राजस्थान राज्य प्रदूषण नियंत्रण मण्डल

RAJASTHAN STATE POLLUTION CONTROL BOARD

F:14(38)Policy/ RPCB/Plg./ 2796-2813 Date: 2-2-09

(1) Group-Incharge(I/II/III/Mine/PAAC/Lab),
Rajasthan State Pollution Control Board, Jaipur.
(2) Regional Officer,
Rajasthan State Pollution Control Board,
Alwar/Bhiwadi/Bikaner/Bhilwara/Jaipur(North)/Jaipur(South)Jodhpur/Kota/Pali/Udaipur.

Sub:- Guidelines for establishment & pollution control with Stone Crusher.

Sir,

With reference to above, it is to inform that the Board has finalized Guidelines for the Stone Crusher for their location & required measures of effective control of air pollution, copy of the same is enclosed.

You are directed to ensure the compliance of the Guidelines while processing the application for Consent to Establish/Operate from crushers. Besides, all the existing crushers of your region be directed to ensure implementation of the measures for control of pollution as specified under item No. I (Standards and Pollution Control Measures) & item No.II (Specific Pollution Control Measures) of the Guidelines within a period of 90 days failure to which their Consent to Operate could be refused.

Encls:- As above.

Yours sincerely,

Member Secretary

Copy to following for information.
1. PS to CP, RPCB, Jaipur.
2. SPA to MS, RPCB, Jaipur.

Environmental Engineer
(Plg.)

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Guidelines

For

Location
&
Prevention & Control of Pollution

In

Stone Crusher Industry

Rajasthan State Pollution Control Board
4, Jhalana Institutional Area, Jaipur
(December-2008)

Stone Crushing Industry

Part I: Background Analysis

- Stone crushing industry is an important industrial sector in the country engaged in producing crushed stone which acts as raw material for various construction activities such as the construction of roads, bridges, buildings, canals, etc.
- The stone crusher is one such industry that exists in the vicinity of almost all major cities/towns throughout the country in all the states because the construction activities go on throughout the country.
- It is particularly true for the Rajasthan which is blessed with the mineral wealth in Aravali Range and caters to the nearby States of Delhi, Uttar Pradesh & Haryana for on going construction activity.
- The transportation of stone over long distances adds on to the cost of the crushed stone products, the crushers are necessarily located nearer to the demand centres such as cities, bridges, canals, etc. or at the source itself.
- Stone crusher also needs electricity supply and a large number of manpower for its operation. It also needs access roads for the movement of mined stone as well as crushed stone products.
- It is for these reasons that most stone crusher units are located along the periphery of cities or in the vicinity of major construction projects. In most cases, the stone crushers come up in clusters of number of units.
- Stone Crushers are also located nearer to the source of raw materials such as stone mines, river beds, etc.
- Their number is expected to grow further keeping in view the future plans for development of infrastructure of roads, canals, and buildings that are required for the overall development of the country.
- It is providing direct employment to a large number of people engaged in various activities such as mining, crushing, transportation of mined stones and crushed products etc.
- Most of these personnel are from rural and economically backward areas where employment opportunities are limited and therefore it carries greater significance in terms of social importance in rural areas. It is a source of earning for the uneducated poor and unskilled rural people.
- The stone crushing industry sector is, therefore, an economically important sector.

Typical Setup

- Except for large stone crushing units, most of the stone crushing units either buy stone from nearby mines or are situated in close proximity of the small mines and operate for about 12 hours a day.
- These smaller units mostly use a combination of local explosives, mechanical and manual breaking of large stones.
- The mined stones are transported to the crusher sites by road through tractor trolleys or pay-loaders.
- The pay-loaders unload the mined stones into storage hoppers located at elevated levels of the crusher sites.
- These stones are crushed in a Primary Crusher and then sent to a Vibrating Screen.
- The oversized stones from the Screen are sent for further size reduction in Secondary and Tertiary Crushers.

- From the Secondary and/or Tertiary Crushers, the crushed stones are again sent for screening.
- In the Screen, products of various sizes get separated which are stored in heaps.
- The movement of stones from the crusher to the screen and then to the product piles is done through conveyor belts.
- The products are generally stored in open areas.
- The crushing operation is similar in almost all the units except the variation in the type of Crushers, their capacity and number.
- Most units predominantly use Jaw Crushers as Primary, Secondary or Tertiary Crushers.

Environmental Problem

- The conversion of naturally occurring rock into crushed and broken stone products involves a series of distinct yet interdependent physical operations.
- These include quarrying or mining operations (such as drilling, blasting, loading, and hauling) and plant process operations (such as crushing, screening, conveying, other material handling, and transfer operations).
- All are potentially significant sources of particulate emissions.
- Emission sources may be categorized as either process sources (primary sources) such as Screen, Crusher etc. or fugitive dust sources (secondary sources), such as movement of vehicle, material transfer.
- Stone Crushers create a substantial amount of environmental pollution by way of fugitive emissions from various sources, which adversely affect the ambient air quality and thereby affect the human health.
- The Board is getting a number of complaints against the Stone Crushers from nearby affected residents.

Various Sources of Emissions

- *Emissions during unloading of mined stones at Crusher site*: At the time of unloading of mined stones into the storage hopper, large amount of fine dust is emitted, which appears like a dust cloud. These emissions are intermittent and last for about a couple of minutes during every unloading cycle. Generally there could be two to six unloading per hour. This emission occurs at an elevated level and the dust is carried by wind currents to a long distance.
- *Emissions during crushing operations*: During crushing operation, size reduction takes place. Bigger stones are broken into smaller sizes and in the process some stone pieces get excessively crushed which, results into formation of stone dust. The finer dust gets airborne and escapes as fugitive emissions. The emissions occur at the inlet chute, from the Crusher body, and from the discharge chutes. These emissions occur at all types of Crushers such as Primary, Secondary and Tertiary Crushers though in varying degrees.
- *Emissions during material movement and transfer*: The crushed stone is moved from one place to the other such as Crusher to Vibratory Screen, Screen to Secondary Crusher, Secondary Crusher to Screen and Screen to Storage piles etc. by Conveyor Belts. At times, the material is transferred from one belt to another or from belt to hoppers etc. During the movement and free fall during transfer of crushed stones, fine dust particles get airborne as fugitive dust emissions.
- *Emissions during Vibratory Screening operation*: During vibratory screening of crushed stones, due to vigorous movement of the stones, the fine dust particles get loose and

airborne as fugitive emissions. These emissions escape from the openings around the screen as well as at the bottom of discharge locations.

- *Emissions during transportation*: During transportation of the mined stones as well as the crushed stone products, due to vehicular movement on non-metalled roads, fine dust settled on the ground gets airborne.
- *Secondary emissions from Stockpiles*: Generally, the crushed stone is stored in open in big heaps/piles. At times, when the wind speed is higher, the fine dust adhered to the stones is blown away off the stockpiles and gets airborne.
- *Emissions during loading of crushed stone products*: The crushed stone products from the stockpiles are loaded into trucks or trolleys for dispatch. The loading is done either manually or with the help of conveyor belt. During loading, due to the movement of stones, the fine dust adhered to stone gets loosened up and gets airborne.

Impact of Dust Emission

- ✓ Some percentage of the fugitive dust emissions may get settled down within the unit's premises itself,
- ✓ A substantial percentage of airborne emissions are carried away to the surroundings by wind currents.
- ✓ Dust settled within the plant gets airborne again due to vehicular movement or by wind and acts as a secondary emission source.
- ✓ Dust settled over the equipment may cause rapid wear and tear of the rotating parts and may lead to frequent breakdowns and higher maintenance costs.
- ✓ Dust emissions affect the climate; damage the material, human health, and vegetation.
- ✓ With the deposition of dust on materials, especially buildings, although little damage is caused to the materials, the effect is expensive to remove deposited particulates
- ✓ Deposition of dust damages vegetation by preventing them from photosynthesis.
- ✓ The physical properties of atmospheric particulates affect human health either by allowing penetration of the lung and causing irritation to the internal membrane, or by transporting absorbed toxic gases and vapours deeper into the lung
- ✓ The work place environment at stone crusher sites contain millions of suspended mineral particles of respirable size that get deposited in lungs following inhalation.

Conventional Environmental Management

- The Ministry of Environment & Forests, Government of India has notified environmental legislation for Stone Crushers for control of emissions but the existing environmental management scenario is far from satisfactory.
- This could be primarily due to factors such as :
    - Lack of availability of low cost and appropriate dust control systems,
    - Lack of pressure from the regulatory authorities, lack of willingness and awareness in unit owners, and
    - Lack of awareness in the affected general public living in surrounding areas.
- However, some units have taken steps to improve environmental scenario by way of providing measures for containments, water sprays, developing green belts, etc.

Dust Containment Measures

- Some units provide partial enclosures for the vibratory screen area. These enclosures are generally of corrugated GI sheets or plastic sheets or used gunny bag clothes. Window/door type openings are provided for accommodating conveyor belts and for maintenance purposes. Some units have enclosures only for housing the screen while some units have enclosures covering even the bottom discharge ends.

- Some units provide partial enclosures covering conveyor belts from the top and sides, which also act as protection from sunrays and rain.

- Some units have installed storage hoppers for storage of products and direct loading in trucks. This reduces secondary dust emissions which occur from open area stockpiles.

Inadequacy of Dust Containment Measures

In general, most of the units have provided partial enclosures, leaving open various openings.

The dust escapes through these openings.

In the absence of water sprays prior to screening, only the enclosure is not expected to control dust emissions adequately.

Dust Suppression (by Spraying Water)

- Many Stone Crushers have one or other type of water spray arrangements, but due to reasons like choking of spray holes, inadequate water pressure, lack of water or too much consumption of water etc, majority of the stone crushers are unable to operate the water sprays. Water is generally drawn from bore wells dug within their premises.
- Most of the units have dug bore wells in their premises. Water is pumped out and stored in a water tank placed at the highest elevation (that of unloading mined stones). Water is taken by gravity through a network of GI pipes to the spray locations. Spray of water is achieved either by making holes in the pipes or by installing showers (like domestic bathroom showers). There is hardly any flow regulating valves for regulating the sprays.
- Some units have installed water sprinklers around the boundary of the unit (similar to sprinklers used for gardening or agricultural fields). A pump supplies water to the sprinklers. The sprinklers mainly serve the purpose of irrigating the green belt plants and wetting of land in the premises.

Inadequacy of Prevalent Water Spray Systems

- Most of the water tanks do not have covered surface and as a result fine dust keeps entering the water tank. There is no filter arrangement to clean the water of dust. Over a period of time, this dust gets into the pipes and blocks/chokes the holes thereby blocking the spray formation. As a result excessive water is put on the stones. This increases moisture content in the stones, which adversely affects product quality.
- The gravity head provided by the elevated water tank is not sufficient enough to enable spray formation, as the pressure head is not sufficient. Also, due to the absence of appropriate spray nozzles, the spray formation is not fine but coarse. For suppressing airborne dust, very fine water droplets are required which can suppress the fine dust.

- The manual spraying of water on stones, though suppresses dust during unloading, excessive water gets added to the stones without desirable effect.
- The water sprinklers are hardly effective for suppressing dust because by the time the dust emissions reach the boundary of the unit the dust gets sprayed in wider area, beyond the capture limit of any sprinkler sprays. It only wets the ground area and excessive operation of sprinklers may even create muddy ground conditions. Also, the water sprinklers consume large quantity of water.

Wind Breaking Measures

- *Green Belt:* Most of the permanently located units have planted trees along the periphery of the premises which forms a green belt. However, the width of the green belt, leafiness and density of trees, etc. varies widely from place to place. In most places, trees are planted and then left solely on mercy of the nature. Some units do provide proper fertilizers and water etc.

- *Wind Breaking Walls:* Some units have wind breaking walls erected in a V-shape alongside the stockpiles. Some units have wind breaking walls made of corrugated GI sheets along the boundary of the premises in the predominant wind direction. Most units do not have adequate wind breaking wall arrangement.

Cleaner production Possibilities

- Keeping in view the
    - Economic and social importance of this unorganized sector
    - Gravity of environmental problems associated
- It is urgently required to take large-scale initiatives to achieve cleaner production.

Typically, to achieve cleaner production following things need to be done.

- Modification of existing layout and material flow to reduce dust generation.
- Improvements in crushers and screens to increase their efficiency.
- Provision of adequate dust containment enclosures.
- Provision of appropriate dust suppression system.
- Provision of metalled roads within the unit premises.
- Development of green belt around the periphery of the unit.

❖ Therefore, the Rajasthan State Pollution Control Board has taken the initiative and devised guidelines for establishment of Stone Crushers so as to mitigate the adverse impact of pollution on the human being & ecology of the area.

Part II: Environmental Friendly Measures for Production

The Board has finalized following measures which are required to be taken by Stone Crushers while establishing & operating the process.

I. *Standards and Pollution Control Measures:*

Stone Crushers shall have to comply with the standards & norms as specified under the provisions of the Environment (Protection) Rules 1986, which are as under:

(A) Quantitative standard for the SPM:-

S. No.	Parameter	Prescribed standard
1.	Suspended Particulate Matter(SPM)	600 micrograms per cubic meter, measured between 3 meter and 10 meter from any process equipment of the stone crusher i.e. centre of the jaw crusher, secondary crusher, screen, conveyors.

(B) Implementation of the following qualitative pollution control measures:

(a) Dust containment cum suppression system of the equipment.
(b) Construction of wind breaking walls.
(c) Construction of the metalled roads within the premises.
(d) Regular cleaning and wetting of the ground within the premises.
(e) Growing of a green belt along the periphery.

(C) Standards for ambient noise level: Stone Crushers shall have to comply with the ambient noise level standards as specified under the provisions of the Environment (Protection) Rules 1986, which are as under-

a. Day time (6.0 AM to 9.0 PM) - 75 dB A (Leq)
b. Night time (9.0 PM to 6.0 AM) - 70 dB A (Leq)

II. Specific Pollution Control Measures:

All the Stone crushers are also required to undertake following specific measures for control of pollution.

A. Technical Conditions:

1. The feed hopper of the Primary Crushers, Secondary Crushers, Vibrating Screens to be housed in a suitable structure of rigid material say steel / tin with suitable roofing.
2. Dust suppression system with water spray and sprinkling system.
3. Water storage facility (minimum 5000 liters) to be provided at the crusher site.
4. The roads including ramps inside the crusher premises to be tarred or cemented or hard topped.
5. The premises of the crusher must have boundary wall of adequate height i.e. height should not be less than 5 feet.
6. For new crushers atleast two rows of tall trees of suitable species to be planted to develop a green belt within and along the boundary of the premises, so that mininmum 33% of the area is covered by plantation. The existing crushers shall also implement development of plantation in two rows near their boundaries as per site conditions. The plantation shall be as per guideline issued by the Board vide its circular dated 15.07.04 (Annexure-B)

7. Suitable storage silos of adequate capacity on ground to be constructed for collection and storage of the grit of different sizes/ stone dust so as to prevent fugitive emissions due to material fall from conveyer belts and during material handling, or alternatively may install Telescopic Mechanical Chute arrangement with all the conveyers carrying the finished products supported with proper wind breaking wall of adequate height & of rigid material (atleast half of the height of the top of the conveyor from the ground).

B. General Conditions

1. A Sign Board showing the name, address and capacity of the crusher should be displayed at the entrance of the site.
2. Crushers shall have its own valid source for raw material or have exclusive contract with the owner of valid source of the raw material.
3. In case of ground water extraction crushers have to obtain permission for same from the competent authority.

III. Location

A Stone Crusher can be established on a land owned by the promoter or taken on long term lease (atleast 20 years or more) with following suitability criteria:

i. No stone crusher shall be established/ operated within a radius of 1.5 Kms. (aerial distance) from Abadi area of recorded revenue village as defined under the provisions of Land Revenue Act.

ii. Aerial distance of the nearest point of boundary of proposed crusher from the State/ National Highway must be atleast 500 metres and 100 metres from the other roads. (Distance is to be measured from the centre of the road).

iii. Aerial distance of the nearest point of boundary of proposed crusher site must be atleast 2.0 Kms. from National Park & Sanctuaries and 200 metres from Reserve Forest/ Protected Forest/ Unclassified Forest. The distance to be verified by the concerned Assistant Conservator of Forest, Government of Rajasthan.

iv. Aerial distance of the nearest point of boundary of the proposed crusher must be atleast 500 metres from any Prominent Public Sensitive Water Body/ Prominent Places of Worship/ School/ Hospital/ Notified Archaeological Monuments.

v. The site of stone crushers located in any notified/protected area under any specific Notification or regulation such as Aravalli Notification (07.5.1992) for the Alwar District shall also comply with the provisions of the concerning Notification /regulation.

vi. The distance of the stone crusher from the abadi area of recorded revenue village has to be certified/verified by the concerned revenue official not below the rank of Tehsildar in the prescribed format and to be submitted in original with the application for Consent to Establish. The format of certificate is given in Annexure-A.

vii. In case if there is scattered habitation or Dhani outside the Abadi area of recorded revenue village within the radius of 1.5 kms. of the boundary of the crusher, impact of proposed crusher on the health of habitants shall be taken into account while considering consent to establish or operate to the unit.

viii. The Regional Officer of the State Board shall satisfy himself about the correctness of the distances.

ix. The Chairman, RPCB, however, may relax in an appropriate case above location norms or make them more stringent in public interest, after recording the reasons thereof in writing.

IV. Land Area

* Minimum land requirement for a stone crusher shall be as under:

Description	Minimum land
600 Tonnes per Day (TPD)or more /Jaw Size ≥ 15"/30" (Red Category Crusher),	1.0 hectare
Less than 600 Tonnes per Day (TPD)/Jaw Size < 15"/30" (Orange Category Crusher),	0.5 hectare

* The land area of the crusher is to be converted for industrial use by the competent authority or it is to be located in the valid mining lease area of the applicants own site /leased site.

* The distance of boundary shall be atleast 30 metres in the case of crushers having capacity < 600 Tonnes per day (TPD) and 50 metres in the case of crushers having capacity ≥ 600 Tonnes per Day (TPD) from the centre of the crusher unit to the nearest point of boundary of the area.

Illustrative Photograph of Model Stone Crusher with Storage Silos

View of the cover on the vibrating Screen

View of the hoppers for the material & dust collection

A bird’s eye view of a model Crusher

Cemented Flooring

Plantation

Annexure: B

No F. 14 (40) RPCB/Plg/Policy/5804 to 5825 Date: 15/07/2004

CIRCULAR

Entry no. 37 of schedule-I of Environment (Protection) Rules 1986 has stipulated that in respect of stone crushing units, the concerned unit would be required to grow a green belt along the periphery. The Board has also incorporated a condition of 33% of the units's area as being required to be covered by plantation, while granting consent to these units to operate under the Air (Prevention & Control of Pollution) Act' 1981. However the numbers of trees, species etc. and the manner of their plantation have not been specified by either the Board or the Environment (Protection) Rules,1986. In view of the difficulty being experienced in implementing this requirement, following clarification is hereby issued:

1. Trees shall necessarily be planted along the periphery of the area in rows. The unit may also take up additional plantation in other available open areas such as along the road, on unused land etc.

2. The computation of the area under plantation shall be done on the basis of the following norms

    i) Tree species like Neem, Pipal, Jamun, Gulmohar etc. shall be deemed to cover 25 M^2 area on maturity.
    ii) Shrubs like Guava, Pomegranate, Jungle Jalebi etc. shall be deemed to cover an area of 9 M^2 on maturity.

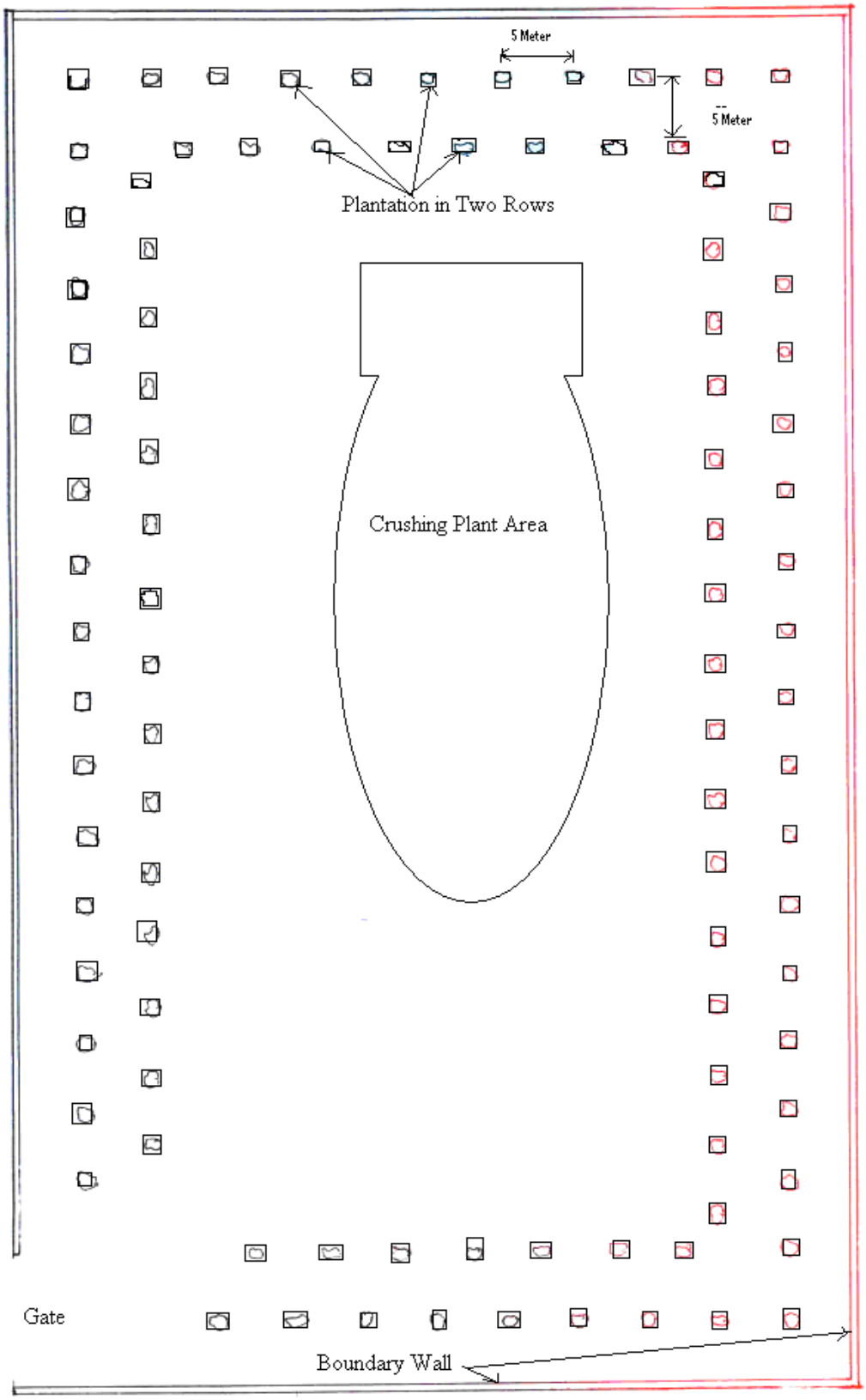
The area likely to be covered by the plants mentioned above shall be computed accordingly. The herbs which require continuous watering for their maintenance shall not be counted to meet the norms though the can be planted by the management as per their need.

Illustration: In case of 10 no. of trees like Sehtoot, Siris, Shisham, Babool; 5 no. of Shrubs like Eucalyptus, Ashok, Ber Kair and 20 no of Herbs like Rose, Mehandi, Duranta, Merigold are planted the total area under plantation shall be computed as follows:

Area covered by trees	**= 10 x 25 = 250 m^2**
Area covered by shrubs	**= 05 x 09 = 045 m^2**
Area covered by herbs	**= 20 x 00 = 000 m^2**
Total Area	**295 m^2**

-Sd-
Member Secretary

Typical Layout for Two Row Plantation



प्रमाण पत्र

स्टोन क्रेशर इकाइयों की आबादी क्षेत्र से दूरी को सत्यापित करने हेतु वांछित प्रमाण पत्र

1. यह सत्यापित किया जाता है कि मैसर्स.....स्टोन क्रेशर ग्राम....., तहसील..... .....,जिला..... जो कि खसरा नंबर..... में प्रस्तावित है के स्थल से 1.5 किलोमीटर की परिधि में आने वाले राजस्व ग्राम/आवासीय क्षेत्र के नाम, उनकी आबादी एवं उद्योग स्थल से सीधी दूरी का विवरण निम्न प्रकार है:–

क. स.	राजस्व ग्राम/आवासीय क्षेत्र का नाम	आबादी	राजस्व ग्राम/आबादी क्षेत्र से स्टोन क्रेशर स्थल की सीधी दूरी

2. स्टोन क्रेशर की प्रस्तावित इकाई के स्थल से राष्ट्रीय/राज्य उच्च मार्ग के केन्द्र बिन्दु से दूरी.....मीटर/किलोमीटर है।
3. स्टोन क्रेशर की प्रस्तावित इकाई के स्थल से अन्य मार्ग (मार्ग का प्रकार) के केन्द्र बिन्दु से दूरी .....मीटर/किलोमीटर है।
4. स्टोन क्रेशर की प्रस्तावित इकाई से 500 मीटर की परिधि में व्यापक जनहित के संस्थान (चिकित्सालय/स्कूल/धार्मिक स्थल/जल स्त्रोत) के नाम व दूरी।
5. स्टोन क्रेशर की प्रस्तावित इकाई से 1500 मीटर की परिधि में स्थित नोटिफाईड औद्यौगिक क्षेत्र का नाम व दूरी।
6. स्टोन क्रेशर की प्रस्तावित इकाई से 500 मीटर की परिधि में स्थित अन्य क्रेशर इकाई का नाम व दूरी।
7. स्टोन क्रेशर की प्रस्तावित इकाई से 200 मीटर की परिधि में स्थित वन क्षेत्र का नाम व दूरी। '
8. प्रस्तावित इकाई की बाउन्डरी से 2000 मीटर की परिधि में स्थित वन अभ्यारण/राष्ट्रीय पार्क का नाम व दूरी।

यह प्रमाण पत्र आज दिनांक.....को मेरे हस्ताक्षर एवं सील से जारी किया गया।

तहसीलदार/उपखण्ड अधिकारी
हस्ताक्षर मय सील

' यदि प्रस्तावित इकाई से 200 मीटर की परिधि में वन क्षेत्र स्थित है तो सहायक वन संरक्षक प्रस्तावित इकाई हेतु अनापत्ति प्रमाण पत्र जारी करने हेतु अधिकृत होंगे।

नोटः

1. उपरोक्त प्रमाण पत्र नवीनतम जनगणना/कार्यालय अभिलेखों के आधार पर जारी किया जावे।
2. प्रमाण पत्र सीधी दूरी अंकित कर जारी किया जाये, जिसमें लगभग शब्द का प्रयोग न किया जावे।
3. यह प्रमाण पत्र तहसीलदार/उपखण्ड अधिकारी से नीचे के अधिकारी द्वारा जारी नहीं किया जावे।
4. यह प्रमाण पत्र मूल रूप में ही संबधित क्षेत्रीय अधिकारी, राजस्थान राज्य प्रदूषण नियंत्रण मण्डल को प्रेषित/प्रस्तुत किया जावे।
5. सीधी दूरी राजस्व ग्राम/आबादी क्षेत्र की सीमा से नापी जावे।
6. उपरोक्त प्रारूप मे ही प्रमाण पत्र जारी किया जावे।