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Proposed Amended Rule 1178 – Further Reductions of VOC Emissions from Storage Tanks at Petroleum Facilities

WORKING GROUP MEETING 7
JANUARY 5, 2022

JOIN ZOOM MEETING
HTTPS://SCAQMD.ZOOM.US/J/93814044899
MEETING ID: 938 1404 4899
TELECONFERENCE DIAL-IN: 1-669-900-6833

Agenda

- Summary of Working Group Meeting #6
- Public Comment and Responses
- Technology Assessment
- Updated Cost-Effectiveness
- Proposed Rule Concepts
- Rule Timeline

Summary of Working Group Meeting #6

- Staff responded to a comment letter submitted to South Coast AQMD by EarthJustice on August 10, 2022
- Staff presented updated cost-effectiveness for doming crude external floating roof tanks and requiring secondary seals on internal floating roof tanks

PUBLIC COMMENT AND RESPONSES

Doming

Comments:

- 50-year useful life of domes not consistent with assumptions made in AQMP, CARB scoping plan, and Rule 1178 adoption

- Storage tanks may not be operated in 50 years

Staff Responses:

- 50-year useful life provided by 2 dome suppliers
- Field observations of 20-year-old domes suggests domes may last 50 years

- Staff is open to considering permit conditions to remove tanks from service upon a future date in lieu of doming
- Seeking information from facilities about timelines for removing tanks from service

Alternative Monitoring Requirements

Comments:

- Consider alternative methods to Optical Gas Imaging (OGI) inspections for fixed roof tanks

Staff Responses:

- Proposing to allow Method 21 inspections at same inspection frequency as OGI inspections for all tanks in lieu of OGI inspections

TECHNOLOGY ASSESSMENT

Vapor Recovery for Floating Roof Tanks

- Discussed feasibility of using vapor recovery on floating roof tanks with suppliers
  - No installations on floating roof tanks for continuous emissions control
  - Unknown configuration/operational drawbacks for using vapor recovery
    - Conventional systems require vapor collection from closed system
      - Floating roof tanks open to atmosphere
  - Unknown result of using vapor recovery on floating roof tanks
    - Expected high energy demand and associated NOx emissions to operate vapor recovery on floating roof tanks open to atmosphere
    - Unknown efficiency for reducing emissions

Staff Conclusion

Insufficient data to determine technical feasibility and effectiveness of using vapor recovery on floating roof tanks

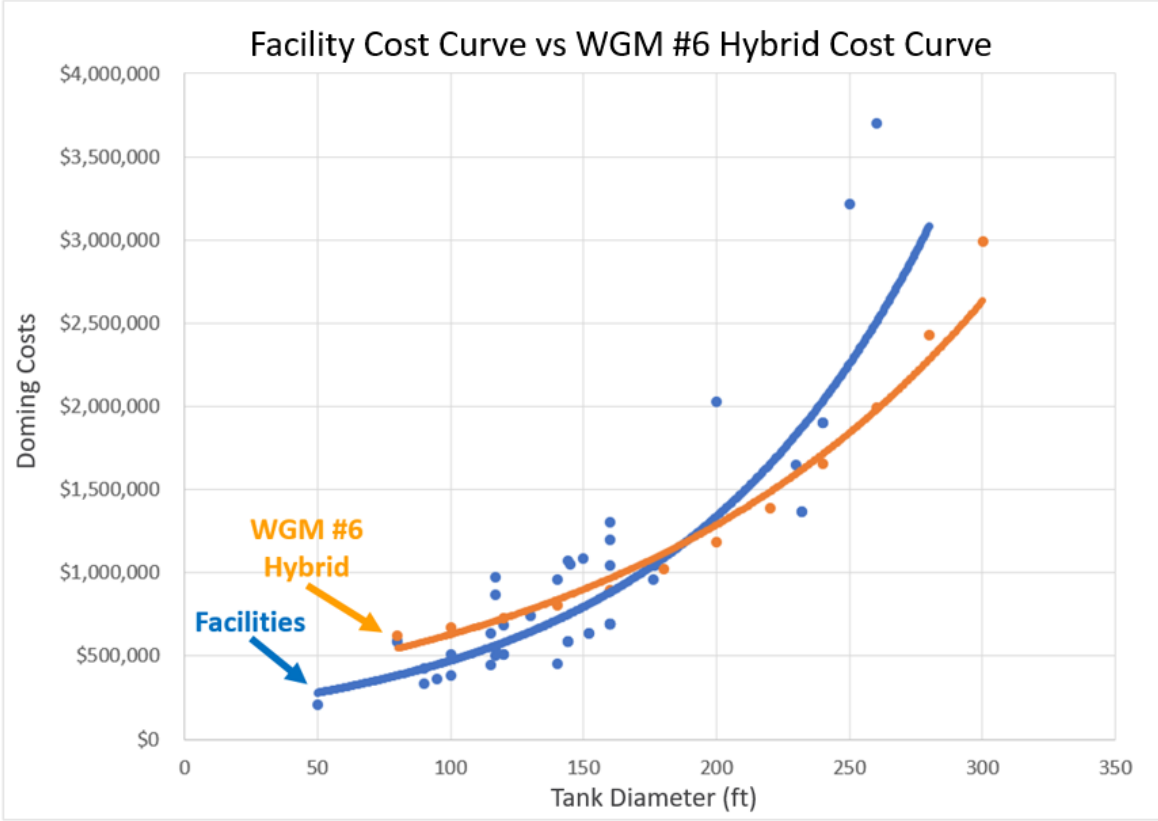
UPDATED COST-EFFECTIVENESS

Updated Costs – Doming Crude External Floating Roof Tanks

- Revised costs based on additional facility cost information and proposed implementation schedule

Additional Facility Cost Information

- Updated costs to reflect additional cost information from facilities to dome 33 tanks 50’-260’ in diameter
- Total of 7 facilities provided estimates for doming 45 tanks
  - Increased total costs for tanks ≥ 200’ in diameter
  - Decreased total costs for tanks < 200’ in diameter



Proposed Implementation Schedule

- Proposing installation of domes upon next API internal inspection after January 1, 2026
  - Reduces cost impacts from tank cleaning/degassing and loss of productivity/capacity

Updated Costs – Doming Crude External Floating Roof Tanks *(continued)*

Tank Cleaning/Degassing Costs

- Cleaning/degassing costs not considered in cost-effectiveness analysis for doming
  - Tanks already out of service for API internal inspections

Loss of Capacity Cost

- Working Group Meeting #6 – assumed cost of $0.50 per barrel (based on facility estimates) to lease tank off-site during doming construction for tanks ≥ 200’ in diameter
- Revised loss of capacity costs based on API inspection timelines
  - Loss of capacity costs assumed for all tanks only for number of days beyond API inspection
    - Assumptions based on stakeholder and vendor discussions:
      - Tank is out of service for API inspection for ~6 weeks
      - ~12 weeks to install dome on large tank (230’-250’ in diameter)
        - Applied to tanks > 160’ in diameter
      - ~6 weeks or less to install tanks ≤ 160’ in diameter
  - Decreased total loss of capacity costs

Updated Cost-Effectiveness – Doming Crude External Floating Roof Tanks

- Updated emission reductions based on updated tank information
- Updated cost-effectiveness:

	Total Costs ($)	Total Emission Reductions Over 50 Years (tons)	Cost-Effectiveness ($/ton)
WGM #6	$73,807,300	2,262	$32,600
WGM #7	$72,427,000	2,233	$32,400

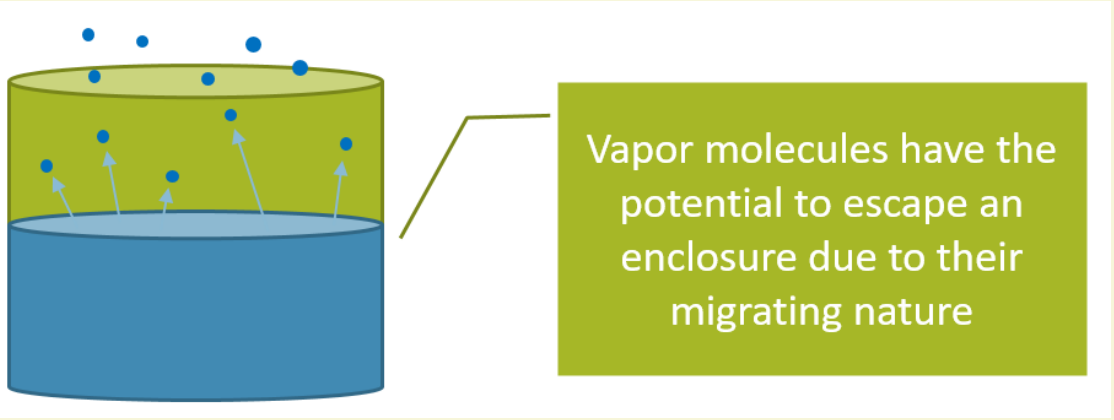
Staff Recommendation

Doming required for all tanks storing crude oil

Alternative to Doming Crude External Floating Roof Tanks

- Staff analyzed emission reductions from requiring permit conditions to limit Reid vapor pressure (RVP) of stored crude
- RVP values affect emissions and potential for leaks to occur
  - Measure of likelihood of liquid to vaporize
  - More vapor molecules form when substances have higher RVP

Working Group Meeting #1



Alternative to Doming Crude External Floating Roof Tanks *(continued)*

- Calculated RVP at which equivalent emission reductions to doming result
  - Equivalent emission reductions to doming can result from limiting crude stored to approximately 4 psia

Staff Recommendation

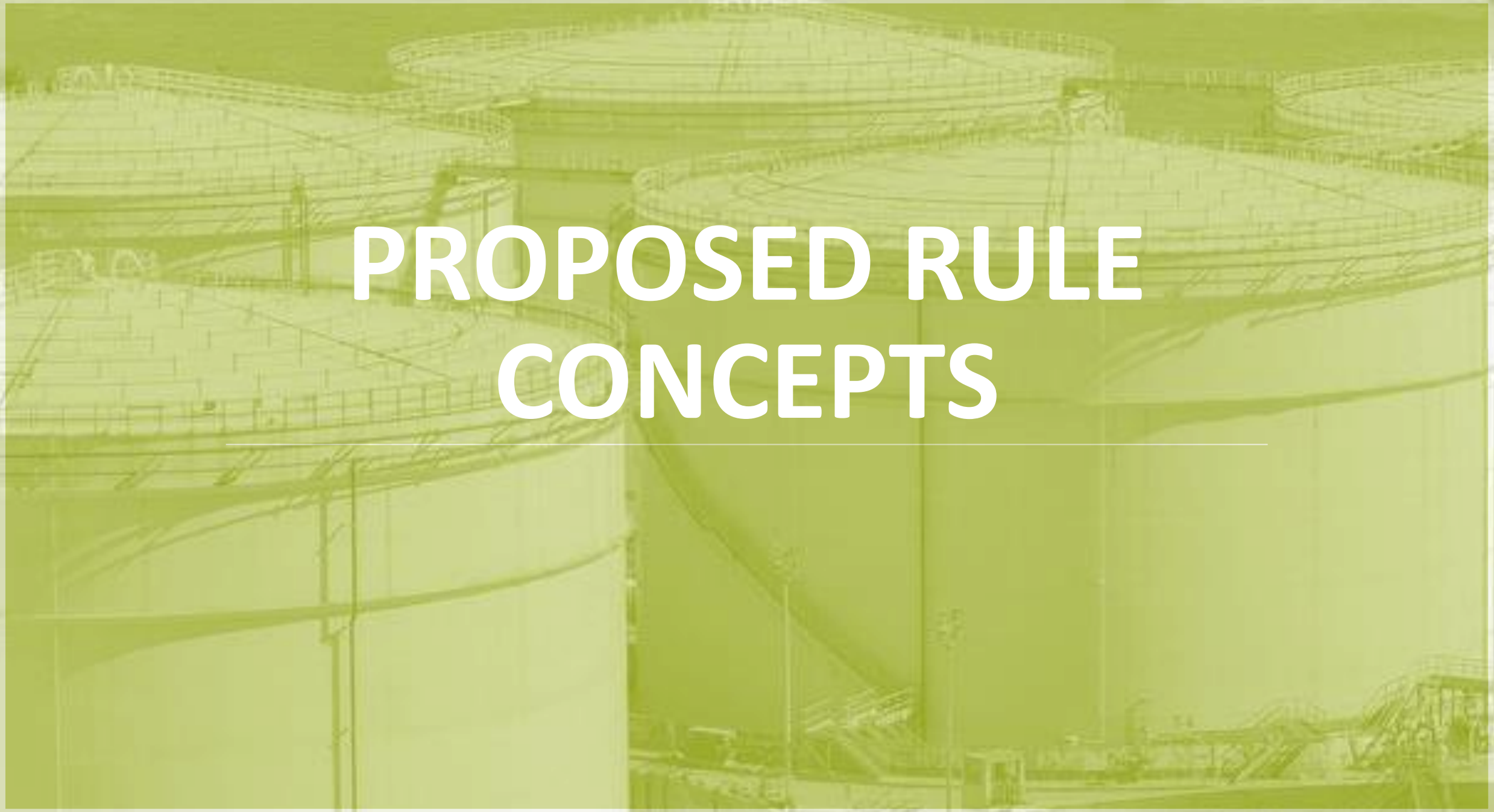
Allow permit condition to limit stored crude RVP to 4 psia in lieu of doming

Updated Cost-Effectiveness – Requiring Secondary Seals on Internal Floating Roof Tanks

- Staff received additional cost information from one facility and two suppliers
- Revised average cost to install complete secondary seal based on all cost estimates: $220 per linear foot ($163 per linear foot used in Working Group meeting #6)
- Cost to replace rubber components: $42 per linear foot
- Equipment life: Stainless steel components = 20 years, rubber components = 10 years
- Proposing implementation when tank is next emptied or degassed
  - No costs considered for tank cleaning/degassing
- Analysis included tanks without secondary seals that store material with TVP > 0.1 psia (8 tanks)
- Total costs
  - Complete seal installation (every 20 years): $299,640
  - Permitting (one-time cost): $72,000
  - Replace rubber components (10 years after complete seal installation): $57,200
- Total cost-effectiveness: $428,840 / (0.97 tpy * 20 years) = $22,100 per ton VOC reduced

Staff Recommendation

Require secondary seals on internal floating roof tanks upon next tank cleaning/degassing



PROPOSED RULE CONCEPTS

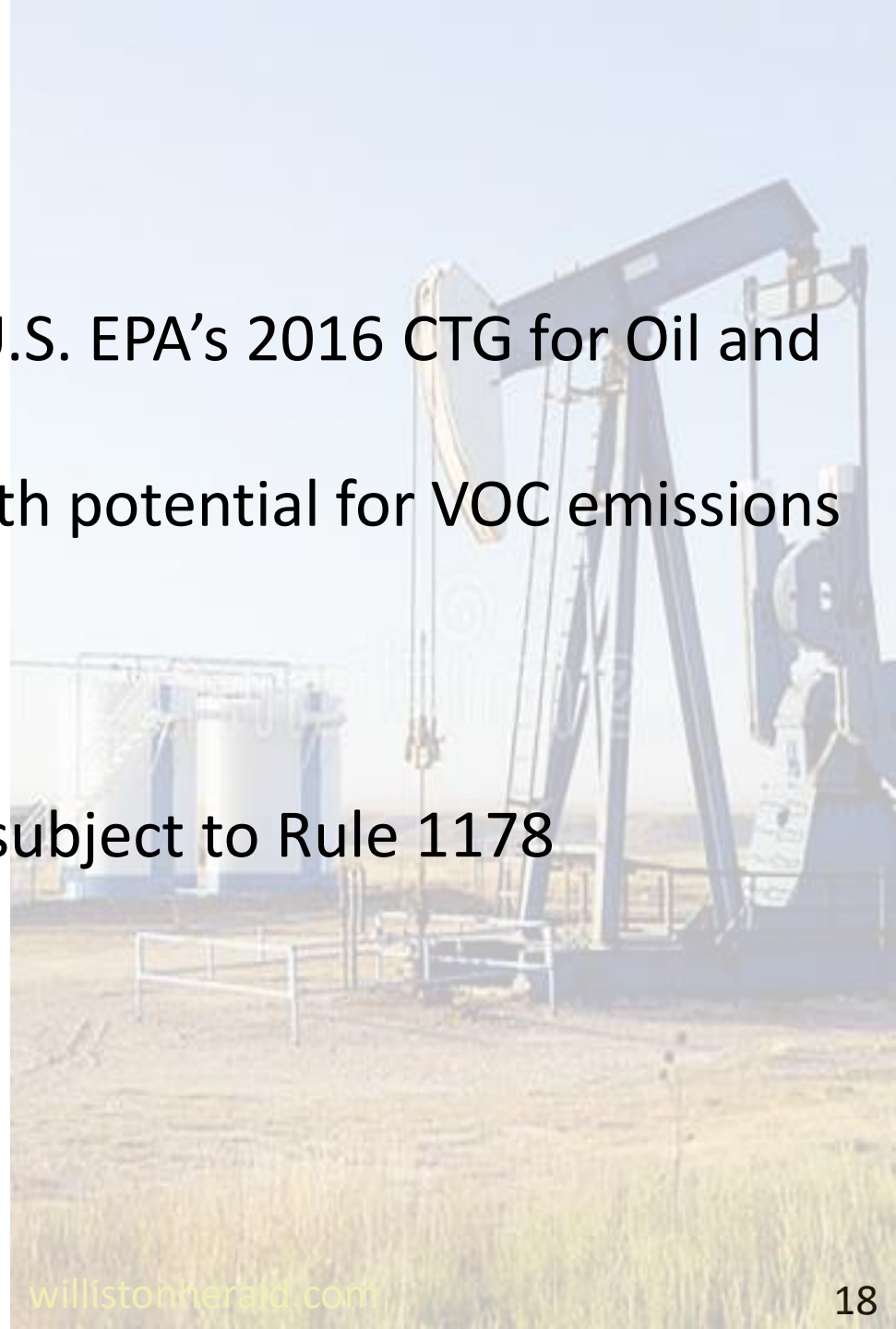
Proposed Revisions

- Proposed revisions based on guidance from U.S. EPA and technology assessment for feasible and cost-effective control and monitoring methods to reduce emissions
  - Applicability
  - Gap requirements for floating roof tanks
  - Vapor recovery requirements for fixed roof tanks
  - Secondary seal requirements for internal (IFR) and domed external floating roof (EFR) tanks
  - Doming requirements for external floating roof tanks
  - Optical gas imaging monitoring requirements for all tanks
    - Procedure
    - Recordkeeping
    - Reporting

Applicability

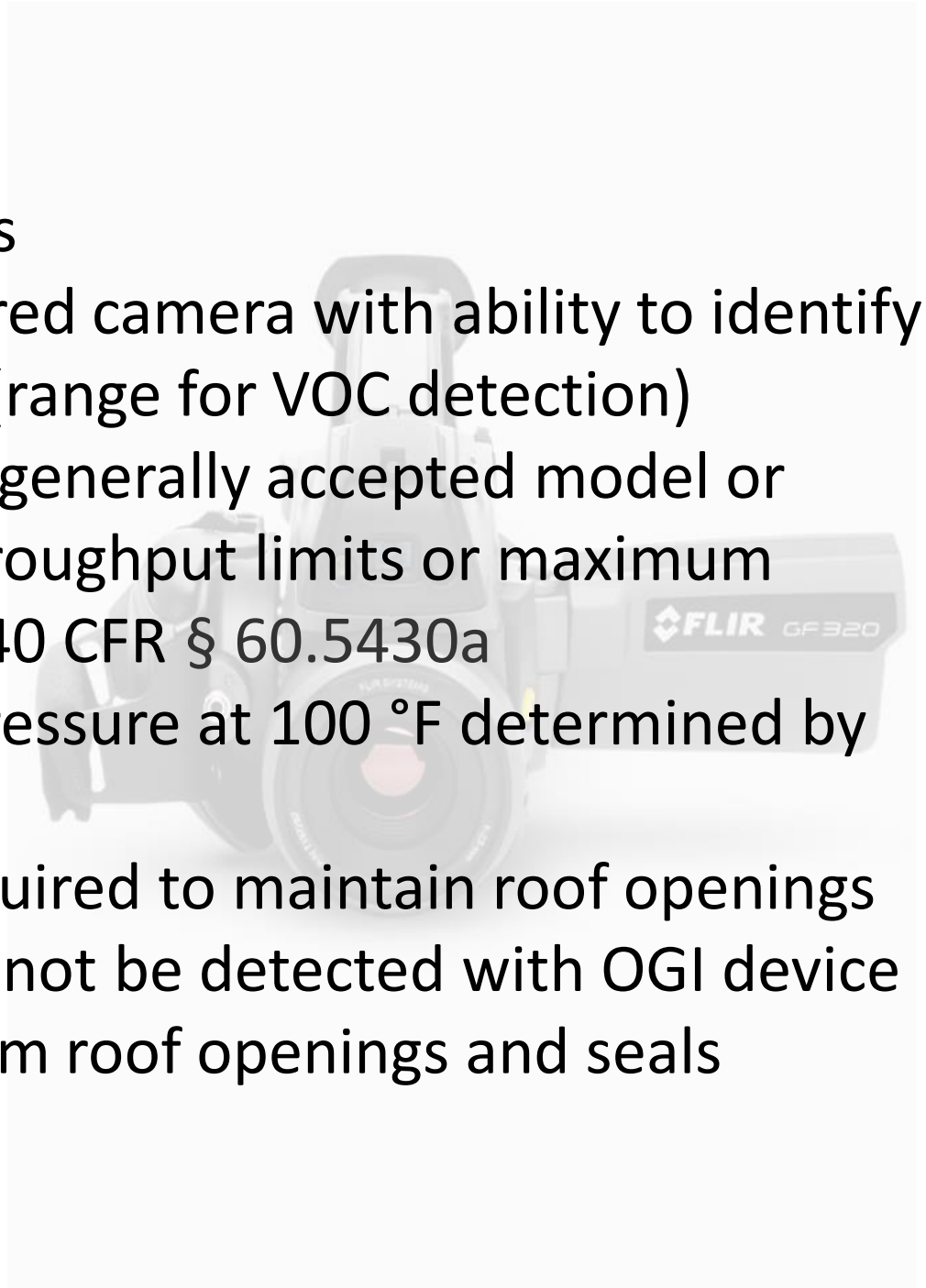
- Updated applicability to reflect stringency of U.S. EPA's 2016 CTG for Oil and Gas Industry
  - Requires 95% emission control for tanks with potential for VOC emissions of 6 tons per year or more

- Effective upon date of adoption
  - Not expected to affect any tanks currently subject to Rule 1178



Definitions

- Definitions to clarify new rule requirements
  - Optical gas imaging (OGI) device – infrared camera with ability to identify gases in 3.2-3.4 micrometer waveband (range for VOC detection)
  - Potential for VOC Emissions – based on generally accepted model or calculation methodology and permit throughput limits or maximum average daily throughput as defined in 40 CFR § 60.5430a
  - Reid vapor pressure – absolute vapor pressure at 100 °F determined by ASTM D-323
  - Visually Leak Free Condition – tanks required to maintain roof openings and seals in condition where vapors cannot be detected with OGI device
    - Leak considered as visible vapors from roof openings and seals identifiable with OGI device

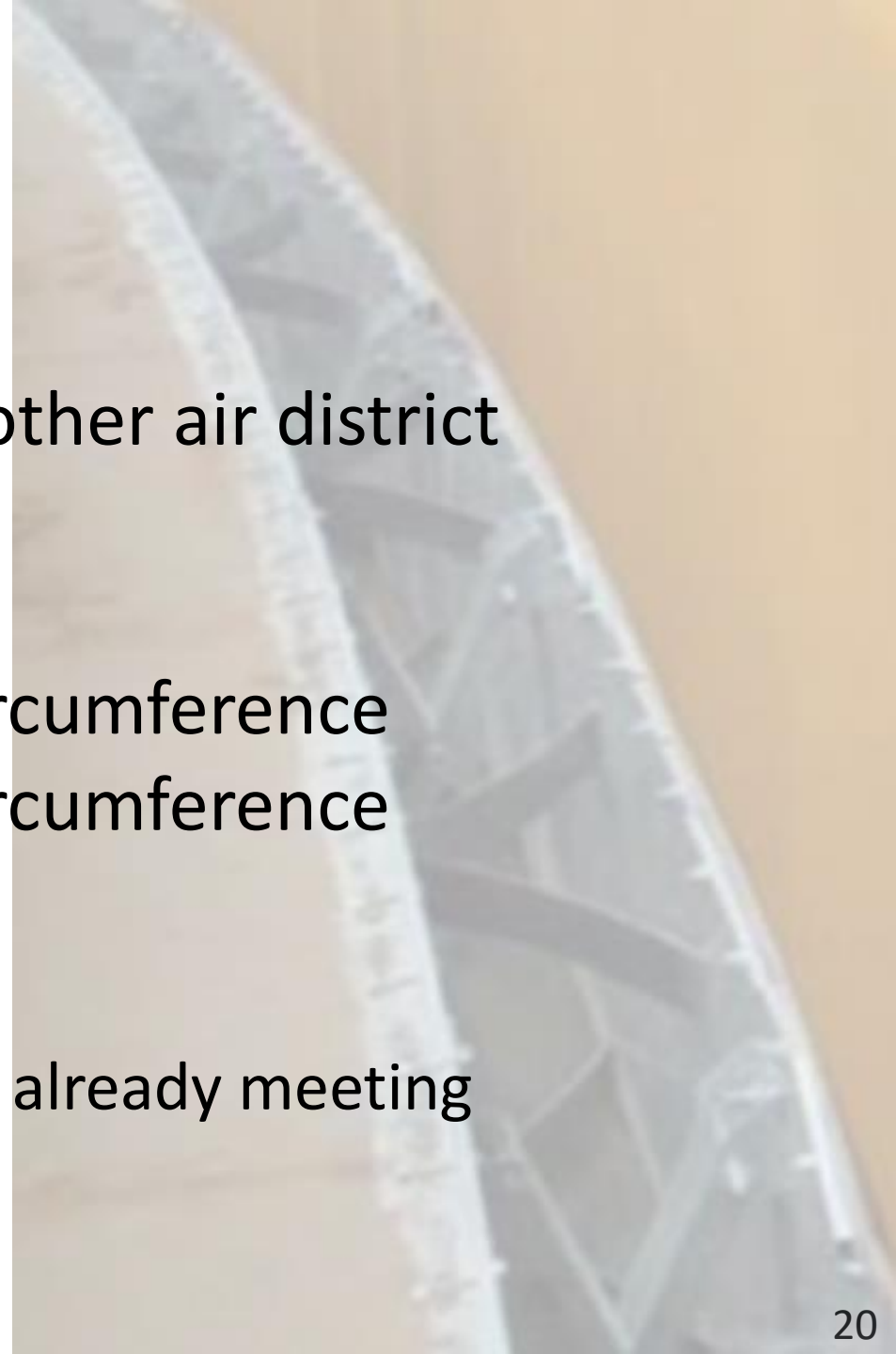


Gap Requirements

- Updated primary seal gap requirements
  - Reflect requirements of U.S. EPA and other air district requirements

- Gaps > 1/2 inch cannot exceed 10% of circumference
- Gaps > 1/8 inch cannot exceed 30% of circumference

- Effective upon date of adoption
  - Current inspection reports suggest all tanks already meeting proposed gap requirements



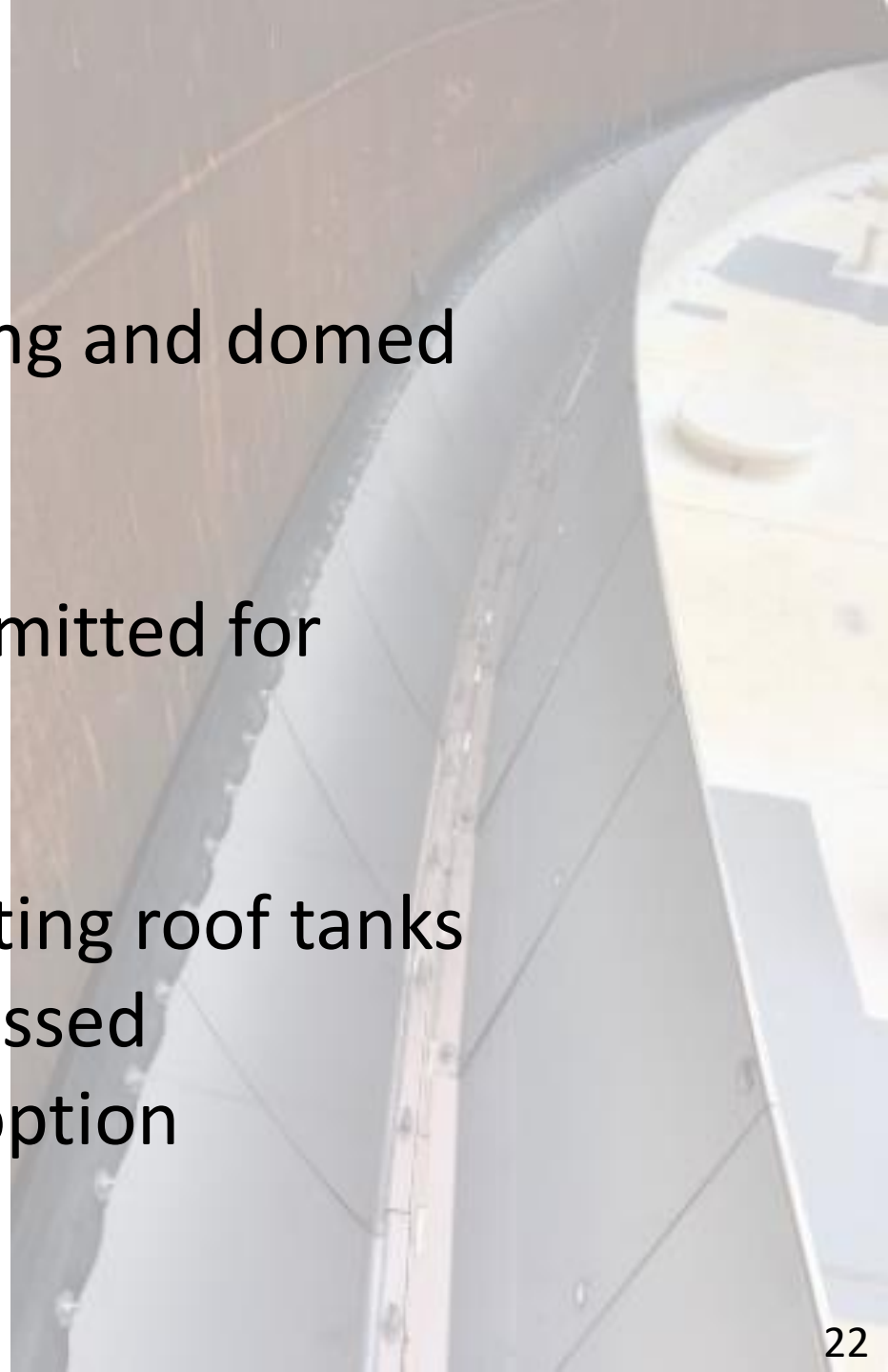
Vapor Recovery

- Require 98% emission control efficiency on all fixed roof tanks

- Effective upon date of adoption
  - Current operating emission control systems already meet proposed control efficiency

Secondary Seals

- Require secondary seals for internal floating and domed external floating roof tanks
- All domed external floating roof tanks permitted for secondary seals
- Implementation schedule for internal floating roof tanks
  - When tanks are next emptied and degassed
  - No later than 10 years after date of adoption

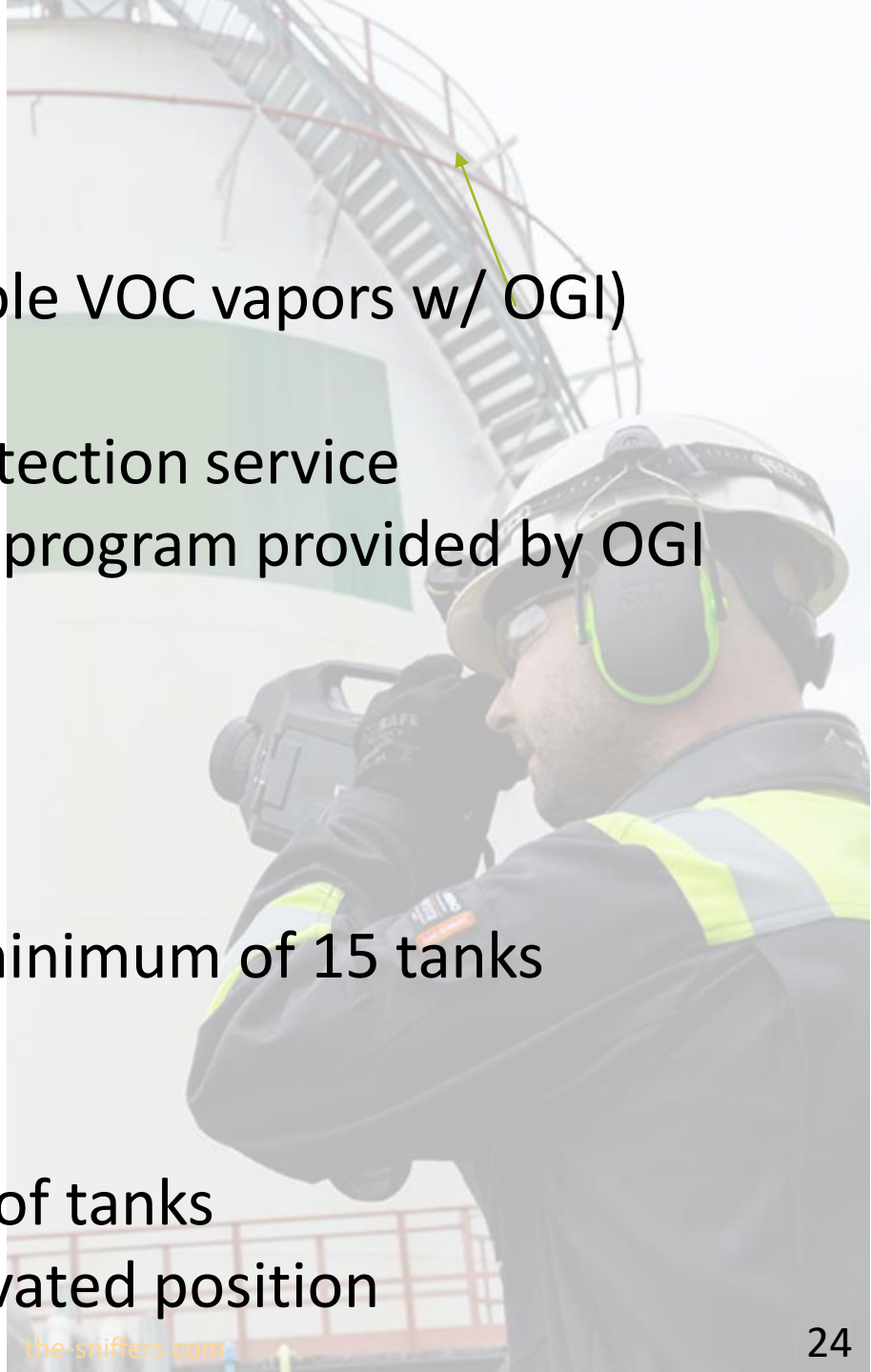


Doming

- Require domes for external floating roof tanks storing organic liquid containing more than 97% by volume crude oil
- Alternative option to doming
  - Permit condition may be taken to limit stored crude RVP to 4 psia if application submitted by January 1, 2026
    - Monthly testing of RVP required using ASTM D-323
- Effective implementation date for doming of January 1, 2026
  - Doming required upon next API 653 internal inspection after January 1, 2026
  - Require facilities to submit API inspection/doming schedule by January 1, 2026

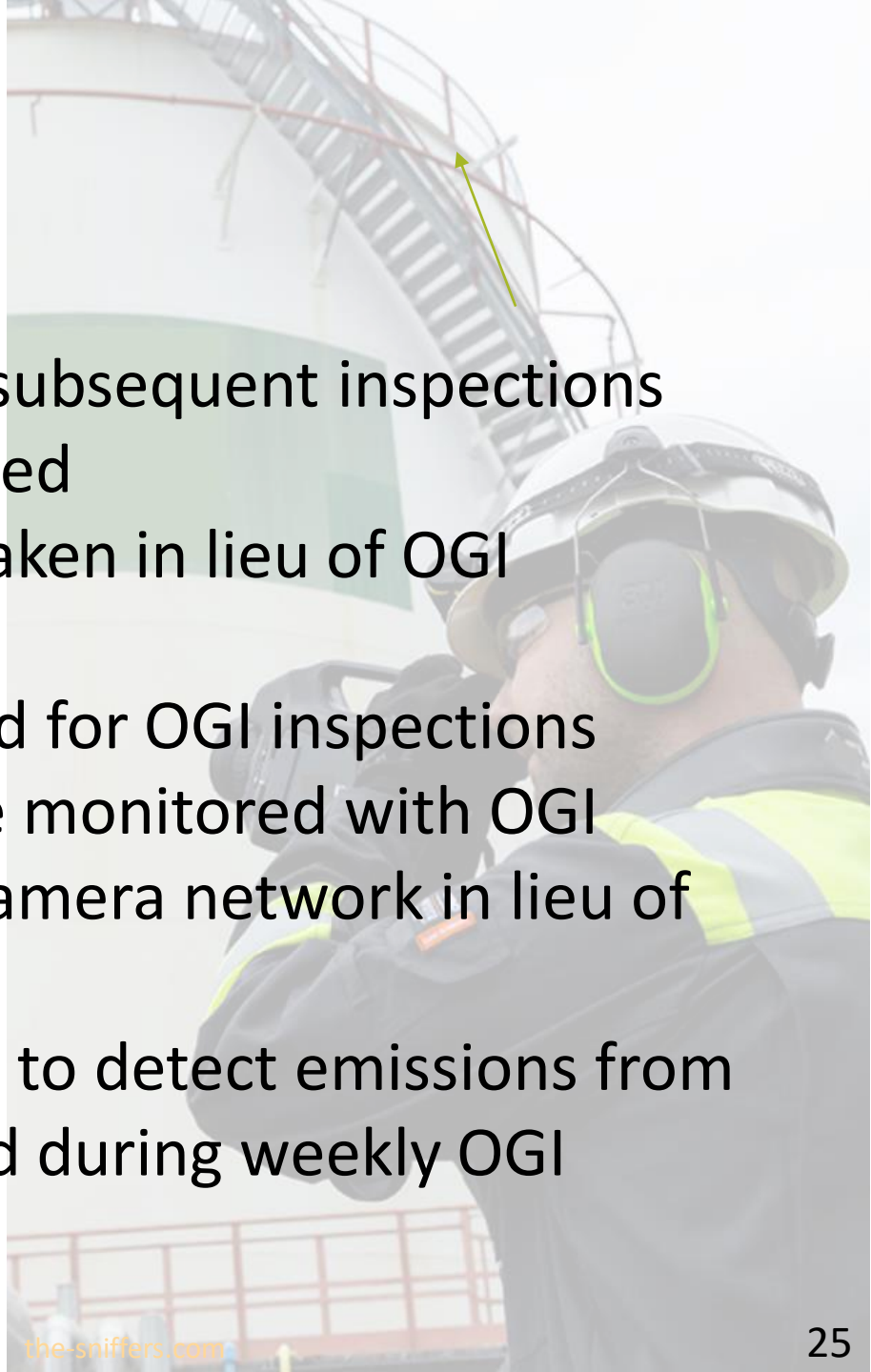
Monitoring

- OGI inspections every 7 days to identify leaks (visible VOC vapors w/ OGI)
- Requirements for inspection/inspector:
  - Facility must use contracted third-party leak detection service
  - Operators must complete certification/training program provided by OGI manufacturer
  - Camera operated according to manufacturer's specification/recommendations
- Requirements for weekly inspection:
  - Individually monitor all components/seals on minimum of 15 tanks
    - Tanks inspected rotated each week
  - Monitor all remaining tanks by:
    - Performing grounds walk around collection of tanks
    - Monitoring all tanks at a roof level from elevated position



Monitoring *(continued)*

- Follow-up monitoring on leaking components
  - Monitor leaking component during next two subsequent inspections after leaking component identified and repaired
- Allowance for Method 21 measurements to be taken in lieu of OGI monitoring
  - Must inspect all components/seals as required for OGI inspections
  - Inaccessible components/seals required to be monitored with OGI
- Allowance for continuous monitoring with OGI camera network in lieu of weekly OGI inspections
  - Continuous monitoring network must be able to detect emissions from all components/seal required to be monitored during weekly OGI inspections



Reporting and Recordkeeping

- Updated reporting and recordkeeping requirements to include records from OGI inspections
  - Leaks detected with OGI during inspection must be recorded for minimum of 5 seconds
  - Digital recordings kept for minimum of 5 years
  - Submit written report to Executive Officer within 120 hours of leak identification, indicating corrective actions (existing language)
    - Applies to OGI inspections

Summary of Costs and Emission Reductions from Proposed Requirements

Proposed Requirement	Cost-Effectiveness ($/ton)	Reductions (tpd)
Gap Requirements	Already meeting requirement	0.01
Vapor Recovery	Already meeting requirement	0.02
Secondary Seals	$22,100	0.003
Doming	$32,400	0.12
OGI	$16,900	0.45
Total Reductions		0.60

Next Steps

Release Preliminary Draft Rule Language and Staff Report January 2023

Public Workshop February 2023

Stationary Source Committee February 2023

Public Hearing Currently Scheduled for April 2023

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