

Offsite Commercial Disposal of E&P Wastes

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Topics for Discussion

- What are commercial disposal facilities?
- Review of earlier studies
- Description of current study
- Findings to date
- Next steps



What Are Commercial Disposal Facilities?

- Offsite businesses that accept E&P wastes for a fee
 - Typically are not part of the oil company
- Charge for:
 - Disposal/management of waste
 - Transportation
 - Cleaning of vehicles/tanks
 - Disposal of wash water
 - Some may charge for analytical fees
- Use various methods for disposal/waste management

Why Use Offsite Commercial Disposal Facilities?

- Comply with applicable regulatory requirements
 - States have lead role
 - Not all disposal methods allowed in all states
 - *Options and constraints driven by waste types, technologies, and locations involved*
- Save costs
 - Capital, operating and maintenance, transportation
 - Cost-effectiveness influenced by waste volumes
- Hedge against potential responsibility
 - Liability may not be avoided (Superfund)
 - Need to review business practices and compliance history

Background – 1985 and 1995 API Waste Surveys

Waste Stream	1985 API Survey (million bbl)	%Sent to Commercial Disposal	1995 API Survey (million bbl)	%Sent to Commercial Disposal
Drilling Waste	360	28	149	3*
Associated Waste	12	52	21	15*
Produced Water	21,000	2	17,911	0.5*

Source: American Petroleum Institute (API) – Studies/Surveys published in 1987 and 2000.

* Percentage of onshore waste stream going to offsite commercial disposal facilities.

Previous Study and Current Project

- Argonne surveyed commercial disposal facilities used for E&P waste in 1997
 - Report can be downloaded at:
www.ead.anl.gov/pub/dsp_detail.cfm?PubID=98
 - Report received significant interest and national attention

- New project to update 1997 report was launched in summer of 2005
 - Why use offsite commercial disposal facilities?
 - Where are offsite commercial disposal facilities located?
 - How do offsite commercial disposal facilities dispose of the wastes?
 - What are the costs charged by offsite commercial disposal facilities?

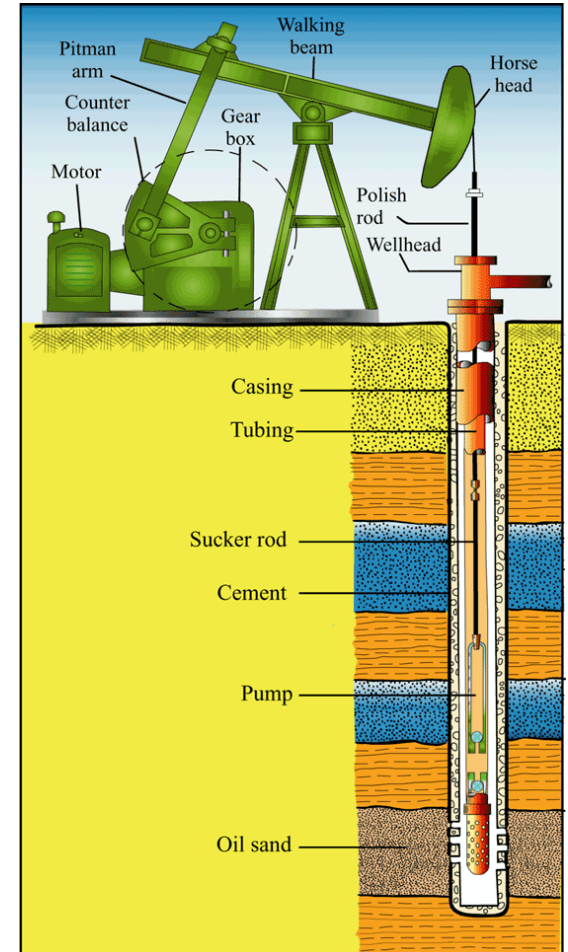
Commercial Management of Solid and Oily Wastes

- Landfarming
- Pits
- Slurry injection
- Landfilling
 - After evaporation, chemical stabilization, or biological treatment
- Thermal treatment/incineration followed by reuse or disposal of residues
- Evaporation in surface impoundments
- Salt caverns



Commercial Management of Produced Water

- Injection
 - Disposal and enhanced recovery
- Evaporation
 - In surface impoundments
- Treatment and discharge
 - Under NPDES permit
 - Through publicly owned treatment works



Source: California Department of Conservation

Commercial Management of Water-Based Drilling Wastes

- Landfarming
- Disposal pits
- Landfilling after evaporation
- Treatment and discharge
 - Under NPDES permit
 - Through local sanitary sewer to municipal water treatment plant
- Injection
- Treatment and reuse



E&P Waste Disposal Practices in the Gulf of Mexico from Three U.S. Majors (1997)

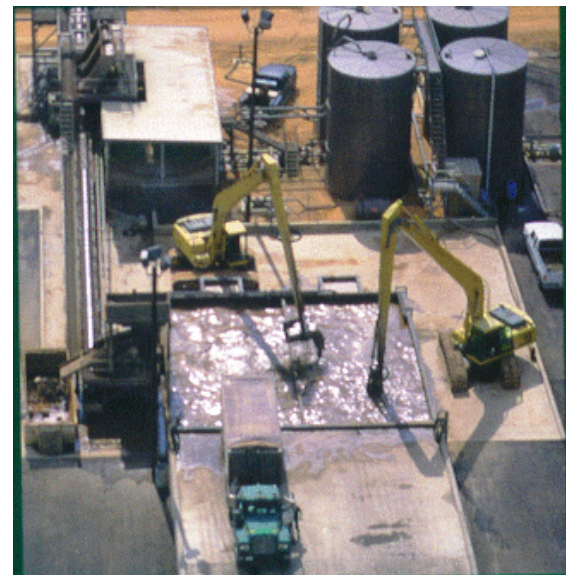
Waste	Company A	Company B	Company C
WB mud	all discharge	most discharge	all discharge
OB mud	recycle	all onshore	recycled
SB mud	recycle	recycle	recycle
WB cuttings	all discharge	most discharge	all discharge
OB cuttings	all onshore	all onshore	all onshore
SB cuttings	all onshore	most discharge	all discharge
Produced water	all discharge	all discharge	all discharge
Produced sand	all onshore	all onshore/inject	all onshore
TWC fluids	60%disch/ 40% onshore	disch/onshore	most disch
NORM	all onshore	all onshore (inject)	all onshore

Onshore means disposal at commercial disposal facility

WB = water based; OB = oil based; SB = synthetic based; TWC = treatment, workover, and completion fluids; NORM = naturally occurring radioactive material

Commercial Management of Offshore Drilling Wastes

- Historically, most offshore drilling waste hauled back to shore has gone to one major waste disposal company
 - Waste collected by barge at series of transfer stations and carried through the Intracoastal waterway to eastern Texas
 - Unloaded to trucks and trucked to site where it is screened and injected at low pressure



Other Commercial Management Competitors for Offshore Waste

- Salt cavern near Houston



- Land treatment sites in Louisiana



Commercial Disposal Costs (\$/bbl) (1997)

Method	Solid & Oily Wastes	Prod. Water	Water-Based DW
Landspread	5.50 – 57.00		0.20 – 55.00
Landfill/pit	0.50 – 36.00		0.35 – 10.50
Treat/dispose	0.00 – 12.00	0.65 – 4.20	2.50 – 14.70
Salt cavern	1.95 – 6.50		1.95 – 6.00
Injection	8.50 – 11.00	0.06 – 9.50	7.50
Evaporation	2.50 – 2.75	0.01 – 2.50	
Incineration	10.50 – 38.00		

Note: includes just disposal fees

Onshore costs are a composite of all disposal facilities in 12 states.

Where Are Offsite Commercial Disposal Facilities Located?

- 14 states have dedicated E&P-specific commercial offsite waste disposal infrastructure
 - AL, AR, CA, CO, LA, NE, NM, ND, OK, PA, TX, UT, WV, WY
 - Major differences from state to state
 - *Extensiveness of facility networks*
 - *Range of disposal options*
- 14 states show few or no disposal companies dedicated to E&P waste
 - AK, AZ, FL, IL, IN, KS, KY, MI, MO, MS, MT, NW, SD, VA
 - In many states, waste disposal facilities are owned by the operators on their respective leases
 - Operators who require offsite disposal send oil field wastes to a local sanitary landfill or out of state

Second Project Phase: Identify Disposal Methods and Costs at Offsite Commercial Disposal Facilities

- Second project phase – contact facilities
 - Used the lists provided by the agencies and made many phone calls

Develop Separate Tables

- Oil-based muds and cuttings
- Water-based muds and cuttings
- Produced water
- Contaminated soils
- Tank bottoms
- Naturally occurring radioactive material (NORM)

Data Elements in Tables

- State
- Disposal company name and contact information
- Type of E&P waste
- Disposal method
- Disposal costs
- Other comments

Preliminary 2005 Commercial Disposal Costs (\$/unit)

Method	Oil-Based DW	Water-Based DW	Produced Water
Landspread	--	\$0.50-2/bbl	\$0.30-0.40/bbl
Landfill	\$28/ton	\$32/ton	
Treat/landfill	\$28-70/ton	\$2.50-70/ton	\$2.30/bbl
Salt cavern	--	--	--
Injection	--	\$0.50/bbl	\$0.35-0.75/bbl
Treat/inject	9.50 – 14.50/bbl	\$0.50-12.50/bbl	\$5-14/bbl
Evaporation	--	\$4-20/bbl	\$1.20-84/bbl
Incineration	\$0.14-0.40/lb	\$0.14-0.40/lb	--
Recycling	\$5/bbl	\$5/bbl	\$0.65-5/bbl

Note: reflects first data from 11 states; includes just disposal fees

Preliminary 2005 Commercial Disposal Costs (\$/unit) - continued

Method	Contaminated Soils	Tank Bottoms	NORM
Landspread	--	--	--
Landfill	\$28-32/ton	\$32/ton	\$135/ton
Treat/landfill	\$65-70/ton	\$65-70/ton	\$70/ton
Salt cavern	--	--	--
Injection	\$50/yd	--	--
Treat/inject	--	\$10.50-14.50/bbl	--
Evaporation	\$45/ton	\$28.00-140.00/ton	--
Incineration	\$35-800/ton	\$35-800/ton	--
Recycling	\$15-35/ton	\$35-200/ton	--
Other	--	--	\$50/hr

Note: reflects first data from 11 states; includes just disposal fees

Next Steps

- Continue with Second Project Phase
 - Data collection effort impacted by the hurricanes
 - Work towards collecting data points from as many disposal companies as possible

- Begin Third Project Phase (Operators/Industry Associations)
 - Verify findings of phase II effort

- Prepare report in 2006