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மத்திய சுற்றாடல் அதிகாரசபை
Central Environmental Authority

Contingency Response Action Plan for Deterioration of Air Quality in Sri Lanka

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ABBREVIATIONS

AAQMS : Ambient Air Quality Monitoring Unit
ARM&NOU : Air Resources & National Ozone Unit
AQI : Air Quality Index
AQI-SL : Air Quality Index for Sri Lanka
CRAP : Contingency Response Action Plan
CEA : Central Environmental Authority
DMC : Disaster Management Centre
DG : Director General
DMT : Department of Motor Traffic
MOE : Ministry of Environment
NBRO : National Building Research Organization
PM : Particulate Matter
SL : Sri Lanka
UDA : Urban Development Authority
USEPA : United States Environmental Pollution Agency
WHO : World Health Organization

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1. PURPOSE

This Contingency Response Action Plan (CRAP) provides the basis for taking action to prevent ambient air pollutants concentrations from reaching levels which could endanger public health, or to abate such concentrations should they occur. Its purpose is to establish new criteria for determination of the existence of an emergency episode whilst meeting the requirements of National Environmental Action Plan 2022-2030 (NEAP). Thus, it prevents the excessive buildup of air pollutants during air pollution episodes.

This emergency plan mainly focuses on particulate matter (PM_{10} & $PM_{2.5}$) which contributes to the degradation of air quality as the prime criteria air pollutant during past decades in Sri Lanka based on regulatory and scientific data. It identifies criteria for the three trigger levels for emergency episodes and components for public announcements whenever an episode has been identified. Additionally, it specifies emission control strategies to be taken with each successive level of PM emergency episodes. The highest concentration ever recorded in previous years during air pollution emergency episodes in Sri Lanka was 142 µg/m^3 at 1-hour average for $PM_{2.5}$ at Battaramulla AAQMS on 11.12.2020 between 7:00-8:00 pm, while for PM_{10} it was 218 µg/m^3 at 1-hour average in 06.12.2022 between 7:00-8:00 pm at Battaramulla AAQMS.

2. HOW CRAP IS OPERATIONED?

2.1 Stakeholders of CRAP:

- Ministry of Administration, Home Affairs & Provincial Councils & Local Government
- Ministry of Environment
- Ministry of Education
- Ministry of Health
- Ministry of Industries
- Ministry of Public Security
- Environmental Protection Division of Police
- University of Moratuwa
- Central Environmental Authority
- National Building Research Organization
- Department of Meteorology
- Department of Motor Traffic
- Disaster Management Centre
- Vehicular Emission Testing Programme
- State media of government

2.2 Operational Procedure

The steering committee accounts for the decision taking (whether to declare of an air pollution emergency or not, to the public) based on the air pollution forecasting and daily monitoring. Then the head of the steering committee (DG/CEA) declares the air pollution emergency to the public through press conference. Parallelly the responses to be taken by the public/government shall be passed over to implementation committee which consisted of relevant stakeholders who can take/initiate ground level response actions.

In the same manner steering committee is authorized to declare the termination of the existed emergency episode. The steering committee shall frequently evaluate the actions and implementations of the CRAP.

3. LEGAL AUTHORITY

National Environmental Act 1980 (No. 47 of 1980) empowers the Central Environmental Authority (CEA) as the prime legislation in SL to control the emission of air pollutants causing or contributing to the injury of the public or their welfare. In addition to CEA, other relevant institutes can work with the local governing body of a city or province, to proclaim a local emergency when there are conditions of disaster or of extreme peril to the safety of persons and property within the territorial limits of the county, caused by such conditions as air pollution. When a local emergency is declared, the relevant authorities shall implement this emergency plan and take actions to mitigate or prepare local community for the emergency threat.

4. AIR QUALITY INDEX FOR SRI LANKA (AQI-SL)

CRAP has a direct relationship with AQI, and here, the AQI means AQI-SL (Air Quality Index for Sri Lanka). AQI is a tool used for reporting daily air quality. It tells you how clean or polluted your air is, and what associated health effects might be a concern for you. The AQI focuses on health effects you may experience within a few hours or days after breathing polluted air. AQI information is obtained by averaging readings from an air quality monitoring equipment, which can increase due to vehicle traffic, industrial emissions, or anything that can increase air pollution. United Nation's Environmental Protection Agency (USEPA) calculates the AQI for five major air pollutants regulated by the Clean Air Act of its own country: ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. In the same manner, for each of these pollutants, Sri Lanka has also established a national AQI unique to SL adhering to the interim target level - II of WHO guidelines, though not stringent as other developed countries. However current national AQI has been formulated in SL by CEA with the support of expert scientific group corresponding with current national ambient air quality standards. It is previously known that the adopting other country's AQI systems may create a confusion over public. It is also apparent that different countries have their own air quality indices, corresponding to different national air quality standards.

The AQI value alone is sufficient for the public to make informed decisions. In our CRAP, the alert is declared from the AQI color of red (over 151 of the index) and extends to Maroon. Therefore, it is important to prepare the CRAP using AQI color codes which is specific to air quality notification to the public (Table 1).

AQI Color	Level of Concern	Index
Green	Good	0 - 50
Yellow	Moderate	51 -100
Orange	Slightly Unhealthy	101 - 150
Red	Unhealthy	151 - 200
Purple	Very Unhealthy	201 - 300
Maroon	Hazardous	301 - 500

Table 1: AQI-SL (National Air Quality Index, Sri Lanka)

5. EMERGENCY EPISODE CRITERIA

This plan includes, at a minimum, provisions for taking action necessary to prevent ambient PM concentrations at any location in any region/city from reaching higher trigger levels which are also provided in Figure 1, 2 & 3 and such location is known as "declared area" hereafter.

As set forth in this plan, three trigger levels (stages) are established for $PM_{2.5}$ and PM_{10} pollution episodes: Alert level (150 µg/m^3), Warning level (200 µg/m^3), and Emergency level (300 µg/m^3). Corresponding actions for each specified trigger level would be identified and will be implemented when the ambient PM hourly concentration measurements reach the specified trigger levels. These elements and actions should provide for rapid short-term emission reductions at each trigger level, to avoid high $PM_{2.5}$ & PM_{10} concentrations from reaching significant harm levels during an episode.

Figure 1,2,3 summarizes three emergency episode trigger levels proposed by the CEA for the 24-hour PM concentration. Following section identifies the corresponding actions for each trigger level, when the corresponding 24-hour PM concentration is reached.

5.1 Alert (Stage I) Episode

An alert status will be declared when following pollutant concentrations is exceeded at any monitoring site, as indicated in **Figure 1**:

Figure 1. Alert Status

Pollutant	Threshold conc.	Threshold AQI	Color code	Averaging Time
PM 2.5	75 µg/m^3	150	Red	24-hour average
PM 10	150 µg/m^3	150		

According to the Air Quality Index, warning will be given when AQI value increase over 150, which indicates Code Red.

5.2 Warning (Stage II) Episode

A warning will be declared when air quality is continuing to degrade and additional control actions are necessary and when following levels is exceeded at any monitoring site, as indicated in **Figure 2**:

Figure 2: Warning Status

Pollutant	Threshold conc.	Threshold AQI	Color Code	Averaging Time
PM 2.5	150 µg/m^3	200	Purple	24-hour average
PM 10	275 µg/m^3	200		

According to the Air Quality Index, warning will be given when AQI value increase over 200, which indicates Code Purple.

5.3 Emergency (Stage III) Episode

The emergency level indicates that air quality is continuing to degrade toward a level of significant harm to the health of persons and that the most stringent control actions are necessary. An emergency will be declared when the following levels is exceeded at any monitoring site, as indicated in **Figure 3**:

Figure 3. Emergency Status

Pollutant	Threshold Conc.	Threshold AQI	Color Code	Averaging Time
PM 2.5	250 µg/m^3	300	Maroon	24–hour average
PM 10	450 µg/m^3	300		

According to the Air Quality Index, warning will be given when AQI value increase over 300, which indicates Code Maroon.

6. PROPOSED ACTIONS FOR CONTINGENCY RESPONSE ACTION PLAN

Step 1: Air Pollution Forecasting

Currently no air quality forecasting system prevailing in Sri Lanka. This area should be compulsory to develop if this emergency response plan to be executed successfully. Use of Forecasting modelling will able to predict the next day ambient air quality in any area thus enforcing the plans to curtail the emission reduction in case of PM exceeds the above trigger levels.

This facility can be employed by the Department of Meteorology but they do not have the capacity so far to harbor such modelling. These predictions will be also strengthened by continuous set of air quality data followed by the reinforcement of national air quality monitoring network.

Step 2: Declaration Decision

Establishment of steering committee to take the decision of emergency episode declaration shall be chaired by Director General/ CEA in association with

- ARM&NOU/Ministry of Environment (MOE)
- Ministry of Health (Environmental and Occupational Health Unit)
- Disaster Management Centre (DMC)
- National Building Research Organization (NBRO)
- University of Moratuwa
- Department of Meteorology
- Environmental Protection Division of Police
- State Media of Government

Note: It is necessary to identify the data source/s and verifying the reliability of the data source/s after carefully evaluated by the steering committee prior to the decision taking.

Meeting frequency:

Steering committee will gather when and where necessary in the onset of incident whereas in the absence of incident, it shall gather once in three months.

Step 3: *Implementation of the CRAP*

The decision taken by the steering committee for declaration of an emergency should be executed by the implementation committee including

- CEA
- SL Police
- DMC
- Ministry of Public Administration, Home Affairs & Provincial Councils & Local Government
- Ministry of Health (Environmental and Occupational Health Unit)

Requirement: Whenever the particulate matter 24-hour average, measured at any permanent location in Sri Lanka, reaches or is predicted to reach any of the episode trigger levels (stages) as shown in Figure 1, 2 & 3, DG/CEA shall declare that an alert/warning/emergency episode is in effect. In addition, CEA can request assistance from responsible institutions, to implement measures as described in this Plan.

Step 4: *Notification/Declaration*

The emergency episode (alert/warning/emergency) shall be declared by DG/ CEA through press conference

Step 5: *Termination*

Steering committee has the authority to declare the termination of the emergency episode after carefully evaluating the decision followed by the declaration made by DG/CEA. Termination notification is also delivered to the public through a press conference.

Requirement: Once declared, any status reached by application of these criteria will remain in effect until the criteria for that level are no longer met. At such time, the next lower/higher status will be assumed.

Step 6: *Review of CRAP*

The steering committee states shall frequently review the actions and implementations of the CRAP especially when the air quality falls or is likely to fall in the 'Emergency' status.

Step 7: The steering committee may decide upon additional measures and exceptions to the schedule of the CRAP, under different air pollution trigger levels as per the prevalent AQI and forecast.

7. CONTROLLED ACTIONS FOR LOCAL EMISSION REDUCTION

CEA is responsible to restrain any source from causing or contributing to emissions that present an imminent and substantial endangerment to public health, welfare, or the environment or to take other action as may be necessary.

7.1 Alert (Stage I) Episode

Controlled actions

Sector	Controlled actions	Responsible/Implementing Agency/Authority
General	Information dissemination including through social media, mobile Apps should be used to inform people about the pollution levels, enable them to report polluting activities/sources to the concerned authorities and actions that will be taken by Government based on the level of Pollution	DMC/ MOH
	There shall be no open burning by any persons of tree waste, vegetation, refuse, or debris in any form.	Police
	For sensitive groups – Avoid all outdoors physical activity. Encourage indoors activities or reschedule to a time when air quality is better.	
	Everyone else – Avoid prolonged or heavy exertion. Consider moving activities indoors	
	Encourage work from home	
	Minimize air emission form equipment Eg: diesel generator	
Construction	Encourage the proper implementation guidelines on dust mitigation measures at construction and demolition sites	UDA/ Local Authority
Transport	Carry out periodic mechanized sweeping and/or water sprinkling on roads	Local Authority
	Deploy traffic police for smooth traffic flow at all identified corridors with heavy traffic and congestion prone intersections.	DIG of Police/ Local Authority

Industrial	Any industry responsible for the operation of a source of air contaminants listed below shall take all required control actions for this alert level • Coal power plants • Primary metal extraction industry • Petroleum refining operations • Cement manufacturing / repacking Industries	CEA BOI Electricity Board Petroleum Corporation

7.2 Warning (Stage II) Episode

Controlled actions

Sector	**Controlled actions**	**Responsible/Implementing Agency/Authority**
General	Information dissemination through social media, mobile Apps should be used to inform people about the pollution levels, enable them to report polluting activities / sources to the concerned authorities and actions that will be taken by Government based on the level of Pollution	DMC/ MOH
	There shall be no open burning by any persons of tree waste, vegetation, refuse, or debris in any form.	Police
	For sensitive groups – Avoid all physical activity outdoors. Move activities indoors or reschedule to a time when air quality is better.	
	Everyone else – Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling to a time when air quality is better.	
	Work from home	
	Prohibit the diesel generator sets as regular source of power supply	
	People to use public transport and minimize use of personal vehicles.	
	Stops the use of incense sticks, mosquito repellent coil in indoor	

	Ensured the reduction of dust around the houses and offices through sweeping and/or water sprinkling	
Construction	Prohibit the dust generation activities at construction and demolition site and closely monitor and conformed the actual situation through vigilant supervision	UDA/ Local Authority/ Environmental Police
Transport	Carry out periodic mechanized sweeping and/or water sprinkling on roads	UDA/ Local Authority
	Deploy traffic police for smooth traffic flow at all identified corridors with heavy traffic and congestion prone intersections.	Police
	Persons operating motor vehicles must reduce operations by the use or car pools and increased use of public transportation and elimination of unnecessary operation.	DMT
Industrial	Any industry responsible for the operation of a source of air contaminants listed below shall take all required control actions for this alert level; • Coal power plants • Primary metal extraction industry • Petroleum refining operations • Cement manufacturing/repacking industries • Chemical Industries • Grain industry	CEA BOI Electricity Board Petroleum Corporation

7.3 Emergency (Stage III) Episode

Controlled actions

Sector	**Controlled actions**	**Responsible/Implementing Agency/Authority**
General	Information dissemination through social media, mobile Apps should be used to inform people about the pollution levels, enable them to report polluting activities / sources to the concerned authorities and actions that will be taken by Government based on the level of Pollution	DMC/ MOH

	There shall be no open burning by any persons of tree waste, vegetation, refuse, or debris in any form.	Police
	Prohibit all outdoor physical activity. Stickily involve into indoor activities or reschedule to a time when air quality is better.	
	Encourage to use electric burners, and gas burners instead of wooden hearth for cooking at indoors	
	Banned the use of diesel generator as regular source of power supply and strictly monitor and confirmed	
	Encourage people to use public transport and minimize use of personal vehicles advice to limit the transport	
	Prohibits the use of incense sticks, mosquito repellent coil in indoor	
	Governments to decide on allowing public, private offices to work on 50% strength and the rest to work from home. Government may take a decision on permitting work from home for central government offices.	
	All places described below shall immediately cease operations Establishments rendering amusement parks & theaters. Elementary and secondary schools, universities professional schools, vocational schools, and public and private libraries.	All Parties Relevant
Construction	Prohibit the any construction activities which generate the dust at construction & demolishing sites and strictly enforce the prohibition.	UDA/ Local Authority
Transport	Ensure water sprinkling along with use of dust suppressants on roads to arrest road dust especially at hotspots, heavy traffic corridors, vulnerable areas (before peak hours)	UDA/ Local Authority
	Prohibit / Limiting the entrance of vehicles into city area or affected areas except in emergencies with the approval of local police	Police

	Encourage to use of public transportation and elimination of unnecessary operation of public transport	DMT
Industrial	All air polluting industries which generate the air emission including the industries listed below shall take all required control measure to reduce the air emission and vigilant monitoring and confirmation should be implemented • Coal power plants • Primary metal extraction industry • Petroleum refining operations • Cement manufacturing/repacking industries • Chemical Industries • Grain industry	CEA BOI Electricity Board Petroleum Corporation

Prepared by:
Air Resources Management & Monitoring Unit
Central Environmental Authority, Sri Lanka

With the collaboration of

- Ministry of Administration, Home Affairs & Provincial Councils & Local Government
- Ministry of Environment
- Ministry of Education
- Ministry of Health
- Ministry of Industries
- Ministry of Public Security
- Environmental Protection Division of Police
- University of Moratuwa
- National Building Research Organization
- Department of Meteorology
- Department of Motor Traffic
- Disaster Management Centre
- Vehicular Emission Testing Programme

References:

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2. Air Quality Emergency Episode Plan for the District of Columbia (Revised: March 2014)
3. Air Quality Index for Sri Lanka (AQI-SL), Calculation & Guideline

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