

General Manager Reg Item #070855

**Beneficial Reuse of
Biosolids at Whistling Pines
Ranch**

**Water & Wastewater Engineering Department
Gainesville Regional Utilities**



February 11, 2008

Status of Biosolids Land Application

- 4/24/07 - GRU received Alachua County opinion that Special Exception required
- 7/23/07 - City Comm approved purchase
- 7/30/07 - Special Exception Application submitted
- 9/4/07 - Neighborhood meeting
- 10/10/07 - Quasi-judicial hearing Alachua County Planning Commission
- 8/27/07 & 10/22/07 - Presentation to Archer City Commission

Since Planning Commission Hearing on October 10, 2007

GRU Initiatives:

- 18 soil samples (collected & sampled by DOH)
- IFAS entomologist inspection & report
- Radiological testing
- Additional groundwater testing

ACEPD Additional Requirements:

- Groundwater monitoring plan for nutrients and pathogens
- Endocrine disruptors identification & sampling
- Aerosol Sampling requested Jan 2008

Current Status of Special Exception

- GRU continues to believe that land application when performed in accordance with regulations is a safe & sustainable activity.
- Special Exception process is more lengthy than anticipated due to information requests from ACEPD
- GRU staff wants to ensure that the City Commission continues to support Land Application and Special Exception Application

Current Positions on Special Exception Request

Support

- Alachua Co. Health
Dept.
- Alachua Co. EPD
- Alachua Co. Planning
Dept.
- Alachua Co. Planning
Comm.

Concerned

- Alachua County
EPAC
- City of Archer
- Neighbors have
expressed various
concerns

Land Application of Biosolids

More Scientific Work Needed

- **National Academy of Sciences 1996**
 - “the use of these materials in the production of crops for human consumption when practiced in accordance with existing federal guidelines and regulation, present negligible risk to the consumers, the to crop production, and to the environment.”
- **National Academy of Sciences 2002**
 - “There is no documented scientific evidence that the Part 503 rule has failed to protect public health. However, additional scientific work is need to reduce persistent uncertainty about the potential for adverse human health effects from exposure to biosolids.”
- **Cornell Waste Management Institute 2007**
 - EPA risk assessment not adequate
 - Lack of scientific investigation of reported health incidents
 - Compiled list of reported health incidents related to biosolids, reports are “not confirmed by scientific investigation”
- **Sierra Club Policy Statement 2007**
 - “The Sierra Club opposes the land application of municipal sewage sludges as a fertilizer and/or soil amendment because the current policies and regulations governing this practice are not adequately protective of human health and the environment.”

Land Application of Biosolids

Beneficial/Safe

- EPA 1999/2007
 - “When properly treated and managed in accordance with existing regulations and standards, biosolids are safe or the environment and human health”
 - “By treating sewage sludge, it becomes biosolids which can be used as valuable fertilizer, instead of taking up space in a landfill or other disposal facility”
- Florida DEP 2005
 - “Beneficial use of residuals in accordance with regulations is considered safe, and protective of public health, animals, and the environment”
- IFAS April 2003
 - “Following proper treatment and processing, biosolids can be recycled as fertilizers or soil amendments to improve and maintain productive soils and stimulate plant growth, with negligible human health or environmental impacts”
 - “When Regulations are followed, the protection of food, animals, human, and environmental health is assured.”

Land Application of Biosolids

Beneficial/Sustainable - Supporting Organizations

- Northwest Biosolids Management Association Strategic Plan 2005-2008
 - “Communities in the Pacific Northwest recognize biosolids recycling as a safe, sustainable, environmental benefit“
- The North East Biosolids and Residuals Association (NEBRA) A Vision and A Voice for Biosolids Recycling in North East America 2007
 - “NEBRA was founded on this vision: if biosolids recycling is to become sustainable and supported by the public in any particular region, it needs a steady, local voice providing accurate information and advocating for sound policies“
 - “it is critical for any society to safely manage such materials in cost efficient and sustainable ways. To do this requires readily-available, diverse, and accurate information for professionals and the public that is asked to support their efforts”
- National Biosolids Partnership 1997
 - “The NBP is a not-for-profit alliance whose purpose is to endorse environmentally sound and sustainable biosolids management practices that build public confidence within local communities”

Outline

I. Background

– GRU Biosolids Program

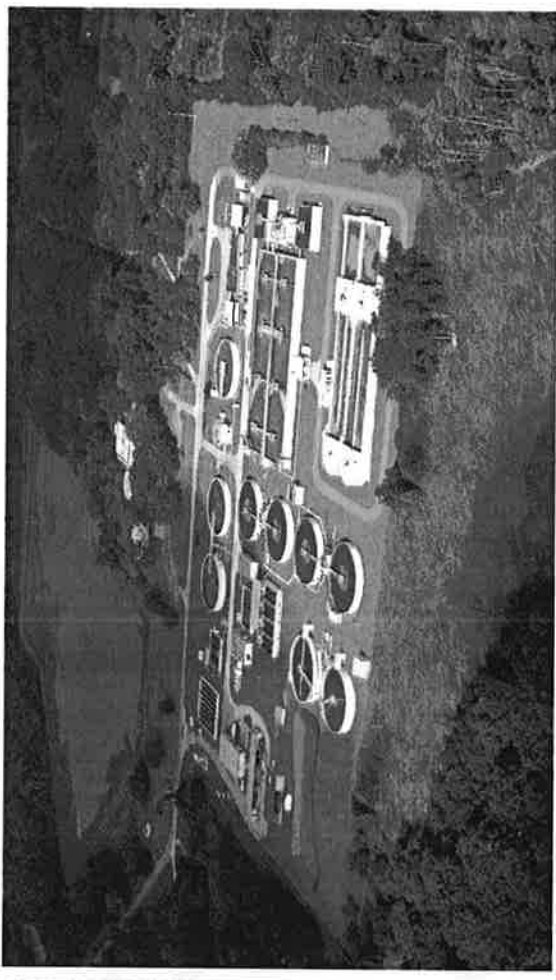
II. Evaluation of Biosolids Alternatives

III. Addressing Environmental & Neighbor Concerns

IV. Conclusions

I. BACKGROUND

What are Biosolids?

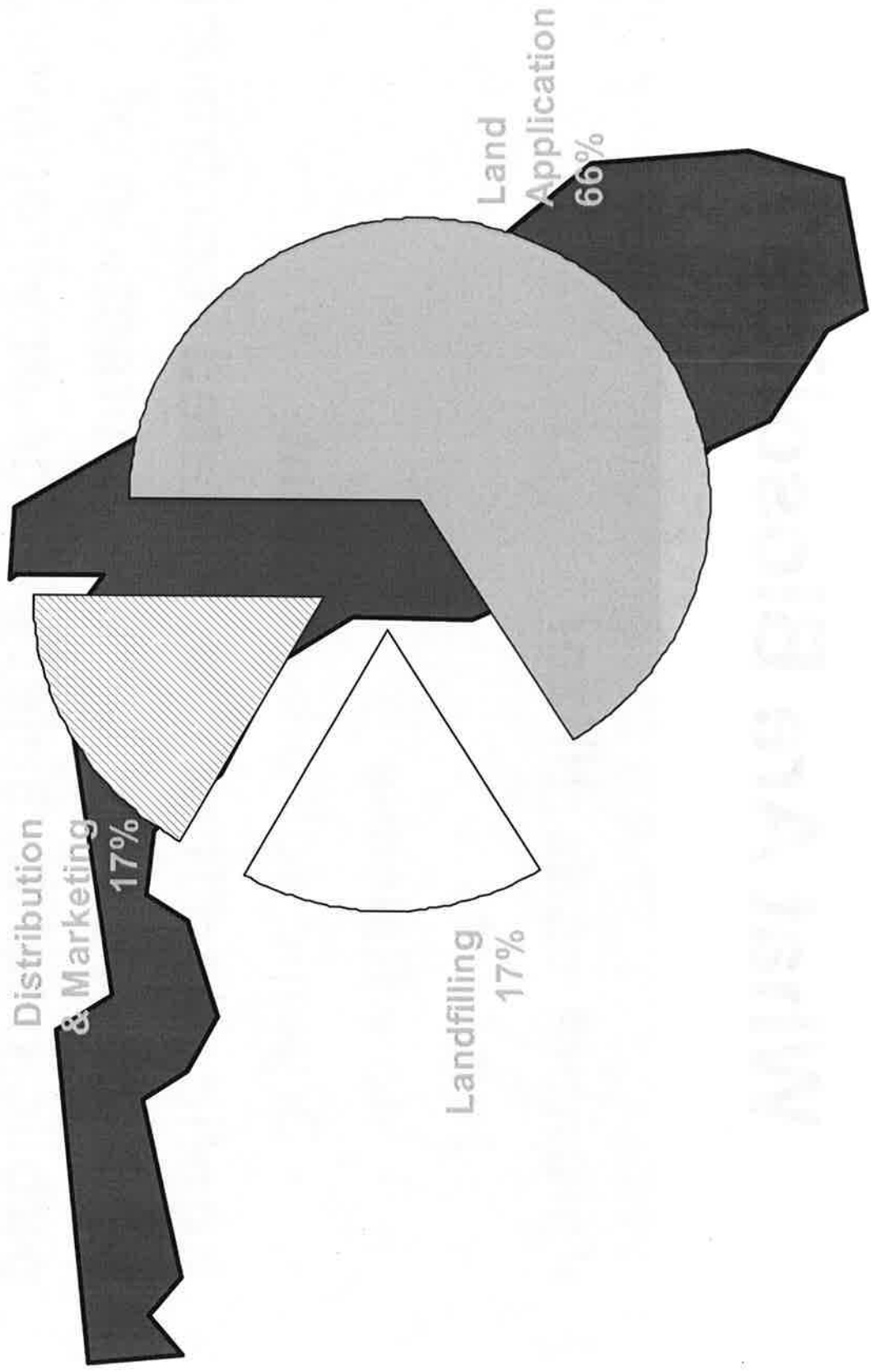


- Not Sewage
- Biomass harvested from water reclamation process
- Further treated through aerobic digestion¹⁰

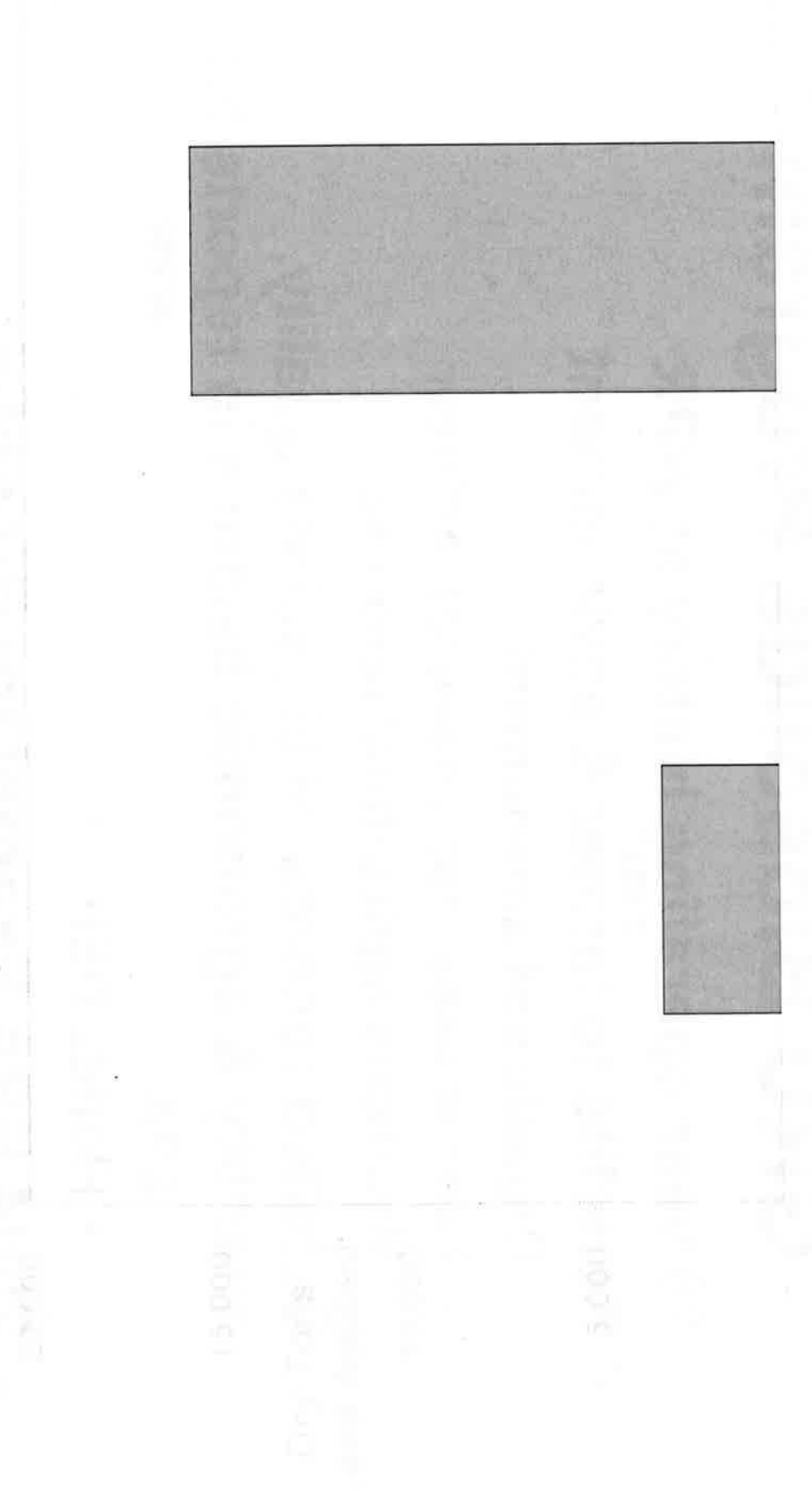
What Are Biosolids?

- **Valuable as fertilizer**
 - **Nutrients**
 - **Slow Release**
 - **Organic soil amendment**
- **Application highly regulated, controlled & monitored to ensure protection of public health, safety & the environment**

Biosolids Usage in Florida



Biosolids Used Beneficially in Alachua County 2006



*Includes Biosolids from UF, High Springs, Waldo, Hawthorne & unincorporated Alachua County

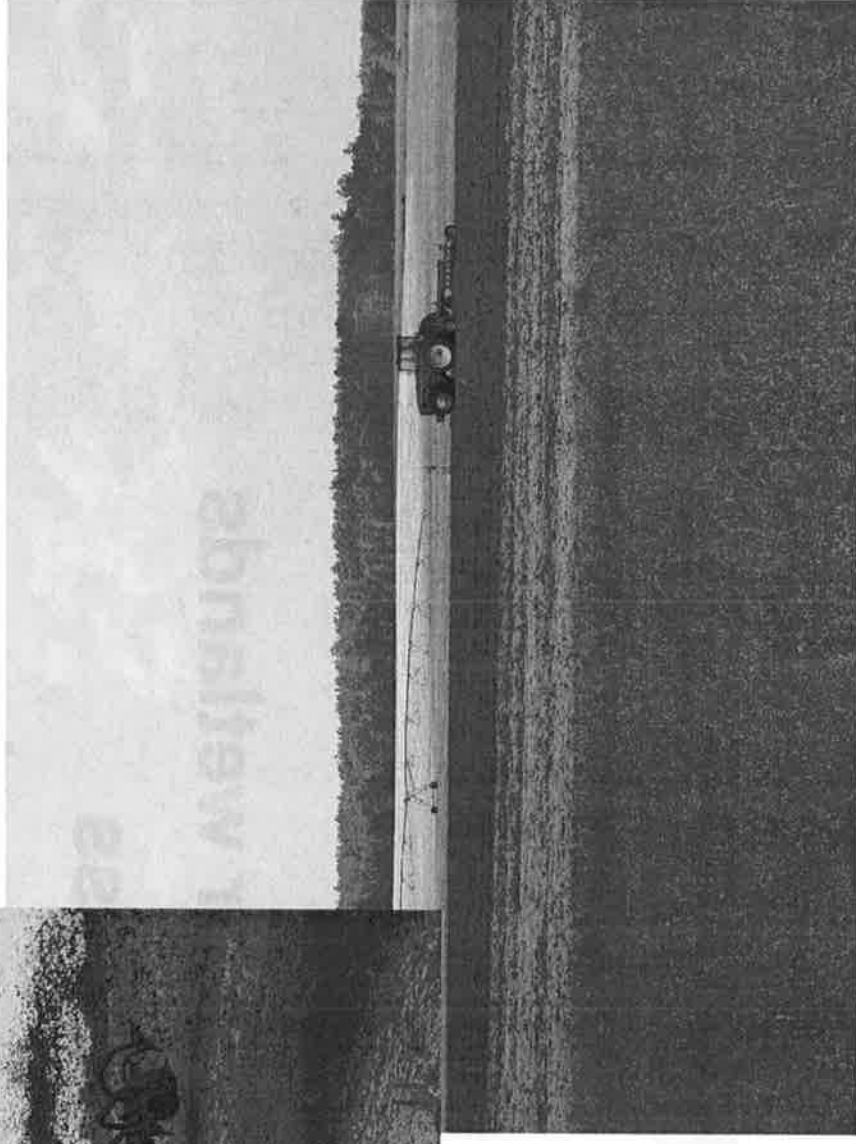
GRU Biosolids Program

- **26 year operating history at WPR**
- **Benefits to farmer & environment**
 - **Organic soil amendment**
 - **Farmer uses less chemical fertilizer**
 - **Maintains agricultural land use**
- **Detailed records of biosolids quality, quantity & agronomic balance in reports to:**
 - **EPA**
 - **Florida DEP**
- **2004 EPA Exemplary Biosolids Operation Award**

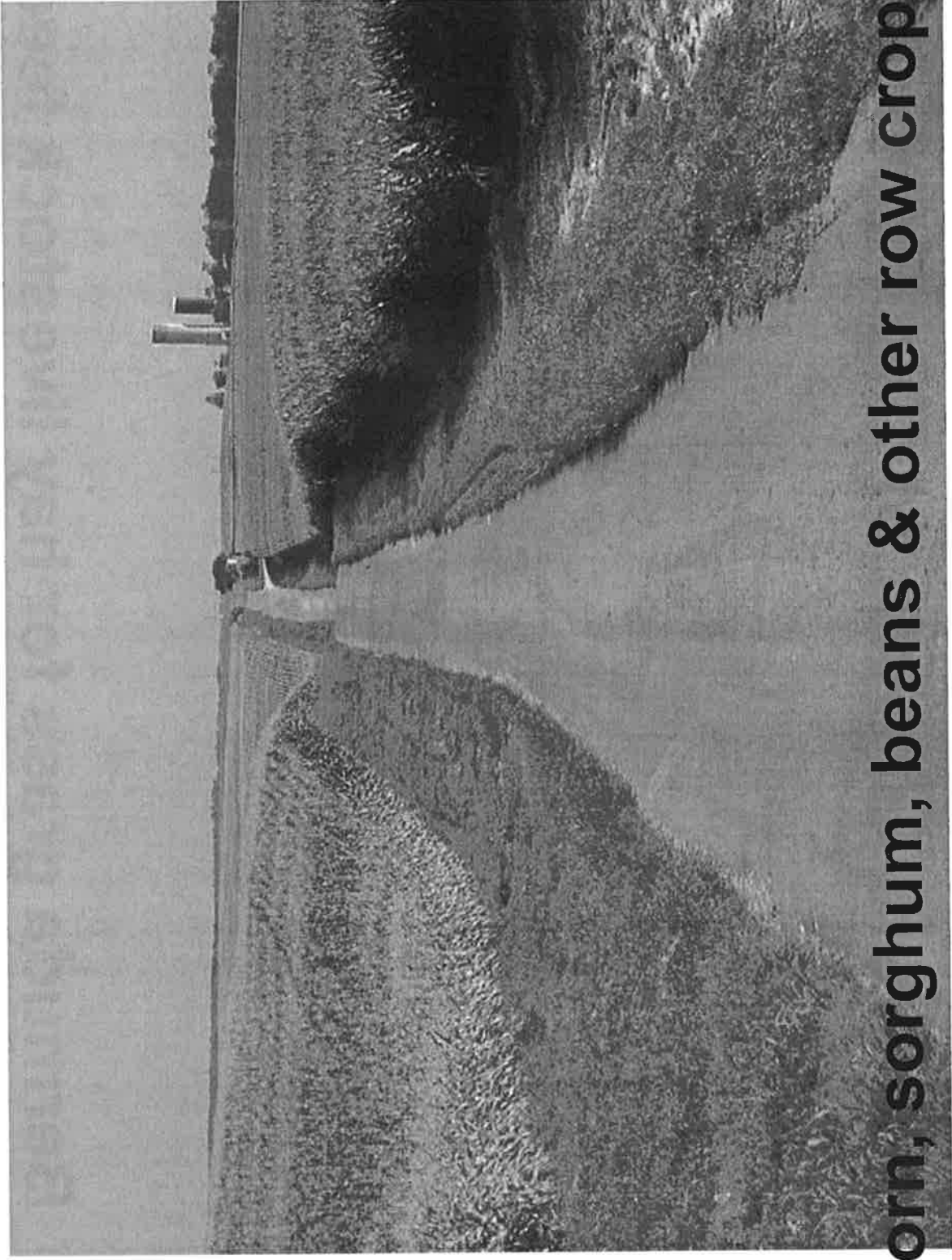
Why the WPR site?

- **1,200 acres established farming**
- **Sandy soils**
- **No surface waters or wetlands**
- **Major roadway access**
- **26 year operating experience**

How are the Biosolids Land Applied?



What is Grown at the Farm?



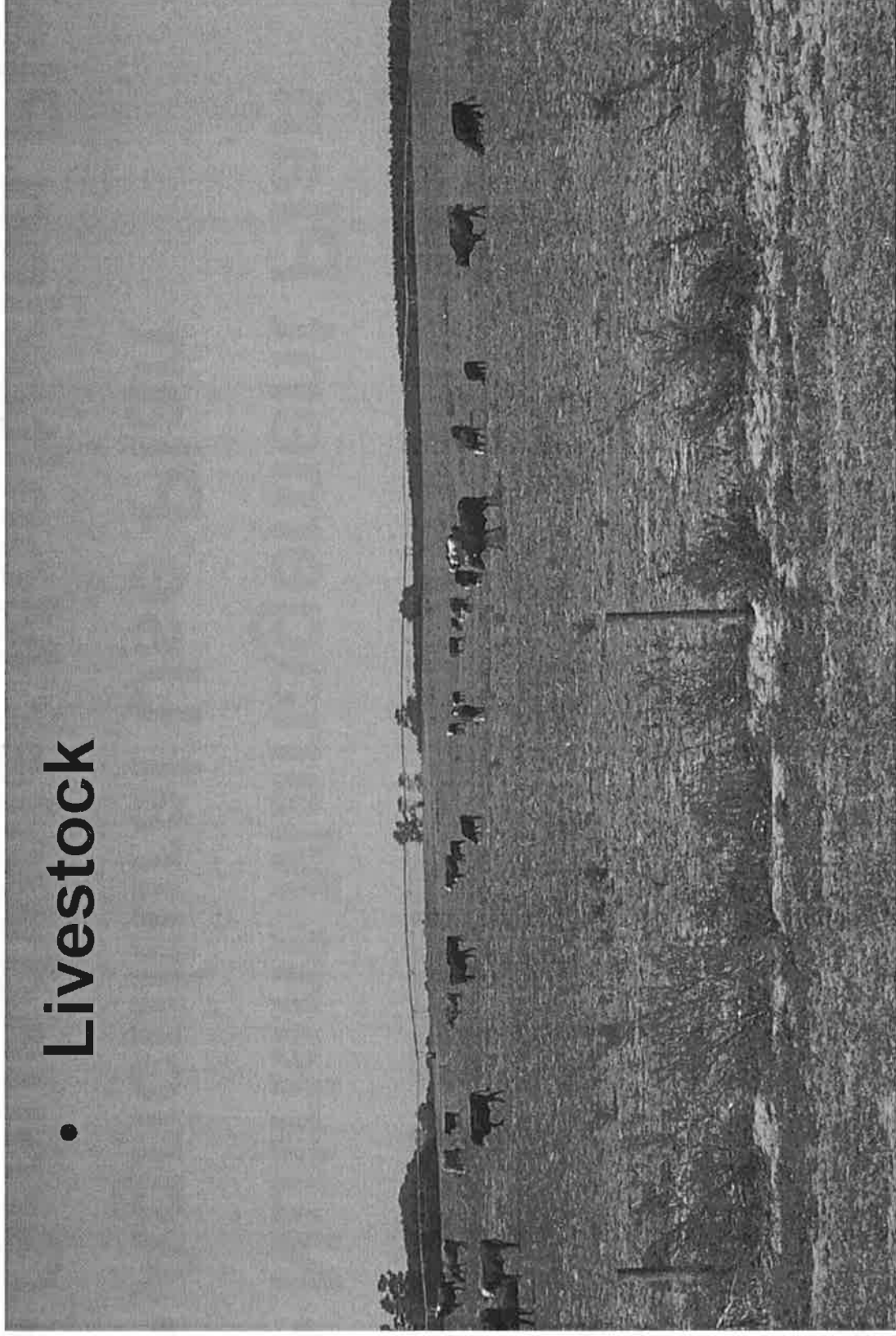
- Corn, sorghum, beans & other row crops⁷

What is Grown at the Farm?

- **Bermuda grass for hay livestock feed**
- **Also Rye grass in winter**

What is Grown at the Farm?

- Livestock



GRU Best Management Practices (BMPs)

- Stormwater Management Plan**
- Soil Conservation Plan**
- Nutrient Management Plan**
- Agricultural Use Plan**
- Groundwater Monitoring Plan**

II. EVALUATION OF BIOSOLIDS **ALTERNATIVES**

A. Mass Market Product (Class A)

High Cap Cost, Energy Intensive, marketability?

B. Energy Production

- 1. Anaerobic Digestion**
- 2. Conventional Combustion**
- 3. Advanced/Evolving Technologies**

C. Controlled Land Application

D. Landfilling

B. Energy Production

1. Anaerobic Digestion

- **Still need land application site**
- **\$41 Million Capital Cost to retrofit**
- **Very small energy benefit**
 - **Initially negative**
 - **Up to 0.2 MW in 2025**
- **Much more costly than other renewable energy sources**
- **Odors**
- **Low Flexibility**

B. Energy Production (cont'd)

2. Conventional Combustion

- **High water content (requires heat to remove)**
- **No energy benefit (due to water)**
- **Operational issues**

3. Advanced/Evolving Technologies

- **Gasification, plasma, others?**
- **May be able to overcome water issue**
- **Ask DH biomass plant proposers give price for taking biosolids**
- **~0 to 1 MW available energy**
- **Would need biosolids alternative until plant operating**

Biosolids Alternatives

	Current Capital Cost	NPV Cost	Rate Impact %
<u>Special Exception Required</u>			
Controlled Land App w/ Contract	0	\$25M	
Controlled Land App Purchase WPR*	\$11.5M	\$25-\$30M	0-3.4%
Anaerobic Dig w/ Purchase WPR	\$52.5M	\$57-\$62M	14.7%
Market Product (Dried Class A)	\$29M	\$51-\$65M	12.0%
<u>No Special Exception Required</u>			
Contract Land Application	\$6M	\$34-38M	5.9%
Gasification Proposal	\$10M	\$36M	6.5%
Landfill (aerobic digestion)	\$6M	\$40-44M	8.3%
Anaerobic Dig & Landfill	\$47M	\$80M	20.4%
<u>Long Term Alternative</u>			
Biomass Energy	?	?	?

*Currently budgeted.

Low Risk

High Risk

\$80M

\$60M

\$40M

\$30M

\$20M

High Cost

Low Cost

Anaerobic Dig & Landfill

Anaerobic Dig with Purchase WPR
Market Product

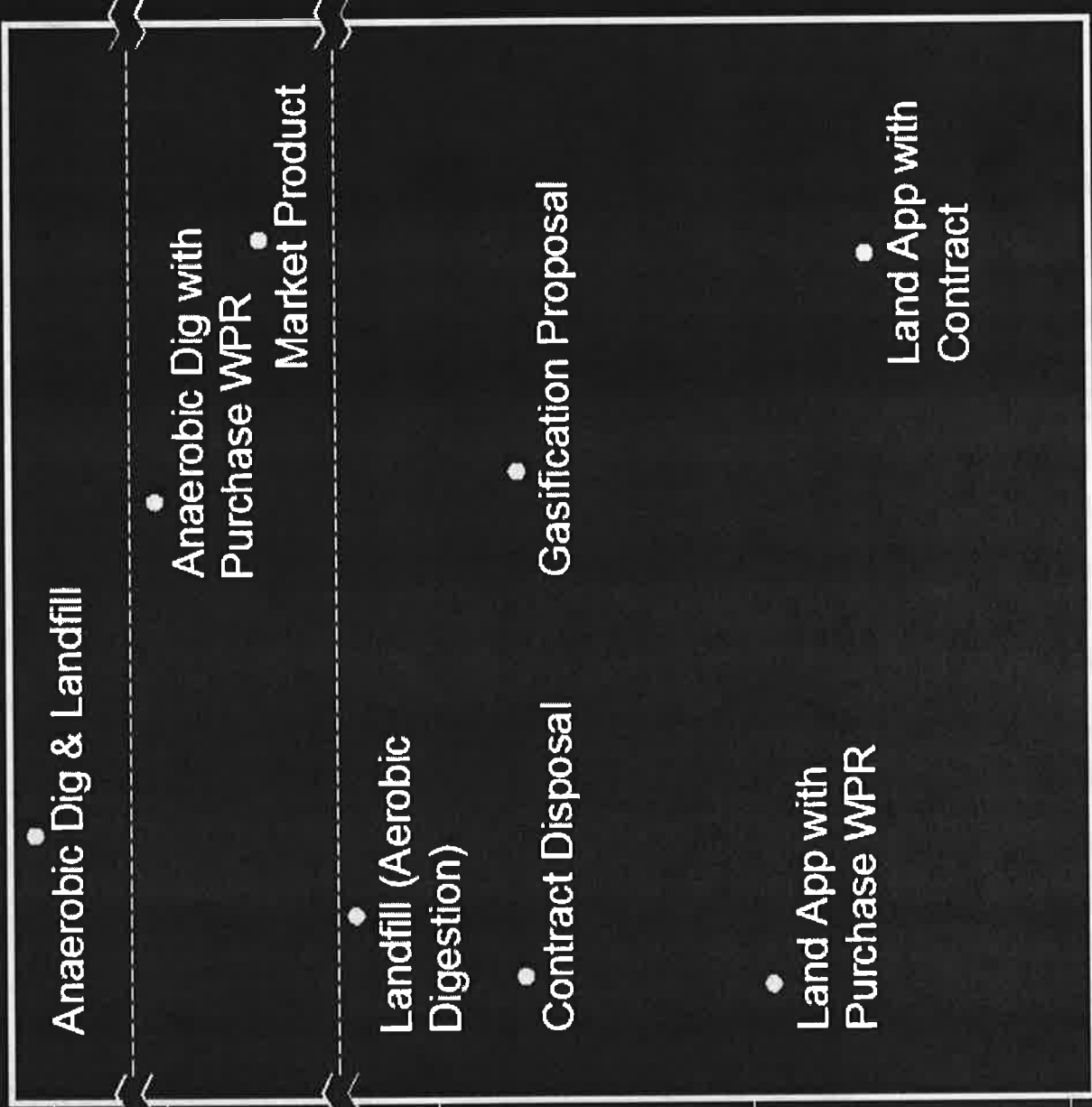
Landfill (Aerobic Digestion)

Contract Disposal

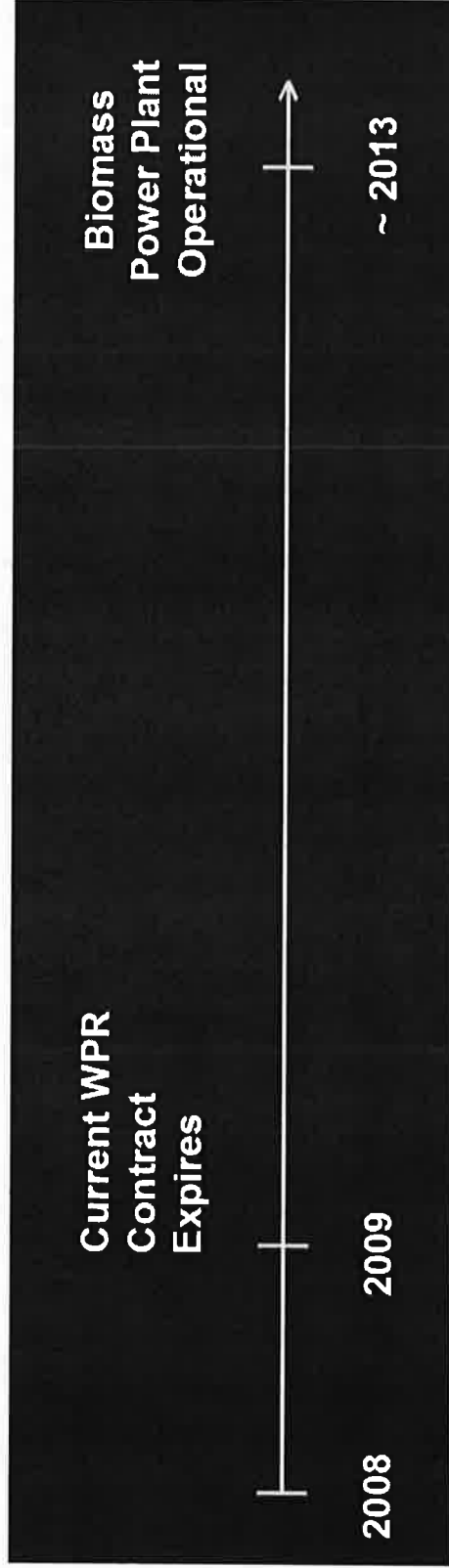
Gasification Proposal

Land App with Purchase WPR

Land App with Contract



Potential Transition to Biomass Energy



2008-2012 Purchase WPR	5 yr NPV \$8.7M	2012-2028 Biomass Energy Land Application	20 yr NPV ?
Contract Land App	\$11.8M	Biomass Energy Contract Land App Land Application	? \$25-\$30M
			\$34-\$38M Unlikely

Conclusions from Biosolids Master Plan

- **Continue Controlled Land Application**
- **Secure Property Rights (purchase)**
 - **High flexibility (WPR is recoverable asset)**
 - **Low energy input**
 - **Beneficial reuse – offsets chemical fertilizer use**
 - **Continue to evaluate energy alternatives as they evolve**

III. ENVIRONMENTAL & NEIGHBOR CONCERNS

- A. Hospital & Industrial Wastes**
- B. Radioactive materials**
- C. Metals**
- D. Trace Organics**
- E. Dust**
- F. Flies**
- G. Groundwater Monitoring**
- H. Regulatory Oversight**

A. Hospital & Industrial Wastes

- **GRU Industrial Pretreatment Program**
 - Permits issued & enforced
 - Monitoring & compliance limits
- **Hospitals**
 - Strict waste management protocols
 - Dept of Health & FDEP regulated
 - GRU wastewater permit
 - Infectious, pathological, pharmaceutical, radiological, & other hazardous wastes not discharged into sewer

B. Radioactive Materials

- Public interest in radioisotopes potentially in hospital effluents - Iodine-131**
- Radioactive waste disposal highly regulated**
- Very short half lives: Iodine 131 ~ 8 days**
- EPA ISCORS Technical Report February 2005 states “In the US, there are no identified cases in which radioactive materials in sewage systems are a threat to the health and safety of POTW workers or the general public”**

GRU Radiological Sample

Results

Onsite Dose from GRU Biosolids

Iodine 131 < 0.000000001 mrem/yr

Background Radiation (Avg Doses)

- Natural.....300 mrem/yr
- Man Made70 mrem/yr

(radon gas, human body, rocks, soil, cosmic rays, medical procedures, consumer products, watching TV)

C. Metal Concentrations

<u>Parameter</u>	<u>Kanapaha</u>	<u>Main Street</u>	<u>EPA</u> (Standard Quality)	<u>EPA*</u> (Exceptional Quality)
Arsenic, mg/kg	<6	<5	75	41
Cadmium, mg/kg	3	3	85	39
Chromium, mg/kg	11	24	3000	1200
Copper, mg/kg**	217	379	4300	1500
Mercury	1	3	57	17
Nickel, mg/kg	19	23	420	420
Lead, mg/kg	14	37	840	300
Selenium, mg/kg	12	15	100	100
Zinc, mg/kg **	690	903	7500	2800

* Ceiling concentrations mg/kg dry weight basis – Class AA Exceptional Quality

** Considered micronutrients

Soil Metal Concentrations

<u>Parameter</u>	<u>FDEP Soil Cleanup Target Levels*</u>	<u>FDOH Soil Sample Results**</u>
Arsenic, mg/kg	2.1	0.2
Cadmium, mg/kg	82	0.2
Chromium, mg/kg	210	2.1
Copper, mg/kg***	150	3.9
Mercury	3	0.03
Nickel, mg/kg	340	1.3
Lead, mg/kg	400	2.2
Selenium, mg/kg	440	0.5
Zinc, mg/kg***	26000	11.4

* Residential unrestricted use

** Based on average of 18 sample sites - Sampling and analysis and by Florida Department of Health

*** Considered micronutrients

Uranium & Aluminum

	Uranium (mg/kg)	Aluminum (mg/kg)
GRU Biosolids	0.0134	130
Natural Soil	0.3 – 1.4	800 – 3,300

Uranium & Aluminum in Biosolids well below background

ACDOH – uranium detected in well likely naturally occurring

D. Groundwater

- **GRU Historical sampling of area residents' wells for nitrate & found levels were very low**
- **ACDOH sampled area private wells:**
 - **Over 30 wells for nitrate & pathogens**
 - **9 wells for all primary drinking water standards**
 - **Drinking water standards met in all wells except 2 wells exceeded MCL for nitrate**
- **Elevated nitrate common in agricultural areas**
- **IFAS: Nitrates above 20 ppm found near farms in North Florida**

Groundwater BMPs

- **Biosolids applied at Agronomic Rates**
- **Biosolids are slow release**
- **If GRU purchases will reduce inorganic chemical fertilizer use**

Proposed Groundwater Monitoring Plan

Well Locations ●

Groundwater Flow



E. Trace Organics

“Pharmaceuticals and personal care products”

“Endocrine Disruptors”

Sources:

- Pharmaceuticals
- Animal feeds & implants
- Fragrances, disinfectants, cleaners, dyes, etc
- Plastics from food containers

Public Interest & Research:

- Human exposures
- Presence & impacts in aquatic environments
- Ubiquitous at low concentrations (ppt levels)

Trace Organics (cont'd)

- **Very low levels in biosolids**
- **Biosolids regulations & BMPs limit exposure to humans and water bodies**

Trace Organics Testing

- **8 representative chemicals being tested**
- **Specialized sampling & analysis**
 - **Parts per trillion (ppt) levels**
 - **Results in 6 weeks**

F. Dust

- **Dust typical of row cropping operations**
- **ACDOH determined that:**
 - *Fecal Coliforms not a viable pathogen in a wind-blown environment*
 - *When diluted w/ air, metal concentrations are orders of magnitude below what would be considered a nuisance level and health concern*
- **GRU implementing BMPs to reduce dust**

GRU Additional BMP's to Reduce Dust

- **Transition to grass crop planting in northern fields and limit seasonal plowing**
- **Installed “wind socks” to help monitor wind speed and direction**
- **Implement DEP proposed 75 ft application setback**
- **Investigate new application technologies**

G. Flies

Conclusions from UF Entomology professor farm inspection report:

- *Flies were from onsite and offsite farming activities*
- *Fly problems can be solved by best management practices*
- **GRU will implement BMP's when property is purchased**

H. Regulatory Oversight

- **Annual inspection and reporting**
 - **USEPA**
 - **FDEP**
 - **ACEPD**
- **5-Year WRF NPDES permitting by FDEP and review by USEPA, ACEPD and DOH**
- **Bi-annual DOH NELAC laboratory inspection and re-certification**

IV. STAFF CONCLUSIONS

- 1. GRU Land Application Program:**
 - **Environmentally Sustainable**
 - **Reduces Chemical Fertilizer Use**
 - **Least Cost/Least Risk Impact to GRU Customers (if WPR purchased)**
 - **High Flexibility (Biomass Energy)**
- 2. Move forward with Special Exception & purchase WPR**
- 3. Implement additional BMPs to further address public concerns**

City Commission Action

- **No further action is required for staff to continue pursuit of a required Special Exception from Alachua County and purchase of the Whistling Pines Ranch**

