Reduction Protocols

Pork

Nitrogen

Alberta Protocol Stakeholder Consultations ~ May 17 -18, 2007

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Pork – Feed and Manure

- Seed Materials
  - *Greenhouse Gas System Pork Protocol: The Innovative Feeding of Swine and Storing and Spreading of Swine Manure (Draft)* ~ (July, 2006)
    - Prepared for: NOQT
    - Rob Janzen - Agrologics Consulting Inc.
  - Other Good Practice Guidance
    - CDM protocols
    - Project evaluations

- Technical Review
  - NOQT review
  - Environment Canada review
  - Alberta process with gov't and industry stakeholders

Pork – Feed and Manure

- Project Condition
  - Innovative feeding
    - Reduce excretion of volatile solids (digestibility)
    - Reduce excretion of nitrogen (amino balance)
  - Storing and spreading
    - Season and frequency of storing and spreading
- Baseline Condition
  - Current feed practices
  - Fall emptying

Pork – Feed and Manure

- Functional Equivalence
  - Output of pigs
- Emission Reduction Mechanisms
  - Feed regime changes
    - Volatile solids and nitrogen
  - Manure management
    - Volatile solids to methane
    - Nitrous oxide emissions from land spreading

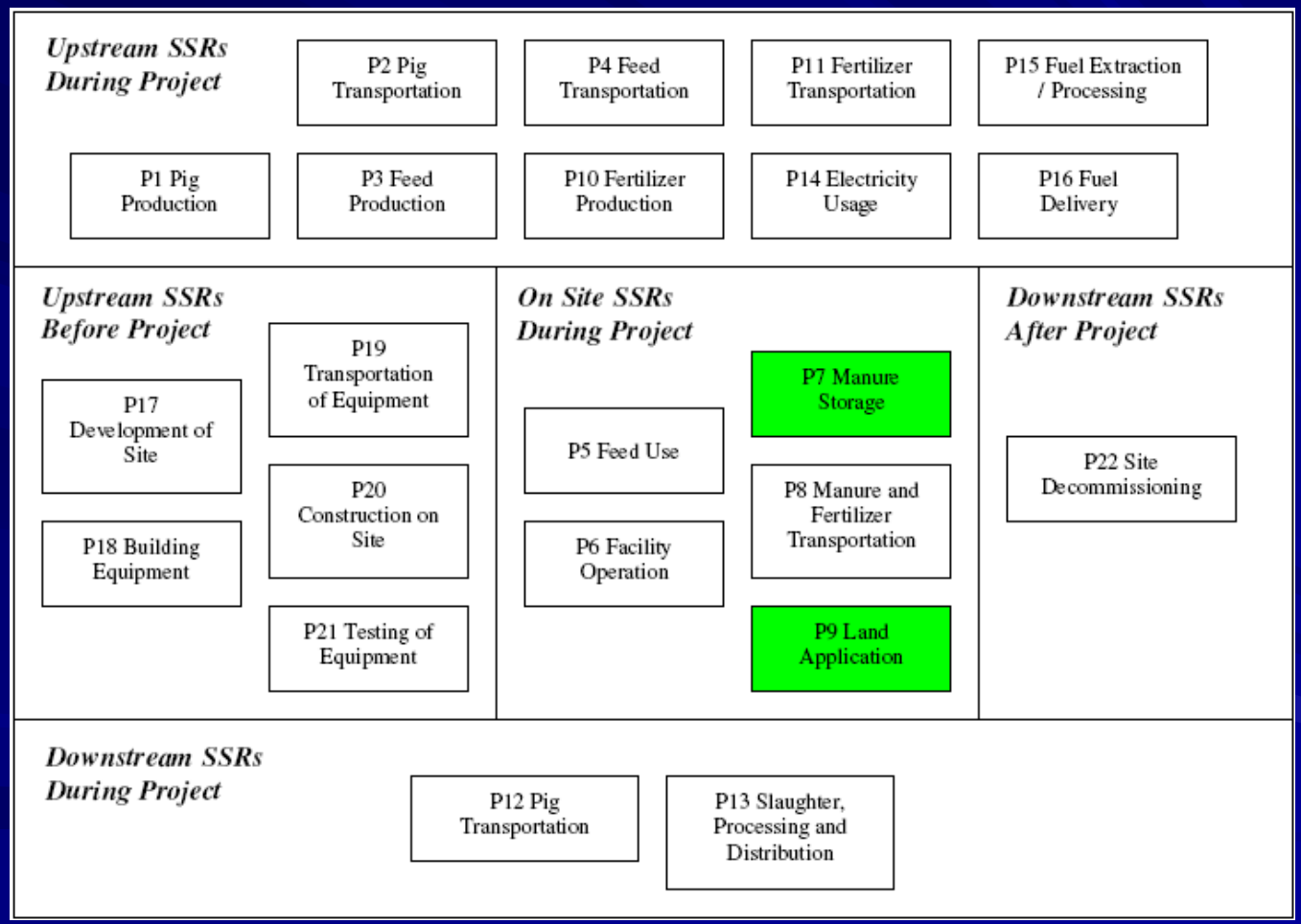
Pork – Feed and Manure

- Applicability criteria
  - Currently feeding swine
    - Farrow, farrow to wean, farrow to finish, nursery, feeder operation
  - Storage of liquid manure for six months
    - Still required if baseline set at fall emptying?
  - Land application is manure end point
  - Demonstrate change
    - Feeding practice
    - Emptying (spring or spring / fall)

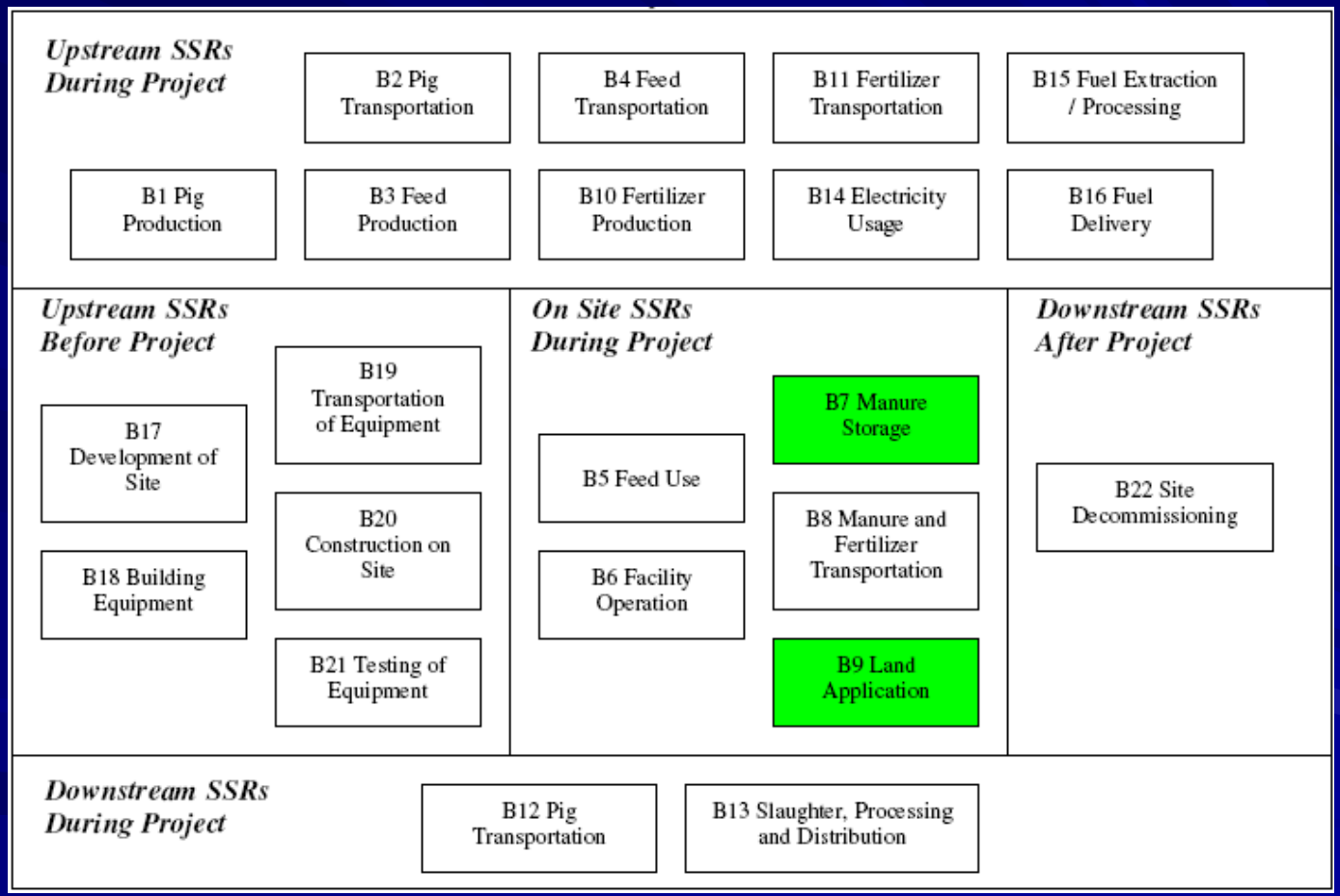
Pork – Feed and Manure

- Flexibility mechanisms
  - Change of one or both types of practice
  - Split out classes under liquid manure
  - Site specific emission factors
  - Baselines
    - Project specific (historic feeding practice)
    - Sector specific (new facility)

Pork – Feed and Manure



Pork – Feed and Manure



Pork – Feed and Manure

$$\text{Emission Reduction} = \text{Emissions}_{\text{Baseline}} - \text{Emissions}_{\text{Project}}$$

$$\text{Emissions}_{\text{Baseline}} = \text{Emissions}_{\text{Methane}} + \text{Emissions}_{\text{Direct Nitrous Oxide}} + \text{Emissions}_{\text{Indirect Volatization Nitrous Oxide}} + \text{Emissions}_{\text{Indirect Leachate Nitrous Oxide}}$$

$$\text{Emissions}_{\text{Project}} = \text{Emissions}_{\text{Methane}} + \text{Emissions}_{\text{Direct Nitrous Oxide}} + \text{Emissions}_{\text{Indirect Volatization Nitrous Oxide}} + \text{Emissions}_{\text{Indirect Leachate Nitrous Oxide}}$$

- Data Capture
  - Mass of pigs
  - Feed regime information
  - Storage parameters

Pork – Feed and Manure

- Questions and Comments
  - Technical issues?
  - Policy concerns?
  - Customization questions?
  - Linkage issues?

Nitrogen Reduction

- Seed Materials
  - *Greenhouse Gas System Pork Protocol: The Innovative Feeding of Swine and Storing and Spreading of Swine Manure (Draft)* ~ (October, 2006)
    - Prepared for: NOQT
    - Lead: Dennis Haak - Agriculture and Agri-Food Canada
  - Other Good Practice Guidance
    - CDM protocols
    - Project evaluations
- Technical Review
  - Multi-stakeholder review
  - Input in review from Environment Canada
  - Alberta process with gov't and industry stakeholders

Nitrogen Reduction

- Project Condition
  - Reduction in application rate of commercial nitrogen fertilizer
    - Functional equivalence is key
- Baseline Condition
  - Application rate of commercial nitrogen fertilizer
    - Average over three year period
    - Flexibility

Nitrogen Reduction

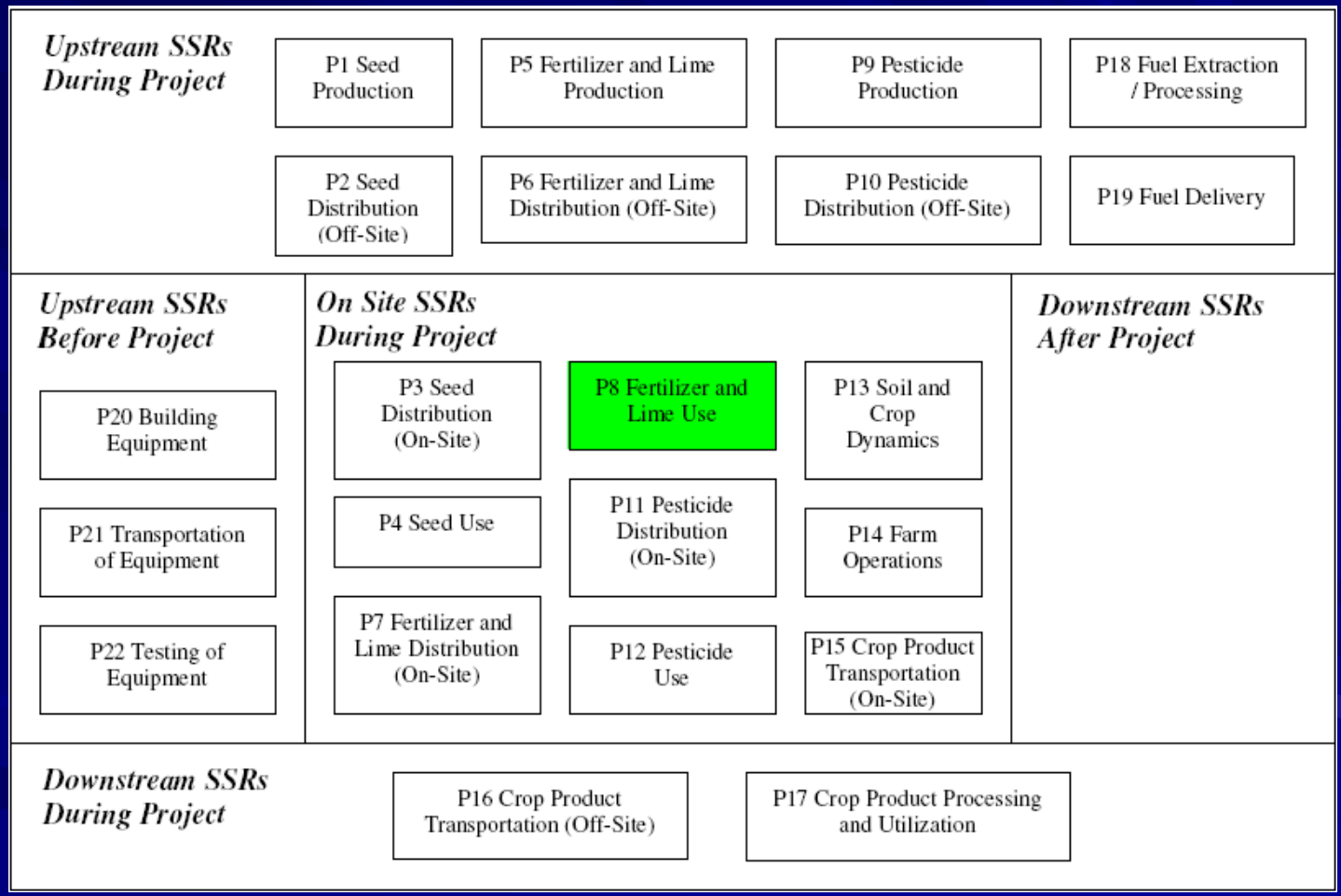
- Functional Equivalence
  - Application rate per area
  - Same crop as baseline
  - Not based on yield
    - Onerous
    - Market factors

- Emission Reduction Mechanisms
  - Direct emissions of nitrous oxide
  - Indirect emissions of nitrous oxide
    - Volatization
    - Leachate

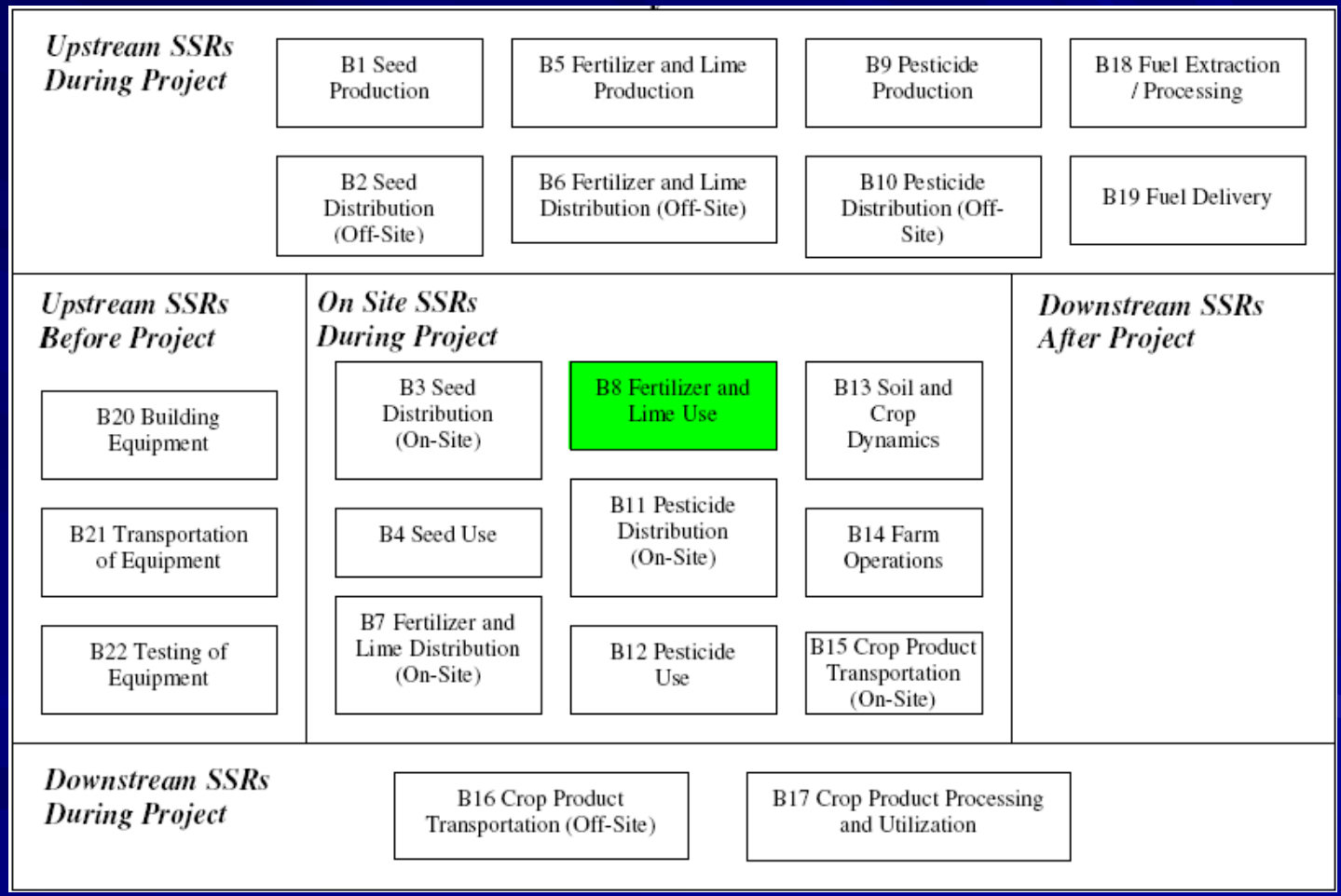
Nitrogen Reduction

- Applicability criteria
  - Baseline established under single crop
  - Crop rotation excluded (see flexibility)
  - Nitrogen application with custom applicator
  - No manure spreading as nitrogen source
- Flexibility mechanisms
  - Non-continuous years for establishing baseline
  - Extrapolation of baseline
  - Crop rotation inclusion under limited circumstances
  - Single component of farm operations

Nitrogen Reduction



Nitrogen Reduction



Nitrogen Reduction

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- Data Capture
  - Nitrogen application rates
  - Area of application

Nitrogen Reduction

- Questions and Comments
  - Technical issues?
  - Policy concerns?
  - Customization questions?
  - Linkage issues?

Uncertainty and Error

- Minimizing Uncertainty
  - Use of accepted quantification protocols
  - Use of National Inventory
  - Use of Good Practice Guidance
- Site specific emissions factors
  - Small data sets and sources of error
  - Effect on related assumptions
  - Sources of error
  - Issues for Verification
    - Assessment of uncertainty