

## **8.0 ADDITIONAL STUDIES**

### **8.1 Public Consultation**


The public hearing for the proposed 30 MW captive power plant was conducted by Andhra Pradesh Pollution Control Board (APPCB) on 30<sup>th</sup> January, 2013 Near Durga Temple located adjacent to the plant premises at Durgapuram village, Dachepalli mandal, Guntur district.

The press notification indicating date and venue of the public hearing was issued by Member Secretary, Andhra Pradesh Pollution Control Board (APPCB), on 28.12.2012 in prominent newspapers Viz. Sakshi (Telugu local news paper) and Indian Express (regional English News Paper) with project details inviting suggestions, views, comments and objections from the public regarding establishment of proposed power project. The copies of the notification issued in newspapers for public hearing are given below in **Figure-8.1** & **Figure-8.2**.

The EIA report along with Executive Summary in English and Telugu were displayed and made available at the following places:

- Office of District Collector, Guntur;
- District Panchayat Office;
- Regional Office, APPCB;
- District Industry Centre;
- Chief Conservator of Forests;
- Regional Office, Guntur; and
- Village Sarpanch Offices of respective villages in 10-km radius.

The minutes of the public hearing is enclosed as **Annexure-XI**.



ఆంధ్రప్రదేశ్ అకాడమీ  
ఆంధ్రప్రదేశ్ అకాడమీ

## ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి

ప్రాంతీయ కార్యాలయం

ఫ్లాట్ నెం. 102, రామవ అపార్ట్ మెంట్స్, బృందావన్ గార్డెన్స్, గుంటూరు - 522 005.

### పర్యావరణ ప్రజాబిప్రాయ సేకరణ ప్రకటన

పర్యావరణ అటవీ మంత్రిత్వశాఖ, భారత ప్రభుత్వం యొక్క నోటిఫికేషన్ నెం. యన్.ఓ. 1533, తేది: 14-09-2008 మరియు దానికి ఇచ్చిన మార్పులు మరియు సర్క్యులర్లను సరించి ఇందు మూలముగా ప్రకటించునదేమనగా మొన్నర్స్ ఆంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్) వారు ప్రతిపాదించినటువంటి క్యాప్టివ్ విద్యుత్ ఉత్పత్తి కేంద్రము ఏర్పాటుకు సంబంధించిన ప్రజాబిప్రాయ సేకరణను ప్రతిపాదించబడినది, వివరాలు దిగువ పేర్కొనబడినవి.

1. కంపెనీ పేరు, చిరునామా మరియు టెలిఫోన్ నెం :
2. విద్యుత్తును నిర్మాణము చేపట్టబోయే ప్రదేశం
3. సంప్రదించబడిన అభివృద్ధి వ్యక్తి, చిరునామా, టెలిఫోన్ నెం :
4. మొత్తం ప్రాజెక్టు యొక్క మూలధనము
5. కేంద్రం యొక్క ఉత్పత్తి సామర్థ్యము
6. ప్యాన్లర్ యొక్క పర్యావరణ విషయ సలహాదారుడు
7. ప్రజాబిప్రాయ సేకరణ :

అంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్)  
దుర్గాపురం గ్రామం, దాచేపల్లి మండలం,  
గుంటూరు జిల్లా, పిన్-522005.  
ఫోన్: 08949-257441, 08949-257428.  
e-mail: dow.secretarial@jalindia.co.in

విద్యుత్తు నందు గల వ రినాలలో దుర్గాపురం గ్రామం, దాచేపల్లి మండలం,  
గుంటూరు జిల్లా.

శ్రీ ఆర్.కె. డూడ, సీనియర్ వైస్ ప్రెసిడెంట్ (ప్రాజెక్ట్),  
అంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్),  
దుర్గాపురం గ్రామం, దాచేపల్లి మండలం, గుంటూరు జిల్లా.  
ఫోన్ : 08649 257440, ప్యాక్స్ : 08649 257428.

రూ. 136 కోట్లు

90 మెగా వాట్స్ (క్యాప్టివ్ వవర్ ఫౌంట్)

విద్యుత్ ల్యాండ్ లిమిటెడ్, 142, ఎ.డి.ఎ. ఫేజ్-2,  
చర్లపల్లి, హైదరాబాద్-51.

తేది: ఓ. 30-01-2018, నమయం: ఉదయం 11 గంటలకు, వేదిక: దుర్గా ఆలయము పరిసరాలలో, దుర్గాపురం గ్రామం, ప్లాట్ నెం. 2-కు ఆనుకుని అంధ్రా సిమెంట్స్ లిమిటెడ్ (దుర్గా సిమెంట్ వర్క్స్) ప్లాంట్ లో ప్రక్కన.

8. తలపెట్టిన ప్రాజెక్టుకు సంబంధించిన వివరములు ఐహారంగంగా ఉంచబడిన ప్రదేశములు

1. శ్రీయుత కళిదాసు మరియు మెట్రోపాలిటన్ వారి కార్యాలయము నందు, గుంటూరు.
2. శ్రీయుత చీఫ్ ఎగ్జిక్యూటివ్ ఆఫీసర్, జిల్లా పరిషత్ వారి కార్యాలయము నందు, గుంటూరు.
3. శ్రీయుత జనరల్ మేనేజర్, జిల్లా పారిశ్రామిక కేంద్రం నందు, గుంటూరు.
4. రిజనల్ ఆఫీస్ (నరసం కోట్) జిఎంఎంఎంఎం, ఫిఫ్త్ ఫ్లోర్, 4వ అంతస్తు, హెగ్డర్ మెంట్ మరియు ప్యాన్లర్ కోయంగ, పింగళి.
5. ఎ.సి పాల్యూషన్ కంట్రోల్ బోర్డు, ఆఫీస్, పర్యావరణ భవన్, ఎ-3, ఇంద్రప్రస్థ రోడ్, ఎస్.ఎస్.ఎస్. నగర్, హైదరాబాద్-18.
6. ఎ.సి పాల్యూషన్ కంట్రోల్ బోర్డు ఆఫీస్, ఫ్లాట్ నెం. 41, ఎ.సి.ఎస్. పబ్లిక్ కోఆర్డినేషన్ కార్యాలయం, చంద్రప్రభుత్వ క్యాంపస్, గుంటూరు రోడ్డు, హైదరాబాద్.
7. ఎ.సి పాల్యూషన్ కంట్రోల్ బోర్డు ఆఫీస్, రిజనల్ ఆఫీస్ ప్లాట్ నెం. 102, రామవ అపార్ట్ మెంట్స్, బృందావన్ గార్డెన్స్, గుంటూరు.
8. ఎ.సి పాల్యూషన్ కంట్రోల్ బోర్డు ఆఫీస్, రిజనల్ ఆఫీస్ ప్లాట్ నెం. 888/9, 2వ ఫ్లోర్, రెడ్డి క్యాంపస్ కౌన్సిల్ బస్ స్టాండ్, నల్గొండ-508001.
9. రెవిన్యూ డివిజన్ ఆఫీసర్, నరసరావుపేట, గుంటూరు జిల్లా.
10. కానీల్లూరు వారి కార్యాలయము, దాచేపల్లి, గుంటూరు జిల్లా.
11. గ్రామ పంచాయితీ కార్యాలయం, గామాలపాడు, దాచేపల్లి, గుంటూరు జిల్లా.
12. గ్రామ పంచాయితీ కార్యాలయం, దాచేపల్లి, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
13. గ్రామ పంచాయితీ కార్యాలయం, రామాపురం, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
14. గ్రామ పంచాయితీ కార్యాలయం, నడికుడి, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
15. గ్రామ పంచాయితీ కార్యాలయం, పాండుగం, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
16. గ్రామ పంచాయితీ కార్యాలయం, శ్రీనగర్, దాచేపల్లి మండలం, గుంటూరు జిల్లా.
17. కానీల్లూరు వారి కార్యాలయము, దామరవర మండలం, నల్గొండ జిల్లా.
18. గ్రామ పంచాయితీ కార్యాలయము, దామరవర, దామరవర మండలం, నల్గొండ జిల్లా.
19. గ్రామ పంచాయితీ కార్యాలయము, భక్తపూరి, దాచేపల్లి మండలం, గుంటూరు జిల్లా.

సంహాలు, ఆర్థిప్రాయాలు, వ్యాఖ్యానాలు, వివరణలు, ప్రజల ఆభ్యంతరాలు ఏమైనా ఉన్నట్లయితే ఈ ప్రకటన ప్రచురించబడిన 90 రోజులలోపైగా కోరబడెను. పైన పేర్కొనబడిన విధముగా ఆభ్యంతరములు ఎవరైనా ఉన్నట్లయితే ప్రాథమిక పూర్వకమైన సంహాలును ఈ దిగువ నంతకుం చేరుబడిన ఆధికారికి, ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి వారికి పంపవచ్చును. అట్టివారు పైన తెలుపబడిన తేది, ప్రదేశమున, ఐహారంగ ప్రజాబిప్రాయ సేకరణలో పాల్గొని తమ ఆర్థిప్రాయాలు, ఆభ్యంతరాలు తెలుపవచ్చును.


సం/ - పర్యావరణ ఇంజనీర్

ప్రదేశము : గుంటూరు

ఆంధ్రప్రదేశ్ కాలుష్య నియంత్రణ మండలి, ప్రాంతీయ కార్యాలయము, గుంటూరు.

తేది

**FIGURE-8.1**  
**PAPER ADVERTISEMENT**


**A.P. POLLUTION CONTROL BOARD, REGIONAL OFFICE**  
 Flat No. 102, Raghava Apartment, Brundavan Gardens, Guntur-522 006  
 Phone No. 0863-2215537, e-mail : gtr.aoes@pcb.ap.gov.in

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**ENVIRONMENTAL PUBLIC HEARING NOTIFICATION**

In accordance with the Notification No:1533, Dt. 14.09.2006 of Ministry of Environment & Forests, Government of India, we hereby notify a Public Hearing for the proposed Captive Power Plant by M/s Andhra Cements Limited (Durga Cement Works). The details of activities are as follows:

1.	Name of the Company with the Phone Number and Office Address	M/s. Andhra Cements Limited (Durga Cements Works) Durgapuram (V), Dachepalli (M), Guntur district-522 426 Phone: 08649-257441, Fax: 08649-257428 Email: dcw.secretariat@jalindia.co.in
2.	Location of the Project Captive Power Plant (CPP)	Within the Plant premises of the existing unit at Durgapuram, Dachepalli (M), Guntur district.
3.	Name of the Authorised Person to be contacted with address & Phone No.	Sri R K Dooda, Sr. Vice President (Projects) M/s Andhra Cements Limited, (Durga Cement Works) Durgapuram (V), Dachepalli (M), Guntur District -522 426. Phone: 08649 257440, Fax: 08649 257428 Email: rk.dooda@jalindia.co.in
4.	Capital Cost of the Project:	Rs. 136 Crores
5.	Capacity of the Power Plant	30 MW (Captive Power Plant)
6.	Environmental Consultant	Vimta Labs Ltd, 142, IDA, Phase-2, Chertapally, Hyderabad-500 051.
7.	Schedule of Public Hearing Date Time Venue	30-01-2013 11.00 AM In the premises of Durga Temple, Abutting State Highway-2, Near Andhra Cements Ltd., (Durga Cement Works), Durgapuram (V), Dachepalli (M), Guntur Dist.
8.	Place of the availability of executive summary (Telugu & English) and Draft EIA report on proposed project which are kept open for public.	

1. Office of the Collector and District Magistrate, Guntur
2. Office of the Chief Executive Officer, Zilla Parishad, Guntur.
3. Office of the General Manager, District Industries Centre, Guntur
4. Regional Office, Southern Zone, GOI, MoEF, Kendriya Sadan, IV-Floor Environment & Forest Wings, Koramangala, Bangalore-560 034.
5. A.P.Pollution Control Board, Paryavaran Bhavan, A3, Industrial Estate, Sanatnagar, Hyderabad-500 018.
6. A.P. Pollution Control Board, Plot No. 41, Opp: SBH Zonal Office, Kanakadurga Officers Colony, Gurunanak Road, Vijayawada.
7. A.P.Pollution Control Board, Regional Office, Flat No. 102, Raghava apartment, Brundavan Gardens, Guntur.
8. A.P.Pollution Control Board, Regional Office, H.No. 6-2-888/B, 2nd Floor, Lakshmi Complex, Near Clock Tower, Nalgonda - 508001.
9. Office of the Revenue Divisional Officer, Narasaraopet, Guntur Dist.
10. Office of the Tahasildhar, Dachepalli Mandal, Guntur Dist.
11. Gramapanchayat Office, Gamalapedu, Dachepalli Mandal, Guntur Dist.
12. Gramapanchayat Office, Dachepalli, Dachepalli Mandal, Guntur Dist.
13. Gramapanchayat Office, Ramapuram, Dachepalli Mandal, Guntur Dist.
14. Gramapanchayat Office, Nadikudi, Dachepalli Mandal, Guntur Dist.
15. Gramapanchayat Office, Ponirugala, Dachepalli Mandal, Guntur Dist.
16. Gramapanchayat Office, Srinagar, Dachepalli Mandal, Guntur Dist.
17. Gramapanchayat Office, Damarlacherla (V&M), Nalgonda Dist.
18. Office of the Tahsildhar, Damarlacherla Mandal, Nalgonda Dist.
19. Gramapanchayat Office, Bhatrupalem, Dachepalli Mandal, Guntur Dist.

Suggestions, Views comments and objections of the Public, if any, are invited within 30 days from the date of Publication of this notification from all persons including bonafide residents. Environmental groups, others located at Project site/sites of displacement/sites likely to be affected. The interested persons can send written suggestions, comments to the under signed officer of A.P. Pollution Control Board, Regional Office, Guntur. The interested persons can participate in the Public Hearing on the date, time and venue specified above.

Date: 27.12.2012  
Place: GUNTUR

Sd/- Environmental Engineer,  
A.P. Pollution Control Board,  
Regional Office, Guntur.

**FIGURE-8.2  
PAPER ADVERTISEMENT**






**PHOTOGRAPHS SHOWING PUBLIC HEARING**





**PHOTOGRAPHS SHOWING PUBLIC HEARING**

	<b>EIA for the Proposed 30 MW Captive Power Plant at Durgapuram Village, Dachepalli, Guntur District, Andhra Pradesh</b>
	<b>Chapter-8 Additional Studies</b>

## 8.2 Issues Discussed during Public Hearing

The entire issues rose by individuals and reply of project proponent along with action plan are given in **Annexure- XI**. The summaries of issues raised are discussed below in **Table-8.1**.

**TABLE-8.1**  
**SUMMARY OF ISSUES RAISED ARE GROUPED AND DISCUSSED**


Sr.No	Issues	Proponent Reply	Action Plan
1	<p>Shri Maasetti Venkateswarulu detailed on following issues</p> <ul style="list-style-type: none"> <li>-To take adequate pollution control measures</li> <li>- Priority in employment to the local people</li> <li>-He extended support to the project if adequate control measure are taken</li> <li>-Suggested for alternative technology - solar based power plant instead of using coal</li> </ul>	<p>The proponent assured to employ local youth fulfilling required qualifications.</p> <p>Preference in employment will be given to local depending on qualification and need of the company.</p> <p>About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist.</p> <p>310 people have been employed directly/indirectly in the cement plant</p>	<p><b><u>Mitigation Measures</u></b></p> <p><b><u>Air</u></b></p> <ul style="list-style-type: none"> <li>- By sprinkling of water to arrest the dust</li> </ul> <p>ESP with &gt;99.9% efficiency to control dust below 50 mg/Nm<sup>3</sup></p> <p><b><u>Water</u></b></p> <p>Air cooled condensers to reduce impacts on natural water resources</p> <p>No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept</p> <p><b><u>Noise</u></b></p> <ul style="list-style-type: none"> <li>- Acoustic measures will be taken</li> </ul> <p>The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha</p> <p>Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex.</p> <p>Power plant of same size (30 MW) with non-conventional sources such as solar power will require about 1 sq.km (&gt;10-ha of land) whereas</p>

Sr.No	Issues	Proponent Reply	Action Plan
			3.0 Ha land proposed for the coal based 30 MW CPP which may lead to additional land requirement.
2	Shri Prathipath Rosaiah, Narayanapuram village - Suggested to give priority on employment to the local people	Preference in employment will be given to locals depending on qualification and need of the company.  About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist.  310 people have been employed directly/indirectly in the cement plant	-Employment will be provided for qualified persons - Industrial Training Institute (ITI) will be started by JAL to train the local youth in different industrial trade coming from villages and other areas. The persons trained in the ITI will be provided with suitable job in the company.
3	Shri Medara Daniyel, Gomalapadu village - Expressed his concerns that they are not in favor of project	The project will uplift the socio-economic conditions of the region	The project will help in development of the area. Total amount of 0.54 crore is proposed to incur on CSR activities as infrastructure development cost and Rs. 10.8 Lakhs every year as recurring expenditure for maintaining the infrastructure and other peripheral development activities
4	Shri Modugula Suresh Reddy, Shrinagar - commented on arrest of CO <sub>2</sub> emission from the proposed project. - Suggest for opting solar or wind power technology for power generation	Necessary pollution control measures will be taken as per APPCB/CPCB norms	<b>Mitigation Measures</b> <b>Air</b> - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm <sup>3</sup> - <b>Water</b> Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept <b>Noise</b>

Sr.No	Issues	Proponent Reply	Action Plan
			<p>- Acoustic measures will be taken</p> <p>The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha</p> <p>Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex.</p> <p>The altitude and wind velocity around the project site donot favour windpower plants. Further 30 MW wind power requires more land than 3.0 – ha proposed for the coal based CPP</p>
5	<p>Shri Shankara Rao, Srinagar village</p> <p>- Expressed his opinion about the venue of public hearing.</p> <p>- He expressed his concerns on providing water supply to the villagers</p>	<p>The venue has been finalized by APPCB as per the EIA Notification 2006.</p> <p>CSR activities will be aimed at supply of water to the villages.</p>	<p>The break of budget allocated for CSR activities is about given below:</p> <p>Education-Rs.0.14 crore</p> <p>Health- Rs.0.18 crore incl. water supply to villages</p> <p>Community development- Rs.0.24 crore</p>
6	<p>Shri Vanga Padmavathi</p> <p>- expressed view on affect of proposed project on human health and live stock</p> <p>- Priority in employment to the local people</p>	<p>All the statutory guidelines will be implemented as per the stipulated norms so that proposed CPP will not impact the health of local villagers and live stock.</p> <p>About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist.</p> <p>310 people have been employed directly/indirectly in the cement plant</p>	<p>- All the conditions/norms for environmental protection that would be stipulated in EC/CFE/CFO etc will be complied</p> <p>Industrial Training Institute (ITI) will be started by JAL to train the local youth in different industrial trade coming from villages and other areas. The persons trained in the ITI will be provided with</p>



Sr.No	Issues	Proponent Reply	Action Plan
			suitable job in the company.
7	Shri Ramanamma & others, Srinagar - Expressed view that they are opposing the project	More initiative will be taken for the development of schools, hospitals, infrastructure like roads, street lights etc. The proponent assured to employ local youth fulfilling required qualifications. Preference in employment will be given to locals depending on qualification and need of the company.	The proposed project will improve the socio-economic conditions of the region
8	Shri Chiluku Chandra Shekar, Advocate & AP.Civil Liberties Union - expressed his views on venue of the public hearing meeting - Preference for Local employment - Suggested for adopting solar power - Pollution measures	The venue has been finalized by APPCB as per the EIA Notification 2006.  About 24 people are proposed to be employed in CPP from 7 villages, 70 people from other than Guntur Dist.  310 people have been employed directly/indirectly in the cement plant - All the statutory guidelines will be implemented as per the stipulated norms.	<b><u>Mitigation Measures</u></b> <b><u>Air</u></b> - By sprinkling of water to arrest the dust ESP with >99.9% efficiency to control dust below 50 mg/Nm <sup>3</sup>  <b><u>Water</u></b> Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept <b><u>Noise</u></b> - Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha  Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex.  Power plant of same size (30 MW) with non-conventional sources such as solar

	<b>EIA for the Proposed 30 MW Captive Power Plant at Durgapuram Village, Dachepalli, Guntur District, Andhra Pradesh</b>
	<p style="text-align: right;"><b>Chapter-8</b> <b>Additional Studies</b></p>

Sr.No	Issues	Proponent Reply	Action Plan
			power will require huge land, of 1.0 Sq.km (>10-ha) whereas 3.0 Ha land proposed for the coal based 30 MW CPP which may lead to additional land requirement.
9	Shri Nava Jyothi, Paryavarana Parirakshana Samithi, Nadikudi village expressed his opinion stating about the damage of biodiversity due to the proposed plant and existing cement plants. - And also raise comment on ministry how it is permitting for too many cement plants at one place	All the statutory guidelines will be implemented as per the stipulated norms.	The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha

### 8.3 Conclusion on Public Hearing


As there is no further representation from the Public present during public hearing, Joint Collector has summed up the Proceedings of the Public hearing and declared the Public Hearing as over.

Shri BMK Sharma from JAL given the clarification of the some of the issues by stating that all employees were retained on the rolls of Andhra Cements even after takeover of the unit and also promised that the loading & unloading contract workers also will be taken as per requirement after commencement of production.

Shri TGV Krishna Reddy, MLC special invitee of the public hearing suggested management to maintain good relationship and discuss the issues. And stressed on providing employment, greenbelt development and suggested for alternative technology solar energy system.

### 8.4 Written Suggestions and Complaints

Comments were received by regulatory authorities in response to the Public Notice. About 205 no of written representations were received expressing their opinion on establishment of proposed project. The copies of the comments and clarifications are given in **Annexure- XI**. The written comments are given in **Table-8.2**.


	<b>EIA for the Proposed 30 MW Captive Power Plant at Durgapuram Village, Dachepalli, Guntur District, Andhra Pradesh</b>
	<b>Chapter-8 Additional Studies</b>

**TABLE-8.2**  
**REPLY TO APPLICATIONS RECEIVED IN WRITING**

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
1	Shri Surkanti Venkata Reddy, Sri Siddhartha rural development & environment safe guard society, NGO	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent
2	Shri Chhintala Sailu, Mathrubhumi Prayavarana Parirakshna Samithi Shri Venkatareddy, President, Swan Environmental Safeguard Society (NGO)	<ul style="list-style-type: none"> <li>- All environmental factors shall have to be taken care and requested to grant environmental clearances</li> <li>-Advised for 80% of local employment</li> <li>- Plantation has been done by the company in existing plant and effective control measures are adopted for control of pollution.</li> </ul>	<p><b><u>Mitigation Measures</u></b></p> <p><b><u>Air</u></b></p> <ul style="list-style-type: none"> <li>- By sprinkling of water to arrest the dust</li> </ul> <p>ESP with &gt;99.9% efficiency to control dust below 50 mg/Nm<sup>3</sup></p> <p><b><u>Water</u></b></p> <p>Air cooled condensers to reduce impacts on natural water resources</p> <p>No wastewater discharge into surface waterbodies. The plant will be working on zero discharge concept</p> <p><b><u>Noise</u></b></p> <ul style="list-style-type: none"> <li>- Acoustic measures will be taken</li> </ul> <p>The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha</p> <p>Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex whereas Rs. 7.2 crores will be spent every year for recurring cost.</p>
3	Shri P.Ranjith Kumar, General secretary, Society of Media awareness service	<ul style="list-style-type: none"> <li>- Advised to take the suggestions from forest department for greenbelt development</li> <li>- Expressed willingness to the project</li> </ul>	The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha. For developing green belt, advice and assistance will be obtained from Forest Dept.
5	Shri Shyamal Nagasena Reddy, President, Charumathi Child Care Centre	<ul style="list-style-type: none"> <li>- Advised to improve CSR activities</li> <li>- Views expressed on greenbelt development and allotment of budget on environment protection measures</li> </ul>	<ul style="list-style-type: none"> <li>- Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures</li> <li>- Total amount of Rs.0.54 crores will be incurred on CSR activities</li> </ul>
6	Shri P.V.Sudhakar Rao, Co-Ordinator, Disha Service Heights Voluntary Organisation	All environmental factors shall have to be taken care and requested to grant environmental clearances	<p>We shall take care of all environmental elements</p> <ul style="list-style-type: none"> <li>- CSR activities will be</li> </ul>



Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
		- Expressed views that the coming project will improve the socio-economic conditions of nearby villages	strengthened for socio-economic development of the region
7	Shri A.Kumar, Co-ordinator, Tribal Rural Development society & G.Janardhan Reddy, President, Paryavarana Praja Parirakshana Samithi, PLN.Rao, Front Line Environment Safe Guard Society	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent
8	The people from Bodugala, Srinagar, Gamalapadu, Pondugala, Ramapuram, Katarapadu and other nearby villages	-Expressed positive concerns for the coming project and suggested to adapt effective measure for abatement of pollution and requested to grant environmental clearance	Thanks for consent
9	PDM, Guntur district	- Opposes the project stating that the levels of pollution due to the project activity will have impact on health of the people	<p><b>Mitigation Measures</b></p> <p><b>Air</b></p> <p>- By sprinkling of water to arrest the dust ESP with &gt;99.9% efficiency to control dust below 50 mg/Nm<sup>3</sup></p> <p>- <b>Water</b></p> <p>Air cooled condensers to reduce impacts on natural water resources No wastewater discharge into surface water bodies. The plant will be working on zero discharge concept</p> <p><b>Noise</b></p> <p>- Acoustic measures will be taken The proposed green belt will be developed in an area of about 46.7 including the cement plant with a tree density of 2500/ha</p> <p>Total amount of Rs.16.3 crores is proposed to be spent on environment protection measures as capex whereas Rs. 7.2 crores will be spent every year for recurring cost.</p> <p>All the statutory guidelines will be implemented as per the stipulated norms so that proposed CPP will not impact the health of local villagers and livestock.</p>
10	People of Gamalapadu village	- Requested to stop the project and opinioned that it will damage agricultural land	Necessary steps will be taken for the abatement of pollution. The produced ash

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Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
			will be 100% utilised in cement plant
11	Public of Bhatrupalem thanda, Chips & welfare unit, Nadikudi	-Expressed concerns on dust pollution and requested to stop the project as it will be damaging the agricultural land and cause health problems to the villages nearby	All standards are being strictly followed by the company in the existing cement plants and regular inspections are done by pollution control board and other departments.
12	Shri V.Venkata reddy, Andhra Cement Company Employees Union	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent
13	<p>The following members who attended public hearing expressed their willingness in writing:</p> <p>Shaik Chand, Pondugala Thanda Ibrahim Pondugala Jhakka Ramnaidu Pondugala Thanda Modhin Pondugala T.M.Kareem Pondugala Thanda Jilani Pondugala G.Masthan Pondugala K.Pichaih Pondugala Gurajala Ghani Pondugala Thanda Odesa Pondugala K. Mutaih Pondugala J.Ramakoteswarao Pondugala M.D.Kalil Pondugala B.Murali Krishna Pondugala Thanda Jilani Basha Pondugala S.K.Fayaziddun Vadapalli G.Narsaiah Vadapalli M.Nageswarao Vadapalli S.K.Salem Vadapalli Shaik Liakathali Vadapalli Maram Koteswarao Vadapalli Ramaswami Srinivas reddy Vadapalli</p>	Expressed willingness for the project to be started up and requested to grant environmental clearance	Thanks for consent

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Korra Nageswarao Vadapalli Shaik Dastagiri Vadapalli G.Rambabu Vadapalli Surepalli Srinivasrao Vadapalli Vattepu Kasiah Vadapalli Shaik Nazir Nadikudi B.Koteswarao Nadikudi Shaik Nazir Nadikudi K.Saidaih Nadikudi B.Krishna Nadikudi ThantiKondalu Gamalapadu Kondalu Gamalapadu D.Nageswarao Gamalapadu Pamula Parvathi Srinagar Settiprolu Srinivasa Rao Gamalapadu Jinkala Kasim Gamalapadu Bomma Suresh Gamalapadu Ch. Venkata Kotaiah Gamalapadu Viriyala China Narasimham Gamalapadu Allari Kondaiah Gamalapadu Palle Saidaiah Gamalapadu Y. Srinivasa Rao Gamalapadu Y. Adinarayana Gamalapadu G. Suresh Babu Gamalapadu Sankarasetti Appara Rao Gamalapadu Munavathu Baghya Naik Batrupalem P. Venkateswarlu Srinagar Devadathu Parama Naik Batrupalem M Saida Naik Batrupalem R. Tikya Naik Batrupalem M. Bimla Naik		



Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Batrupalem SK. Leela Srinagar Taviti Subba Rao Srinagar Mukku Madhusudan Srinagar R. Raghu Gamalapadu T. Venkateswararam Gamalapadu Y. Yedukondalu Pondugula K.V.Rao Srinagar P. Venkaiah Ramapuram Lela Srinagar Shyam Babu Nadikudi Korrapati Purnaiah Ramapuram V. Vinod Reddy Ramapuram Vemula Srinivasara Ramapuram A. Kondaiah Gamalapadu Chilaka Marthamma Nadikudi Erisi Mashaiah Nadikudi Erisi Jargi Nadikudi Velpula Santhosham Nadikudi Velpula Suryanarayana Nadikudi Mamidi GOpal Nadikudi Velpula Linkan Nadikudi Eriki Durga Rao Nadikudi Velpula Ambhedkar Nadikudi V. Ramesh Babu Ramapuram B. Yesaiah Srinagar B. Parameswara Rao Gamalapadu Karasani Nagireddi Srinagar Bidigula Nagaiah Gamalapadu R. Ravi Naik Vadapalli K. Saidaiah CHoudhary Nadikudi		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Md. Basheer Ahmed Vadapalli Md. Jahangir Vadapalli Kothapalli Anandababu Nadikudi Patrapu Saibabu Batrupalem Sudhakar Gamalapadu Saidalu Gamalapadu Ramalinga Reddy Dachepalli B. Venkat Reddy Srinagar Mallu Madi Reddy Batrupalem Vishnu Babu Srinagar Koti Reddy Ramapuram G.P.Rao Gamalapadu P.G. Rao Srinagar K. Rama Rao Srinagar M. V.V. Reddy Ramapuram C. Ramaiah Gamalapadu P. Lakshmi Gamalapadu S. Venkateswarao Gamalapadu K. Patha Kalaiah Gamalapadu G. Anjaneyulu Gamalapadu N. Srinivas Gamalapadu A. Saidulu Gamalapadu B. Koteswara Rao Srinagar P. Kondaiah Gamalapadu M. Devasahayam Gamalapadu P. Sathanandham Srinagar M. Yesu Gamalapadu K. Saidulu Gamalapadu T. Balaji Hyderabad K. Anki Reddy Gamalapadu N. Chandra Sekhar		

Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	<p>Gamalapadu Vemula Nagamani Ramapuram Todeti Punna Rao Nadikudi Kobbari Murali Nadikudu Velpula Jakkaiah Nadikudi B.V.Veswara Rao Srinagar V. Satyanarayana Dacheipalli K.Srinivasa Reddy Srinagar Sk. Kasim Gamalapadu V. Satyanarayana Dacheipalli K. Srinivasa Reddy Srinagar T. Sambasiva Rao Gamalapadu Koya Koteswara Rao Gamalapadu Sudhakar Kumar Srinagar B. Sekhar Durgapuram K. Sekhar Gamalapadu Rajkiran Gamalapadu M. Nagulu Gamalapadu V. Venkat Reddy Durga Puram S. Anji Reddy Gamalapadu K. Meera Reddy Gamalapadu A. Bharathi Ramapuram V. Krishnaveni Ramapuram V. Sambrajamma Gamalapadu Sk. Shahina Kousar Gamalapadu Vemula Lingamma Gamalapadu Annangi Anjamma Gamalapadu A.V. Rao Durgapuram V . Padma Ramapuram Sripathi Ananda Rao Nadikudi L.C.H. Meerabhi Ramapuram</p>		



Sr. No.	Applicants Name/Designation and Address	Important points of the application received	Reply by Project Proponent
	Rudraiah Bodugula Ramapuram Lakshmi Srinagar C. Krishna Rao Dachepalli P. Saidulu Pondugula Jamula Naik Gamalapadu Md. Janmiya Dachepalli Mangaraithu Srinagar Tulasiraithu Srinagar Maisamma Raithu Srinagar L. Samy Goud Srinagar S. Yadaih Srinagar B. Lingaiah Srinagar Saleru Buchamma Pondugula B. Krishna Rao Ramapuram K. Jagga Rao Katarapadu V. Sankar Batrupalem Y. Sathi Reddy Irika Gudem J. Kamili Ganesh Pahad P. Damodhar Reddy Vadapalli K. Janaiah Vadapalli K. Yadi Reddi Vadapalli D. Manga Naik Vadapalli D. Peer Naik Vadapalli D. Mamatha Vadapalli K. Ramuli Dachepalli K. Ramireddi Nadikudi V. Koti rEddi Gamalapadu Sankar Naik Vadapalli D. Ravidhar Naik Vadapalli		

## **8.5 RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN**

### **8.5.1 Risk Assessment and Disaster Management Plan**

Hazard analysis involves the identification and quantification of various hazards (unsafe conditions) that exist in the plant. On the other hand, risk analysis deals with the identification and quantification of risks, the plant equipment and personnel are exposed to, due to accidents resulting from the hazards present in the plant.

Risk analysis follows an extensive hazard analysis. It involves the identification and assessment of risks the neighboring populations are exposed to as a result of hazards present. This requires a thorough knowledge of failure probability, credible accident scenario, vulnerability of populations etc. Much of this information is difficult to get or generate. Consequently, the risk analysis is often confined to maximum credible accident studies.

In the sections below, the identification of various hazards, probable risks in the plant, maximum credible accident analysis and consequence analysis are addressed which gives a broad identification of risks involved in the cement and captive power plant. Based on the risk estimation, disaster management plan has also been prepared.

### **8.5.2 Approach to the Study**

Risk involves the occurrence or potential occurrence of some accidents consisting of an event or sequence of events. The risk assessment study covers the following:

- Identification of potential hazard areas;
- Identification of representative failure cases;
- Visualization of the resulting scenarios in terms of fire (thermal radiation) and explosion;
- Assess the overall damage potential of the identified hazardous events and the impact zones from the accidental scenarios;
- Assess the overall suitability of the site from hazard minimization and disaster mitigation point of view;
- Furnish specific recommendations on the minimization of the worst accident possibilities; and
- Preparation of broad Disaster Management Plan (DMP), On-site and Off-site Emergency Plan, which includes Occupational Health and Safety plan.

### **8.5.3 Hazard Identification**

Identification and quantification of hazards in plant is of primary significance in the risk analysis. Hence, all the components of a system/plant/process has been thoroughly examined to assess their potential for initiating or propagating an unplanned event/sequence of events, which can be termed as an accident. The following two methods for hazard identification have been employed in the study:

- Identification of major hazardous units based on Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 of Government of India (GOI Rules, 1989); as amended in 2000; and

- Identification of hazardous units and segments of plants and storage units based on relative ranking technique, viz. Fire-Explosion and Toxicity Index (FE&TI). Hazardous substances may be classified into three main classes: Flammable substances, unstable substances and Toxic substances. The ratings for a large number of chemicals based on flammability, reactivity and toxicity have been given in NFPA Codes 49 and 345-M. The storages of raw materials, products of power and cement plants are given in **Table-8.3**.

Coal is the main fuel used in the Captive Power Plant and Kiln in cement plant.

Hazardous characteristics of the major flammable materials and chemicals that are employed in different processes and storages of the cement and power plant are listed in **Table-8.4**.

**TABLE- 8.3**  
**CATEGORYWISE SCHEDULE OF STORAGE TANK**

Sr. No	Product	No. of Tanks	Classification	Design Capacity (KL)
1	HSD	1	B	200

A: Dangerous Petroleum      B: Non- Dangerous Petroleum      C: Heavy Petroleum

**TABLE-8.4**  
**PROPERTIES OF FUELS/CHEMICALS USED AT THE PLANT**

Chemical	Codes/Label	TLV	FBP	MP	FP	UEL	LEL
			°C			%	
HSD	Flammable	5 mg/m <sup>3</sup>	400	338	32-96	7.5	0.6

TLV :	Threshold Limit Value	FBP :	Final Boiling Point
MP :	Melting Point	FP :	Flash Point
UEL :	Upper Explosive Limit	LEL :	Lower Explosive Limit

#### 8.5.3.1 Identification of Major Hazard Installations Based on GOI Rules, 1989 (amended in 2000)

Following accidents in industries in India over a few decades, a specific legislation covering major hazard activities has been enforced by Govt. of India in 1989 in conjunction with Environment Protection Act, 1986. This is referred here as GOI Rules 1989 (amended in 2000). For the purpose of identifying major hazard installations the rules employ certain criteria based on toxic, flammable and explosive properties of chemicals. A systematic analysis of the fuels and their quantities of storage has been carried out, to determine threshold quantities as notified by GOI Rules and the applicable rules are identified. The results are summarized in **Table-8.5**.

**TABLE-8.5**  
**APPLICABILITY OF GOI RULES TO FUEL/CHEMICAL STORAGE**

Sr. No.	Fuel	Listed in Schedule	Total Quantity [KL]	Threshold Quantity (T) for Application of Rules	
				<b>5,7-9,13-15</b>	<b>10-12</b>
1	HSD	3(1)	200	25 MT	200 MT



## 8.6 Hazard Assessment and Evaluation

An assessment of the conceptual design is conducted for the purpose of identifying and examining hazards related to feed stock materials, major process components, utility and support systems, environmental factors, operations, facilities and safeguards.

### 8.6.1 Preliminary Hazard Analysis (PHA)

A preliminary hazard analysis is carried out initially to identify the major hazards associated with storages and the processes of the plant. This is followed by consequence analysis to quantify these hazards. Finally the vulnerable zones are plotted for which risk reducing measures are deduced and implemented. The potential risk areas in the plant are given in **Table-8.6** & hazard analysis in **Table-8.7**.

**TABLE-8.6**  
**PRELIMINARY HAZARD ANALYSIS FOR PROCESS AND STORAGE AREAS**

Sr. No.	Blocks/Areas	Hazards Identified
1	Coal Handling Plant	Fire and/or Dust Explosions
2	Boilers	Fire (mainly near oil burners), steam; Explosions, Fuel Explosions
3	Kiln	Fires in - a) Lube Oil systems b) Cable galleries c) Short circuits in i) Control Rooms ii) Switchgears
4	Power Transformers	Explosion and fire.
5	Switch-yard Control Room	Fire in cable galleries and Switchgear/Control Room.
6	Tank Farms Furnace Oil	Fire

**TABLE-8.7**  
**PRELIMINARY HAZARD ANALYSIS FOR THE WHOLE PLANT IN GENERAL**

PHA Category	Description of Plausible Hazard	Recommendation	Provision
Environmental factors	If there is any leakage and eventuality of source of ignition.	--	All electrical fittings and cables are provided as per the specified standards. All motor starters are flame proof.
Environmental factors	Highly inflammable nature of the chemicals may cause fire hazard in the storage facility.	A well-designed fire protection including protein foam, dry powder and CO2 extinguisher shall be provided.	Fire extinguisher of small size and big size are provided at all potential fire hazard places. In addition to the above, fire hydrant network is also provided.

### 8.6.2 Fire Explosion and Toxicity Index (FE&TI) Approach

Fire, Explosion and Toxicity Indexing (FE & TI) is a rapid ranking method for identifying the degree of hazard. The application of FE&TI would help to make a quick assessment of the nature and quantification of the hazard in these areas. However, this does not provide precise information.

The degree of hazard potential is identified based on the numerical value of F&EI as per the criteria given below:

F&EI Range	Degree of Hazard
0-60	Light
61-96	Moderate
97-127	Intermediate
128-158	Heavy
159-up	Severe

By comparing the indices F&EI and TI, the unit in question is classified into one of the following three categories established for the purpose are presented in **Table-8.8**.

**TABLE-8.8**  
**FIRE EXPLOSION AND TOXICITY INDEX**

Category	Fire and Explosion Index (F&EI)	Toxicity Index (TI)
I	F&EI < 65	TI < 6
II	65 < or = F&EI < 95	6 < or = TI < 10
III	F&EI > or = 95	TI > or = 10

Certain basic minimum preventive and protective measures are recommended for the three hazard categories.

- **Results of FE and TI for Storage/Process Units**

Based on the GOI Rules, the hazardous fuels used in the plant were identified. Fire and Explosion are the likely hazards, which may occur due to the fuel storages. Hence, Fire and Explosion index has been calculated for in plant storage. Detailed estimates of FE&TI are given in **Table-8.9**.

**TABLE-8.9**  
**FIRE EXPLOSION AND TOXICITY INDEX FOR STORAGE FACILITIES**

Sr. No.	Chemical	Total Quantity	F&EI	Category	TI	Category
1	HSD	200 KL	10.1	Light	Nil	-

Furnace oil storage falls into 'light' category of F&EI and 'nil' toxicity index.

### 8.6.3 Maximum Credible Accident (MCA) Analysis

Hazardous substances may be released as a result of failures or catastrophes, causing possible damage to the surrounding area. This section deals with the

question of how the consequences of the release of such substances and the damage to the surrounding area can be determined by means of models. Major hazards posed by flammable storage can be identified taking recourse to MCA analysis. MCA analysis encompasses certain techniques to identify the hazards and calculate the consequent effects in terms of damage distances of heat radiation, toxic releases, vapor cloud explosion, etc. A host of probable or potential accidents of the major units in the complex arising due to use, storage and handling of the hazardous materials are examined to establish their credibility. Depending upon the effective hazardous attributes and their impact on the event, the maximum effect on the surrounding environment and the respective damage caused can be assessed.

The reason and purpose of consequence analysis are many folds like:

- Part of Risk Assessment;
- Plant Layout/Code Requirements;
- Protection of other plants;
- Protection of the public;
- Emergency Planning; and
- Design Criteria (e.g. loading on Control Room).

The results of consequence analysis are useful for getting information about all known and unknown effects that are of importance when some failure scenario occurs in the plant and also to get information as how to deal with the possible catastrophic events. It also gives the workers in the plant and people living in the vicinity of the area, an understanding of their personal situation.

#### **8.6.3.1 Damage Criteria**

The fuel storage and the supply pipelines may lead to fire and explosion hazards. The damage criteria due to an accidental release of any hydrocarbon arise from fire and explosion. Contamination of soil or water is not expected as these fuels will vaporize slowly and would not leave any residue. The vapors of these fuels are not toxic and hence no effects of toxicity are expected.

- **Fire Damage**

A flammable liquid in a pool will burn with a large turbulent diffusion flame. This releases heat based on the heat of combustion and the burning rate of the liquid. A part of the heat is radiated while the rest is convected away by rising hot air and combustion products. The radiations can heat the contents of a nearby storage or process unit to above its ignition temperature and thus result in a spread of fire. The radiations can also cause severe burns or fatalities of workers or fire fighters located within a certain distance. Hence, it will be important to know beforehand the damage potential of a flammable liquid pool likely to be created due to leakage or catastrophic failure of a storage or process vessel. This will help to decide the location of other storage/process vessels, decide the type of protective clothing the workers/fire fighters need, the duration of time for which they can be in the zone, the fire extinguishing measures needed and the protection methods needed for the nearby storage/process vessels. **Tables-8.10** and **Table-8.11** tabulated the damage effect on equipment and people due to thermal radiation intensity.

**TABLE-8.10**  
**DAMAGE DUE TO INCIDENT RADIATION INTENSITIES**

Sr. No	Incident Radiation (kW/m <sup>2</sup> )	Type of Damage Intensity	
		Damage to Equipment	Damage to People
1	37.5	Damage to process equipment	100% lethality in 1 min. 1% lethality in 10 sec.
2	25.0	Minimum energy required to ignite wood at indefinitely long exposure without a flame	50% Lethality in 1 min. Significant injury in 10 sec.
3	19.0	Maximum thermal radiation intensity allowed on thermally unprotected adjoining equipment	--
4	12.5	Minimum energy to ignite with a flame; melts plastic tubing	1% lethality in 1 min.
5	4.5	--	Causes pain if duration is longer than 20 sec, however blistering is un-likely (First degree burns)
6	1.6	--	Causes no discomfort on long exposures

Source: Techniques for Assessing Industrial Hazards by World Bank

**TABLE-8.11**  
**RADIATION EXPOSURE AND LETHALITY**

Radiation Intensity (kW/m <sup>2</sup> )	Exposure Time (seconds)	Lethality (%)	Degree of Burns
1.6	--	0	No Discomfort even after long exposure
4.5	20	0	1 st
4.5	50	0	1 st
8.0	20	0	1 st
8.0	50	<1	3 rd
8.0	60	<1	3 rd
12.0	20	<1	2 nd
12.0	50	8	3 rd
12.5	--	1	--
25.0	--	50	--
37.5	--	100	--

#### 8.6.3.2 Fuel Storage

Only one storage tank is provided in the plant for Furnace Oil storage. The oil is supplied by road tankers. In case of tank or fuel released in the dyke area catching fire, a steady state fire will ensue. Failures in pipeline may occur due to corrosion and mechanical defect. Failure of pipeline due to external interference is not considered as this area is licensed area and all the work within this area is closely supervised with trained personnel.



### 8.6.3.3 Modeling Scenarios

Based on the storage and consumption of furnace oil, the following failure scenarios for the plant have been identified for MCA analysis and the scenarios are discussed in **Table-8.12**.

**TABLE-8.12**  
**SCENARIOS CONSIDERED FOR MCA ANALYSIS)**

Sr. No.	Fuel/Chemical	Total Storage Quantity (KL)	Scenarios Considered
1	Failure of HSD Tank	200	Pool Fire

### 8.6.3.4 Details of Pool Fire Model

Heat Radiation program **RADN** has been used to estimate the steady state radiation effect from various storage of fuel and chemicals at different distances. The model has been developed by VIMTA based on the equations compiled from literatures by Prof.J.P.Gupta, Department of Chemical Engineering, IIT Kanpur. The equations used for computations are described below:

### 8.6.3.5 Properties of Fuels Considered for Modeling Scenarios (Pool fire)

The data for various fuels used for modeling is tabulated in **Table-8.13** and are compiled from various literatures.

**TABLE-8.13**  
**PROPERTIES OF FUEL CONSIDERED FOR MODELING**

Sr. No.	Fuel	Molecular Weight	Boiling Point	Density
		kg/kg. mol	<sup>0</sup> C	kg/m <sup>3</sup>
1	HSD	114.24	400.0	920.0

### 8.6.3.6 Results and Discussion - Pool Fire

The results of MCA analysis are tabulated indicating the distances for various damages identified by the damage criteria. Calculations are done for radiation intensities levels of 37.5, 25, 19, 12.5, 4.5 and 1.6 kW/m<sup>2</sup>, which are presented in **Table-8.14** for different scenarios. The distances computed for various scenarios are given in meters and are from the edge of the pool fire. The radiation intensities are computed for the maximum and minimum diameter of the storage tanks. It is further assumed that all other tank diameters fall in between the maximum and minimum diameter, thereby the radiation intensities also fall in between the maximum and minimum radiation intensities.

**TABLE-8.14**  
**OCCURRENCE OF VARIOUS RADIATION INTENSITIES- POOL FIRE**

Failures	Quantity KL	Radiation Intensities (kW/m <sup>2</sup> )/Distances (m)			
		37.5	25.0	4.5	1.6
Failure of HSD tank	200	12.3	15.4	41.1	74

A perusal of modeling results tabulated in **Table-8.14** indicate that the radiation intensity of  $37.5 \text{ kW/m}^2$  (100% lethality) and  $25.0 \text{ kW/m}^2$  (50% lethality) are likely to occur within the radius of the pool, which is computed at 12.3 m and 15.4 m respectively.

Similarly, the radiation intensity of  $4.5 \text{ kW/m}^2$  is likely to occur within a distance of 41.1 m from the center of fuel storage tank. First-degree burns are likely to occur within this distance. The radiation contours are shown in **Figure-8.3**.

#### *8.6.3.7 Effect of Thermal Radiation on Population*

The radiation of  $1.6 \text{ kW/m}^2$  represents the safe radiation intensity for human population even for long exposures.

In case of pool fire of tank the safe distance i.e. distance of occurrence of  $1.6 \text{ kW/m}^2$  is observed to be 74 m and falls within the plant boundary.

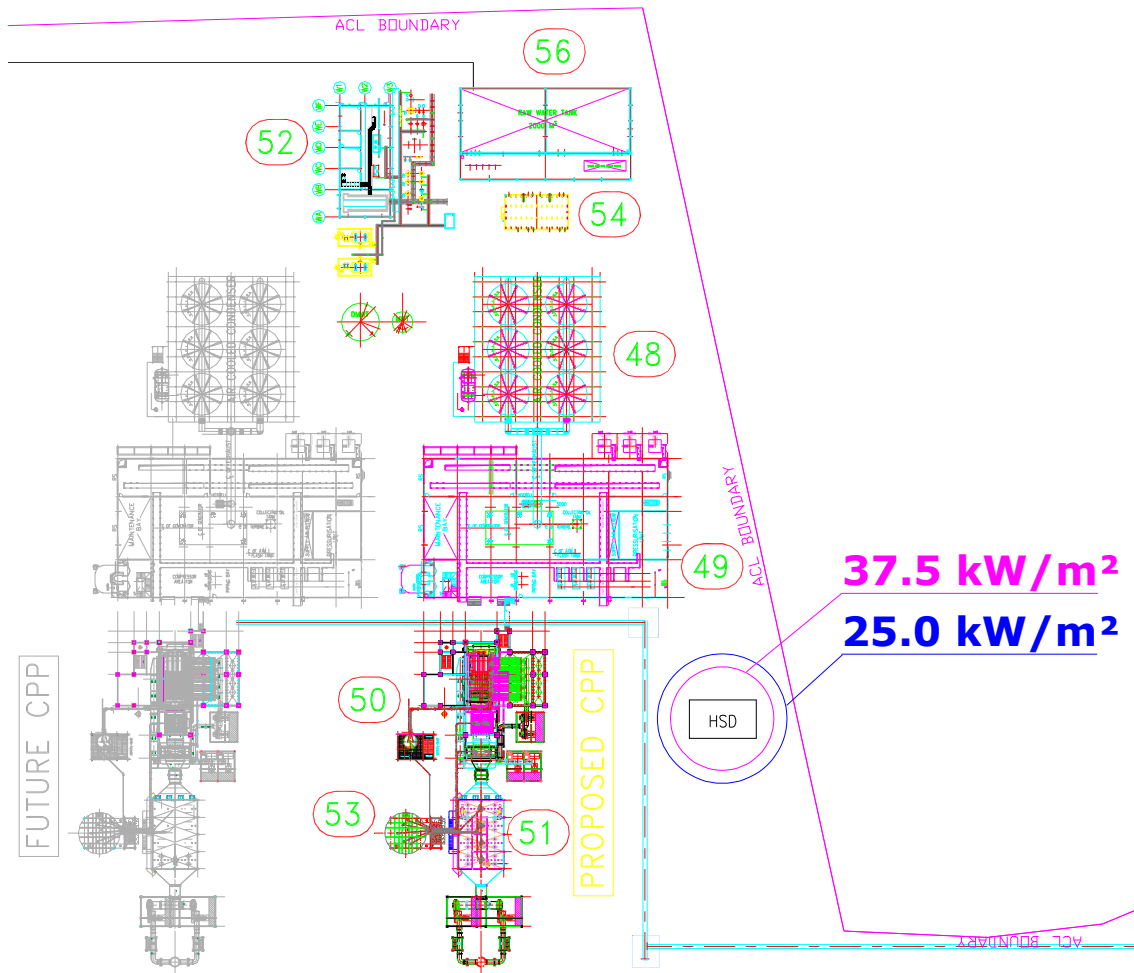
#### **8.6.4 Risk Associated with Coal Handling Plant - Dust Explosion**

Coal dust when dispersed in air and ignited would explode. Coal crusher house and conveyor systems are most susceptible to this hazard. To be explosive, the dust mixture should have:

- Particles dispersed in the air with minimum size (typical figure is 400 microns); and
- Dust concentrations must be reasonably uniform.

Failure of dust extraction and suppression systems may lead to abnormal conditions and increasing the concentration of coal dust to the explosive limits. Sources of ignition present are incandescent bulbs with the glasses of bulk head fittings missing, electric equipment and cables, friction, spontaneous combustion in accumulated dust.

Dust explosions may occur without any warnings with Maximum Explosion Pressure upto 6.4 bar. Another dangerous characteristic of dust explosions is that it sets off secondary explosions after the occurrence of the initial dust explosion. Many a times, the secondary explosions are more damaging than primary ones. The dust explosions are powerful enough to destroy structures, kill or injure people and set dangerous fires likely to damage a large portion of the Coal Handling Plant including collapse of its steel structure, which may cripple the life line of the power plant.



**FIGURE-8.3  
RADIATION CONTOURS**

Stockpile areas shall be provided with automatic garden type sprinklers for dust suppression as well as to reduce spontaneous ignition of the coal stockpiles. Necessary water distribution network for drinking and service water with pumps, piping, tanks, valves etc will be provided for distributing water at all transfer points, crusher house, control rooms etc.

A centralized control room with microprocessor based control system (PLC) has been envisaged for operation of the coal handling plant. Except for locally controlled equipment like traveling tripper, dust extraction/ dust suppression / ventilation equipment, sump pumps, water distribution system etc, all other in-line equipment will be controlled from the central control room but will have provision for local control as well. All necessary interlocks, control panels, MCC's, mimic diagrams etc will be provided for safe and reliable operation of the coal handling plant.

#### 8.3.5 Control Measures for Coal Yards

The total quantity of coal shall be stored in separate stockpiles, with proper drains around to collect washouts during monsoon season.

Water sprinkling system shall be installed on stocks of coal in required scales to prevent spontaneous combustion and consequent fire hazards. The stock geometry shall be adopted to maintain minimum exposure of stock pile areas towards predominant wind direction.


#### 8.6.6 Identification of Hazards

The various hazards associated, with the plant process apart from fuel storage have been identified and are outlined in **Table-8.15**.

**TABLE-8.15  
HAZARD ANALYSIS FOR PROCESS IN POWER PLANT**

Sr. No.	Blocks/Areas	Hazards Identified
1	Coal storage in open yard	Fire, Spontaneous Combustion
2	Coal Handling Plant including Bunker area	Fire and/or Dust Explosions
3	Boilers	Fire (mainly near oil burners), Steam Explosions, Fuel Explosions
4	Steam Turbine Generator Buildings	Fires in – a) Lube oil system b) Cable galleries c) Short circuits in: i) Control rooms ii) Switch-gears  Explosion due to leakage of Hydrogen and fire following it.
5	Switch-yard Control Room	Fire in cable galleries and Switch-gear/Control Room
6	LDO Tank Farms HFO Tank Farm	Fire



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### 8.6.6 Generator Buildings

Turbo-Generator buildings are exposed to risks due to similar hazards given below:

1. As per the summary of study of losses in United States for a period of 50 years, the probability of fire in Turbo-Generators is one in 185 unit years. Therefore, there is a possibility of fire/explosion in turbo-generator set once in 50 years. The probable hazardous area is lubrication system in the turbo-generator.
2. Apart from the Turbo-Generator sets, other major hazardous areas in Turbo-Generator Buildings are:
  - Cable Galleries;
  - Control Rooms;
  - Switchgears;
  - Oil drums stored at Ground Floor level; and
  - Battery Rooms.

PVC cables can be involved in fire. Such fires are known to propagate at speeds upto 20 m/min. Hence, there is a possibility of starting fresh fires in all directions wherever cable runs cross each other or bifurcate. On combustion, every kilogram of PVC compound produces 1000 M<sup>3</sup> of highly dense smoke, which mainly contains hydrogen chloride fumes sufficient to produce 1 liter of Hydrochloric acid, which may condense on cooler metallic parts and instruments in presence of moisture damaging them severely. Since length of PVC cables is several kilometers in Turbo-Generator Buildings, the hazard is tremendous.

Apart from PVC cables, the oil installation is a large one for Turbo-Generator sets and can burn furiously spreading fires to Cable Galleries and other places.

The rapidity of spread of fire may create problems such as safe shutdown of units not involved initially in fire and safe evacuation of personnel, particularly operators and engineers in control rooms.

Turbo-Generator building is a steel structure with no insulation, and in case of a major fire, may collapse as the strength of steel would get reduced by half at temperature of 550°C (yield point of steel) and above.

There will also be serious implications for supply in power grids including its total collapse following major fires.

## 8.7 Disaster Management Plan

### 8.7.1 Introduction

Disaster Management Plan for an industrial unit is necessarily a combination of various actions which are to be taken in a very short time but in a pre-set sequence to deal effectively and efficiently with any disaster, emergency or major

accident with an aim to keep the loss of men, material, plant/machinery etc., to the minimum.

Creation and establishment of a cell within the industrial unit is a pre-requisite for an effective implementation of any disaster management plan. The main functions of the Disaster Management Cell are to prepare a detailed disaster management plan, which includes:

- Identification of various types of expected disasters depending upon the type of the industrial unit;
- Identification of various groups, agencies, departments etc. necessary for dealing with a specific disaster effectively;
- Preparation - by intensive training - of relevant teams/groups within the organization to deal with a specific disaster and keep them in readiness;
- Establishment of an early detection system for the disasters;
- Development of a reliable instant information/communication system; and
- Organization and mobilization of all the concerned departments/ organizations/ groups and agencies instantly when needed.

Major disaster that can occur in this Cement Plant /CPP may be due to fire. In the existing cement plant already having a good and well-maintained

#### 8.7.2 Emergency Planning For Disaster due to Fire

Coal storage, cable rooms, transformer unit, auxiliary transformers, oil tanks, coal bunkers including all conveyor lines etc., within the plant are the likely areas for which plan is outlined to deal with any eventuality of fire. Stores, workshop, canteen and administration building have also been included.

##### 8.7.2.1 *Classification of Fires*

The various classes of fire, explanation of the classes of fire and method of fighting the different classes of fire are given in **Table-8.16**.

**TABLE-8.16**  
**CLASSES OF FIRE**

<b>Class</b>	<b>Explanation</b>	<b>Method of Fire</b>	<b>Fire Fighting</b>
A	Solid – Carbonaceous inflammable material	Fire involving wood, paper, coal, cloth and other material	Water
B	Liquid	Fire involving oil, kerosene etc.	Foam or dry powder chemical extinguisher
C	Special	Electrical fire	DCP or CO <sub>2</sub> extinguisher

#### 8.7.2.2 Equipment System Dealing with Coal Handling

The whole system dealing with coal handling can be summarized as follows:

- A wagon tripper for unloading transported coal from the racks/trucks;
- Coal is unloaded into ground level hopper(s) from where it is transported to pre-blending stock pile through belt conveyors;
- Coal is reclaimed for the above stock pile and is transported to the raw coal hopper for vertical mill by a set of belt conveyors;
- For collection of the pulverized fuel as well as venting the mill, a high efficiency bag filters will be provided; and
- The fine coal from the hoppers will be sent to kiln firing by a set of pumps.

Water sprinklers will be provided for the stockpile at the unloading point to prevent fire. Pull cords and emergency switches will be provided all along the conveyor belt to avoid the spreading of fire.

#### 8.7.2.3 Need for a Fire Fighting Group

A small spark of fire may result into loss of machines and conveyors and the damage by fire may be of the order of few crores of Rupees. This type of losses can be avoided by preventing and controlling the fire instantly for which fire-fighting group shall be established.

#### 8.7.2.4 Fire Fighting with Water

Adequate and reliable arrangement is required for fighting the fire with water such as:

- Identification of source of water and equipping with pumps;
- Arrangement of pipe lines along and around all vulnerable areas;
- Alternative water supply arrangements to divert the water from one set of pipe lines (connected to another source) or to connect to other source;
- Provisions of valves at appropriate points to enable supply of water at the required place/area or divert the same to another direction/pipe line; and
- Each source of water shall be equipped with one standby diesel driven pump to serve in case of power failure.
- **Water Line Arrangement**

Water lines shall be provided at coal handling area along the conveyors and around the stockyards, transformers, oil tanks, coal crusher house etc. Water lines shall also be provided around other infrastructures in the plant like administration building, canteen, stores and other plant equipment. The system

shall be designed in conformity with the recommendations of the NFPA of Insurance Association of India. A reserve water level shall be maintained in the sump as per NFPA requirements.

Hydrant system feed pressurized water to hydrant valves shall be located throughout the plant and also at strategic locations. The water pressure shall be maintained at 6 to 8 kg/cm<sup>2</sup> in these lines. By operating a few of the valves water pressure can be increased at one particular place. There are two types of valves. Non-return valves shall be provided to allow only unidirectional flow of water. Gate valves shall be provided for closing or opening the water supply. An adequate number of gate valves shall be provided at appropriate points to tap water to deal with fire if it breaks out at any point of the plant.

#### **8.7.2.5 Fire Fighting with Fire Extinguishers**

To deal with fires - other than carbonaceous fires, which can be dealt with by water - suitable fire extinguishers are required to do the job effectively. Adequate number of 'Fire stations' are to be established with the following types of equipment and arrangements:


- Soda Acid Fire Extinguishers;
- CO<sub>2</sub> Extinguishers;
- Dry Powder Chemical Extinguishers;
- Foam Extinguishers;
- Fire buckets; and
- 50-mm spray hoses up to 150-m length.

Appropriate types of fire extinguishers shall also be provided at conveyor drive heads, crusher house, control rooms, in machines like stacker and reclaimer, electrical yard, sub-station and other infrastructure facilities within the premises.

In the transformer yard, automatic fire detecting and quenching system shall be provided for each transformer. This system comes into operation whenever the temperature of surrounding air exceeds 80°C and sprays water over the transformer to prevent spreading of fire and quenches the same. In order to avoid fire in cable galleries, all the power and control cables of FRLS type (Fire Resistant Low Smoke) shall be used. In addition, fire detecting and Fire Alarm Systems shall be installed in the cable galleries.

#### **8.7.2.6 Inspection**

- Fire alarm panel (electrical) shall cover the entire plant. Fire Extinguishers in Fire Stations and machines and other places shall be periodically inspected by the inspection group;
- The temperature of the coal stack shall be regularly measured and recorded. If the temperature exceeds 80°C, water quenching shall be carried out;
- Emergency telephone numbers shall be displayed at vital points by the groups; and

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- General inspection for fire shall be regularly carried out by the group.

#### 8.7.2.7 Procedure for Extinguishing Fire

The following steps shall be taken during a Fire Accident in the system:

- As soon as the message is received about fire, one of the spray groups in the system shall be diverted to the place of the fire accident along with a staff member;
- Simultaneously plant Fire Station shall be informed by phone, walkie-talkie for fire brigades;
- Fire stations nearby also be informed by phone to be in readiness;
- In the meanwhile, the pipe system shall be operated to obtain maximum pressure and output;
- In case cables are within the reach of fire, power supply shall be tripped and the cables shifted;
- Further, other spray groups from the system shall be diverted to the spot;
- In case of fire in the belt, belt shall be cut near the burning portion, to save the remaining parts; and
- After extinguishing the fire, the area shall be well prepared for re-use.

#### 8.7.3 Specific Emergencies Anticipated


Fire consequences can be disastrous, since they involve huge quantities of fuel either stored or in dynamic inventory in pipe lines or in nearby areas. Toxic releases can affect persons working around. Preliminary hazard Analysis has provided a basis for consequence estimation. Estimation can be made by using various pool fires, tank fire consequence calculations. During the study of Risk Assessment, the nature of damages is worked out and probability of occurrence of such hazards is also drawn up.

#### 8.7.4 Emergency Action Plan

The emergency action plan consists of:

- First information;
- Responsibilities of Work Incident Controller;
- Responsibilities of Chief Incident Controller;
- Responsibilities for Declaration of Emergency;
- Responsibilities for Emergency Communication Officer;
- Responsibilities of key personnel;
- Responsibilities and action to be taken by essential staff and various teams during emergency; and
- Responsibilities for All Clear Signal.



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#### *8.7.4.1 First Information*

The first person who observes/identifies the emergencies shall inform by shouting and by telephone to the Shift Engineer and Fire Station about the hazard. The Shift Engineer will inform to Works Incident Controller, Chief Incident Controller and also telephone operator, who shall communicate it to all key personnel.

#### *8.7.4.2 Responsibilities of Work Incident Controller (WIC)*

The Work Incident Controller on knowing about an emergency immediately will rush to the incident site and take overall charge and inform the same to Chief Incident Controller (CIC). On arrival, he will assess the extent of emergency and decide if major emergency exists and inform the communication officer accordingly.

#### *8.7.4.3 Responsibilities of Chief Incident Controller (CIC)*


The Additional General Manager, who is also the Chief Incident Controller, will assume overall responsibilities for the factory/storage site and its personnel in case of any emergency. His responsibilities are to:

1. Assess the magnitude of the situation and decide if staff needs to be evacuated from their assembly point to identified safer places. Declare onsite/offsite emergency;
2. Exercise direct operational control over areas other than those affected;
3. Undertake a continuous review of possible developments and assess in consultation with key personnel as to whether shutting down of the plant or any section of the plant and evacuation of personnel are required;
4. Liaison with senior officials of Police, Fire Brigade, Medical and Factories Inspectorate and provide advice on possible effects on areas outside the factory premises;
5. Look after rehabilitation of affected persons on discontinuation of emergency; and
6. Issue authorized statements to news media, and ensures that evidence is preserved for enquiries to be conducted by the statutory authorities.

#### *8.7.4.4 Responsibilities for Declaration of Major Emergency*

It is important to make the emergencies known to every one in the plant. The major emergency will be made known to every one inside the plant by sounding the alarm. Separate alarms to warn different types of major emergencies such as fire and explosion or toxic gas escape are provided. Public address system is also available throughout the plant.

Announcement will be made by the concerned official/interpreter in local language. Similarly, announcement for termination of the emergency will also be announced.

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#### 8.7.4.5 Responsibilities of Emergency Communication Officer (ECO)

On hearing the emergency alarm he will proceed to Emergency Control Center. He will

- Report to Chief Incident Controller and Work Incident Controller and maintain contact with them;
- On information received from the WIC of the situation, recommending if necessary, evacuate the staff from the assembly points;
- Identify suitable staff to act as runners or messengers who are listed in the Essential staff, between him and the Works Incident Controller if the telephone and other system of communication fail due to any reason;
- Maintain inventory of items in the emergency control center;
- Contact local meteorological office to receive early notification of changes in weather condition in case of gas leak and prolonged action;
- Maintain a log of incidents;
- Keep in constant touch with happenings at the emergency site and with WIC;
- Liaise with neighbor fire brigade, hospital, civil and police authorities on advice from CIC.

#### 8.7.4.6 Key Personnel

Apart from Works Incident Controller and Chief Incident Controller, other works personnel will have key role to play in providing advice and in implementing the decisions made by the Chief Incident Controller. The key personnel include:

- A. Sr. Superintendents/Engineer-in-charge responsible for :
  - Operation;
  - Electrical Maintenance;
  - Mechanical maintenance;
  - C&I; and
  - Chemical.
- B. Head of Personnel and Officers connected with IR and Labour Welfare
- C. Head (Technical Service)

#### 8.7.4.7 Responsibilities of Key Personnel

##### • **Department Heads**

The departmental heads will provide assistance as required by the WIC. They will decide which members of their departments are required at the incident site.

- **Chief Personnel Manager**

He will have following responsibilities:

- a) Report to Work Incident Controller;
- b) Ensure that all non-essential workers in the affected areas are evacuated to assembly points in consultation with the Chief Incident Controller;
- c) Receive reports from nominated persons from assembly points, and pass on the absence information services;
- d) Keep liaison with other coordinators to meet the requirements of services such as materials, security management, transportation, medical, canteen facilities etc. as required during emergency;
- e) Be in constant touch with the Chief Incident Controller and feed him correct information of the situation;
- f) Give information to press, public and authorities concerned on instructions from the CIC/WIC;
- g) Ensure that casualties receive adequate attention at medical center and arrange required additional help and inform relatives of the injured;
- h) Arrange to inform public on Radio and TV about evacuation etc.; and
- i) Arrange TV coverage on handling emergency.

- **In-Charge (TS)**

On knowing about an emergency, he will report to CIC and assist him in all activities. He will also liaison with all teams.

- **Medical Officer**

Medical Officer will render medical treatment to the injured and if necessary will shift the injured to nearby Hospitals. He will mobilize extra medical help from outside if necessary.

- **Head of Safety**

On hearing the emergency alarm, he will proceed to the site. He will

- a. Make sure that all safety equipment are made available to the emergency teams;
- b. Participate in rescue operations;
- c. Co-ordinate to transfer the injured persons to medical center and arrange for first aid; and
- d. Keep in contact with ECO and the WIC and advice them on the condition of injured persons

- **Security Officer**

On hearing the Emergency alarm, he will proceed to main entrance/main gate. He will

- a. Arrange to control the traffic at the gate and the incident area;

- b. Direct the security staff to the incident site to take part in emergency operations under his guidance and supervision;
- c. Evacuate the persons in the plant or in the nearby areas as advised by WIC after arranging the transport through the Transport in-charge;
- d. Allow only those people who are associated with handling emergency;
- e. Maintain law and order in the area, if necessary seek the help of police; and
- f. Maintain communication with CIC/WIC and ECO.

- **Fire Officer**

On hearing the emergency, he will reach the fire station and arrange to sound the alarm as per the type of emergency in consultation with WIC, He will:

- a. Guide the fire fighting crew i.e. firemen and trained plant personnel and shift the fire fighting facilities to the emergency site. Adequate facilities will be made available;
- b. Take guidance of the WIC for fire fighting as well as assessing the requirement of outside help; and
- c. Maintain communication with WIC, CIC and ECO.

- **Transport Engineer-in-Charge**

On hearing the emergency alarm, he will immediately report to Work Incident Controller. He will:

- a. Ensure availability of auto base vehicles for evacuation or other duties, when asked for; and
- b. Make all arrangements regarding transportation.

#### 8.7.5 General Responsibilities of Employees During an Emergency

During an emergency, it becomes more enhanced and pronounced when an emergency warning is raised, the workers if they are in charge of process equipment shall adopt safe and emergency shut down and attend any prescribed duty as essential employee. If no such responsibility is assigned, he shall adopt a safe course to assembly point and await instructions. He shall not resort to spread panic. On the other hand, he must assist emergency personnel towards objectives of DMP.

#### 8.7.6 Emergency Facilities

##### 8.7.6.1 Emergency Control Center (ECC)

For the time being Office Block is identified as Emergency Control Center. It would have external Telephone, Fax, Telex facility. All the Site Controller/ Incident Controller Officers, Senior Personnel would be located here. Also, it would be an elevated place. The following information and equipment are to be provided at the Emergency Control Center (ECC).

- Intercom, telephone;
- P and T telephone;

- Safe contained breathing apparatus;
- Fire suit/gas tight goggles/gloves/helmets;
- Hand tools, wind direction/velocities indications;
- Public address megaphone, hand bell, telephone directories;
- (internal, P and T) factory layout, site plan;
- Emergency lamp/torch light/batteries;
- Plan indicating locations of hazard inventories, plant control room, sources of safety equipment, work road plan, assembly points, rescue location vulnerable zones, escape routes;
- Hazard chart;
- Emergency shut-down procedures;
- Nominal roll of employees;
- List of key personnel, list of essential employees, list of Emergency Co-ordinators;
- Duties of key personnel;
- Address with telephone numbers and key personnel, emergency coordinator, essential employees; and
- Important address and telephone numbers including Government agencies, neighboring industries and sources of help, out side experts, chemical fact sheets population details around the factory.

#### **8.7.6.2 Assembly Point**

Number of assembly depending upon the plant location would be identified wherein employees who are not directly connected with the disaster management would be assembled for safety and rescue. Emergency breathing apparatus, minimum facilities like water etc. would be organized. In view of the size of plant, different locations are ear marked as assembly points. Depending upon the location of hazard, the assembly points are to be used.


#### **8.7.6.3 Emergency Power Supply**

Plant facilities would be connected to Emergency Power supply units and would be placed in auto mode. Thus water pumps, plants lighting and emergency control center. Administrative building and other auxiliary services are connected to emergency power supply. In all the blocks, flame proof type emergency lamps would be provided.

#### **8.7.6.4 Fire Fighting Facilities**

First Aid Fire fighting equipment suitable for emergency shall be maintained in each section in the plant. This would be as per statutory requirements as well as per NFPA Regulations. However, fire hydrant line covering major areas would be laid. It would be maintained as 6 kg/sq.cm pressure. Fire alarms would be located in the bulk storage areas. On the top of the Administration block, top of each production blocks, wind socks would be installed to indicate direction of wind for emergency escape.



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#### 8.7.6.5 Emergency Medical Facilities

Stretchers, gas masks and general first aid materials for dealing with chemical burns, fire burns etc. would be maintained in the medical center as well as in the emergency control room. Private medical practitioners help would be sought. Government hospital would be approached for emergency help. Breathing apparatus and other emergency medical equipment would be provided and maintained. The help of near by industrial management's in this regard would taken on mutual support basis.

An ambulance with driver availability in all the shifts, emergency shift vehicle would be ensured and maintained to transport injured or affected persons. Number of persons would be trained in first aid so that, in every shift first aid personnel would be available.

#### 8.7.7 Emergency Actions

##### 8.7.7.1 Emergency Warning

Communication of emergency would be made familiar to the personnel inside the plant and people outside. An emergency warning system would be established.

##### 8.7.7.2 Emergency Shutdown


There are number of facilities which can be provided to help deal with hazardous conditions, fire breaks out. Under this situation the supply of the fuel will be disconnected immediately. Whether a given method is appropriate depends on the particular case. Cessation of agitation may be the best action in some instances but not in others. Stopping of the feed may require the provision of by pass arrangements.

Methods of removing additional heat include removal through the normal cooling arrangements or use of an emergency cooling system. Cooling facilities, which use vapouring liquid, may be particularly effective, since a large increase in vaporization can be obtained by dropping pressure.

##### 8.7.7.3 Evacuation of Personnel

There could be more number of persons in the storage area and other areas in the vicinity. The area would have adequate number of exits, stair cases. In the event of an emergency, unconnected personnel have to escape to assembly point. Operators have to take emergency shutdown procedure and escape. Time Office maintains a copy of deployment of employees in each shift, at ECC. If necessary, persons can be evacuated by rescue teams.

Also, at the end of an emergency, after discussing with Incident Controllers and Emergency Co-ordinators, the Site Controller orders an all clear signal. When it becomes essential, the Site Controller communicates to the District Emergency Authority, Police, and Fire Service personnel regarding help required or development of the situation into an Off-Site Emergency.

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## 8.7.8 General

### 8.7.8.1 *Employee Information*

During an emergency, employees would be warned by raising siren in specific pattern. Employees would be given training of escape routes, taking shelter, protecting from toxic effects. Employees would be provided with information related to fire hazards, antidotes and first aid measures. Those who would be designated as key personnel and essential employees shall be given training to emergency response.

### 8.7.8.2 *Public Information and Warning*

The industrial disaster effects related to this plant may mostly be confined to the plant area. The detailed risk analysis has indicated that the effects would not be felt outside. However, as an abundant precaution, the information related to chemicals in use would be furnished to District Emergency Authority for necessary dissemination to general public and for any use during an off site emergency.

### 8.7.8.3 *Co-ordination with Local Authorities*

Keeping in view of the nature of emergency, two levels of coordination are proposed. In the case of an On Site Emergency, resources within the organization would be mobilized and in the event of extreme emergency local authorities help shall be sought.

In the event of an emergency developing into an off site emergency, local authority and District Emergency Authority (normally the Collector) would be appraised and under his supervision, the Off Site Disaster Management Plan would be exercised. For this purpose, the facilities that are available locally, i.e. medical, transport, personnel, rescue accommodation, voluntary organizations etc. would be mustered. Necessary rehearsals and training in the form of mock drills shall be organized.

Mutual aid in the form of technical personnel, runners, helpers, special protective equipment, transport vehicles, communication facility etc. shall be sought from the neighboring industrial management.

### 8.7.8.4 *Mock Drills*

Emergency preparedness is an important aspect in the planning of Industrial Disaster Management. Personnel would be trained suitably and prepared mentally and physically in emergency response through carefully planned, simulated procedures. Similarly, the key personnel and essential personnel shall be trained in the operations.

### 8.7.8.5 *Important Information*

Once the plant goes into stream, important information such names and addresses of key personnel, essential employees, medical personnel, out side the plant, transporters address, address of those connected with Off Site Emergency such as

Police, Local Authorities, Fire Services, District Emergency Authority shall be prepared and maintained.

## **8.8 Off-Site Emergency Preparedness Plan**

The task of preparing the Off-Site Emergency Plan lies with the district collector, however the off-site plan will be prepared with the help of the local district authorities. The proposed plan will be based on the following guidelines.

### **8.8.1 Introduction**


Off-site emergency plan follows the on-site emergency plan. When the consequences of an emergency situation go beyond the plant boundaries, it becomes a off-site emergency. Off-site emergency is essentially the responsibility of the public administration. However, the factory management will provide the public administration with the technical information relating to the nature, quantum and probable consequences on the neighboring population.

The off-site plan in detail will be based on those events, which are most likely to occur, but other less likely events, which have severe consequence, will also be considered. Incidents, which have very severe consequences yet have a small probability of occurrence, shall also be considered during the preparation of the plan. However, the key feature of a good off-site emergency plan is flexibility in its application to emergencies other than those specifically included in the formation of the plan.

The roles of the various parties who will be involved in the implementation of an off-site plan are described below. Depending on local arrangements, the responsibility for the off-site plan shall be either rest with the works management or, with the local authority. Either way, the plan shall identify an emergency co-ordinating officer, who would take the overall command of the off-site activities. As with the on-site plan, an emergency control center shall be setup within which the emergency co-ordinating officer can operate.

An early decision will be required in many cases on the advice to be given to people living "within range" of the accident - in particular whether they shall be evacuated or told to go indoors. In the latter case, the decision can regularly be reviewed in the event of an escalation of the incident. Consideration of evacuation may include the following factors:

- In the case of a major fire but without explosion risk (e.g. oil storage tank), only houses close to the fire are likely to need evacuation, although a severe smoke hazard may require this to be reviewed periodically; and
- If a fire is escalating and in turn threatening a store of hazardous material, it might be necessary to evacuate people nearby, but only if there is time; if insufficient time exists, people shall be advised to stay indoors and shield them from the fire. This latter case particularly applies if the installation at risk could produce a fireball with vary severe thermal radiation effects.

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### 8.8.2 Aspects Proposed to be Considered in the Off-Site Emergency Plan

The main aspects, which shall be included in the emergency plan, are:

- **Organization**

Names and appointments of incident controller, site main controller, their deputies and other key personnel.

- **Communications**

Identification of personnel involved, communication center, call signs, network, lists of telephone numbers.

- **Specialized knowledge**

Details collected of specialized bodies, firms and people upon whom it may be necessarily to call e.g. those with specialized chemical knowledge, laboratories.

- **Voluntary organizations**

Details of organizers telephone numbers, resources etc.

- **Chemical information**

Details of the hazardous substances stored or procedure on each site and a summary of the risk associated with them.

- **Meteorological information**

Arrangements are done for obtaining details of weather conditions prevailing at the time and weather forecasts.

- **Humanitarian arrangements**

Transport, evacuation centers, emergency feeding treatment of injured, first aid, ambulances, temporary mortuaries.

- **Public information**

Arrangements for:

- (a) Dealing with the media press office;
- (b) Informing relatives, etc.

- **Assessment of emergency plan**

Arrangements for:

- (a) Collecting information on the causes of the emergency;
- (b) Reviewing the efficiency and effectiveness of all aspects of the emergency plan.

### 8.8.3 Role of the Emergency Co-coordinating Officer

The various emergency services shall be co-ordinated by an emergency co-coordinating officer (ECO), who will be designated by the district collector. The ECO shall liaise closely with the site main controller. Again depending on local arrangements, for very severe incidents with major or prolonged off-site consequences, the external control shall be passed to a senior local authority administrator or even an administrator appointed by the central or state government.

### 8.8.4 Role of the Local Authority

The duty to prepare the off-site plan lies with the local authorities. The emergency planning officer (EPO) appointed shall carry out his duty in preparing for a whole range of different emergencies within the local authority area. The EPO shall liaise with the works, to obtain the information to provide the basis for the plan. This liaison shall ensure that the plan is continually kept upto date.

It will be the responsibility of the EPO to ensure that all those organizations, which will be involved off site in, handling the emergency, know of their role and are able to accept it by having for example, sufficient staff and appropriate equipment to cover their particular responsibilities. Rehearsals for off-site plans should be organized by the EPO.

### 8.8.5 Role of Police

Formal duties of the police during an emergency include protecting life and property and controlling traffic movements. Their functions shall include controlling bystanders evacuating the public, identifying the dead and dealing with casualties, and informing relatives of death or injury.

### 8.8.6 Role of Fire Authorities

The control of a fire shall be normally the responsibility of the senior fire brigade officer who would take over the handling of the fire from the site incident controller on arrival at the site. The senior fire brigade officer shall also have a similar responsibility for other events, such as explosions and toxic release. Fire authorities in the region shall be apprised about the location of all stores of flammable materials, water and foam supply points, and fire-fighting equipment. They shall be involved in on-site emergency rehearsals both as participants and, on occasion, as observers of exercises involving only site personnel.

### 8.8.7 Role of Health Authorities

Health authorities, including doctors, surgeons, hospitals, ambulances, and so on, shall have a vital part to play following a major accident, and they shall form an integral part of the emergency plan.

For major fires, injuries shall be the result of the effects of thermal radiation to a varying degree, and the knowledge and experience to handle this in all but extreme cases may be generally available in most hospitals.

Major off-site incidents are likely to require medical equipment and facilities additional to those available locally, and a medical "mutual aid" scheme shall exist to enable the assistance of neighboring authorities to be obtained in the event of an emergency.

#### **8.8.8 Role of Government Safety Authority**

There will be the factory inspectorate available in the region. Inspectors are likely to want to satisfy themselves that the organization responsible for producing the off-site plan has made adequate arrangements for handling emergencies of all types including major emergencies. They may wish to see well documented procedures and evidence of exercise undertaken to test the plan.

In the event of an accident, local arrangements regarding the role of the factory inspector will apply. These may vary from keeping a watching brief to a close involvement in advising on operations in case involvement in advising on operations.

### **8.9 Occupational Health and Safety**

Large industries, in general where multifarious activities are involved during construction, erection, testing, commissioning, operation and maintenance, the men, materials and machines are the basic inputs. Along with the boons, the industrialization generally brings several problems like occupational health and safety.

The industrial planner, therefore, has to properly plan and take the steps to minimize the impacts of industrialization and to ensure appropriate occupational health, safety including fire plans. All these activities again may be classified under construction and erection, and operation and maintenance. The proposed safety plan is given below:

#### **8.9.1 Occupational Health**

Occupational health needs attention during operation and maintenance of the plant. However, the problem varies both in magnitude and variety in the above phases.

The hazardous area of work place in the cement plant, the projected numbers of employees to be employed in the hazardous activities and the safety measures to be adopted in the proposed cement plant are given in **Table-8.17**.

**TABLE-8.17  
HAZARDOUS ACTIVITIES AND SAFETY MEASURES TO BE ADOPTED**

<b>Sr. No.</b>	<b>Hazardous Activities</b>	<b>Safety Measures</b>
1	Working in confined spaces	work permits system to be followed strictly
2	Working at height	work permits system to be followed strictly
3	Excavations/Trenching/Penetration/Digging	work permits system to be followed strictly
4	Hot work	work permits system to be followed strictly
5	Lockout/tag out	work permits system to be followed strictly
6	Scaffolding	Training , checklist and continues monitoring by safety



Sr. No.	Hazardous Activities	Safety Measures
		patrollers
7	Demolition works	Safe work procedures and under supervision and SOPs
8	Reinforcement bending & laying	Training and use of PPEs
9	Concrete formwork	use of PPEs
10	Concreting	use of PPEs
11	Structural works	use of PPEs
12	Lifting with Cranes	Proper Training to personnel and lifting area barricading
13	Lifting tools and tackles operation	Testing of all lifting tools and tackles with competent and training to operators
14	High pressure testing, cleaning and painting	Proper training, use of PPEs and work procedures for high pressure vessels
15	Overhead works	Use of PPEs and
16	Working in dust and noise	Use of PPEs display of sign boards
17	Storing, Transportation & handling of Materials	Proper work instructions
18	Machining operations (drilling, shaping, turning, sawing, grinding etc.)	Use of PPEs and Awareness training
19	Bending & rolling	Use PPEs
20	Hand tools operation	Use of PPEs and WI
21	Pneumatic tools operation	use of PPEs and Proper WI
22	Electrical tool operation	use of PPEs SOPs
23	Commissioning	use of PPEs SOPs
24	Working in electrical load centres EHT/HT/LT	use of PPEs SOPs

The personnel protective equipment shall be given to employees based on the work area.

- Industrial Safety Helmet
- Crash Helmets
- Face shield with replacement acrylic vision
- Zero power plain goggles with cut type filters on both ends
- Zero power goggles with cut type filters on both sides and blue color glasses
- Welders equipment for eye and face protection
- Cylindrical type earplug
- Ear muffs
- Canister Gas mask
- Self contained breathing apparatus
- Leather apron
- Aluminized fiber glass fix proximity suit with hood and gloves
- Boiler suit
- Safety belt/line man's safety belt
- Leather hand gloves
- Acid/Alkali proof rubberized hand gloves
- Canvas cum leather hand gloves with leather palm
- Electrically tested electrical resistance hand gloves
- Industrial safety shoes with steel toe
- Electrical safety shoes without steel toe and gum boots

Full fledged hospital facilities shall be made available round the clock for attending any emergency, if any. All working personnel shall be medically examined at least once in every year and at the end of his term of employment.

The problem of occupational health, in the operation and maintenance phase is due to noise and dust, which may lead to ailments related to lung and hearing losses. DCW has a well equipped hospital where, the Occupational Health Survey of the employees is carried out regularly. During occupational health survey following tests are conducted:

1. Lung Function Test;
2. Hearing Loss (audiometer)

The details of the existing Occupational System practiced are given in **Table-8.17**.

#### 8.9.2 Safety Plan

Safety of both men and materials during construction and operation phases is of concern. The preparedness of an industry for the occurrence of possible disasters is known as emergency plan. The disaster in proposed plant is possible due to leakage of fuels, collapse of structures and fire/explosion etc.

Keeping in view the safety requirement during construction, operation and maintenance phases, the plant shall formulate safety policy with the following regulations:

- To allocate sufficient resources to maintain safe and healthy conditions of working environment;
- To take steps to ensure that all known safety factors are taken into account in the design, construction, operation and maintenance of plants, machinery and equipment;
- To ensure that adequate safety instructions are given to all employees;
- To provide wherever necessary protective equipment, safety appliances and clothing and to ensure their proper use;
- To inform employees about materials, equipment or processes used in their work, which are known to be potentially hazardous to health or safety;
- To keep all operations and methods of work under regular review for making necessary changes from the point of view of safety in the light of experience and upto date knowledge;
- To provide appropriate facilities for first aid and prompt treatment of injuries and illness at work;
- To provide appropriate instruction, training, retraining and supervision to employees in health and safety, first aid and to ensure that adequate publicity is given to these matters;
- To ensure proper implementation of fire prevention methods and an appropriate fire fighting service together with training facilities for personnel involved in this service;
- To organize collection, analysis and presentation of data on accident, sickness and incident involving personal injury or injury to health with a view to taking corrective, remedial and preventive action;
- To promote through the established machinery, joint consultation in health and safety matters to ensure effective participation by all employees;
- To publish/notify regulations, instructions and notices in the common language of employees;

- To prepare separate safety rules for each types of occupation/processes involved in a project; and
- To ensure regular safety inspection by a competent person at suitable intervals of all buildings, equipment, work places and operations.

#### 8.9.3 Safety Organization

- **Construction and Erection Phase**

A qualified and experienced safety officer shall be appointed. The responsibilities of the safety officers include identification of the hazardous conditions and unsafe acts of workers and advice on corrective actions, conduct safety audit, organize training programs and provide professional expert advice on various issues related to occupational safety and health. He is also responsible to ensure compliance of Safety Rules/ Statutory Provisions. In addition to employment of safety officer by power plant, every contractor, shall also employ one safety officer to ensure safety of the worker, in accordance with the conditions of contract.

- **Operation and Maintenance Phase**

When the construction is completed the posting of safety officers shall be in accordance with the requirement of Factories Act and their duties and responsibilities shall be as defined there of.


#### 8.9.4 Safety Circle

In order to fully develop the capabilities of the employees in identification of hazardous processes and improving safety and health, safety circles would be constituted in each area of work. The circle would consist of 5-6 employees from that area. The circle normally shall meet for about an hour every week.

#### 8.9.5 Safety Training

Safety training shall be provided by the Safety Officers with the assistance of faculty members called from Corporate Center, Professional Safety Institutions and Universities. In addition to regular employees, limited contractor labors shall also be provided safety training. To create safety awareness safety films shall be shown to workers and leaflets etc. Some precautions and remedial measures proposed to be adopted to prevent fires are:

- Compartmentation of cable galleries, use of proper sealing techniques of cable passages and crevices in all directions would help in localizing and identifying the area of occurrence of fire as well as ensure effective automatic and manual fire fighting operations;
- Spread of fire in horizontal direction would be checked by providing fire stops for cable shafts;
- Reliable and dependable type of fire detection system with proper zoning and interlocks for alarms are effective protection methods for conveyor galleries.
- Housekeeping of high standard helps in eliminating the causes of fire and regular fire watching system strengthens fire prevention and fire fighting; and

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- Proper fire watching by all concerned would be ensured.

#### 8.9.6 Health and Safety Monitoring Plan

All the potential occupational hazardous work places such as fuel storage area, coal handling area shall be monitored regularly. The health of employees working in these areas shall be monitored once in a year for early detection of any ailment.

Though effective measures are taken to combat pollution in ambient conditions, occupational health hazards are not overlooked. Project will provide well organized occupational health services to all its employees by taking responsibility for establishment and maintenance of safe and healthy working environment and assessment of the physical and mental capabilities to turn out specific work loads. The industrial medical centre will have following responsibilities:

1. Surveillance of workers health in relation to work;
2. Surveillance of working environments;
3. Identification and evaluation of environmental factors which may affect the workers health;
4. Assessment of conditions of occupational workers health; and
5. Observance of safety norms and reduce/eliminate exposure to hazardous environs.