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***
***              O O C              ***
***
***      D I S C H A R G E      M O D E L      ***
***      -----      ***
***      MUD, CUTTINGS AND PRODUCED WATER      ***
***
***              VERSION: 2.5              ***
***              2 DECEMBER 1999              ***
***
***              PRODUCTION VERSION              ***
***
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***
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***
***              WRITTEN FOR EXXON BY:              ***
***
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***
*****
*****

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ERROR MESSAGES WILL BE WRITTEN TO A FILE NAMED 'OOCERROR'
INSTEAD OF APPEARING IN THIS OUTPUT LISTING.

```

1                               INPUT DATA FILE
LINE
NO.  ----+----1----+----2----+----3----+----4----+----5----+----6----+----7--
--+----8

0:  PW
1:  EX043E.IN
2:  Example produced water FPSO P43
3:  Petrobras Campo de Barracuda

0:  NOSQUEEZE

0:  FULL

0:  PVALL

0:  SAVEDYN

0:  GRID
1:  34  91      ! 34 GRID SQUARES IN E-W AND 91 IN N-S DIRECTIONS
2:  100.        ! 100 FT SIDES OF GRID SQUARE
3:  CONSTANT    ! CONSTANT DEPTH OF 328. FEET = 100 m
4:  328.

0:  OUTPUT

```

```
1: 0 0 1 1 10
2: 20          ! 20 POINTS PER SPOT PROFILE
3: 0          ! NO PLUME PROFILES
4: 67          ! Request 67 spot profiles
5: 625.0 2300.0 !specific spot profiles by global coordinates
6: 725.0 2300.0
7: 825.0 2300.0
8: 925.0 2300.0
9: 1025.0 2300.0
10: 1125.0 2300.0
11: 1225.0 2300.0
12: 1325.0 2300.0
13: 1425.0 2300.0
14: 1525.0 2300.0
15: 1625.0 2300.0
16: 1725.0 2300.0
17: 1825.0 2300.0
18: 1925.0 2300.0
19: 2025.0 2300.0
20: 2125.0 2300.0
21: 2225.0 2300.0
22: 2325.0 2300.0
23: 2425.0 2300.0
24: 2525.0 2300.0
25: 2625.0 2300.0
26: 2725.0 2300.0
27: 2825.0 2300.0
28: 2925.0 2300.0
29: 3025.0 2300.0
30: 3125.0 2300.0
31: 3225.0 2300.0
32: 3325.0 2300.0
33: 3425.0 2300.0
34: 3525.0 2300.0
35: 3625.0 2300.0
36: 3725.0 2300.0
37: 3825.0 2300.0
38: 3925.0 2300.0
39: 4025.0 2300.0
40: 4125.0 2300.0
41: 4225.0 2300.0
42: 4325.0 2300.0
43: 4425.0 2300.0
44: 4525.0 2300.0
45: 4625.0 2300.0
46: 4725.0 2300.0
47: 4825.0 2300.0
48: 4925.0 2300.0
49: 5025.0 2300.0
50: 5125.0 2300.0
51: 5225.0 2300.0
52: 5325.0 2300.0
53: 5425.0 2300.0
54: 5525.0 2300.0
55: 5625.0 2300.0
56: 5725.0 2300.0
57: 5825.0 2300.0
58: 5925.0 2300.0
59: 6025.0 2300.0
60: 6125.0 2300.0
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61: 6225.0 2300.0
62: 6325.0 2300.0
63: 6425.0 2300.0
64: 6525.0 2300.0
65: 6625.0 2300.0
66: 6725.0 2300.0
67: 6825.0 2300.0
68: 6925.0 2300.0
69: 7025.0 2300.0
70: 7125.0 2300.0
71: 7225.0 2300.0
72: 100 90 1 ! ASK FOR RADIUS PROFILES AT 100 M
73: 0
74: 0
75: FLUID/TRACER !ASK FOR RADIUS AND SPOT PROFILES AT 3600 S.
76: SP
77: 3 3600.
78: -1
79: RA
80: 3 3600.
81: -1
82: LA
83: 3 3600.
84: -1

0: DISCHARGE
1: 3471.6, 0.42, 0.5, 90., 90. !
2: 625. 2300. ! XRG AND ZRG
3: 43200. ! DURATION OF DISCHARGE (12 hs)
4: 38.0 056. ! SALINITY, TEMPERATURE OF EFFLUENT
5: 'oleo' 0.8833 2.4e-5 -1.66e-5 ! Dados sobre o óleo a traçar

0: AMBIENT
1: 3 1
2: -3
3: 0.0 1.47 180. !UNIFORM CURRENT
4: 164.00 1.47 180.
5: 328.00 1.47 180.
6: 1 3
7: 0. 25.13 36.69 ! TEMP AND SALINITY OF AMBIENT
8: 164.00 23.33 36.71
9: 328.00 21.04 36.48
10: 1
11: 6.5 6. 21.57 24.0

0: TIMESTEP
1: 3600.

0: WAKE
1: 1105.8 178.8 69. 551.2 0.1 0 0

0: TRACER
1: 1.0 0.

0: END
1: ☐
-----1-----2-----3-----4-----5-----6-----7--
--1-----8
1
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THIS EXECUTABLE MODULE HAS THE FOLLOWING LIMITS COMPILED INTO THE CODE:

SYMBOLIC CONSTANT NAME	DESCRIPTION	PRESENT SETTING
MEMCLD	MAX. # OF CLOUDS AVAILABLE TO MODEL EACH CONSTITUENT	25000
MEMGRD	MAX. # OF POINTS IN SIMULATION GRID	12100
MXGTS	MAX. # OF GLOBAL TIME STEPS (DTL)	110
MXNOCV	MAX. # OF CURRENT VELOCITY PROFILES	110
MXNODP	MAX. # OF DENSITY PROFILES	110
MXNOSS	MAX. # OF SEA STATES	110
MXNOVD	MAX. # OF VERTICAL DISPERSION COEFFICIENT PROFILES	110
MXNOSP	MAX. # SPOT PROFILES	250
MXNOLA	MAX. # OF LAYERS IN WATER COLUMN PLAN VIEWS	20
MAXTRP	MAX. # OF SEDIMENT TRAPS	50
MXPTCV	MAX. # PTS. IN CURRENT VELOCITY PROFILES	25
MXPTCP	MAX. # PTS. IN CONCENTRATION PROFILES	50
MXPTDP	MAX. # PTS. IN DENSITY PROFILES	25
MXPTVD	MAX. # PTS. IN VERTICAL DISPERSION COEFF. PROFILES (DEPENDS ON 'MXNOVD' AND 'NSWDEP')	59
NOPP	FIXED # OF PLUME PROFILES	60
NORP	FIXED # OF RADIUS PROFILES	13
MXTRY	FIXED # OF SOLUTION TRIALS IN JET/COLAPS	5
NSWDEP	FIXED # OF PTS. DEFINING SURFACE WAVE ORBITAL VELOCITIES (USED IN CALCS. OF VERTICAL DISPERSION COEFF. PROFILES)	10
NOCLSB	FIXED # OF DEPTH BANDS FOR CLOUD CREATION STATISTICS	50

(ALL THESE LIMITS CAN BE CHANGED BY CHANGING THE APPROPRIATE SYMBOLIC
CONSTANT AND RECOMPILING THE MODEL.)

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THIS EXECUTABLE MODULE IS CONFIGURED AS DESCRIBED BELOW:

CONFIGURATION VARIABLE	PRESENT SETTING	DESCRIPTION
RANDVF	TRUE	ALLOW RANDOM FLUCTUATIONS OF SETTLING VELOCITIES.
REFLON	TRUE	ACCOUNT FOR CLOUD REFLECTIONS FROM SURFACE & SEABED IN CALCULATING WATER COLUMN CONCENTRATIONS.

***** PRODUCED WATER DISCHARGE

EX043E.IN
 Example produced water FPSO P43
 Petrobras Campo de Barracuda

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D I S C H A R G E S P E C I F I C A T I O N

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RATE (BBLPH, BBL/HR)	3471.6
(5.414 CUFT/SEC)	
DURATION (TJET, SECONDS)	43200.0
DEPTH OF MOUTH OF DISCHARGE PIPE (DJET, FT)5
DISTANCE FROM NORTH BOUNDARY SOUTH TO DISCHARGE PT. (XRIG, FT) ...	625.0
DISTANCE FROM WEST BOUNDARY EAST TO DISCHARGE PT. (ZRIG, FT) ...	2300.0
RADIUS OF DISCHARGE PIPE (FT) .....	.420
ANGLE BELOW HORIZONTAL OF DISCHARGE PIPE (DEGREES)	90.0
BEARING OF DISCHARGE PIPE (DEGREES FROM NORTH)	90.0
TEMPERATURE OF PRODUCED WATER (DEGREES C)	38.00
SALINITY OF PRODUCED WATER (PARTS/THOUSAND)	56.00
DENSITY OF PRODUCED WATER + CONSTITUENTS (ROIM, GM/CM3)	1.0315911
(8.609 LBS/GAL)	

----- CONSTITUENTS INCLUDED IN THE DISCHARGE -----

VELOCITY VARIATION LIMITS (FT/SEC)	DENSITY (GM/CC)	CONCENTRATION (CUFT/CUFT)	SETTLING VELOCITY (FT/SEC)	
NO. NAME.... LOWER UPPER				
1 OLEO	.8833	.2400E-04	-.1660E-04	-
.1162E-04	-.2158E-04			
2 FLUID	1.0316	1.000	.0000	

CONCENTRATION OF TOTAL SUSPENDED OIL AT PIPE EXIT = 21.1991 MG/LITER.

EXIT VELOCITY (FT/SEC)

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MODEL WILL TRACK SOLUBLE TRACER IN DISCHARGE

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CONCENTRATION IN UNDILUTED DISCHARGE (MG/LITER OF FILTRATE) 1.000
BACKGROUND CONCENTRATION IN SEA WATER (MG/LITER OF FILTRATE)0000

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EFFECTS OF PLATFORM WAKE WILL BE ACCOUNTED FOR

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PLATFORM DIMENSIONS USED IN ESTIMATING WAKE EFFECTS:

LENGTH (FT) 1105.80
WIDTH (FT) 178.80
WORKING DRAFT (FT) 69.00
TYP. DIAMETER OF STRUCTURAL MEMBERS (FT)... 551.20
TYP. SPACING OF STRUCTURAL MEMBERS (FT)10

QUANTITIES USED FOR DEFINING WAKE ZONE:

NO. OF B-V OSCILLATIONS (LENGTH) 3.00
MULTIPLE OF RIG DRAFT (DEPTH) 1.30
CHARACTERISTIC RIG DIMENSION (FT) 642.30

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D E S C R I P T I O N O F R E C E I V I N G W A T E R

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CURRENTS:

PROF. NO.	BEGIN TIME (SEC)	PROF. PT.	DEPTH (FT)	----- VECTORS -----		--- COMPONENTS ---	
				SPEED (FT/SEC)	DIRECTION (DEGREES)	U (FT/SEC)	W (FT/SEC)
1	.0	1	.0	1.470	180.0	1.470	.000
		2	164.0	1.470	180.0	1.470	.000
		3	328.0	1.470	180.0	1.470	.000

NOTE: U VELOCITIES ARE POSITIVE SOUTH (+X-AXIS)
W VELOCITIES ARE POSITIVE EAST (+Z-AXIS)

DENSITY STRATIFICATION:

PROF. NO.	TIME (SEC)	PT. NO.	DEPTH (FT)	SALINITY (O/OO)	TEMPERATURE (DEG C)	SIGMA-T	DENSITY (GM/ML)
1	.0	1	.0	36.690	25.130	24.60182	1.02460182
		2	164.0	36.710	23.330	25.15642	1.02515642
		3	328.0	36.480	21.040	25.63076	1.02563076

SEA STATE:

NO.	TIME (SEC)	SIGNIFICANT WAVE		--- SURFACE AIR ---	
		H1/3 (FT)	T1/3 (SEC)	SPEED (FT/SEC)	TEMPERATURE (DEG C)
1	.0	6.5	6.0	21.6	24.0

 DISSIPATION PARAMETER FUNCTION FOR HORIZONTAL DISPERSION COEFFICIENT BASED ON
 ALAMDA = .00100

LENGTH SCALE (FT)	FRAC. OF ALAMDA	DISS. PARAM. FT 2/3 / SEC
.0	1.000	.00100
1000.0	.750	.00075
30000.0 +	.330	.00033

1-----
 VERTICAL DISPERSION COEFFICIENTS:

PROF. NO.	TIME (SEC)	PT. NO.	DEPTH (FT)	COEFFICIENT (FT ² /S)
1	.0	1	.0	.1408
		2	10.2	.9934E-01
		3	20.5	.7007E-01
		4	30.7	.4943E-01
		5	41.0	.3487E-01
		6	51.2	.2459E-01
		7	61.4	.1735E-01
		8	71.7	.1224E-01
		9	81.9	.8631E-02
		10	92.2	.6491E-02
		11	164.0	.9940E-02
		12	323.0	.4191E-04
		13	328.0	.1000E-05

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G R I D S P E C I F I C A T I O N

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GRID DIMENSIONS:

NMAX 34 (EAST-WEST)
 MMAX 91 (NORTH-SOUTH)

GRID CELL SIZE:

DX (FT) 100.0

GRID DEPTH SUMMARY (FOR DEPTHS > 0):

MINIMUM DEPTH (FT) ... 328.0

AVERAGE DEPTH (FT) ... 328.0
MAXIMUM DEPTH (FT) ... 328.0

GRID IS CONSTANT DEPTH, IT WILL NOT BE PRINTED

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M O D E L S E T T I N G S

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MODEL ACTION: FULL SIMULATION AS SPECIFIED

OUTPUT FORM IS: VERBOSE

PLAN VIEWS PRINTED: IN FULL

TRACER PLAN VIEWS DO NOT INCLUDE MASS ASSOCIATED WITH BACKGROUND
CONCENTRATIONS.

TIME STEP USED FOR THIS SIMULATION (DTL, SECONDS) ... 3600.0

NUMBER OF CLOUDS ALLOWED PER CONSTITUENT (NSC) 25000

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C O E F F I C I E N T S P E C I F I C A T I O N

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NTRY1	(SETS NO. OF TRIAL CALCULATIONS: JET)	5	< DEFAULT >
NTRY2	(SETS NO. OF TRIAL CALCULATIONS: COLAPS)	5	< DEFAULT >
ALPHA3	(ENTRAINMENT COEFFICIENT: COLAPS, THERMAL)....	.3536	< DEFAULT >
ALPHA4	(ENTRAINMENT COEFFICIENT: COLAPS, EDGE EFFECT)	.1600	< DEFAULT >
ALPHA7	(ENTRAINMENT COEFFICIENT: TURBULENCE)	1.0000	< DEFAULT >
ALPHA8	(ENTRAINMENT COEFFICIENT: BOTTOM, WALL JET) ..	.0920	< DEFAULT >
ALPHA0	(ENTRAINMENT COEFF: POOL COLLAPSE, THERMAL) .	.2350	< DEFAULT >
ALPHAC	(ENTRAINMENT COEFF: POOL COLLAPSE, SPREADING)	.0010	< DEFAULT >
BETA	(SETTLING COEFFICIENT) .....	.0000	< DEFAULT >
CD	(DRAG COEFFICIENT: CYLINDER)	1.3000	< DEFAULT >
GAMA	(RATIO OF DENSITY GRADIENTS: COLAPS) .....	.2500	< DEFAULT >
CDRAG	(FORM DRAG COEFF: ELLIPTICAL CYL.) .....	.5000	< DEFAULT >

CFRIC	(SKIN FRICTION COEFF: ELLIPTICAL CYL.)	.....	.00250	< DEFAULT >
CD3	(DRAG COEFF: ELLIPTICAL WEDGE)	.....	.2000	< DEFAULT >
CD4	(DRAG COEFF: 2-DIMENSIONAL PLATE)	.....	1.0000	< DEFAULT >
FRICTN	(BOTTOM FRICTION COEFF.)	.....	.1000	< DEFAULT >
TURBF	(TURBULENT VELOCITY FLUCTUATION COEFF.)	.....	.0100	< DEFAULT >
AKY0	(IF NON-ZERO, CONSTANT VERTICAL DIFFUSION)	...	.0000	< DEFAULT >
ALAMDA	(BASE DISSIPATION PARAMETER, 4/3 LAW DIFF.)	..	.0010	< DEFAULT >
ALAF(2)	(AKX @ LS(2) = ALAF(2)*ALAMDA)	.....	.7500	< DEFAULT >
ALAF(3)	(AKX @ LS(3) = ALAF(3)*ALAMDA)	.....	.3300	< DEFAULT >
LS(2)	(LENGTH SCALE (FT) FOR DISSIPATION PARAMETER)		1000.0	< DEFAULT >
LS(3)	(LENGTH SCALE (FT) FOR DISSIPATION PARAMETER)		30000.0	< DEFAULT >
ASFM	(MAXIMUM ENHANCED SETTLING FACTOR)	.....	1.0000	< DEFAULT >
FMIN	(MIN. RELATIVE IMPORTANCE OF ANY SOLID CLASS)		1.0000	< DEFAULT >
DELTA1	(FRACTION VERT. MOMENTUM => COLLAPSE IMPULSE)		.1500	< DEFAULT >
DELTA2	(BOTTOM COLLAPSE FRICTION FACTOR MODIFIER)	...	.0000	< DEFAULT >
BIELL	(LIMITS ENERGY LOSS, BOTTOM OR SURFACE IMPACT)		1.0000	< DEFAULT >
BETAKK	(JET PHASE SEPARATION COEFFICIENT)0000	< DEFAULT >
AVTOMX	(MAX/AVE RATIO ACROSS GAUSSIAN DISTRIBUTION)	.	1.5820	< DEFAULT >

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O U T P U T S P E C I F I C A T I O N

DYNAMIC PHASE OUTPUT:

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PRINTED LISTING OF JET PHASE .....: YES
PRINTED LISTING OF COLLAPSE PHASE .....: YES
OUTPUT LISTING INTERVAL FOR DYNAMIC
  PLUME HISTORY (STEPS) .....: 10
PRINTER PLOTS OF JET PHASE ONLY .....: NO
PRINTER PLOTS OF JET AND COLLAPSE PHASES: NO

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PLAN VIEWS REQUESTED:

FLUID/TRACER:

LA: MASS IN LAYERS WITHIN WATER COLUMN

INDIVIDUAL CONSTITUENTS: NONE

COMBINED SOLIDS: NONE

COMBINED OILS: NONE

LAYER INTERFACE DEPTHS

THERE ARE 20 LAYERS OF CONSTANT THICKNESS (10.0), BEGINNING AT SURFACE.

RUN COMPLETED

2 WARNING MESSAGE(S) ISSUED FOR THIS SIMULATION.
THE WARNING MESSAGES IN FILE 'OOCERROR' SHOULD BE
EXAMINED TO SEE IF THEY AFFECT VALIDITY OF RESULTS.
(FILE 'OOCERROR' MAY HAVE BEEN RENAMED BY A
SCRIPT OR BATCH FILE SUPERVISING MODEL EXECUTION.)

TOTAL CPU TIME (SEC) = 1.10