POSTCLOSURE CARE PERIOD

POSTCLOSURE CARE

- Maintenance and operation of postclosure structures and systems and assuring containment of wastes and preventing environmental degradation.
- Monitoring postclosure systems and environmental media to ensure there are no releases or that existing releases are contained.

POSTCLOSURE PERIOD STATUTORY CITATIONS

- -California Health and Safety Code (CHSC) section 25245(a):
- (1) Require financial assurances for the cost of closure and maintenance and monitoring of groundwater and the environment after closure.
- (2) Facilities are closed and maintained for at least 30 years in a manner that protects human health and the environment and minimizes or eliminates the escape of leachate, contaminated rainfall, and waste to ground and surface waters and to the atmosphere.

Postclosure Period Regulatory Citations

California Code of Regulations title 22:

- Requires that the final cover for landfills and surface impoundments to prevent the downward entry of water into the closed surface impoundment or landfill throughout a period of at least 100 years.
- DTSC to release the owner/operator from financial assurance requirements only after all post-closure care requirements have been met.

CURRENT APPROACH

To determine postclosure care period and needed funding

- DTSC initially uses a thirty year postclosure care period for facilities where waste remains in place after closure.
- This thirty year period is reviewed and can be reset to thirty years during permit renewal – every ten years, “rolling 30-year PC period.”
- For other facilities, such as corrective action, that require PC or long-term O&M, period is based on site-specific factors (such as length of time to remediate plume).

PROBLEM WITH CURRENT APPROACH

- At any point in time a land disposal facility has only between 20 and 30 years of financial assurance to cover ongoing postclosure care costs that will continue much longer.
- If the company declares bankruptcy or becomes non-viable, the waste generators are forced to pay for the remaining postclosure costs or public could be used.

POSTCLOSURE BEYOND 30 YEARS WOULD LIKELY INCLUDE:

- Groundwater/surface water monitoring,
- Cover and drainage maintenance,
- Inspections and administration,
- Operation and maintenance of leachate/groundwater/vapor extraction and treatment systems,
- Replacement of closure structures such as covers, drainage, wells, treatment systems,
- Some activity costs will decrease over time.

Extended Postclosure Estimate Examples

- Two Landfill Facilities
- Facility A is a large 100 acre landfill with leachate collection and limited groundwater remediation.
- Facility B is 50 acre landfill without leachate or groundwater collection.

EXAMPLE 200 YEAR ESTIMATE

2 CALIFORNIA LANDFILLS - POSTCLOSURE COST ESTIMATES

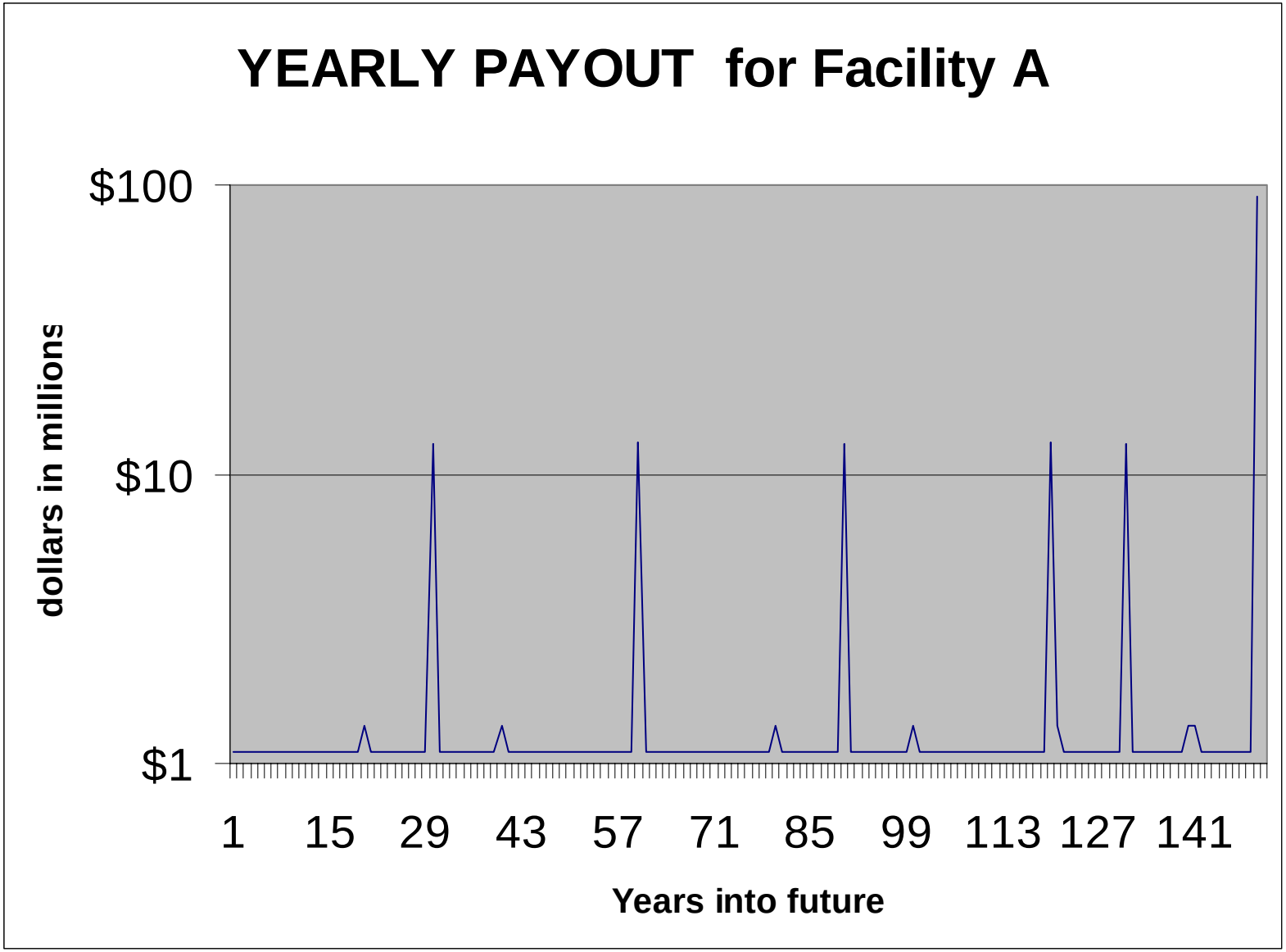
ANNUAL OPERATION, MONITORING AND MAINTENANCE (per year)	**Facility A**	**Facility B**
Inspections (facility A weekly, facility B monthly)	$30,000	$10,000
Well Maintenance	$7,000	$1,500
Leachate/Groundwater treatment	$60,000	
Management, Office Support, Supplies, fuel, vehicles, utilities, fees	$100,000	$20,000
Groundwater Monitoring years 1-10	$140,000	$60,000
Groundwater Monitoring years 10-30 (25% reduction)	$105,000	$45,000
Groundwater Monitoring years 30-200 (50% reduction)	$70,000	$30,000
Liability/Corporate Insurance	$340,000	$340,000
Accounting/Administrative	$30,000	$30,000
Contingency of 20%, 10%	$176,400	$53,650
ANNUAL TOTAL	**$1,058,400**	**$590,150**

Continued…

EQUIPMENT REPLACEMENT	Facility A	Facility B
(recurring every 20, 30, 150 years)		
20 year schedule		
electical system	$100,000	$50,000
office space	$60,000	$30,000
piping for hypersaline water	$100,000	
20 year year total	$260,000	$80,000
20 year year total over 200 years (9 times)	$2,340,000	$720,000
30 year schedule		
evaporative ponds	$2,000,000	
tanks	$600,000	
siesmic damage for cover systems -	$9,000,000	$4,000,000
(10% of installation cost)		
30 year year total	$11,600,000	$4,000,000
30 year year total over 200 years (6 times)	$69,600,000	$24,000,000
150 year schedule		
cover system replacement	$90,000,000	$40,000,000
Equipment Subtotal	**$161,940,000**	**$64,720,000**

TOTAL COSTS FOR 200 YEARS

Summary of costs	Facility A	Facility B
TOTAL ANNUAL COSTS	$1,058,400	$590,150
20 EQUIPMENT REPLACEMENT YEAR COSTS (recurring)	$260,000	$80,000
30 EQUIPMENT REPLACEMENT YEAR COSTS (recurring)	$11,600,000	$4,000,000
150 EQUIPMENT REPLACEMENT YEAR COSTS	$90,000,000	$40,000,000
200 YEAR TOTAL	$373,620,000	$182,750,000


YEARLY PAYOUT for Facility A
$100
$10
$1
dollars in millions
1
15
29
43
57
71
85
99
113
127
141
Years into future

Projecting Costs into the Future Definitions and Assumptions

- Money over time makes money. i.e., Interest
  - The government or private parties will pay you to borrow your money. Highly variable over time and type of investment/risk. The low risk U.S. Treasury bond rate has ranged from 3-13% annually over the last 50 years.
- Costs over time increase. i.e., Inflation
  - There are many measurements for inflation, but Consumer Price Index (CPI) is most common. This has ranged from 1.5 to 3.0% over the last ten years and from -2.01 to 17.86% over 100 years. Deflation and high inflation are rare but do happen.

Definitions and Assumptions

continued..

- **Discount Rate** is = [**Interest** – **Inflation**].

  Also known as a “real rate of return” as it measures the extra money earned by interest beyond what is needed for spending as prices go up over time due to inflation. It is commonly used for planning long term projects that involve expenditures and investments. It is used in the fields of engineering and economics.

Examples using 2005 rates :

Treasury bond rate – CPI = conservative discount rate

5% - 2.5% = 2.5%

High yield security rate – Retail Price Index = “high roller” discount rate

12% - 2.3% = 9.7%

Treasury Inflation Protected Security pays a rate of return plus the current rate of the CPI. It is basically a discount rate from the government. It is 2% right now for a 10 year period. It is guaranteed. It has varied form 1.5 to 2.5 over the last few years.

Definitions and Assumptions continued..

Net Present Worth = The amount that a future sum of money or expenditures is worth today given a specified rate of return.

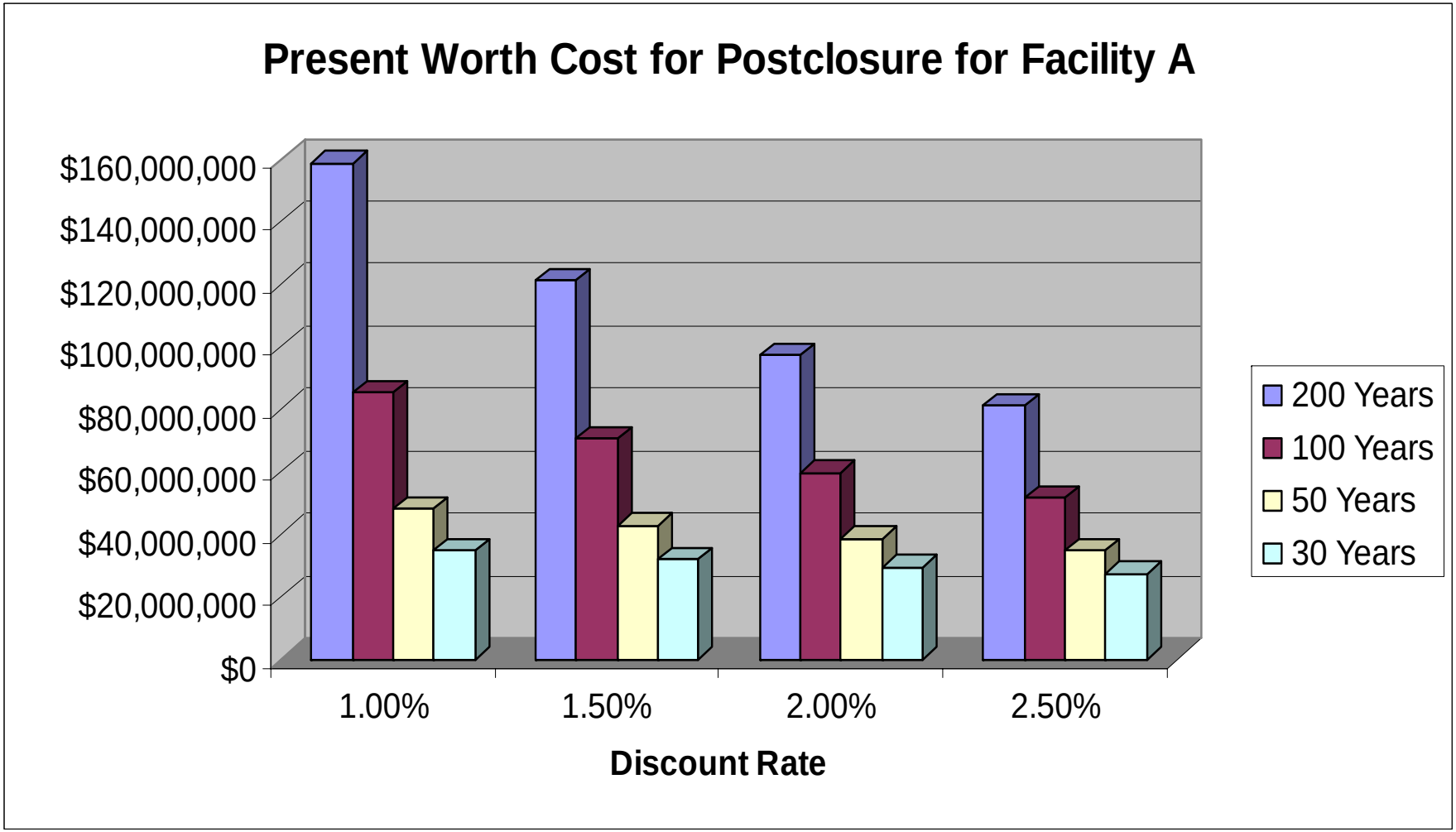
- e.g. An investment that earns 10% per year and can be redeemed for $1000 in five years would have a present value of $620.
- e.g. In other words, $620 today is worth $1000 in five years. Similarly If you had a $1000 payment due in five years, you could pay it off today for $640.

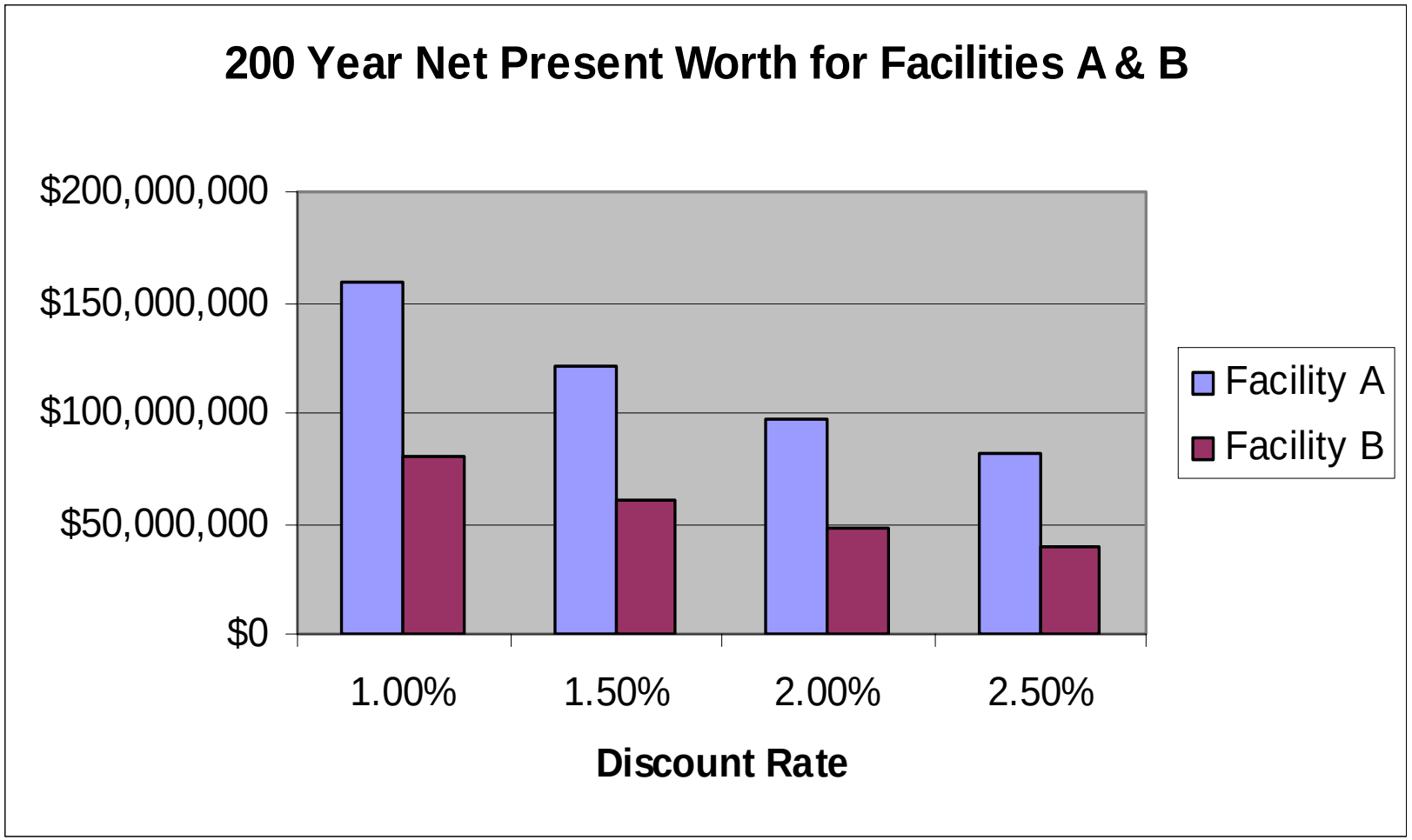
Net Present Worth for the 200 Year Estimates

Category	Facility A	Facility B
Discount rate of 1.0%	1.00%	1.00%
30 YEAR PRESENT WORTH	$36,454,622	$18,374,009
50 YEAR PRESENT WORTH	$50,810,629	$26,332,321
100 YEAR PRESENT WORTH	$89,697,431	$45,096,933
200 YEAR PRESENT WORTH	$164,965,736	$79,864,684
Discount rate of 1.5%	1.50%	1.50%
30 YEAR PRESENT WORTH	$33,618,363	$16,993,106
50 YEAR PRESENT WORTH	$45,406,170	$23,525,225
100 YEAR PRESENT WORTH	$74,298,544	$37,222,338
200 YEAR PRESENT WORTH	$125,593,843	$60,276,079

Net Present Worth for the 200 Year Estimates Continued

Category	Facility A	Facility B
Discount rate of 2.0%	2.00%	2.00%
30 YEAR PRESENT WORTH	$31,140,123	$15,774,411
50 YEAR PRESENT WORTH	$40,838,903	$21,146,228
100 YEAR PRESENT WORTH	$62,829,220	$31,349,966
200 YEAR PRESENT WORTH	$100,809,124	$48,014,488
Discount rate of 2.5%	2.50%	2.50%
30 YEAR PRESENT WORTH	$28,954,526	$14,691,060
50 YEAR PRESENT WORTH	$36,950,575	$19,117,066
100 YEAR PRESENT WORTH	$54,084,171	$26,876,298
200 YEAR PRESENT WORTH	$84,059,358	$39,786,953


Present Worth Cost for Postclosure for Facility A
$160,000,000
$140,000,000
$120,000,000
$100,000,000
$80,000,000
$60,000,000
$40,000,000
$20,000,000
$0
1.00%
1.50%
2.00%
2.50%
Discount Rate
200 Years
100 Years
50 Years
30 Years


200 Year Net Present Worth for Facilities A & B
$200,000,000
$150,000,000
$100,000,000
$50,000,000
$0
1.00%
1.50%
2.00%
2.50%
Discount Rate
Facility A
Facility B

POSTCLOSURE BEYOND 30 YEARS

- Will require future projection similar to 30 years estimates and may entail long-term “Superfund-like” settlements.
- Alternative financial mechanisms ? Could some alternative fill the “gap” for land disposal facilities? Or, a combination of known mechanisms?

Possible Mechanisms

- Use existing mechanisms:
  - Trust,
  - Surety bond
  - Insurance,
  - Financial test,
  - Letter of Credit.

Possible Mechanisms continued..

- Government Program
  - Tipping fee on hazardous generation goes to providing funding for postclosure care beyond thirty years.

Possible Mechanisms continued..

- Alternative mechanism for care beyond thirty years.
  - Could be performance based and without being prescriptive.
  - Could allow for the time value of money.
  - Could include conservative investments such as: annuities, bonds, securities, etc.

Conclusions

- Postclosure structures and systems require maintenance and replacement over time or they will fail.
- Although groundwater monitoring can decrease over time, depending on site conditions, a minimum level of groundwater monitoring will be necessary as long as waste remains in place.

Conclusions continued..

- Some activities could end completely, such as groundwater remediation and gas extraction, depending on site data.
- Investment now in financial assurance for long-term postclosure care will cost less money and involve less risk than waiting for 10 or more years.

Raymond Leclerc, P.E.

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