

U.S. DEPARTMENT OF ENERGY
INDUSTRIAL SOLVENT RECYCLING CONFERENCE
MAY 23-24, 1991

VOC CONTROL:
CHOICES, COSTS, AND PERFORMANCE OF SYSTEMS

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DEVELOPMENT OF SCREENING MODEL

ELEVEN CONTROL TECHNOLOGY COMBINATIONS IMPLEMENTED
ADDITIONAL TECHNOLOGIES PARTIALLY IMPLEMENTED

TWENTY FIVE SOLVENTS IMPLEMENTED
ADDITIONAL SOLVENTS BEING CONSIDERED FOR ADDITION

MODEL CALCULATES COSTS OF CONTROL TECHNOLOGIES
MODEL FLAGS POTENTIAL PROBLEMS AND CONCERNS

MODEL ALLOWS USER INPUT FOR STREAM CONDITIONS
MODEL ALSO ALLOWS USER INPUT FOR UTILITIES, ETC.
MODEL CALCULATES CAPITAL AND OPERATING COSTS
MODEL CALCULATES ANNUAL COSTS

CONTROL TECHNOLOGIES IMPLEMENTED IN SCREENING MODEL

THERMAL INCINERATION

THERMAL INCINERATION WITH HEAT RECOVERY

REGENERATIVE INCINERATION

CATALYTIC INCINERATION

ADSORPTION WITH OFF-SITE REGENERATION

ADSORPTION WITH ON-SITE STEAM REGENERATION

ADSORPTION WITH ON-SITE STATIONARY RANKINE REGENERATION

ADSORPTION WITH ON-SITE STATIONARY BRAYTON REGENERATION

ADSORPTION WITH ON-SITE DECOUPLED BRAYTON REGENERATION

REVERSE RANKINE CYCLE CONDENSATION

REVERSE BRAYTON CYCLE CONDENSATION

CRYOGENIC LIQUID CONDENSATION (PARTIALLY IMPLEMENTED)

ADSORPTION SCRUBBING (PARTIALLY IMPLEMENTED)

MEMBRANE SEPARATION (PARTIALLY IMPLEMENTED)

BIOFILTRATION (PARTIALLY IMPLEMENTED)

VOLATILE ORGANIC COMPOUNDS INCLUDED IN THE MODEL

ACETIC ACID

ACETONE

BENZENE

CARBON TETRACHLORIDE

CHLOROBENZENE

p-DICHLOROBENZENE

ETHYLENE

ETHYLENE DICHLORIDE

FORMALDEHYDE

HEPTANE

METHANOL

METHYL CHLORIDE

METHYL CHLOROFORM

METHYL ETHYL KETONE

METHYL ISOBUTYL KETONE

METHYLENE CHLORIDE

PERCHLOROETHYLENE

TOLUENE

TRICHLOROETHYLENE

TRICHLOROFLUOROMETHANE

TRICHLOROTRIFLUOROETHANE

VINYL CHLORIDE

m-XYLENE

o-XYLENE

p-XYLENE

INPUTS TO THE MODEL (DEFAULT VALUES PROVIDED AS BACKUP)

SOLVENTS

COMPOUNDS

CONCENTRATIONS

RECOVERY VALUE

STREAM CONDITIONS

FLOW RATE

TEMPERATURE

PRESSURE

OPERATING TIME

HR/DAY, DAYS/WK, WK/YR

PERCENT RECOVERY REQUIRED

UNIT COSTS OF UTILITIES AND CHEMICALS

ELECTRICITY

LABOR

STEAM

INERT GAS

WATER

CATALYST

FUEL

CARBON

MODEL CALCULATES COSTS OF CONTROL TECHNOLOGIES

CAPITAL COSTS

EQUIPMENT COSTS

INSTALLATION COSTS

OPERATING COSTS

ENERGY

WATER

LABOR

MAINTENANCE

INERT GAS

WASTE DISPOSAL

CAPITAL RECOVERY

TAXES AND INSURANCE

OVERHEAD

SOLVENT RECOVERY

MODEL FLAGS POTENTIAL PROBLEMS AND CONCERNS

EXAMPLES OF CONDITIONS WHICH COULD REPRESENT
TECHNOLOGY LIMITATIONS OR FAVOR SELECTION OF
SPECIFIC CONTROL TECHNOLOGIES

HIGH CONCENTRATIONS OF CONDENSIBLE ORGANICS

LOW BOILING POINT CONDENSIBLES

PRESENCE OF WATER VAPOR

HIGH VALUE SOLVENTS

LOW VALUE SOLVENTS

MIXTURES OF SOLVENTS

ABILITY TO SEPARATE SOLVENTS

MISCIBILITY OF SOLVENTS

REACTIVITY OF SOLVENTS

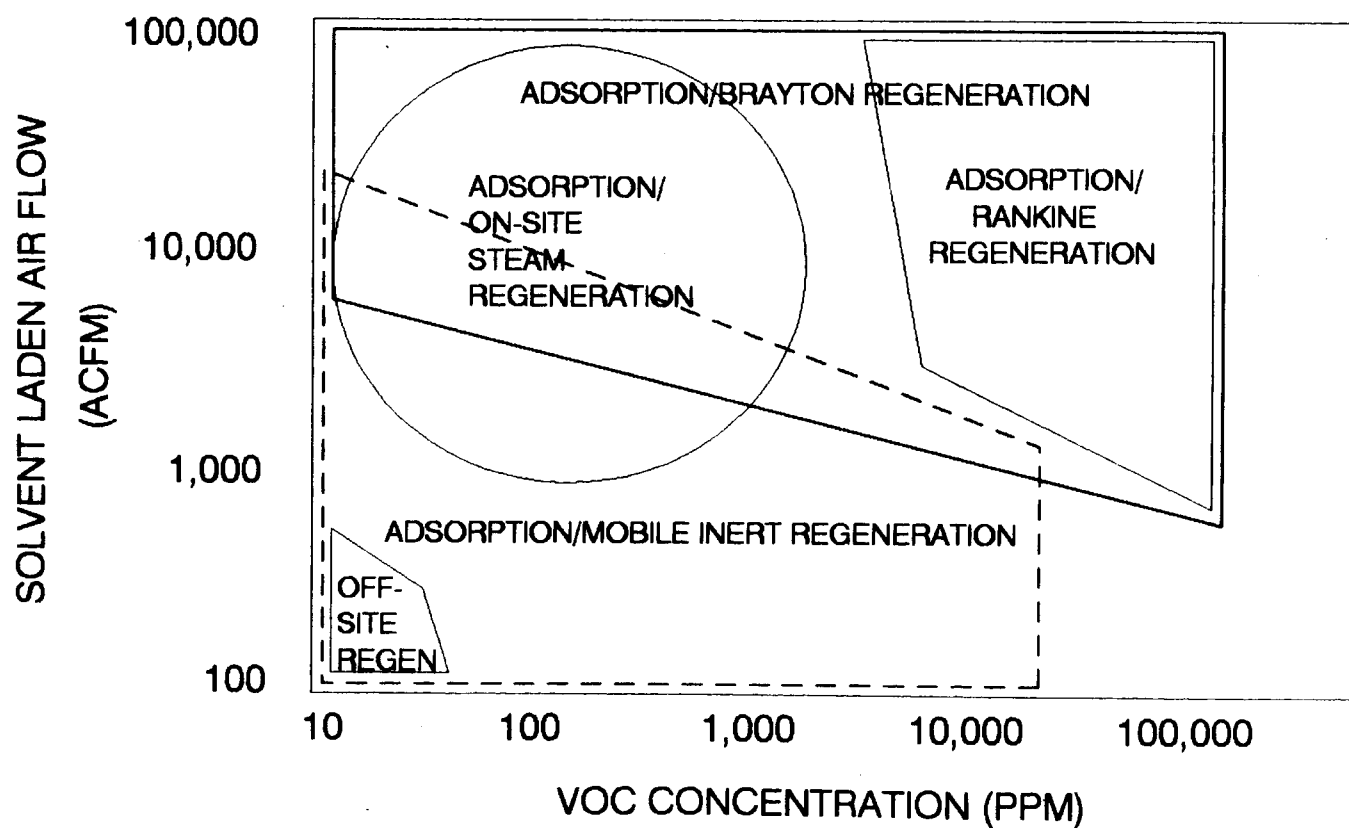
FLOW RATE OF EXHAUST STREAM

GRAPHS OF SELECTED OUTPUTS
FROM THE MODEL

LEAST-COST OPTIONS FOR CONTROL TECHNOLOGIES REACTIVE SOLVENT (INCLUDING ADSORPTION)

OTHER FACTORS AFFECTING VOC CONTROL SELECTION

- VALUE
- # COMPONENTS
- CONDENSATION TEMP
- REACTIVITY
- WATER CONTENT
- MISCIBILITY

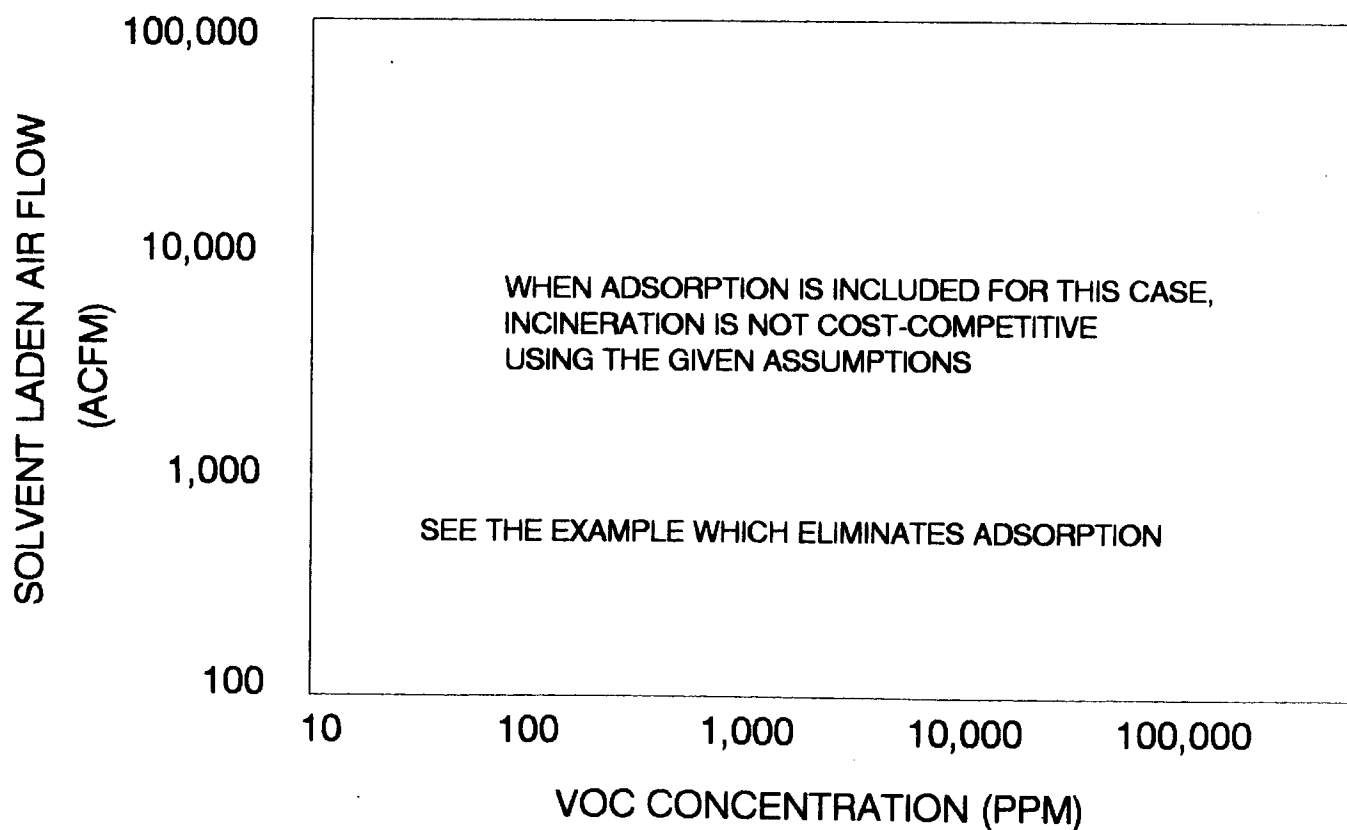


LEAST-COST OPTIONS FOR CONTROL TECHNOLOGIES REACTIVE SOLVENT (INCLUDING ADSORPTION)

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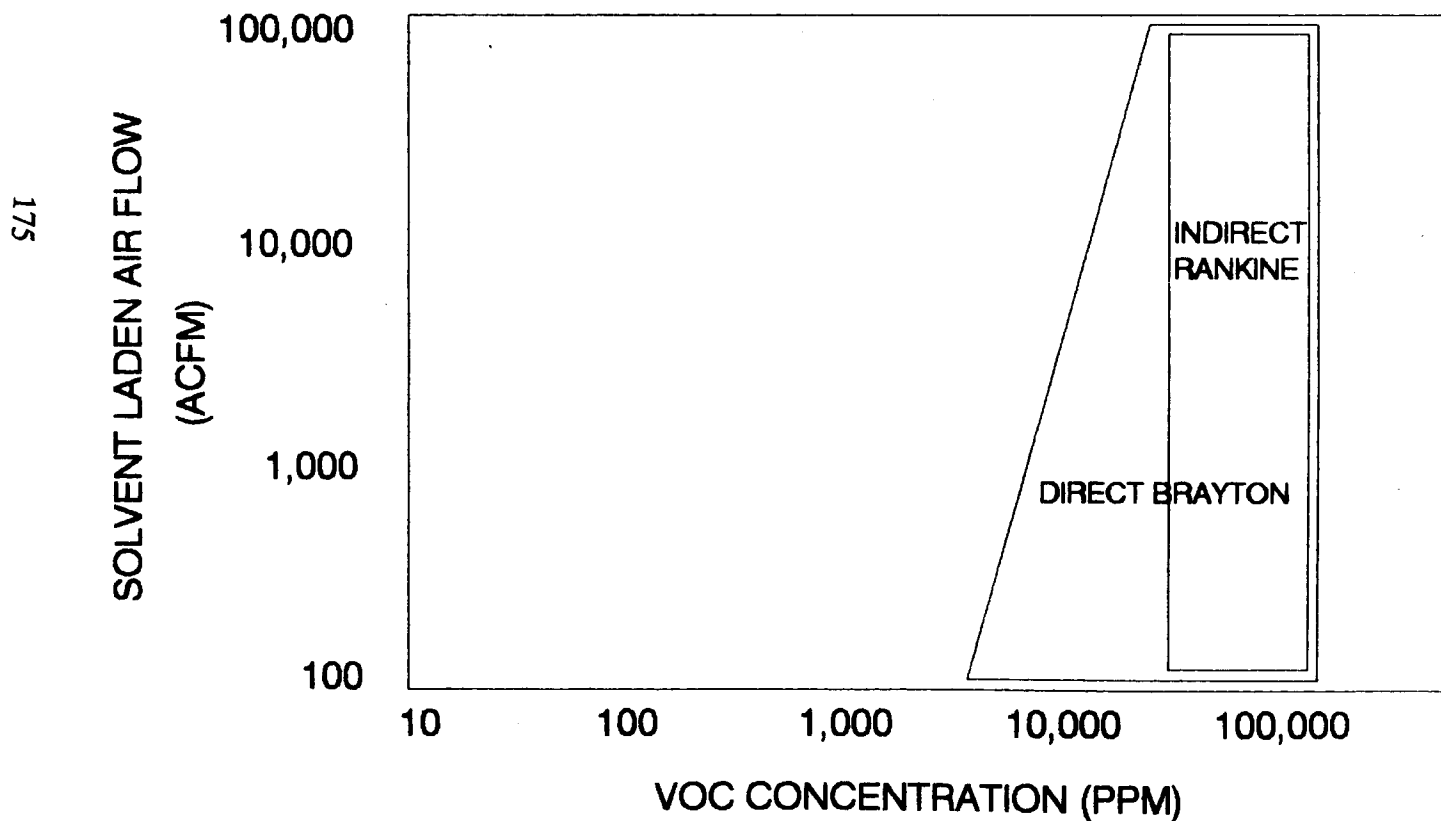
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LEAST-COST OPTIONS FOR CONTROL TECHNOLOGIES REACTIVE SOLVENT (INCLUDING ADSORPTION)

OTHER FACTORS AFFECTING VOC CONTROL SELECTION

- VALUE
- # COMPONENTS
- CONDENSATION TEMP
- REACTIVITY
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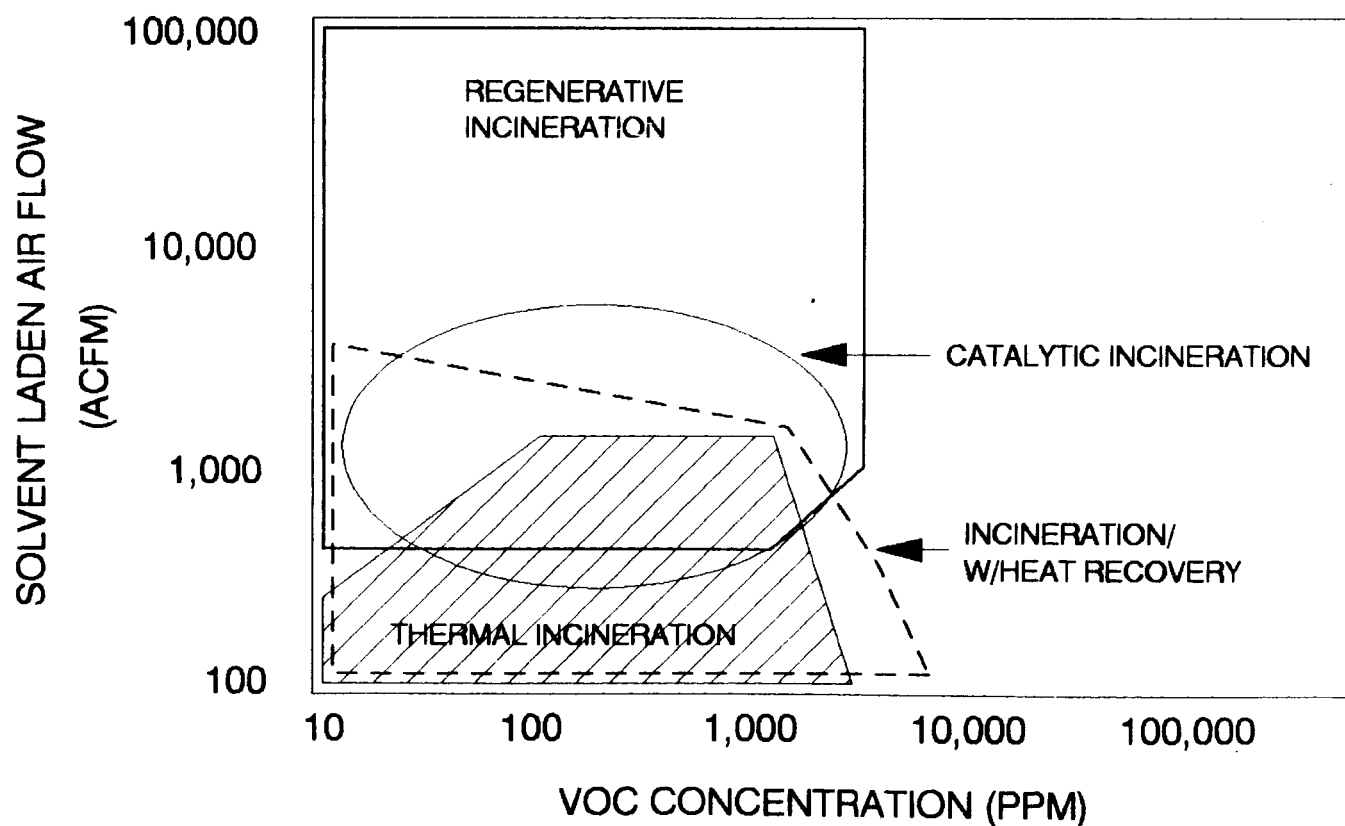


LEAST-COST OPTIONS FOR CONTROL TECHNOLOGIES

REACTIVE SOLVENT (ELIMINATING ADSORPTION)

OTHER FACTORS AFFECTING VOC CONTROL SELECTION

- VALUE
- # COMPONENTS
- CONDENSATION TEMP
- REACTIVITY
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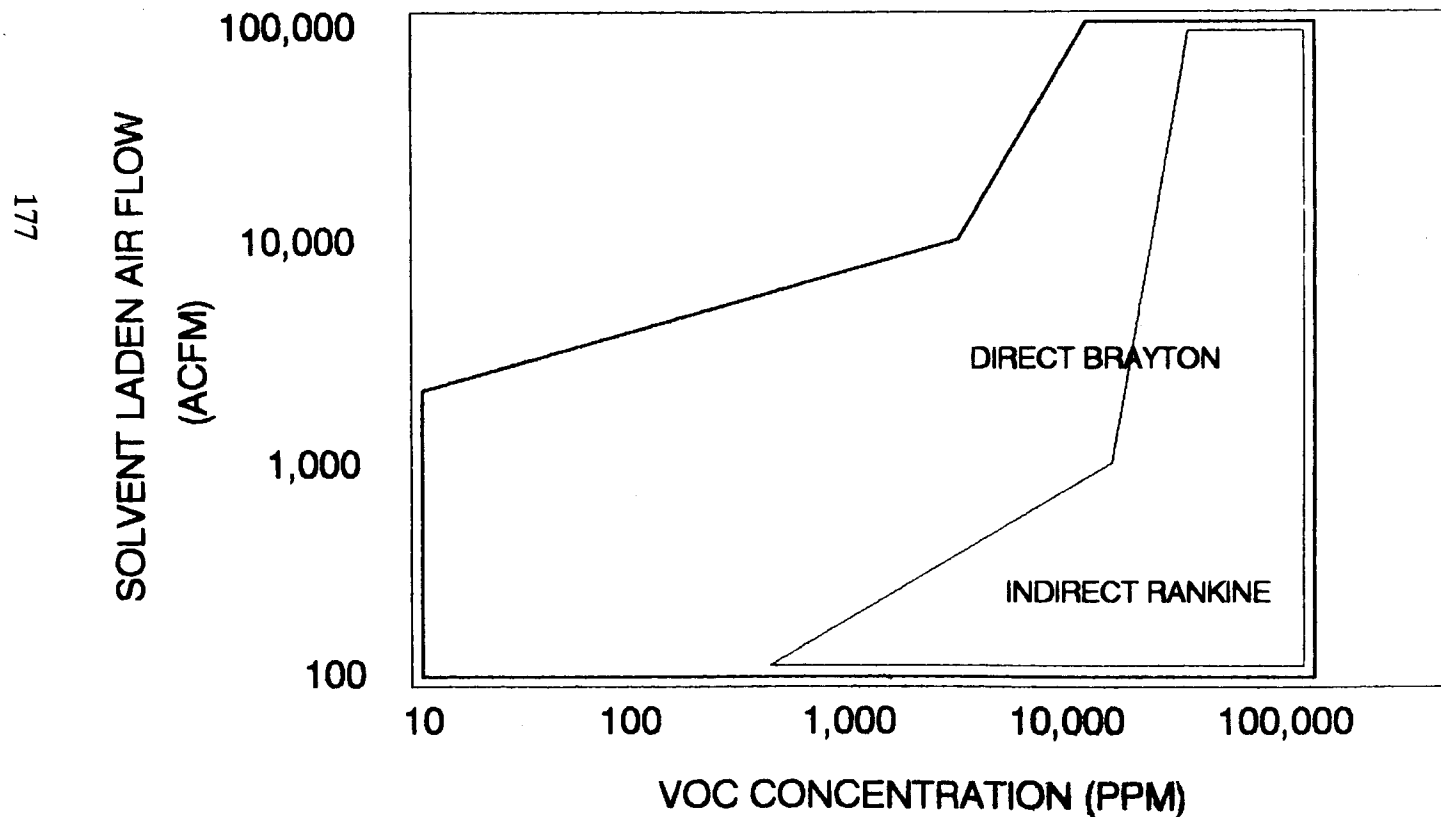


LEAST-COST OPTIONS FOR CONTROL TECHNOLOGIES

REACTIVE SOLVENT (ELIMINATING ADSORPTION)

OTHER FACTORS AFFECTING VOC CONTROL SELECTION

- VALUE
- # COMPONENTS
- CONDENSATION TEMP
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**U.S. Department of Energy,
Office of Industrial Technologies**

INDUSTRIAL SOLVENT RECYCLING CONFERENCE

May 23-24, 1991

**San Diego Marriott Hotel & Marina
San Diego, California**

Co-Sponsors:

Southern California Edison

Center for Emissions Control

National Association of Solvent Recyclers

San Diego Gas & Electric

DOE/Industry
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San Diego, California
May 23-24, 1991

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