

IMPLEMENTATION SCHEDULE FOR FLUE GAS ENVIRONMENTAL CONTROLS FOR COAL-FIRED POWER PLANTS

Prepared for
May 26, 2011 Discussion with OMB

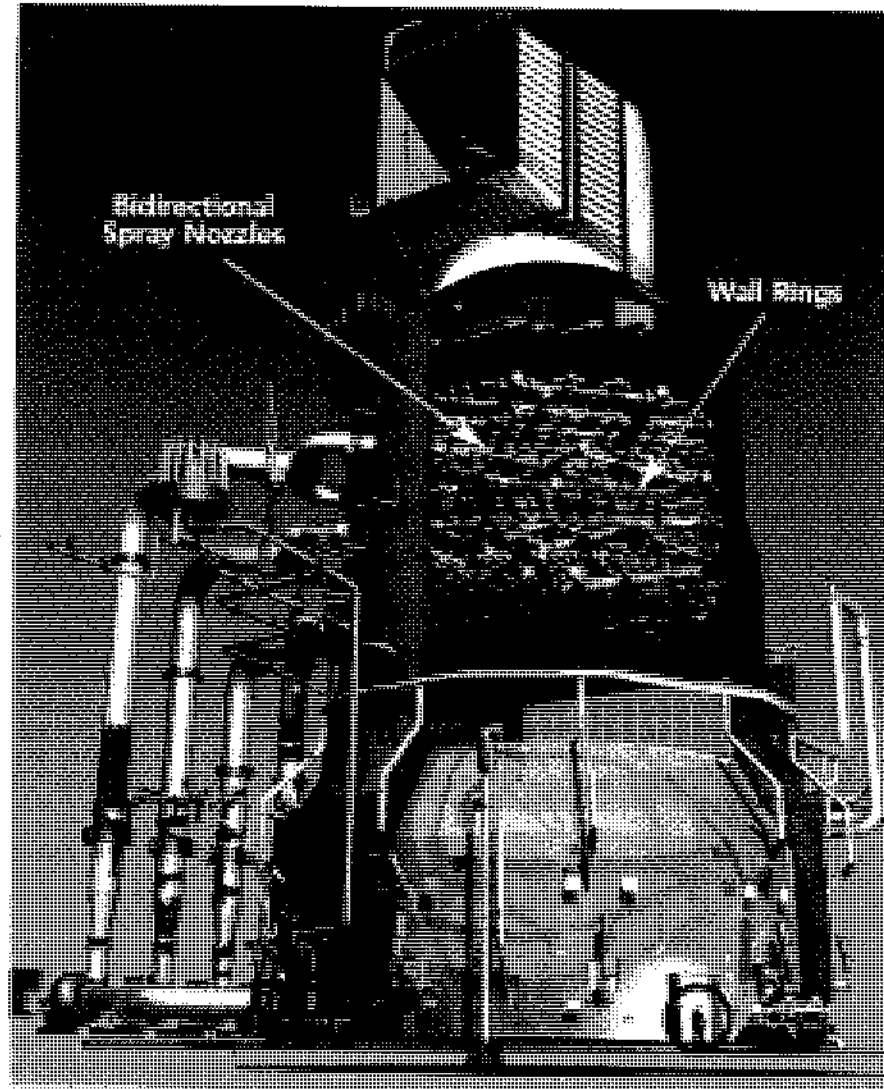
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OVERVIEW

- Description of Flue Gas Process Equipment
- General Steps to Deploying Environmental Controls
- Time Needed for Installation of Controls at Individual Units – EPA and Industry Perspectives
- Projected Schedule for Installation of Equipment Industry-Wide

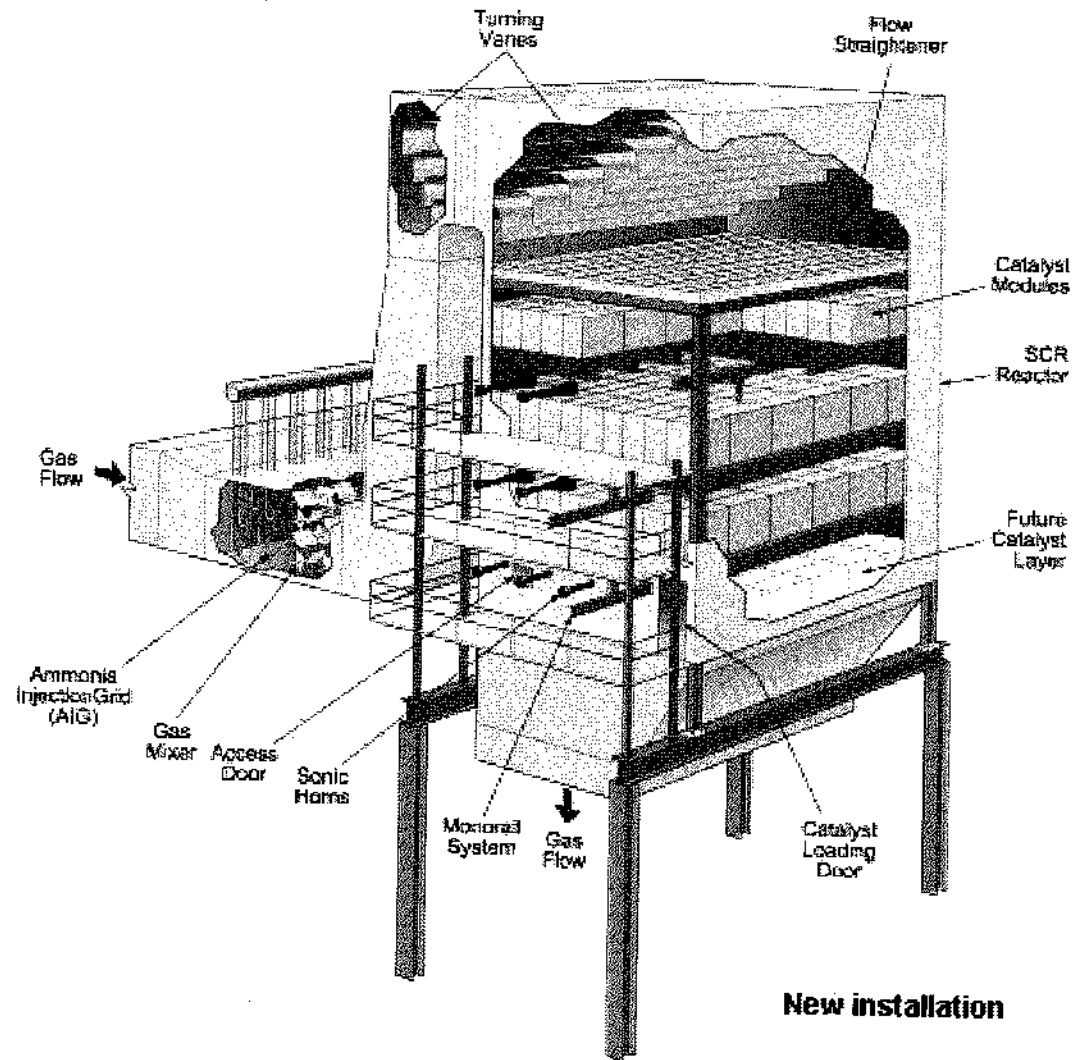
TYPICAL WET FGD ABSORBER TOWER

(Courtesy Babcock-Power)

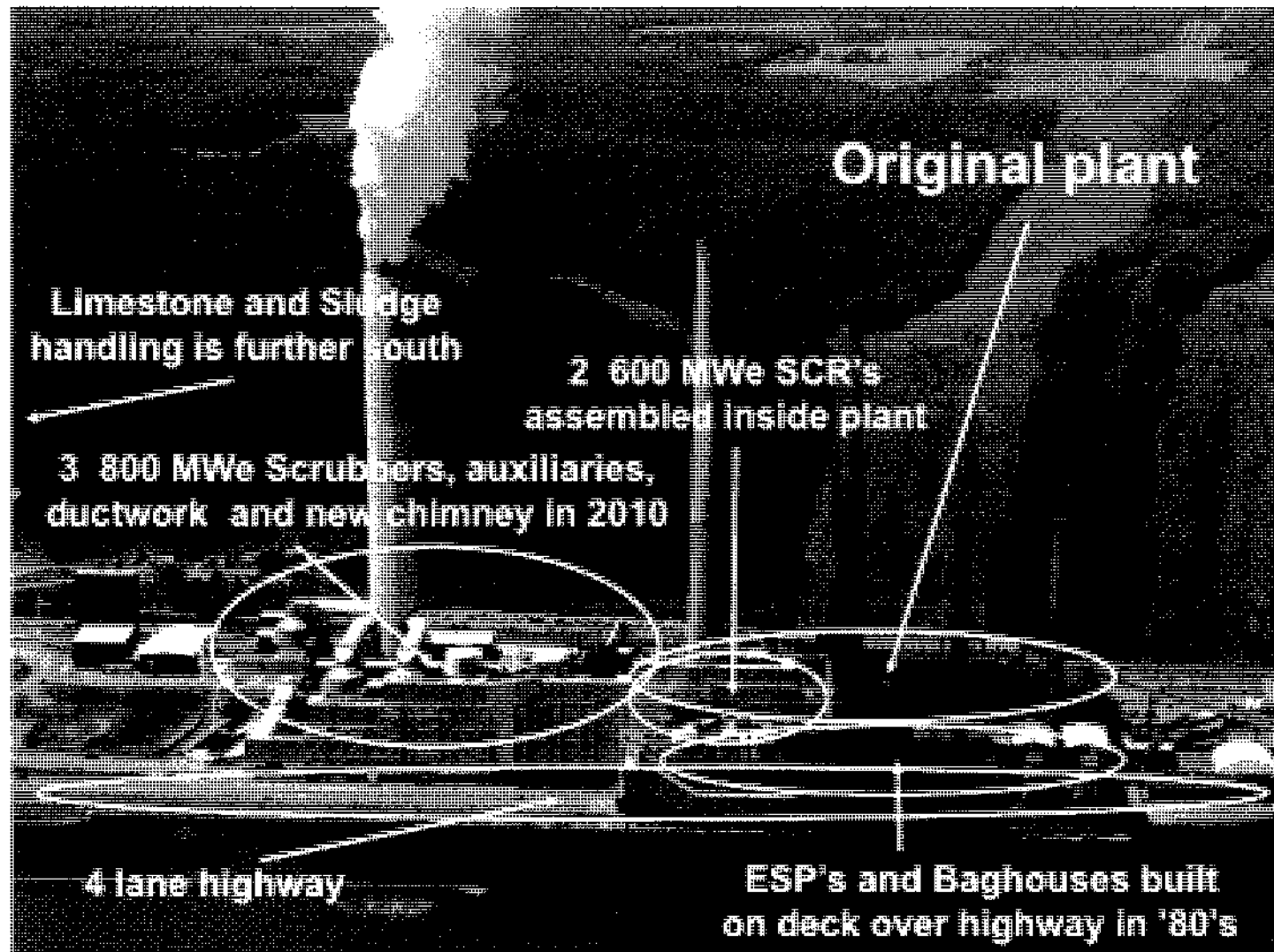


PERSPECTIVE: SCR REACTOR

(per Babcock & Wilcox)



FIRST ENERGY SAMMIS STATION



INSTALLATIONS AT INDIVIDUAL UNITS: EPA & INDUSTRY PROJECTIONS

- EPA Schedule (described in CATR Preamble):
 - SCR Installations: 21 Months
 - FGD Installations: 27 Months
- UARG Schedule: Based on Industry-Wide Survey From Fall 2010:
 - SCR Installations: Typically 30-40 months; up to > 4 years
 - FGD Installations: Typically 40-50 months; up to > 5 years
- Differences: EPA Does Not Take Into Account Key Activities (e.g., Permitting, Preliminary Engineering)

INSTALLATION SCHEDULES AT INDIVIDUAL UNITS: THE DETAILS

1. Conceptual Process Design, Prepare Specifications (6-12 months)
2. Identifying Qualified Contractors (1 month)
3. Solicit & Review Bids, Select Contractors (4-5 months)
4. Negotiation of Terms & Conditions (1-5 months, depending upon relationship with contractors)
5. Applying for/Acquiring Permits and Other Regulatory Approvals (less than 1 year to more than 4 years, depending on number and nature of permits)
6. **Finalization of Process Design and Preparation of Drawings (15-45 months)**
 - Ordering Long-Lead-Time Items [see next slide for examples]

LEAD TIME FOR KEY FGD COMPONENTS (after Katzberger, 2007)

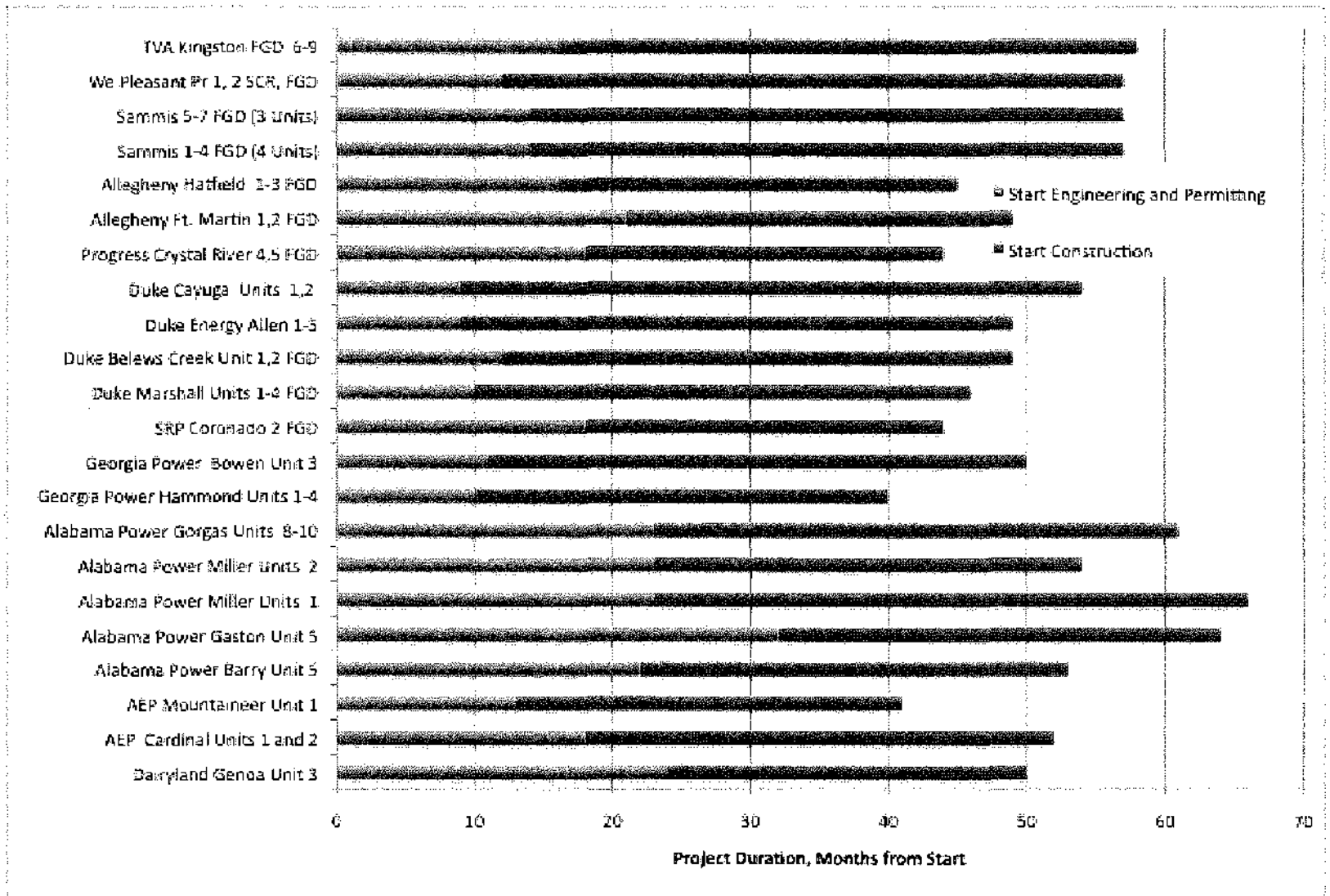
Equipment	Lead time (weeks)			
	Sept. 2003	Oct. 2005	Aug. 2006	Dec. 2006
Ball mills	32	65	68	70
Rubber-lined recycle pumps	26	52	92	112
Booster fans	NA	54	54	60
Oxidation air compressors	32	44	44	52
Internal-recycling alloy spray headers	28	40	40	48

Note: NA = Not available.

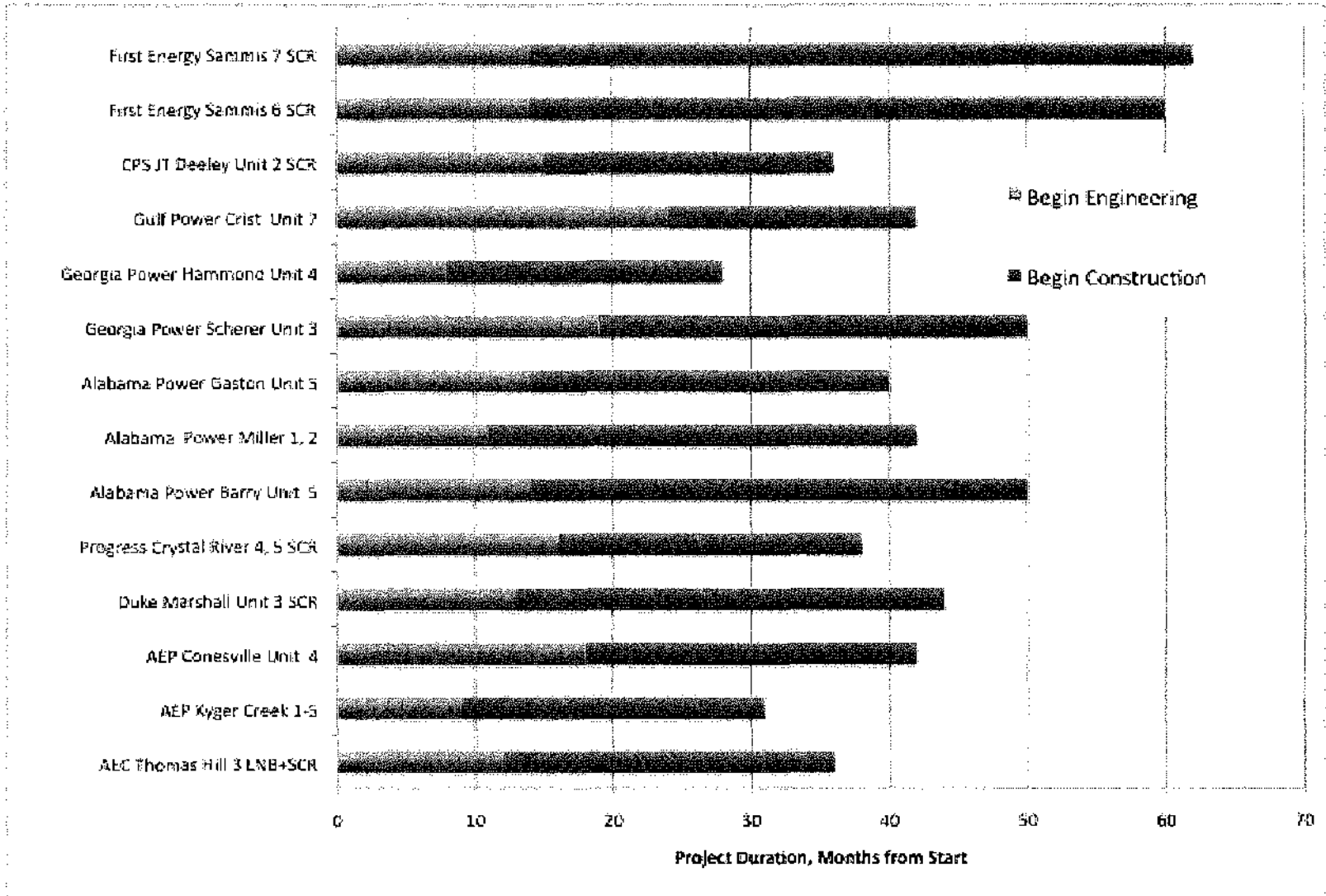
INSTALLATION SCHEDULES AT INDIVIDUAL UNITS: DETAILS (cont'd)

- 7. Mobilize Workforce To Site (1-3 months)**
- 8. Fabrication and Construction of Equipment (typically 25-30 months, but more than 40 months at challenging sites)**
- 9. Tie-In to Plant (1 month)**
- 10. Process Startup (1-3 months)**

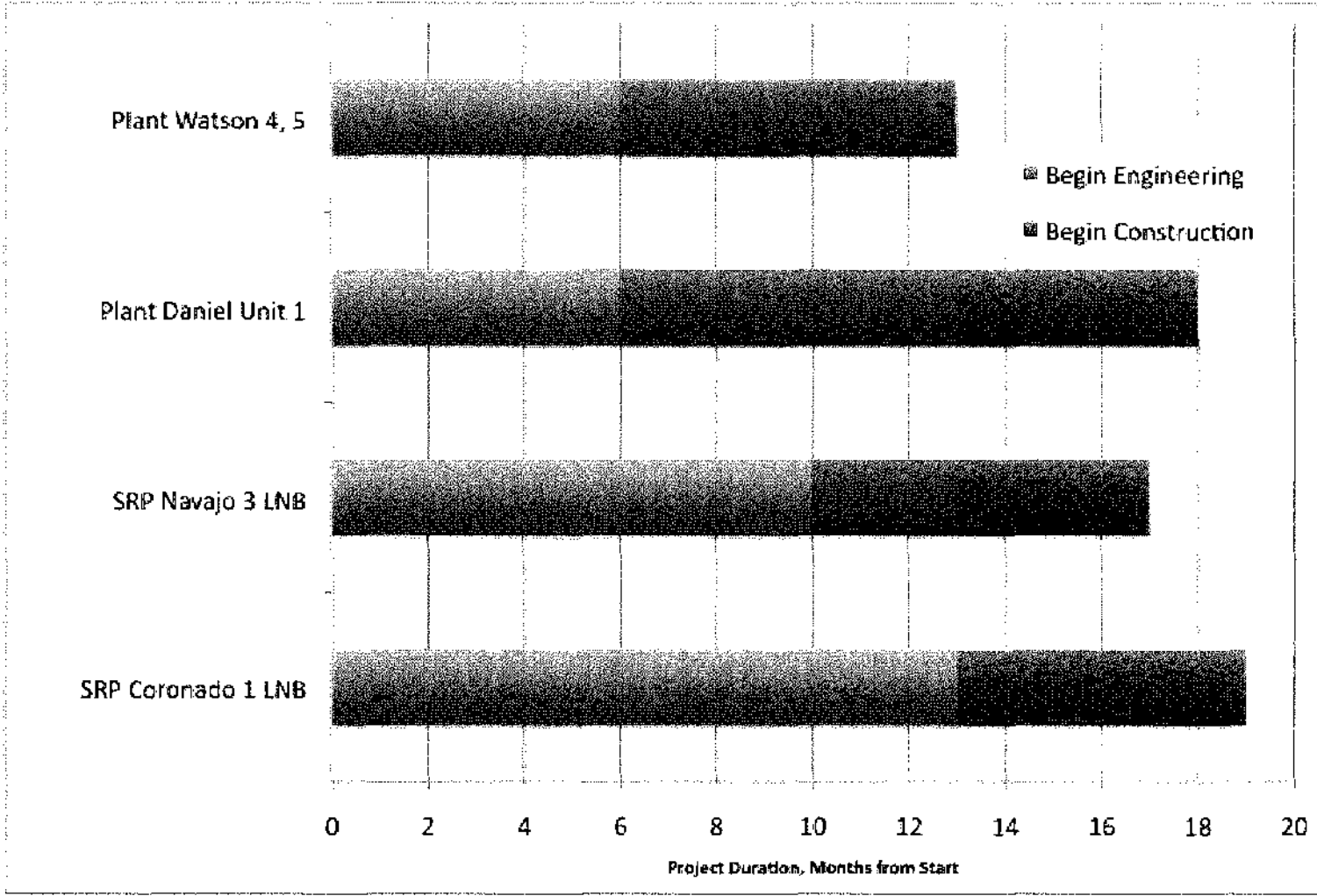
FGD TIMELINE: ENGINEERING-OPERATION



SCR TIMELINE: ENGINEERING-OPERATION



LNB TIMELINE: ENGINEERING-OPERATION



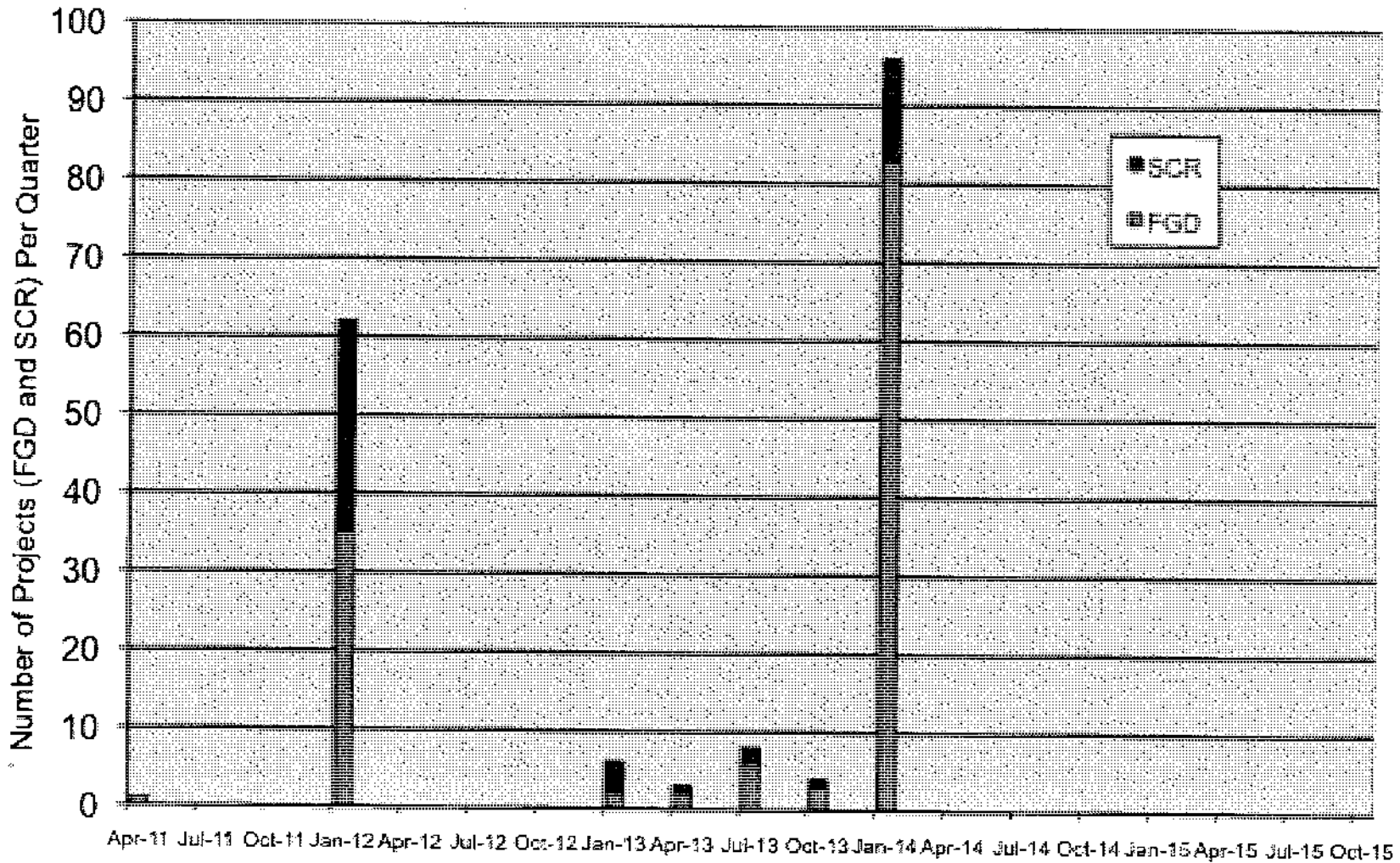
SCHEDULE FOR INSTALLATION OF EQUIPMENT INDUSTRY-WIDE

- Assuming work begins as soon as the rule is final (3Q 2011), when would all control systems be fully deployed?
- Basis:
 - How much generation will have to install SCR or FGD systems?
 - On what schedule will such installations proceed?
- EPA and Industry Disagree on Both

NATURE OF DISAGREEMENT ON GENERATION TO BE RETROFIT

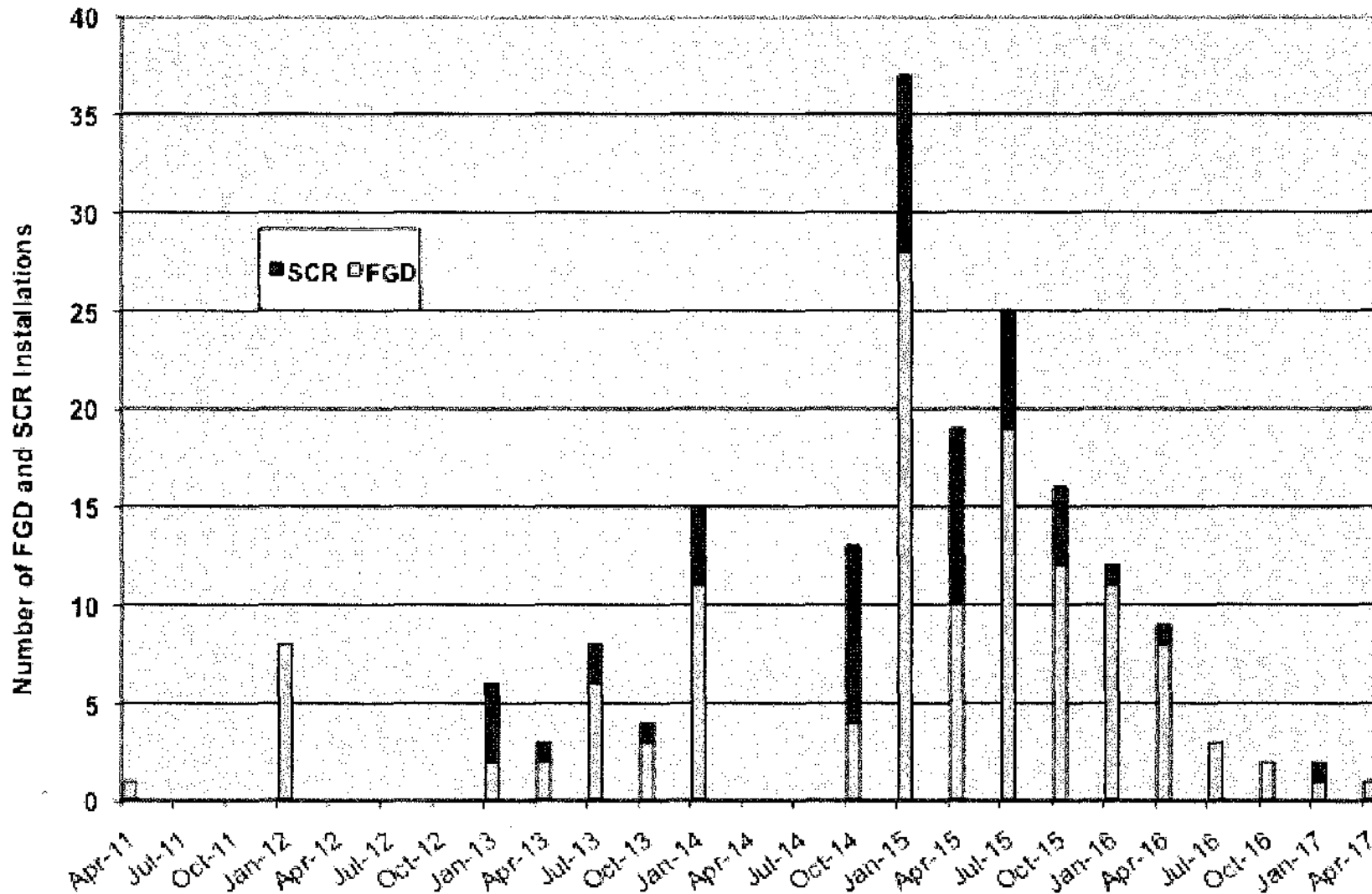
- EPA's air quality modeling assumes many units will retrofit FGD and SCR systems through January 1, 2014:
 - FGD: 35.8 GW
 - CATR will drive FGD retrofits on 18.4 GW
 - Other initiatives are driving FGD retrofits on 17.4 GW
 - SCR: 19.1 GW
 - CATR will drive installation of SCR on less than 800 MW
 - Other initiatives are driving SCR retrofits on 18.3 GW
- To evaluate the feasibility of completing all these retrofits by CATR's deadlines, EPA considers only retrofits driven by CATR:
 - FGD: 18.4 GW
 - SCR: < 800 MW

EPA ESTIMATE OF FGD, SCR PROJECTS OPERATIONAL: 2011-2014



Operating Date of FGD or SCR Process: EPA

INDUSTRY SCHEDULE FOR FGD, SCR PROJECTS OPERATIONAL: 2011-2014



Operating Date of FGD or SCR Process: Industry Projections

CONCLUSIONS

- Compliance Dates Cannot Be Attained
 - Only 27% of the targeted installations are projected to be completed “on time.”
 - 54 “Phase I” installations are projected to be completed after the January 1, 2012 Phase I deadline.
 - 81 “Phase II” installations are projected to be completed after the January 1, 2014 Phase II deadline.

CONCLUSIONS (cont'd)

- More FGD and SCR Retrofits Than EPA Suggests Must Be Completed through January 1, 2014:
 - FGD: 35.8 GW affected rather than 18.4 GW
 - SCR: 19.1 GW affected rather than < 800 MW
- Individual Installations Will Take Longer
 - SCR installations will typically take at least 30-40 months, not 21 months
 - FGD installations will typically take at least 40-50 months, not 27 months