

Disaster Recovery Support Manual

Using EM (Water damage)



EM Research Organization

Overseas Department

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Table of Contents

<1. Introduction>	3
<2. In the Event of a Disaster>	5
— Initial response.....	5
• Disaster Awareness and Emergency Preparation.....	5
<3. Preparations to entering the disaster area>	5. 6
— Information gathering.....	5
• Situation of the disaster.....	5
• Geography of the disaster site.....	5
— Scheduling.....	6
• Set a date for entering the disaster area and a date for leaving the area.....	6
— Preparation.....	6
• Accommodation.....	6
• Review of materials and equipment preparation methods.....	6
<4. Activities at disaster area>	7
— Arriving on location.....	7
• Check local conditions.....	7
—Arrangement of materials and equipment.....	7
—Coordination and expansion of activities.....	7
<5. Production and Supply Method of EM Activated>	8
—Determining the EM supply system.....	8
—Manufacturing EM Activated.....	8
<6. Spraying method>	9.10.11.12.13
—Deodorizing mechanism of EM.....	9
—Spraying does not mean “disinfection”	10
—The timing and significance of spraying.....	10
—Prior arrangements.....	11
—Work flow line.....	11
—Nozzle water volume adjustment.....	12
—Indication of the effect of spraying EM.....	12
—Distribution of EM Activated.....	12
—Record of spraying.....	13

<1. Introduction>

EMRO has been involved in reconstruction support activities in cooperation with local volunteers for many years, Project include the outbreak of foot-and-mouth disease in Miyazaki Prefecture in 2010, the floods in Thailand in 2010, the floods in Fukushima Prefecture caused by Typhoon No. 19 in 2019, and the floods in Kumamoto Prefecture caused by the torrential rains in July 2020.

In recent years, as disasters have become more frequent due to global weather changes, the role of EMRO in contributing to society through disaster recovery will be even more pronounced in the future. We can expect to receive more requests for reconstruction assistance using EM in the future. In this context, speed is of the essence when responding to a disaster, and since rapid decision-making and precise action are required at the scene, optimal team formation and response capabilities are required.

This manual has been prepared as a guideline for all EMRO staff to be able to respond to disaster relief by utilizing the know-how of EMRO's disaster relief activities to date.

In the event of a disaster, please read through this manual and familiarize yourself with its contents before providing to reconstruction assistance.



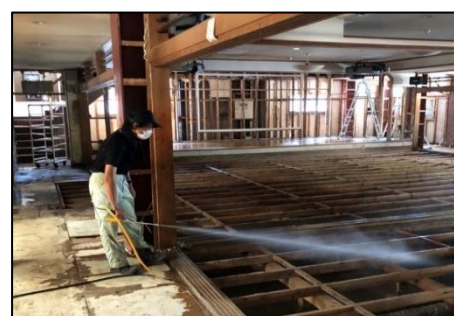
Support for foot-and-mouth disease in Miyazaki Prefecture in 2010



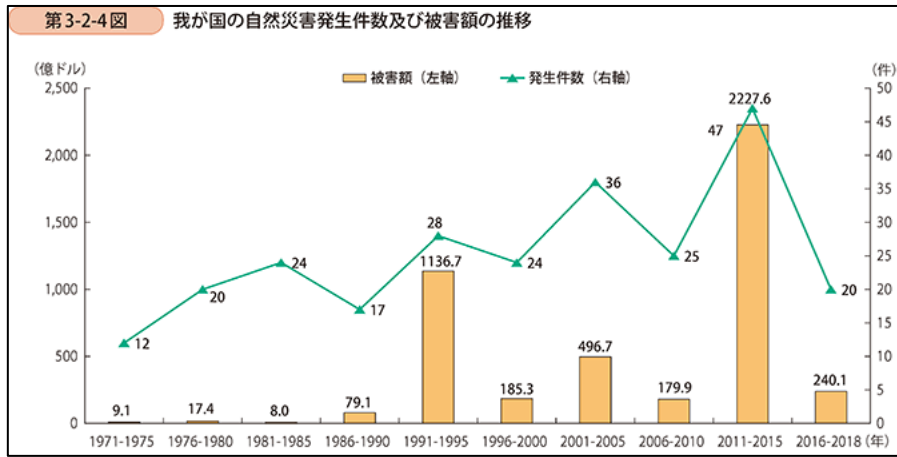
Flood Recovery Support in Thailand in 2010



Support for recovery from Typhoon No. 19 in Fukushima Prefecture in 2019



Heavy rainfall disaster recovery support in Kumamoto Prefecture in 2020



Number

of Natural Disasters and Amount of Damage in Japan (Prepared by Small and Medium Enterprise Agency)

The number of disasters is on the rise.

<2. In the event of a disaster>

— Initial response

• Disaster Awareness and Emergency Preparedness

When a disaster (earthquake, typhoon, flood, tsunami, etc.) occurs, there is a possibility that a request for assistance will come, so check the news and other reports. Please use this manual in the event of a request for assistance. In particular, technical staff who can manufacture EM are likely to be dispatched to the affected areas, so check the manual on a daily basis and be prepared for emergencies.

<3. Preparing to enter the disaster area>

— Information gathering

• Situation of the disaster

Check disaster and disaster prevention information on TV and the Internet to keep abreast of the scale and status of the damage, as well as the activities of the government and Self-Defense Forces and / or Military. Also, conduct sufficient interviews with those who have requested assistance from the region to confirm the support needed and the safety of the region.

Check the websites of local newspapers to get a more detailed picture of local trends and sentiments. Be sure to gather a wide range of information.

• Geography of the disaster site

Examine the local geography and determine the location of rivers, topography, nearest major cities, national highways, expressways, airports, stations, etc. in the surrounding area. This information will be an important prerequisite for future communication with personnel at the destination.

When going to the disaster site, Google maps and other information are not fully prepared for the situation at the disaster site, so discuss with the person requesting assistance the best route to take to get to the site and other means that can be taken if roads are blocked due to secondary disasters.

Although the government may not be able to be reached since it is preoccupied with due to the disaster response, it is advisable to contact them to obtain information on local roads.

— Scheduling

- **Set a date for entering the disaster area and a date for leaving the area**

Once you have confirmed the local situation with persons in the destination, make a rough schedule for the activities. Plan to stay in the affected area for a minimum of two to three weeks, because you need to confirm the situation there, prepare materials and equipment, manufacture and arrange for the manufacture of EM Activated, teach the locals about manufacturing and spraying so that they can take over the activity.

One leader and one or two assistants should be chosen as the members of the first team, and if the activities are expected to be longer, rotation of spare personnel should be considered.

— Prior arrangements

- **Accommodations**

Secure inexpensive accommodations that are close to your base of operations and that will allow you to stay for long periods of time. Make sure to confirm the availability of washing machines and dryers, parking space, and the location of the nearest supermarket or convenience store.

- **Review of materials and equipment preparation methods**

Before departure, purchase as much personal equipment as you can afford.

Before departure, consider how to source equipment and materials locally, such as rental cars, trucks, sprayers, tanks, seeds, molasses, etc., and if possible, ask the person requesting assistance to obtain and prepare them in advance.

(***Attachment 3**: List of equipment, materials, and materials required for disaster relief)

<4. Activities at disaster area>

— Arriving on location

• Checking local conditions

After arriving in the area, check the situation of the affected areas, the state of infrastructure such as electricity, water, and transportation, as well as whether your own safety is being maintained.

Also check the convenience of logistics, stores, home centers, and accommodation.

Also, confirm the location of the EM production base, and ascertain the status of facilities such as electricity, water, and roofs.

— Arrangement of materials and equipment

You will be required to make local arrangements for vehicles such as trucks, EM production materials, and EM spraying equipment. If the host company is willing to make these arrangements, ask them to confirm whether they are insured and what they are covered for. If the host company is unable to make such arrangements, rent equipment from a local rental car company. However, it is highly likely that trucks and other vehicles have already been rented out in and around the disaster site.

— Collaboration and expansion of activities

Once the activities get going, it may be necessary to expand the activities.

It would be best if you could coordinate your activities with the government, but in many cases, immediately after a disaster, the government is busy issuing disaster victim certificates, and it is unlikely that they will assist with our EM activities if we suddenly approach them. In addition, there are many cases where the government officials themselves are affected by the disaster. In such cases, complaints and dissatisfaction are more likely to be directed at the government, and they are likely to be too busy checking the site for disaster certification and dealing with residents who are not satisfied with the situation to pay attention to odor problems.

<5. Production and Supply Method of EM Activated>

— Determining the EM supply system

When one sprayer is in operation, the amount of spray that can be applied in one day (8 hours) of normal work is around 1,000 liters. Therefore, the required amount of EM active solution per day is 100 liters at 10 times dilution or 10 liters at 100 times dilution.

The amount of EM needed will vary depending on the number of spreaders and sprayers, the duration of the activity, and the dilution factor, but it is necessary to estimate the amount to be used to a certain extent, and then determine and decide whether it is better to manufacture it locally or to find a supplier from outside the disaster area.

— Manufacturing EM Activated

- Refer to **Attachment 1: Manual for the Production of EM Activated in Times of Disaster**

<6. Spraying Method>

—Deodorizing mechanism of EM

Bad bacteria live in the sludge brought into the house by flood water, and they decompose the organic matter contained in the sludge, causing it to emit foul odors, making the house a putrid environment.

Ammonia is a typical causative agent of these foul odors, and ammonia is alkaline. On the other hand, the EM liquid contains good bacteria such as lactic acid bacteria, enzymes produced by these bacteria, and organic acids such as lactic acid and acetic acid, etc. When the organic acids contained in EM hit alkaline malodorous substances such as ammonia, a neutralization reaction occurs, and these malodorous substances are eliminated, making it possible to instantly deodorize the space. In addition, the enzymes contained in EM can be used to eliminate odors.

In addition, the enzymes contained in EM promote the decomposition of organic matter in the sludge, and the good bacteria inhibit the activity of the bad bacteria in the environment. Thus, EM has the effect of directly and indirectly eliminating the causes of bad odors.

Nitrogen compound	Ammonia	Alkaline odor
Amines	trimethylamine	Toilet odor, rotting fish odor
Sulfur compounds	Methyl mercaptan Hydrogen sulfide Methyl sulfide Methyl disulfide	Acidic odor
Low fatty acids	Propionic acid Normobutyric acid Normovaleric acid Isovaleric acid	Smell of rotten eggs, body odor
Aldehydes	Acetaldehyde Aldehydes	Neutral Order Smell of alcohol on one's breath.

Malodorous substances and acid/alkali classification

— Spraying EM does not mean "disinfection"

In the affected areas, disinfection of affected houses is encouraged by the government, and in some cases, the Self-Defense Forces and volunteers are spraying disinfectants and distributing disinfectants to residents. It is necessary to clearly understand the difference between disinfectants and EM Activated and explain it to the victims so that they do not misunderstand. The term "disinfectant" can only be used for "pharmaceuticals" and "quasi-pharmaceuticals" that are approved under the Pharmaceutical Affairs Law. EM is not approved by the Ministry of Health, Labor and Welfare as a disinfectant, so the term "disinfectant" cannot be used to describe EM spraying.

It is important to understand that the purpose of spraying EM is to deodorize and, as a side effect, to control mold in the house, and since there are laws involved, it is important to tell residents in advance that EM spraying is not disinfection so that they will not misunderstand.

However, explaining the definition of the word to the residents on site will not help them understand, so it would be better to explain that EM is a collection of good bacteria, has a deodorizing effect, and suppresses bad bacteria such as mold, while maintaining a balance among bacteria rather than killing bad bacteria.

Also, since EM is alive and EM itself is affected by disinfectants, if the house you are planning to spray has already been disinfected, it is advisable to wait to spray EM at least two weeks after disinfection.

The most important thing in controlling mold is to dry the environment, and in some cases, even without EM, if the sludge is washed away with water and dried well, mold can be controlled to some extent.

In other words, even if EM is sprayed, if the house is not thoroughly dried, EM may not be able to control mold, so explain to residents the necessity of thoroughly drying the house after spraying. After spraying, open windows and doors until well dried.

After washing off the mold with EM, also tell them that if the drying process is inadequate, the mold may reappear, and make sure they understand.

— Timing and significance of spraying

The significance of spraying EM differs depending on when it is done.

In the immediate aftermath of the disaster, sludge and debris were deposited in the houses, and volunteers had to physically remove these as the first step for reconstruction.

Spraying EM at this time will be significant for volunteers and residents. It will improve workability and livability by reducing the odor of the sludge and lowering the risk of infectious diseases, thereby creating a sanitary environment on a temporary basis. Also, since the floor has not been removed, it is important to spray EM so that it is well absorbed throughout the sludge

accumulated in the house, including going under the floor if necessary.

Many building materials such as walls and floors are made of materials such as veneers, composites, and plasterboard, and these materials are known to be particularly susceptible to mold. If a large amount of mold grows on these building materials, they can be very harmful to the lives of the residents by releasing spores, so it is best to remove the molds by using the water pressure of the sprayer nozzle to wash them away.

However, it is impossible to know what is wrong with the inside of the house without thoroughly stripping away the flooded areas, as sludge will have gotten into every crevice and the insulation material inside the exterior walls absorbs sewage and rots the walls from the inside.

Later, when the sludge removal work has progressed and the flooded floors and walls have been stripped, EM can penetrate under the floors and inside the walls, so in addition to deodorizing, we can expect to see an anti-fungal effect under dry conditions.

— Prior arrangements

Have the person requesting local support to organize those who wish to spray and schedule the spraying. It is advisable to inspect the houses to be sprayed before the day of spraying, and understand the layout and size of the houses, the height of the flooded area, the water supply points, whether the floors and walls have been removed, and the parking location of trucks and other work vehicles, and consider the work flow line for spraying and the amount of water needed.

The standard spraying volume is about 100L/100 m²/1h - 1.5h when spraying to flush out mold. Based on the size of the house, estimate the approximate amount of water required and the working time.

Also, to avoid problems, ask the landlord what he or she does not want to get wet. In addition, be aware of the power status of the house, and avoid spraying electrical outlets and appliances to avoid causing electrical leakage.

If there is something that you do not want to get wet, you need to avoid spraying that area or cover it. If you need to remove walls or floors, you will need to get permission from the landlord as to which areas and to what extent you will remove them.

Before departure, make sure that all the necessary equipment for spraying is installed in the truck, that the sprayer is fully fueled, and that the spraying tank is filled with 200-300 liters of water if water cannot be supplied at the site, as well as and necessary amount of EM Activated.

— Work flow line

When you arrive at the house to be sprayed, prepare the sprayer and extend the spraying hose to

the far end of the house. Start spraying from the farthest point of the house, and consider the work flow line to go around the house in one stroke.

The sprayer moves backward while spraying from a high place such as the ceiling or wall to a low place such as the floor. The sprayer concentrates on the spraying, and the assistant should collect loose hoses, so that the sprayer can move smoothly while spraying.

Assistants should also check the amount of remaining liquid and fuel as necessary, or use a flashlight to light the sprayer's way, to ensure that the entire operation proceeds efficiently while paying attention to safety.

— **Nozzle water volume adjustment**

Spray nozzles need to be adjusted as needed according to the work situation. For space spraying, the nozzle should be squeezed to atomize the spray, while for spraying at high altitudes or washing away sludge and mold, the nozzle should be loosened to produce a jet of water.

If you adjust the position between fog and jet, you can spray a wide area with a powerful water volume.

— **Indication of the effect of spraying EM**

Normally, 100-fold diluted EM Activated is used, but in conditions where sludge has accumulated or there is a strong odor, 10-fold diluted solution should be considered. If you have enough EM Activated, it is better to use a 10-fold dilution.

To get an indication of the effect of spraying EM, assess the odor as well as the unpleasant feeling in the house before spraying, and judge how it is reduced compared with conditions after spraying. This is a sensory assessment, but when EM is sprayed in strong concentrations, the odor not only disappears, but the space becomes refreshing and comfortable.

If you can remember and confirm the transition to this refreshing feeling, you will gain more confidence in the effect. The effect is especially noticeable when EM Activated is sprayed at 10-fold dilution.

— **Distribution of EM Activated**

In addition to spraying EM Activated, you can also distribute small portions of the EM Activated in PET bottles or water cans to disaster victims and encourage them to use it themselves. It would be a good idea to have bottles placed in a corner of the relief goods storage area, and distribute them along with flyers showing how to use EM Activated.

—Record of spraying

If you keep a record of which houses in which areas you sprayed, the amount of spraying, the amount of EM used, and any special matters, it will be an important document for later review of your activities. Be sure to create these records.

< Attachment >

- **(Attachment 1) Manual for the Production of EM Activated in Times of Disaster**
- **(Attachment 2) Manual for Spraying EM Activated**
- **(Attachment 3) List of equipment and materials for disaster recovery**