Urban Services Planning
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Lecture 12
Solid Waste Management Rules 2016

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Welcome back in lecture 12, we will talk about solid waste management rules 2016. So we will talk about this rule in general and then we will look into some of the definitions for the different terminologies that has been used in this particular rule. This is important why because the definitions this is because it is a rule that definitions have to be adhered to. And then we will talk about the duties of the waste generators and then we will talk about the duties of the different authorities which are involved in the solid waste management process.

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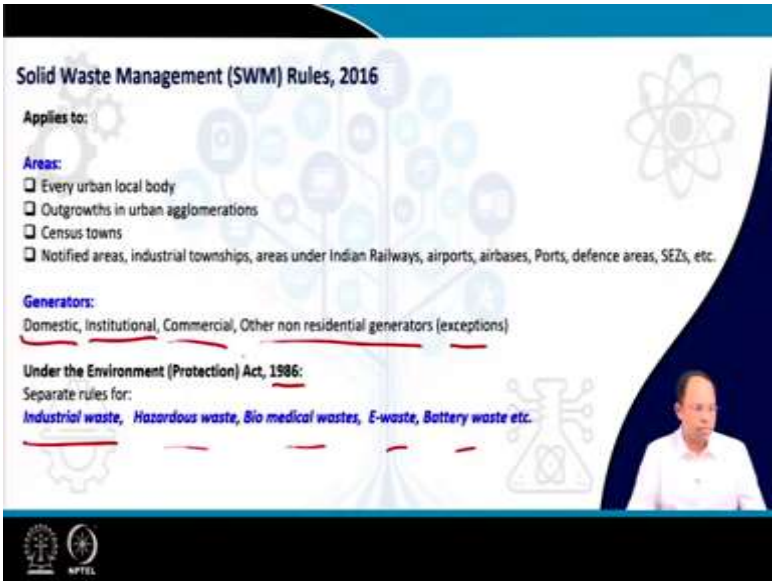

So solid waste management rules 2016 it is applicable to every urban local body and not only urban local bodies, but any outgrowth in urban agglomeration the all the difference all the senses terms and also the notified areas, industrial townships areas under Indian railways, airports, air bases, different ports, defense areas, SEZs, etc. and so on. So what it means is these rules equally applies to all the different urban areas in the country. So every urban area has to adhere to this particular rule.

Then comes the generators who are considers as generators of solid waste the generation can happen in houses. So that is this is domestic generators, then there are institutional generators that means some colleges, some offices these are institutions which also generate waste. Commercial that means market areas, certain commercial buildings all these things can generate waste and other non-residential generators are also there. But of course, there are a lot of exceptions also which are not considered as generators. So in general in urban areas, we have institutional, commercial, domestic, and some other non-residential generators which are generating solid waste for which we have to manage the waste.

So as we have discussed in the last lecture under the Environmental Protection Act of 1996 as per that, we have to create separate rules for industrial waste, hazardous waste, biomedical waste, E-waste, Battery waste and so on. So the municipal solid waste management rules only apply for the waste that is generated in urban areas and also for domestic, institutional, commercial, and some non-residential generators.

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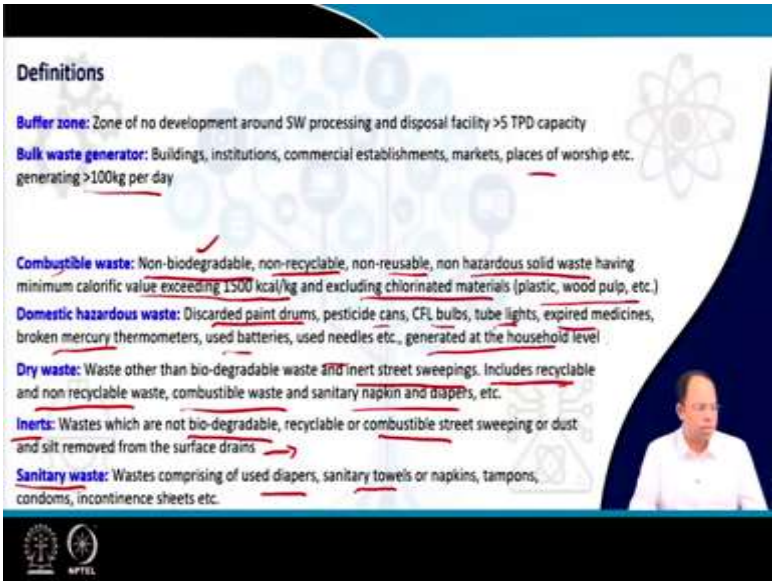

Now, coming to definitions, we will go with not all definitions that are given in the rules there are many definitions given which we will actually we will use those terms subsequently in other lectures in whenever we will require them we will define them, but at this point of time, we required some basic definitions which has to be learned so that it later on when we use the terms you know that what these things are.

So first of all, the term buffer zone is a zone of no development around any kind of software, this solid waste processing and disposal facility which handles waste which is greater than 5 tons per day in those kinds of facilities there has to be a buffer area around this particular facility so that it does not affects those areas would be I mean if I have a house then there may be concerns in terms of order it or in terms of other health issues and all can arise in those areas, so there is a need to create a buffer zone.

Then bulk waste generators, why we make this definition some buildings, some institutions, some commercial establishments, some markets, some temples or other places of worship generating greater than 100 kg per day could be termed as bulk waste generators, why? So that if we consider bulk waste generators, that means, we can specify some additional rules, we can specify some additional charges with this for this particular group of generators, so which is different from individual generators such as one household so that is why this distinction is there.

Then coming to the different way we can categorize waste the rules talk about several categories, some of these categories are combustible waste, then domestic hazardous waste,

dry waste, inerts, sanitary waste. Now starting with combustible waste, these are non-biodegradable waste.

So obviously there is biodegradable waste, then these are non-recyclable waste. So obviously there are recyclable waste in addition to all this what we have just discussed. Then non-reusable waste. So there is waste which can be reused also, and non-hazardous solid waste having minimum calorific value exceeding 1500 kilocalories per kg and excluding chlorinated materials such as plastic, wood, pulp, etc.

So all the waste which are neither of this the remaining ones, but even then we have to check if the calorific value is more than 1500 kilocalories per kg. If it is not there is no point of burning this waste otherwise, it will require more energy to burn it so we have to introduce more energy into the system. So if it is more than 1500 kilocalories per kg there is a chance we can generate some energy out of this burning process. And it should also exclude certain materials, because of certain chemical composition.

Now domestic hazardous waste so this as we said that combustible waste has to be non-hazardous waste. So what are hazardous waste? Particularly from domestic areas, non-domestic industrial waste is also there, but in domestic hazardous waste are discarded paint drums, pesticide cans, CFL bulbs, tube lights, expired medicines, broken mercury thermometers, use batteries, used needles. So these are some of the waste or hazardous waste which is generated at the household level. So this cannot be mixed with the normal waste trip, this has to be dealt with separately.

Then comes dry waste. Waste which is we have learned the term biodegradable waste, so waste which are non-biodegradable, which is not which does not go into the biodegradable waste stream and inert streets sweepings removing those that includes recyclable. So what does dry waste include? Dry waste you when we categorize waste in residential household obviously, the biodegradable waste is separated. The rest of the waste keeping aside the hazardous waste and all could be kept in one container and for that we can say that this container will include all the dry waste which include recyclable waste, non-recyclable waste, combustible waste, and sanitary napkins, diapers, etcetera.

So as you can see that recyclable, non-recyclable, combustible, combustible we learned at the beginning. So this kind of wastes are there in part of dry waste. So once dry waste is collected at your household then it has to be taken to a sorting center or a facility where we will

actually divide or we will take out some of the recyclable materials, some of the non-recycled and some of the combustible materials and then the remaining so that this wasted could be further segregated or further processed on.

Then inerts, inerts are waste that are non-biodegradable, non-recyclable or combustibles street sweepings or dust and silt removed from the surface drains. So usually this will, these are material which we cannot either do any kind of recovery or we cannot recycle or reuse those kind or neither then we can burn. So these are the inert waste which has to be taken out. And usually this is the waste which goes into the sanitary landfills.

And finally comes the sanitary waste. Sanitary waste is waste comprised of used diapers, sanitary towels or napkins, tampons, condoms and inconsistency and other kinds of items, which it usually is a health hazard and also not only health hazard it is something which is not aesthetically pleasing also, and if you find them lying without any sort of consideration on the normal open bins, it does not give us a good look to the city as well as it may cause some other problems.

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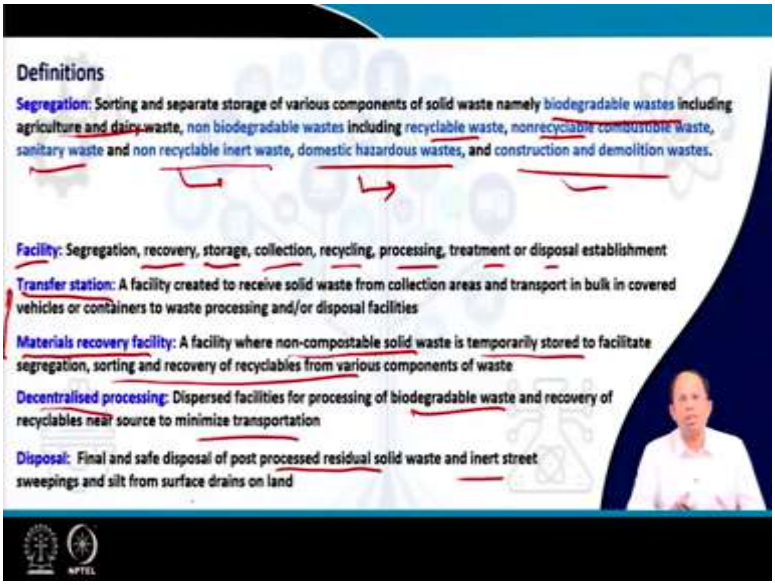

So there is a need for segregation of waste and the laws define segregation as sorting and separate storage of various components of solid waste, namely, biodegradable waste, which includes agriculture and dairy waste, particularly in household's also biodegradable waste we can segregate. Particularly some amount of kitchen waste including vegetable shavings and all those things can come into the biodegradable waste.

Non-biodegradable waste which includes recyclable waste, non-recyclable, combustible waste, sanitary waste and non-recyclable inert waste, domestic hazardous waste, and construction and demolition waste. So non-recyclable inert waste is the one which goes into the landfill, construction and demolition waste also may go to the landfill, but we have to make separate provisions for that, and domestic hazardous waste also has to be taken and dealt with in a separate way.

Now, coming to after segregation, obviously, we have to think about how to deal with so there has, there is a requirement of certain facilities or certain kinds of infrastructure that has to be provided in urban areas. So the law talks about a few. The facility first of all, it defines the term facility which is establishment which enables segregation of waste that means sorting of waste, recovering that means you can remove certain items from that and reuse them eventually. Storage of waste that means we need to store somewhere temporarily. Collection, recycling, processing, treatment, disposal, all kinds of facilities are known as a solid waste management facility.

Then there is a transfer station. This is a facility created to receive solid waste from collection areas and transport in bulk in covered vehicles or containers to waste processing and or disposal facilities. So once from the neighborhood or from a particular zone, we collect waste, it has to be brought to a point consolidated and then from there transferred to places where it could be finally disposed or it could be further processed, or it could be even incinerated or burned. So that is called a material, that is a transfer station.

Then coming to material recovery facility that is pretty understandable, that means it is a facility where non-compostable waste that is non-biodegradable waste is temporarily stored to facilitate segregation, sorting, and recovery of recyclables from various components of waste. So this can sometimes even happen in a transfer station. So that means a material recovery facility and a transfer station can also happen together. So this is how mighty us infrastructure could be or facilities could be actually constructed.

Then decentralized processing talks about the primary it is focused on the biodegradable waste and it is suggested that many of like communities' certain communities or certain group housing group housing projects, they can actually construct a decentralized processing facility for this biodegradable waste, so that we can convert them into compost and so on. The primary benefit of setting up these decentralized processing treatment units is to minimize the transportation cost, but there are other benefits as well.

Finally, coming to disposal, the final safe disposal of post process residual solid waste that is after taking out all the material that could be recovered, recycled and everything. Then an inert street sweeping and silt from surface drains on land, so this has to be disposed to a landfill site. So after that, whatever is the post process residual waste and the inert street sweeping and silt from drains after cleaning up drains, we get certain material, so all this material has to be taken to the landfill site.

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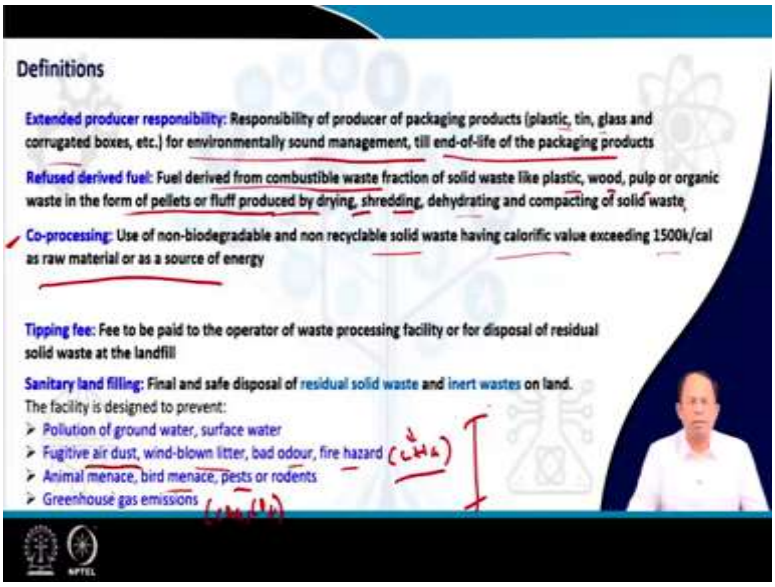

So then there are certain other terms which are also gaining prominence these days. So these are also included in municipal laws as in the solid waste management laws. So one term is extended producer responsibility. So this is particularly important for hazardous waste management, why? Because there is, the produces responsibility should not end at once he sells a product that once the material is consumed, then what happens to that, packaging material what happens to that particular product and so on.

So responsibility of producer of packaging products, plastic, tin, glass, corrugated boxes etc. they should consider environmentally sound management till end of life of this packaging product. So they should not only look into selling of the product, but once it is utilized, how to what to do with this product? So they should create some facilities so that these products could be collected or they could be reused or they could give some kind of measure so that we can that this product will go back to the same producer and they can repurpose it. So this extended producer responsibility is becoming important these days.

Then refused derived fuel. So fuel sometimes as we say we have discussed there is combustible waste which can be burned. Now if I want to burn the waste, it would generate some bout of pollution, but we sometimes balance it by saying that well, we will be also generating energy out of this waste because when you burn something, then you can generate energy because using that heat we can actually run boilers, we can generate electricity or we can use directly as a fuel as well.

So refused derived fuel is fuel derived from combustible waste fraction of solid waste like plastic, wood, pulp or organic waste in form of pellets or fluff produced by drying, shredding, dehydrating and compacting of solid waste. So after we process the waste and all and then we make it into pellets or fluffs, after drying, shredding, dehydrating and compacting this kind of waste, we will be able to use it as a fuel when you burn it you can generate energy.

Then comes co-processing that means, if I use this particular non-biodegradable and non-recyclable solid waste having higher calorific value exceeding of course 1500 kilocalories as we have discussed as raw material or as a source of energy for some other processes like in cement kilns and all we can use this kind of waste as to generate energy in those particular kilns or cement kilns, so that called co-processing of waste.

So in addition to that, there is a term called Tipping fee, which is the fee that has to be paid to the operator of a waste processing facility or for it has to be paid for disposal of residual solid waste at the landfill to some contract operators or some organizations which will take up this particular process. So this is the amount of money paid by the ULB to this particular stakeholders who actually conduct some operation in the overall municipal solid waste management, so that is the tipping fee.

And finally coming to sanitary landfilling. It is the final and safe disposal of residual solid waste and inert waste on land. And usually these kind of facilities are designed to prevent pollution to groundwater and surface water, why? Because when you dump waste automatically there is water that in the waste which comes down it carries all the hazardous chemicals and all along which comes along with the waste and it is forms leachate, and this leachate gradually goes into the soil and then mixes with the groundwater. So sometimes if it is near a surface water body, it will directly mix with the surface water. So we have to prevent this kind of pollution.

Then a solid waste dumping site also creates a lot of dust, windblown litter, garbage also floats in the it is taken carried by the air, bad odour, it can create fire, because there is a lot of CH4 methane gas generated in the landfill because of decomposition of organic waste and this is very-very, this can result in some fire hazard, because this is very easily burnable.

So this has to be considered when we design sanitary landfill. Then how to prevent animal menace, bird menace, pests or rodents and how to reduce overall gas emissions that is CH4 and CO2 from solid from this particular landfill sites. So these are different aspects that needs to be considered while designing a sanitary landfill and later lectures we will discuss this in detail.

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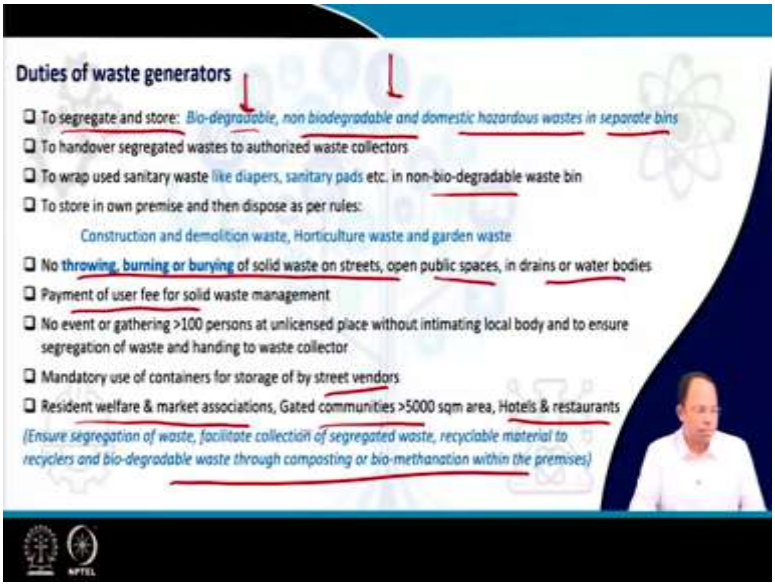

So now coming to the duties of waste generators, that means what should waste generators like every individual like you or me or for example, certain households or certain institutions, what are their roles, what rules they should follow what they have to do. So that is being suggested in the duties of waste generators.

Let us go through the major ones, first of all segregation is made mandatory. So once you segregate, you have to also store it. And how to segregate? There are 3 categories mainly biodegradable, non-biodegradable, and domestic hazardous waste. So these 3 has to be in 3 separate bins, but sometimes in most municipal areas we find this two, but this one usually is not taken care of but gradually we have to move to that.

To handle a segregated waste to authorize waste collector that means you cannot throw it away you have to handle it to only authorized personnel. Then sanitary waste has to be

wrapped as we know that why they have to be wrapped and it can be also placed in this non-biodegradable or dry waste bin. Then for construction demolition waste, horticulture waste, this has to be stored within your own premises and you cannot just throw it into the street in front of your house, you have to store within your house and then you have to call the municipal body and as per the arrangement there in that particular ULB this has to be disposed.

No throwing, burning or burying of solid waste on streets open public spaces in drains or water bodies. So you cannot litter, you cannot throw garbage in unauthorized places. Then payment of user fee is mandatory that means, everybody has to pay some money for solid waste management, so you cannot say no, it is not a free service. Then in cases where there are certain events where more than 100 peoples generate, they generate a lot of garbage and so it you have to take permission for that and also you have to do proper segregation of this waste and then finally you have to handover this waste to proper authorities.

And for street vendors, there is requirement for mandatory use of containers to store the different waste that they generate. Then in addition to that, resident welfare and market associations, gated communities greater than 5000 square meter, hotels and restaurants which usually generate a lot of waste, they should ensure that the waste is segregated within their community, they should facilitate the collection of the segregated waste and recyclable materials has to be handed to the recyclers and biodegradable waste has to be composted as much as possible within their premises. So that means decentralized waste processing has to be conducted and that is actually encouraged and it is made mandatory for bigger waste generators.

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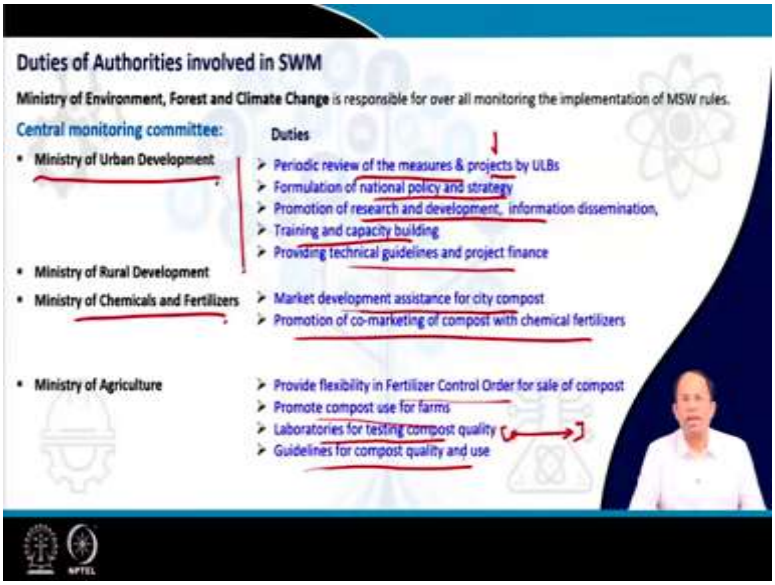

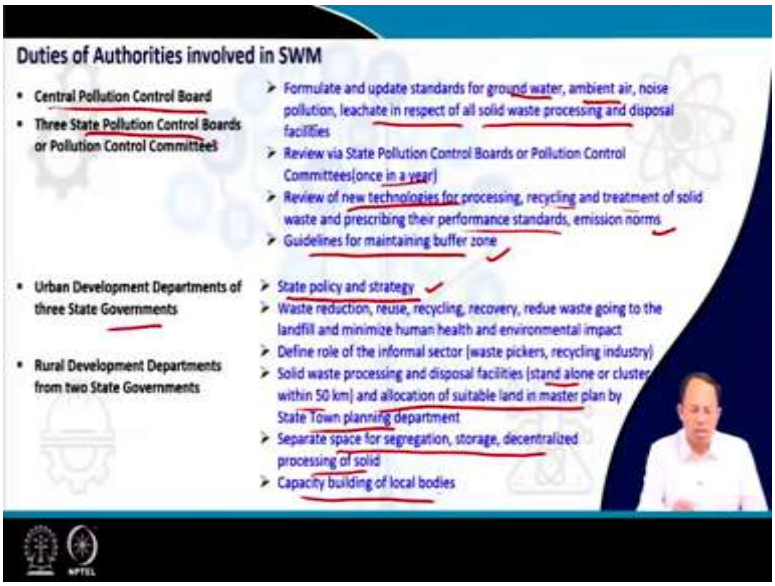

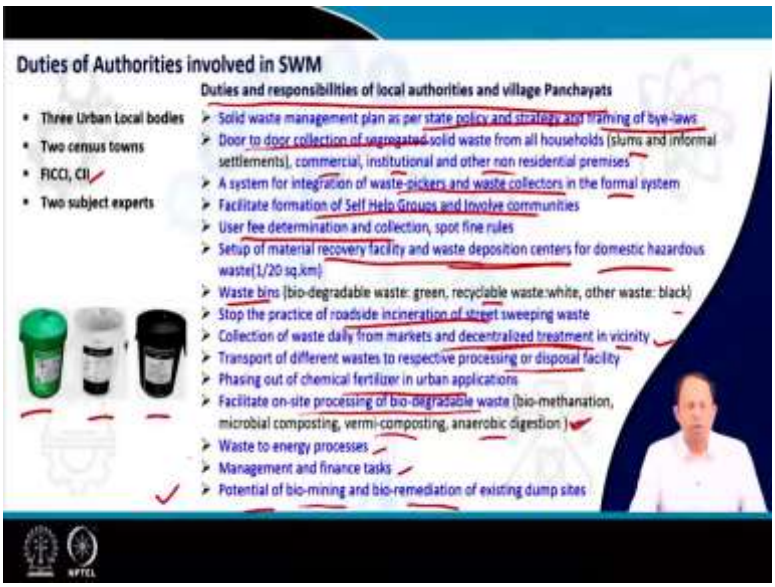

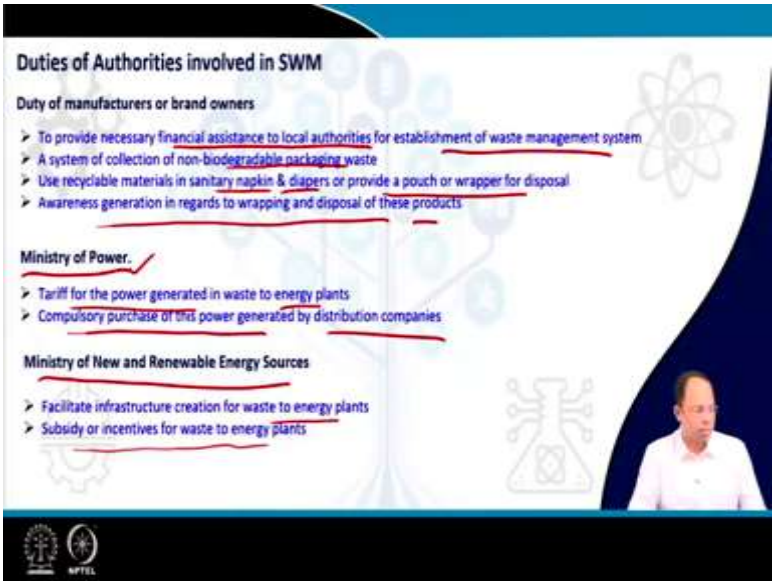

Now coming to the duties of the different authorities involved in solid waste management. So the once we have talked about the generators, now comes the role of the government or role of different agencies and authorities which are engaged in the solid waste management process. So ministry of environment forests and climate change. So this is the primary ministry which is responsible for monitoring and implementation of solid waste management rules in the country, so this is the primary body.

Accordingly, they have created a central monitoring committee which includes representation from different ministries and other stakeholders. So let us take a look at these stakeholders that is ministry of urban development, ministry of rural development, ministry of chemicals and fertilizers, ministry of agriculture, and then central pollution control board then state and some representative state pollution control board which is on a rotation basis, then urban development departments, again, 3 state governments, it is done in rotation, rural development departments from 2 state governments, so again done in rotation.

And then 3 urban local bodies again selected 3 and then it changes over time. Two census towns, then this CII and other bodies industry which promotes different kinds of economic growth or industrial growth, two subject experts all these create, all these form a committee, which actually advises the ministry on how to implement this solid waste management rules in different urban local bodies.

Now, coming to the specific duties of this particular ministry, for example, the Ministry of urban development, so what are their duties, so, of course, they have to review of the

measures and projects which are undertaken by the ULB. Because not only they give some rules and all but they also fund certain projects at the ULB level. So to monitor that.

Formulation of national policy and strategy, that is the primary role of this particular ministry. Promotion of research and development and information dissemination, whatever comes out of those research. Training and capacity building exercises for the ULB's. Providing technical guidelines and project finance to make sure money is available for different projects to be taken ULB. So these are the goals of the Ministry of urban development.

Now coming to Ministry of chemicals and fertilizers, what is their goal? So in case of compost that means in case of biodegradable waste we say that as we have to convert it to compost, but just producing compost is not enough we have to also sell that compost otherwise, compost plants can be set up after a few years they will close because there is no takers for this particular fertilizer.

So market development assistance for city compost that has to be taken up by the ministry. Promotion of co-marketing of compost with chemical fertilizers that means with some amount of chemical fertilizer you have to buy some amount this compost which could be applied together as per laws made by the Ministry of chemicals, as per guidelines given by the Ministry of chemicals and fertilizers. So that will enable sale of compost that will enable use of compost. So this has to be this is the duty of this particular ministry.

Then for Ministry of Agriculture, once compost is there, we have the Ministry of Agriculture has to be ensured that it is used. So promote compost use for farms, then provide flexibility in fertilizer control order for sale of compost. So that means adjusts the fertilizer control order so that we can also sell compost. Then they have to set up laboratories to test compost quality.

Why this is important? Because compost is made out of garbage generated in the municipal urban areas, so it contains a lot of heavy metals and all. So we have to make sure that that those does not get into the compost. So there are certain standards that has to be maintained. So there has to be laboratories which will take that. Then guidelines for compost quality and use. So these are the different things that the Ministry of Agriculture has to prepare.

Then coming to the duties of the pollution control board, both state and state pollution control boards their job is to formulate and update the standards for groundwater, ambient air

noise pollution, leachate in respect to all solid waste processing and disposal facilities. So what should be the standard for leachate that is generated? So they will give us the standards and we have to check if the leachate coming out of that facility is adhering to the standard or not. If not, then we have to propose some alternative measures or technical processes to adhere to those standards,

Then review via a state called pollution control board or pollution control committees once in a year to review projects, review actions taken up by the ULB's, that is another big task of this pollution control board. Then if a ULB suggest a new technology that has to be implemented in a particular area, then review of the new technologies for processing, recycling and treatment of solid waste and prescribing their performance standards and emission norms. So that means to decide on the standards for a new technology that has to be taken up by the central pollution control board. And finally, how to maintain or how to provide buffer zones, that is also another duty of the central pollution control board.

Then comes the state government roles that is the Urban Development Department of the state government and sometimes the rural governments can also participate. So this helps in formulation of the state level policy and strategy that we discussed earlier. State government ultimately creates their own policy and strategy for solid waste management in urban areas. So waste reduction, reuse, recycling, recovery, reduce waste going to the landfill and minimize human health and environmental impact. Define role of the informal sector waste pickers and recycling industry within that particular state.

Solid waste processing and disposal facilities should it be standalone should it be in form of a cluster like we discussed earlier and what should be the distance of this cluster within 50 kilometers maybe a sort of law. And allocation of suitable land in master plan by the state town planning department, so that is also part of the overall state government duties. Separate space for segregation, storage, decentralized processing of solid, so provision of spaces to conduct all these activities, then also capacity building of that local body. So this is the role of the state government.

Now finally coming to the duties and responsibilities of local authorities and village panchayat, so that is what will be should do. So these are again duties which are listed in the municipal solid waste rules, what has to be done. So following this particular laws following this particular rules, municipalities has to adjust or more or less follow this kind of your aspects or this kind of rules that has been formulated.

So solid waste management has to be as per state policy and strategy, but municipality has to frame the different bylaws or these are sub rules which are formulated which helps in implementation of that system in that urban body. Then door to door collection of segregated solid waste from every kind of settlement including slums, commercial, institutional and other nonresidential premises, so door to door collection has to be practiced in all urban areas. A system of integration of waste pickers and waste collectors in the formal system that is mandatory.

Formation of self-help groups and involved communities in the waste management process, so that is also part of the rules. User free determination, collection, spot fine rules, so how to do that? Then set up a material recovery facility at waste disposition centers for domestic hazardous waste 1 per every 20 square kilometers. So that means every ULB we should set up this kind of material recovery facility and waste deposition centers for domestic hazardous waste, so that you can go and carry your hazardous waste and put it there.

Then how what kind of waste been has to be provided? Green for biodegradable, white for recyclable, and black for all the other kinds of waste. So, these are the 3 colors of waste bins, that is being defined by the government, you have to also adhere to this particular standards. Stop the practice of roadside incineration and street sweeping. So, in many cases what happens sweepers when they clean streets, they will gather the waste somewhere and they will burn it, so to stop this practice, because it creates sort of pollution and smog.

Collection of waste daily from markets and decentralized treatment in vicinity and this. So, first you have to collect the waste from different markets, because it is a bulk waste you can say markets are bulk generators. Then treat them in a decentralized facility particularly for organic waste part in vicinity of the market, nearby to the market, so this is another part another law which has to be followed.

Transport of different ways to respective processing and disposal facility. Phasing out of chemical fertilizers. Facilitate on site processing of biodegradable waste as we discussed earlier also, that means the ULB should make sure bio methanation, microbial composting, vermin-composting, anaerobic degradation, these are the different kinds of techniques which could be adopted for processing of biodegradable waste in local areas that means in the in a decentralized fashion, so that is one thing that has to be taken up.

Then the ULB be should also explore waste to energy processes. And it should undertake the management and finance tasks different ones. And finally, if not only disposal of solid waste to the sanitary landfill and all, they should also explore the potential of bio mining and bio remediation of existing dump sites which are not sanitary landfills. That means, if earlier dump sites which were constructed, which were not done in as a proper engineer, these are not engineered facilities, they are not sanitary landfills, so how to remedy them or how to do take, do measures so that we can improve them? So these are the different tasks that the ULB should actually perform.

So in addition to the different ministries or the ULBs and the state governments, there is some role of the manufacturers or brand owners as we have discussed earlier about extended producer responsibility. So they should provide some amount of financial assistance to the local authorities for establishment of waste management system.

A system of collection of non-biodegradable packaging waste. So there must be a way to collect this non-biodegradable waste particularly used in packaging of different items. So that means when you deliver a particular item like you deliver a refrigerator you have give the option to carry that particular packaging material back with that delivery people so that it goes back to the company.

Use recyclable materials in sanitary napkins, so that it can be directly put into the, it could be recycled, or it could be gradually, it does not harms the environment and provide a pouch or wrapper in case it is not degradable and all. In that case, we can use a pouch or wrapper so that it will be disposed in a proper way. Awareness generation in regards to wrapping and disposal of this problem of these products so that means you have to also tell the public to do this kind of activities or you have to make them aware of this particular way to dispose this particular sanitary waste and so on.

Then, coming to ministry of power in case I am generating waste energy from waste, waste in an urban area then tariff for power generation also has to be looked into. Compulsory purchase has to be made mandatory for power generated from this waste to energy plants by the distribution companies, they should not buy it from somewhere else, it is generated locally so that has to be made mandatory, so this is what the ministry of power should look into. Ministry of new and renewable energy sources they should facilitate infrastructure creation from waste to energy plants, and also subsidy or incentivize for waste energy plants to be set up in urban areas.

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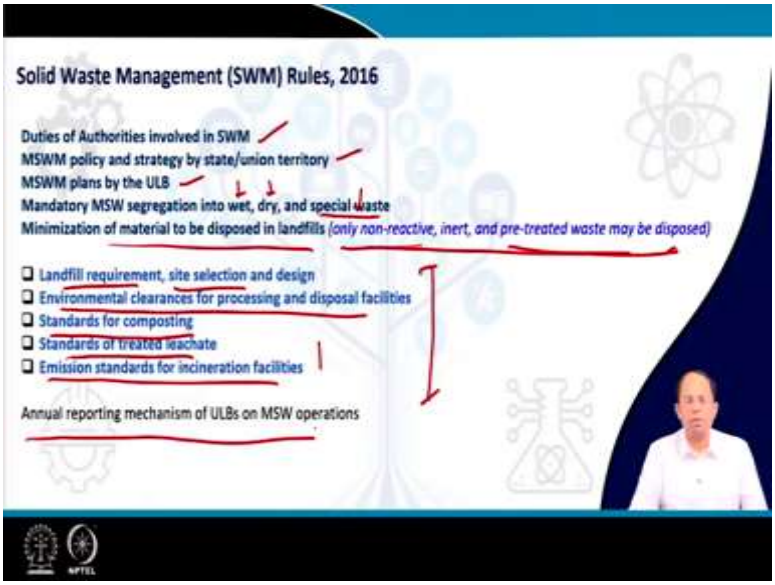

So overall we can say the solid waste management rules talks about summarize, we can say that it talks about the duties of authorities involved in solid waste management. The municipal solid waste management policy and strategy by states and union territories, what they should do? Then MSW plans by ULB, rules for Plan Preparation by the ULBs.

Mandatory MSW segregation into wet, dry and special waste, wet is biodegradable, dry is non-biodegradable, but includes recyclable, non-recyclable, combustible and all other waste and special waste or the domestic hazardous waste. So these are the basic segregation that has to be done, mandatory segregation that has to be done. Then minimization of material to be disposed in the landfill. So only non-reactive, inert and pretreated waste has to go to the landfill site. So that is the law, that is the rule that has been formulated every ULB has to or every state government has to adhere to this particular rules.

So in addition to all this, there is detailed specifications for landfill size, landfill requirements, site selection for this landfill and design of this landfill in the municipal solid management rules. Then what are the environmental clearances for different processing and disposal facilities that are required? What should be the standards for composting that means, what sort of constituent should be there in a fertilizer that is comes out of composting, standards for treated leachate. So once leach it is captured from landfill site it is treated, then what should be the standard for that treated leachate.

And emission standards for incineration facilities, that means how much amount of gases you can emit into the atmosphere. So all these are also part of the solid waste management rules

and we have not covered them in detail, but we will look into each one of them in detail when we cover those individual aspects in subsequent lectures. So finally, annual reporting mechanisms of ULB or MSW operations, how to do that what format and all that is also listed in the solid waste management rules.

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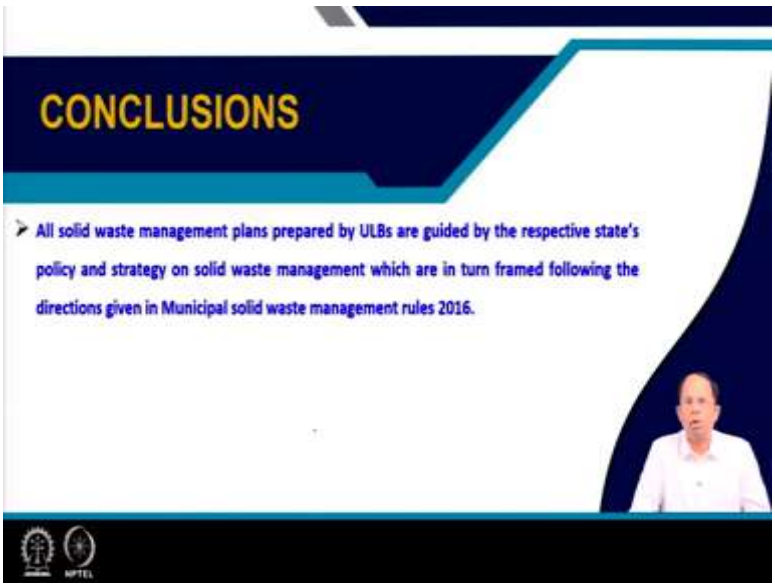

So these are the references you can follow. So to conclude, all solid waste management plans prepared by ULBs are guided by the respective state policy and strategy on solid waste management, which are in turn framed following the directions given in municipal solid waste management rules 2016.