Modifying Ash Resistivity and Improving ACI Performance for Mercury Control with Liquid Flue Gas Conditioning

McIlvaine Hot Topic
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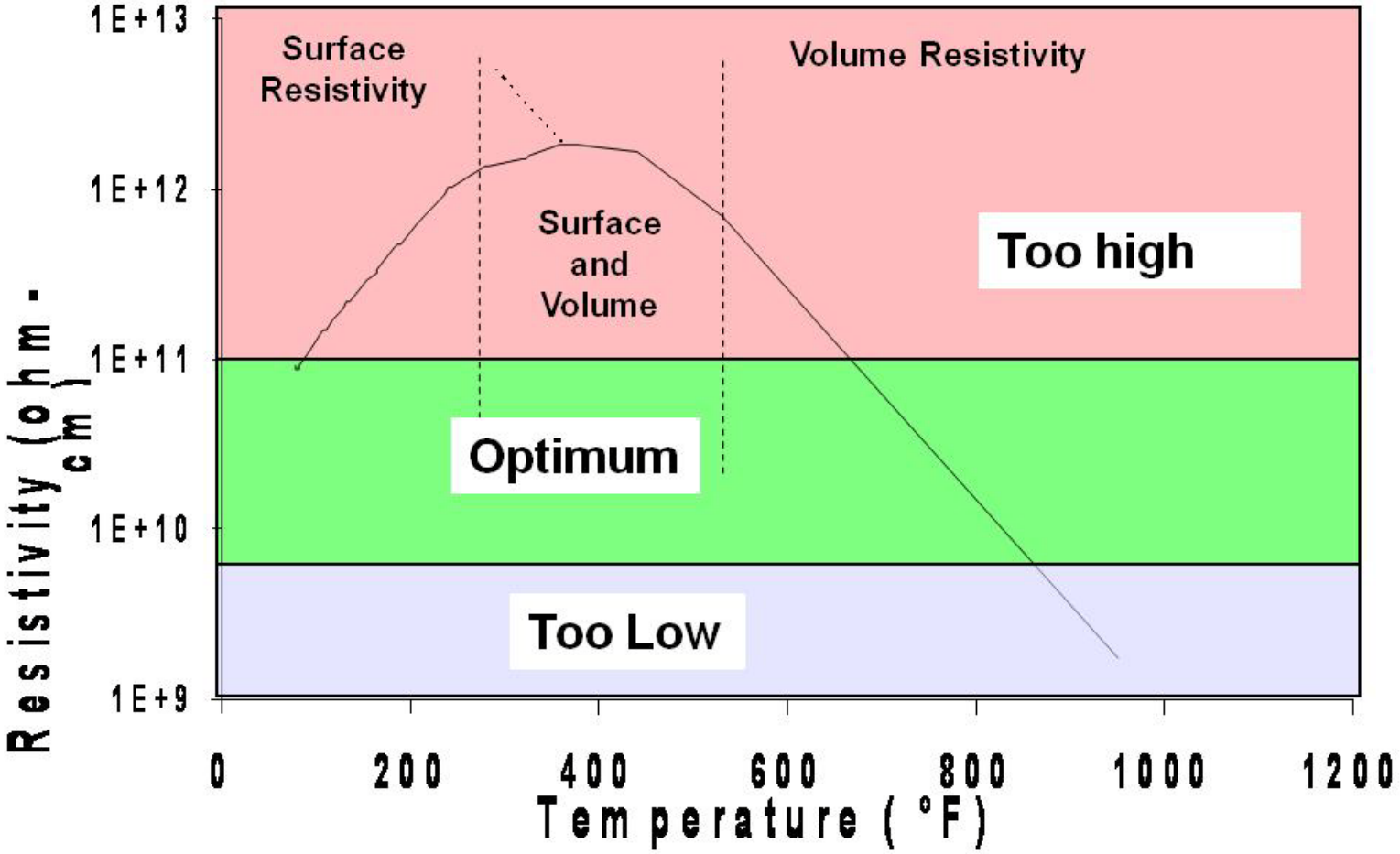
ADA Experience with FGC and ESPs

- Have been providing flue gas conditioning systems for ESPs since 1997
- Recognized experts in ESP troubleshooting and performance evaluations
  - In house tools for resistivity measurement and ESP modeling
  - Provide support with specification, selection and start-up of ESPs and baghouses on utility boilers

Typical Temperature Resistivity Relationship



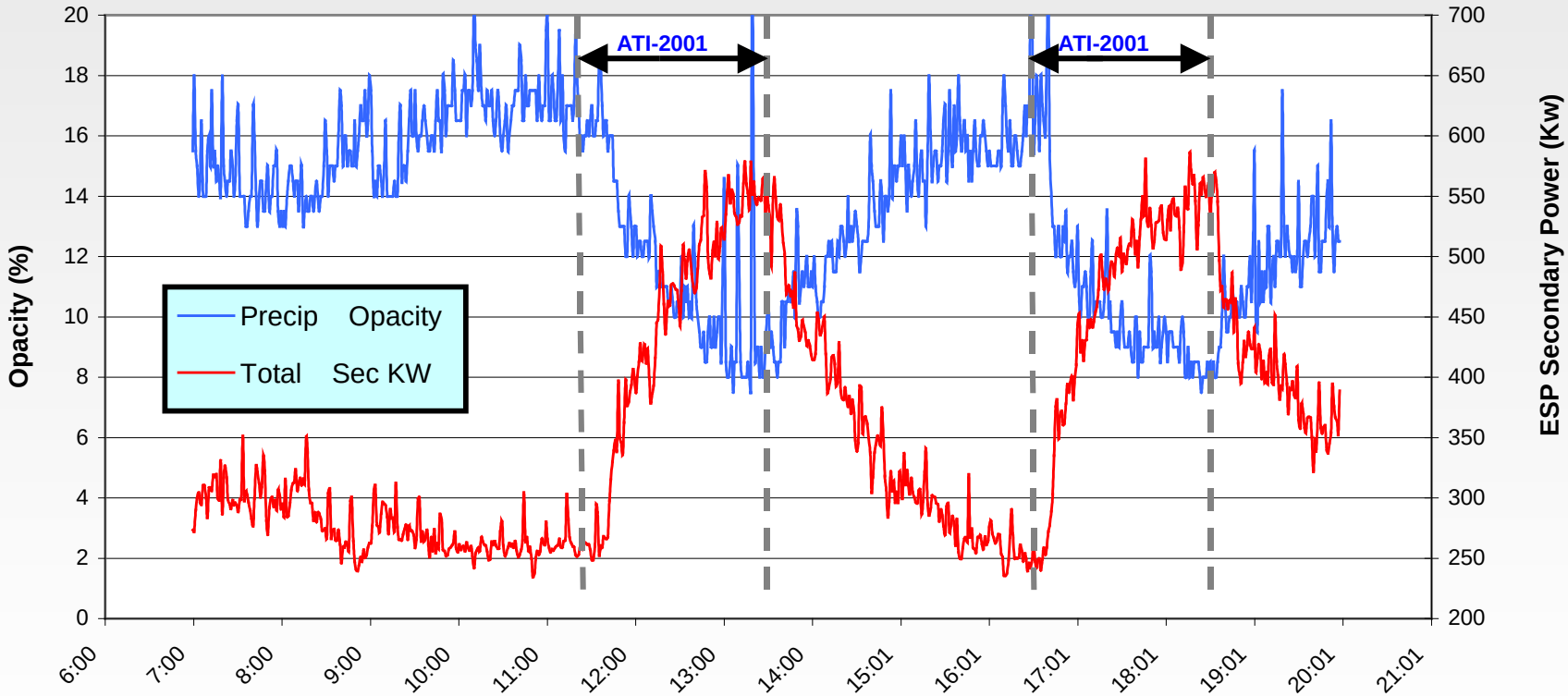
FGC: How It Works

- Resistivity modification of particulate layer
  - Resistivity mid-10^9 to <10^{11} ohm-cm is optimal
  - Too high (>10^{11} ohm-cm yields poor charging and/or back corona
  - Below 10^9 yields maximum ESP power but can increase reentrainment
- Provides ability to vary injection rate with varying ash characteristics and operating conditions
- Liquid spray injection of chemical additives
  - Flash evaporation of additive spray droplets
  - Co-deposition onto ESP collection plates
  - Electrical conductivity through surface moisture on particles improved via chemical alteration

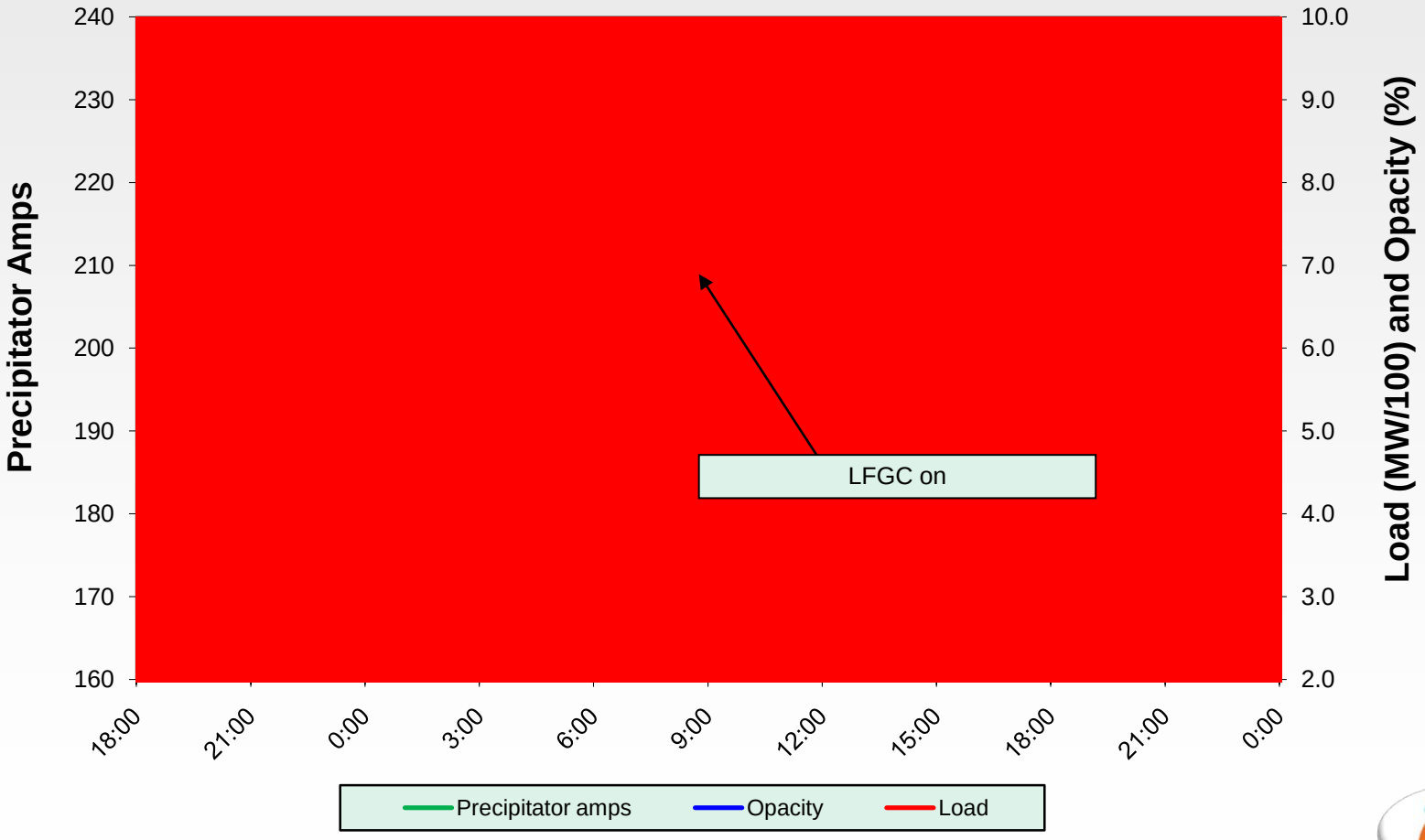
Liquid FGC Chemical (ATI-2001™)

- Effective resistivity modifier w/PRB or bituminous fly ash
- As-needed injection for problem coals
- Long-term conditioning as SO_3 replacement
- Effective temperature range 250 to 500^{o}F
- Does not interfere with activated carbon for Hg control
- Does not affect the ability to sell the fly ash

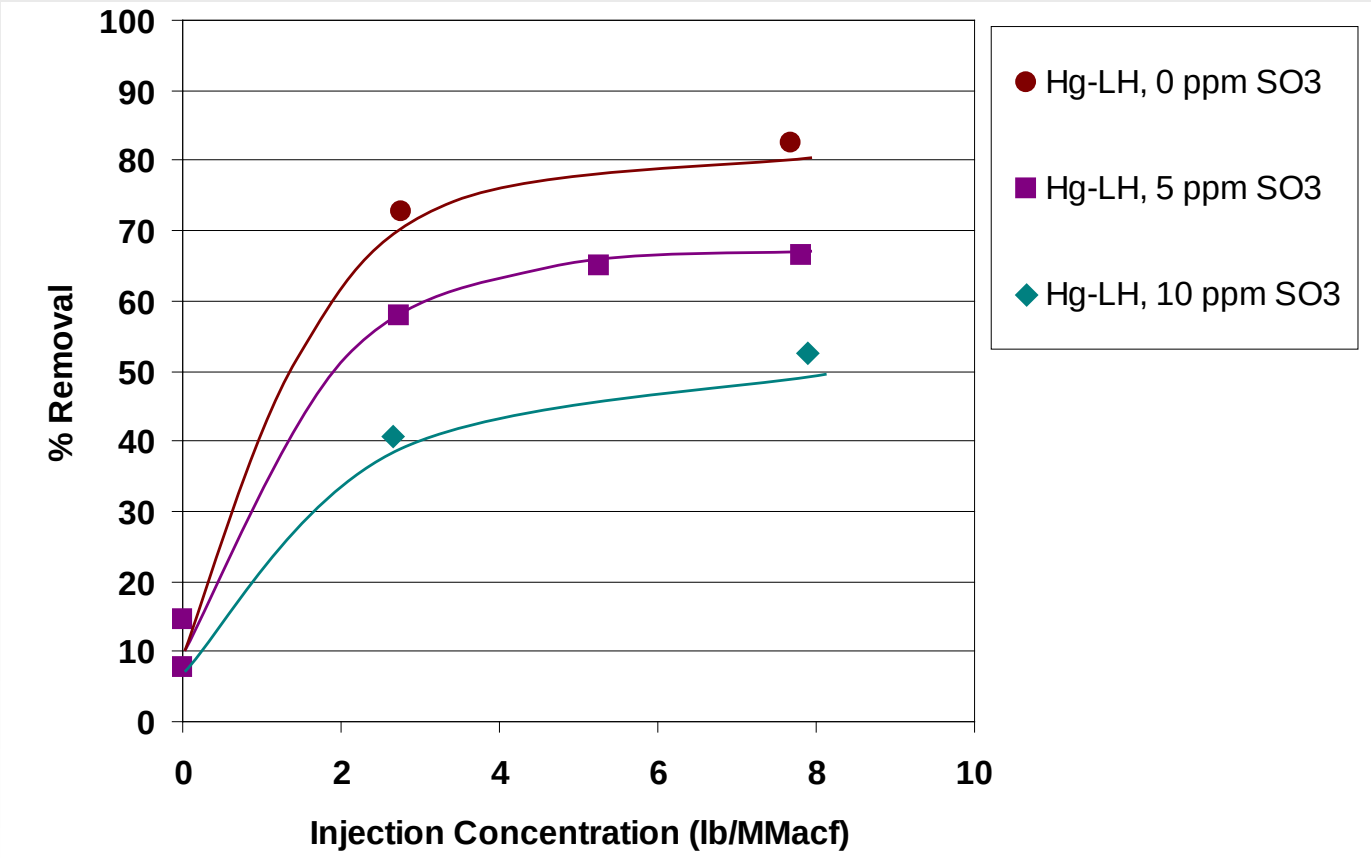
ESP Response with LFGC



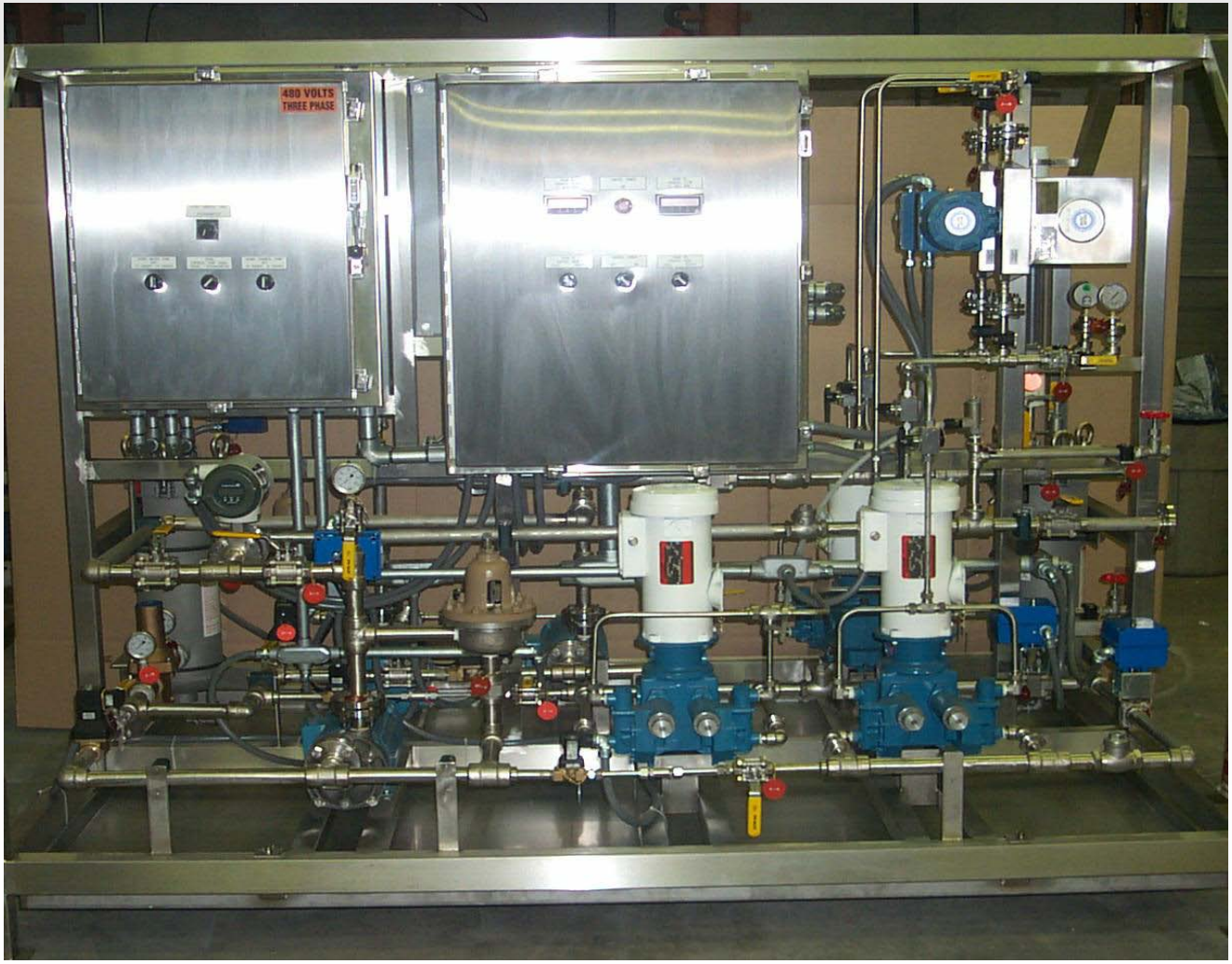
ESP Response with LFGC



Impact of SO_3 on PAC Performance



Chemical Injection Skid



Liquid Distribution Manifold

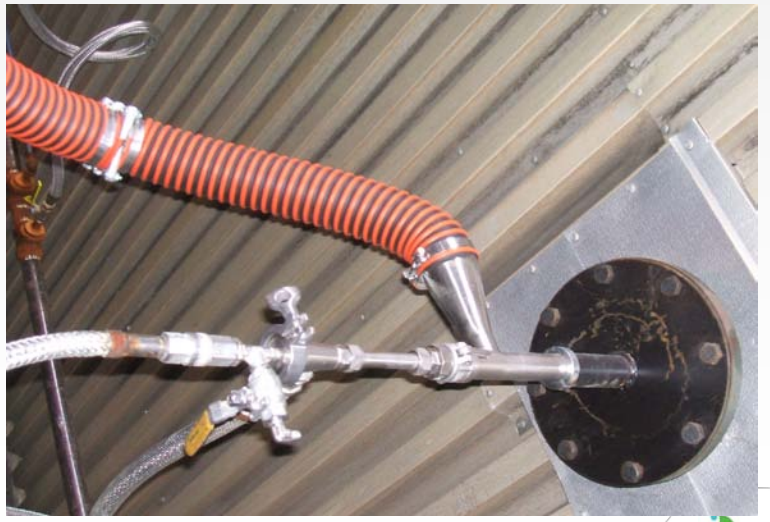
Injection Lance Grid

LFGC as Replacement for SO_3

- ATI-2001 designed for utility ESPs and has been in commercial use for over 10 years
- Recently completed several successful demos with ATI-2001 LFGC as an SO_3 replacement
- Low cost, small foot print injection equipment
- One customer using ATI-2001 with activated carbon and achieving > 90% Hg control
  - Opacity levels maintained
  - Activated carbon usage reduced for mercury control

Summary

- SO_3 impacts the performance of PAC for Hg control
- ADA offers an alternative resistivity modifying chemical and injection system
  - Demonstration equipment available for short-term tests
  - Equipment lease w/purchase option
  - Permanent injection system



Creating a Future with Cleaner Coal

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Equipment

- Low cost, small footprint
- Low utility power requirements
- Injection equipment connected to plant controls
- Includes: chemical storage tank, injection skid, transport piping, chemical and compressed air distribution manifold, injection lances, shield air blower