

Advanced Refrigeration Systems

Maintaining CO₂ Secondary & Cascade Systems

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Hilton
Minneapolis, MN
September 19-22, 2010

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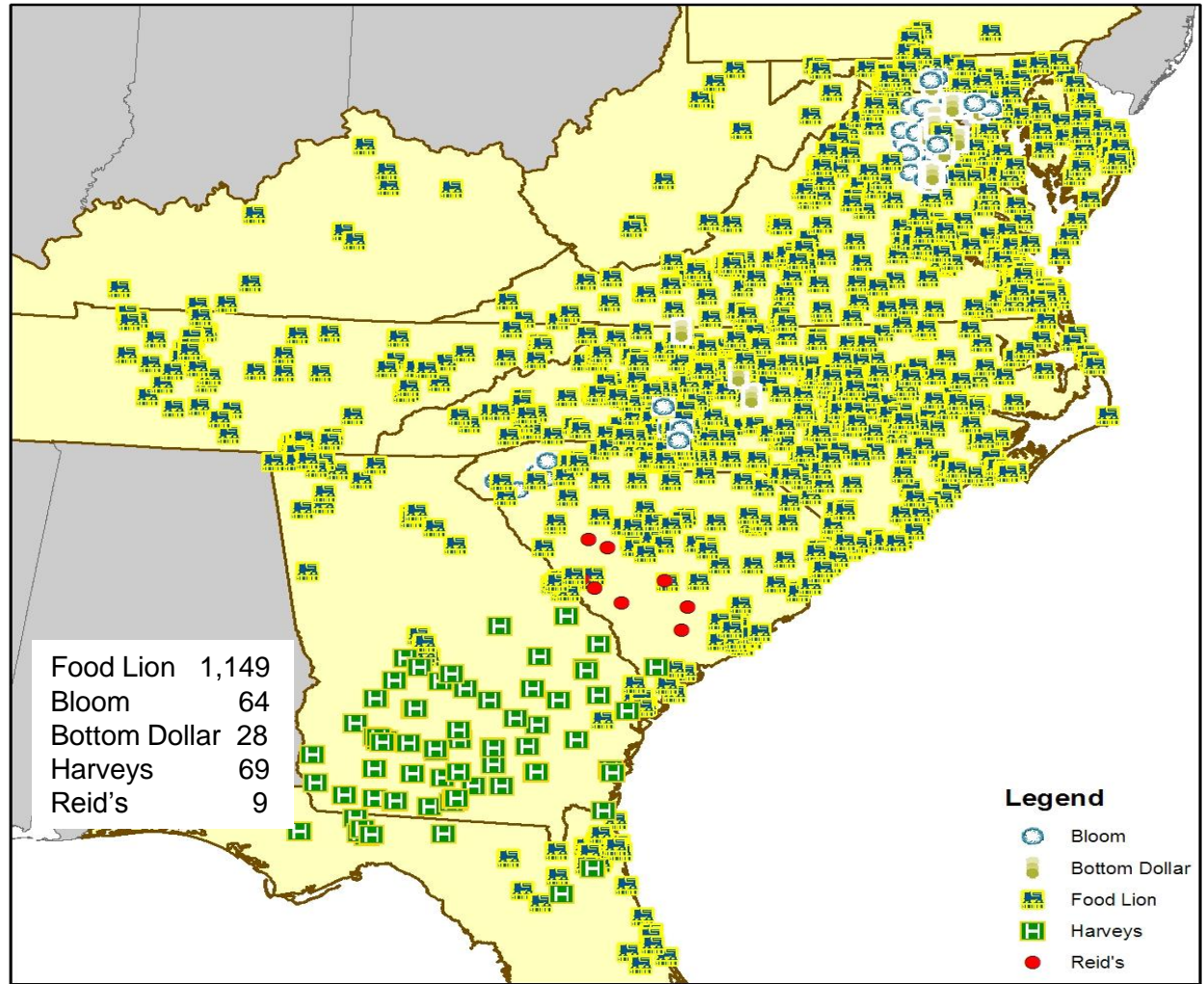


bottom dollar
FOOD



bloom
a different kind of grocery store

Reid's



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Advanced Refrigeration Systems

- 2118** Dinwiddie, VA: MT Glycol Secondary Loop System (R507)
- 2663** Montpelier, VA: LT CO₂ Secondary System (R507)
- 2659** Portsmouth, VA: MT Glycol Secondary Loop System (R507)
LT CO₂ Secondary System (R507)
- 2161** College Park, GA: CO₂ Cascade System (R507)
- 2157** Columbia, SC: CO₂ Cascade System (R407A)
- 2191** Conyers, GA: CO₂ Cascade System (R407A)
Opened July 28, 2010

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Refrigerant Reductions

	<u>Refrigerant</u>	<u>Refrigerant/CO₂ Charge (lbs)</u>
2118:	R507/Glycol	500/???
2663:	R507/CO ₂	350/900
2659:	MT R507/Gycol LT R507/CO ₂	800/??? 300/900
2161:	R507/CO ₂	1800/2248
2157:	R407A/CO ₂	900/1450
2191:	R407A/CO ₂	1000/1800

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Refrigerant Reductions

	<u>Refrigerant</u>	<u>ARS (lbs)</u>	<u>DX System (lbs)</u>	<u>Reduction</u>
2118:	R507	500	1150	650 (57%)
2663:	R507	350	885	535 (60%)
2659:	MT R507	800	1753	953 (54%)
	LT R507	300	1367	1067 (78%)
2161:	R507	1800	3100	1300 (42%)
2157:	R407A	900	3100	2200 (71%)
2191:	R407A	1000	3100	2100 (68%)

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Refrigerant Reductions - Savings

	<u>Refrigerant</u>	<u>ARS (lbs)</u>	<u>DX System (lbs)</u>	<u>Savings</u>
2118:	R507	500	1150	\$4,388
2663:	R507	350	885	\$3,612
2659:	MT R507	800	1753	\$6,433
	LT R507	300	1367	\$7,202
2161:	R507	1800*	3100	\$8,775
2157:	R407A	900**	3100	\$13,860
2191:	R407A	1000	3100	\$13,230

*Refrigerant reclaim

**Glycol Loop reclaim

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Leak Rates

- Primary Refrigerant Leak Rate: 0%
 - Total refrigerant use (rolling 1 year - August 2010)
 - Last refrigerant add was July 30, 2009
 - 1.79% rolling 1 year (60 lbs.)
- CO₂ operating leak rate: 42.7%
 - CO₂ loss thru actual system failure (Leak – 2350 lbs)
 - 2010 (rolling 1 year thru August): 11,609 lbs CO₂ used
 - Power Failure
 - Water Cooled Condenser (Freezing)
 - Volumetric expansion in system (PRV)
 - Component failures (Pressure Relief Valves)

Refrigeration Costs

Advanced Refrigeration Systems:

- Average Refrigeration Cost is 49% of chain average.*
- Refrigeration CPSW calculation (Metric)
- Low Leak Rates and Low Refrigerant use

Refrigeration Costs include (CPSW):

- Refrigerant (includes CO₂)
- Refrigeration Parts
- Refrigeration Labor

*Year to date 2010

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Key to Successful Implementation

Manufacturer Sponsored Training

- Factory visit
 - Training by Engineering Department (Theory)
 - Equipment Assembly (Chillers, pumps, heat exchangers)
 - Promote equipment familiarity
- On-site during installation
 - Pipe routing
 - Control wiring

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Key to Successful Implementation

Who to include:

- Installing Refrigeration Contractor
- Refrigeration Technician (In-House)
- Back-up/Service Contractor
- Energy Specialist (Refrig. Commissioning)

Require Factory Start-up

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Installation

- Construction - Cost Neutral
 - Electric Defrost – Added Cost
 - EEV – Added Cost
 - Generator/Condensing Unit

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Challenges

- **CO₂ Availability**
 - Lead Times at Supply House (Week Delivery)
 - Not Common stocking item at Supply House
 - Build Relationship with Supply House
 - Maintain Rack Capacity on Site
- **Proper Service Tools**
 - CO₂ Leak Detectors
 - Heavy Duty Hoses for charging system
 - Adaptors for CO₂ cylinders for system charging

Thank You

Questions?

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