# TRRP NAPL Guidance (NAPL done right)

## RTDF/TCEQ LNAPL-fest
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# NAPL Guidance Document

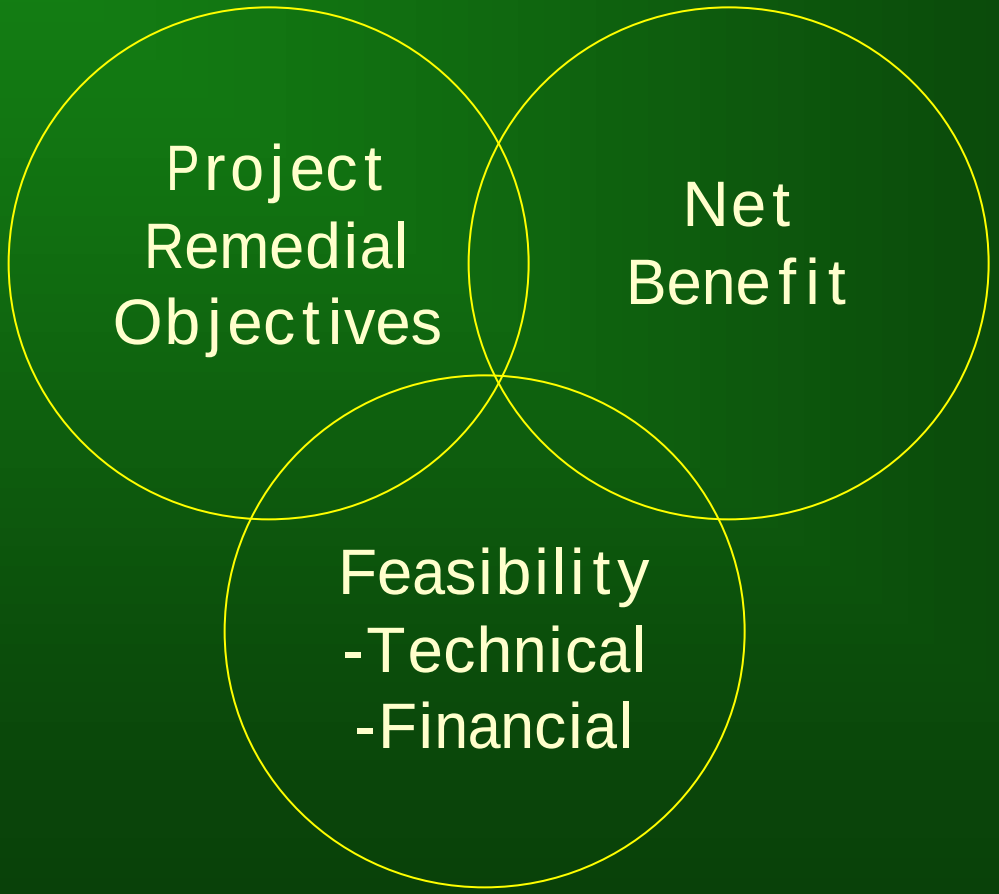
- *NAPL Evaluation and Recovery* (RG-366/TRRP-32)
- Explains TRRP NAPL management requirements in a procedural manner
- Assessment
- Recovery feasibility
  - Qualitative tools
  - Quantitative tools (trying)
- NAPL recovery effectiveness
  - Upfront considerations
  - Recovery limits
- Demonstrations
- www.tnrcc.state.tx.us/permitting/trrp.htm

# Purpose of Guidance

- Identify and describe NAPL management requirements
- Insights to facilitate compliance
- Encourage source area abatement
- Recognize the difficulty associated with NAPL recovery
- Determine endpoints for NAPL sites

NAPL = non-aqueous phase liquids

# Recover to the extent practicable????



# Topics

- Key Terms & Concepts
- NAPL Management Strategy
- TRRP NAPL Provisions
  - General
  - Remedy Standard A
  - Remedy Standard B

# Key Terms

- **NAPL Management** – recovery or control
- **Recovery** – removal or decontamination
  - Fluid recovery, excavation, volatilization, destruction
- **Control** – application of physical or institutional controls in addition to or in lieu of recovery

# The Gist of TRRP NAPL Management Requirements

- Is there any current real risk (explosive condition; human exposure)? If so – eliminate it
- If in class 1 – clean it up or do involved TI
- If in class 2 or 3 – clean it up; OR
- If in PMZ – "recover readily recoverable"
- If in surface water, clean it up
- If in soil, clean it up or control

# NAPL Interim Action/Abatement (§350.1)

- Stop the NAPL release
- Abate safety hazards
- Explosive conditions §350.31(c)
- Extent/spreading

Get things under control before you start to worry about TRRPing!

# TRRP's NAPL Concern

common examples of current risks

Volatilization

NAPL Migration

Leaching to Groundwater

Direct Contact

Surface Impacts

Nuisance

- Visual
- Odors

10 feet

- Surface Use

# What is the NAPL concern at the site?

- Explosive vapors
- Volatilization of toxics
- Sourcing dissolved plume and ingestion
- NAPL toxicity
- NAPL mobility
- Aesthetic/nuisance

# NAPL Assessment

- Determine if NAPLs present
- NAPL distribution
- NAPL Characteristics (density, viscosity, volatility, single or multi-component)
- NAPL Mobility
  - Evaluate potential NAPL mobility (observation)
  - If soil COC concentration > residual saturation = evaluate for presence of mobile NAPL (§350.75(i)(10))
  - Tier 1 residual saturation concentration is 10,000 mg/kg
- Consequence if NAPLs remain
  - Explosive conditions or hazards
  - NAPL spread, surface discharges

# Your Brain on TRRP NAPL Management

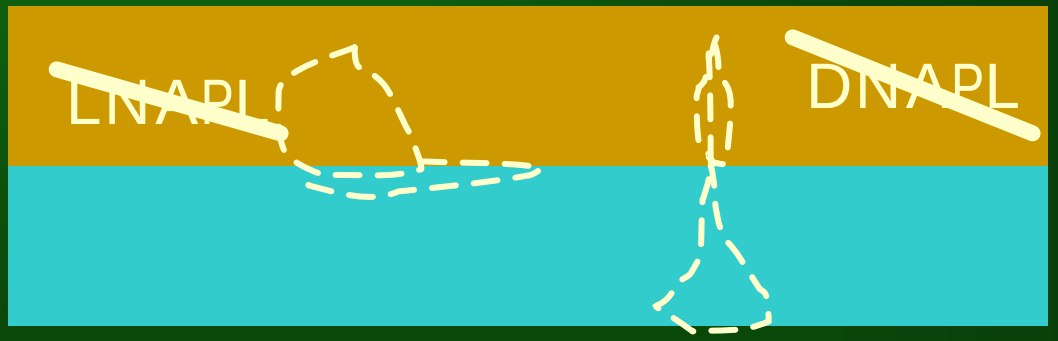
| NAPL MANAGEMENT PROCESS | KEY DECISION POINTS |
| --- | --- |
| Determine if NAPL is present. | If not present, No Further Action |
| Determine NAPL response objective. | Explosive, aesthetic, or nuisance conditions must be addressed. |
| Determine if NAPL recovery is to be applied (see Figure4). | If recovery not applied, then implement a control (e.g., cap, monitor NAPL in PMZ). Complete TI demonstration if required. Decide this based on groundwater classification; whether a PMZ can be established, and other factors (see Figure 4). |
| If recoverable, select appropriate remediation technology based on response objective and primary NAPL property (Table 1). | Remediation technology must address governing property that controls NAPL recoverability. |
| Determine primary recovery endpoint | If primary endpoint is met, No Further Action. If primary endpoint is not achievable, apply alternative endpoint (TI may be required(TI may be required). |
| If primary recovery cannot be met, determine alternative recovery endpoint (TI may be required).(TI may be required). (Table 4). | If alternative endpoint is met, No Further Action. |

# Remedy Standard A – clean it up

- Recover NAPL
- Remove/decon. to critical PCL
- Addressing toxicity and/or nuisance

Pre-Remedy Standard A

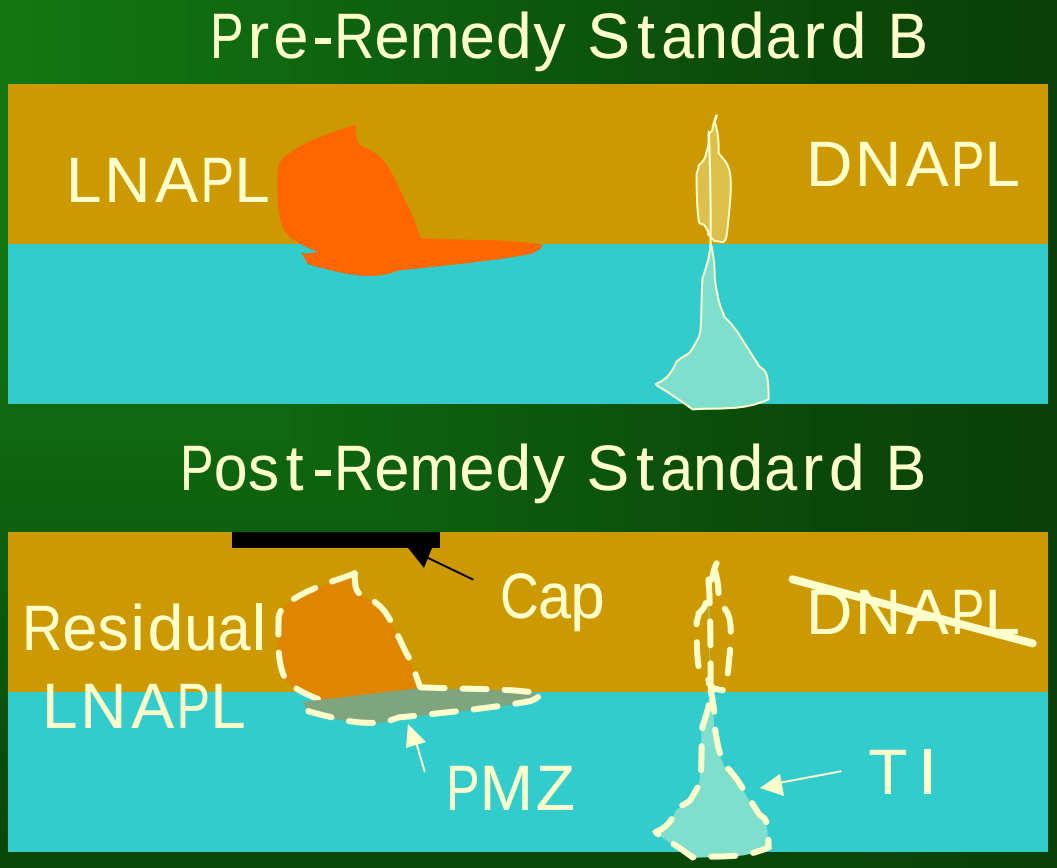

Post-Remedy Standard A




In summary, there ain't no NAPL left!

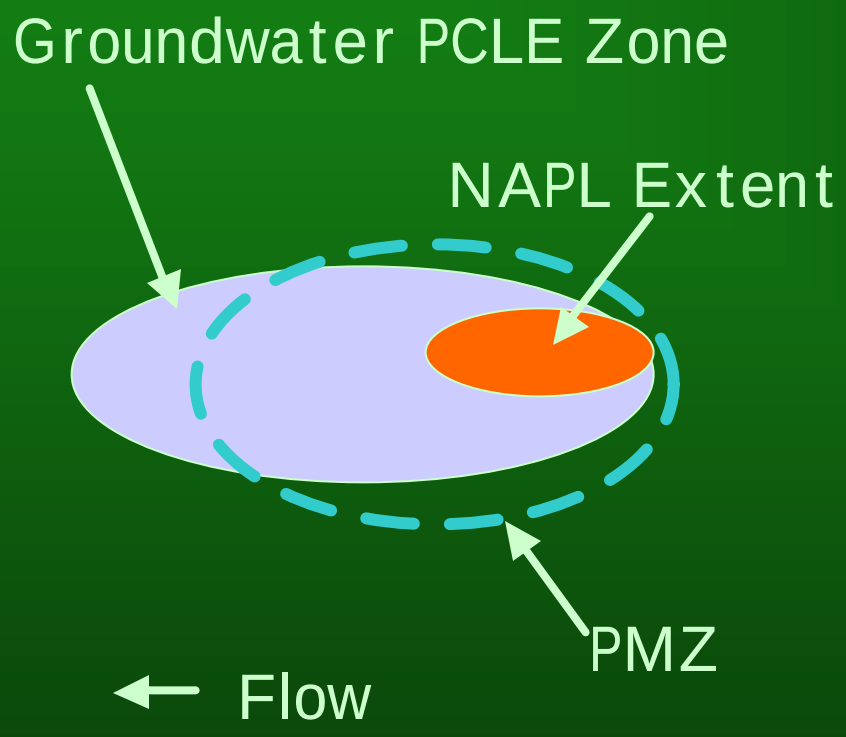
# Remedy Standard B – clean it up and or control it

- Recover NAPL to critical PCL or control NAPL
- Addressing toxicity and/or nuisance
- Groundwater [§350.33(f)]
  - WCU
  - PMZ
  - TI




WCU = waste control unit PMZ = plume management zone TI= technical impracticability

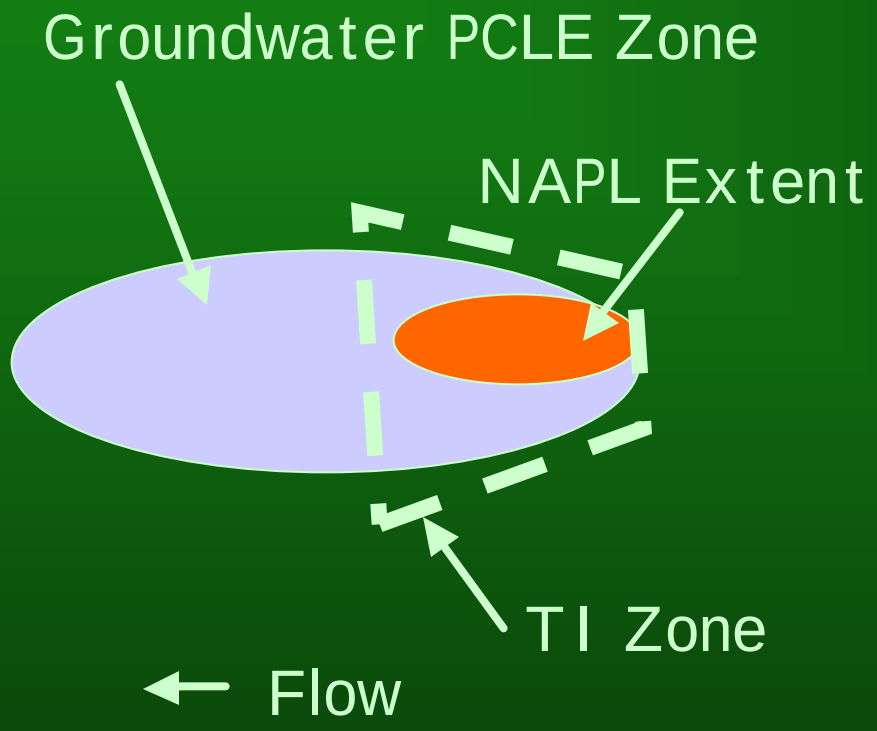
# Plume Management Zone
## you can implement IC or deed restrictions




- Class 2-3 groundwater
- Within PMZ, recover NAPLs "to the extent practicable"
- "readily recoverable"
- Beyond PMZ, meet critical PCLs
- Proposed in a RAP

PMZ = plume management zone  RAP = response action plan  PCLE= protective concentration level exceedence

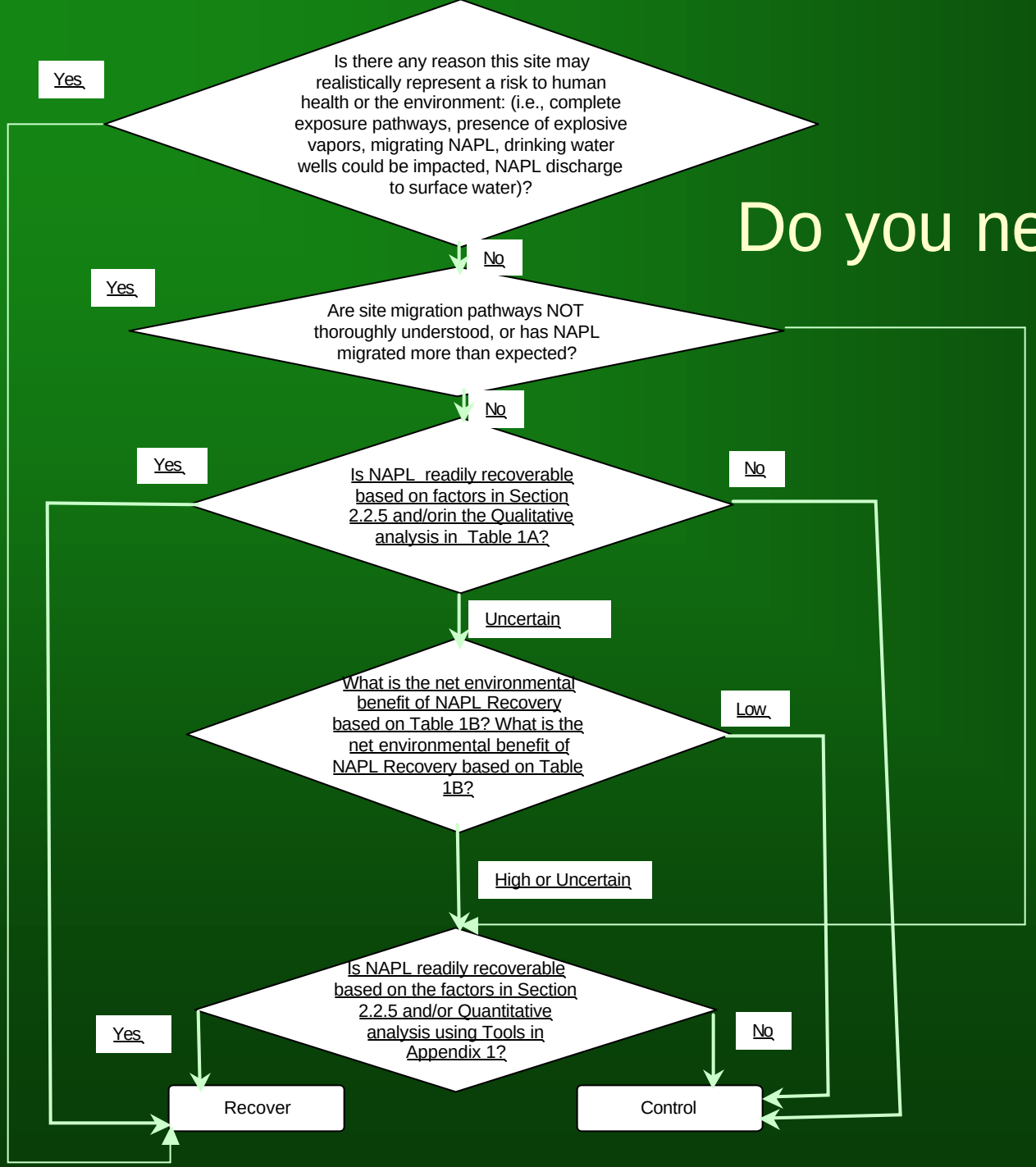
# Technical Impracticability




- Within TI zone, recover NAPLs "to the extent practicable"
- Beyond TI zone, meet critical PCLs
- Propose TI in RAP

TI = technical impracticability RAP = response action plan PCLE= protective concentration level exceedence

# Do you need to recover?



# Readily Recoverable (qualitative)

| CHARACTERISTIC | PARAMETER | CONDITIONS INDICATING NAPL RECOVERABILITY POTENTIAL IS: | | |
|---|---|---|---|---|
| | | LOW LIKELIHOOD NAPL is Readily Recoverable | MODERATE LIKELIHOOD NAPL is Readily Recoverable | HIGH LIKELIHOOD NAPL is Readily Recoverable |
| PHYSICAL PROPERTIES | • NAPL Viscosity *(free-phase NAPL only)* | High Viscosity (> 2 cp) | Moderate Visc. (0.9 to 2 cp) | Low Viscosity (< 0.9 cp) |
| | • NAPL Volatility *(vadose zone only)* | Low Volatility (< 1 mm Hg) | Moderate Volat. (1 - 5 mm Hg) | High Volatility (> 10 mm Hg) |
| REMEDIATION FACTORS | • Potential for Excavation *(vadose zone NAPL only)* | Deep (NAPL>15' deep) | Moderate Depth (5 – 15' deep) | Shallow (NAPL< 5' deep) |
| | • Accessibility | Poor (i.e., below bldg.) | Moderate (some obstruc.) | Good (no obstructions) |
| NAPL OCCURRENCE | • NAPL Distribution | Residual NAPL | Potentially Mobile (NAPL) | Mobile NAPL |
| | • NAPL Location | Fractures or Deep Saturated Zone | On or Shallow Saturated Zone | Vadose Zone |
| HYDRAULICS/FLOW | • Permeability | $K = 10^{-4}$ cm/sec k= 0.10 darcies | $10^{-4}<K<10^{-2}$ cm/sec 0.1<k<10 darcies | $K = 10^{-2}$cm/sec k= 10 darcies |
| GEOLOGY | • Soil Type | Clay | Silty/Sand | Gravel |
| | • Stratigraphy | Complex and poorly understood geologic processes | Moderately complex geologic processes | Well defined geologic processes |

Table 1A

# Net Environmental Effect

| CHARACTERISTIC | PARAMETER | NET ENVIRONMENTAL BENEFIT OF NAPL RECOVERY: | | |
|---|---|---|---|---|
| | | LOW | MODERATE | HIGH |
| BENEFITS | Site Use | No impact on use | Potential for improvement in site use | Beneficial use of site clearly improved |
| | Priority for Resource Allocation | Financial resources are redirected for other potentially more beneficial response actions (such as capping, more reliable containment system, etc.) | Cost-effective based on $$ per volume but marginal improvement to environment. | NAPL is primary risk driver at site; therefore cost of recovery mitigates problem. |
| | Consequences of Failure of Physical Control | No adverse consequences | Potential adverse effect | Definite adverse effect. |

Table 1B

# NAPL Recovery Feasibility

Informal Decision

Or

Formal Technical Impracticability

Prior NAPL recovery attempt not always required:

- Exposure Risk
- On or Off-site
- Landownership
- Environmental sensitivity

- Response Objective
  - (e.g. Class 1 groundwater)
- Exposure potential/impact
- Landowner consent to institutional control

TI concept applies to all environmental media