

The Technical Concept of the Port Reception Facility System - Waste Management -



Workshop
23-09-09

Objectives

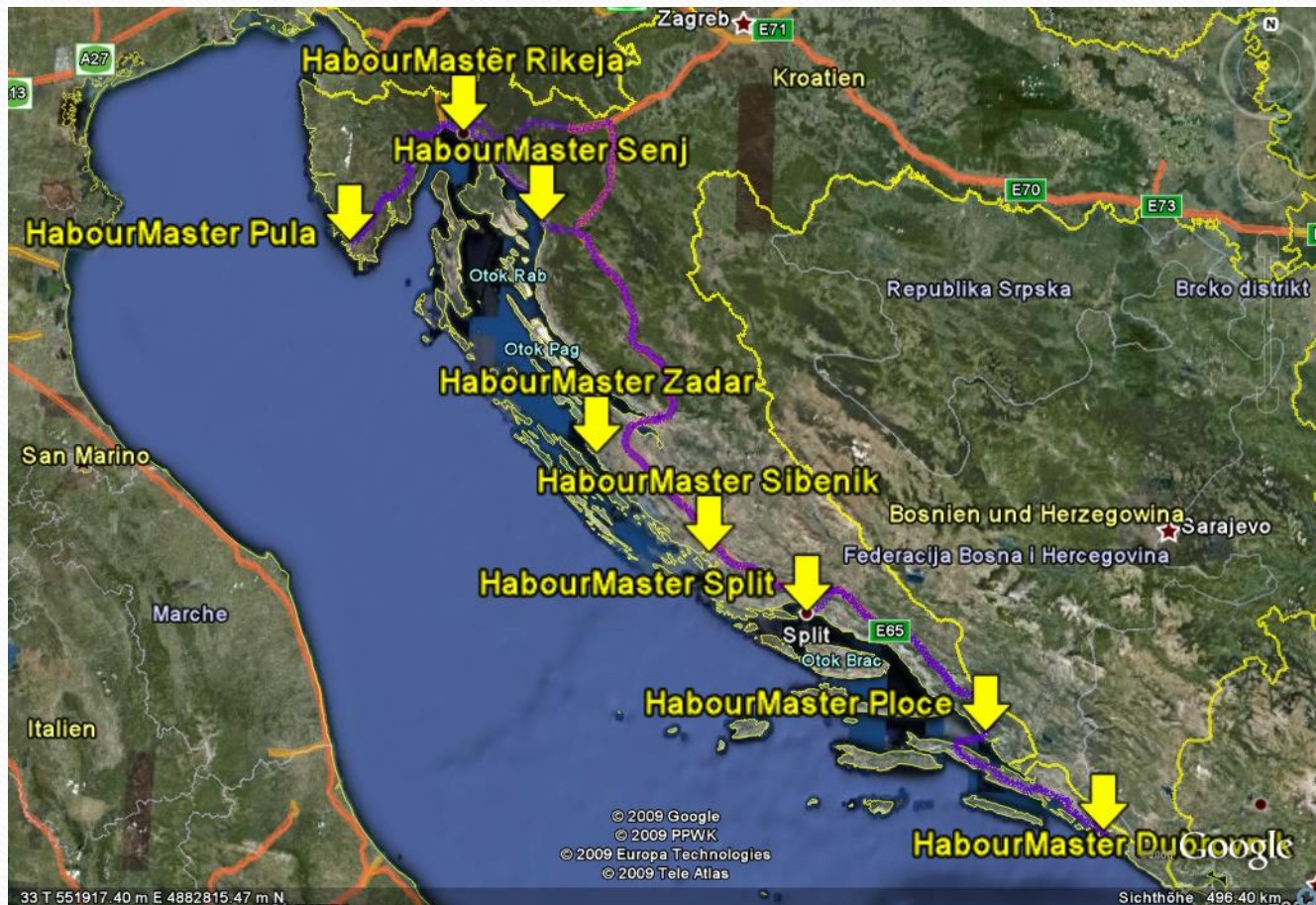
- Identification of current situation and current practise
- Identify of waste management systems including -
 - Appropriate Technology (BATNEEC)
 - Environmentally sound
 - Economical feasible (competition driven approach)
 - Financial affordable
 - Meets national laws (eg. Environmental Law, Waste Managment Law, etc.)
 - International legislations and directives (eg. Waste Frame Directive, Hazardous Waste Directive, etc.
 - Future orientated (EU approximation)
 - Political acceptable

The Background

- The reported amount (volume) of ship generated waste from Port Authorities
- The reported treated amount of ship generated wastes from companies
- Current fees, tariffs, costs
- Evaluation of transport distances from Ports to nearest licensed treatment / disposal facilities
- Economical development data for prognosis issues
- Treatment and Disposal Capacities
- National Waste Management Plan (2007-2015)

Data Evaluation - Area

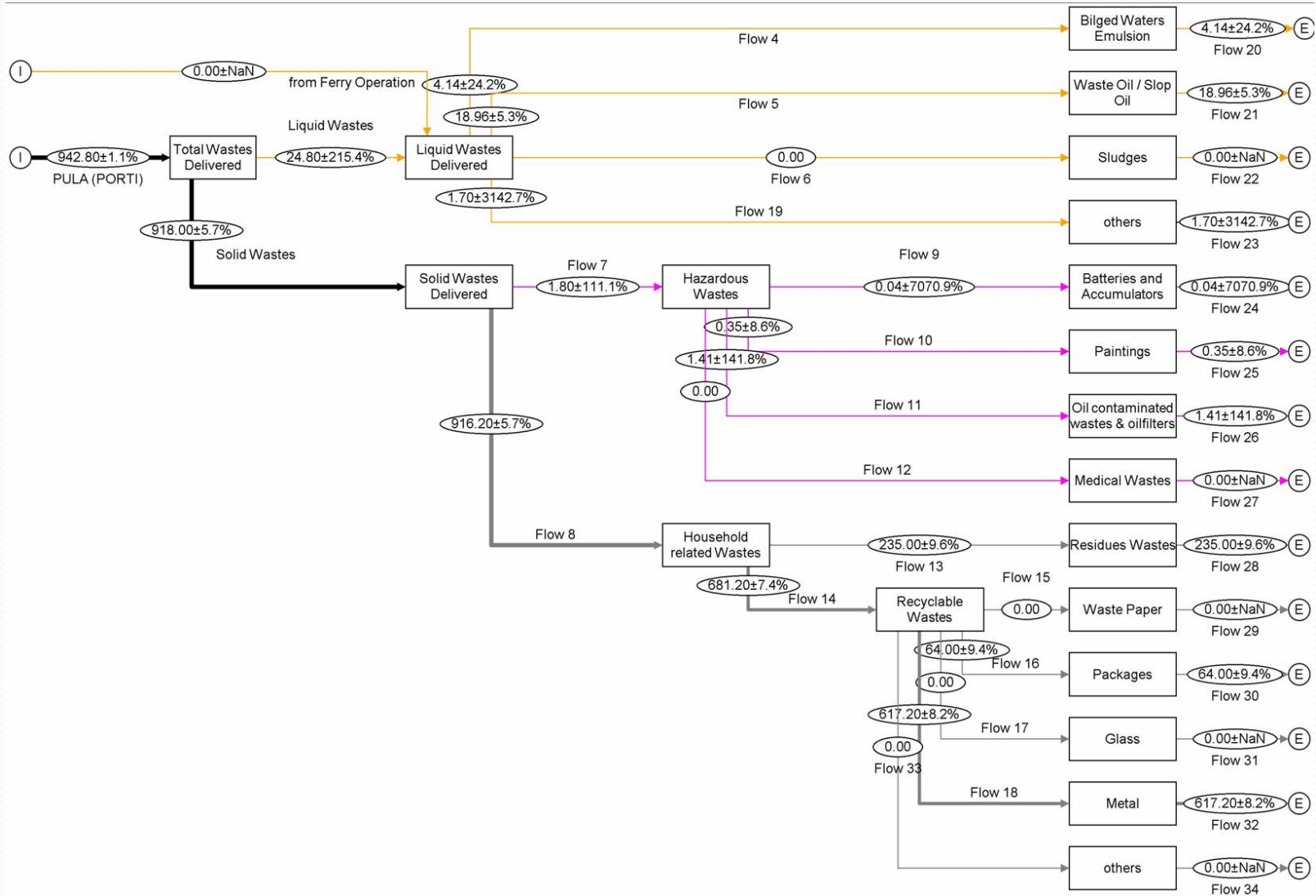
- Investigated Areas and Ports
 - 8 Ports (HM) have been investigated



Data Evaluation - Wastes

- Waste Generation Data according Records
 - Hazardous Wastes (Annex I – Wastes)
 - Bilged Water
 - Waste Oil
 - Household similar Wastes (Annex V – Wastes)
 - Residues Wastes
 - Recycleables
 - Plastic
 - Metal
 - Paper / Glass / others
 - Hazardous components
 - Fluid hazardous components
 - Solid hazardous components
 - Food Wastes
- Findings - Inconsistence of Data gathered
- Conclusion – Necessary data consistency and recording system
- Results – Benchmarks of Waste Generation / ship / arrival

Data Evaluation – Flow Chart

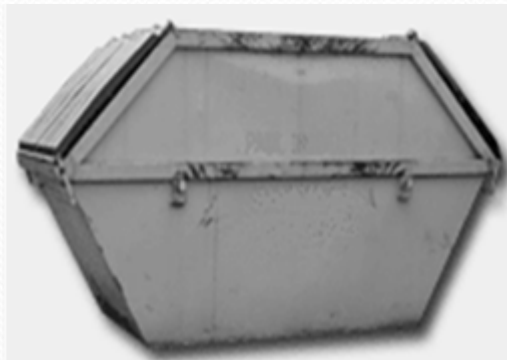


Data Evaluation - Benchmarks

Ship-generated – annex I	Pula	Rijeka	Senj	Zadar	Sibenik	Split	Ploce	Dubrovnik	Total
Bilge water	4,14	186	27,01	302,4	179,6	970,2	197,83	93,4	1.961
Used oil / waste oil	18,96	537,43	9,99	3,5	1,3	107,6	73,17	2,52	754,43
Bilge water + used oil Jadrolinija		670		258	144	757		78	1.907
Bilge water from Jadrolinija	0	172	0	255	143	681	0	76	1377,10
Waste Oil from Jadrolinija	0	498	0	3	1	76	0	2	529,90
SUM Bilge Water	4,14	358,26	27,01	557,45	322,57	1651,65	197,83	169,35	3337,68
SUM Waste Oil	18,96	1035,17	9,99	6,45	2,33	183,10	73,17	4,57	1284,33
SUM Annex I	23,1	1393,43	37	563,9	324,9	1834,756	271	173,92	4.622
% Bilge Water	17,92%	25,71%	73,00%	98,86%	99,28%	90,02%	73,00%	97,37%	72,21%
% Waste Oil	82,08%	74,29%	27,00%	1,14%	0,72%	9,98%	27,00%	2,63%	27,79%
Solid waste – annex V	Pula	Rijeka	Senj	Zadar	Sibenik	Split	Ploce	Dubrovnik	Total
Food waste	45	212,5							258
Plastic	60	417							477
Other	145	818,1		730	504	8.022	506,1	6.769	17.494
Dily rags, oil filters, absorbents	0,78			1,7				0,12	3
Solvents	0,35								0
Packing	4								4
(oil) contaminated packing	0,625				9,1				10
Cargo-related – annex I and V	Pula	Rijeka	Senj	Zadar	Sibenik	Split	Ploce	Dubrovnik	Total
Dunning, lining, strapping etc)	45				10				55
Metals	617,2				2				619
Others (antifreeze, edible oil etc)	1,7			783		0,002	0,18		784
SUM	919,655	1447,552	0	1514,3	525,0909	8022,002	506,28	6769,1212	19703,98
Grouping according Annex	Pula	Rijeka	Senj	Zadar	Sibenik	Split	Ploce	Dubrovnik	Total
Annex V - solid to be disposed	235	1.031	0	730	514	8.022	506	6.769	17.807
Annex V - solid to be recycled	681	417	0	0	2	0	0	0	1.100
Annex I - solids to be treated or disposed	3,5	0,0	0,0	784,3	9,1	0,0	0,2	0,1	797,1
SUM (control)	919,7	1.447,6	0,0	1.514,3	525,1	8.022,0	506,3	6.769,1	19.704,0
Bilge water / ship	0,020	0,206	0,730	1,128	0,898	1,745	0,730	0,361	0,725
Used oil / waste oil / ship	0,091	0,595	0,270	0,013	0,007	0,193	0,270	0,010	0,279
Annex I / ship	0,111	1,543	1,000	2,104	1,625	3,300	1,000	0,672	1,710


Annex V - Waste

- Systems are in use



Annex V – Regional Centres

13 centres are planned all over Croatia, partly on existing and partly on new locations.

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- The map shows Croatia divided into counties, with various regions highlighted in different colors to indicate the service areas of planned waste management centres (WMCs). Lines connect the listed centres to their respective locations on the map. The text 'DRAFT PLAN' is visible at the bottom of the map area.
- Pula port(s) - Istria WMC in Kastijun
 - Rijeka port(s) – WMC in Marescina
 - Senj port(s) – 50% to Benkovac, 35% to County of Karlovac, 15% to Mariscina
 - Sibenik port(s) – WMC Bakarac
 - Split port(s) – WMC Lecevisa
 - Ploce port(s) - either to WMC Lecevisa or to WMC Neretva
 - Dubrovnik port(s) – WMC Neretva

Annex V – Qualitative Prognosis

Division of total household similar waste	Basis for waste generation prognosis
Food waste	16,3%
Plastic	26,4%
Other	13,4%
Oily rags, oilfilters, absorbents (0.35% of total household similar waste)	0,35%
Solvents	50% of oily rags etc. (estimate)
Packing	10% of plastic waste (estimate)
(Oil) contaminated packing	80% of oily rags etc., except where data available
Dunning, lining, strapping etc)	0.006m ³ per landing
Metals: m ³ /arrival (shipyard/no shipyard)	0,08

Annex V – Future Requirements

- Following the Waste Management Law and EU Directive
 - Avoidance and Minimisation
 - Separation (dangerous / non-dangerous wastes)
 - Recovery
 - Treatment
 - Disposal
 - Safe transport of wastes to treatment and/or disposal facility → licensed waste management company (not concessioned)
 - Minimum Collection of:
 - Paper / Glass / Plastics (packages) / Metal / Residues
 - Minimum Collection Frequency:
 - Daily / weekly / monthly
 - Recording of all incoming and outgoing wastes
 - Own systematic for hazardous components within „household and household similar wastes“
- **RESULT: For every Port a logistics requirement calculated**



Annex V – HW System

- System for HW components



BATTERIES - WET	
Filled with ACID	
Signalword:	Danger
Hazard Statement:	Causes severe skin burns and eye damage
UN - Number:	2794 / 2796
Class:	8
Waste Catalogue:	16.06.01*
EINECS No.:
EINECS No.:
R - Phrase:	R34/41/52
S - Phrase:	S14-gf/25/26/29/36/43
Precautionary Statement:	
Supplier Identification:	
Contact Person:	
Address:	
Tel Number:	

Labelling



Fluid – Bin

- Solvents
- Paintings
- Antifouling

Solids – Bin

- Oilfilters
- Oilcontaminated Packages
- Accumulators
- Batteries

Annex I – Current Situation

- All treatment facilities for bilged water and waste oil together have a capacity of ~ 8000 m³ (two shifts up to 20000 m³)
 - Current amount ~ 4000 m³
 - All treatment facilities missing material
 - Costs for one m³ up to 200 Euro (international level ~ 50 – 60 Euro)
 - Long distances between Ports and Treatment facilities
 - Almost no intermediate storage (high transport fluctuation)
 - Only Rijeka Dockstation for direct supply
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Conclusion

- recognising transport matrix (critical distances) and requirement of intermediate storage (reduction of specific costs)
- Including existing plants in future regional waste management plan to reduce fix costs

Annex I – Transport Matrix

Logistic matrix in Km to HarbourMaster (Port)								
Ports	Pula	Rijeka	Senj	Zadar	Sibenik	Split	Ploce	Dubrovnik
Pula	0	99,8	166	369	448	513	611	740
Rijeka	99,8	0	67,4	243	352	413	514	639
Senj	166	67,4	0	175	233	297	400	525
Zadar	389	243	175	0	91,1	158	260	378
Sibenik	448	352	233	91,1	0	92,1	194	314
Split	513	413	297	158	92,1	0	141	266
Ploce	611	514	400	260	194	141	0	125
Dubrovnik	740	639	525	378	314	266	125	0

Treatment Matrix

- Treatment Costs per m³ Waste Oil – 35 – 40 Euro (rest transport costs)
- Treatment Costs per m³ Bilge Water – 55 – 60 Euor (- “ -)

Annex I – Optioneering

- Options for Waste Oil compared and critical distances calculated

Medium		Waste Oil Transport - 10 Euro			
Options		Option 0	Option I	Option II	Option III
Optioneering	Unit	Total	Total	Total	Total
Amount	(m ³ /year)	1333,7	1333,7	1333,7	1333,7
Closest treatment facility	--	0,0	0,0	0,0	0,0
Distance to treatment facility	km	115,8	115,8	115,8	115,8
Current Storage Amount	(m ³)	0,0	0,0	0,0	0,0
Discharge fluctuation	times	50,3	28,0	17,0	11,0
Total Distance per Year	km/year	46775,6	16884,5	3702,3	2250,7
Transport Capacity	m ³	5,0	5,0	5,0	10,0
Required fluctuation (limited by Vessel)	times	70,0	47,3	35,6	17,3
Required Distance per year	km/year	46853,6	16962,5	3780,3	2276,7
Required Transport Distance per year	km/year	93707,2	33925,0	7560,6	4553,4
Costs for Transportation	Euro/year	131190,1	47495,0	10584,8	6374,8
Cost per m ³ discharged	Euro/m ³	98,4	35,6	7,9	4,8
Costs for Discharging	Euro/m ³	13337,4	13337,4	13337,4	13337,4
Maximum Transportation Distance	km/year	4763,4	4763,4	4763,4	4763,4
Within Critical Distance	km	68,0	100,8	133,7	276,1

- Conclusion**
- average transport capacity is 10 m³**
- Pula, Senj and Ploce are 10 m³ reception tanks**
- Zadar, Sibenik and Dubrovnik reception facilities of minimum 5 m³.**
- Pretreatment (option IV) not feasible**

Annex I – Optioneering

- Options for Bilge Water compared and critical distances calculated

Medium		Bilge Water - 10 Euro				2 times Bilge Water - 10 Euro				
Options		Option 0	Option I	Option II	Option III	Option 0	Option I	Option II	Option III	Option IV
Optioneering	Unit	Total	Total	Total	Total	Total	Total	Total	Total	Total
Amount	(m ³ /year)	3288,3	3288,3	3288,3	2165,8	6576,5	6576,5	6576,5	6576,5	4331,6
Closest treatment facility	--	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Distance to treatment facility	km	115,8	115,8	115,8	115,8	115,8	115,8	115,8	115,8	115,8
Current Storage Amount	(m ³)	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Discharge fluctuation	times	52,0	41,0	28,0	14,0	52,0	165,0	83,0	42,0	28,0
Total Distance per Year	km/year	48172,8	30174,3	20001,1	2902,2	48172,8	80655,6	40491,3	20343,1	3244,2
Transport Capacity	m ³	5,0	5,0	10,0	10,0	5,0	5,0	10,0	20,0	20,0
Required fluctuation (limited by Vessel)	times	99,0	83,0	42,0	27,5	176,3	164,9	82,6	41,5	27,5
Required Distance per year	km/year	59697,1	40491,3	20343,1	3244,2	92451,6	80655,6	40491,3	20343,1	3244,2
Required Transport Distance per year	km/year	119394,2	80982,6	40686,2	6488,4	184903,2	161311,2	80982,6	40686,2	6488,4
Costs for Transportation	Euro/year	167151,9	#####	56960,7	9083,8	258864,5	225835,7	113375,6	56960,7	9083,8
Cost per m ³ discharged	Euro/m ³	50,8	34,5	17,3	4,2	39,4	34,3	17,2	8,7	2,1
Costs for Discharging	Euro/m ³	32882,6	32882,6	32882,6	21657,8	65765,2	65765,2	65765,2	65765,2	43315,6
Maximum Transportation Distance	km/year	11743,8	11743,8	11743,8	7734,9	23487,6	23487,6	23487,6	23487,6	15469,9
Within Critical Distance	km	118,6	141,5	279,6	281,3	133,3	142,5	284,3	566,0	562,5

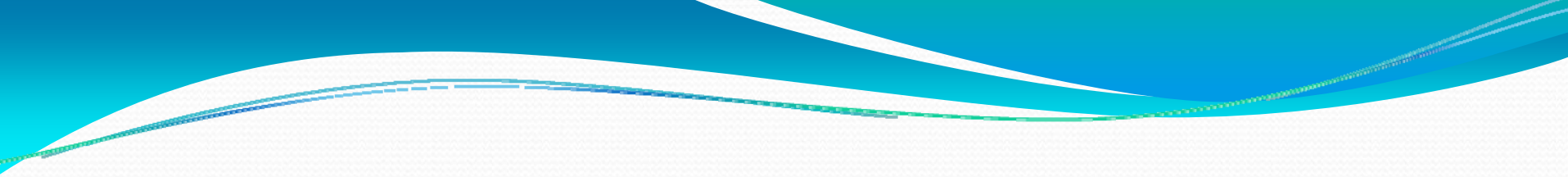
- Conclusion**
- Ports of Senj, Rijeka, Sibenik, Ploce and Dubrovnik are 20 m³ reception tanks**
- In Pula a reception facility of minimum 10 m³**
- In Zadar, Sibenik, Ploce and Dubrovnik takes a pre-treatment place**

Annex I – Bilge Water Treatment

- Optioneering

Options	I	II	A	B	C	D	E	F	G	Sludge	Water	Oil
Option 1	x		x	x	x		x	x	x	Skip, 5%DS	Leachate 5% oil, COD 400 mg/l	Tank
Option 2		x	x	x			x	x	x	Skip, 5%DS	Leachate 5% oil, COD 400 mg/l	Tank
Option 3	x		x	x	x	x	x	x	x	Skip, 22%DS	Sewer 20ppm oil	Tank
Option 4		x	x	x		x			x	Skip, 22%DS	Sewer 20ppm oil	Tank
Option 5	x		x	x			x		x	Skip 10% DS	Sewer 15 ppm oil	Tank
Option 5		x	x	x			x		x	Skip 10% DS	Sewer 15 ppm oil	Tank
Option 6	x			x				x		Skip, 2%DS	Leachate 5% oil, COD 400 mg/l	Tank
Option 7		x		x				x	x	Skip, 2%DS	Leachate 5% oil, COD 400 mg/l	Tank
Option 8	x			x		x			x	Skip, 22%DS	Sewer 20ppm oil	Tank
Option 9		x		x		x			x	Skip, 22%DS	Sewer 20ppm oil	Tank
Option 10	x			x			x		x	Skip 10% DS	Sewer 15 ppm oil	Tank
Option 11		x		x					x	Skip 10% DS	Sewer 15ppm oil	Tank

- Conclusion - II – B – F



**Thank You
for your Attention !!**

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