APPENDEX A

ELECTROSTATIC PRECIPITATOR OF GARRI 4 POWER PLANT

Figure A.1: Garri 4 power plant

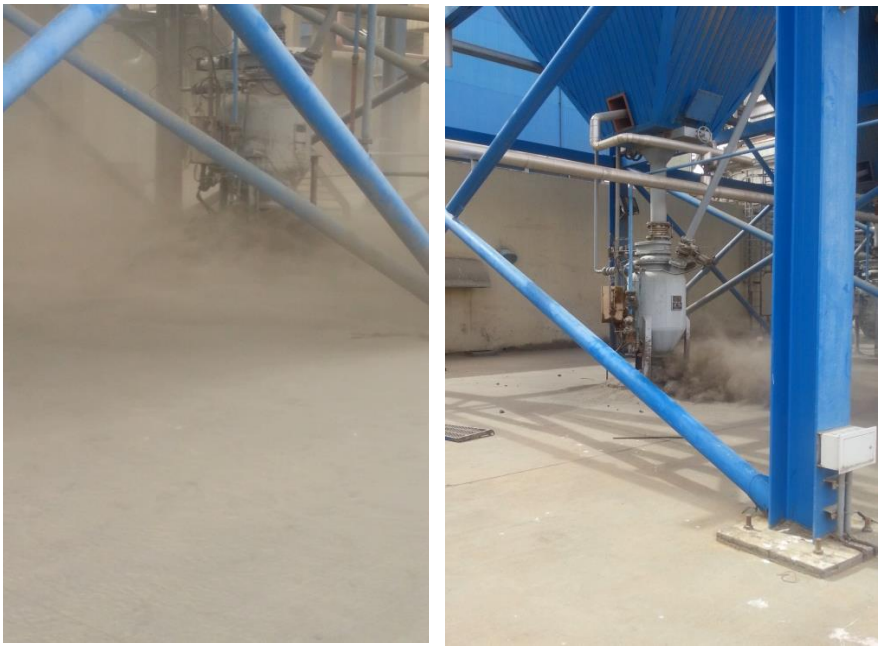

Figure A.2: Manual discharge for fly ash

Figure A.3: Collection plats and wires discharge

Figure A.4: Rapping mechanism

APPENDEX B

ELECTROSTATIC PRECIPITATOR DATA

Emitting Electrode Type	spiral with hooks
Emitting Electrode Size	2.7 mm
Total no of Electrode	29808
Plate Wire Spacing	14 mm
No of Electrode per Field	24
No of Plates Each Row	6
Total Collecting Area	3456
Eefficiency	99.9%
Inlet Temperature Degree	110
Velocity Of Gas at Electrode	0.95 m/s
Particle Diameter	2.5 µm
Gas Constant	8314.34
Gas Pressure	101325

APPENDICES C

MATLAB CODE FOR CALCULATION OF THEORETICAL EFFICIENCY

```
for (i=1:600)
T=109+273;
P=101325;
R=8314.34;
Dp=16E-06;
area=24*128*(25.4E-03)^2;
q=24*18*(25.4E-03)^2;
k=1.9;
gasmw=.06*44+.78*28+.16*32;
rhog=P*gasmw/(R*T);
v(i)=20000+i*100;
d=4.5*(25.4E-03);
mug=2.284e-05;
E(i)=v(i)/d;
charge(i)=(3*k/(k+2))*pi*8.853e-12*E(i)*Dp*Dp;
mfp=mug/(4.99*P*(8*gasmw/(pi*T*R))^.5);
kn=mfp/(Dp);
cc=1+kn*(1.257+.4*exp(-1.1/kn));
x=1+0.15*.4^.687;
ve(i)=(cc*charge(i)*E(i)/(3*pi*Dp*mug*x));
Re(i)=rhog*ve(i)*Dp/mug;
eff(i)=1-exp(-area*ve(i)/q*1.455);
end;
```

```
vv=v/1000;
efff=eff*100;
for(i=1:500)
plot((vv(i)),efff(i),'-b');grid on;hold on;
end;
x1 = [27 27 30 30 33 33];
y1 = [80.4 81.19 83.75 86.05 89.74 91.71];
plot(x1,y1,'o');grid on;hold on;
```

- matlab code for electrostatic field calculation

```
k = 9*10^9;

eps_r = 1;
charge_order = 10^-9;
 const = k*charge_order/eps_r;

Nx = 101;
Ny = 101;

n = 3;

E_f = zeros(Nx,Ny);
Ex = E_f;
Ey = E_f;
```

```
ex = E_f;
ey = E_f;
r = E_f;
r_square = E_f;

Q = [-1,-1,-1];

X = [5,0,-5];
Y = [0,0,0];

for k = 1:n
    q = Q(k);

    for i=1:Nx
        for j=1:Ny

            r_square(i,j) = (i-51-X(k))^2+(j-51-
Y(k))^2;
            r(i,j) = sqrt(r_square(i,j));
            ex(i,j) = ex(i,j)+(i-51-X(k))./r(i,j);
            ey(i,j) = ey(i,j)+(j-51-Y(k))./r(i,j);
        end
    end



    E_f = E_f + q.*const./r_square;
```

```
    Ex = Ex + E_f.*ex.*const;
    Ey = Ex + E_f.*ey.*const;

end


x_range = (1:Nx)-51;
y_range = (1:Ny)-51;
contour_range = -8:0.02:8;
contour(x_range,y_range,E_f',contour_range,'linewidth',
0.7);
axis([-30 30 -30 30]);
colorbar('location','eastoutside','fontsize',12);
xlabel('x ','fontsize',14);
ylabel('y ','fontsize',14);
title('Electric field distribution, E (x,y) in
V/m','fontsize',14);
```