

# Feasibility of an Integrated Poultry and Ethanol Production System in North Alabama

## Project Description and Rationale

Bert Bock

 Review Meeting

April 18 and 19, 2005

# IPEP Feasibility Study

- One of 19 out of 400+ projects funded in 2003 USDA/DOE bioenergy solicitation
- Matching funds from
  - TVA PPI
  - TVA Resource Stewardship
  - Poultry Water Quality Consortium
- In-kind support
  - TVA Economic Development

# Objective

- Assess technical, economic, and environmental feasibility of **IPEP**  
VS.
- Traditional stand-alone corn/ethanol plants
- Other alternative uses of poultry litter

# Expected Outcome



- Provide documentation required to:
  1. Develop **IPEP** business plans
  2. Acquire financing to commercialize **IPEP**

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- Facilitate **IPEP** commercialization—SE U.S.
- Improve economic and environmental performance
  - Poultry production
  - Corn/ethanol production

# Responsibilities for Coordination/Integration

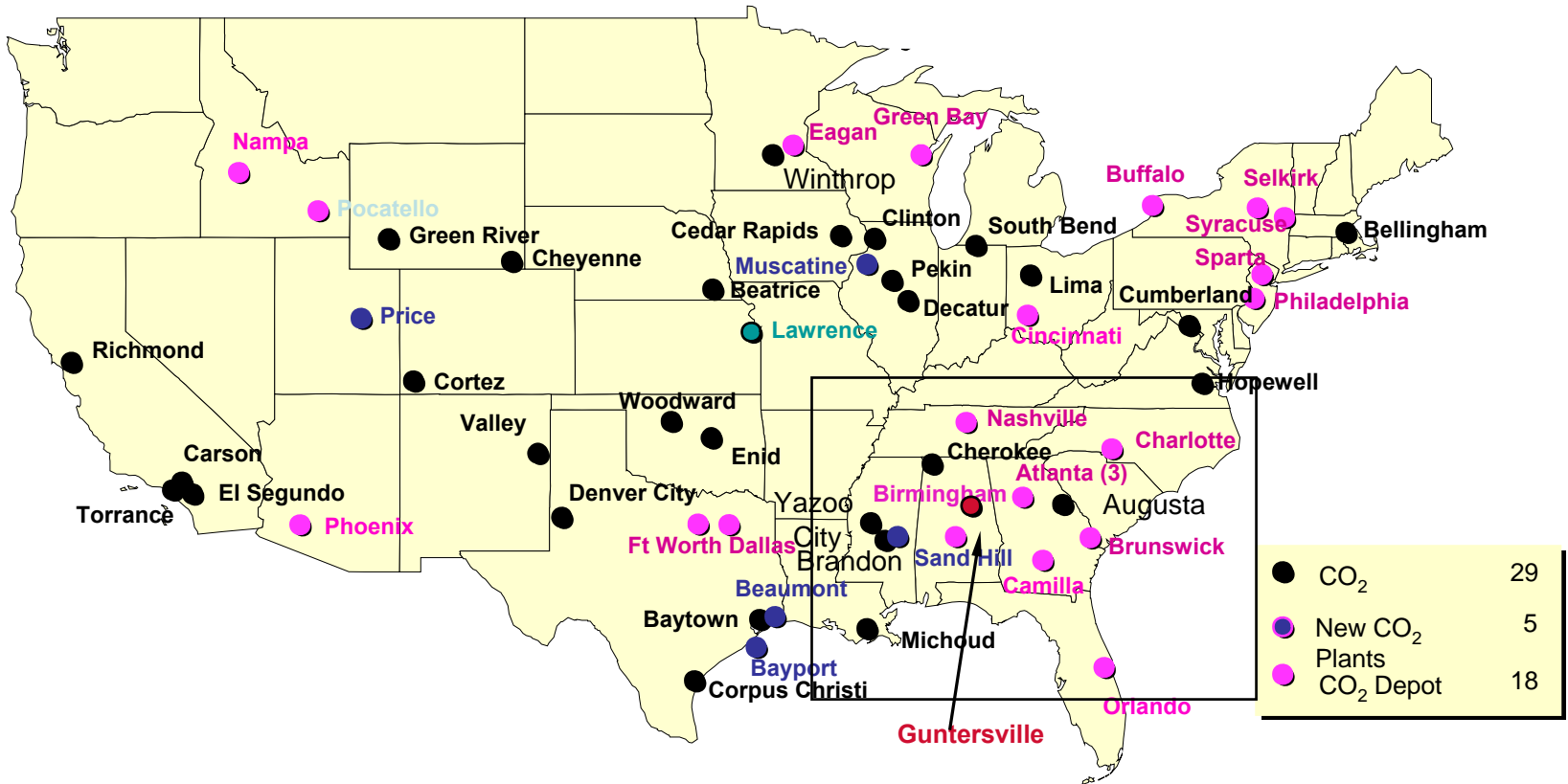
- TR Miles Technical Consultants, Inc.
  - Prime contractor—financial administration
  - Bioenergy consulting
  - Poultry litter and ash handling and storage
- BR Bock Consulting, Inc.
  - Technical project coordination
  - Overall IPEP economics
  - Life-cycle analysis—GHG, energy
  - **IPEP** vs. other poultry litter alternative uses

# Responsibilities for Core Tasks

- Informa Economics, Inc.— vs. traditional corn/ethanol
- Energy Products of Idaho—Fluidized bed combustion of PL
- BR Bock Consulting, Inc.—Poultry litter ash use in fertilizers
- Auburn Poultry Science—Poultry litter ash use as a mineral supplement (feeding trials)
- Alabama Mountains, Rivers, and Valleys RC&D—Poultry litter supplies and prices
-  TVA—Transportation costing



# BOC GASES






## PMC Marketing Group, Inc.

**Address:** 6530 Dearborn Drive, Falls Church, VA  
22044, USA

**Telephone:** 703.256.4497

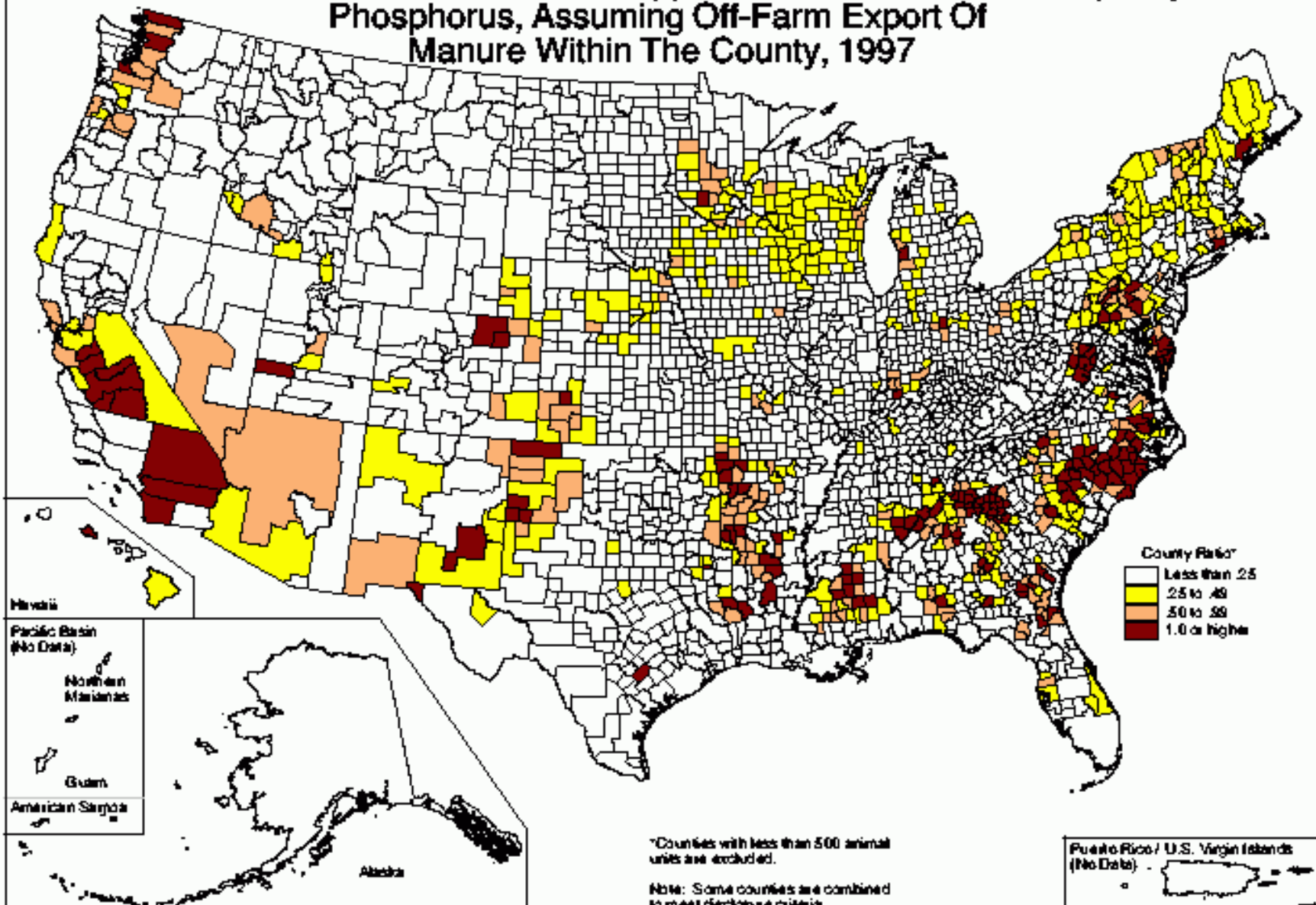
**Fax:** 703.256.8585

**Product/Service:** National supplier of biodiesel (methyl esters), fuel ethanol (up to E85), and fuel additives for fleets, fuel wholesalers, and other fuel suppliers/end users.

Task	Completed	Remaining
 vs. traditional corn/ethanol	Analysis and projections	Revision of narrative report
Fluidized bed combustion of poultry litter	Conceptual design & cost estimate, emissions projections	More detail on costs for balance of plant
Poultry litter and ash handling and storage	Conceptual design & cost estimate	More detail on cost estimate, narrative report
Poultry litter supplies and prices	Grower and vendor surveys	Logistical considerations, narrative report

Task	Completed	Remaining
Use of poultry litter ash in fertilizers	Analysis	Narrative report
Use of poultry litter ash as a mineral supplement	All	none
Overall assessment	Economic analysis, siting considerations	Life-cycle analysis, poultry litter alternatives, narrative report
Projected completion date: September 30, 2005		

# Ratio of Manure Available For Land Application To Assimilative Capacity For Phosphorus, Assuming Off-Farm Export Of Manure Within The County, 1997



**County Ratio**

- Less than 25
- 25 to 49
- 50 to 99
- 1.0 or higher

Pacific Basin  
(No Data)

Northern  
Mariana

Guam

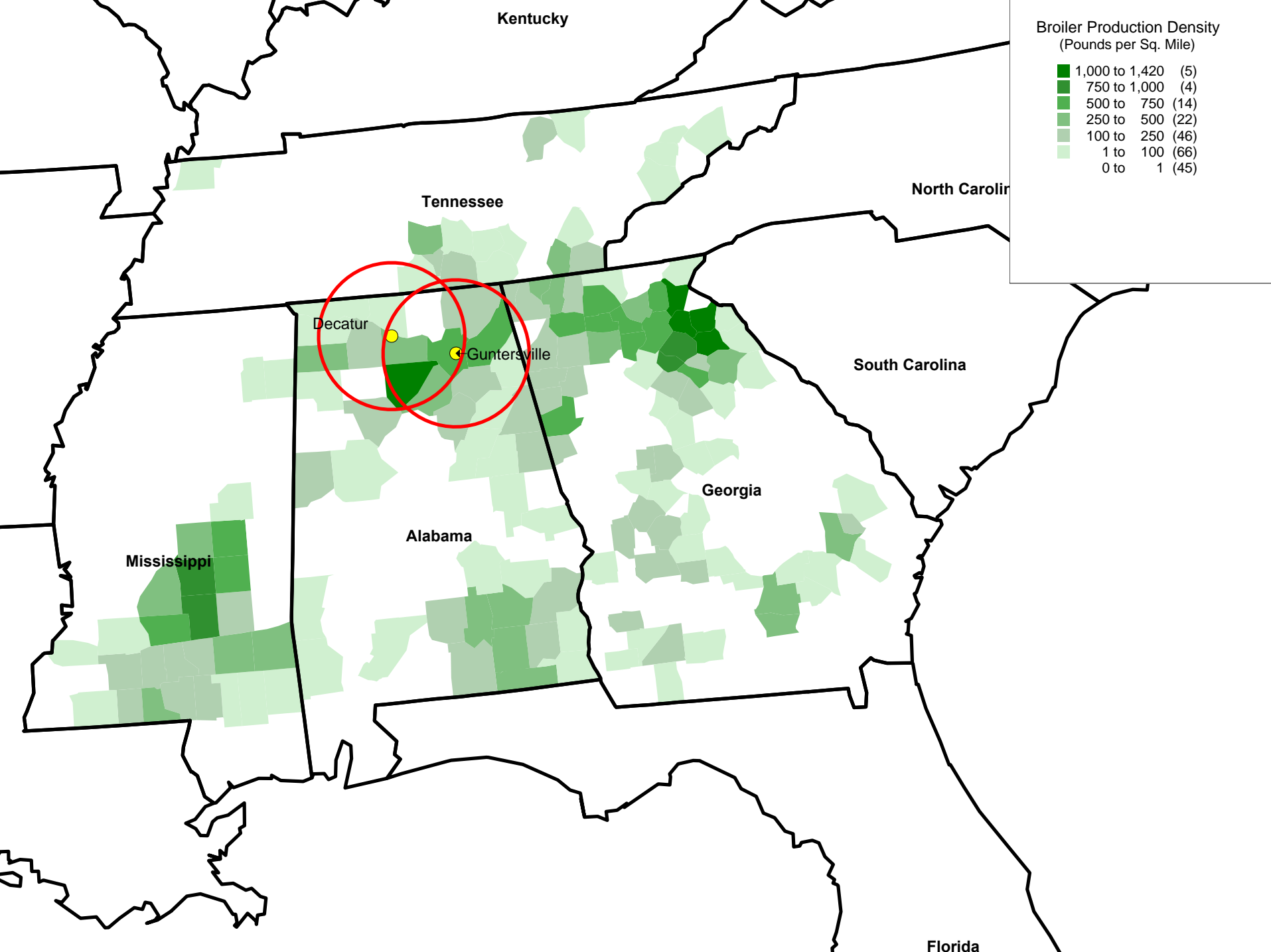
American Samoa



\*Counties with less than 500 animal units are excluded.

Note: Some counties are combined to meet disclosure criteria.

Puerto Rico / U.S. Virgin Islands  
(No Data)



# Current AL Rules for Local Land Application: Practical Limitations for Compliance

- Ban on poultry litter application when rain predicted within 72 hours
- Very strict limits on winter application
- P-based CNMP's
  - Substantially limit local land application of poultry litter
  - Fully implemented by December 2006

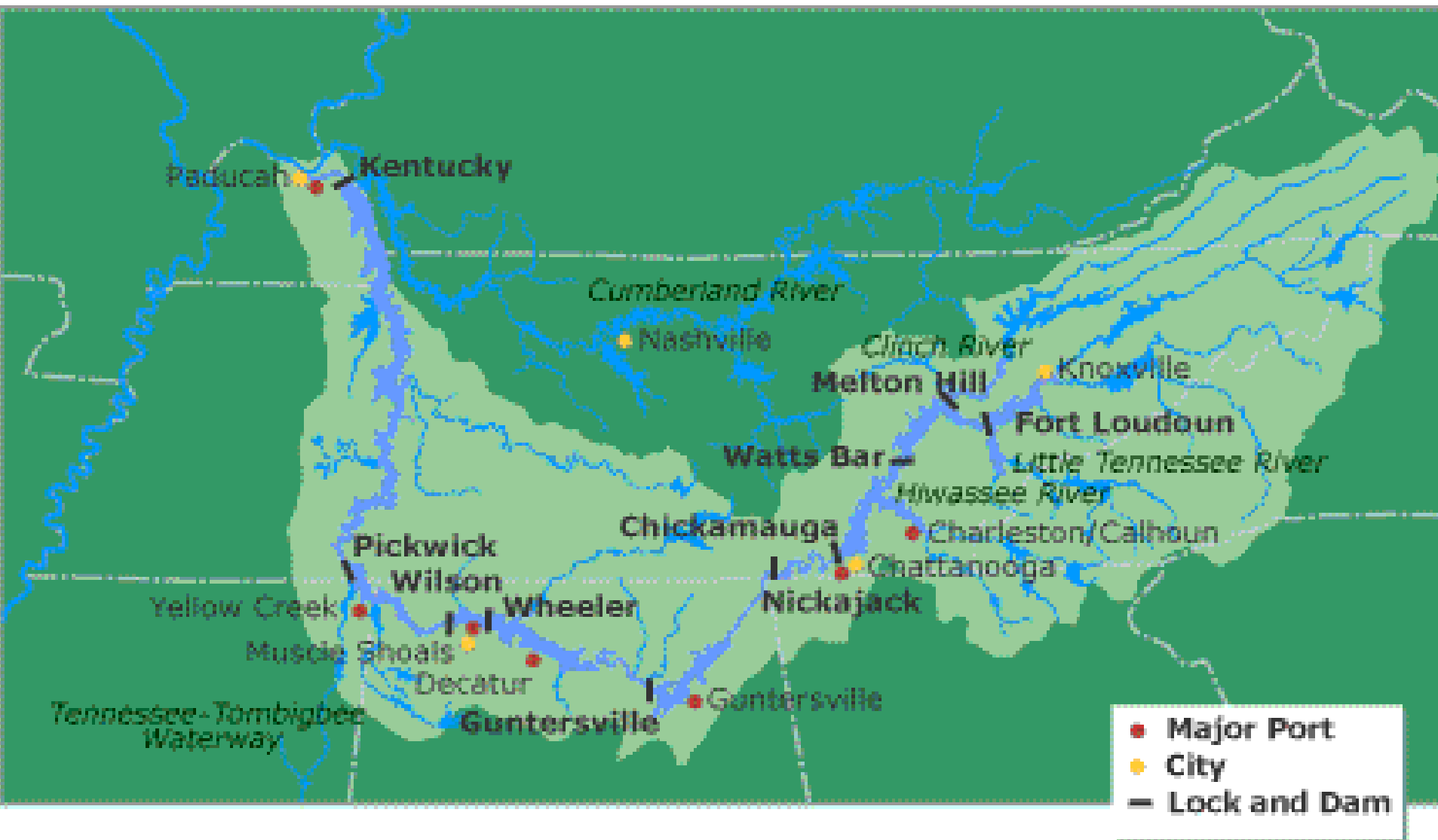
# NW AR Legal and Political Actions: Is North AL Next?

- Both regions have had long-term PL applications
- Both regions applying more PL P than removed by crops
- Significant portion of PL P is soluble and susceptible to runoff into surface waters
- Both regions close to significant surface waters
- Potential for cascading beyond NW AR
- Need proactive approach to avoid legal and political actions in NW AR

# Oklahoma Notice of Intent to File Suit: Based on Solid Waste Disposal Act

- P and P compounds
- N and N compounds
- As and As compounds
- Zn and Zn compounds
- Cu and Cu compounds
- Hormones
- Antibiotics
- Microbial pathogens





# Economic Impact: Alabama Poultry Industry

- Third largest poultry producing state
- Broiler cash receipts: \$2.0 billion
- Annual economic impact: \$8.0 billion
  - 12% of AL economy
  - 60% of AL agricultural economy
  - 75% of AL farm exports
- Responsible for over 78,000 jobs

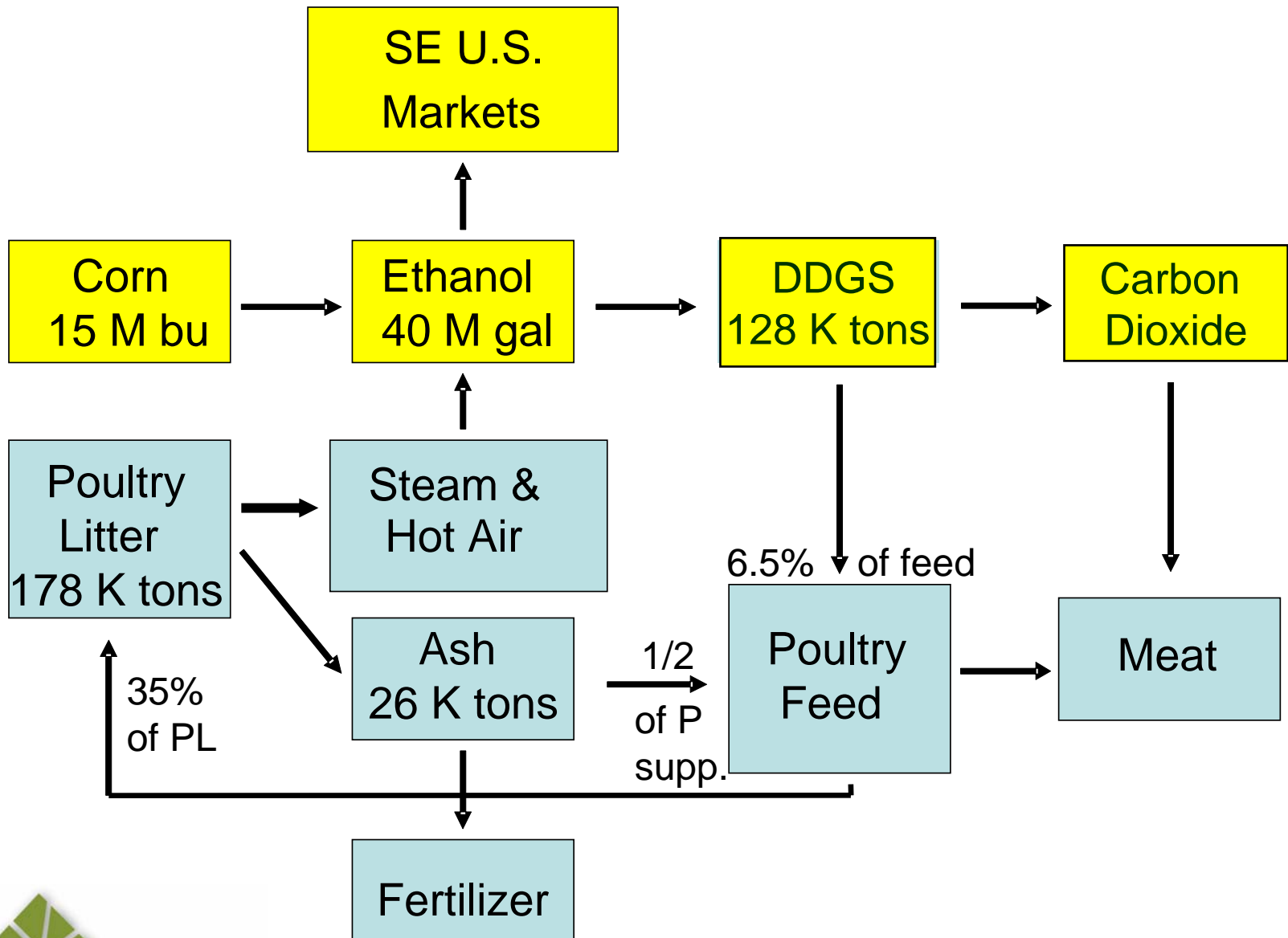
# Potential Solutions for P Surpluses

- Reduce P imports and excretion--feed management (partial solution)
- Export unprocessed poultry litter (requires subsidies; logistical limitations)
- Export value-added organic products (low-volume markets)
- Produce process heat and/or electricity
  - Export ash nutrients for use in fertilizers
  - Reduce P imports by using ash as P feed supplement  
(Large-vol., year-round, non-subsidized market for poultry litter; → staggered, year-round cleanout)

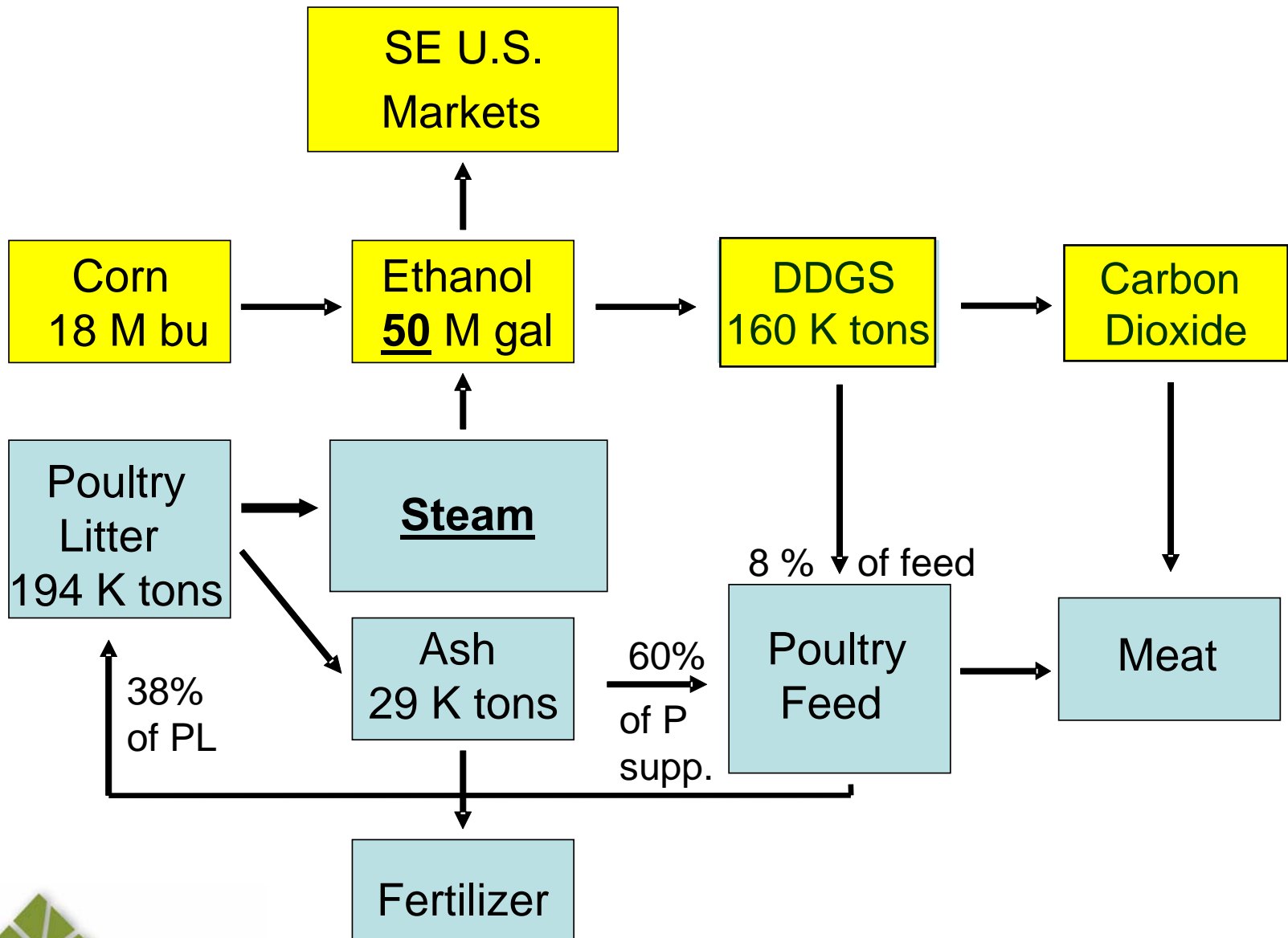
# Process Heat from PL has Favorable Economics, If

- Ash value offsets delivered PL feedstock cost
  - Ash value  $\geq$  PL cleanout and transportation costs
- Large continuous demand for process heat (replace natural gas)
- Promising option: New corn/ethanol plant
  - MTBE phase-out
  - Proposed Renewable Fuels Standard (3.8 to 8.0 billion gallons by 2012)
  - Proposed state incentives
  - Mandated Atlanta RFG market—still in courts

# Integrated Poultry and Ethanol Production



# Integrated Poultry and Ethanol Production



### Economics of Conventional vs. IPEP Corn-Ethanol Plants (15-year projections).

	Conventional Pekin, IL	IPEP Guntersville, AL	Difference \$/denatured gal
<b>Ethanol Production:</b>			
<b>Revenues</b>			
DDGS, \$/ton	\$74.05	\$91.84	\$0.057
CO <sub>2</sub> , \$/ton	\$0.00	\$13.00	\$0.042
<b>Feedstock cost</b>			
Corn, \$/bu	\$2.18	\$2.49	\$0.111
	<b>ΔGross margin (production)</b>		-\$0.012
Natural gas (or IPEP NG eq.), \$/MBtu	\$7.31	\$3.50	-\$0.130
Electricity, \$/kWh	\$0.078	\$0.040	-\$0.029
	<b>ΔProcessing cost</b>		-\$0.158
	<b>ΔNet margin (production)</b>		\$0.146
<b>Ethanol Transportation:</b>			
\$/ton	\$32.00	\$20.00	\$0.039
	<b>ΔNet margin (ethanol production &amp; transportation)</b>		\$0.186
<b>Rack ethanol price, \$/denatured gal</b>	\$1.41	\$1.42	

**Economics of Conventional vs. IPEP Corn-Ethanol Plants (15-year projections).**

	<b>Conventional</b>	<b>IPEP</b>	<b>Difference</b>
<b>Ethanol Production:</b>	Pekin, IL	Guntersville, AL	\$/denatured gal
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DDGS, \$/ton	\$74.05	\$91.84	\$0.057
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<b>Feedstock cost</b>			
Corn, \$/bu	\$2.18	\$2.49	\$0.111
	<b>ΔGross margin (production)</b>		-\$0.012
Natural gas (or IPEP NG eq.), \$/MBtu	\$7.31	\$4.50	-\$0.096
Electricity, \$/kWh	\$0.078	\$0.040	-\$0.029
		<b>ΔProcessing cost</b>	-\$0.124
		<b>ΔNet margin (production)</b>	\$0.112
<b>Ethanol Transportation:</b>			
\$/ton	\$32.00	\$20.00	\$0.039
	<b>ΔNet margin (ethanol production &amp; transportation)</b>		\$0.152
<b>Rack ethanol price, \$/denatured gal</b>	\$1.41	\$1.42	



# IPEP : Win-Win for All Stakeholders

- Poultry growers—economical, non-subsidized, alternative use for poultry litter
- Poultry integrators
  - Lower feed and carbon dioxide costs
  - Non-subsidized alternative use for poultry litter (no legal ownership but vested interest)
- Ethanol producers
  - Lower and more stable energy costs vs. natural gas
  - Lower ethanol transportation costs—eastern U.S.
  - Local DDGS market
  - Local CO<sub>2</sub> market
  - Above advantages more than offset higher corn costs
  - IPEP ethanol competitive with regular octane gasoline in SE US (10% ethanol blend sold as medium octane grade)
  - Potential RFG market in Atlanta metro area (13 counties)

# IPEP: Win-Win for All Stakeholders

- Thermal energy providers
  - Large continuous demand for thermal energy
  - Low incremental O&M—shared mgt., operators, maintenance staff
  - Ash nutrient value ~ offsets fuel cost
  - Potential local ash market as mineral feed supplement
- Government agencies (e.g., NRCS, EPA)
  - Reduced costs for poultry litter storage and transport
    - Switch to staggered year-round clean-out—little temporary storage
    - Avoid long-distance hauls out of concentrated poultry area
  - Proactive approach to water quality issues
  - Renewable energy: “dark green” ethanol

[www.brbock.com](http://www.brbock.com)



**BR Bock Consulting, Inc.**

Waste, Energy and Nutrient Solutions for a Better Tomorrow