

Coal Mine Methane Project Protocol Public Workshop



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August 25, 2009

Philadelphia, PA

Call-in number: 773-945-1011

Access code: 497-045-582



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Agenda

- Climate Action Reserve background
- Protocol development process
- Introduction to the Coal Mine Methane Project Protocol
 - Project definitions
 - Eligibility rules
 - Development of performance standard
 - GHG assessment boundary
 - Calculations
 - Monitoring and reporting requirements
 - Verification guidance
- Next steps
- Q&A



What is the Climate Action Reserve?



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- Non-profit GHG offsets registry
- Develop high-quality projects standards and register/track offset credits in public online system
- Ensure environmental integrity and quality of offset credits
- Intended to be the premier place to register carbon offset projects for North America
- Reserve stats:
 - 119 account holders
 - 14 projects registered with 1.6 million CRTs issued
 - 79 additional projects seeking registration
 - Projects in 28 states





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Protocol Development Goals

- Develop a standardized approach for quantifying, monitoring and verifying GHG reductions from CMM projects
 - Active underground coal mines in the US
 - Drainage and ventilation system projects
- Maintain consistency with or improve upon existing methodologies
- Ensure accuracy and practicality of projects





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Principles of Reserve Project Accounting

- **Real:** Reductions have actually occurred, and are quantified using complete, accurate, transparent, and conservative methodologies
- **Additional:** Reductions result from activities that would not happen in the absence of a GHG market
- **Permanent:** Reductions verified ex-post, risk of reversals mitigated
- **Verified:** Emission reports must be free of material misstatements, confirmed by an accredited verification body
- **Owned unambiguously:** Ownership of GHG reductions must be clear
- **Not harmful:** Negative externalities must be avoided
- **Practicality:** Project implementation barriers should be minimized





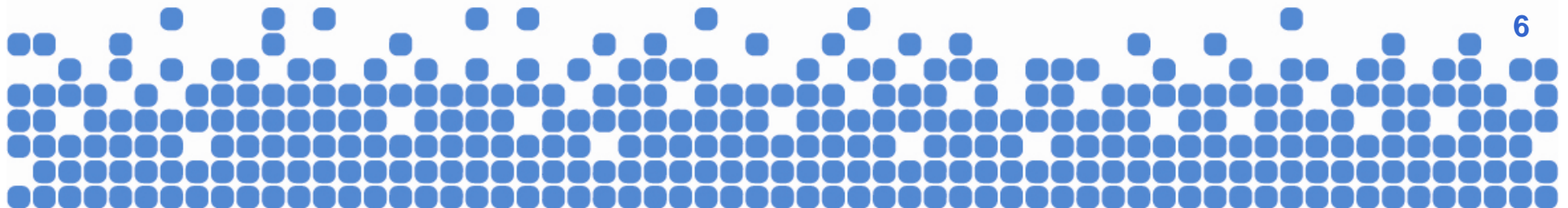
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The Standardized Approach

Benefits to a top-down approach:

- Low up-front costs to project developers
- Efficient review and approval of projects
- Transparency and consistency
- Same approach applies across projects
- Prescriptive guidance to eliminate judgment calls

*But...*high initial resource investment to program





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Protocol Development Process

- Internal protocol scoping
- Form multi-stakeholder workgroup
- Draft protocol
- Send draft through workgroup process
 - Workgroup provides feedback, consensus is built
 - Can be iterative process
- Draft protocol released for public review
- Public comments incorporated
- Protocol submitted to Reserve board for adoption



Protocol Timeline



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<i>Public Scoping Meeting</i>	<i>February 10</i>
<i>WG Meeting 1</i>	<i>May 8</i>
<i>Draft protocol to workgroup</i>	<i>June 3</i>
<i>WG Meeting 2</i>	<i>June 17</i>
<i>WG Meeting 3</i>	<i>July 22</i>
Public comment period	August 17 - September 11
Public workshop	August 25
<i>WG Meeting 4, if needed</i>	<i>Mid-September</i>
Protocol adoption by Reserve Board	October 7



Workgroup



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Raphaël Bruneau, Biothermica Technologies

Keith Driver, Blue Source Canada

David Cartella, Cliffs Natural Resources

John Grubb, Colorado School of Mines

Steve Winberg, CONSOL Energy Inc.

Weidong Yang, DNV Climate Change Services

Jay Wintergreen, First Environment Inc.

Joseph D'Amico, Foundation Coal Corp.

Jerry Gureghian, Green Holdings

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Neil Butler, Harworth Energy

Ken Zak, Megtec

Charlee Bergamo, Raven Ridge Resources

Ron Collings, Ruby Canyon Engineering

Bill Reynolds, SCC Americas

Melissa Weitz, US EPA

Pamela Franklin, US EPA CMOP

Jeff Liebert, Verdeo Group



Project Protocol Components



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Define the GHG reduction project	Section 2
Determine eligibility	Section 3
Establish the GHG assessment boundary	Section 4
Calculate GHG reductions – Baseline emissions – Project emissions	Section 5
Monitoring requirements	Section 6
Reporting requirements	Section 7
Verification guidance	Section 8





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Project Definition

The installation and operation of any device, or set of devices, that result in the destruction of methane gas that would otherwise have been emitted to the atmosphere from an active underground mine.

- Coal mines and MSHA Category III trona mines are eligible
- Two defined project types: drainage projects and VAM projects

Excludes:

- Surface mines
- Abandoned/decommissioned mines
- Coal bed methane
- Mines that use fluid/gas to enhance CMM drainage





Drainage Project Definition

- Specifies allowable drainage activities
- Boreholes, destruction devices (DD) and any non-qualifying devices that make up project are defined by project developer
 - Opportunity for multiple drainage projects at a single mine site

Once project is defined:

- New boreholes + existing DD = project expansion
- New DD + existing boreholes = project expansion
- New boreholes + new DD = new project





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VAM Project Definition

- Definition tied to a single ventilation shaft
- Shaft, VAM destruction devices (VAM) and any non-qualifying devices that make up project are defined by project developer
 - Opportunity for multiple drainage projects at a single mine site

Once project is defined:

- New VAM + existing shaft = project expansion
- VAM + new shaft = new project



Eligibility Rules



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1. Location	U.S. operations
2. Project Start Date	January 1, 2001
3. Additionality	Exceed regulatory requirements
	Meet performance standard
4. Regulatory Compliance	Compliance with all applicable laws
Crediting Period	10 year, non-renewable

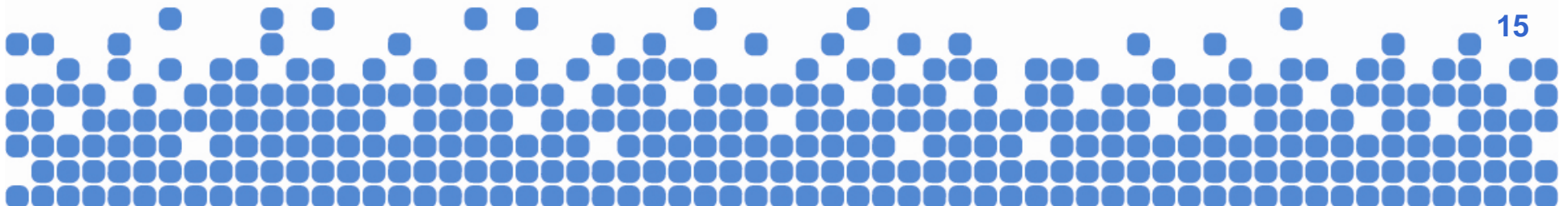




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Regulatory Test

- Regulatory analysis identified no regulations that obligate coal mines to destroy methane
- Project developers required to submit signed Regulatory Attestation for each verification cycle
- If regulation is passed during crediting period, emission reductions can be reported up until date methane is legally required to be destroyed
 - Similar treatment if source is subject to cap-and-trade





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Performance Standard Test

- Performance standard based on end use destruction device
 - Drainage projects: any end use destruction other than injection into a natural gas pipeline
 - All VAM projects are eligible
- Performance Standard Test is applied once at the beginning of crediting period



Performance Standard Development



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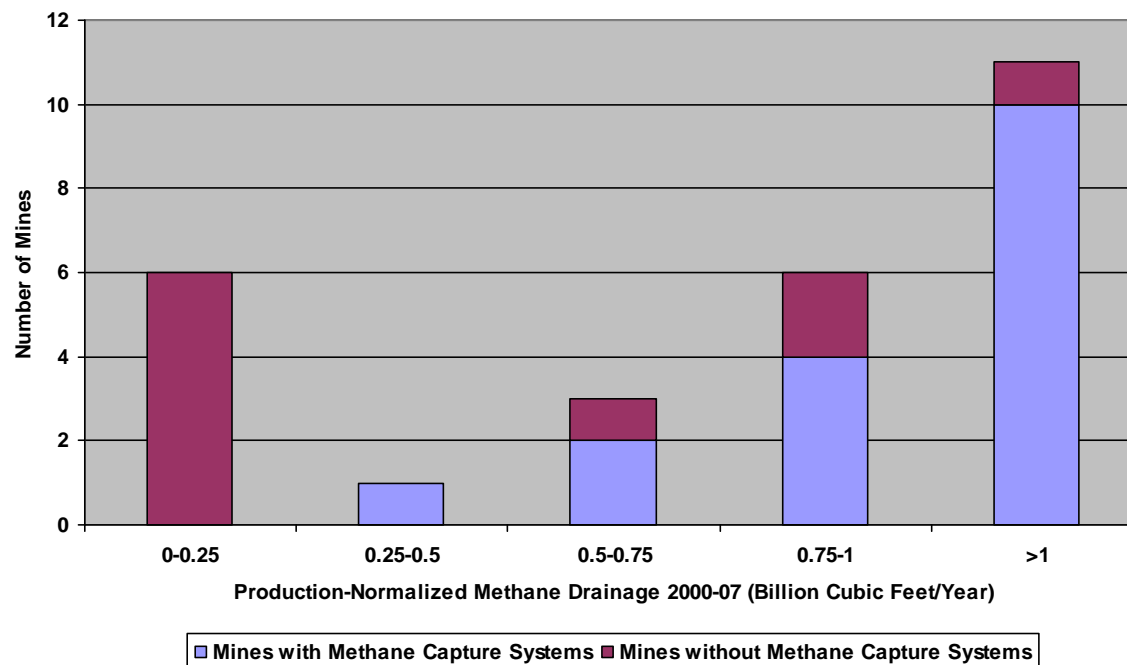
- Contracted with SAIC to conduct an analysis of CMM management practices in order to define performance standards
- Informed by common practice of drainage and destruction systems
- Examined industry trends, current practices, regional variations, current and pending regulations, etc.
- Utilized data from MSHA, EPA, CMOP, EIA, CoalUSA
- Summary of study in Appendix A





Hypothesis & Results

- Hypothesis: amount of methane available from drainage system and end use determine standard practice
 - Prevalence of existing projects increases in proportion to methane drained





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Results, cont.

- **Methane drainage and end use** are key determinants of common practice
- Recommendations:
 - All non-pipeline end uses be eligible
 - For projects injecting to pipeline, eligibility dependent on methane drainage rate
 - All VAM projects eligible



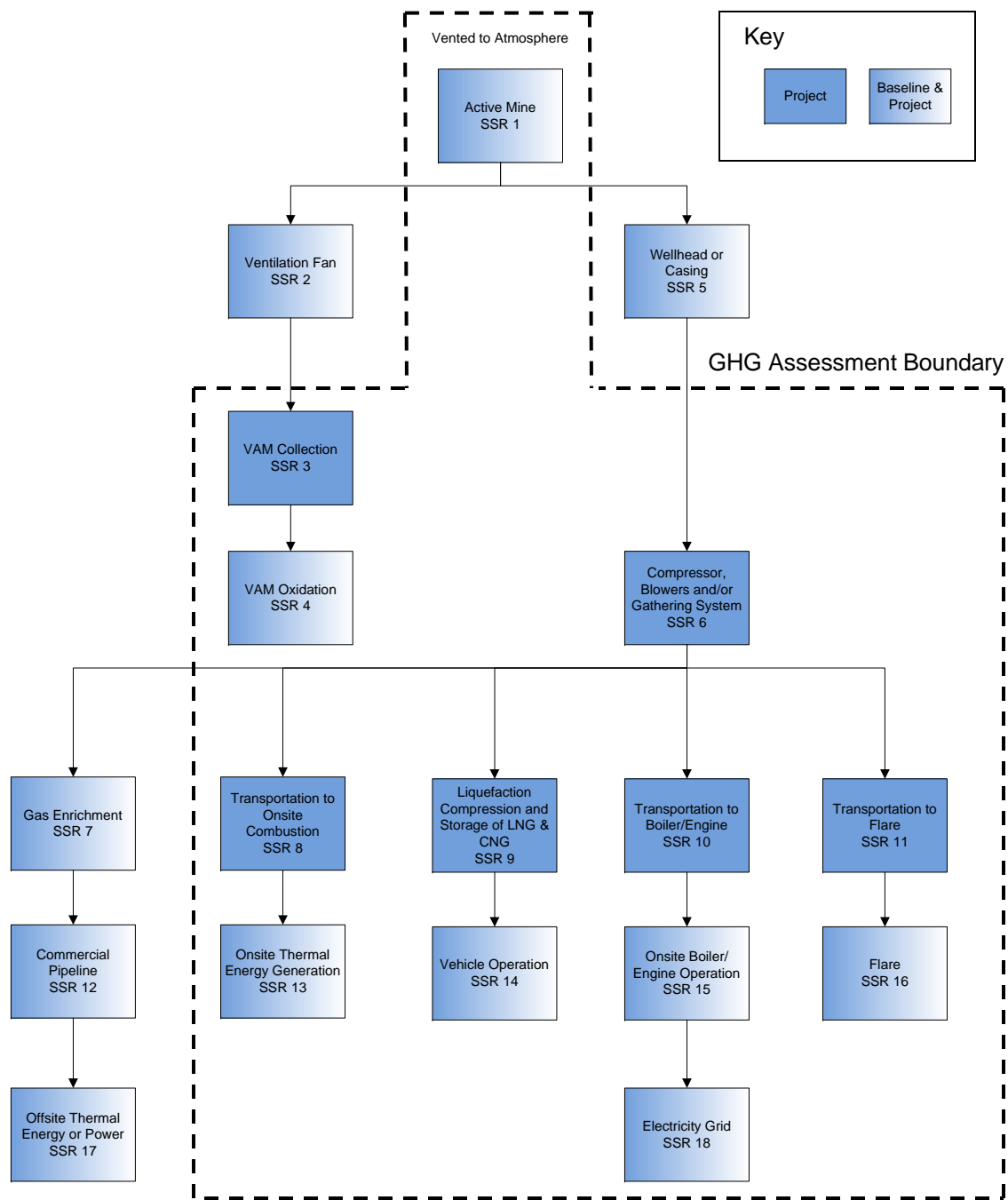


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Version 2.0

- Based analysis on available data (end use and methane drainage rates)
- No support for pipeline project performance standard based solely on methane drainage rates
- Working with industry to collect data on gas quality to refine analysis
- Add to performance standard to allow for pipeline projects

Staff and workgroup develop Version 2.0	August – November 2009
Protocol released for public comment	December 2009
Public workshop	December 2009
Adoption by Reserve Board	February 2010





Project Emission Reductions

Equation 5.2: Emission Reductions

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission reductions during the year y

BE_y = Baseline emissions during the year y

PE_y = Project emissions during the year y





Baseline Emissions

Equation 5.3: Baseline Emissions

$$BE_y = BE_{MD,y} + BE_{MR,y}$$

Equation 5.4: CO₂ from Methane Destruction of Non-Qualifying Devices

$$BE_{MD,y} = \left(CEF_{CH_4} + r \times CEF_{NMHC} \right) \times \sum_i \left(SMM_{BL,i,y} + VAM_{BL,i,y} + HMM_{BL,i,y} + PMM_{BL,i,y} \right)$$

Equation 5.5: Methane Released into Atmosphere

$$BE_{MR,y} = GWP_{CH_4} \times \left[\begin{aligned} & \sum_i \left(SMM_{e,i,y} - SMM_{BL,i,y} \right) + \sum_i \left(HMM_{PJ,i,y} - HMM_{BL,i,y} \right) \\ & + \sum_i \left(PMM_{PJ,i,y} - PMM_{BL,i,y} \right) + \sum_i \left(VAM_{PJ,i,y} - VAM_{BL,i,y} \right) \end{aligned} \right]$$



Calculating Baseline SMM, VAM, HMM and PMM



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Calculate:

- Average annual value destroyed over 3 year period prior to project implementation AND
- Actual metered annual value
- Use higher number
 - If non-qualifying DD was shut down within one year of project start date, accounted for
 - If DD shut down more than one year before, ignore





Calculating $SMMe_{i,y}$

Equation 5.6:

Calculating Eligible CMM from Surface Pre-mining Boreholes

$$SMMe_{i,y} = SMMpre_{e,y} + SMMpost_{e,y}$$

Where,

$SMMpre_{e,y}$ = CMM from surface pre-mining destroyed by the project for year y from boreholes mined through in current year

$SMMpost_{e,y}$ = CMM from surface pre-mining destroyed by the project in year y from boreholes previously mined through





Project Emissions

Equation 5.7: Project Emissions

$$PE_y = PE_{ME} + PE_{MD} + PE_{UM}$$

Equation 5.8: CO₂ from Fossil Fuel and Grid Electricity

$$PE_{ME} = \left(CONS_{ELEC, PJ} \times CEF_{ELEC} \right) + \frac{\left(CONS_{HEAT, PJ} \times CEF_{HEAT} + CONS_{FossFuel, PJ} \times CEF_{FossFuel} \right)}{1000}$$

Equation 5.9: CO₂ from Destruction of Captured Methane

$$PE_{MD} = \left(MD_{OX} + MD_i \right) \times \left(CEF_{CH_4} + r \times CEF_{NMHC} \right)$$

Equation 5.13: Emissions from Uncombusted Methane

$$PE_{UM} = \left[GWP_{CH_4} \times \sum_i MM_i \times \left(1 - Eff_i \right) \right] + PE_{OX} \times GWP_{CH_4}$$

Drainage Project Monitoring Requirements



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- Total flow of CMM from each drainage system
 - measured continuously
 - recorded every 15 minutes or totalized and recorded at least daily
- Total flow of CMM delivered to each destruction device
 - measured continuously
 - recorded every 15 minutes or totalized and recorded at least daily
- Fraction of methane in the CMM
 - measured with a continuous analyzer
- NMHC content of CMM:
 - Annual gas chromatograph analysis at a certified gas lab
 - Each drainage type within project sampled separately



VAM Project Monitoring Requirements



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- Total inlet flow entering reaction chamber
 - measured continuously
 - recorded every 2 minutes
- Temperature and pressure of inlet flow and exhaust gas
 - measured continuously
 - recorded every hour
- Fraction of methane in VAM entering oxidation unit and in exhaust gas
 - measured continuously
 - recorded every 2 minutes
- NMHC content of VAM:
 - Annual gas chromatograph analysis at a certified gas lab





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Calibration Requirements

All gas flow meters and continuous methane analyzers must be:

- Cleaned and inspected on a quarterly basis
- Field checked for calibration accuracy, using either a portable flow velocity instrument or manufacturer specified guidance, at the end of but no more than two months prior to the end date of the reporting period
- Calibrated by the manufacturer or a certified calibration service per manufacturer's guidance or every 5 years, whichever is more frequent





Calibration Requirements, cont.

- If any field check reveals accuracy outside of a +/- 5% threshold, calibration by the manufacturer or a certified service provider is required
- Required adjustments for entire time period since last successful calibration until properly calibrated meter is in place:
 - For calibrations that indicate under-reporting, metered values must be used without correction
 - For calibrations that indicate over-reporting, metered values must be adjusted based on the greatest calibration drift recorded at the time of calibration





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Project Documentation

Required project documentation includes:

- Completed Project Submittal form
- Project diagram*: diagram of boreholes, eligible destruction devices and non-qualifying destruction devices within project's GHG assessment boundary
- Current mine plan
- Signed Attestation of Title document
- Verification Report
- Verification Opinion
- Signed Regulatory Attestation

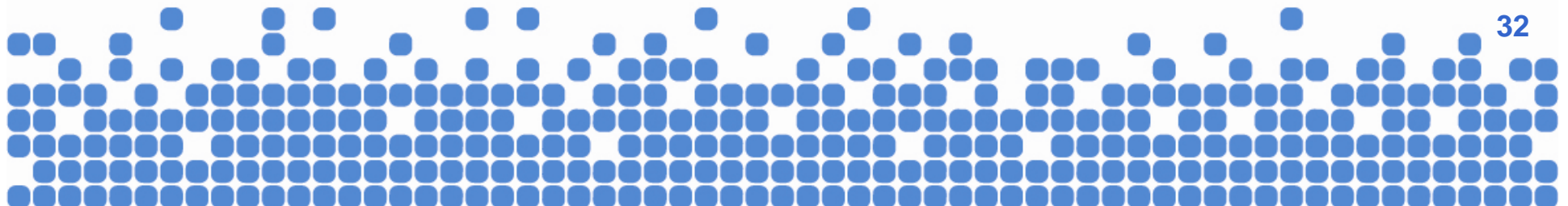
* Must be updated if a project expands or if non-qualifying device is added to project





Verification Guidance

- New approach - combine reporting protocol and verification protocol into one document
- General verification guidance in Verification Program Manual; Section 8 details coal mine methane project-specific guidance
- Table 8.2: Summary of items to be verified and if professional judgment is appropriate
- Allows for “joint project verification” - single verification body to verify multiple projects at a single mine





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Next Steps

- Submit written comments via CMM webpage - deadline is **5 PM PDT on September 11, 2009**
 - Comments will be made public
- Summary of comments with responses and final protocol will be posted on CMM webpage week of September 28
- Will be presented to Reserve Board on October 7, 2009
 - Opportunity for public comment in person or via conference call





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