



PETROLEUM CONTAMINATED SITES: RISK-BASED REMEDIATION & THE EX SITU SOIL REMEDIATION PERMIT PROGRAM

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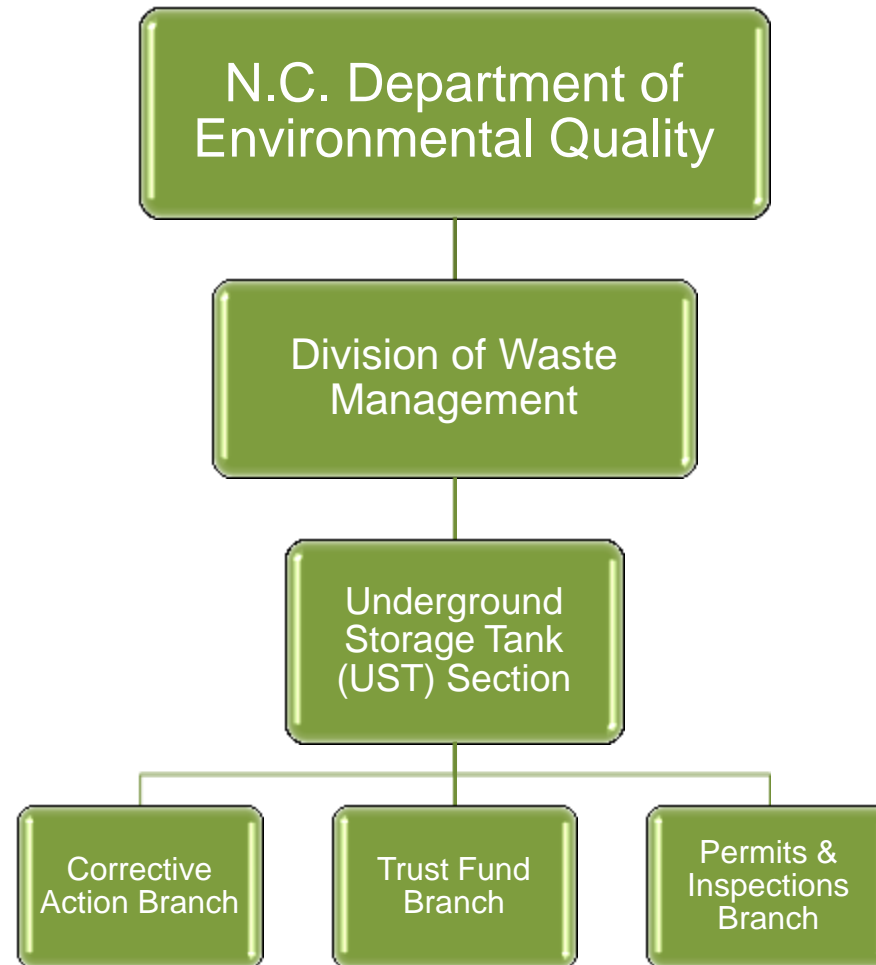


Risk-Based Remediation: Petroleum Contaminated Sites

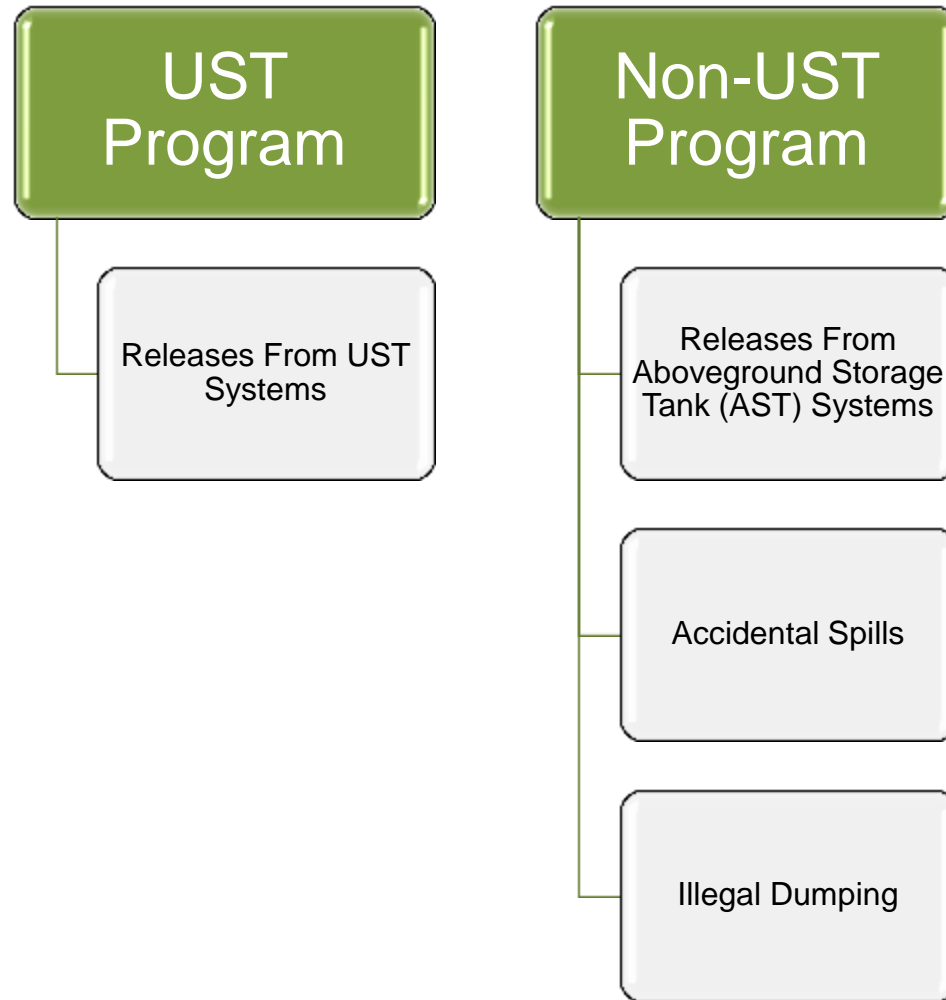


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Risk-Based Remediation: Petroleum Contaminated Sites



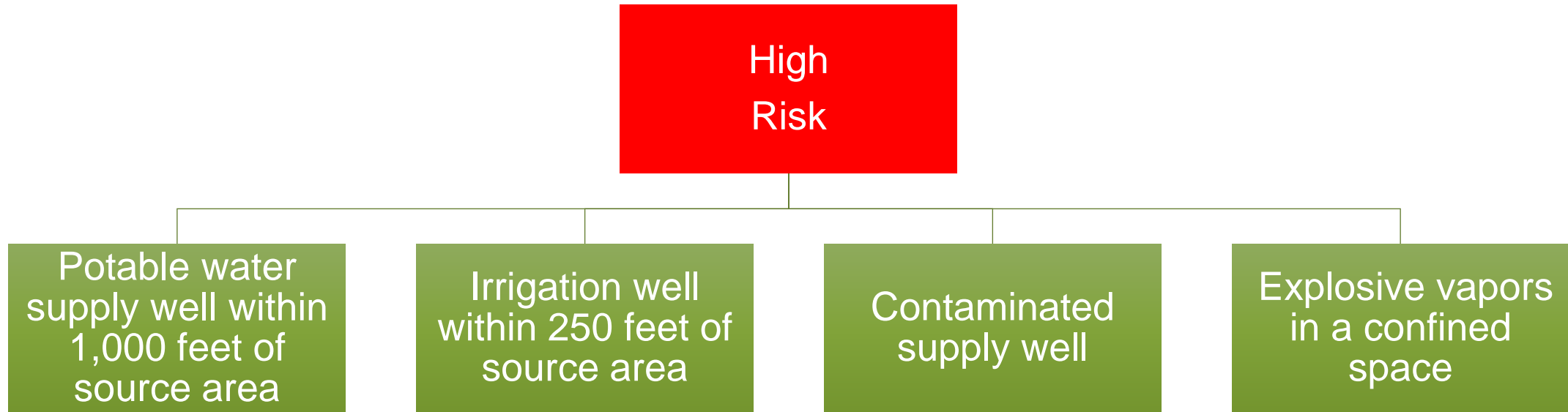
Risk-Based Remediation: Petroleum Contaminated Sites

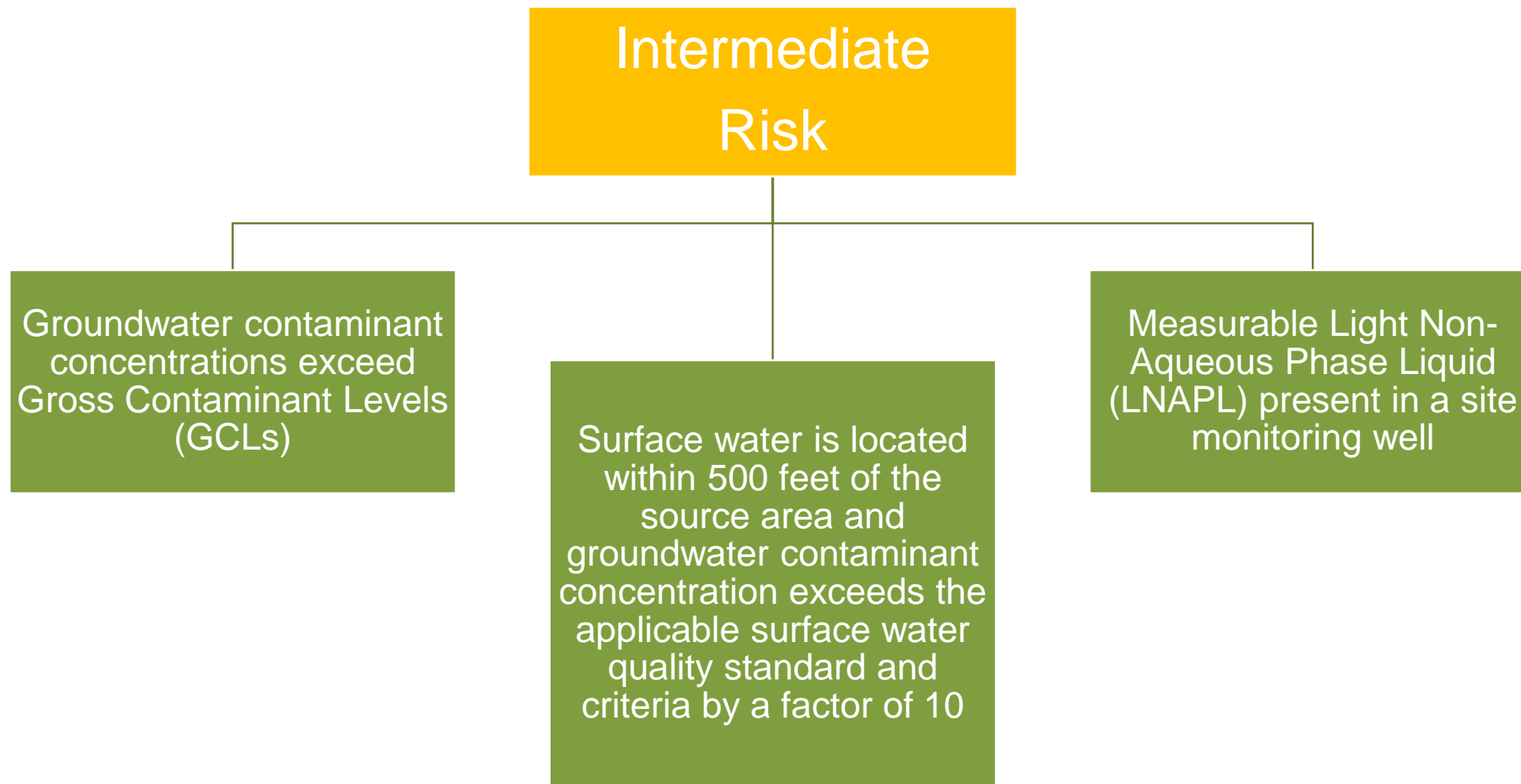
UST Program	Non-UST Program
❖ Receives between \$25 and \$27 Million in fees and receipts per year.	❖ No funding mechanism
❖ Known obligation for clean-up is approximately \$800 Million.	❖ Known obligation for clean-up is approximately \$120 Million.

- Without a risk-based option to regulate, cleanup would proceed to unrestricted use standards at all sites.
- Cleanup to unrestricted use standards on all sites = increased per site cost of remediation.
- Typically, there is a 2 to 3 order of magnitude cost differential.

Risk Classification Categories



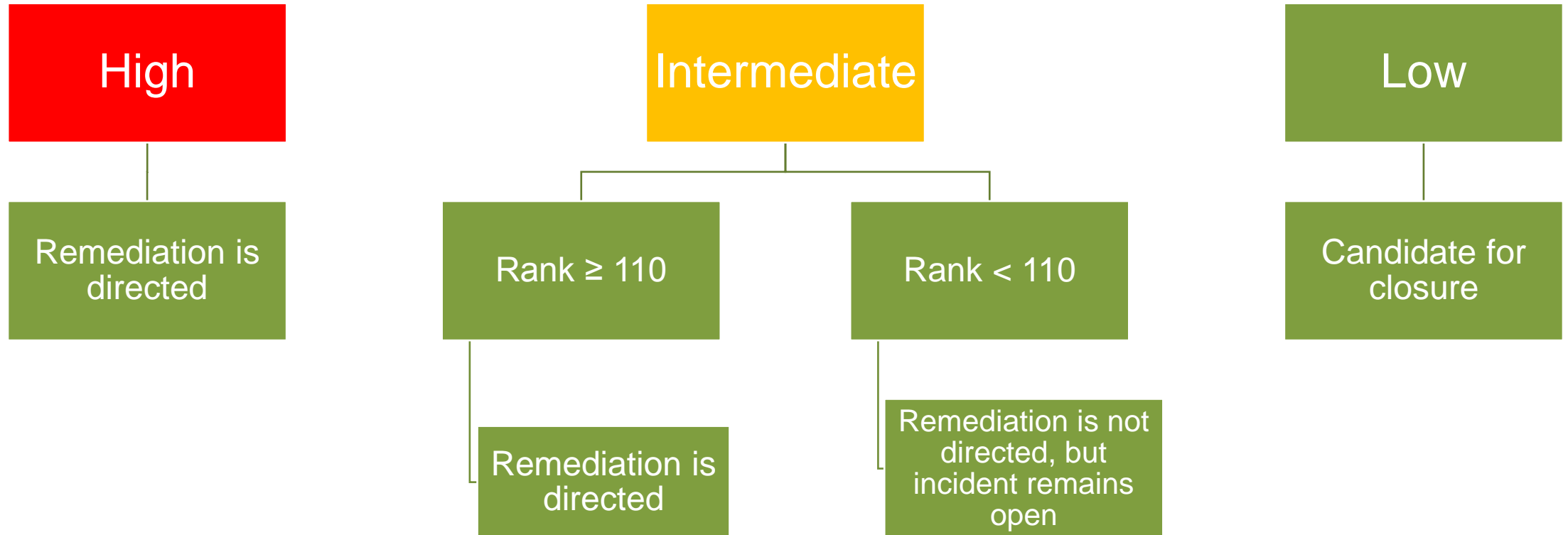




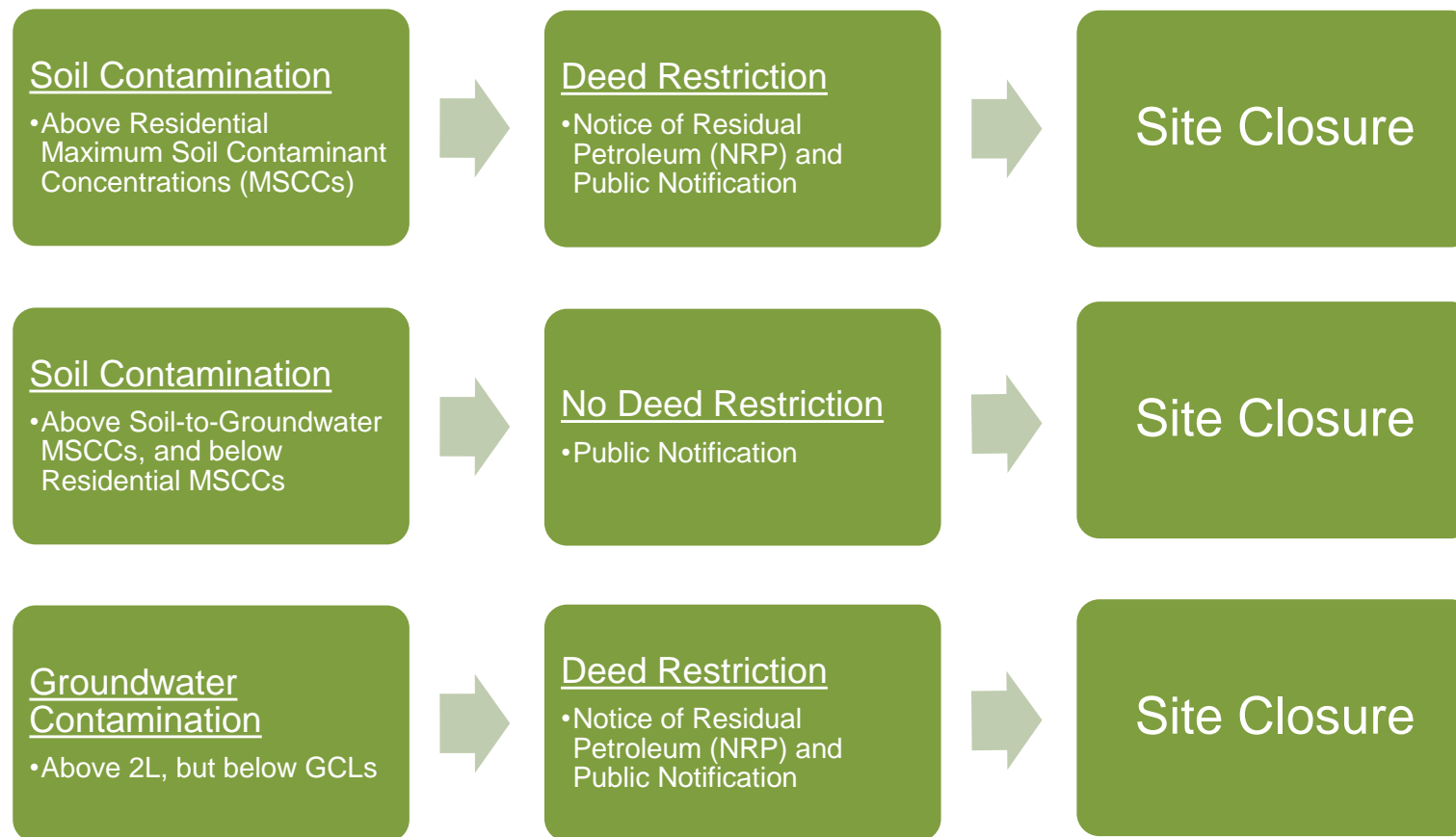
Low
Risk

The risk posed by a release does not meet any of the high or intermediate risk criteria or, based on site-specific information received by the Department, the release does not pose a significant risk.

Risk Classification Categories



Risk-Based Closure



Ex Situ Petroleum Contaminated Soil Remediation Permit Program



Department of Environmental Quality



Program Exclusions

- Chlorinated solvents, organic acids or other hazardous waste;
- Heavy oils;
- Petroleum refinery sludge;
- Spray irrigation from municipal or industrial wastewater treatment systems;
- Tars and asphalt;
- Industrial sludge, fly ash or other unapproved non-petroleum substances.

One-Time Land Application

Certificate of Approval (UST-71 Form)	One-Time Permit (UST-70 Form)
No certificate fee	\$480
Do not need to notify city or county	Notify city or county
Establish cover	Establish cover
$50 > \text{yd}^3 \leq 100$ applied at Minimum Rate	$> 100 \text{ yd}^3$ applied at Minimum Rate
$\leq 50 \text{ yd}^3$ applied at Conventional Rate	$> 50 \text{ yd}^3$ applied at Conventional Rate (periodic soil monitoring is required to track treatment progress and verify permit completion)
Use of leased area requires property owner permission	Use of leased area requires property owner permission

Minimum Rate = 1-inch max. thickness

Conventional Rate = 4-inch max. thickness

One-Time Land Application

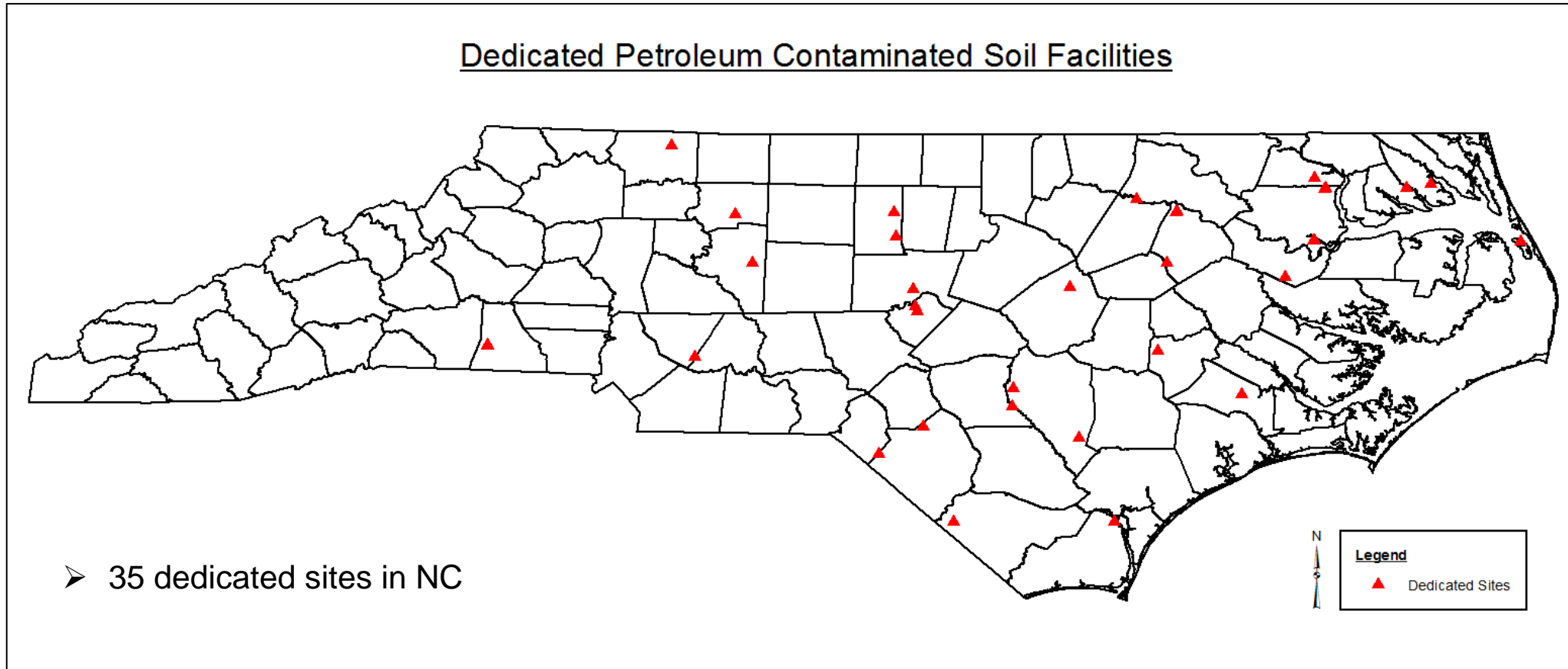
**NC DOT Facility
Martin County, NC**



Dedicated Contaminated Soil Facilities

- Routinely receive contaminated soil from different sources
- Land Farms
- Contain and Treat
- Production Facilities
- Permits are issued for up to five years
- Permits require soil, groundwater, and possibly surface water and air monitoring

Ex Situ Petroleum Contaminated Soil Remediation Permit Program



Land Application Site Considerations

1. Depth to seasonal high water table
2. Slope
3. Topsoil organic content
4. Soil textures
5. pH
6. Setbacks
7. Available area

Land Application

- No petroleum fuel contaminated soil should be permitted on sites where:
 - 1) Crop seedlings have just been planted or are expected to be planted within 30 days
 - 2) A food-chain crop is growing. Once a permit has been issued, food chain crops for human consumption may not be grown on the permitted fields until 12 months after the permit expires.
- No soil contaminated with heavy fuel oils (#4, #5 or #6), new, or used motor oils, shall be applied to sites where food-chain crops will be grown.

Land Application

- Conventional application rates are dependent upon the petroleum-fuel product involved, depth to seasonal high water table and application site vegetation.
- The contaminated soil and lime should be thoroughly incorporated into the top six to eight inches of the native soil by tilling or discing.
- To provide extra oxygen for waste biodegradation to proceed, the site should be re-tilled every six months following application. Straw or other bulking agents may be added to the native soil to encourage aeration and biological activity.

Setback Requirements

- Homes or place of public assembly not part of the site: 100 feet
- Any well with the exception of a Division approved groundwater monitoring well: 100 feet
- Surface waters (streams – intermittent and perennial, perennial water bodies, and wetlands): 100 feet
- Surface water diversions (ephemeral streams, waterways, ditches): 25 feet
- Groundwater lowering ditches (where the bottom of the ditch intersects the seasonal high water table): 25 feet
- Subsurface groundwater lowering drainage systems: 25 feet
- Any building foundation except treatment facilities: 15 feet

Setback Requirements Continued

- Any basement: 15 feet
- Any property line: 50 feet
- Any water line: 10 feet
- Any swimming pool: 100 feet
- Rock outcrops: 25 feet
- Public right-of-way: 50 feet
- 10 foot buffer around application area with a permanent vegetative cover in addition to any of the existing buffers where applicable.



Land Farms

**Sans Souci Land Farm
Bertie County, NC**



Ex Situ Petroleum Contaminated Soil Remediation Permit Program

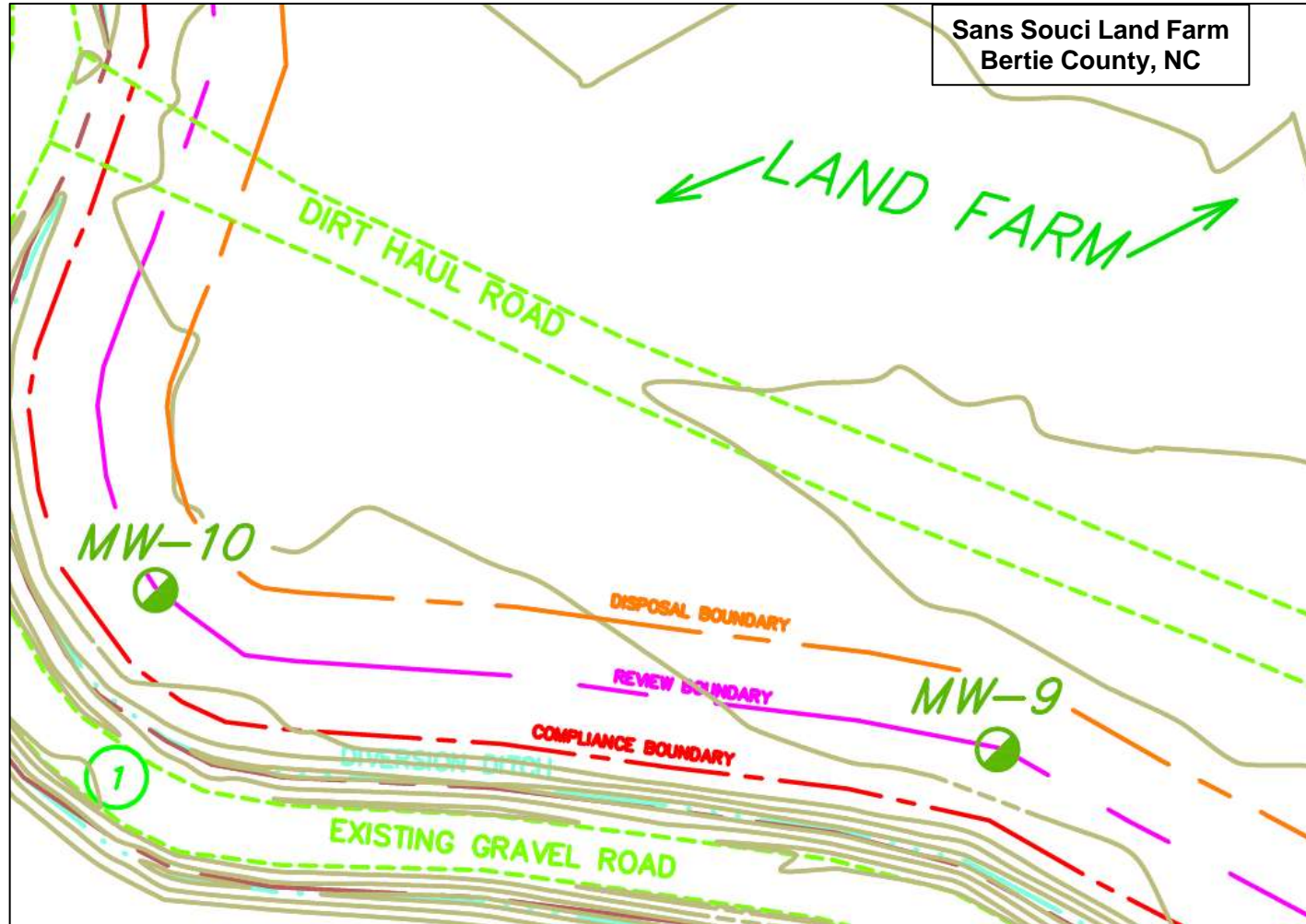
Land Farms



Land Farms



Land Farms



Land Farms

Pros	Cons
❖ Responsible party receives a Certificate of Disposal	❖ Transportation and disposal costs
	❖ Possible excavation delays while waiting for trucks to return

Mobile Thermal Treatment



Mobile Thermal Treatment

Pros	Cons
❖ Responsible party receives a Certificate of Destruction	❖ Requires a large quantity of soil to be cost-effective
❖ Create clean fill at large sites	
❖ No transportation costs	

Thermal Treatment Facility

Pros	Cons
❖ Responsible party receives a Certificate of Destruction	❖ Transportation costs
	❖ Possible excavation delays while waiting for trucks to return
	❖ Cost of treatment may be more than bringing to the landfill or a Dedicated Site

Containment In Brick, Asphalt or Other Production Facilities

Facility

Pros	Cons
❖ Reduction of mining operations	❖ Soil is often unusable or requires sifting
❖ Negative delivery cost for soil (production materials)	❖ QA/QC process is not cost-effective
❖ Responsible party receives Certificate of Destruction	❖ Permit cost

Responsible Party

Pros	Cons
❖ Responsible party receives Certificate of Destruction	❖ Transportation and disposal costs
	❖ Possible excavation delays while waiting for trucks to return
	❖ Cost of clean fill

Roadbed Incorporation (No Longer Used)

Pros	Cons
❖ Contaminated soil is capped by road	❖ NC DEQ couldn't issue permits fast enough for this to be a practical method for NC DOT
❖ NC DOT could "easily" deal with contaminated soils encountered during road construction projects	❖ Off-spec soils couldn't be used

- The UST Section would like to address the problem that Roadbed Incorporation was attempting to solve, and develop a practical solution with stakeholder input.
- Input from agencies outside of NC is also welcome.

Containment Inside an Enclosed Structure

Pros	Cons
❖ No erosion from runoff	❖ Limited space
❖ Risk of leaching is minimal	❖ Cost for transportation and disposal
❖ Responsible party receives Certificate of Disposal	

Containment On Impermeable Surfaces Open to the Environment

Bioremediation on plastic, bioremediation under a shed that has no sidewalls, composting operations involving windrows that are either covered with plastic or uncovered, or other facilities subject to weather.

Pros	Cons
❖ Responsible party receives Certificate of Disposal	❖ Plastic barrier not a viable option (Heavy Equipment)
	❖ Limited space
	❖ Transportation and disposal costs

Landfill Disposal

Pros	Cons
❖ Responsible Party receives a Certificate of Disposal	❖ Possible excavation delays while waiting for trucks to return
❖ More numerous than Dedicated Sites	❖ Transportation and disposal costs

Questions?



Department of Environmental Quality



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