LQ THR CN-TM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1051 L THR CN CFA
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1052 L THR CN CFB
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1053 LTC UPR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1054 LTC LWR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1055 LQ HT CAP-PT
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1056 LQ HT CAP-TM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1057 L HT CAP CFA
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1058 L HT CAP CFB
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1059 LHC UPR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1060 LHC LWR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1061 SURF TNS-TMP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1062 SVP UPR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1063 SVP LWR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1064 V HT CAP-CFA
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1065 V HT CAP-CFB
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1066 V HT CAP-CFC
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1067 V HT CAP-CFD
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1068 VHC UPR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1069 VHC LWR BND
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1070 HT OF FUSION
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1071 HT OF COMB
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1072 HT OF DECOMP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1073 HT OF SOLN
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1074 HT OF REACTN
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1075 HT OF POLYMR
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1076 UPR FLAM LIM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1077 ST INHAL LIM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

1078 ST INHAL TIM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.

- 1079 LWR TOX INGS
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1080 UPR TOX INGS
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1081 L THR CON-AM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1082 L THR CON-BP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1083 HT CAP LQ-BP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1084 SOLUBLTY-AM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1085 SOLUBLTY-BP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1086 S VPR PRS-AM
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1087 S VPR PRS-BP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 1088 HT CAP VP-BP
REFER TO CHRIS MANUAL II FOR CHEMICAL PROPERTY DATA ITEMS.
- 2001 TANK VOLUME
TOTAL CAPACITY OR VOLUME OF DISCHARGING TANK
- 2002 TANK HEIGHT
TANK HEIGHT OR OVERALL DEPTH
- 2003 HOLE HEIGHT
VERTICAL DISTANCE FROM BOTTOM OF TANK TO BOTTOM OF HOLE IN TANK.
- 2004 TEMP START
TEMPERATURE OF DISCHARGING LIQUID BEFORE ACCIDENT. IF IT IS UNKNOWN, AND MODEL A IS BEING EXECUTED, HIT CARRIAGE RETURN KEY FOR USE OF DEFAULT VALUE. IF ANOTHER MODEL IS BEING EXECUTED, USER MUST PROVIDE A VALUE.
- 2005 TANK PRESS
ABSOLUTE PRESSURE IN TANK BEFORE ACCIDENT; INPUT VALUE NOT NEEDED IF 2004 TEMP START IS PROVIDED. NOTE: THE PRESSURE IN EXCESS OF ATMOSPHERIC PRESSURE IS KNOWN AS GAUGE PRESSURE. ABSOLUTE PRESSURE IS THE GAUGE PRESSURE ADDED TO ATMOSPHERIC PRESSURE, WHERE ATMOSPHERIC PRESSURE IS ROUGHLY 14.7 PSI OR 760 MM HG.
- 2006 ADBT OR ISO
INTEGER FLAG INDICATING WHETHER VENTING IS ADIABATIC OR ISOTHERMAL. ADIABATIC IS SELECTED WHEN THE TANK IS INSULATED IN SOME WAY. ISOTHERMAL IS SELECTED WHEN THE TANK IS NOT INSULATED.
(0=ISOTHERMAL, 1=ADIABATIC)

2007 INITIAL MASS

INITIAL WEIGHT OF CHEMICAL IN TANK. NOTE THAT WEIGHT = VOLUME TIMES DENSITY.

2008 HOLE DIAM

DIAMETER OF HOLE IN TANK WHEN ASSUMING THAT HOLE IS CIRCULAR.

2009 NUM MASS INC

NUMBER OF MASS INCREMENTS TO BE USED FOR INTEGRATION. USE 50 FOR MINIMUM ACCURACY, 100 FOR AVERAGE ACCURACY, OR 150 FOR HIGH ACCURACY. NOTE THAT HIGHER NUMBERS REQUIRE MORE COMPUTATION AND OUTPUT TIME.

2010 RAD FLUX

THE RATE OF TRANSFER OF THERMAL RADIATION (USER SPECIFIED THERMAL RADIATION FLUX FOR WHICH A SAFE SEPARATION DISTANCE FROM THE FLAME WILL BE ESTIMATED). IT IS AN OPTIONAL INPUT, AND NEED NOT BE GIVEN UNLESS DESIRED.

2011 EL TM - CONC

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

2012 COORD X

USER SPECIFIED TARGET LOCATION DOWNWIND IN THE CENTERLINE DIRECTION (DISTANCE FROM THE SPILL SITE). IT IS ONE OF THREE COORDINATES DEFINING THE LOCATION AT WHICH THE USER DESIRES AN ASSESSMENT OF HAZARDS.

2013 COORD Y

USER SPECIFIED DISTANCE IN THE CROSSWIND DIRECTION MEASURED FROM THE CENTERLINE. IT IS ONE OF THREE COORDINATES DEFINING THE LOCATION AT WHICH THE USER DESIRES AN ASSESSMENT OF HAZARDS.

2014 COORD Z

HEIGHT ABOVE GROUNDLEVEL OR WATER SURFACE. IT IS ONE OF THREE COORDINATES DEFINING THE LOCATION AT WHICH THE USER DESIRES AN ASSESSMENT OF HAZARDS.

2015 HOLE HEIGHT

HEIGHT OF THE CENTERLINE OF THE GAS OR VAPOR SOURCE ABOVE GROUND-LEVEL OR WATER SURFACE. IT SHOULD BE SET TO 0.0 IF MODEL C IS CALLED BY MODELS G, J, N, S, OR W.

2016 WIND VELOC

AVERAGE WIND SPEED IN THE VICINITY OF THE RELEASE.

2017 ATMOS COND

CODE NUMBER FOR PREVAILING ATMOSPHERIC CONDITIONS IN VICINITY OF SPILL (INTEGER FLAG INDICATING ATMOSPHERIC STABILITY CLASS PREVALENT DURING RELEASE). THE NUMBERS 1 TO 6 CORRESPOND TO CLASSES A TO F AS DEFINED ON PAGE 73 OF THE USERS REFERENCE MANUAL.

2018 DIM FLAG

INTEGER FLAG INDICATING WHETHER GAS OR VAPOR SOURCE IS CIRCULAR OR RECTANGULAR IN SHAPE (1=RECTANGULAR, 2=CIRCULAR). ESTIMATES PROVIDED BY MODELS D, I, N, R, AND U.

2019 DIM SPILL

SIZE OF THE GAS OR VAPOR SOURCE. IF SOURCE IS RECTANGULAR, IT IS THE LENGTH OF THE SOURCE. IF SOURCE IS CIRCULAR, IT IS THE RADIUS OF THE CIRCLE. ESTIMATES PROVIDED BY MODELS D, I, N, R, AND W.

2020 CHAN L WIDTH

THE WIDTH OF THE CHANNEL OR RIVER INTO WHICH LIQUID IS DISCHARGED. IN MODEL C, IT CAN ALSO REPRESENT THE WIDTH OF A SMALL RECTANGULAR SOURCE OF GAS OR VAPOR DISCHARGE.

2021 SPILL DEPTH

DEPTH IN WATER AT WHICH CHEMICAL IS DISCHARGED; MEASURED FROM THE SURFACE WITH DOWN AS THE POSITIVE DIRECTION.

2022 FLUX VAR

INTEGER FLAG INDICATING WHETHER HEAT TRANSFER FROM WATER TO POOL OF CHEMICAL IS LIMITED BY ICE FORMATION OR IS A CONSTANT, 1=CONSTANT (NO ICE); 2=ICE FORMS. USE 1 IF YOU DO NOT KNOW. IF RESULTS ARE FOR A CRITICAL USE, RUN MODEL TWICE USING BOTH OPTIONS AND UTILIZE WORST CASE ANSWERS, I.E., THOSE GIVING SHORTEST EVAPORATION TIME AND/OR SMALLEST POOL SIZE FOR POOL FIRE HAZARDS.

2023 WATER TEMP

TEMPERATURE OF WATER BODY INTO WHICH DISCHARGE OCCURS.

2024 HEAT FLUX

HEAT FLUX BETWEEN WATER AND POOL OF DISCHARGED LIQUID. HACS WILL ESTIMATE A VALUE AND USE IT IF THE USER DOES NOT PROVIDE ONE.

2025 CRIT. FLAG

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

2026 POOL SIZE TM

ELAPSED TIME FROM THE START OF THE DISCHARGE AT WHICH THE POOL SIZE IS TO BE ESTIMATED.

2027 EVAP TIME

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

2028 WAT TYPE P/R

INTEGER FLAG INDICATING THE TYPE OF WATER BODY INTO WHICH SPILL OCCURS. 1=STILL WATER LIKE A LAKE OR POND; 2=NON-TIDAL RIVER; 3=ESTUARY OR TIDAL RIVER.

2029 SPILL TYPE P

INTEGER FLAG INDICATING WHETHER LIQUID DISCHARGE IS INSTANTANEOUS OR CONTINUOUS (0=INSTANTANEOUS; 1=CONTINUOUS). WILL USUALLY BE SET TO 0 BY PRECEDING MODELS IF RELEASE TAKES LESS THAN 10 MINUTES. OTHERWISE IT WILL BE SET TO 1.

2030 MIN DIST HFM

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

2031 MAX DISTANCE

MAXIMUM DISTANCE RANGE FOR TABLES.

2032 LOW TOX LIM

THE CONCENTRATION OF GAS OR VAPOR IN AIR THAT IS CONSIDERED TOXIC TO PEOPLE. IF NOT PROVIDED BY USER, HACS WILL UTILIZE THE VERY CONSERVATIVE THRESHOLD LIMIT VALUE FOR THE CONTAMINANT IN AIR.

2033 LOW FLAM LIM

LOWER FLAMMABLE LIMIT CONCENTRATION OF THE GAS OR VAPOR IN AIR.

2034 MIN HAZ ZONE

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

2035 MAX HAZ ZONE

THE MAXIMUM DOWNWIND CENTERLINE DISTANCE FOR TABLES OR PLOTS.

2036 TEMP LIQUID

TEMPERATURE OF LIQUID DISCHARGED, MUST BE EQUAL TO OR LESS THAN BOILING POINT OF LIQUID WHEN MODEL I IS EXECUTED.

2037 MAX TME CONC

MAXIMUM ELAPSED TIME FROM START OF SPILL TO BE SHOWN ON PLOTS OR TABLES. HACS MAY MODIFY AN INPUT VALUE THAT IS UNREASONABLY LARGE.

2038 AVR RATE MS

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

2039 CONC PT X

DISTANCE DOWNSTREAM FROM THE SPILL LOCATION IN THE CENTERLINE DIRECTION. IT IS THE FIRST OF 3 COORDINATES DEFINING THE LOCATION AT WHICH THE USER DESIRES THE DOWNSTREAM CONTAMINANT CONCENTRATION IN WATER TO BE ESTIMATED.

2040 CONC PT Y

DISTANCE IN CROSS-STREAM DIRECTION MEASURED FROM DOWNSTREAM CENTERLINE. IT IS THE SECOND OF 3 COORDINATES DEFINING THE LOCATION AT WHICH THE USER DESIRES THE CONTAMINANT CONCENTRATION IN WATER TO BE ESTIMATED.

2041 CONC PT Z

DEPTH IN WATER MEASURED FROM WATER SURFACE WITH DOWN AS THE POSITIVE DIRECTION. IT IS THE THIRD OF 3 COORDINATES DEFINING THE LOCATION AT WHICH THE USER DESIRES THE CONTAMINANT CONCENTRATION IN WATER TO BE ESTIMATED.

2042 TIME CONC PT

ELAPSED TIME AT WHICH THE CONTAMINANT CONCENTRATION IS TO BE COMPUTED AT THE USER SPECIFIED POINT.

2043 DIF COEF H2O

DIFFUSION COEFFICIENT OF THE CHEMICAL IN WATER. HACS WILL ESTIMATE AND USE A VALUE IF THE USER DOES NOT PROVIDE ONE.

2044 RIVER DEPTH

AVERAGE DEPTH OF WATER BODY INTO WHICH DISCHARGE OCCURS.

2045 RIVER WIDTH

AVERAGE WIDTH OF WATER BODY INTO WHICH DISCHARGE OCCURS.

2046 OFF DIST

CROSS-STREAM DISTANCE AT WHICH DISCHARGE OCCURS. IT IS MEASURED FROM THE CENTERLINE OF THE WATER BODY.

2047 STREAM VEL

AVERAGE CURRENT VELOCITY OF THE WATER BODY. WHEN THE SPILL IS INTO AN ESTUARY OR TIDAL RIVER, USE THE VELOCITY AT AN UPSTREAM POINT NOT AFFECTED BY TIDAL ACTION OR COMPUTE A VALUE FROM DATA IN THE TIDAL CURRENT TABLES BY SUBTRACTING THE MAXIMUM FLOOD CURRENT VELOCITY FROM THE MAXIMUM EBB CURRENT VELOCITY GIVEN.

2048 TIDAL VEL

MAXIMUM AMPLITUDE OF TIDAL CURRENT VELOCITY WHEN SPILL IS INTO AN

ESTUARY OR TIDAL RIVER, CAN BE ESTIMATED BY USING THE TIDAL CURRENT TABLES AND COMPUTING THE AVERAGE OF THE MAXIMUM EBB AND FLOOD CURRENT VELOCITIES.

2049 TIDAL PERIOD

ELAPSED TIME FROM ONE HIGH TIDE TO THE NEXT, OR FROM ONE LOW TIDE TO THE NEXT. WILL USUALLY BE ABOUT 12 HOURS.

2050 PHASE LAG

TIME TO NEXT HIGHWATER SLACK TIDE FROM TIME OF DISCHARGE; CAN RANGE FROM 0 TO ABOUT 12 HOURS.

2051 DECAY COEFF

DECAY COEFFICIENT IS NEEDED ONLY IF POLLUTANT DECAYS AS PER FIRST ORDER DECAY EQUATION. MOST POLLUTANTS HAVE A VALUE OF 0.0 AND THIS IS THE DEFAULT VALUE.

2052 MANNING FACT

MANNING ROUGHNESS FACTOR FOR THE RIVER BOTTOM. FACTOR RANGES FROM 0.03 FOR RIVER AT FULL STAGE WITH CLEAN, STRAIGHT BANKS TO 0.125 WHEN THERE ARE SLUGGISH REACHES, DEEP POOLS, OR A LOT OF WEEDS. SEE PAGE 146 OF USER REFERENCE MANUAL FOR A TABLE OF VALUES.

2053 DIFF COEF V-A

DIFFUSION COEFFICIENT OF THE CHEMICAL VAPOR IN AIR. HACS WILL ESTIMATE A VALUE AND USE IT IF THE USER DOES NOT PROVIDE ONE.

2054 AIR TEMP

TEMPERATURE OF THE ATMOSPHERE IN THE VICINITY OF THE SPILL.

2055 TIME LIQ SPR

MAXIMUM TIME TO BE SHOWN ON PLOTS OR TABLES.

2056 LIQ SPR TIME

ELAPSED TIME FROM START OF DISCHARGE AT WHICH THE USER DESIRES THE POOL SIZE TO BE ESTIMATED.

2057 TIME SPL COND

ELAPSED TIME FROM START OF SPILL AT WHICH THE USER DESIRES POOL CONDITIONS TO BE ESTIMATED.

2058 SPILL TYPE T

INTEGER FLAG INDICATING WHETHER DISCHARGE IS INSTANTANEOUS OR CONTINUOUS (0=INSTANTANEOUS; 1=CONTINUOUS). WILL USUALLY BE SET TO 0 BY PRECEDING MODELS IF RELEASE TAKES LESS THAN 10 MINUTES. OTHERWISE, IT WILL BE SET TO 1.

2059 HOLE HGT UP

HEIGHT OF THE CENTER OF THE DISCHARGE HOLE ABOVE THE WATER SURFACE.

2060 SPILL TYPE D

INTEGER FLAG INDICATING WHETHER LIQUID DISCHARGE IS INSTANTANEOUS OR CONTINUOUS (0=INSTANTANEOUS; 1=CONTINUOUS). WILL USUALLY BE SET TO 0 BY PRECEDING MODELS IF RELEASE TAKES LESS THAN 10 MINUTES. OTHERWISE, IT WILL BE SET TO 1.

2061 SPILL TYPE C

INTEGER FLAG INDICATING WHETHER VAPOR OR GAS RELEASE IS INSTANTANEOUS OR CONTINUOUS (0=INSTANTANEOUS; 1=CONTINUOUS). WILL USUALLY BE SET TO 0 BY PRECEDING MODELS IF RELEASE TAKES LESS THAN 10 MINUTES. OTHERWISE, IT WILL BE SET TO 1.

2062 TANK DIAM
INTERNAL DIAMETER OF A CYLINDRICAL TANK EXPOSED TO FIRE.

2063 WALL THICKNS
WALL THICKNESS OF THE TANK EXPOSED TO FIRE.

2064 ULLAGE FRCTN
FRACTION OF THE EXPOSED TANK VOLUME THAT DOES NOT CONTAIN LIQUID.

2065 RLF VALV SET
PRESSURE SETTING (GAUGE) FOR THE RELIEF VALVE ON THE EXPOSED TANK.
GAUGE PRESSURE IS THE PRESSURE ABOVE NORMAL ATMOSPHERIC PRESSURE.

2066 HEAT FLUX
THERMAL RADIATION FLUX TO WHICH THE TANK IS EXPOSED. WILL BE ESTI-
MATED BY HACS IF THE USER DOES NOT PROVIDE A VALUE.

2067 THR CNC 0 DG
THERMAL CONDUCTIVITY OF THE EXPOSED TANK WALL AT 0 DEGREES F.

2068 THR CND 400
THERMAL CONDUCTIVITY OF THE EXPOSED TANK WALL AT 400 DEGREES F.

2069 THR CND 800
THERMAL CONDUCTIVITY OF THE EXPOSED TANK WALL AT 800 DEGREES F.

2070 THR CND 1200
THERMAL CONDUCTIVITY OF THE EXPOSED TANK WALL AT 1200 DEGREES F.

2071 THR CND 1600
THERMAL CONDUCTIVITY OF THE EXPOSED TANK WALL AT 1600 DEGREES F.

2072 SPEC HT 0 DG
SPECIFIC HEAT OF THE EXPOSED TANK WALL AT 0 DEGREES F.

2073 SPEC HT 400
SPECIFIC HEAT OF THE EXPOSED TANK WALL AT 400 DEGREES F.

2074 SPEC HT 800
SPECIFIC HEAT OF THE EXPOSED TANK WALL AT 800 DEGREES F.

2075 SPEC HT 1200
SPECIFIC HEAT OF THE EXPOSED TANK WALL AT 1200 DEGREES F.

2076 SPEC HT 1600
SPECIFIC HEAT OF THE EXPOSED TANK WALL AT 1600 DEGREES F.

2077 TNS STR 0 DG
ULTIMATE TENSILE STRENGTH OF THE EXPOSED TANK WALL AT 0 DEGREES F.

2078 TNS STR 400
ULTIMATE TENSILE STRENGTH OF THE EXPOSED TANK WALL AT 400 DEGREES F.

2079 TNS STR 800
ULTIMATE TENSILE STRENGTH OF THE EXPOSED TANK WALL AT 800 DEGREES F.

2080 TNS STR 1200
ULTIMATE TENSILE STRENGTH OF THE EXPOSED TANK WALL AT 1200 DEGREES F.

ULTIMATE TENSILE STRENGTH OF THE EXPOSED TANK WALL AT 1200 DEGREES F.
2081 TNS STR 1600

ULTIMATE TENSILE STRENGTH OF THE EXPOSED TANK WALL AT 1600 DEGREES F.
2082 TNK HEAT FLG

INTEGER FLAG INDICATING WHICH PARTS OF THE MODEL ARE TO BE EXECUTED.
USE 0 FOR COMPUTATION OF FLAME SIZE AND SAFE SEPARATION DISTANCES.
USE 1 FOR EXECUTION OF TANK HEATING MODEL B3. USE 2 FOR BOTH OF THE
ABOVE.

2083 TNK-FIRE DIS

DISTANCE FROM THE EDGE OF THE FLAME TO THE TANK EXPOSED TO FIRE.

2084 MODK FLAG

FLAG INDICATING WHETHER MODEL K HAS BEEN ABLE TO ESTIMATE THE
SPECIFIC PORTION OF THE SPILLED CHEMICAL WHICH VAPORIZES. 0 MEANS
THE MODEL HAS ESTIMATED THE PORTION WHICH VAPORIZES; THIS PORTION
TO BE USED BY MODELS M AND N. 1 MEANS THE MODEL HAS NOT ESTIMATED
THE PORTION WHICH VAPORIZES; MODELS M AND N WILL ASSUME A CERTAIN
PORTION HAS VAPORIZED.

2085 GAS FRACTION

USER SPECIFIED FRACTION OF DISCHARGED LIQUID THAT IS ASSUMED TO
VAPORIZE. SHOULD BE BETWEEN 0.0 AND 1.0. USE 0.5 FOR ANHYDROUS
AMMONIA SPILLS ON THE SURFACE OF THE WATER.

2086 MODEL TYPE-T

INTEGER FLAG INDICATING WHICH PARTS OF MODEL T ARE TO BE EXECUTED.
0=EXECUTE POOL SPREADING PART GIVING POOL SIZE AS A FUNCTION OF TIME
1=EXECUTE POOL DISSOLUTION AND DISPERSION PART GIVING RATE THAT
DISCHARGED LIQUID DISSOLVES INTO WATER AND RESULTING DOWNSTREAM
CONCENTRATIONS;
2=BOTH OF THE ABOVE

3001 TABLE FLAG A

INTEGER FLAG INDICATING WHETHER TABLES ARE DESIRED GIVING TANK
CONDITIONS AND VENTING RATES AS A FUNCTION OF TIME:
0=NO TABLES DESIRED
1=TABLES ARE DESIRED

3002 PLOT OFFLINE

INTEGER FLAG INDICATING WHETHER HACS WILL PREPARE AN OUTPUT TAPE
FOR OFFLINE PLOTTING:
0=TAPE NOT PREPARED
1=TAPE IS PREPARED

3003 PLOT FLG B/E

INTEGER FLAG INDICATING WHETHER A PLOT OF THERMAL RADIATION FLUX VS.
DISTANCE FROM THE FLAME IS DESIRED:
0=PLOT NOT DESIRED
1=PLOT IS DESIRED

3004 PLOT FLAG C

INTEGER FLAG INDICATING WHICH PLOTS ARE DESIRED:
0=NO PLOTS DESIRED
1=PLOT OF CONCENTRATION VS TIME AT USER SPECIFIED POINT
2=PLOT OF MAXIMUM GROUNDLEVEL CONCENTRATION VS TIME AND DOWNWIND
DISTANCE
3=BOTH PLOTS DESCRIBED ABOVE

3005 TABLE FLAG C

INTEGER FLAG INDICATING WHICH TABLES ARE DESIRED:

0=NO TABLES DESIRED
1=TABLE OF ARRIVAL TIMES, DURATIONS AND 1/2 WIDTHS OF CLOUD OR
PLUME FOR TOXIC AND FLAMMABLE CONCENTRATIONS AS A FUNCTION OF
DOWNWIND DISTANCE
2=TABLE OF CONCENTRATION VS TIME AT USER SPECIFIED POINT
3=BOTH OF THE TABLES DESCRIBED ABOVE

3006 PLOT FLAG D

INTEGER FLAG INDICATING WHETHER A PLOT OF POOL SIZE VS
TIME IS DESIRED:
0=PLOT NOT DESIRED
1=PLOT IS DESIRED

3007 PLOT FLAG I

INTEGER FLAG INDICATING WHETHER PLOTS OF VOLUME RATE OF LIQUID
REMAINING AND EVAPORATION RATE VS TIME ARE DESIRED:
0=PLOTS NOT DESIRED
1=PLOTS ARE DESIRED

3008 PLOT FLAG P

INTEGER FLAG INDICATING WHICH PLOTS ARE DESIRED:
0=NO PLOTS DESIRED
1=PLOT OF CONCENTRATION VS TIME AT USER SPECIFIED POINT
2=PLOT OF MAXIMUM CONCENTRATION VS DOWNSTREAM DISTANCE (NOT
APPROPRIATE FOR SPILLS INTO STILL WATER OR ESTUARIES)
3=BOTH PLOTS DESCRIBED ABOVE

3009 PLOT FLAG T

INTEGER FLAG INDICATING WHICH PLOTS ARE DESIRED:
0=NO PLOTS DESIRED
1=PLOT OF POOL SIZE VS TIME (MODEL TYPE-T MUST BE 0 OR 2)
2=PLOT OF CONCENTRATION VS TIME AT USER SPECIFIED POINT (MODEL
TYPE-T MUST BE 1 OR 2)
3=BOTH PLOTS DESCRIBED ABOVE (MODEL TYPE-T MUST BE 2)

3010 PLOT FLAG V

INTEGER FLAG INDICATING WHETHER PLOTS ARE DESIRED:
0=NO PLOTS DESIRED
1=PLOTS OF POOL SIZE, TEMPERATURE, EVAPORATION RATE, AREA, AND
VOLUME OF LIQUID REMAINING VS TIME ARE DESIRED

3011 READ PROP

INTEGER FLAG INDICATING WHETHER HACS WILL UTILIZE THE CHEMICAL
PROPERTY FILE:
0=PROPERTY FILE NOT ACCESSED, USER MUST PROVIDE ALL REQUIRED
PROPERTY DATA
1=HACS WILL AUTOMATICALLY ACCESS AND UTILIZE NECESSARY DATA

3012 TABLE FLAG X

INTEGER FLAG INDICATING WHETHER TABLES OF PEAK CONCENTRATION AT
WATER SURFACE AND BOTTOM ARE DESIRED AS A FUNCTION OF DOWNSTREAM
DISTANCE AND TIME:
0=NO TABLES DESIRED
1=TABLES ARE DESIRED

3013 TABLE FLAG D

INTEGER FLAG INDICATING WHETHER TABLE OF POOL SIZE VS TIME IS DESIRED:
0=TABLE NOT DESIRED
1=TABLE IS DESIRED

3014 TABLE FLAG V

INTEGER FLAG INDICATING WHETHER A TABLE OF POOL SIZE, TEMPERATURE,
EVAPORATION RATE, AND AREA VS TIME IS DESIRED:
0=TABLE NOT DESIRED
1=TABLE IS DESIRED

3015 TABLE FLAG F

INTEGER FLAG INDICATING WHICH TABLES ARE DESIRED:

- 0=NO TABLES DESIRED
- 1=TABLE OF CONCENTRATION VS TIME AT USER SPECIFIED POINT
- 2=TABLE OF MAXIMUM CONCENTRATION VS DISTANCE DOWNSTREAM (NOT APPROPRIATE FOR SPILLS INTO STILL WATER OR ESTUARIES)
- 3=BOTH TABLES DESCRIBED ABOVE

3016 TABLE FLAG I

INTEGER FLAG INDICATING WHETHER TABLE OF MASS OF LIQUID REMAINING AND EVAPORATION RATE VS TIME IS DESIRED:

- 0=TABLE NOT DESIRED
- 1=TABLE IS DESIRED

3017 TABLE FLAG T

INTEGER FLAG INDICATING WHICH TABLES ARE DESIRED:

- 0=NO TABLES DESIRED
- 1=TABLE OF POOL SIZE VS TIME (MODEL TYPE-T MUST BE 0 OR 2)
- 2=TABLE OF PEAK CONCENTRATIONS AT MID-DEPTH AND BOTTOM OF RIVER (MODEL TYPE-T MUST BE 1 OR 2)
- 3=TABLE OF CONCENTRATION VS TIME AT USER SPECIFIED POINT (MODEL TYPE-T MUST BE 1 OR 2)
- 4=TABLES DESCRIBED FOR OPTIONS 2 AND 3 ABOVE
- 5=ALL TABLES DESCRIBED ABOVE (MODEL TYPE-T MUST BE 2)

3018 PROP REPORT

INTEGER FLAG INDICATING WHETHER HACS WILL PROVIDE THE USER WITH AN AUDIT OF THE TRANSFER OF ALL CHEMICAL PROPERTY VALUES, INCLUDING THE COMPUTATION OF ALL FUNCTIONS OF TEMPERATURE:

- 0=NO AUDIT
- 1=AUDIT DESIRED

3019 UNIT SELECT

INTEGER FLAG INDICATING WHICH SET OF UNITS WILL BE USED FOR OUTPUT:

- 0=ALL UNITS USED
- 1=CGS UNITS
- 2=SI UNITS
- 3=ENGLISH UNITS
- 4=MIXED UNITS

4001 TOT MASS GAS

TOTAL WEIGHT OF GAS OR VAPOR RELEASED TO THE ATMOSPHERE; COMPUTED BY MODELS A AND K.

4002 TOT MASS LIQ

TOTAL WEIGHT OF LIQUID DISCHARGED; COMPUTED BY MODEL A. NOT MANDATORY AS INPUT TO MODELS D OR V IF TOTAL VOLUME SPILLED IS KNOWN.

4003 TOT VOL LIQ

TOTAL VOLUME OF LIQUID DISCHARGED; COMPUTED BY MODEL A. NOT MANDATORY AS INPUT TO MODELS D AND V IF TOTAL WEIGHT SPILLED HAS BEEN PROVIDED.

4004 TIME OF REL

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

4005 MX TEMP TANK

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

4006 FLAME LENGTH

LENGTH OF FLAME JET (COMPUTED BY MODEL B1, USED BY MODELS B2 AND B3).

4007 DIAM FLAME

DIAMETER OF THE BURNING POOL OF LIQUID; COMPUTED OR ESTIMATED BY

MODELS D, H, L, Q, OR T.

4008 FLAME ANGLE

ANGLE OF FLAME FROM PLUMB VERTICAL; STRAIGHT UP IS 0.0

4009 SAF SEP WOOD

MAXIMUM DISTANCE FROM FLAME AT WHICH WOOD WILL IGNITE IF EXPOSED FOR A PROLONGED PERIOD OF TIME; MEASURED FROM EDGE OF FLAME.

4010 MAX DIST FIR

MAXIMUM DISTANCE DOWNWIND IN THE CENTERLINE DIRECTION OVER WHICH THE CLOUD OR PLUME IS FLAMMABLE.

4011 1/2 HAZ ZONE

ONE-HALF THE WIDTH IN THE CLOUD OR PLUME WHICH IS AT OR ABOVE THE TOXIC CONCENTRATION. MEASURED FROM THE CENTERLINE DOWNWIND DIRECTION AT GROUNDLEVEL, AND GIVEN FOR THE USER SPECIFIED DISTANCE 2012 COORD X

4012 DUR HAZ CLD

DURATION FOR WHICH HAZARDOUS TOXIC CONCENTRATION EXISTS AT THE USER SPECIFIED POINT.

4013 ARRL TME HAZ

TIME OF ARRIVAL OF HAZARDOUS TOXIC CONCENTRATION AT USER SPECIFIED POINT.

4014 IN OR OUT

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

4015 SAF SEP SKIN

MAXIMUM DISTANCE FROM FLAME AT WHICH PEOPLE WILL IMMEDIATELY BE BURNED; MEASURED FROM EDGE OF FLAME.

4016 TIME LQ EVAP

THE TIME IT WILL TAKE FOR ALL THE CHEMICAL TO VAPORIZE (OUTPUT ONLY FOR INSTANTANEOUS DISCHARGES).

4017 SAF SEP PBRN

MAXIMUM DISTANCE FROM FLAME AT WHICH PEOPLE WILL BE BURNED IF EXPOSED FOR A PROLONGED PERIOD OF TIME; MEASURED FROM EDGE OF FLAME.

4018 POOL FLM HGT

FLAME HEIGHT, OUTPUT OF MODEL E1, FIELD NUMBER AND NAME ARE CHANGED TO 4006 FLAME LENGTH BEFORE USE IN MODEL B2.

4019 REMAIN LIQ

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

4020 TOT EVP RATE

REFER TO HACS USER'S REFERENCE MANUAL FOR FIELD DESCRIPTION.

4021 EVAP TIME LQ

TIME REQUIRED FOR ALL DISCHARGED LIQUID TO EVAPORATE. RESULT IS VALID ONLY IF CHEMICAL HAS NOT BEEN RELEASED BENEATH ITS CRITICAL DEPTH AND IF PART OF IT DOES NOT SINK BENEATH ITS CRITICAL DEPTH BEFORE VAPORIZING.

4022 LIQ-H2O CONC

CONCENTRATION OF THE CHEMICAL IN WATER AT THE USER SPECIFIED LOCATION. REFER TO HACS USER REFERENCE MANUAL FOR COMPUTATION OF

CONCENTRATIONS OF CHEMICALS WHICH ARE DILUTED WITH WATER BEFORE THEY SPILL.

4023 MASS VAP LIB

TOTAL WEIGHT OF VAPOR WHICH EVOLVES WHILE THE CONCENTRATION OF THE CHEMICAL IN WATER IS SUFFICIENT TO PRODUCE TOXIC VAPORS. IF THE LOWER TOXIC LIMIT CONCENTRATION IS ZERO, THIS FIELD WILL BE USED FOR FLAMMABLE VAPORS.

4024 SAFE DIST

DISTANCE DOWNSTREAM OVER WHICH TOXIC VAPORS WILL BE GENERATED (NOT TO BE CONFUSED WITH MAXIMUM DISTANCE OF TOXICITY). IF THE LOWER TOXIC LIMIT CONCENTRATION IS ZERO, THIS FIELD WILL BE USED FOR FLAMMABLE VAPORS.

4025 POOL SZ HBTL

SIZE OF THE POOL AT THE USER SPECIFIED TIME. IF THE POOL IS CONFINED BY CHANNEL BANKS, IT IS THE LENGTH OF THE CHANNEL COVERED. IF THE POOL IS NOT CONFINED, IT IS THE RADIUS OF THE POOL. HACS ALWAYS ASSUMES THAT THE SPILL POOL IS CIRCULAR IN THE CONTINUOUS SPILL CASE.

4026 VOL REM HVPL

VOLUME OF LIQUID NOT YET EVAPORATED AT USER SPECIFIED TIME GIVEN BY 4030 EVP TIM HVPL; COMPUTED BY MODEL V.

4027 SPL SZE HVPL

SIZE OF POOL AT USER SPECIFIED TIME GIVEN BY 4030 EVP TIM HVPL; COMPUTED BY MODEL V. IF POOL IS CONFINED BY CHANNEL BANKS (2018 DIM FLAG=1), IT IS THE LENGTH OF CHANNEL COVERED. IF POOL IS NOT CONFINED AND IS CIRCULAR (2018 DIM FLAG=2), IT IS THE RADIUS OF THE POOL.

4028 TEMP HVPL

TEMPERATURE OF LIQUID CHEMICAL AT TIME 4030 EVP TIME HVPL.

4029 EVAP RT HVPL

EVAPORATION RATE OF CHEMICAL AT TIME 4030 EVP TIME HVPL.

4030 EVP TIM HVPL

TIME FOR ALL LIQUID TO EVAPORATE OR SPECIFIED ELAPSED TIME, WHICHEVER IS SMALLER.

4031 AREA HVPL

AREA COVERED BY POOL AT TIME 4030 EVP TIM HVPL.

4032 SINK TIME

TIME IT TAKES CHEMICAL TO SINK TO BOTTOM OF WATER BODY.

4033 DIST TRAV

DISTANCE THE CHEMICAL WILL TRAVEL DOWNSTREAM FROM THE SPILL SITE BEFORE REACHING THE BOTTOM OF THE WATER BODY.

4034 SAF SEP USER

DISTANCE FROM THE EDGE OF THE FLAME AT WHICH THE USER SPECIFIED THERMAL RADIATION FLUX WILL OCCUR. OUTPUT WILL NOT APPEAR IF USER DOES NOT INPUT VALUE FOR 2010 RAD FLUX.

4036 DISOLVE RATE

RATE AT WHICH POOL ON BOTTOM DISSOLVES.

4037 DISOLVE TIME

TIME IT TAKES FOR ALL OF POOL TO DISSOLVE.

4038 POOL AREA
MAXIMUM BOTTOM AREA WHICH CHEMICAL WILL COVER.

4039 POOL LENGTH
MAXIMUM LENGTH WHICH POOL ON BOTTOM WILL REACH.

4040 SPRD TIME
TIME IT TAKES POOL TO REACH ITS MAXIMUM SIZE.

4041 CLEAR TIME
TIME AT WHICH ALL POLLUTANT WILL HAVE PASSED BY USER SPECIFIED POINT.

4042 CONC AT XYZ
CONCENTRATION OF THE CHEMICAL IN WATER AT THE USER SPECIFIED POINT.

4043 MAX DIST TOX
THE MAXIMUM DISTANCE DOWNWIND IN THE CENTERLINE DIRECTION OVER WHICH THE CLOUD OR PLUME IS TOXIC.

4044 AVG VAP RATE
AVERAGE RATE AT WHICH LIQUID VAPORIZES; ESTIMATED BY MODELS A, D, I, R, AND V.

4045 EVOLVE TIME
ELAPSED TIME OVER WHICH GAS OR VAPOR EVOLUTION TAKES PLACE; ESTIMATED BY MODELS A, D, I, R, AND V.

4046 CRIT DEPTH
DEPTH IN WATER BELOW WHICH CHEMICAL WILL NOT BOIL (DUE TO HYDRO-STATIC PRESSURE EFFECTS); CRITICAL DEPTH.

4047 GAS FLWRATE
AVERAGE DISCHARGE RATE OF GAS WHILE IT VENTS.

4048 GAS FLW TIME
TIME SPAN OVER WHICH GAS WILL VENT.

4049 LIQ FLWRATE
AVERAGE DISCHARGE RATE OF LIQUID WHILE IT VENTS; COMPUTED BY MODEL A.

4050 LIQ FLW TIME
TIME DURATION OF LIQUID DISCHARGE; COMPUTED BY MODEL A.

4051 OUT FAIL STR
FAILURE STRESS AT OUTSIDE OF WALL; OUTPUT IF FAILURE OCCURS AT OUTSIDE OF WALL.

4052 OUT WALL TMP
TEMPERATURE AT OUTSIDE OF WALL; OUTPUT IF FAILURE OCCURS AT OUTSIDE OF WALL.

4053 IN FAIL STRS
FAILURE STRESS AT INSIDE OF WALL; OUTPUT IF FAILURE OCCURS AT INSIDE OF WALL.

4054 IN WALL TEMP
TEMPERATURE AT INSIDE OF WALL; OUTPUT IF FAILURE OCCURS AT

- INSIDE OF WALL.
- 4055 FAILURE TIME
TIME IN WHICH TANK WILL RUPTURE; OUTPUT ONLY IF IT IS DETERMINED THAT TANK WILL RUPTURE.
- 4056 MASS VAP LIB
TOTAL WEIGHT OF VAPOR WHICH EVOLVES WHILE THE CONCENTRATION OF THE CHEMICAL IN WATER IS SUFFICIENT TO PRODUCE FLAMMABLE VAPORS. USED ONLY IF MODEL R IS EXECUTED FOR BOTH TOXIC AND FLAMMABLE CONCENTRATIONS.
- 4057 SAFE DIST
DISTANCE DOWNSTREAM OVER WHICH FLAMMABLE VAPORS WILL BE GENERATED. USED ONLY IF MODEL R IS EXECUTED FOR BOTH TOXIC AND FLAMMABLE CONCENTRATIONS.
- 4058 DIM SPILL
MAXIMUM RADIUS OF VAPOR SOURCE WHICH EVOLVES FLAMMABLE VAPORS (SOURCE IS ASSUMED TO BE CIRCULAR). USED ONLY IF MODEL R IS EXECUTED FOR BOTH TOXIC AND FLAMMABLE CONCENTRATIONS.
- 4059 AVG VAP RATE
AVERAGE RATE AT WHICH FLAMMABLE VAPORS WILL BE EVOLVED. USED ONLY IF MODEL R IS EXECUTED FOR BOTH TOXIC AND FLAMMABLE CONCENTRATIONS.
- 4060 EVOLVE TIME
ELAPSED TIME FROM SPILL OVER WHICH FLAMMABLE VAPORS WILL BE EVOLVED. USED ONLY IF MODEL R IS EXECUTED FOR BOTH TOXIC AND FLAMMABLE CONCENTRATIONS.
- 4061 DISOLVE RATE
RATE AT WHICH POOL DISSOLVES INTO WATER.
- 4062 DISOLVE TIME
ELAPSED TIME IT TAKES FOR ALL OF THE POOL TO DISSOLVE.
- 4063 POOL CENT X
DISTANCE DOWNSTREAM THE CENTER OF THE POOL HAS TRAVELLED AT THE USER SPECIFIED TIME.
- 4064 CONC AT XYZ
CONCENTRATION OF THE CHEMICAL IN WATER AT THE USER SPECIFIED TIME AND LOCATION.
- 4065 1/2 HAZ ZONE
ONE-HALF THE WIDTH IN THE CLOUD OR PLUME WHICH IS AT OR ABOVE THE LOWER FLAMMABLE LIMIT CONCENTRATION, MEASURED FROM THE CENTERLINE DOWNWIND DIRECTION AT GROUNDLEVEL, AND GIVEN FOR THE USER SPECIFIED DISTANCE 2012 COORD X.
- 4066 DUR HAZ CLD
DURATION OVER WHICH FLAMMABLE CLOUD OR PLUME EXISTS AT USER SPECIFIED POINT.
- 4067 ARRL TME HAZ
TIME OF ARRIVAL OF FLAMMABLE CONCENTRATION AT USER SPECIFIED POINT.
- 4068 AVG GAS TEMP
TEMPERATURE OF GAS OR VAPOR BEING RELEASED; ESTIMATED BY MODELS A, D, I, R, AND V.

4069 VP DEN RATIO

RATIO OF GAS OR VAPOR DENSITY AT RELEASE TEMPERATURE TO DENSITY OF
AIR AT AMBIENT TEMPERATURE.

**DATE
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