Worldwide Pollution Control Association

FirstEnergy ESP Seminar

November 27th – 28th, 2007

Visit our website at www.wpca.info

LODGE-COTTRELL INC.

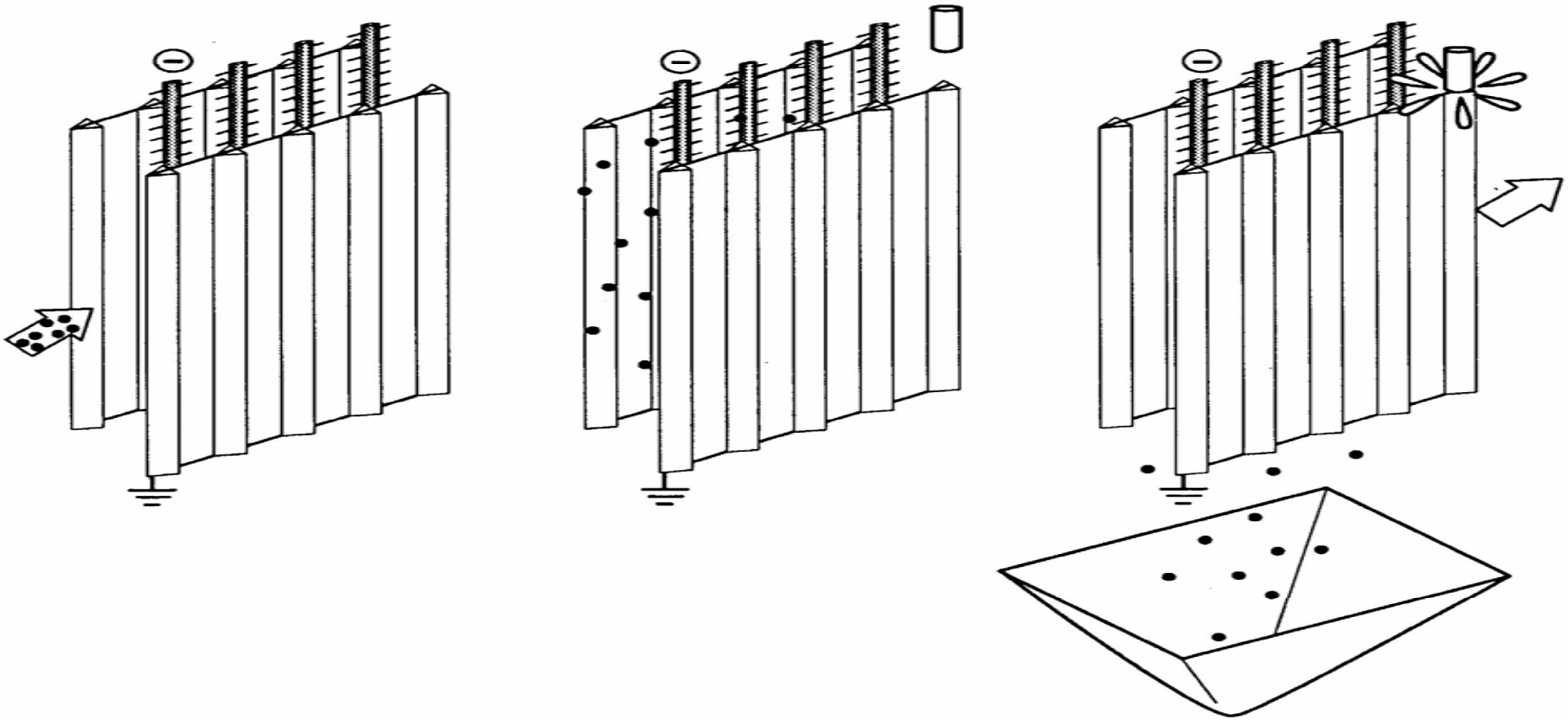
ROBERT MASTROPIETRO

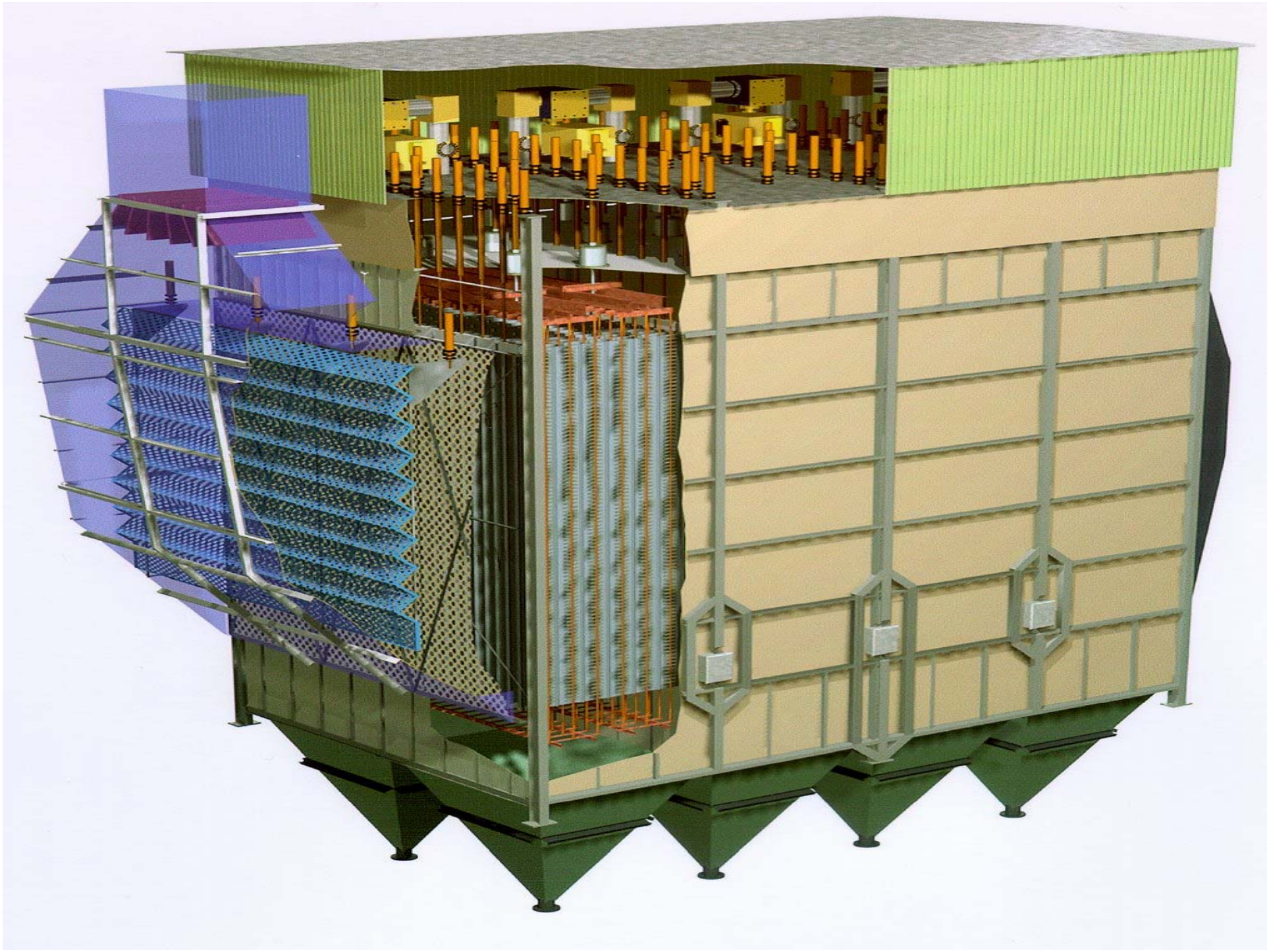
FIGURE 1
ESP Operating Principle

Particles suspended in a gas enter the precipitator; passing through ionized zones around high voltage electrodes. These high voltage electrodes, through a corona effect, emit negatively charged ions into the gases.

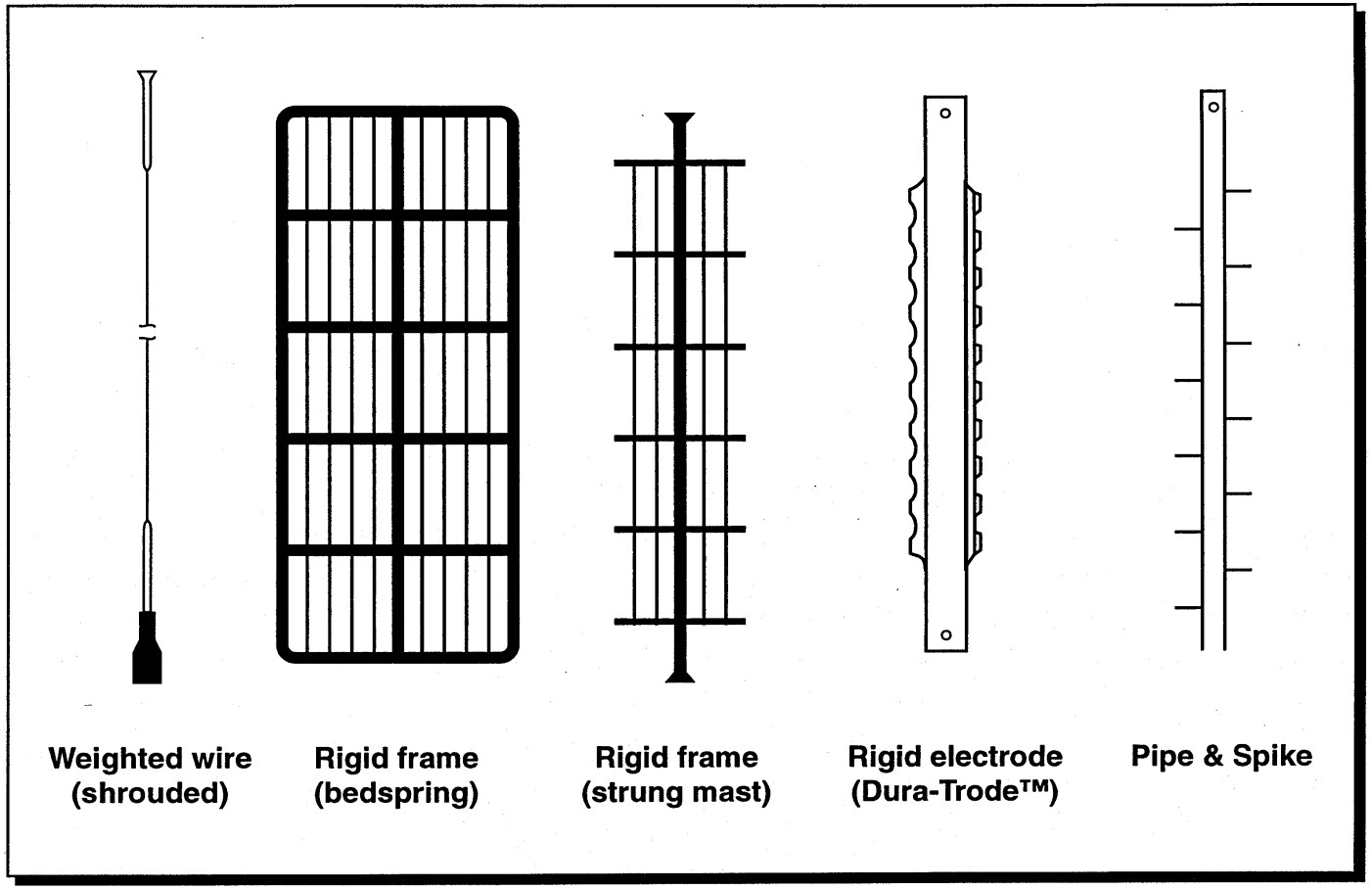
The negatively charged gas field around each electrode charges passing particulates, causing the particulates to migrate to the electrode of opposite polarity, the collector plates.

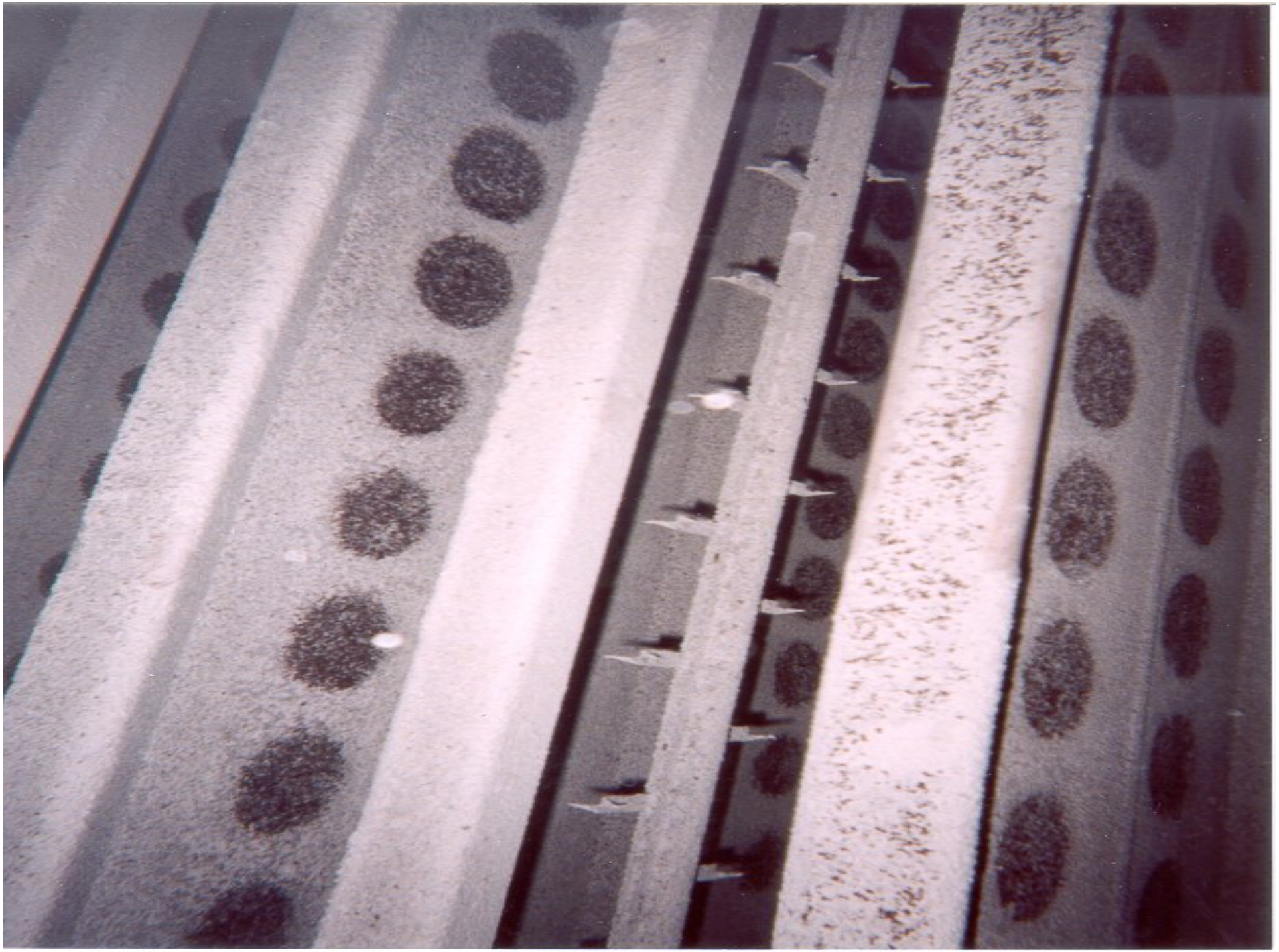
The charged particulates gather on the grounded collector plates. Rappers shake loose the agglomerate which falls into the collection hoppers for removal.

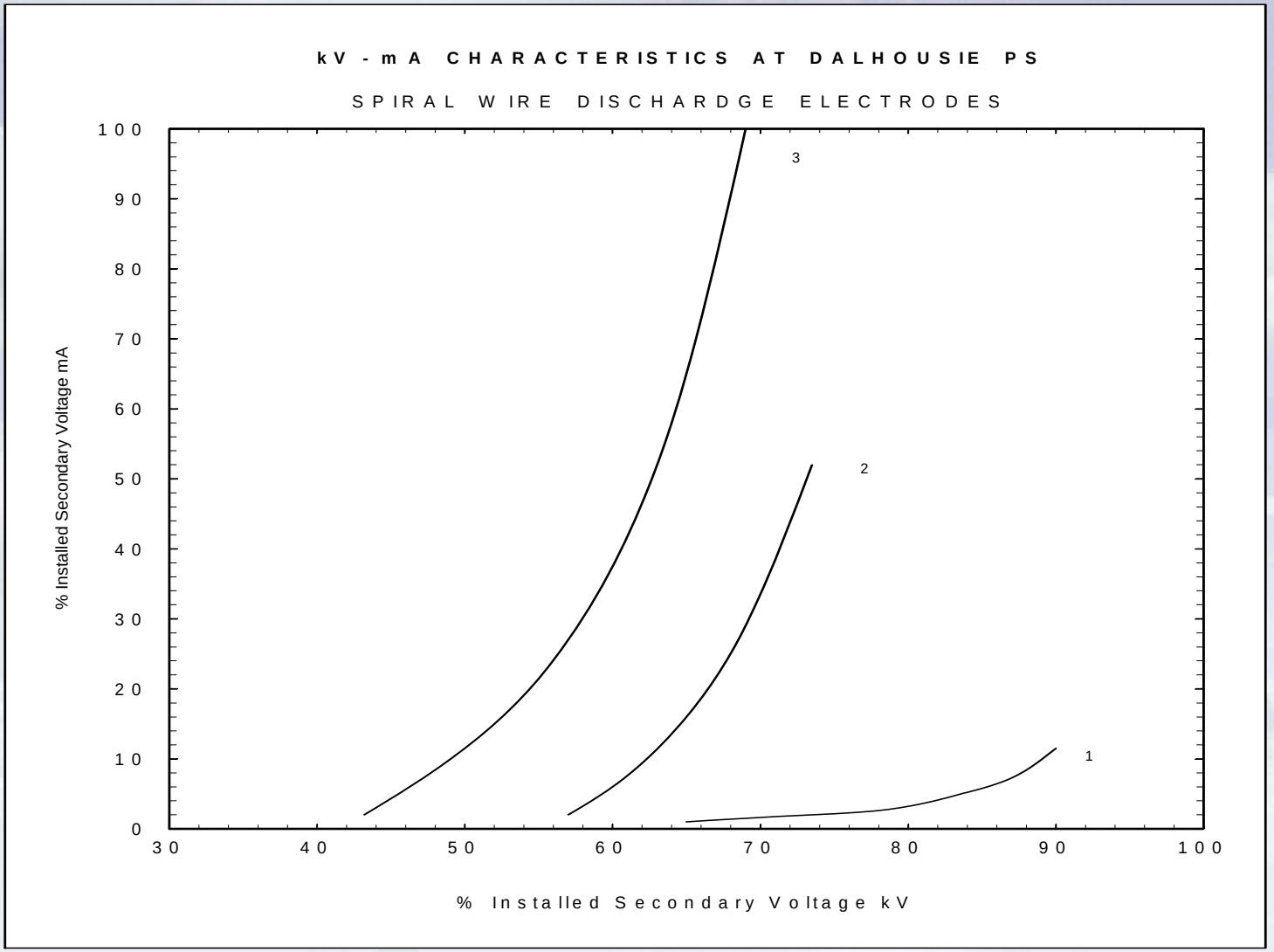




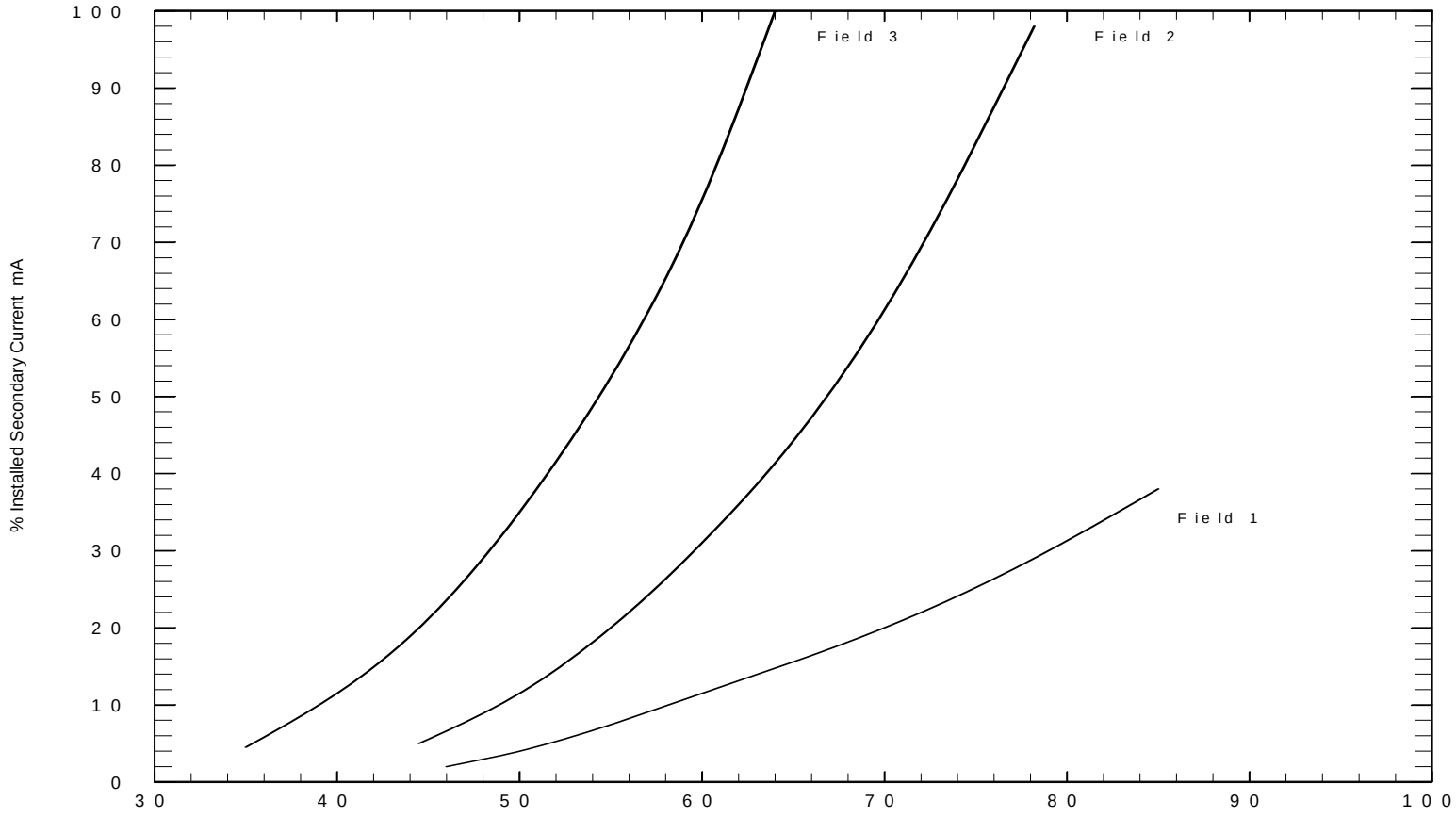
Discharge Electrode Types






kV - mA CHARACTERISTICS AT DALHOUSIE PS
SPIRAL WIRE DISCHARDGE ELECTRODES
% Installed Secondary Voltage mA
100
90
80
70
60
50
40
30
20
10
0
30
40
50
60
70
80
90
100
3
2
1
% Installed Secondary Voltage kV

High and Standard Emission Electrodes


kV - mA CHARACTERISTICS AT INCE PS
HIGH EMISSION ELECTRODES IN FIRST FIELD
% Installed Secondary Current mA
100
90
80
70
60
50
40
30
20
10
0
Field 3
Field 2
Field 1
30
40
50
60
70
80
90
100
% Installed Secondary Voltage kV

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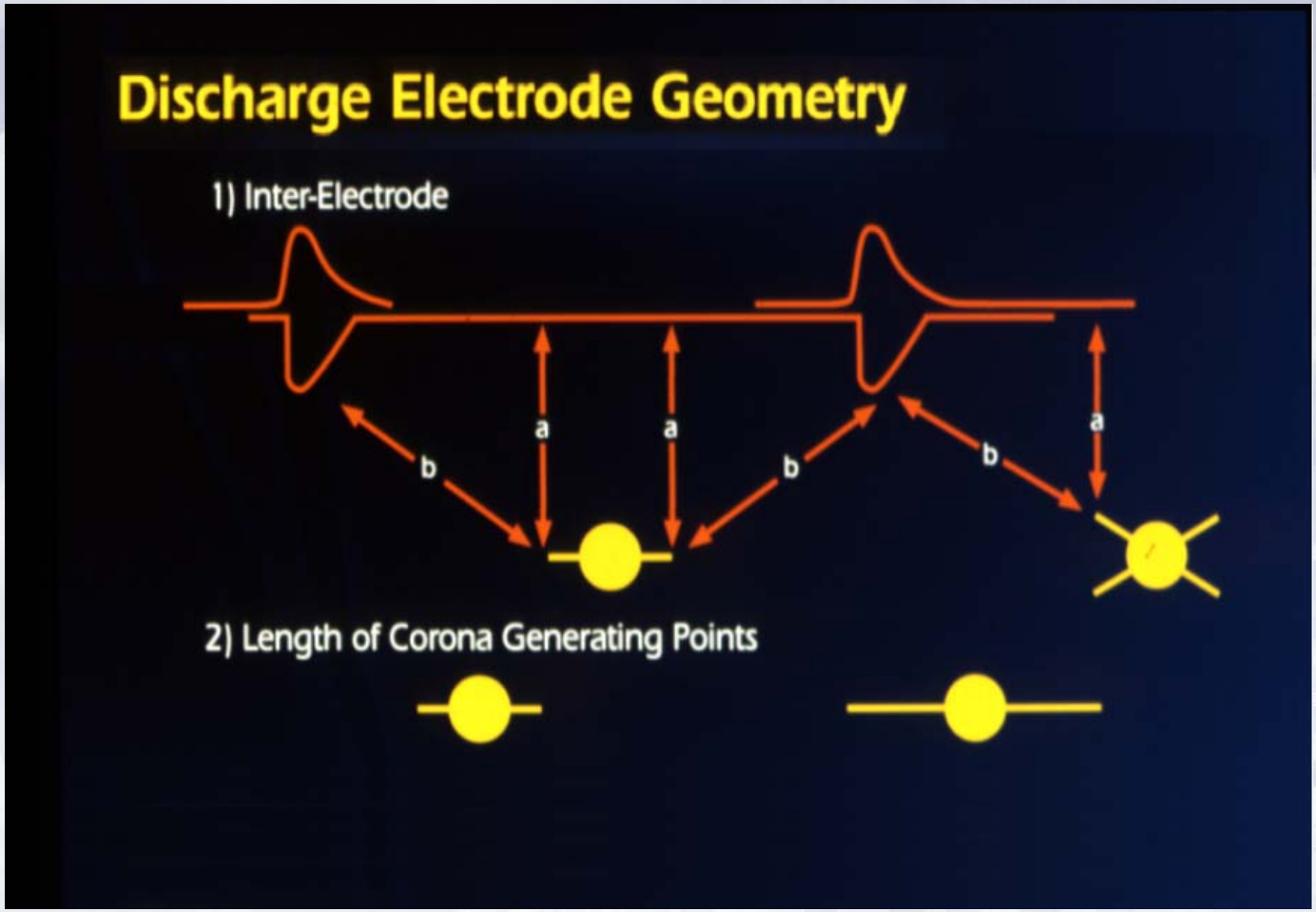

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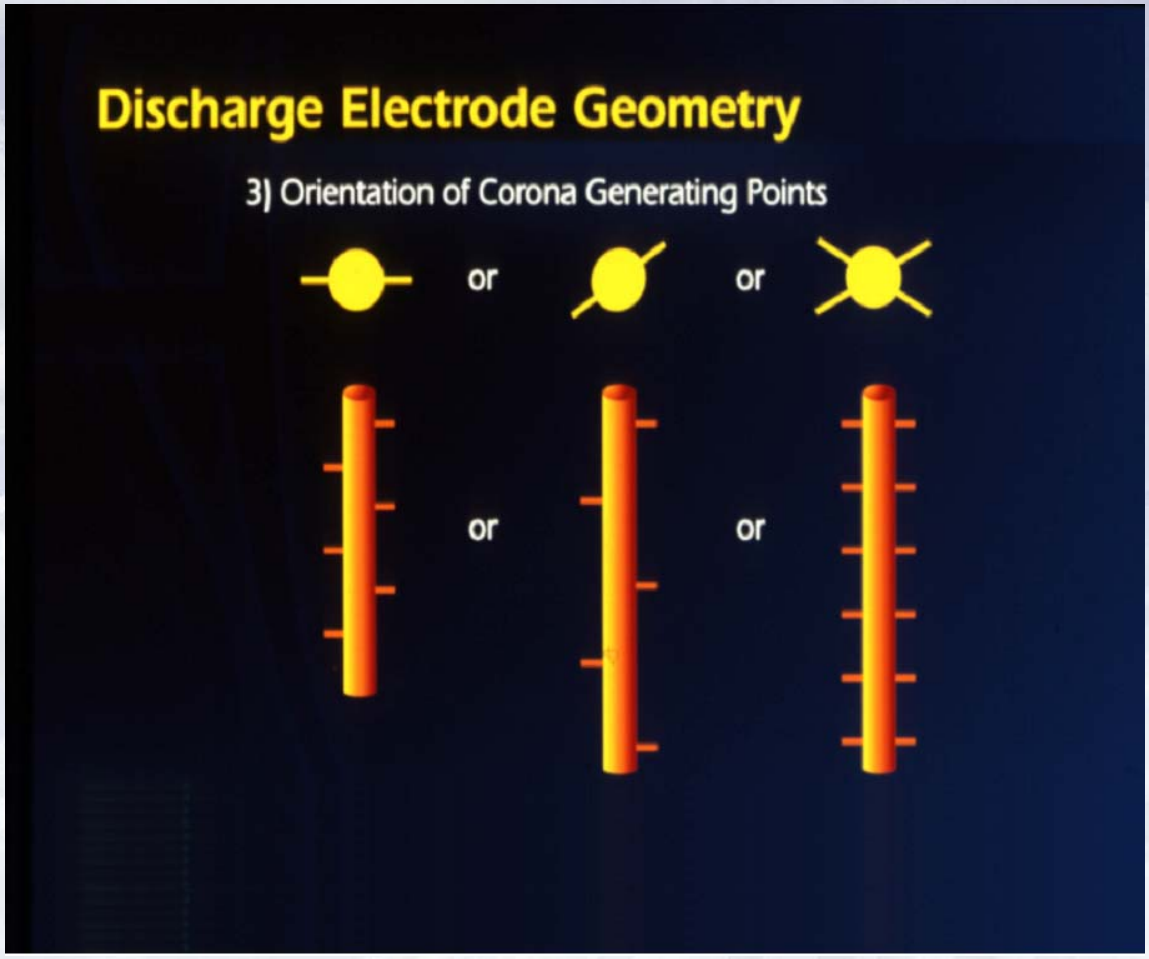

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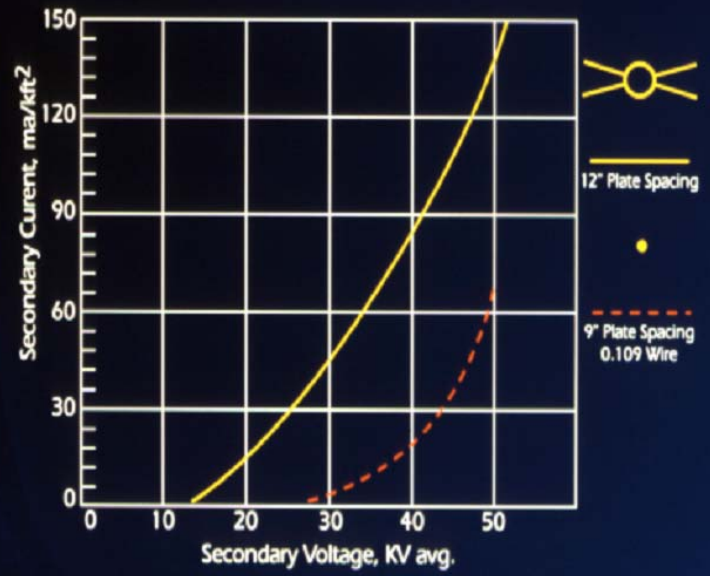
Electrostatic Precipitator Air Load Data

Pipe & Spike at 12" Spacing vs. 0.109" Wire at 9" Spacing



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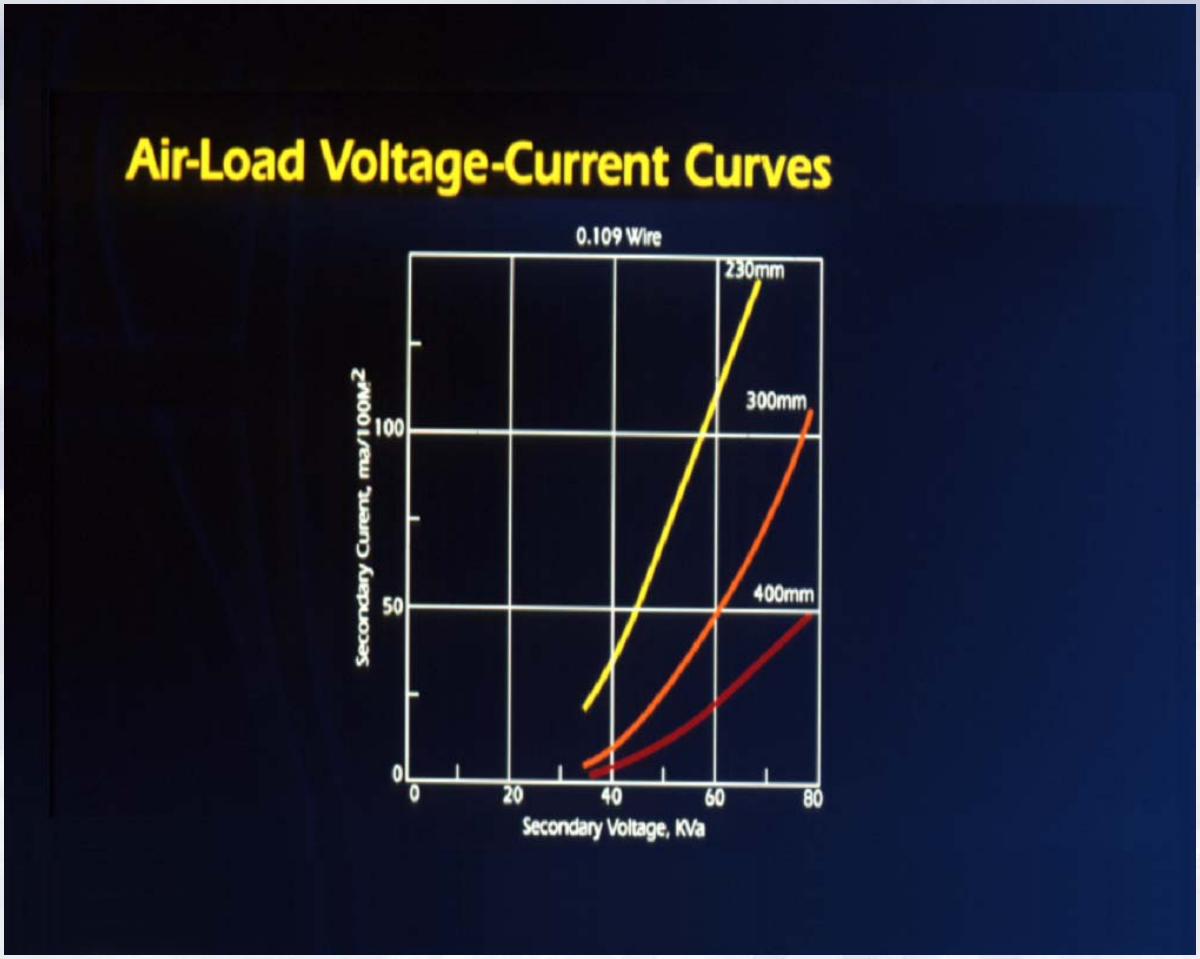
Air-Load Voltage-Current Curves



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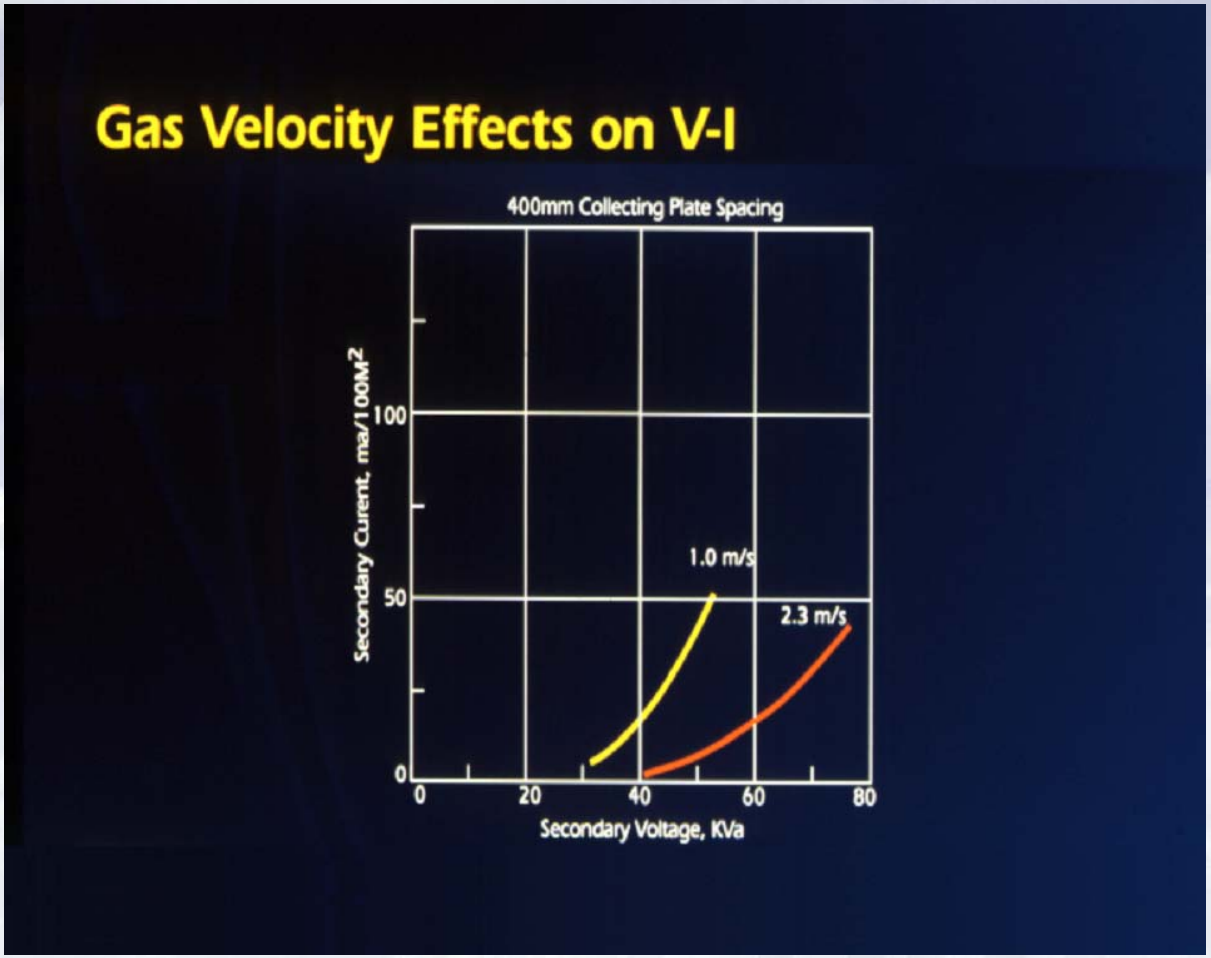
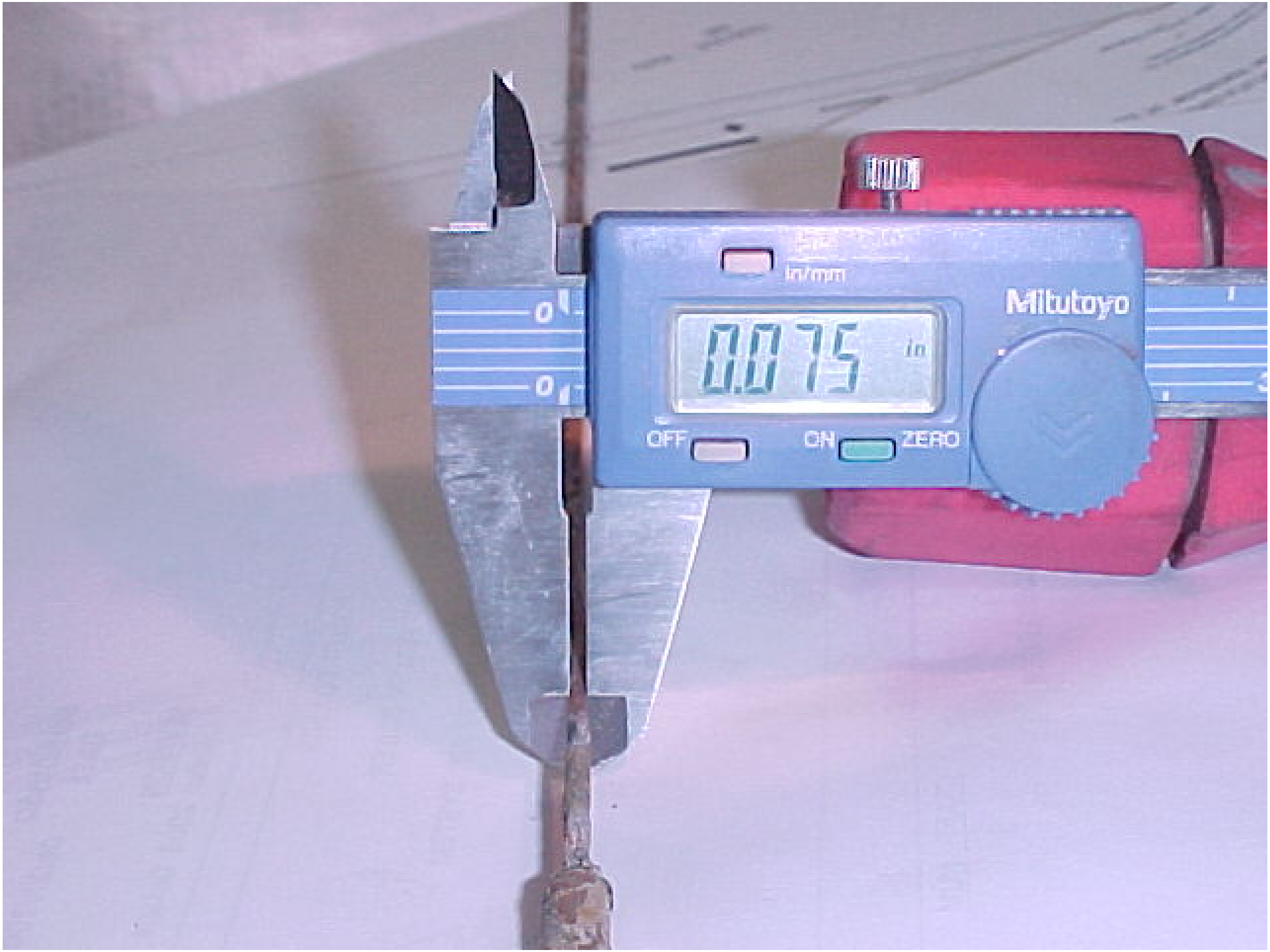
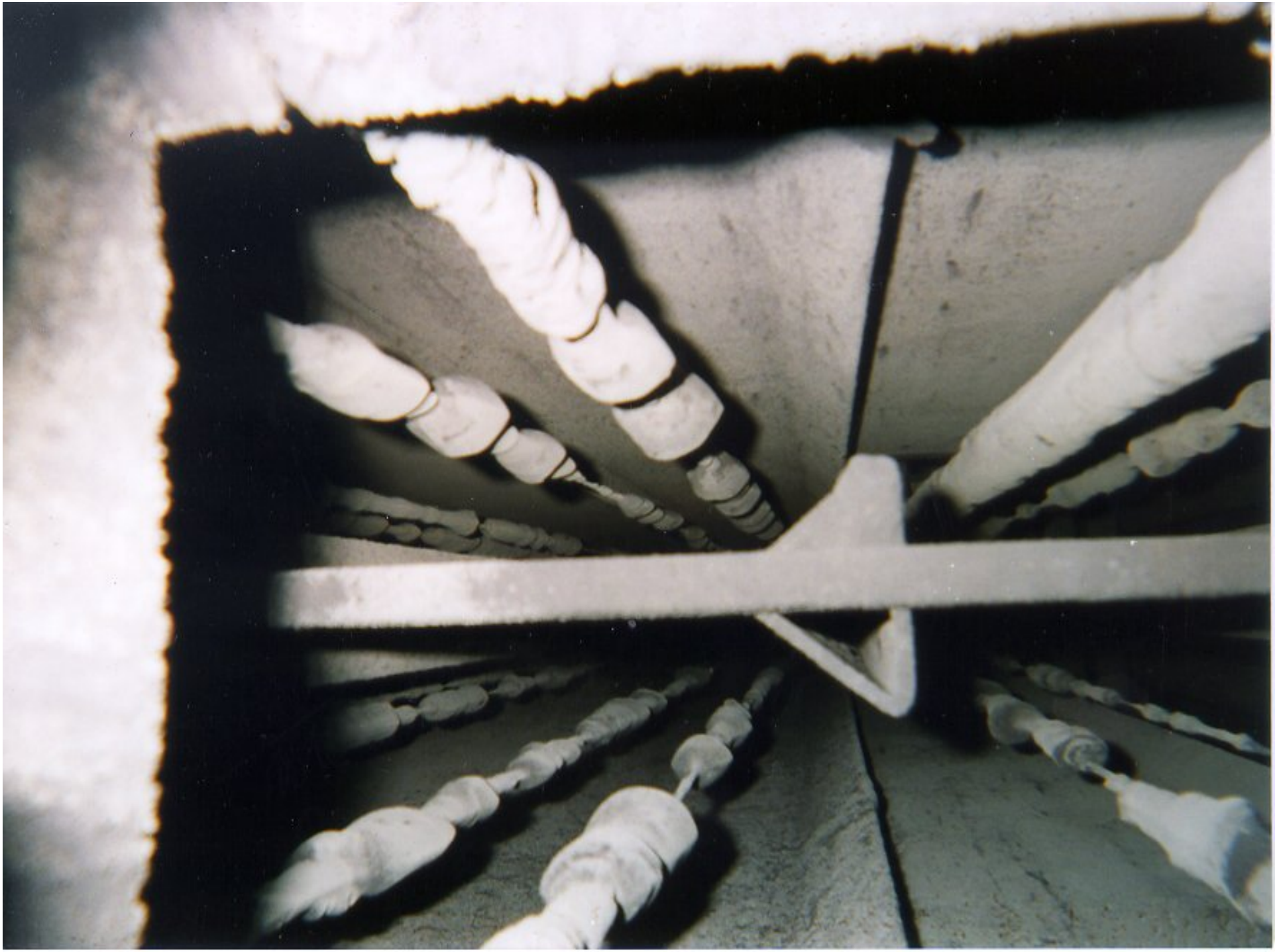
Gas Velocity Effects on V-I




in/mm
0.075 in
Mitutoyo
OFF
ON
ZERO


#29



SUMMARY

Discharge electrode design can be modified to adjust for;

- dust loading, particle size, resistivity, etc.
- collecting plate spacing
- ESP gas velocity
- installed T-R voltage capacity
- dust stickiness (rapping density and type)
- gas temperature (flue gas density)

Discharge electrode design has reached to point where it is done by calculation, rather than by pilot plant study