

# CHISAPANI (2)

VENUE : Bhatte Danda, Chisapani.

DATE : 6 May 1996

TIME : 1200 Hrs.

Discussion with Male group of Chisapani.

GG : Let me introduce ourselves first. Here is Dr. Takashima who is responsible for Community programs. Myself is Ganesh Gurung and our friend Mr. Giridhar Tondon. We both work for this study project.

We have come here to know your development needs. You may have surprised that why we were interested to talk with women group. I think it is better we make you clear. In most cases programs and plans are prepared without consulting the primary users/beneficiary group such as women group. This is a reason that fails the project.

In order to avoid the such situation, we wanted to consult the women separately and of course definitely with you people.

We are mainly interested to understand your problems, needs and of course your latent strengths and possibilities in the area. You are staying in the area from your childhood, so you are the best knowledgeable persons in the area. We have come here only few times and do not know much things about you and your area. So please cooperate us in the process.

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Note : TK= Takashima. GG= Ganesh KP =Key person.

GG : Do you have any other projects/ programs with other donors. Because it is better not to be duplicated in the same area.

KP : No. There is no any development program in Chisapani. Chisapani is a remote place. Who comes for such area. And we do not know any donors, where to go , how to go? and how to apply ? So if you give something to us. we will take it. If not we do not have alternative.

KP : In Phedigaon, we had German Football Team which wanted to help us in relief program. They gave us 17 lakh Nepalese rupees. [ approximetely 34 thousand US \$] We received only few bundles of roofing corrogated sheets.

We do not know anything. So whatever you provide us. We will take it. We do not ask this and that. Whatever you give us, we accept it.

[ The gentleman is a person from Chisapani but had migrated from Chisapani to Phedi gaon. His house was washed away by 1993 disaster]

GG : We had discussion with women group too. We got their opinion.

KP : We need some industry ?

GG : Have you seen any program that can generate the income of Chisapani.

KP : Our clamate is very cool clamate. May be there are several cash crops which is feasible in this area. But we do not know the feasibility such as tea, coffe, cardemam, and so forth.

KP : Yes I agree to have new types of cash crops in the area. But if we do not have land. Where do you plant this cash crop ? So our need is to save the land first. There is no use of talking of such new crops, even though it is very profitable.

GG : We can not say anything at this stage. Our Engineers colleagues will examine it and recommend what is possible. Similarly, our Agriculturist colleague will examine your request such as feasibility of tea, coffee, cardemam etc.

We can speak anything without the opinion of experts.  
We are not the experts of these fields. Our Agriculturist will have to give the opinion.

KP : Yes we like to have such agriculturist to visit our place and examine the possibility of new cash crops. We can produce many kind of vegetable in Chisapani. But due to lack of road, we can not transport to market . And vegetable is a perishable goods.

TK : Ropeway seems feasible here instead of road ?

GG : What othet employment you have seen here ?

KP : Beside vegetables, cottage industries such as DHAKA ( meaning weaving of clothes).

GG : Do you have raw material for such industries ?

KP : I do not think, we have such material here. But if there was road, we could have taken it to market. So we need road .

KP : My brothers have asked for the road. But the point is whether the land remains or not ? If the land is going to be washed away after few years time , there is no use of of any development activities in this area. We are not sure whether it remains or not ?

So in my opinion, we need to get Experts opinion. If they can not save this area and the landslide continues at the present rate. No need of any development.

KP : Irrigation can also lift the economic situation of the area.

KP : No. We need first landslide control. If it continues at the present rate, after few years, Chisapani will nor remain.

TK : Even though, land is stable, it is difficult to invest huge amount of money for such a small population.

GG : Can we go back to the same issue ? The prioritisation of the development programs. You all have said many things but what are the prioritisation ?

[ Discussion on prioritisation of the development need for some time among themselves]

[Finally consensus was there for the same.]

KP : Conclusions are:

1. Landslide control
2. Employment/ Income generation.
3. Road
4. Electricity
5. Drinking Water
6. Health Post

GG : What about evacuation system which you people did not mention ?

KP : Yes yes We want. Earlier, we did not know about it.

KP : I think it has no use at all. Because during the last disaster, there was no road to go to anywhere. How do you go to evacuation place if everywhere there is water and it is beyond our capacity to go to anywhere. we can not see , we can not hear, and we can not go anywhere.

GG : Basically you are suggesting to have drainage and walking path from the villages to evacuation area.

KP (Ward Member) : I live in Majhuwa village. During the monsoon, we can not go anywhere due to drainage problem. What can you do for that village ?

GG : Now we can not say anything. And next thing is you should also come up with the idea what can be done there. Because you have been living here from many years. You know better than us.

KP : First thing is control of landslide. Then only we can think of many ways.

GG : We can not say now what we will do. But we can say is that, whatever we plan to do, there will be your participation. Without your participation, it is not possible.

KP : But we also do not want that people sell our name and take advantage as in Phedigaon.

GG : If we agree the need, let us conclude. If you have something to ask us please ask us ?

GG : If not, Thank you very much .

Meeting Concluding.

NAMTAR (1)

VENUE: Sub Health Post Building of Namtar

Date : 30 May 1996

Time : 1800 hr.

Discussion with Mr. Tulsi Thapa, (HM) Head Master of Kalika Secondary School of Namtar.

*HM is from Buisac.*

[Mr. Thapa is not from Namtar itself but comes from Hetauda Municipality. In this way he is a service holder (Salary man) in Namtar. However, as a person living in Namtar since five year, he takes keen interest in the development of Namtar and he has contributed in the development of the Namtar too. Futhermore, prior to present position, he was working with PRAJA (Chepang) Development Project, a nomadic type tribal group found in the Mahabharat range of Nepal. Because of this, Mr. Thapa has very good experience in the field of community development. He was consulted by every group which went to Namtar in relation to this project.]

### Introductory

GG: As we told you before, we will be coming here frequently until June/July of this year. We have to consult the people and know their needs. Not only their needs, but their role to be played. Since this project intends to obtain maximum people's participation, every program recommended should be people's real requirement. We would like to thank you for the kind support you have been providing to us.

Regarding the work, you must have thought that we are a bit slow, but this study project is 12 month long study. There are still few more months to complete the study and it is not sure for implementation.

HM : I don't think you are slow. It seems that you have systematic working style.

GG : As you are aware that we are responsible for preparing Community Disaster Prevention Plan. Dr. Takashima is Incharge of the particular work. Whatever information/ Data collected earlier is homework for the same. Our Engineers colleagues will come after few days.

### Causes of Landslide:

HM : There is lot of pressure to forest due to poverty. Forest is the only resource left for the poor people. People depend on forest for firewood, fodder, and timber. Such a heavy pressure to forest has been a major cause for the disaster. So in order to reduce the disaster, there should be an effort to reduce pressure to existing forest.

[ It is true that there is heavy pressure to existing limited forest of the area. There is no alternative for firewood, timber and fodder. It is their compulsion to depend on nearby forest. As a result, number of livestock raising has been decreasing in many parts of Nepal and it is true to some extent in Namtar too. But there are ways to increase the existing forest without the support of the outside. It does not need any large support from outside to conserve the forest. Dept of Forest with the assistance of many external donors is always encouraging the villagers to manage the forest themselves. All the Forest Offices located in district headquarter can provide the necessary seedlings, other necessary materials and technical assistance if villagers are willing to do it. It is basically commitment from the villagers themselves and regulate for themselves. For such purpose, it does not need external assistance. There are several such good example in the hills of Nepal. Presently, Dept of Forest has Community Forest act and Leasehold forest act which enables the villagers to manage their forest themselves.

But I am surprised why people of Namtar have not started the community forestry. It is common these days to start the community forestry in villages of Nepal. Community forestry is the national policy and it has been encouraged by the Dept of Forest. ]

HM : The practice of gum (KHOTO) collection from the pine tree (?) by the Contractors have also contributed for the deforestation in Namtar area.

[ After few years of gum collection, tree become very vulnerable for many diseases and finally it dies]

HM : Education also plays a vital role in community development or disaster prevention. Awareness level is low in the area due to illiteracy.

[ It would have been better if we could have literacy level of the area. But there is no way out for the data.]

HM : If there were small scale cottage industries in Namtar, it would have been easier to provide the employment. Or few agricultural activities were improving, the pressure to forest would have been decreased. But all these activities are not possible mainly because of road facility in Namtar.

#### Priority Projects in Namtar

GG : So will it help to Namtar?

HM : Yes all these activities should have road facility . If there is road, it will provide the oppurtunity to develop these activities which I said.

[ It is true that market assessibility is one of the pre requisite for any cottage or agriculture production. For cottage industry, even electricity is must. If not production cost will be very high. As a result, it can not compete with other production in the market.]



HM : Transportation is the main infrastructure needed in Namtar at presently.

GG : What other possibility exists in Namtar for income generation ?

HM : There are several. Without road it is not possible. First of all, there should be road. If there is road, people, can be encouraged to take part in other activities which finally reduces pressure to forest. As a result, people will start new things, and their life style may change.

In Namtar, road is a must as said earlier. Similarly, electricity, skill training, and so forth. People should be given alternatives, if not they will follow traditional way of living.

[ Here traditional way of living means may be, largely depending on forest as now]

TK : We are just a private Consultant trying to make a plan which should be attractive. We can just write the report. Regarding implementation, it depends upon the project and Japanese Government. Japanese government will select projects on the basis of project. This project will be compared with other projects. So basically, it should compete with other projects. In order to compete with other project, we ought to know the right need of the people of Namtar.

But it seems we can not widen the road from Churiya to Namtar. We may try to protect the landslide area if it is taken.

HM : People expect Chuniya-- Namtar road to be improved. People also demand electricity. They think they are the primary projects.

HM : People here also wants immediate relief. People may come and ask for immediate relief but it is due to their ignorance. It should not take it otherwise. It has become the habit of the people to ask for immediate relief. It is purely because of their ignorance.

Kattel : What is the attitude of the people here?

HM : All the villagers want benefit. Take the case of school building construction. We asked for volunteer labour. No one came to participate. Then there was <sup>water pipe</sup> pipe from Swiss Disaster Relief. Then what we did is, we negotiated with Swiss Disaster Relief and said to people that if you want this pipe, first you should provide volunteer labour to school building. Once the school certifies that they have completed their participation, then only Swiss will provide the pipe. Similarly, it was completed.

We should be able to attract them. If not they will not take interest.

Kattel : If govt says, Govt will provide fifty percent and the rest should be from people's side. What will be people's reaction here?

HM : Govt or any project should have check and balance system.

[ May be check and balance means as he did for water pipe. Or first you provide volunteer labour then we will provide you water pipe.]

11/8 DDC member  
VDC member  
↓

Kanchan : People are hoping for many things. For the disaster of 1993, we people are also responsible. We have slash and burn system. Tamangs collect gums from pine tree. Tamangs prefers slash and burn agriculture system in the conception that there will be higher production. It is also true that Tamangs have limited land and they are illiterate. Among Brahmins, there is feeling of non cooperation among themselves. Brahmins are zealous among themselves. We lack unity.

[ Mr. Kanchan himself is a brahmin. So he used the word "we"]

Kanchan : I think you need to tell the people about slash and burn. They do not listen us very well.

[ I think Mr. Kanchan is talking here about slash and burn system]

HM : I think, it is not an ethnicity problem rather it is due to poverty. Instead of Tamangs, if it was even Brahmin having very little land, they would have done slash and Burn system like Tamangs. So it is not an ethnic matter rather matter of poverty.

And also, Tamangs have poligamy system. They bring wives if they can manage the new land.

So new projects should be able to provide the new oppurtunities to the new generations and mobilise them.

Kanchan : We have still old tradition.

HM : One Japanese visited our school and when we asked him to write something in our visitors book. He wrote only three words :

" No More Disaster"

What did we do for that " No More Disaster". I think we should go towards that line. We should go towards disaster prevention and go for community prevention. Namtar should be turned into a model.

Kanchan : I think, there should be some sort of training such as knitting, weaving, farming , carpentry and so forth. We are unknown about it. There is no one to guide us.

Kattel : You should be aware yourself.

### Migration

There was migration from Namtar to Hetauda (or Tarai area) but in smaller number and generally it was relatively richer people. But after 1993 disaster, even poor people have started to migrate towards tarai. 20 percent of Tamangs have migrated to Kathmandu for carpet weaving job. Those who are in Namtar are in confusion weather to migrate or to remain in Namtar. May be 50 percent are in process to migrate from Namtar.

[ Percentage given here is sort of wild estimation]

Kanchan : In my opinion, it is true that 1993 Disaster has increased the migration rate or in process. But after completion of three key projects namely Suspension bridge, High School Building, and and restart of Chuniya-- Namtar road should have difenitely contributed to check the migration from Namtar.

Meeting concluded around 1930.

NAMTAR (2)

VENUE : Sub Health Post building, Namtar

DATE : 1 May 1996

TIME : 08.00 Hr.

Discussion with Rural farmers of Namtar.

[ Previously, it was planned to have Focus Group Discussion with rural farmers regarding their development need. But many farmers like to participate and we could not deny them to participate. So it turned to a discussion to whom we have called here "GAUN SALLAHA" meaning village discussion and agreement.]

GG : Thank you all for coming for the meeting. We know that you all are extremely busy in your agricultural work. Despite of that you have come to this meeting. We will try to complete the meeting as soon as possible. So that you can go back to your work.

Let me start with introducing my three colleagues here. Here is Dr. Takashima who has come all the way from Japan. He is responsible for the community development plan. I have next friend Mr. Tondon and Mr. Kattel. Mr. Kattel represents Dept of Soil Conservation at Kathmandu. And my name is Ganesh Gurung. Many of you know me or atleast seen me here who asked several tiring questions with you in my last visits.

Let me give you a brief introduction of the project. Or why are you gathered here, why we asked you to come here. What is it after all.

After the disaster of 1993, His majesty's Govt of Nepal requested the Japan Govt to assist the Nepal govt in the disaster area. In response to that letter, Japan govt wrote that prior to say yes or no, we would like to send a study team who will conduct a study and submit a report. After studying the report, then only we will say Yes or No.

So we are the study team. Our job is to prepare a attractive plan and to make an attractive plan, it should be realistic and beneficial to many people. It should be also cost effective as much as possible. So we need your help to prepare a realistic as well as attractive.

How many of you have been interviewed earlier by our team?

Ans : 13 of us

[ We asked to raise the hand those who were interviewed ]

PP : In Namtar, there is no job oppurtunity. We need job. So that we can feed our children.

GG : What is the most needed development program in this area?

PP : All weather road from Chuniya to Namtar. It is the first project. It will open door for all other new oppurtunities. People can go to work even other places.

PP : Vegetable farming can be developed if there is all weather road. Presently out of twelve months, road can be used only 4 - 6 months. Other months road can be used due to lack of maintenance. Every year, after the mansoon DDC Makwanpur somehow manages bulldizor from private companies ( such as HAZAMA, Chinese Contractors and so forth) and clears the road for few months.

[ Few minute it was quite. It seems it is the consensus and this man seems as leader of the area too. Other participants are not speaking because they agree the idea.]

GG : You said road is the most important project. What about your participation or what will the role of the beneficiaries?

PP : If it is road, there will be definitely people's participation.

[ Here people's participation means volunteer labour]

GG : What about land, tree, canal and so forth which may fall in the road. Because people may say that we don't want to provide or we should get maximum compensation.

PP : No it will be our part to convince those people. We are ready to even make a contract for such arrangement.

[ Every one agreed to have road project]

GG : Why do you want road ? Do you think it will help? Don't you have other priority than this/

PP : For any kind development, we need road. Road is a must. Even for marketing of vegetable, for emergency hospital services, we need to have road.

[ I got the impression from the meeting that they all think road is a pre requisite for any kind of development]

GG : What do you prefer in second?

PP : Irrigation

GG : Where?

PP : We had an irrigation system in namtar which is washed away by 1993 disaster. We want that irrigation system to be rehabilitated.

GG : So far, I know that there is land slide and it is very big. Even though, we construct this year, during the rainy season it may wash away. How do you propose to construct the canal if it is to be constructed ?

PP : It should be taken to other side of the landslide which is Dhungyan village and again it can be brought back towards Namtar side.

There are also two other small irrigation schemes which were damaged by 1993 disaster yet it has not been rehabilitated such as Simle Dhungyan and Gaire gaon- Bhalutar irrigation Scheme.

GG : Will it be sufficient water ? if not it can create more conflict in the village than income generation ?

PP : There is enough water for irrigation. It was old system. Only thing it needs is rehabilitation. Prior to disaster, water was being used without any conflict.

[ It seems consensus regarding this. ]

GG : What is your third priority ?

PP : Electricity

PP : I do not need electricity. We the poor need industry to get employment opportunity.



PP : We have demanded for irrigation.

PP : I do not have land What is the use of irrigation for me ? It is good for richer people who do have land. My land is washed away by flood. Give land first.

PP : If there is electricity, there will be industries.

PP : I do not think there will be any industries coming here eventhough elctricity has been installed.

PP : What about development priorities we reported last time ?

GG : We have it. But you are free to change it if you want.

PP : Let us listened it first. If it not appropriate then we will change it.

GG : First priority----- Chuniya - Namtar road.  
Second ----- Irrigation  
Third -----Electricity  
Fourth -----Protection  
Sirse river and reforestation.

[ all the participants had their discussion for awhile regarding these priorities. They had short debate. Finally all agreed the previous priorities]

PP : We agree prior development needs. It represents our minds.

GG : Let us go back once about your electricity need ?  
There are three options for it in my opinion.

1. Extension of line from Chuniya
2. Micro Hydro
3. Biogas

PP : What is mirco hydro?

GG : It is separate power generation in Manahari river and managing by the people. You are not depended to central system. No load shedding.

[ Participant had their own discussion for a while]

PP : Biogas is not new for us. There were few biogas plants in Namtar before the disaster such as Mr. Kanchan had. And still there are two Biogas plants which are functioning well. These biogas belong to Mr. Pathak and Badri Bartaula.

PP : We prefer to have micro hydel plant instead of extension from Chuniya.

PP : We all want road, rehabilitation of irrigation schemes, electricity ( micrc hydro ) and protection from Manahari and Sarse river.

GG : Ok, I would like to repeat once again that we are not making a commitment rather it is a study. It may or may not be implemented ? Let us hope that it will be implemented and you all will be benifitted.

*Mr. Kanchan's biogas was not successful.  
Too big facilities by ~~state~~ that was blocked, the state  
loan to pay back.*

Our Engineer colleagues will come and explore about the feasibility of your request. For your information there should be technically and financially viable for the implementation.

Mr. Kattel : It all depends on Japanese govt to accept the project or not . So it is not yet decided. You all should understand the situation.

PP (new comer) : Our first priority is dam in Sarse river. If this can be done, it will benefit to many people.

GG : You came very late. And we have noted down that first priority is road , electricity, electricity then only prevention in Manahari and Sarse.

PP(new comer) : No. No. Yhe idea of road, electricity, and irrigation is not the demand of the area.

GG : Why do you think so? Dont's you need this projects in this area?

PP(new comer): Road, Irrigation and Electricity are not the priority for the Japanese.

GG : Why?

PP(new comer): Because it is the job of His majesty's Government of Nepaal.

GG : Where do you live ?

PP (new Comer): My house is in next village which is also Namtar.

PP : He lives in Hetauda.

[ Later it was known that he comes from next village and lives in Hetauda. He is a one of the rich man of Namtar who lost his land due to flood in Sarse river. He has vested interes to say dam in Sarse river]

GG : Ok. Let us conclude the minute. You have to go for work. Before I conclude, let me tell what I have understood ? from the this meeting.

Your priority are 1. Improvement of existing Chuniya- Namtar road, 2. Rehabilitation of three irrigation canals 3. Electricity and 4. Protection from Manhari and Sarse River.

Do you have any ammendments in these priorities ? If so let me know now.

All the Participants : We all agree.

GG : Thank you all for your time on behalf of Dr. Takashima too.

Meeting concluded .

NAMTAR (3)

VENUE : Sub Health Post, Namtar.

DATE : 1 May 1996

TIME : 14 30 Hr.

PARTICIPANTS : Rural Women of Namtar.

RW : Rural Women

TK : Dr. Takashima

KATTEL : Mr. Kattel of Dept of Soil Conservation.

GG : Have you been to this building before ?

RW : Three of us have been here.

GG : What was the purpose?

RW : To get treatment in the Health Post.

GG : No. No. What about coming here for meeting to discuss about any development.

RW : No. We had never such chance

RW : Genarally our husbands come and discuss about it. We do not come.

RW : Why women need to come

RW : Men are good enough

GG : What do you think when you are consulted ?

RW : Great.

RW : We feel proud

RW : Why should we be consulted ? We know little about it. We women may make some some mistakes

RW : No. No. We should be also consulted. Why do you think that way. It will be good if we are consulted.

RW : We do not have much time from our household chores. You manage the household chores or go for meetings. Even to come today, we had problems.

[ It is true that no one had come for any meetings in the past. If they had come to this building, it was for treatment. So it is first time in their life to attend a meeting for the development of Namtar.

Because of their illiteracy and ignorance they feel that it is not their role to participate in the meetings. They have an understanding that development of Namtar is the job of only men]

GG : Ok. Let me introduce my colleagues first.

GG : Let me also tell you the reason why you are requested to come here. We are trying to make a Community Disaster Prevention Plan for Namtar. To make this we need to know your difficulties, problems, strengths and also thinking.

If we know it, it will help us to think better programs. We do want to know from women also and not only men. Your names are not important for us rather your opinions are important for us. We will not record who said what rather only opinions to make a project a realistic and beneficial to larger populations.

We want to design "your project" not "our project" and such project should owned by the beneficiaries.

GG : Can you answer me two questions. One what is your problem. It can be individual and household level. Second, what is the problem in Namtar ? Or what is needed in Namtar ?

RW : I did not understand ?

GG : You can also understand this way. If you are asked to choose five development projects for Namtar ? What would you choose ? Or what would make your life easier ?

RW : I have problem to feed my children.

RW : No employment.

R W : No land. 1993 disaster washed away all land.

RW : My house has been demaged. I do not have money to repair it.

RW : No food to eat.

RW : My house is about to wash away by the landslide. Presently my house is very close to landslide. It is coming nearer and nearer every year.

RW : I have taken loan. No money to send children to school.

RW : No drinking water.

GG : Ok, we heard your personal problem. Now , we understood your problem. It seems you have many problems. Can we forget this personal problem for a while and think about problem of Namtar now ?

If you were to demand projects for Namtar what would you demand ?

RW : There are many problems here. Which are the most important ? We do not know ?

RW : Everything is problem here.

RW : We do not know what to say. Please teach us to get food.

GG : Teach us to get work.

RW : We need road, drinking water, electricity and many other things.

RW : Why do you need these projects ? Or why did you choose these ? You could have choosed other too ?

RW : When there is emergency (like some get sick), it is problematic. So we need road.

GG : Do you have any idea how much money is needed to construct the road and what will be your role.

RW : No idea. Only we know is it needs much money.



- RW : We need in fact knitting and sewing training, Cottage industries, food, and employment.
- RW : We need resettlement program. We need land.
- GG : What about forest. How far you have to go to get a load of fire wood ?
- RW : Firewood is relatively difficult than water.
- GG : Is there any Mothers group or women group in the village ?
- RW : No.
- RW : We want road, drinking water and electricity.
- KATTEL : If you get a fixed of money, where do you use it?
- RW : Road first.
- RW : We also don't know where to use it ?
- KATTEL : How many of you are planning to migrate to other places ? Or in process ?
- RW : Eventhough we sell everything, we can not buy land in other places ?
- RW : There were many after disaster of 19993. But there are not much. May be one or two be thinking.
- RW : I would have migrate if I could have. But, I do not have capacity to migrate. Without capital. my life can be even worse than here especially in tarai like Hetauda.

RW : Here everybody are interested to migrate but there is no money to invest in tarai. Without investing money, life is terrible in tarai. It is better to be here.

RW : As you asked earlier, what benefit we will have if we have road ? We can transport the vegetable easily to market.

RW : What program you have for landless people?  
Will there be land ?

GG : We can not distribute the land. I think it is the responsibility of Nepal govt rather than such project. Our purpose is to prepare community development plan rather to distribute the land.

GG : We heard a lot from you. We understood that there are several problems and you want thes to be solved. Please keep in mind that it can not be solved by outsiders only. You have to play a greater role than any outsiders. You will have to do your development by yourself rather than any other people.

You all have said different views. Let me consolidate and prioritise the needs.

You have said road, drinking water, electricity, knitting and sewing training, land, cottage industries, food and so forth. But if you were to ask by ranking, what would you say first , second, third and fourth.

RW : Road, Drinking Water and Electricity

[ After discussion among themselves, all agreed. Basically, due to illiteracy and ignorance, they are not aware of their own need also. It was very difficult to make them speak. Eventhough, every effort was done to make them speak]

GG ; We asked you many questions. Please if you have any questions, please ask us.

[ No response. ]

RW : In fact we do not know what to request and what not to request. You know problem of the village. So you provide us whatever is good for us. But we need development.

GG : Thank you for your time and suggestions. On behalf of the team. Thank you.

Meeting concluded.

NAMTAR ( 4 )

DATE : 2 May 1996

VENUE : Sub Health Post Building, Namtar.

TIME : 08 00 hrs

#### DISCUSSION WITH KEY PEOPLE OF NAMTAR.

GG : Ok . You all know the purpose of our visit and I think, I should not waste the time in repeating the same think. So let us proceed the main discussion.

In order to develop the socio- economic status of the people of Namtar, what are suggestions you have since you people are key as well as knowledgeable persons of the area. Please try to think about your role also, not as gift project. And also cost effective type covering more poorer section of the society. Larger the poorer section of the society better the project.

KP : First of all let us think what contributed for such disaster in our area ? Now, we can think of only one thing that is deforestation. We should improve forest also.

GG : Do you have Community forest in the area ?

KP : Not really. There are some forest being managed by some villages. we have heard about it but not really done any community forest.

GG : But in order to make any community forest you do not need much resources. And villagers can manage by themselves. It is just to prepare a regulation and implement the regulation among the beneficiaries. Furthermore, there are several govt and non govt organisations to assist for needed technical support too.

Only thing you need is people/ beneficiaries should be ready to implement the community forestry concept in their own forest.

KP : Let me tell something about the Community forestry in the village. We have a community forestry in Hetauda (Nawalpur) in an area of about 500 hectare of land. It was natural forest before we started. There was already a forest but we took the responsibilities to conserve it and use it. We have very strict rules and regulations regarding the use of the forest. If somebody violate the local regulations, s/he will be punished according the regulation. We open the forest four times of the year. We have taken care of the need of the people. Everyone of the committee has functions. We have a forest Users committee approved by the District Forest Office. As a result, presently we sell timber of approximately 2-3 00,000 . We have also nursery which sells seedlings every year. Because of income, we have allocated salary to Chairman and Forest Gurd who are full time staff for the forest.

We also provided timber to its members in very subsidised cost. We have bank balance of 200,000 Nepali rupees. We also went to Kathmandu and presented our working procedure in a seminar, which was beneficial to many other organisation. Why not people of Namtar also benefit from our experience.

[ This gentleman is from Namtar. he migrated from Namtar to Nawalpur (Hetauda) many years back. But according him, he has still his house and some land in Namtar. He visits quite frequently to Namtar. Because its his birth place.

---

NOTE: TK : Dr. Takashima. GG : Ganesh

K : Kattel

KP : Key Person

KP : We may also get an opportunity to go to Indonesia to see some similar projects in Indonesia. Since this is my birthplace, I would like to help here if I am any helpful to Namtar

GG : What a good story. I think it is a perfect example of participatory development. It fulfilled the needs of the beneficiary, it generated the income and finally it helped to maintained the environment of the area too.

But the thing is, as I told earlier, you don't need any big thing to start the community forest. There is a community forest act which enables you to have community forest. Only thing you need is common understanding among the beneficiaries. Why the people of Namtar have not started ? This surprised me very much.

[ Name of the person is Gopi Nath Upreti who comes from Namtar itself. But migrated to Nawalpur pf Hetauda]

KP [Gopi Nath] : First work you should do is form a Forest Users Committee. Then you get ball rolling.

Then please let me know. I can act as advisor for you people atleast for the beginning. I will be very happy to help to organise all.

KP : Let us have meeting right this coming saturday with al our brithers and sisters. Let get their opinion.

KP : This coming saturday is very short. Let us fix for next sturday.

KP : No. If we conduct the meeting this saturday, Gopi Nath will be here who can advice us and tell the story.

GG : Let us go back to our main agenda. Ok What are your development needs in Namtar ? We have discussed same thing with women and men group. Let us hear from you knowledgeable persons ? Please try to give us rationale of the need also. Or why you think necessary ? And it should be not only possible but also feasible such as financially, technically and socially. If you can tell us your role also in your proposed need, it would be better.

KP : Basically, there is need of economic upliftment in Namtar. For this, there are many potential income generating projects in Namtar. These projects are not feasible due to lack of road. So we need road.

KP : As we have already given to previous team also. Our main needs are improvement of the existing Chuniya-Namtar road. Without it no market assesibility will be there.

Irrigation is our second priority. It will increase the production of the area.

Third we want is electricity.

Fourth one is protection from two rivers e g Manahari and Sarse.

KP : If we have road, irrigation, electricity and protection from rivers, we will have all infrastructure for the development. Then any thing is feasible in Namtar.

KP : Now we have vegetable every year, due to lack of assesibility of road, we can not take it to market eventhough Hetauda is so close. So we are discouraged to produce the vegetable.

KP : We need assistance for the school. We can not miss it.

GG : What do you need in school ?

KP : Student come from far away. If there is School hostel, it would be very convinient for the students coming from far away.

KP : I feel good about this proposal, because I am a teacher of the school.

[ There was debate among themselves about prioroties. Some argued but it was not that strong. Finally they all agreed the proposed development needs and even priorities. It seems they had discussed earlier regarding the development needs.]

[ It is interesting to hear that key participants said that we have many needs like literacy program, awareness program, biogas, school hostel, drinking water projects, teliphone etc but these are small budget project. We can find money from many other sources. But there are no such organisations who can provide money for road, irrigation and electricity. So we should try to get from JICA. Other small things we can try from other small organisations. Ask the demand according the client/donor. "HATTI LAI JIRA " It is a Nepali proverb which says that don't give cumin to elephant. ]

GG : OK, we understood your development need. But one thing let me ask you. Every project wants to benefit maximum to poorer sectction of the society. How do you think your projects will benefit to poorer section of the society? Or in other word, are we trying to benefit to richer people of Namtar ? I am just anxious to know it.



KP : May be there should be different approach to tackle to poorer section of the society. There should be different programs for it. Or there should be some other programs simultaneously.

KP : Who do you mean by poorer section ?

GG : Best example is, How do you benefit to landless people by road, irrigation and electricity ?

KP : Those landless people's most need is employment in the village. If there is road, irrigation and electricity, they will get employment. This is how they will benefit by the proposed development needs.

KP : Do you have any program for victims of 1993 disaster in terms of relief ?

GG : No

GG : What about your role in the proposed projects ?

KP : We will contribute by labour. We are poor . So we can not afford in cash. And also we will take the responsibility to manage if there is any conflict such as land for road, and so forth.

KP : It is difficult for us to share the cost of the project, but we can contribute in terms of volunteer labour.

KP : We can also provide the land needed for the road and if there is any conflict about it , it will be our responsibility to manage it.

[ People of Namtar seems quite clever that they say their development need according the donors. They are willing to have many other programs but here they want only big structure project with Japanese side. ]

GG : You proposed few development needs. Do you have some other comments or anyone has different idea than proposed one.

KP : No. We all have same opinion. We do not need to discuss anymore regarding the development need.

KP : Yes, we do not need to discuss about it.

KP : When does it start if the project is to be implemented ?

GG : Atleast it takes one to two year if everything goes well.

GG : Is there anything you would like to ask us or Dr. Takashima. Please you can ask us.

KP : No we agree all the proposd development needs if possible.

KP : We hope this project will get success and implemnted in our area. This will definetly benefit

GG : Your development needs have been same as previously said to our colleagues who visited earlier.

GG : From our perspective, we are thinking evacuation system in case of emergency.

KP : It would be nice if such system can be arranged here.

GG : We heard that there was problem for Helicopter to land in the Namtar. May be one is to have helicopter landing areaa and safer place for evacuation place.

GG : We heard the story of Small Farmers Development Program. It was surprising to know that it failed here. We are also trying to know why it failed.

GG : Our colleagues Dr. Badri Adhikari and many other colleagues will come here to know about the different subjects. Many of them may not consult you and some of them may want to know something. Please we request to help them.

GG : Thank you for your participation.

Th end.

## Name of the Key Persons.

1. Mr. Ganesh Kanchan Social Worker and <sup>2X-</sup> V DDC member.
2. Mr. Tulsi Thapa Head Master of Kalika School
3. Mr. Arjun Bartaula Asst Head Master of Kalika School
4. Mr. Ram Pd bartaula Teacher
5. Mr. Rajeshwor Pandey Teacher
6. Mr. Guna Raj bartaula Farmer - Jyarpur.
7. Mr. Hari Pd Bartaula Farmer - Namtar
8. Mr. Gyan P. Bartaula Bussiness - Namtar
9. Mr. Udhav Parajuli Farmer - Jyarpur
10. Mr. Gopi Nath Upreti Farmer - Migrated to Nawalpur.
11. Mr. Hari Bansh bartaula Farmer - Jyarpur
12. Ms. Nani Maiya Satyal MCHW - Namtar Sub Health Post
13. Ms. Sita Bartaula Housewife- Jyarpur.
14. Mr. Shri Ram Bartaula Farmer - Jyarpur
15. Mr. Mahesh Sibakoti Student - Namtar.
16. Mr. Subba Bartaula Farmer - Tilar.

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**REPORT  
ON GEOLOGICAL INVESTIGATION  
ON KULEKHANI RESERVOIR**

**JAPAN INTERNATIONAL COOPERATION AGENCY**

**REPORT  
ON  
GEOLOGICAL INVESTIGATION  
OF  
KULEKHANI RESERVOIR**

**PREPARED FOR:  
JICA DISASTER PREVENTION STUDY TEAM  
JULY, 1996**

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## 1.0 INTRODUCTION

The Field Investigation on Kulekhani Reservoir had been carried out by Soil, Rock and Concrete Laboratory, NEA (Engineering and Geotechnical Services) according to their agreement of May 28, 1996 on this subject with Disaster Prevention Study Team of Japan International Co-operation Agency. The scope of works covered in this Agreement includes mobilisation of boring machine with special sampling accessories suitable for sampling soft material, storing the samples in the acrylic tubes as well as in the polythene bags sampling of sediments at four locations in the Kulekhani reservoir (as indicated in figures 1 and 2), prepare a geological log of the sediments, carry out gradational analysis of the collected sediments and prepare a comprehensive report with an elaborate photographic presentation. In addition, the sampling of bed load and its gradational analysis was included in the scope of works in the later part of the investigation programme. The site mobilisation for the field exploration had been started in the beginning of June 1996.

The work consisted of the following main activities:

- Sampling by rotary boring
- Bed load Sampling from open pits
- Laboratory testing and analyses.

The field exploration consisted of rotary drilling with the use of suitable accessories and applicable technology in the reservoir area for collecting sediments samples from various four points in the reservoir, collection of samples of bed load from various points along the Kulekhani river as well as from various tributary rivers for testing and analysis in the laboratory.

The field investigation had been carried out for a period of about 7 weeks in the months of June and July 1996.

The Laboratory investigation included gradational analysis of the sediments including the bed load and the mineralogical studies of the sediments.

The locations of the Sampling points are presented in figure 1.

## **2.0 SEDIMENT SAMPLING**

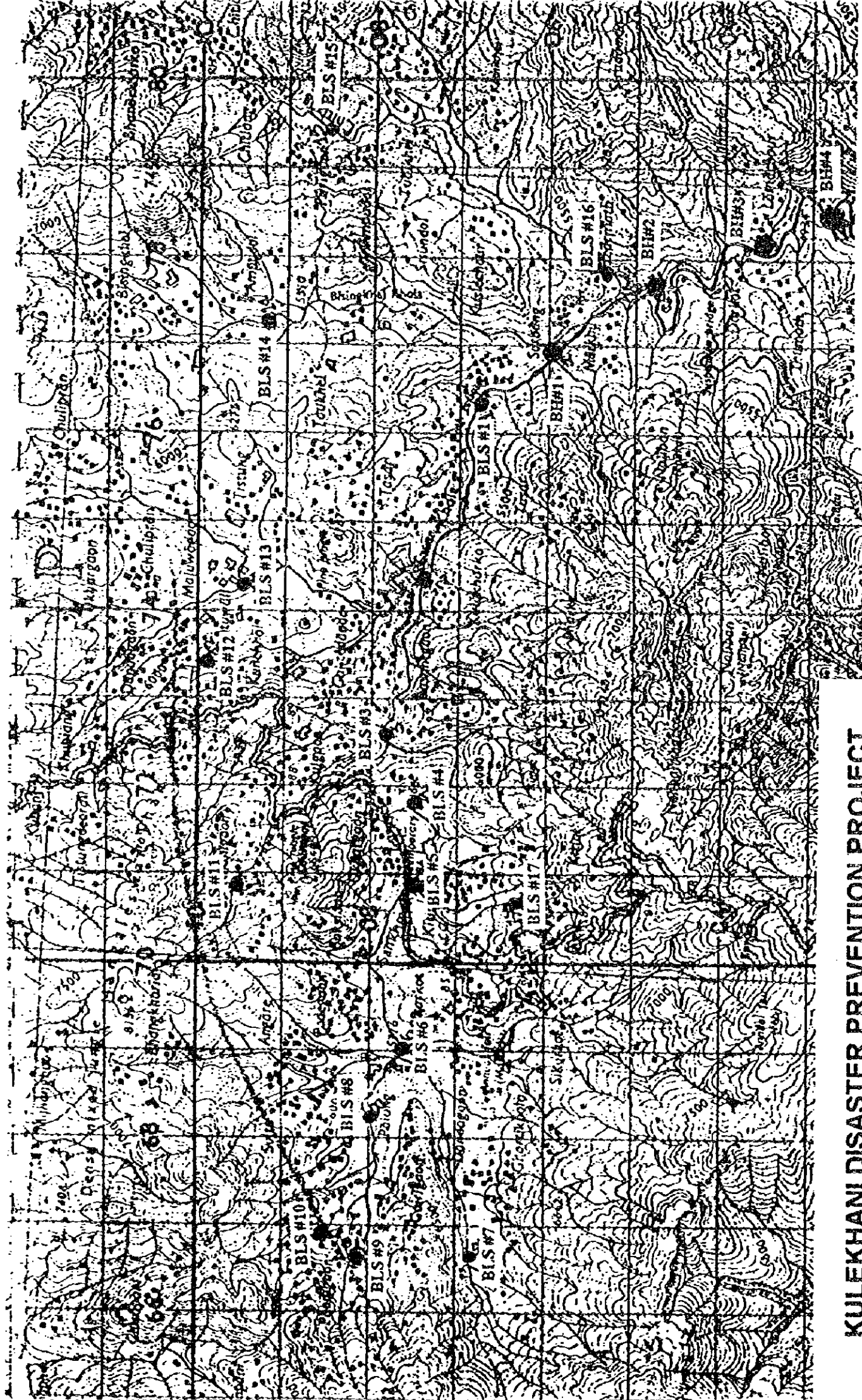
The type and volume of investigation carried out during the course of sampling has been presented hereinunder.

### **2.1 Selection of Sampling Points**

The sampling points had been fixed by the Disaster Prevention Study Team as shown in figures 1, 2 of the agreement as well as in figure 1 of this report. Samples had been collected from the respective points of the reservoir area as well as from various locations at the river bed of either Kulekhani river or its tributaries feeding the reservoir (Chitlang Khola, Bisinkhel Khola, Chilipran Khola, Kunchal Khola, Khanigaun Khola, Palung Khola, Kiteni Khola).

### **2.2 Sampling by rotary boring**

The sampling by rotary boring had been carried out at four points located in the reservoir. The details of boring are presented in Table - 1.



**KULEKHANI DISASTER PREVENTION PROJECT**  
**KULEKHANI BASIN**  
**SEDIMENT SAMPLING LOCATION**

FIGURE - 1

**LEGEND**

BH

BORE HOLE LOCATION

BLS

LOCATION OF BED LOAD SAMPLES

**Table - 1: Details of Boring**

S No	Location	Hole Number	Depth, m
1	Upstream part of the reservoir area at an elevation of 1518 m	BH-1	13.05
2	Upstream part of the reservoir close to confluence of chitlang khola at an elevation of 1502 m.	BH-2	10.30
3	Middle part of the reservoir area at an elevation of 1466 m.	BH-3	10.00
4	Downstream part of the reservoir area in front of the Intake at elevation of 1462.5 m	BH-4	20.00
5	TOTAL		53.35

The total linear meters of boring in sediments had been 53.35. During this process, up to 48.00 m of special casing of 150 mm diameter had been placed between the water surface and the sediment. The bore holes are logged and photographed. The core logs are presented in Appendix A, the Grain Size Curves in Appendix B and the photographs are presented in Appendix C.

### 2.3 Sampling of Bed Load

Sampling of bed load by open pit excavation comprised of the following steps:

- identification of the location of bed load sampling

- marking of 1 m x 1 m square on the bed by paint
- Taking photograph of the bed load sampling area
- stripping of the sampling area to a depth between 5 and 10 cm
- discarding large bed material larger than 50 mm in diameter
- Taking photograph of the bed load sampling material
- collection of about 30 kg of the bed load approximately from the middle part of sampling area

A total of 17 numbers of bed load samples from different locations as shown in the Table - 2 were collected.

**Table - 2: Site-wise distribution of sampling points**

<b>Sample No.</b>	<b>Location</b>	<b>Elevation (m)</b>
1	Kulekhani Khola near NEA Guest House at Markhu	1535
2	Confluence of Palung Khola and Kunchal Khola	1620
3	Confluence of Palung Khola and Khanigaun Khola	1650
4	Palung Khola near Okhar Gaun	1735
5	Palung bridge nearby the confluence of Palung Khola and Kitini Khola	1750
6	Confluence of Palung Khola, Gharti Khola and Phedigaun Khola	1790
7	Gharti Khola near Ghartigaun	1800
8	Phedigaun Khola, Palung Phat Bazar	1805
9	Dhungakate Khola near Pakhatol	1815
10	Bhottekorla Khola near Phedigaun	1810
11	Khanigaun Khola near Khanigaun	1830
12	Kunchal Khola near Kunchal village	1700

Table - 2: (Continued..)

Sample No.	Location	Elevation (m)
13	Confluence of Tistung Khola and Chiliprang Khola	1705
14	Bisingkhel Khola near Nulgaun	1700
15	Chitlang Khola near Chitlang village	1720
16	Chitlang Khola near Markhu village	1575
17	Kiteni Khola near Kitini village	1845

All the collected samples of the bed load as well as the sediment from the Kulekhanai reservoir had been transported to the Laboratory in Kathmandu for necessary testing.

### **3.0 METHODOLOGY**

The field investigation comprised of sediment sampling by rotary boring as well as by open pit excavation. The works as defined in the scope of works had been carried out according to relevant International Standards.

The methodologies of each type of investigation have been presented in the following paragraphs in more detail.

#### **3.1 Sampling by rotary boring**

Core boring had been carried out per ASTM Designation D-2113-83 standard procedure using conventional drilling method and special sampling barrels as "N 66-50 Double Core Tube" and "[NSR] [NS] type double tube core barrel". Boring had been carried out telescopically with the special type casing (6" dia. made out of steel pipe with flange connection) forming the upper part of the bore hole from the surface of the barge to at least 1 m inside the sediment. Clean water in its natural form had been used wherever washing was necessary, otherwise, boring was carried out without flushing. All the holes had been bored vertically. The drilling machine used had been of Tone boring Machine of UD-5 type for boring bore hole numbers BH#1 and BH#2, whereas the machine used for boring and sampling from within water (BH#3 and BH#4) had been Acker ACE model.

#### **3.2 Bed Load Sampling by open pit excavation**

All the sampling points had already been fixed on 1:25,000 topographic map provided by the Disaster Prevention Study Team. The sampling points at the site were fixed with the help of a topographic map of 1:25,000 scale and an altimeter.



Before excavation of the pit, 1m x 1m area was marked by the white paint and a photograph was taken. First 10 cm of the surface material was removed from the marked area and again a second photograph was taken. Materials larger than 5 cm were removed and about 30 kg of bed load sample from each pit was collected in separate plastic bags, labelled and well packed before transportation to SRC Laboratory in Katmandu.

### **3.3 Laboratory Tests**

The tests carried out on sediment samples of Kuleknani I included gradational analysis and mineralogical study. The tests had been carried out according to relevant ASTM Standard. The methodology of laboratory investigation is presented hereinunder.

#### **Gradational Analysis**

The gradational analysis of the bed load sediment consists of sieve analysis only because of a very low percentage of fines in this sediment. But, the gradational analysis of the reservoir samples consist of sieve analysis as well as hydrometer analysis required for the determination of the gradation of the finer fraction of the sediment. The Grain Size Distribution Curves are presented in Appendix B.

Sieve Analysis is carried out according to the standard method suggested by ASTM D 422-63. Sieve analysis was carried out to determine the percentage of each fraction coarser than 80 micron.

All seventeen bed load samples were subjected to sieve analysis. Similarly, the samples of reservoir sediments were also subjected to sieve analysis.

Hydrometer Analysis was carried out on each sample

containing more than 15 percent of material finer than 0.08 mm size for the quantitative analysis of the finer fraction.

A total of 36 hydrometer analyses were carried out during the course of sediment test and analysis.

#### **4.0 LABORATORY TEST RESULTS**

The laboratory investigation includes tests on the gradational as well as mineralogical analysis of the sediments. The results of these analyses are presented separately for the bed load, sediment from the upstera part of the reservoir and the sediment from the downstera part of the reservoir. The results of laboratory investigation are presented in Tables - 3, 4 and 5 respectively. The mineralogical analysis of the sediments is presented in Table 6. The results of laboratory tests and analysis are presented hereinbelow.

##### **4.1 Bed Load**

As mentioned above, seventeen samples of bed load from various rivers and streams in the Kulekhani basin had been collected for their gradational analysis. All these samples were subjected to sieve analysis. The results are presented in table - 3.

The samples of bed load vary from sandy gravel to gravelly sand. The material grading varies from well to poor. The percentage of fines in the bed load is generally very nominal with the majority of the values lying below 2.

**Table 3: Results of Sieve Analysis of Bed Load**

Sample #	Sieve analysis Results (%)			USCS	Remarks
	Gravel	Sand	Fines		
1	58.7	38.2	3.1	GP	
2	58.3	38.7	3.0	GP	
3	3.1	96.4	0.5	SW	
4	15.5	84.1	0.4	SP	
5	34.5	64.8	0.7	SW	
6	45.3	54.2	0.5	SP	
7	34.0	63.8	2.2	SP	
8	44.9	50.0	5.1	SW	
9	81.9	16.5	1.6	GW	
10	55.0	41.5	3.5	GW	
11	82.3	15.7	2.0	GW	
12	76.7	20.6	2.7	GW	
13	69.7	26.1	4.2	GW	
14	78.3	20.1	1.6	GW	
15	86.7	12.6	0.7	GW	
16	43.4	54.2	2.4	SP	
17	27.5	71.3	1.2	SP	

#### 4.2 Sediments from upstream part of the Reservoir

A total of 23.35 m of core boring had been done in two locations namely BH1 and BH2 in the upstream part of the reservoir. The elevation of the sampling points had been 1518 and 1502 m respectively. A wireline type Double tube core barrel as well as the special sampling tool (N 66-50 Double core Tube) had been used for collecting the samples of the sediments. Clear water was used as coolant during the boring operation.

The obtained samples were tested on gradation including sieve analysis as well as hydrometer analysis wherever necessary. Similarly, mineralogical studies were carried

out on them.

Representative sediment samples were selected from the material obtained from the bore holes for their tests. All these samples were subjected to sieve analysis. The results of sieve analysis are presented in table - 4.

**Table 4: Results of Sieve Analysis of Sediments  
from the upstream part of the reservoir**

Sample #	Depth, m		Sieve analysis Results (%)			USCS
	From	To	Fraction >5 mm	Sand	Fraction <0.06 mm	
<b><u>BH#1</u></b>						
1	0.00	- 1.50	42.40	52.16	5.44	SP
2	1.50	- 2.65	2.72	75.65	21.63	SM
3	2.65	- 4.00	65.11	23.10	11.79	GP
4	6.00	- 8.00	0.00	64.80	35.20	SM
5	8.00	- 9.55	0.00	55.17	44.83	SM
<b><u>BH#2</u></b>						
1	0.00	- 1.00	1.41	72.30	26.29	SM
2	1.00	- 1.50	0.97	66.94	32.09	SM
3	1.50	- 2.50	0.24	58.85	40.91	SM
4	2.50	- 3.15	35.4	22.70	41.90	ML
5	3.15	- 3.75	21.13	55.08	23.79	SM
6	4.30	- 4.90	42.94	17.78	39.28	GM
7	4.90	- 5.30	51.15	28.14	20.71	GM
8	5.50	- 5.70	51.17	39.20	9.63	GM
9	5.70	- 7.15	22.33	36.82	40.85	ML
10	7.15	- 7.50	14.23	66.87	18.90	SM
11	8.00	- 8.20	0.00	23.59	76.41	ML
12	8.20	- 9.50	6.49	26.12	67.39	ML
13	9.50	- 9.70	0.47	28.06	71.47	ML
14	9.70	- 10.30	21.39	29.22	49.44	ML

#### **4.3 Sediments from the downstream part of the reservoir**

A total of 30.00 m of boring had been done in two locations namely BH3 and BH4 in the downstream part of the reservoir. The sampling had been done from the reservoir with a standing water level varying between 42 and 48 m. The level of water in the reservoir on the dates of sampling varied at about 1508 m. The surface of

the sediment lied at 48 m below the water surface at bore hole No. BH4. Similarly, the surface of the sediment lied at 42 m below the water surface at bore hole No. BH3.

A wireline type Double tube core barrel as well as the special sampling tools such as "N 66-50 Double core Tube" and "NSR type double tube core barrel" had been used for collecting the samples of the sediments. Sediment sampling accessories of NSR type double tube core barrel had been especially useful in collecting soft sediment samples characterised by SPT N values of one and less. Clear water was used whenever washing of the hole was required.

The obtained samples were tested on gradation including sieve analysis as well as hydrometer analysis wherever felt necessary. Similarly, mineralogical studies were carried out on the sediments.

Representative sediment samples were selected from the material obtained from the bore holes for their tests. All these samples were subjected to sieve analysis. The results of sieve analysis are presented in table - 5. Similarly, the results of hydrometer analysis are presented in table - 6.

**Table 5: Results of Sieve Analysis of Sediments  
from the downstream part of the reservoir**

Sample #	Depth, m		Sieve analysis Results (%)		
	From	To	Fraction >5 mm	Sand	Fraction <0.08 mm
<b><u>BH#3</u></b>					
1	0.0-2.5 (Top)		0.00	15.00	84.00
2	0.0-2.5 (Bottom)		0.00	29.00	71.00
3	5.00 - 6.00		0.00	13.44	86.56
4	6.00 - 7.00		0.00	26.18	73.82
5	7.00 - 8.00		0.00	34.87	65.13
6	8.00 - 9.00		0.00	14.40	85.60
7	9.00 - 10.00		0.00	79.60	20.40
<b><u>BH#4</u></b>					
1	0.0-1.5 (Top)		0.00	0.36	99.64
2	0.0-1.5 (Bottom)		0.00	0.12	99.88
3	1.5-2.5 (Top)		0.00	0.59	99.41
4	1.5-2.5 (Bottom)		0.00	0.44	99.56
5	3.50 - 4.00		0.00	1.83	98.17
6	4.00 - 5.50		0.00	0.85	99.15
7	5.50 - 6.50		0.00	2.34	97.66
8	6.50 - 8.00		0.00	0.35	99.65
9	8.00 - 9.00		0.00	3.05	96.95
10	9.00 - 9.50		0.00	2.88	97.12
11	9.50 - 11.00		0.00	4.32	95.68
12	11.00 - 12.00		0.00	10.73	89.27
13	12.00 - 13.00		0.00	0.61	99.39
14	13.00 - 13.50		0.00	13.30	86.70
15	19.00 - 20.00		0.00	23.19	76.81

**Table 6: Results of Hydrometer Analysis of Sediments**

Sample #	Depth, m	Hydrometer Analysis Results in Percents							
		Fraction Passing in mm							
		0.04	0.03	0.02	0.01	0.06	0.04	0.02	0.01
BH#1/S#1	6.00 - 8.05	22.4	15.5	11	10.5	9.3	8		
2	8.05 - 9.55	28.4	19	14.5	10.5	9.3	8.5		
BH#S#1	0.00 - 1.00	15.5	14.2	11.2	9.7	8.5	7.8		
2	1.00 - 1.50	20.1	17.7	16.3	13.3	11.1	10		
3	1.50 - 2.50	41.1	36.2	27.3	19.4	17.4	14.7		
4	2.50 - 3.15	14.1	12.9	11.2	9.9	8.2	7.6		
5	3.15 - 3.75	9.8	8.6	7.7	7	6.3	5.5		
6	4.30 - 4.90	20.8	17.5	13.2	10.3	8	7.2		
7	4.90 - 5.30	14.5	11.8	9.2	7.5	6.1	5.5		
8	5.50 - 5.70	5.8	5	4.3	4.2	3.5	3.2		
9	5.70 - 7.15	24.6	20.3	17.4	12.7	11.3	10.6	7.6	6.5
10	8.20 - 9.50	38.4	33.4	30.6	22.3	18.7	16.8	12.9	12
11	9.50 - 9.70	29.5	23.7	18.8	15.4	13.9	13.4	10.8	9.8
12	9.70 - 10.30	34.3	27.9	23.4	18.2	16.4	15.4	8.7	7.9
BH#3/S#1	0.00 - 2.50 (TOP)	42.4	41.4	36.4	25.5	21.5	17.5		
2	0.00 - 2.50 (BOTTOM)	39.4	34.4	26.5	20	15	13		
3	5.00 - 6.00	44.8	41.8	25.4	17.1	15.1	13.6	10.9	9.9
4	6.00 - 7.00	37.9	28.9	23	16.6	14.1	12.2	10.5	9.5
5	7.00 - 8.00	26.4	18	13	11	9.3	8.3		
6	8.00 - 9.00	43.8	37.9	24.3	15.6	13.6	13.1	10.5	9.5
7	9.00 - 10.00	13.5	12.5	11	9.5	8.8	7.8		
3H#S#1	0.00-1.50 (TOP)	59.5	57.6	53.6	34.5	27.6	23.5		
2	0.00-1.50 (BOTTOM)	59.3	56.3	50.4	37.4	26.5	22.5	19	
3	1.50 - 2.50 (TOP)	55.7	54.7	45.7	32.0	27.9	23	20.4	19.4
4	1.50 - 2.50 (BOTTOM)	39.3	32.9	25	18.6	16.6	15.6	13.9	12.9
5	3.50 - 4.00	53.5	50.6	50.4	40.3	29.0	26.5	21.3	19.4
6	4.00 - 5.50	57.6	54.7	50.7	35	30.9	24	19.3	16.4
7	5.50 - 6.50	55.7	54.7	49.7	30.6	27.9	25	20.4	17.9
8	6.50 - 8.00	61.3	56.7	47.3	33.0	26.4	22	17.9	16.4
9	8.00 - 9.00	55.7	51.7	45.3	27.5	23	21.1	17.4	15.9
10	9.00 - 9.50	51.5	53.7	43.8	28.5	22.5	19.1	16.4	14.0
11	9.50 - 11.00	43.3	37.0	29	19.1	17.1	12.6	11.5	10.9
12	11.00 - 12.00	51.5	57.6	52.7	33.4	26.4	24.5	17.9	15.9
13	12.00 - 13.00	46.8	32.9	22.3	15.1	14.1	13.1	9.5	3.9
14	13.00 - 13.50	44.9	25.5	13.5	11	10.5	9		
15	19.00 - 20.00	20.9	18.2	13	11	9.7	9		



The sediments of the downstream part of the reservoir, especially the sediments from the vicinity of the intake are represented by silts varying from pure silt to slightly clayey silts. These sediments are either non-plastic or their plasticity is very low. The sediments vary from non-cohesive to slightly cohesive.

#### 4.4 Mineralogical Analysis of Sediments.

The sediments collected during the course of sampling had been subjected to petrographical and mineralogical analyses. The petrographical analysis mainly includes identification of rock types in the coarse fraction. The mineralogical analysis includes identification of the minerals in sand fraction. The composition of bed load is presented in table 7.

**Table No. 7: Composition of Bed Load**

Sample #	Rock Types/Composition of Sediment (%)					
	Phyllite	Limestone	Granite	Quartzite	Slate	Sand
1	40	40	-	5	-	-
2	60	5	2	3	-	-
3	2	1	2	-	-	95
4	10	-	20	10	-	60
5	-	-	30	-	-	70
6	-	-	95	-	-	5
7	25	-	20	10	5	40
8	50	10	-	20	10	-
9	85	-	-	5	-	-
10	85	-	-	5	-	10
11	75	15	-	-	-	-
12	85	-	-	-	-	-
13	70	-	-	10	10	-
14	75	5	-	15	-	-
15	60	10	-	15	-	-
16	-	10	-	20	65	-
17	-	-	45	5	-	50

It is evident from table - 7 that bed load sediments are composed of phyllitic, granitic or other material depending upon its location. The finer fraction is composed mainly of quartz sand.

The petrographical and mineralogical composition of the sediments from the reservoir are presented in Table - 8. The results show a clear dominance of phyllitic material in the sediments; granitic material is in the second place.

The finer fraction is characterised by a high percentage of quartz and feldspathic material with some mica derived from the granites of the Palung Massif. The mica is of Muscovite type.

There is a clear dominance of silty material in the sediments from the vicinity of the intake. The percentage of clay is less than 20.



## 5.0 CONCLUSIONS

The conclusions drawn from the results of investigation and also from the discussion presented hereinabove are as under:

1. The size of the sediments consistently decreases from the upstream part of the reservoir to its downstream part.
2. In bore hole BH#3 the deposition of sediments is found to be of cyclic nature with the percentage of sand increasing with depth within the cycle (0.00-2.5m, 5.00 - 8.00).
3. The top 1.5 m of the sediment is represented by fine material in BH#2, below which the material is coarse.
4. Near the intake, the top 12 m of the sediment is represented by clayey silt with the percentage of clay varying from 16 to 20. Below 12 m depth, the sediment is mostly silt.
5. No laminations or beds of deposition could be seen in the sediments.
6. The coarse grained material in the sediment is mostly represented by phyllite and granite. The sand is quartz and feldspathic types.

## REFERENCES

1. **AASHTO - THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS:**

Part-1 Specifications, Thirteenth Edition, 1982

Part-2 Tests, Thirteenth Edition, 1982.

Interim Specifications and Methods of Sampling and Testing adopted by the AASHTO subcommittee on Materials, 1983.

Interim Specifications and Methods of Sampling and Testing adopted by the AASHTO subcommittee on Materials, 1984.

Interim Specifications and Methods of Sampling and Testing adopted by the AASHTO subcommittee on Materials, 1985.

2. **Annual Book of ASTM Standards**

Section 4, Construction,

Vol. 04.08 Soil and Rock; Building Stones, 1986.

3. **ASTM - Special procedures for testing soil and rock for engineering purposes, fifth edition, STP 479, 1970.**

APPENDIX A  
CORE LOGS OF BORING

**BORE HOLE REPORT**  
**BORE HOLE No. 1**

PROJECT: KULEKHANI DISASTER PREVENTION PROJECT  
CLIENT: JICA DISASTER PREVENTION STUDY TEAM, JAPAN  
DRILLING MACHINE TYPE: TONE UD-5  
DRILL HOLE DEPTH (m): 13.05

GROUND ELEVATION (m): 1518  
DRILLED BY: BISHNU P. DHAKAL  
LOGGED BY: J.B. RAMACHARYA  
DATE: JULY 16, 1996

DEPTH (m)	DEPTH	LOG	DESCRIPTION	SAMPLE		RECOVERY %					OTHER TESTS	REMARKS TEST RESULTS	W. LEVEL (m)
				DEPTH, m	TYPE #	REC %	20	40	60	80			
1.00	1.50		Sediments represented by light grey coloured gravelly sand with some fines.			30							
2.30	2.95		Gravels, pebbles and cobbles of weathered limestone and granite in sandy silty matrix.			80							
4.00	4.20					60							
4.75	4.75					75							
5.00	5.75					90							
6.00	6.00		Pebbles, cobbles & boulders mainly of limestone (upto 9.55 m) and boulder of granite at 9.55 - 11.05 m.			30							
7.00	7.00					45							
8.00	8.05		The fines are represented by silty sands.			15							
9.00	9.55					75							
11.00	11.05					60							
11.00	11.90					25							
12.00	12.55		Gravels, pebbles and cobbles of limestone and quartzite.			50							
13.00	13.05					50							

**BORE HOLE REPORT**  
**BORE HOLE No. 2**

PROJECT: KULEKHANI DISASTER PREVENTION PROJECT  
CLIENT: JICA DISASTER PREVENTION STUDY TEAM, JAPAN  
DRILLING MACHINE TYPE: TONE UD-5  
DRILL HOLE DEPTH (m): 10.30

GROUND ELEVATION (m): 1503  
DRILLED BY: BISHMU P. DHAKAL  
LOGGED BY: J.B. RAJRACHARYA  
DATE: JULY 26, 1996

DEPTH (m)	DEPTH	LOG	DESCRIPTION	SAMPLE		REC. %	RECOVERY %					OTHER TESTS	REMARKS TEST RESULTS	W. LEVEL (m)
				DEPTH, m	TYPE #		20	40	60	80	100			
1.00	1.00	[Diagonal hatching pattern]	Silty sand with some clay			75								
1.50	1.50													
2.00						50								
2.50						50								
3.00														
3.15	3.15	[Diagonal hatching pattern]	Gravelly silt with sand			90								
3.75	3.75													
4.00						2								
4.30	4.30	[Circular pattern]	Gravels and pebbles mostly of slate and of granite with sand in silty clayey matrix. It has a pocket of fines between 3.00 and 8.20 m.			50								
4.65	4.65													
5.00						90								
5.30	5.30					40								
5.50	5.50					30								
6.00														
7.15	7.15					35								
7.50	7.50					50								
7.75	7.75					50								
8.00	8.00					35								
8.20	8.20					40								
9.00						40								
9.50	9.50					30								
10.00	10.00													
			Hole terminated at 10.00 m.											





**SRC Laboratory, NEA**  
NEA Engineering Company

**BORE HOLE REPORT**  
**BORE HOLE No. 4**

PROJECT: KULEKIANI DISASTER PREVENTION PROJECT  
CLIENT: JICA DISASTER PREVENTION STUDY TEAM, JAPAN  
DRILLING MACHINE TYPE: ACKER ACE  
DRILL HOLE DEPTH (m): 20.00

GROUND ELEVATION (m): 1460  
DRILLED BY: BISHNU P. DHAKAL  
LOGGED BY: J.B. BAIKACHARYA  
DATE: JULY 26, 1996

DEPTH (m)	DEPTH	LOG	DESCRIPTION	SAMPLE		REC %	RECOVERY %					OTHER TESTS	REMARKS TEST RESULTS	W. LEVEL (m)
				DEPTH, m	TYPE #		20	40	60	80	100			
	1.50		Clayey silt with the percentage of clay varying from 16 % to 20 %.			65								
2.00	2.50					100								
	3.50					0								
4.00	4.00					20								
	5.50					20								
6.00	6.50					30								
	8.00					15								
	9.00					20								
	9.50					50								
10						30								
	11.00					15								
12	12.00			Silt, fines			60							
	13.00					20								
14	14.00					0								
	15.00					5								
16														
18														
19	20.00		Hole terminated at 20.00 m.											

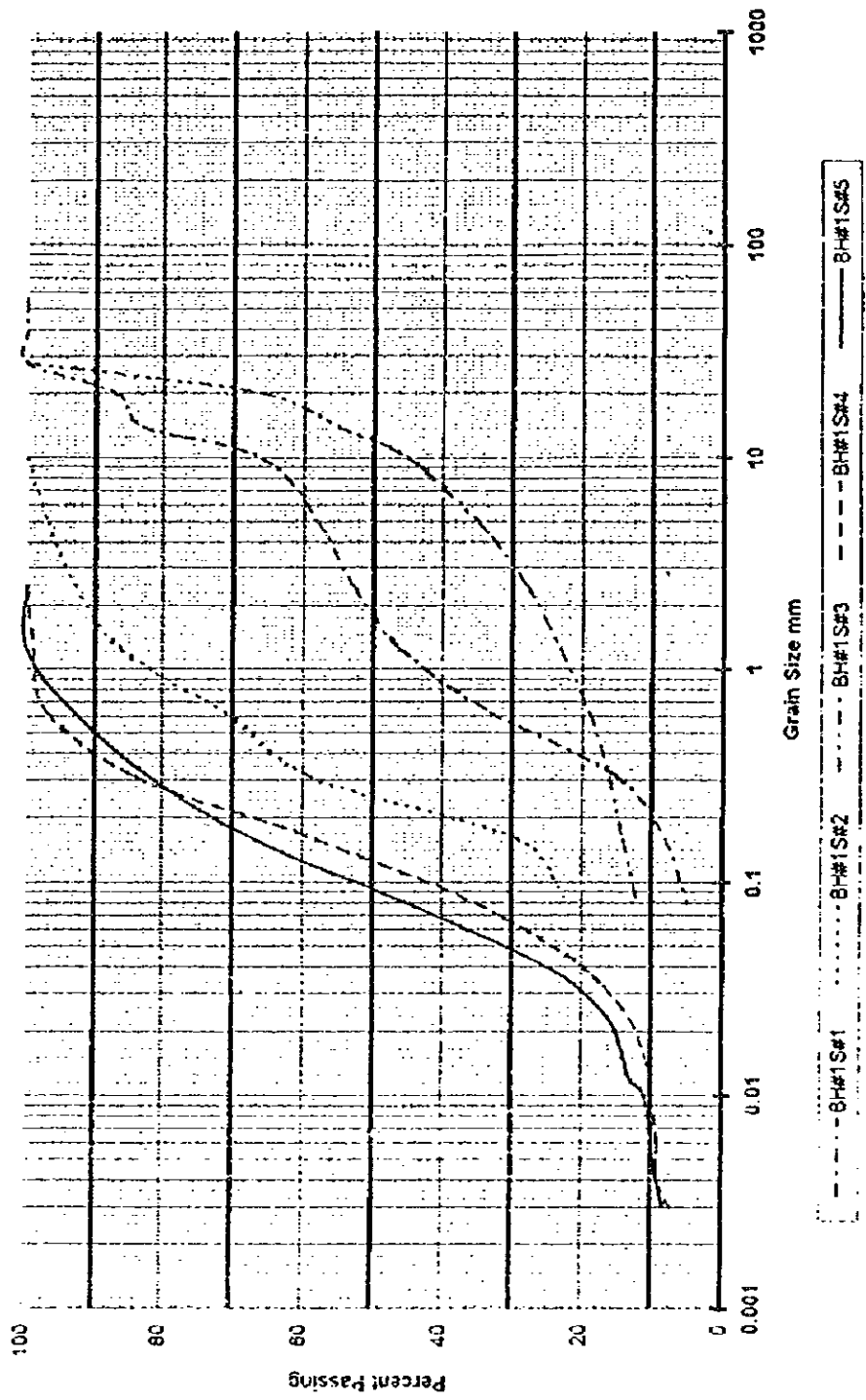
APPENDIX B  
GRAIN SIZE CURVES

**GRAIN SIZE DISTRIBUTION CURVES OF RESERVOIR SEDIMENTS**

SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: BORE HOLE BH#1

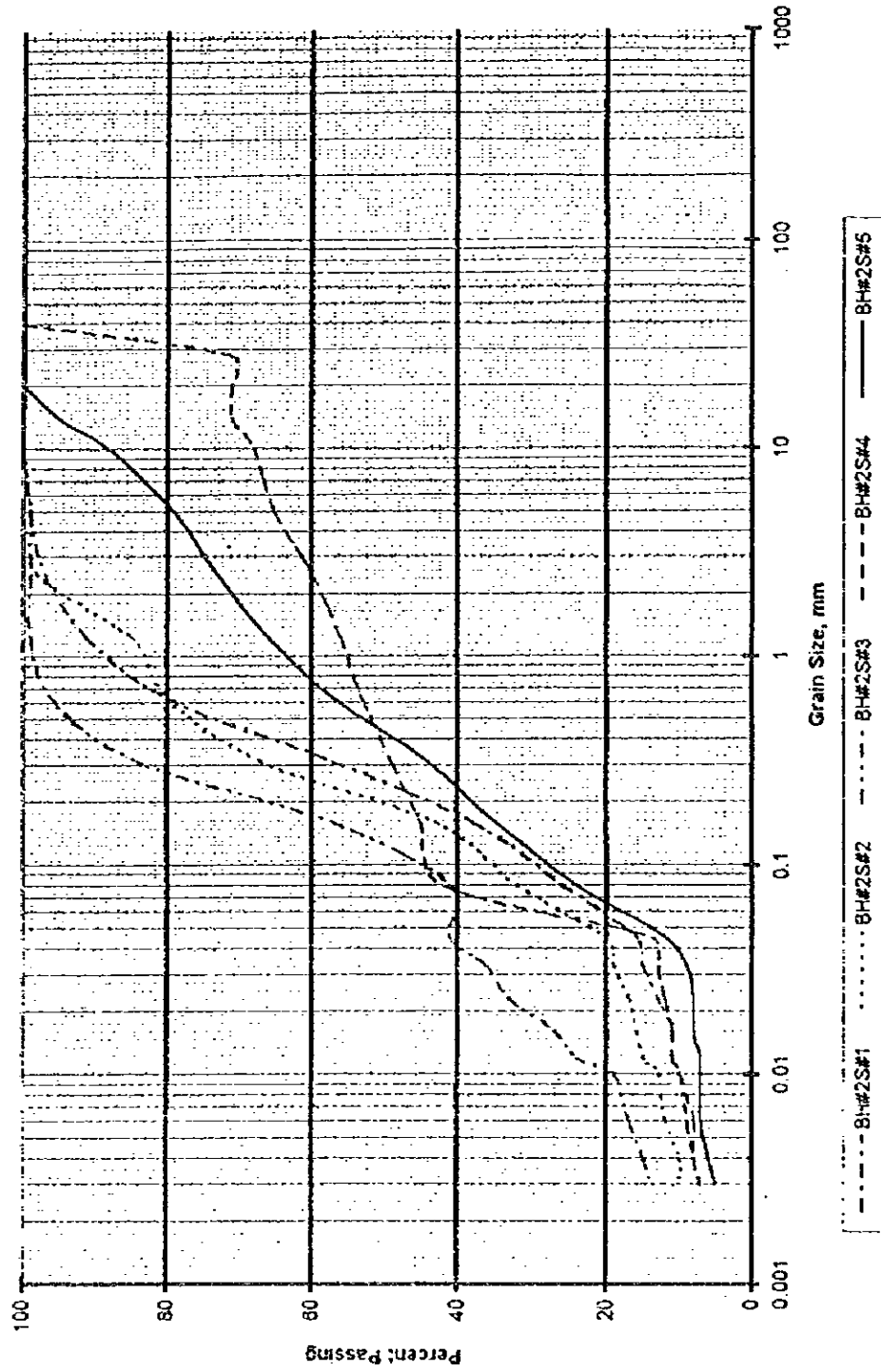
GRADATIONAL ANALYSIS OF SEDIMENTS



SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: BORE HOLE BH#2

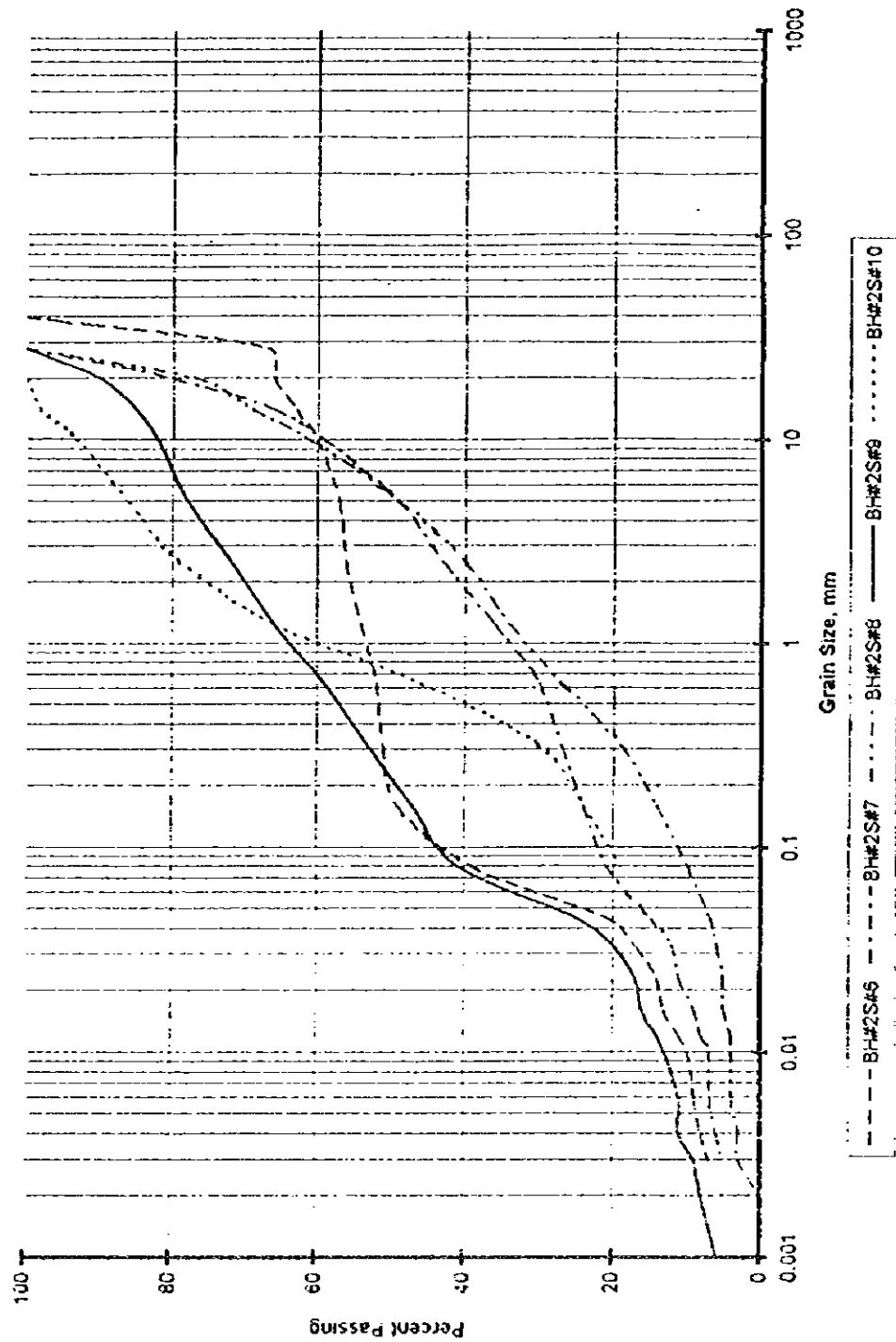
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SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: BORE HOLE BH#2

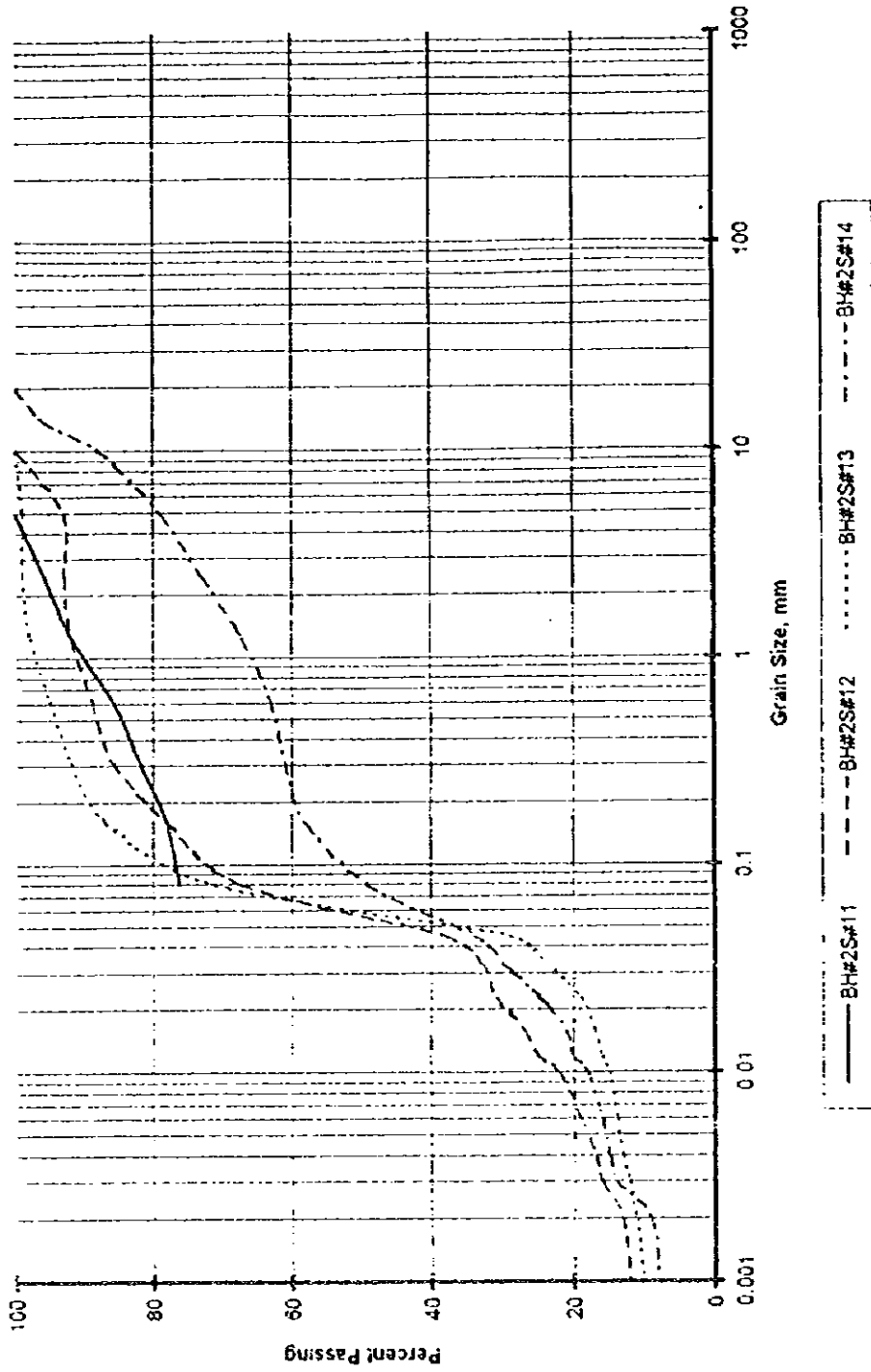
GRADATIONAL ANALYSIS OF SEDIMENTS



SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: BORE HOLE BH#2

GRADATIONAL ANALYSIS OF SEDIMENTS

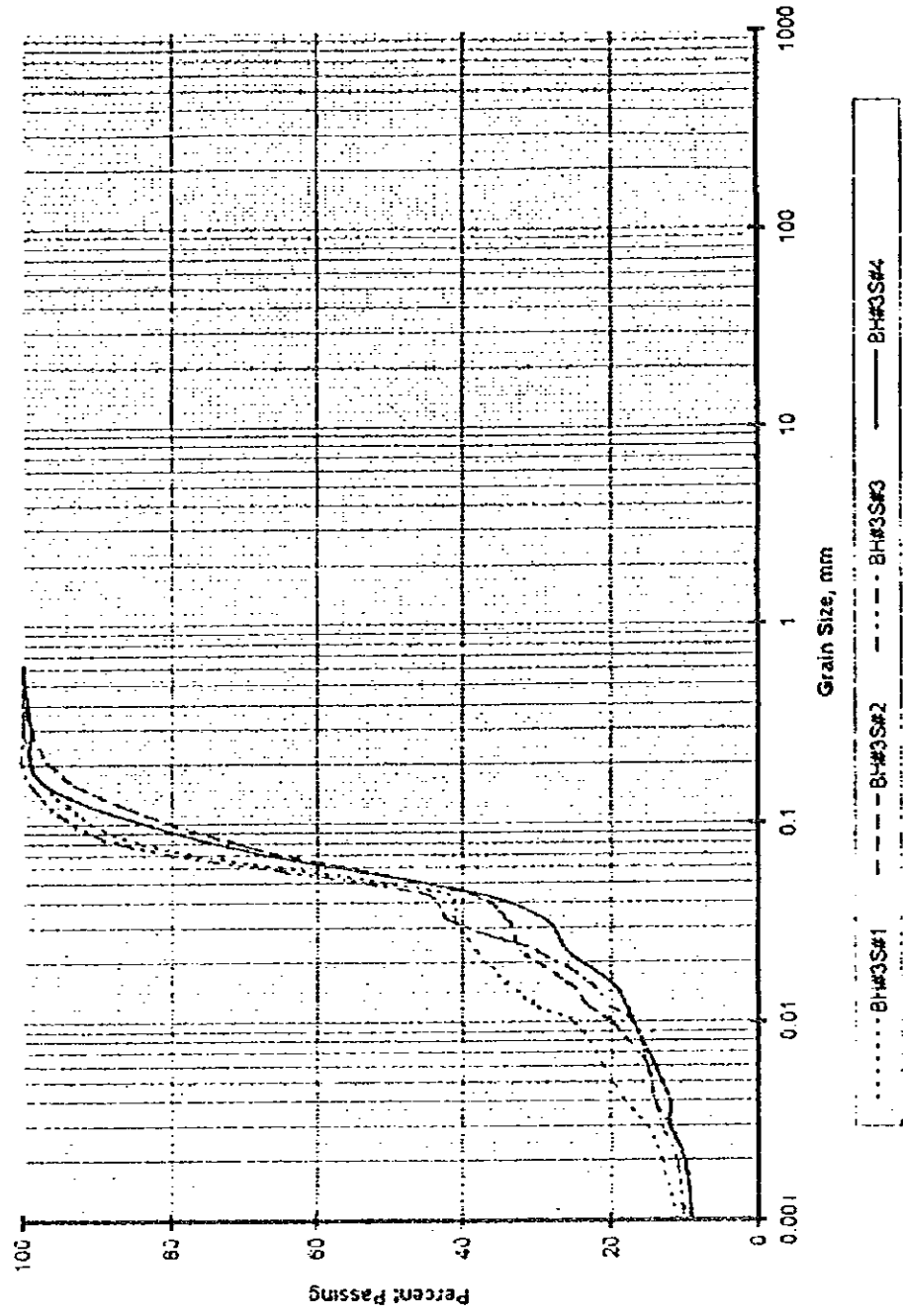




SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: KULEKHANI RESERVOIR AT BONE HOLE, BH#3

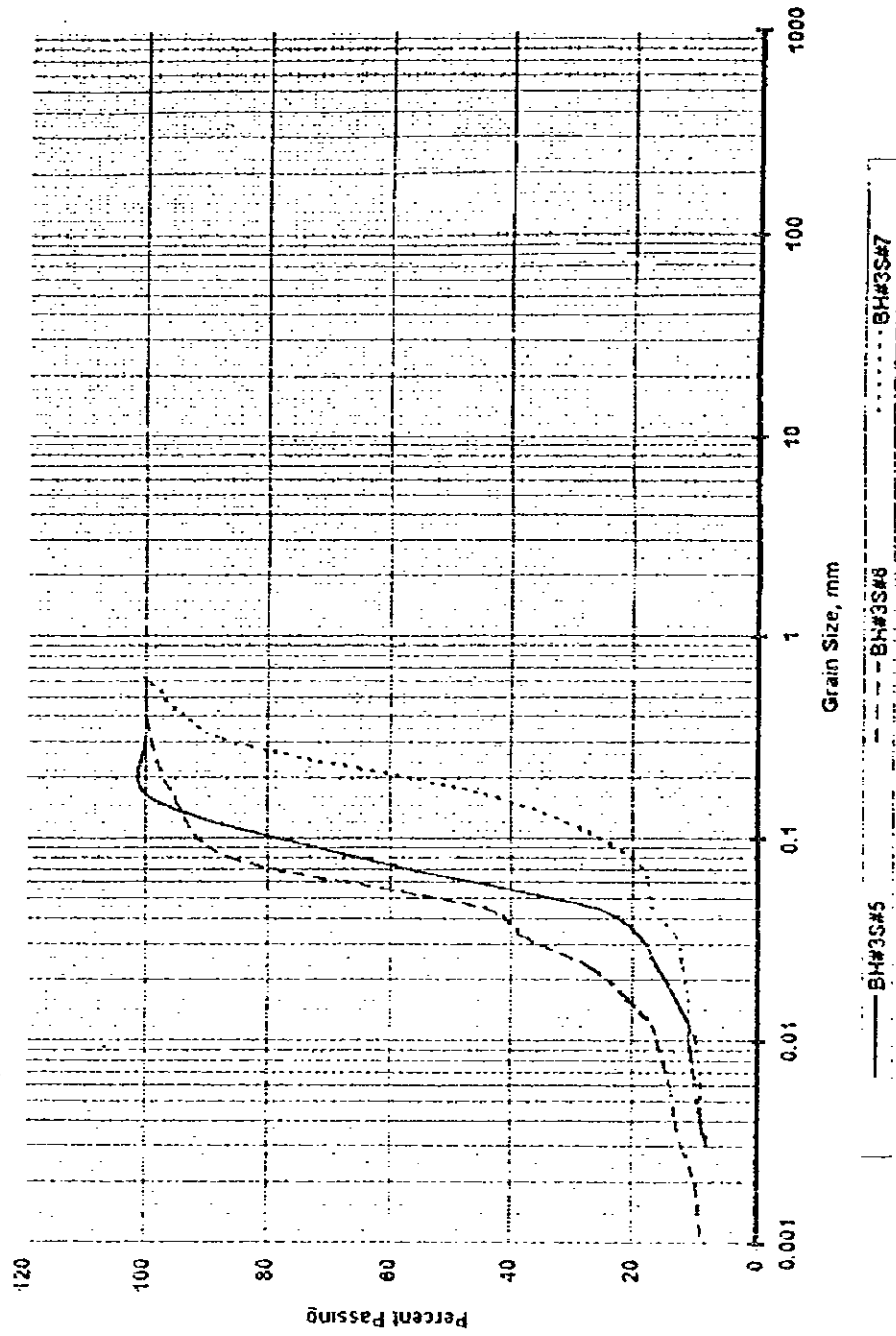
GRADATIONAL ANALYSIS OF SEDIMENTS



SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: KULEKHANI RESERVOIR AT BOREHOLE BH#3

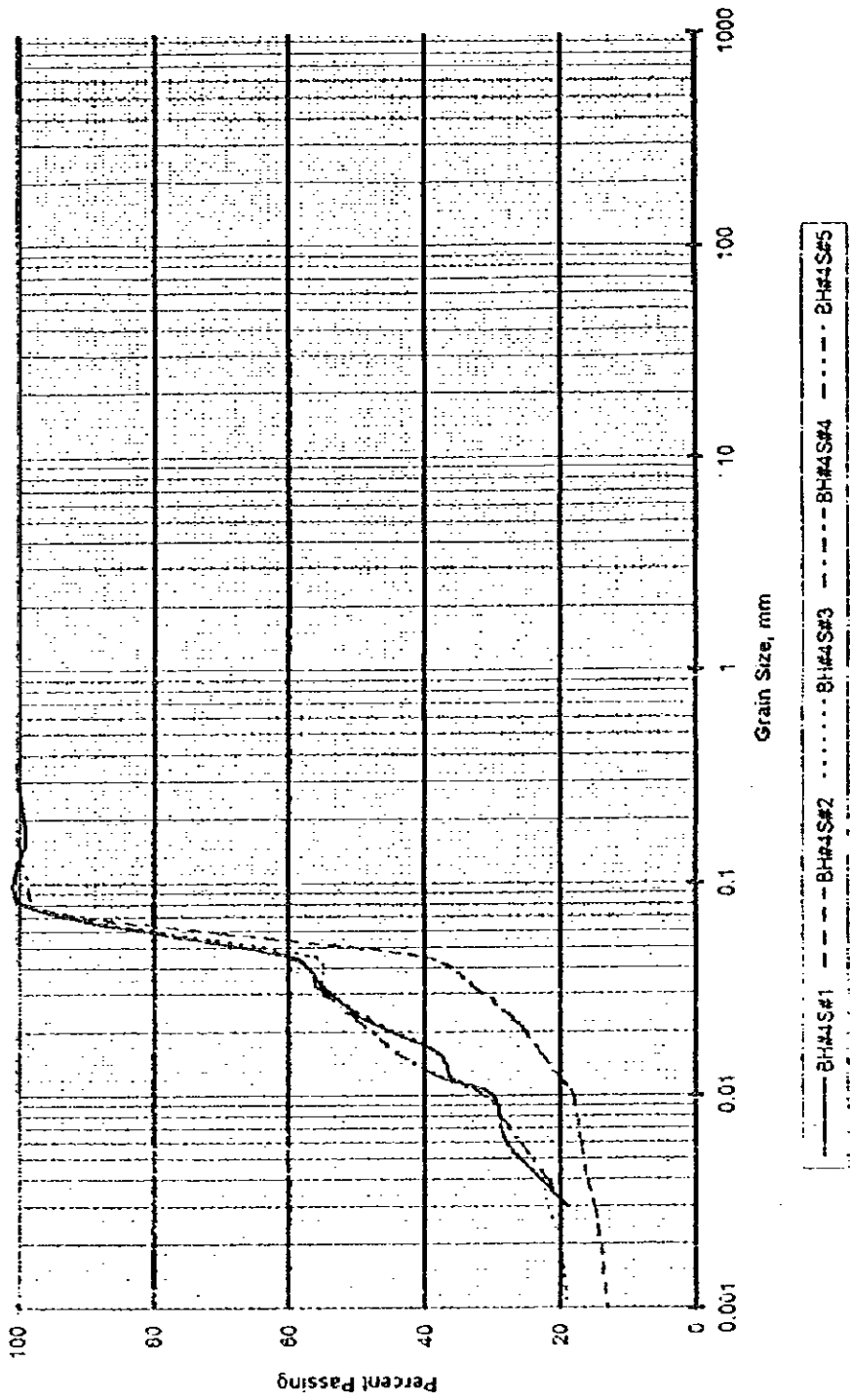
GRADATIONAL ANALYSIS OF SEDIMENTS



KULEKHANI DISASTER PREVENTION PROJECT  
SOIL ROCK AND CONCRETE LABORATORY, NEA

LOCATION: KULEKHANI RESERVOIR BH#4

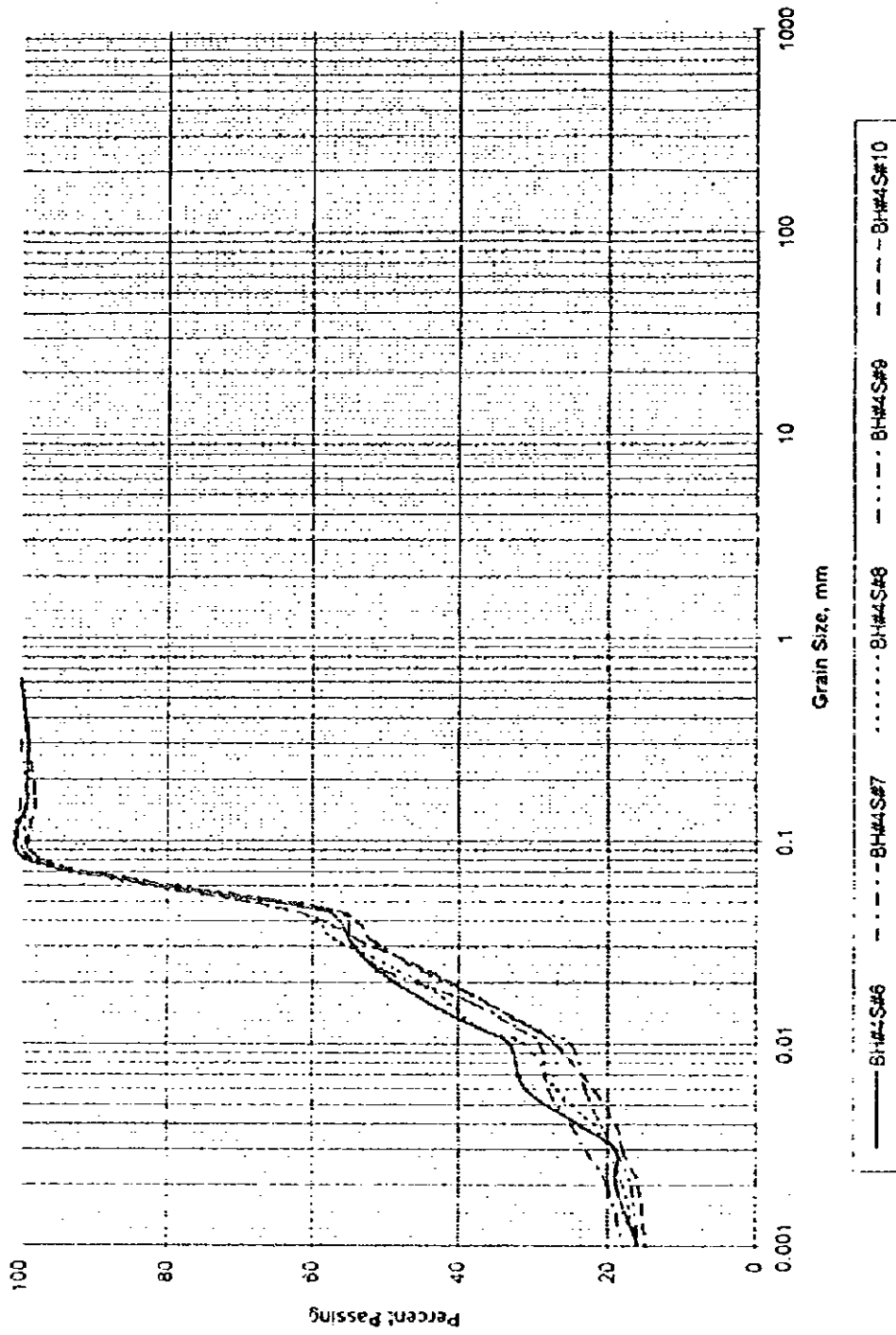
GRADATIONAL ANALYSIS OF SEDIMENTS



KULEKHANI DISASTER PREVENTION PROJECT  
SOIL ROCK AND CONCRETE LABORATORY, NEA

LOCATION: KULEKHANI RESERVOIR BH#4

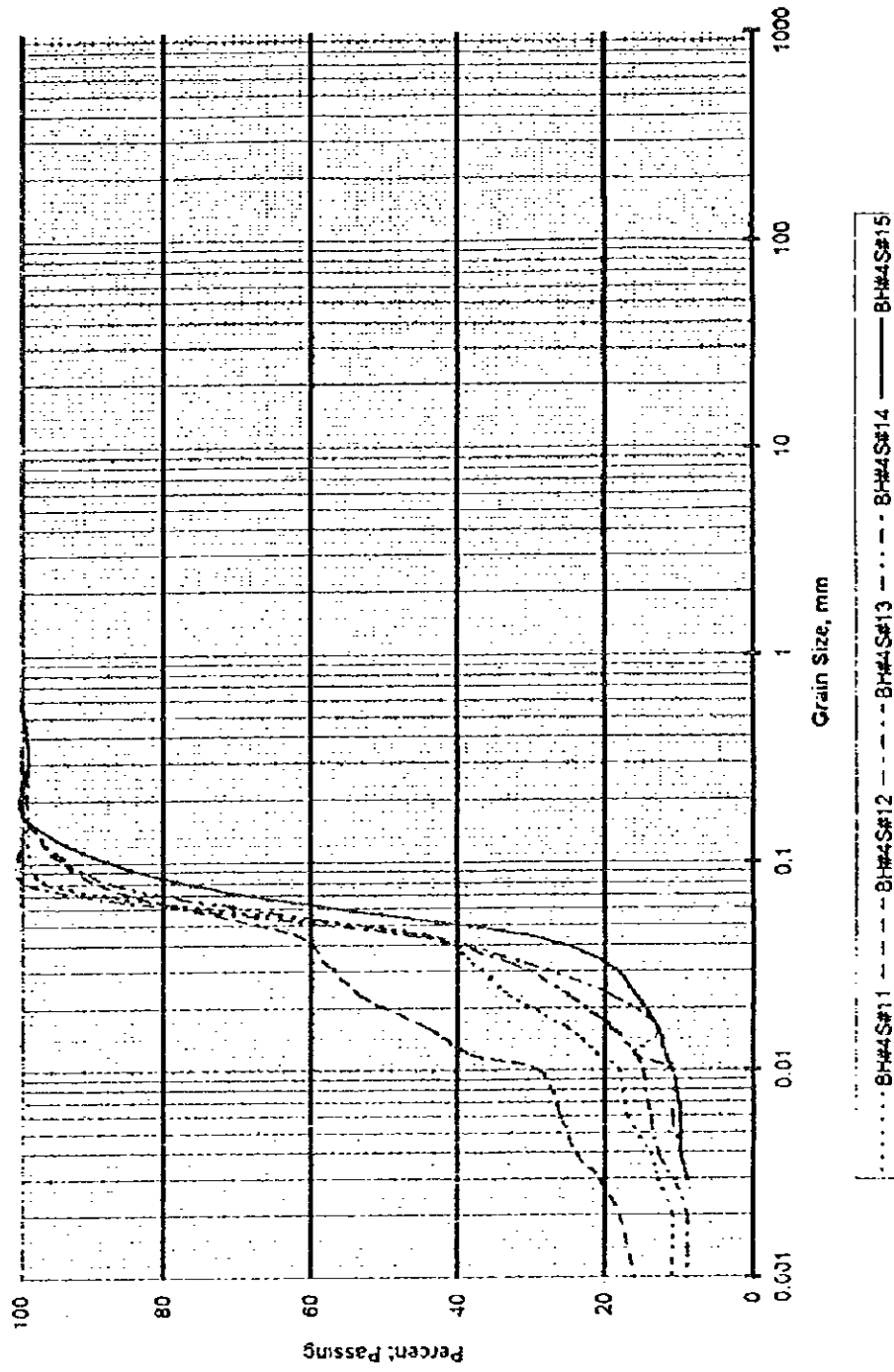
GRADATIONAL ANALYSIS OF SEDIMENTS



KULEKHANI DISASTER PREVENTION PROJECT  
SOIL ROCK AND CONCRETE LABORATORY, NEA

LOCATION: KULEKHANI RESERVOIR BH#4

GRADATIONAL ANALYSIS OF SEDIMENTS

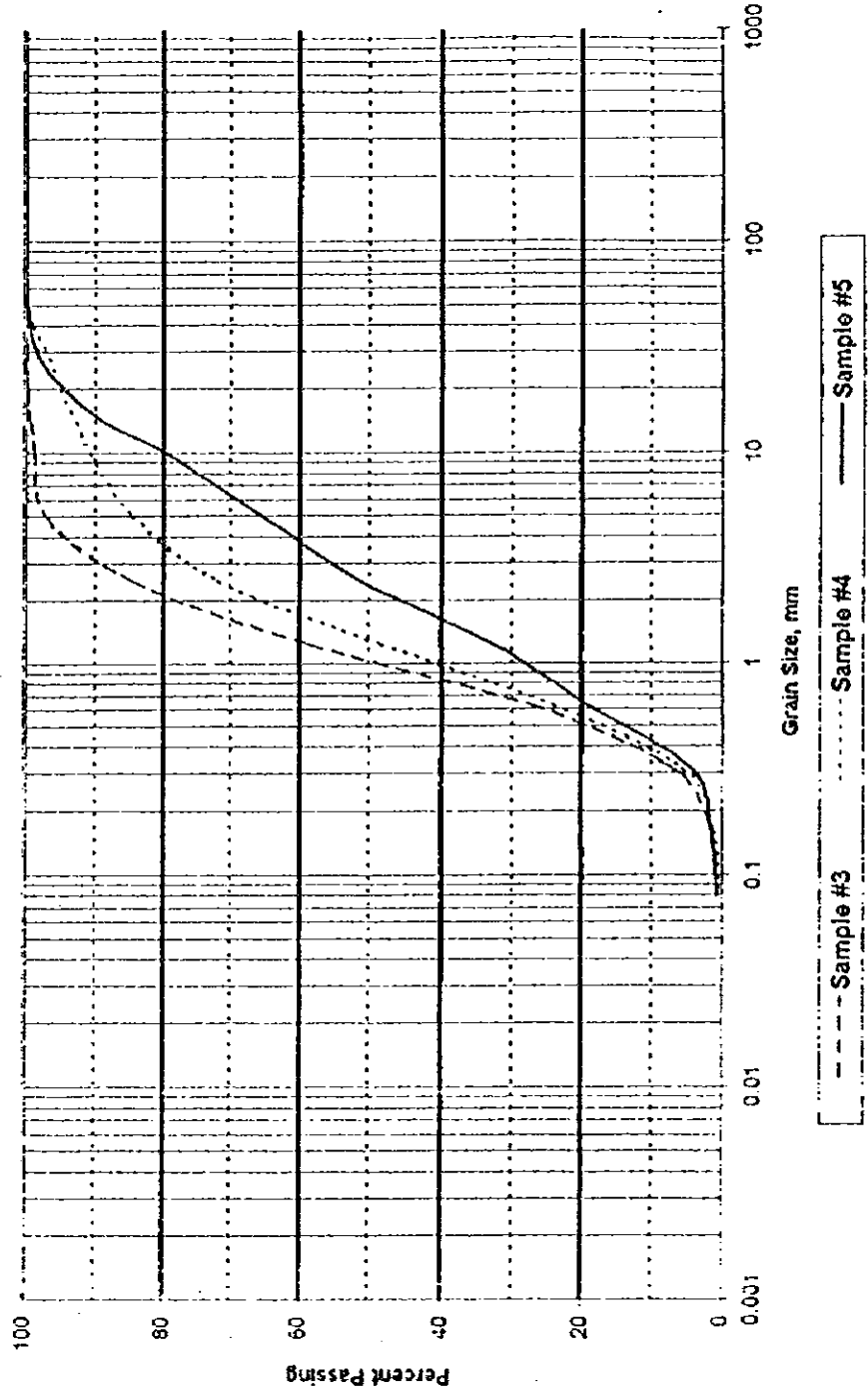


**GRAIN SIZE DISTRIBUTION CURVES OF BED LOAD**

SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: BETWEEN MARKHU AND KUNCHIAL

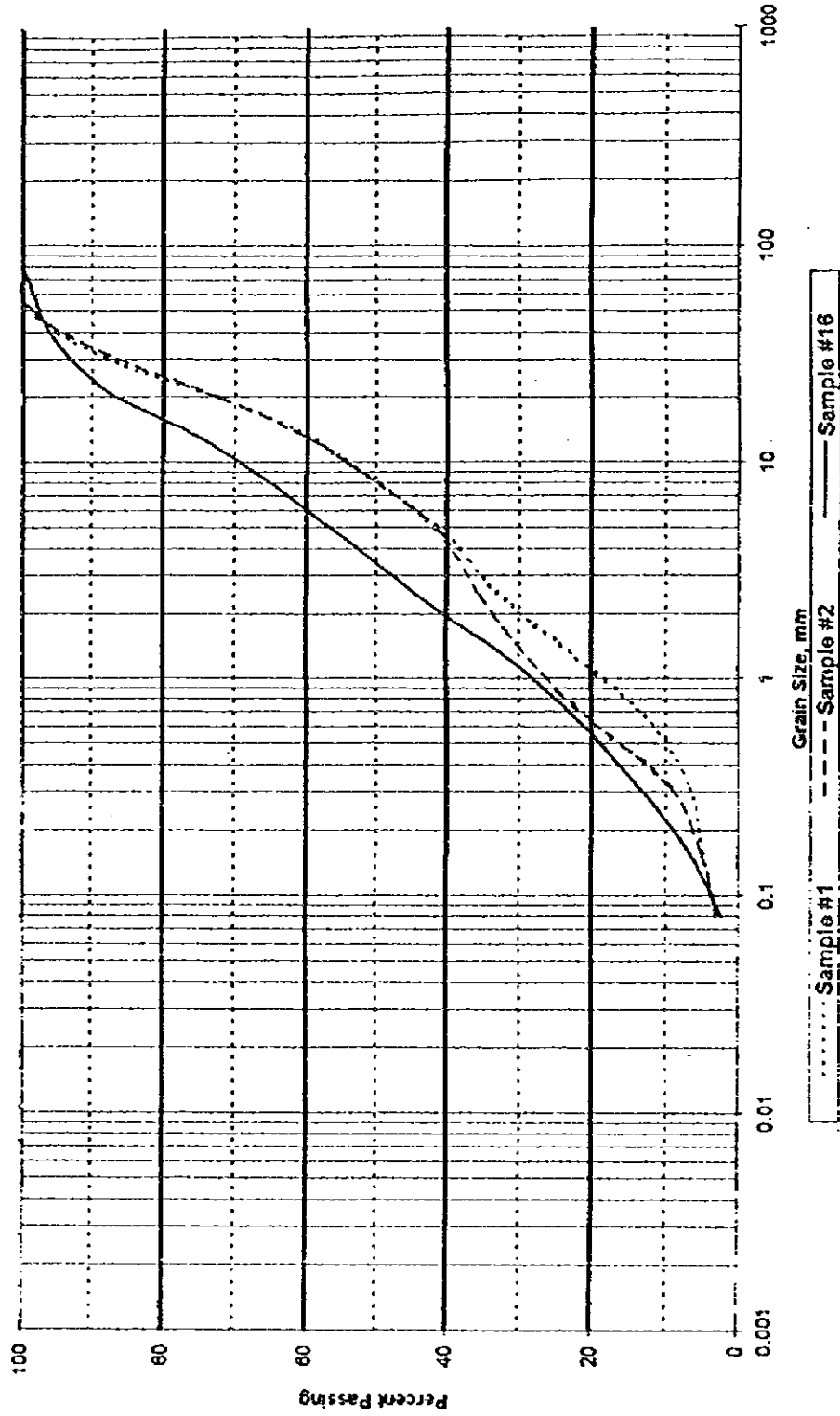
GRADATIONAL ANALYSIS OF SEDIMENTS



SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: VICINITY OF MARKHU

GRADATIONAL ANALYSIS OF SEDIMENTS

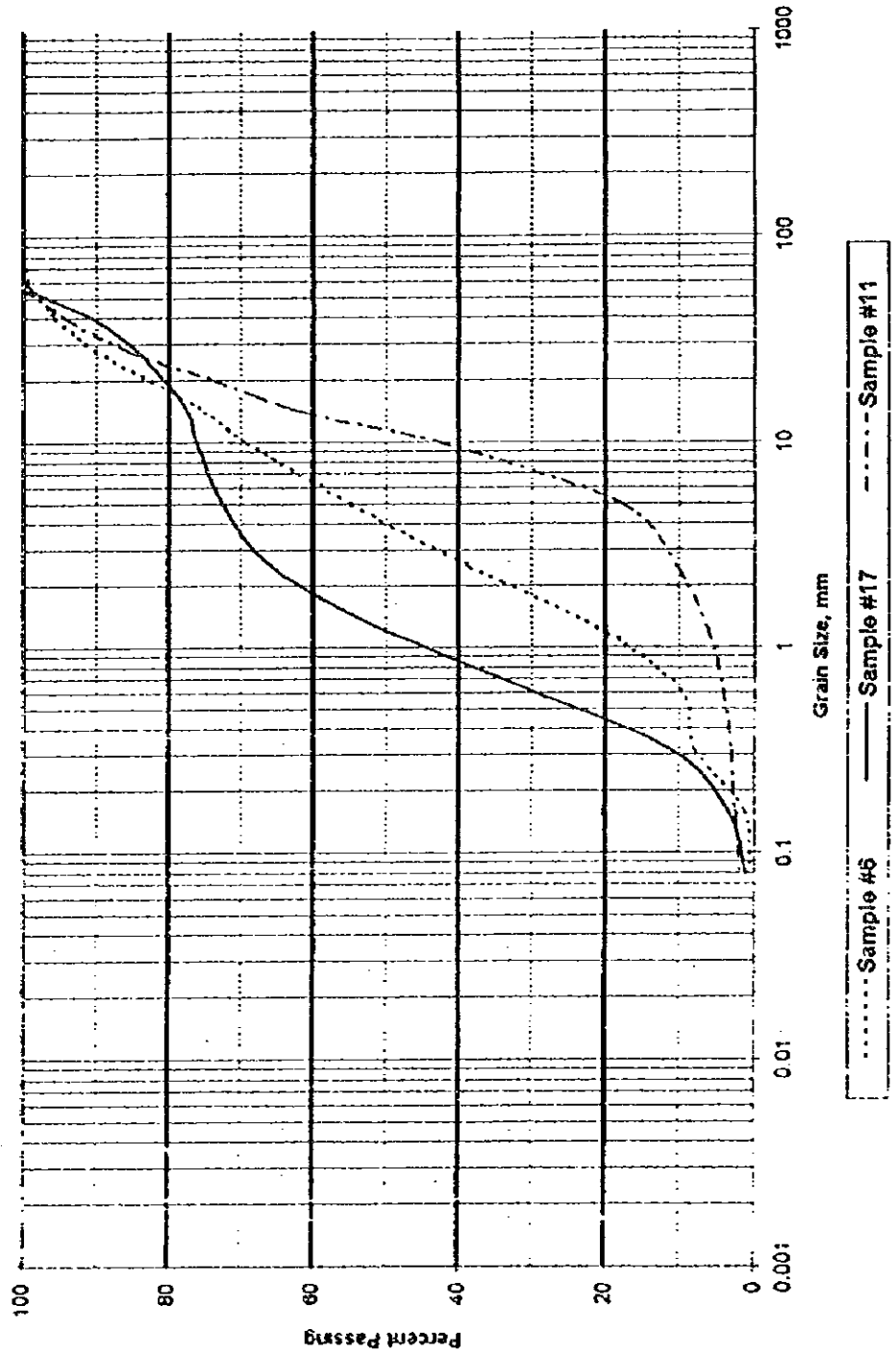




SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: BETWEEN MARKHU AND KUNCIHAL

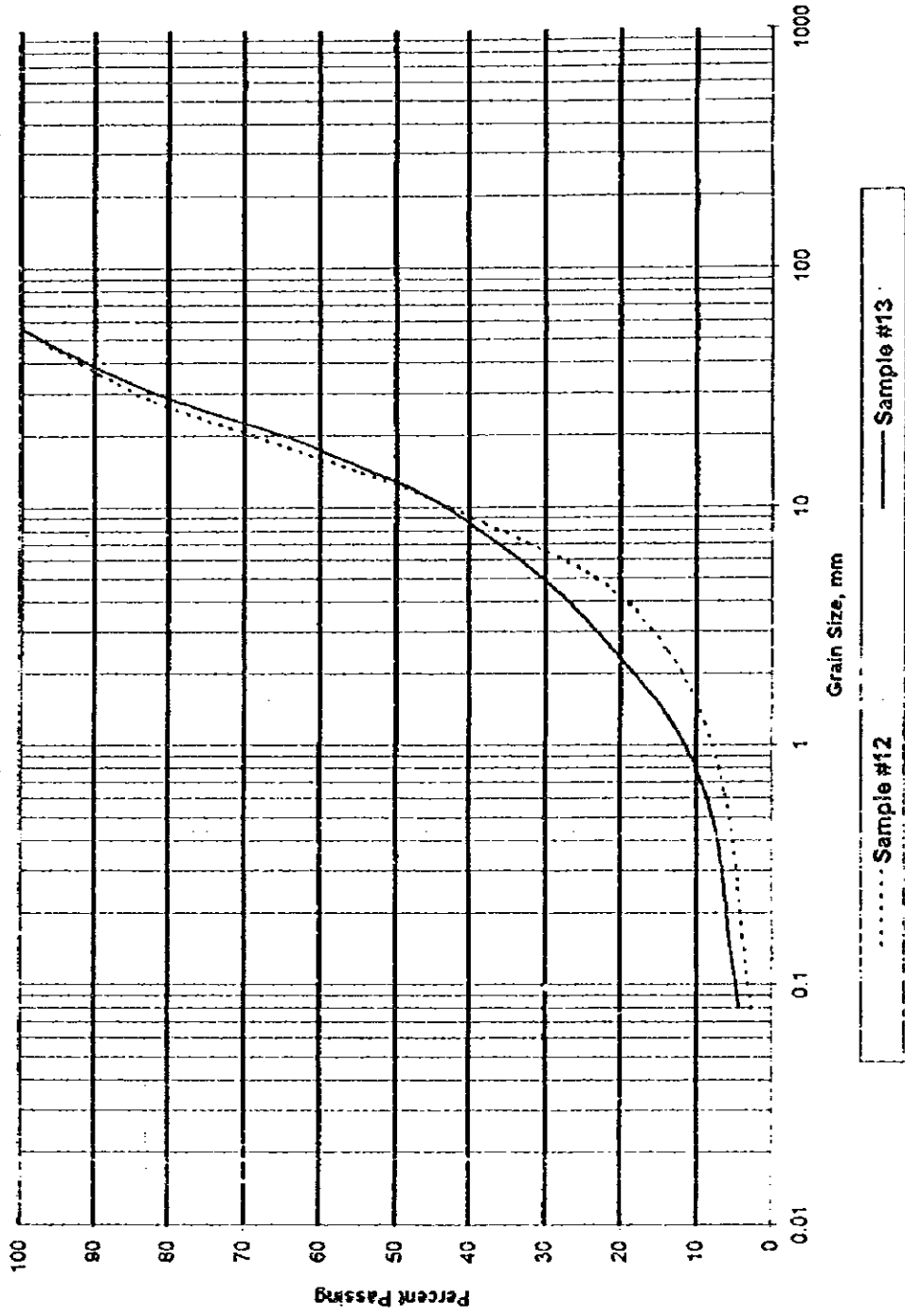
GRADATIONAL ANALYSIS OF SEDIMENTS



SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: BETWEEN MARKHU AND KUNCHIAL

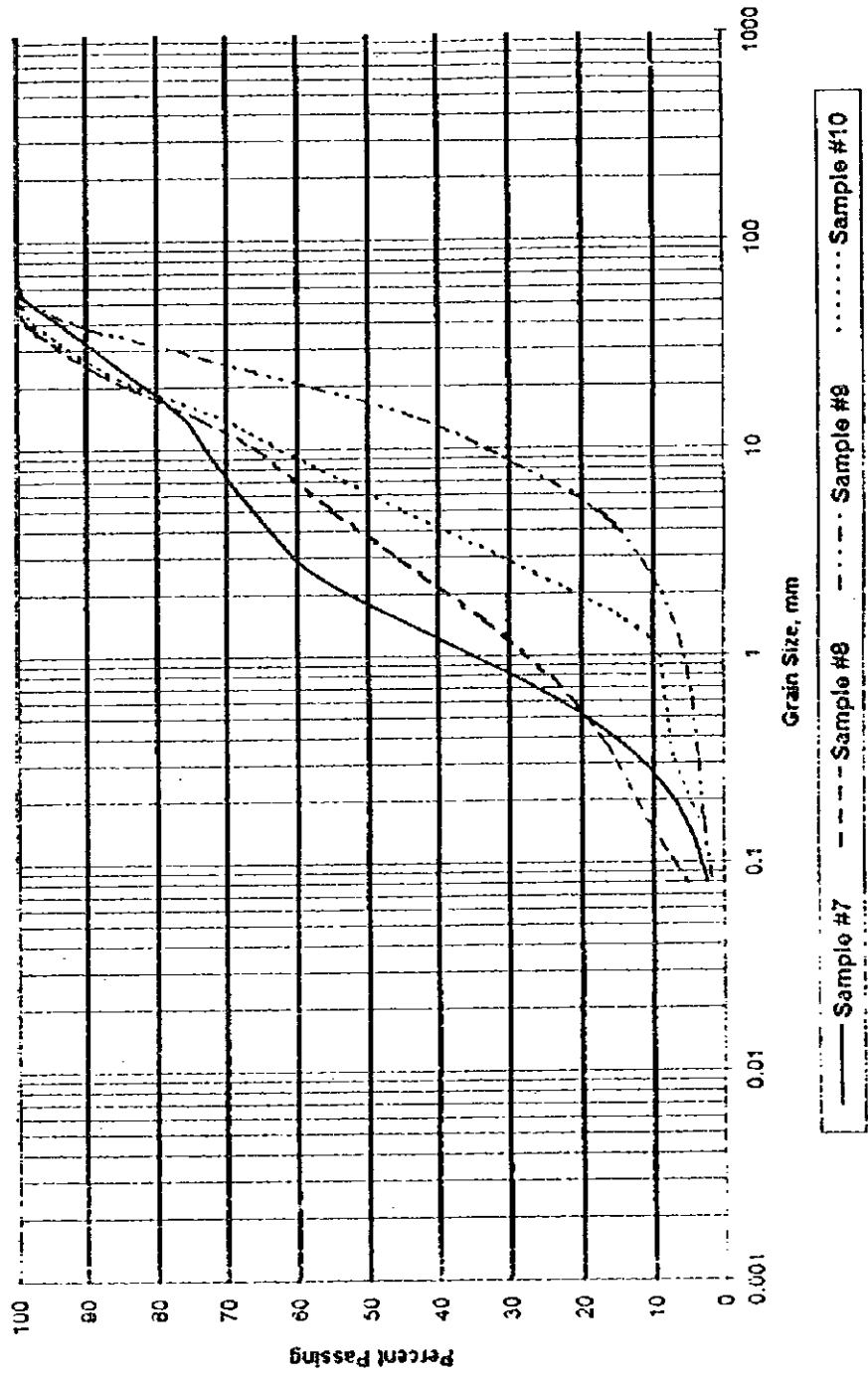
GRADATIONAL ANALYSIS OF SEDIMENTS



SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: PALUNG VALLEY

GRADATIONAL ANALYSIS OF SEDIMENTS



SOIL, ROCK AND CONCRETE LABORATORY, NEA  
KULEKHANI DISASTER PREVENTION PROJECT

LOCATION: CHILANG VALLEY

GRADATIONAL ANALYSIS OF SEDIMENTS

