CHAPTER 4

ENVIRONMENTAL MANAGEMENT, MONITORING AND INSTITUTIONAL PLANS

Chapter 4 Environmental Management, Monitoring and Institutional Plans

4.1 General

This section deals with the Environmental Management Plan (EMP), Monitoring Plan and Institutional Plan. These plans are designed to implement the proposed SLF project in an environment-friendly manner.

The EMP is the plan on what to do with the potential impacts identified and discussed in Chapter 3.0. The purpose of the EMP is to enhance the beneficial impacts and to lessen the adverse impacts of the project at different stages of its development.

The Monitoring Plan is a pro-active plan that will serve as a blue print in overseeing and preventing the occurrence of some adverse impacts during the construction and operation phases of the SLF project implementation. The monitoring works will be undertaken by a multi-partite, multi-sectoral monitoring team (MMT) to be created for the project. The result of the monitoring initiative will be used by MMDA in gauging their compliance performance on matters that are stipulated in this EIS document and ECC. Included as part of the monitoring plan is the formulation of a "Reporting System" within SLF management body and among the members of the MMT.

The Institutional Plan is equally important. The purpose is to clearly delineate the functions of each of the players in this SLF project, especially the function of the Environment Officer (EO) (equivalent to a Pollution Control Officer, PCO). The position entails for the overall management and planning of all environment-related issues and concerns that may arise during the construction and operation stages of the proposed SLF project.

4.2 Environmental Management Plan

Management of the impacts will be implemented through the following proposed impact mitigating measures.

4.2.1 Mitigating/Enhancement Measures for the Construction Phase

Duration of the impacts identified for the construction phases are all short-term in nature. The adverse ones can easily be mitigated. The identified potential sources of significant adverse impacts during construction stage that may need mitigating measures are as follows:

(1) Soil Erosion

Soil erosion during rainy days of the construction periods is unavoidable. However, this can be controlled by the use of structural erosion prevention and sediment control practices which will divert the storm water flows away from the exposed areas, prevent sediments from moving offsite, and reduce the- erosive forces of runoff waters. These may include the following: (1) interceptor dikes, (2) pipe slope drains, (3) straw bale barrier, (4) sediment trap, and (5) temporary sediment basin. **Figures 4.2.1** to **4.2.5** shows these structural erosion prevention and sediment control measures.

Interceptor dikes are generally built around the perimeter of a construction site before any major soil disturbing activity takes place. Pipe slope drains reduce the risk of erosion by discharging runoff to stabilized areas. This is effective before a slope has been stabilized or before permanent drainage structures are ready for use. A straw bale can be used as a temporary sediment barrier by placing them ends to end in a shallow excavated trench. The sediment trap is appropriate for sites with short time schedules. It is formed by excavating a pond or by placing earthen embankments across a low area or drainage. A temporary sediment basin is a settling pond with a controlled water release structure used to collect and store sediment produced by construction activities.

2. Dust Generation Control

Common to most construction is fugitive dust generation, which persist only during the first few months of site development. Regular sprinkling the exposed areas with water can easily control it. Strict implementation of dust control is necessary since the wide unobstructed air space of the project area is favorable for dust transport. Spraying with used oil for dust control should not be allowed since it will contaminate the ground.

As there will be sections that will be opened and filled after sometime, it is necessary that these opened areas be covered with vegetation or suitable paving materials that will likely prevent soil erosion and dust resuspension.

As provided in the air quality impact assessment, TSP generation due to soil work will be substantial and is expected to increase ambient concentration well above the standard. This will exacerbate the already high background TSP concentration which already exceeds the standards. In this regard, two measures are recommended by the study team:

- Coordinate with local government units in the creation of a 1-kilometer buffer zone from the center of the landfill of open or agricultural use and in no circumstance should it be developed for residential or commercial use during the life of the landfill. This buffer zone is expected to receive the maximum dust ground concentration level
- Watering of soil cover for dust suppresion
- Provision and use of dust mask for all on-site workers

Impacts from the increase volume of traffic to and from landfill site is not expected to create substantial increase in background concentration. However, it would be prudent for both project proponent and LGU to strictly implement the 10 meters buffer zone on both side of the road.

3. Traffic Plan

At present, the Marcos Road and Cogeo road which lead to the project site is experiencing heavy traffic congestion during peak-hour periods. The presence of hauling trucks during construction stage may change further exacerbate this present situation. In order to minimize and prevent any possible traffic related problems; a centralized scheduling of trips through a dispatching officer will be implemented. Further, the use of radio communication gadgets will allow trip flexibility and helps avoid unnecessary trips.

As has been experience in the operation of the San Mateo SLF, people of Antipolo are complaining about the frequency of traffic related accidents. The main cause of the problem as they observed it is the poor driving habits/attitudes of garbage hauling drivers in the area. To avoid this kind of problem, the drivers who will be commissioned for the delivery of construction materials will undergo education /guidance program on safe driving.

4. Noise Generation

Noise levels as previously discussed will be tolerable. The buffer zone, which will be planted with trees and other vegetation, will help attenuate the noise generated from the landfill area. Nevertheless, equipment with less noise generation will be used during construction.

5. Greening of the Project Site to Improve Aesthetics

The project development will be implemented in phase development scheme. This would mean that clearing and other required civil works to be undertaken in the project area during construction stage will not result to monotonous barren area. Only

the section subject for SLF development will be void of green vegetation. Per SLF layout, planting of grasses and tree and other ornamental plants in open spaces intended for greening purposes will be immediately undertaken. The purpose is to enhance the aesthetic appeal of the project area.

Tree buffer zones will also be established around the perimeter of the project area. Fast growing species of trees adopted to local condition will be used to improve aesthetic value of the project site.

6. Workers and Public Satiety

In order to ensure the workers' safety during construction stage, the project proponent and its commissioned constructor will adhere to the Department of Labor and Employment Occupational Safety and Health Hazard Standards with particular emphasis on the following:

- personal protective equipment (Rule 1040) which specify the use and type of eye and face protection, respiratory protection, hand and arm protection, safety belts life lines and safety nets, safety shoes.

- personal protective equipment, and minimum space requirements for gas, electric welding and cutting operations (Rule II 00)

- fire protection and control rule (Rule 1940)

- notification, record keeping requirements (Rule iO5O)

During the construction phase when earth-moving activities are undertaken, markers aimed at warning people against going into or near the construction site should be installed. The markers should prevent accidents caused by moving machineries or altered terrain. During the operation phase, similar markers must be installed in critical and hazardous areas. A fence to deter intruders may have to be installed in these areas.

7. Local Labor Employment

Prioritization of local labor for employment will maximize the positive impact of the project. Priority in employment may be given to those households whose properties will be negatively affected by the project. The employment of any of their household members can be part of the compensation package.

Requiring the contractor to give priority to the local workers in hiring the required non-skilled construction work force will enhance beneficial impact on local labor

employment. This will effectively reduced the possible increase of population due to the in-migrant workers. Close coordination between the constructor and the local officials will be made.

If the manpower pool in the barangays hosting the proposed SLF will not suffice to meet the requirements of the project, recruitment may be done from among the labor force in the adjacent barangays. In this case, it will make the provision of housing and utilities to outside workers unnecessary because they are just living nearby. The result is reduced construction cost to the project,

If the project management must bring in workers from outside, housing and utilities must be provided to these workers. This will prevent the creation of unsightly housing units, which the workers may construct for temporarily use and the competition for social services with the local population. The coming in of workers from outside without the proper utilities will make the existing sanitation level worse.

8. Compensation of Crop Damages

Before and/or during construction phase, crops, which may be affected by the activities, will be assessed and appropriately valued. Crop valuation may be based on prevailing market rates or as prescribed by the Assessors office. This process will be jointly undertaken by MMDA, the LGUs, the farm owner, and a third party.

The start of the construction should be made before the planting season and after the harvest season. This will minimize the value of the crop damage that may be incurred. If the site clearing will be made, it must be in the staggered basis and done only in areas that will be immediately developed. This will further reduce crop damage. Besides, it will enable the farmers recoup their farm investment and can decide to work on the project while the fields unaffected by the project are left to fallow.

9. Control of Non-Compatible Land Use

The Municipality of Rodriguez and the host barangay of the project site should generate a land use and zoning plan of the area around the project site. This plan should be integrated with the municipality's city's investment plan and tax assessment map. Strict implementation is the secret of the success of every plan. The land use and zoning plan will prevent the creation of undesirable housing clusters and incompatible industrial and commercial establishments. These housing clusters and establishments may be attracted by the improved access and employment opportunities. The construction of the SLF encourage lower-income migrants to move in and may displace the resident lower-income in the area who may have to occupy open areas for

free. The land use and zoning plan will also prevent commercial establishments from establishing themselves in predominantly restricted areas, easement from critical installations including the SLF vicinity or near critical environment such as riverbanks.

(a) Acquisition of Land and Resettlement Area for Affected Families

A resettlement site for the displaced community should be provided a space to enable the resettled households raise. Together with farming, activities such as livestock and poultry raising may be some of the major sources of household income. The continuation of this economic activity will lessen the impact of losing one's farmland. This will also provide the resettled households a continuing link with the traditional lifestyle and will cushion the lifestyle shift brought about by the transfer to the resettlement site.

A detailed resettlement plan should be followed. The plan should address the issues that are normally raised by the resettlers but are overlooked by agencies undertaking the resettlement. The issues that must be addressed and the procedures that must be followed are discussed in the succeeding sections.

(b) Resettlement Guidelines

The development of the 130-hectare New Parcel B SLF project entails the resettlement of 75 households. The resettlement if not well implemented has significant socioeconomic consequences to both the resettled and recipient communities and political consequences to the national and local leadership. The basic foundation of a well-implemented resettlement program is a plan which sharply foresees not only the need of the resettlers but also the investment required to make them prosper in the new setting without adverse impact on the recipient communities. It is the thorough inventory of needs and the investment requirements which ensures that the cost of the resettlement program will not be systematically underestimated in the plan and will not be systematically under financed in implementation. Experiences in the past stand as evidence that without such inventory a resettlement program is never viable.

(c) Issues In Resettlement

A resettlement plan can only be generated if it responds to ten issues which resolution determines the success or failure of a relocation program. The issues are as follows:

1) Resettlers have varying resource base and network of social support and most assistance must go to the ones with least capacities.

2) The resettlers' lack of familiarity of the new setting and living arrangement engenders feeling of powerlessness, which may results to extreme stress and reassertion of old behavioral patterns.

3) The usual resettlement programs being implemented have built-in characteristics that tend to increase the resettlers' dependency on outside assistance rather than supporting their independence and self-sufficiency.

4) The single most important factor for recovery from relocation is the reestablishment of a secure source of livelihood.

5) The physical arrangement of a resettlement is the second most important factor that determines the likelihood of its success.

6) The roles and responsibilities of men and women very often change under the circumstances of resettlement.

7) When resources are focused on the creation of new settlement, groups with higher level of material, social or psychological capacities may join the resettlement because they see it as a promising option for getting ahead.

8) Integration of the physical infrastructure and the population of a new settlement into the economic and social systems of the neighboring communities affect the success of any resettlement.

9) Settlements always have an important impact of the ecosystems of the areas which they are placed.

10) Settlements require a combination of community-based actions and private individualized actions.

(d) Planning Activities

For the resettlement plan to appropriately respond to the ten issues, four activities will be undertaken in plan generation. These activities are as follows:

1) Baseline Information Collection

Preliminary information on the existing conditions of the population to be resettled and the recipient community has already been gathered to serve as one of the bases of the plan. The information includes description of the following aspects: demography of the households, the production systems of the affected

area and the dependent social groups, shared and divided areas and infrastructure resources, suitability of alternative site and environmental and socio-economic carrying capacity of alternative site for intensification of production systems. The data to be gathered for these activities is listed on **Table 4.2.1**.

Table 4.2.1
Baseline Data To be Collected For the Preparation of the Resettlement Plan

Demography	Production System	Common Resources	Site Suitability	Recipient Community
No of households	Tenure system	Schools	Water sources	Demography
Age composition	Land distribution	Health facilities	Soil	Receptivity
Sex composition	Production level	Pastures	Farm potential	Absorbtive Capacity
Growth rate	Market access	Forest	Grazing land	Production Systems
Ethnicity	Economic values	Roads	Fuelwood sources	Value Systems
Employment	Income pattern	Water sources	Transport	Leadership patterns
Migration	Skills	Communicatio n	Communication	Production systems
Density	Equipments/Se rvices	Recreation	Residential sites	
Fertility/ Mortality	Women's role	Churches	Social Services	

With the assistance of the Local Government Unit of Rodriguez, the proponent shall screen and properly select only those affected families on the basis of the following scheme as shown in **Figure 4.2.6**.

An application scheme will also be employed in order to get as many information as possible from potential resettlers. The following would be included:

(a) Minimum Qualification for Applicant

1. Must be of legal age
2. Must be the head of the family
3. Must be a registered socialized housing beneficiary
4. Must not be a registered owner of lot
5. Must not have any current obligation for the purchase of a lot

6. Must be the one who actually occupy the lot
7. The occupied structure is located in danger zone
9. Must be a resident of San San Rafael, Rodriguez since 1992 to present

(b) Minimum Requirement for Applicant

1. One (1) W ID picture
2. Photo copy of marriage contract
3. Latest Income Tax Return
4. Statement of assets and liabilities
5. Affidavit of no paying any amortization for the acquisition of lot
6. Certificate from the Municipal Planning and Development Office that the occupied structure is located in danger area
7. Photo copy of Court Order
8. Certificate of non-ownership of lot from the Register of Deeds and the Municipal Assessor's Office
9. Certificate from the Municipal Planning and Development Office as potential Socialized Housing Beneficiary

c. Procedure

1. Applicant will submit requirements
2. Applicant will up forms
3. Background and social investigation
4. Orientation and consultation
5. Contract and MOA signing
6. Tagging of structure
7. Transfer to site
8. Amortization

(e) Definition of Policy and Legal Framework

The policies, which will be applied in the resettlement case, will be studied. Provisions will be identified and their relevance to the following will be investigated: entitlement to replacement land and other productive resources, house reconstruction, transportation and transfer arrangements, grievance procedures, cash compensation levels, terms for individuals and groups, overall development objectives of resettlement policy. The legal definition of the rights of displaced population will also be clarified. The clarification will consider the following: resettlement grants, technical assistance for bringing new resources into production, financial assistance, rights of the landless and households in non-agricultural sectors, adequacy of legal provisions in

reconstructing the social and economic systems destroyed by resettlement, and benefits of the displaced households from SLF development.

(f) Development Plan For New Site

The development plan will have six parts. First is the development objectives and policies for the resettlement and new production systems including the alternative matrix wherein the number of households opting for a particular objective will be determined. Second is the detailed engineering of the new site which covers design and layout plans for infrastructure, public and common installations, land and resources used plans, potable water system, drainage and waste disposal system and environmental assessment of the plans. Third is the technical description of the agricultural development packages some of which are the livestock improvement plans, cropping regime packages, outputs estimates, opportunities of women in the schemes, fuel wood production and fruit tree development. Fourth is the technical description of plans for groups in non-agricultural occupations including training for vocational, artisan, trades, industrial and service occupations. Fifth is the schedule of activities specified with the level of responsibilities of the agencies concerned complete with display point when the responsibility for the operation of resettlement will pass from the agencies to the resettlers. Sixth is the monitoring and evaluation systems for development phase specifying the frequency of data collection, key indicators, information users and feedback system to fully harness the monitoring results.

(g) Participation of the Resettlers- Recipient Community Planning and Implementation of the Resettlement Program

Interwoven into the planning process is the participation of the displaced and host households in the development of alternatives for resettlement as well as the agencies and local government units who will be involved in the implementation. Specific roles of the various players in decision-making among alternative design elements will be conceived. Strategies for participation such as the formation of resettlement committees, public consultation, leadership training, and role specification in land preparation, operation and maintenance will be prepared.

(h) Financial and Economic Evaluation.

The resettlement component of the project requires a separate economic justification other than the one of the project. Doing so will enable the resettlement program be designed with the net present value (NPV) at the maximum. Cost would be distinguished between financial and economic where there is no counterpart in cash flows. Most of the cost for resettlement is allocated to compensation of property

losses. These are transfer costs that can be taken as proxy for certain economic costs. But some economic costs have no financial equivalent. Some costs can never be put in monetary terms such as the psychosocial difficulty that normally accompanies displacement. But specific programs and services will, nonetheless, be designed and implemented to mitigate such negative experience.

The formulation of economic development packages will include all the costs and benefits entailed in reestablishing the family and other production units in new productive enterprises. These include measures to enhance environmental quality, technology inputs and production support services which will enable the resettlers regain the standard of living enjoyed previously. This is done by determining at the outset the baseline income streams against which financial returns expected from redevelopment packages are measured to assess the viability of re-establishment options.

4.2.2 Mitigating/Enhancement Measures for the Operation Phase

Mitigating measures for the operation phase are essentially long-term in nature. The proposed environmental management plans are as follows:

(1) Stormwater Regulation

The projected increase in stormwater due to the increase in impervious areas will be prevented as much as possible. The storm-water from the surrounding areas will be collected by an open drain system which shall be placed around the landfill area. A horizontal drainage system will be installed in the landfill area to collect the storm-water and divert it to the vertical drain. Perforated pipes will be placed along the present creeks to collect groundwater and to prevent its seepage into the landfill layers.

(2) Leachate Treatment

The design treatment capacity is decided based on the rainfall data taken over the last 20 years. The design capacity of the leachate treatment facilities is set at 1,400 m3/day, under a condition of maximum use of active landfill area. **Figures 4.2.7 a** and **b** show the storage and treatment volume, and the regulation capacity and daily treatment volume of the proposed facility.

The design of the leachate treatment facility shall satisfy the standard established by the DENR for Class C or D receiving water. The treatment method includes a circulation system in which the collected leachate circulates between the landfill waste and the anaerobic lagoons in the dry season. In addition, the system, shall be installed with

sand filtration and active carbon systems for the final phase of leachate treatment to obtain a better effluent quality.

The division of leachate flow into two equal streams of 700 m3.day is proposed, each stream is shown in **Figure 4.2.8**.

Management of the SLF wastewater will be easy since these are mainly floor drains from administration building and those generated by the people's use of the sanitary facilities.

(3) Control of Air Pollution

The most probable sources of air pollutant as presented in Chapter 3 are hauling and the SLF itself. From the point of view of regulation, these sources of air pollution are very difficult to control and regulate.

The landfill gas as shown in the previous section is mainly composed of methane and carbon dioxide. For methane gas, gas vents will be provided for methane gas escape to the atmosphere. Since large- scale generation of methane gas at the early years of SLF operation, it expected that pollution from methane gas emission insignificant. For advance information, technical possibility of recovering landfill gas for energy production is also under study by MMDA for possible implementation in the near future. In this case, its effect to the environment would be minimized and the methane contribution from the proposed SLF to global warming would similarly be minimized. Study show that methane gas effect as green house gas is 20 times more potent than carbon dioxide.

In the case of hauling trucks, emissions are very much dependent on the type of vehicle and the type of fuel they are using. With the government efforts to banned leaded gasoline, the emission of lead particulate will surely minimize. However, the emissions of sulfur oxides, nitrogen oxides and particulates from the hauling trucks using diesel as fuel may not really help in minimizing the generation of air pollutants. The best that the proponent can do is to coordinate with the concerned authority and the hauling truck contractor on how to effectively and strictly implement the anti-smoke belching campaign of the government. The assistance of the local government officers will surely help in the implementation of such a program.

(4) Hazardous Wastes Management

The proposed SLF is designed to for the final disposal of municipal solid waste from its service areas. At no circumstances the management of SLF will allow the disposal of toxic and hazardous waste in the SLF. In case toxic and hazardous are delivered for

disposal, measure will be undertaken to bring back the toxic and hazardous from its legitimate owner or origin. The management will likewise comply with the provisions of the implementing rules and regulations (IRR) of RA 6969 ("Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990"). Under this IRR, the DENR encourages proper management of toxic and hazardous wastes.

(5) Increase Demand on Road Services vis-a-vis with Traffic Generation

During the implementation period of the proposed SLF project, the traffic situation at the entrance and exit area along the national highway would still be manageable and could easily be handled by providing the necessary personnel to direct the flow of traffic. The proposed access road in which hauling trucks can access the SLF from two directions will surely ease the traffic congestion in the impact area. MMDA shall likewise formulate a more comprehensive and integrated vehicular traffic plan that will address the traffic circulation-related impacts including travel times, degree of congestion, effect on public transit mobility and traffic safety.

(6) Implementation of Pro-Active Pollution Prevention Program

In order to prevent the occurrence of any pollution-related problems arising from the operation of the proposed SLF, (i.e., contamination of ground water by infiltration to the acquifer by leachate, proliferation of blown up solid waste especially plastics in the surrounding area, etc), a pro-active pollution prevention program will be formulated. Based on the experiences of MMDA it gained from the operation San Mateo SLF, it will reformulate its pollution prevention program side by side with any pollution control measures that are proposed for incorporation in this project. This is highly recommended approach in preventing or reducing the creation of pollutants during the operation cycle of any project. This program could be patterned with those practices being applied in advance counties operating SLF projects.

(7) Management Residual Impacts

The adverse residual impacts associated with the construction phase are not alarming as these will be temporary and on manageable levels. Strict implementation of the erosion prevention and sediment control methods during rainy days and dust control during the dry seasons will keep the problems in manageable levels. Residual magnitudes of the mitigated adverse impacts during the operation phase will also be at acceptable levels under strict implementation of the mitigating measures. Diligent monitoring will ensure that these levels will be maintained.

(8) Contingency Plans

In the presence of any undesirable situation related to environmental disaster, emergency preparedness is therefore important. It is necessary that the proposed SLF project formulate contingency plans for dealing with emergencies and should be made available to the administrator of the SLF. At any undesirable event or accident, the Environmental Officer must:

- notify the DENR (required by RA 6969) and the industrial park administrator
- submit plans on containment, decontamination, and disposal
- immediately issue notification of any release.

Each incident involving the release of hazardous substances presents special problems. Response personnel must evaluate these problems and determine an effective course of action to mitigate the incident. The following phases are involved in safely responding to an incident: (1) site assessment, (2) site entry, and (3) site control.

Site assessment will include an evaluation for site approach to keep emergency control personnel out of the hazardous area until identification of the nature and degree of the hazards can be made and initial assessment completed. Important requirements in site entry are personnel protective equipment and monitoring. The preliminary safety requirements will be based on the findings of the initial on-site survey and reconnaissance which may consist of more than one entry. Each situation will be examined individually since no method can select a level of protection in all unknown environments.

Control of the site is necessary to reduce the possibility of exposure to any contaminants present and contaminant transport by personnel or equipment. This may include the setting up of security and physical barriers to exclude unnecessary personnel from the general area and establishing control points to regulate access to work zones. These control points will limit movements of personnel and equipment between zones and onto the site.

4.3 Impact Monitoring and Reporting Plan

The environmental impact of leachate and landfill gas on the site and the surrounding area should be minimized not only during the period of operation but also even after its closure and conversion to another land use. Therefore, the periodic monitoring of what is expected to impact to the environment must be implemented for a long period

of time. S review of the plans of facilities and landfill work, and the proper preventive plan will be comprehensively formulated. Items to be considered are as follows:

- Leachate Monitoring (Quantity and Quality)
- Water Discharged (Quantity and Quality)
- Landfill gas
- Odor
- Noise and Vibration (Noise, vibration and traffic volume)

4.3.1 Monitoring of Construction Phase Impacts

Usually, construction phase impacts are short-term in nature. For this reason, monitoring plan during this phase of the project implementation may be carried by checking the adherence of the contractor to fundamental engineering construction protocol. Likewise, an on the spot inspection of the contractors/constructor performance and adherence to the mitigating measures indicated in the EIS can be checked.

4.3.2 Monitoring of Operation Phase Impacts

The monitoring plans during operation phase are summarized in **Table 4.3.1**.

Table 4.3.1 Summary Table of the Proposed Monitoring Plan

Monitoring Item	Measurement Item	No. of Location	Frequency of Test	Total No. of Tests	Remark
1. Leachate	Quantity and Quality	2	(2x12)/year	48	21 years
2. Leachate Treatment Plant Effluent	Quantity and Quality	2	(2x12)/year	48	21 years
3. Landfill Gas	Quantity and Quality	10	(2x12)/year	48	21 years
4. Ground Water	Quality	3	12/year	8	21 years
5. Odor	Intensity	4	2 / year	8	During landfill operation
6. Noise and Vibration	Noise, vibration and Traffic Volume	4	2 / year	8	During landfill operation

4.3.3 Application of Environmental Audit as Alternative to Regular Environmental Monitoring Program

Environmental audits should be used as a preventive tool. These are independent, systematic method of verifying that environmental regulations, internal policies, and good operating practices are being followed. Ideas on minimizing and managing the industrial hazards through the use of engineering controls, administrative controls, personnel protection, occupational health and safety training, health and safety planning, and medical monitoring should be considered and practiced.

4.3.4 Impact Reporting

The proposed impact monitoring and reporting plans are intended for the continued observation and evaluation of the mitigated impacts during the construction and operation phases. The proponent will closely coordinate with the DENR on the monitoring and reporting activities. It shall provide the DENR with a quarterly environmental status report. The proponent will appoint an Environmental Coordinator.

(1) Construction Phase

Soil erosion is the only significant adverse impact during the construction phase. Monitoring of the identified mitigating measures for control of soil erosion will be easy since construction activities will be within the property boundaries of the project proponent. The project proponent shall closely monitor its constructors if the mitigating measures are being implemented. In addition, the project proponent shall regularly inform the DENR on the progress of the construction activities. Any new environmental issues that will arise and associated with the project shall be referred promptly to the DENR.

(2) Operation Phase

The proposed development will have some significant adverse impact to groundwater resources. This impact will be monitored closely. Changes in the groundwater quality will be one of the main targets of the observations. The use and protection of the groundwater are important issues for the monitoring activities. Other items for monitoring and its frequencies are presented elsewhere in this Chapter.

4.4 Designation of an Environmental Officer

From environmental management and protection point of view, a very important position in the management of SLF is the Environmental Officer (EO) who shall be responsible for all environmental matters. The EO shall be tasked with the following:

- coordinate with the DENR, and LGUs on all environmental monitoring activities.

- monitor the environmental compliance of inconspicuous systems
- maintain copies of the reports on the regular testing and inspection of the pollution control installations
- monitor all activities relative to the Environmental Compliance Certificate (ECC) stipulations to ensure compliance of all requirements
- actively participate in the periodic consultations with all concerned sectors on the various environmental impact issues
- prepare a monthly environmental status report and consolidate these reports for a semi-annual submittal to the DENR.

4.5 SLF Organization, Staffing and Training

4.5.1 General

An appropriate organization, staffing and training are based of the efficient operations and management of the proposed SLF. It is of great importance to create a functional and integrated organization. This shall include continuous training and education of SLF to perform their various functions effectively and efficiently. Delicate staff requirement planning will have the following advantages:

- It creates a possibility to keep the total number of staff at the lowest possible level
- It creates an organizational flexibility to meet the demands at peak hours
- It is a means for human resource development

4.5.2 Organization

The study on SLF organization, staffing and training is conducted based on the existing organizational framework of other very successful SLF outside the country.

The proposed SLF organization is shown in **Figure 4.5.1**. It is proposed for its smooth operation and maintenance.

4.5.3 Staffing

The proposed number of staff for both the MMDA and the Contractor are presented in **Table 4.5.1**.

Table 4.5.1 Proposed Staffing for the Proposed SLF

	Employee Worker	Head	Remark
I. MMDA	1. MMDA Main Office		
	Project Manager	1	
	Site Environmental Manager	1	
	2. Site Office		
	Site Manager	1	
	Landfill Manager	3	3 shifts (1 x3)
	Maintenance Manager	1	
	Administrator	2	
	Driver	2	
II Contractor	1. Waste Receiving Work		3 shifts
	Weighbridge Operator	6	2 x 3
	Spotter	6	2x3
	2. Landfill/Soil Covering Work		
	Site Manager	1	
	Foreman	3	1x3 shifts
	Driver (tractor) Compactor Water tank Truck	36 6 3	1x3 shifts
	Driver (Power Shovel) Loader Dump Truck Tractor	3 2 10 4	
	4. Maintenance Work		
	Assistant Worker	10	

4.5.4 Training

There are training programs for SLF operation and maintenance being offered private institutions locally and abroad. There is, however, a need of developing a local training program for the staff of the SLF section in order to adjust the training closely to the local conditions. There are two main objectives to be achieved by this local training program:

a) prepared the staff for the new conditions, facilities and equipment they will meet at the SLF ; and

b) give the staff of each class sufficient training and education in various functions at the SLF.

There is also a need of a training program for management staff. An integrated organization needs staff with integrated competencies It is very evident that the staff have to be familiar with the new establishment, facilities and equipment and well trained to handle them. Sufficient time to perform such training has to be planned normally within a few months before the opening of the new SLF when the construction works are almost completed.

4.5.5 Operation and Maintenance of Sanitary Landfill

(1) Periodic maintenance of the landfill site

The maintenance explained below should be implemented to fully achieve the functions of a landfill site.

(a) Control of incoming waste

Control and monitoring of waste carried into the landfill site are very important because of the following reasons:

- to carry out smoothly the plans and workings of a landfill,
- to maintain the facilities of the site,
- to check for noxious waste being carried and protect the environment within, as well as the area surrounding the landfill, and
- to obtain basic data for collection of fee for solid waste treatment.

(b) Control of waste volume at truck weighing scale yard

Incoming waste must be weighed and a record kept for each truck.

(c) Monitoring of incoming waste

Incoming waste must be monitored to check for noxious waste and to adequately control the quality of waste.

(d) Maintenance of facilities

Facilities within the landfill site are very important to maintain its functions, and the facilities must be operated at all times. Daily maintenance results in early detection of accident-causing defects. In case of an earthquake or heavy rains, an investigation of the facilities should be conducted as soon as possible.

In case facilities and machines have to undergo repairs, an alternative plan should be drawn up before such repairs are undertaken, taking into consideration its effects on the environment of the surrounding areas, on other structures, landfill works, and the cost for repairs.

Facilities requiring periodic maintenance are as follows: (Items and contents of the maintenance needed for facilities must be studied closely at the detailed design stage.)

1) Dike (Surface of dikes, Location of dikes and others)
2) Water interception (Earth Lining)
3) Drainage facilities
4) Leachate collection facilities

5) Leachate treatment facilities
6) Waste control and monitoring facilities
7) Landfill gas collection facilities
8) Site Road
9) Other related facilities

(2). Management of Landfill Work

Adequate management of the landfill work must be undertaken to stabilize the landfill site and to control the quantity and quality of leachate and landfill gas. A management manual, therefore, is required for a proper landfill work.

The management manual should contain the following items:

1) Landfill plan and work

- Long term landfill plan (Long term landfill plan by year and by area, Monthly landfill plan by division)
- Method of Landfill (Size of the cell for a daily landfill, Order of landfill)
- Operating hours (Operating hours of a landfill work: 3 shifts at 24 hours a day, Operating hours of a soil covering work: 8 hours at daytime)
- Work of Landfill (Plan of a daily waste dumping place in line with monthly landfill plan, thickness of waste spreading and times of crashing and compacting)
- Plan and Work of Soil Covering (Proper material and thickness of covering soil by purpose: daily, intermediate, final, Plan of excavation, haulage and storage of covering soil needed, Work method of soil covering
- Operation and Maintenance of Landfill Vehicles and Machinery (Secure road-worthiness of vehicles for waste haulage, and as onsite vehicles, Periodic education and training of workers, Pre- and post-inspection of vehicles and machinery, as well as periodic maintenance work
- Road Plan of the Landfill Site (Layout plan of the main and distribution roads meeting with landfill plans, Road design considering safety, workability and easiness of maintenance)

2) Management of Landfill Form and Settlement Survey of landfill form and measurement of settlement volume Recording and filing of data

3) Safety Control on Site

- Traffic Safety Control (Traffic control: traffic, speed etc., Installation of traffic signs, Selection of operating vehicles and machinery meeting with site conditions)
- Safety Control for Landfill Work (Countermeasures for landfill gas leakage, Countermeasures for oxygen deficiency in pipes and manholes, Rules for treatment of chemicals being used)
- Safety of Workers (Measures for prevention of accidents, Conduct safety drills and health education programs, Medical check ups of workers)
- Data Management for Landfill Work (Collection, filing and storage of data on landfill work and landfill form)

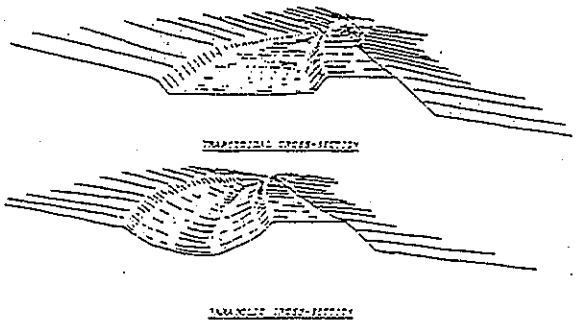

Figure 4.2.1 Typical Interceptor Dikes Swales

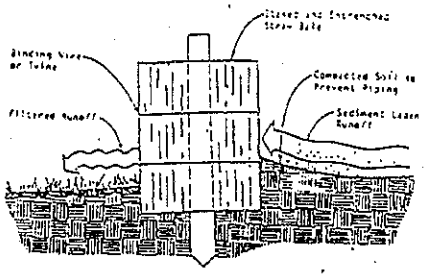

Figure 4.2.2 Flexible Slope Drain

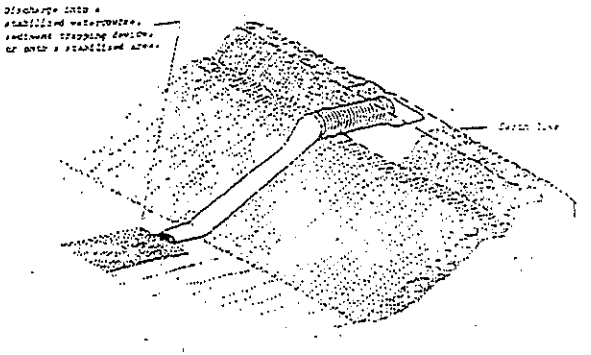

Figure 4.2.3 Cross Section of Installed Straw Barrier

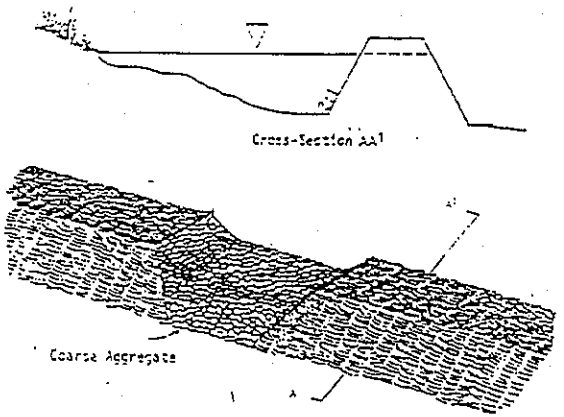

Figure 4.2.4 Typical Sediment Trap

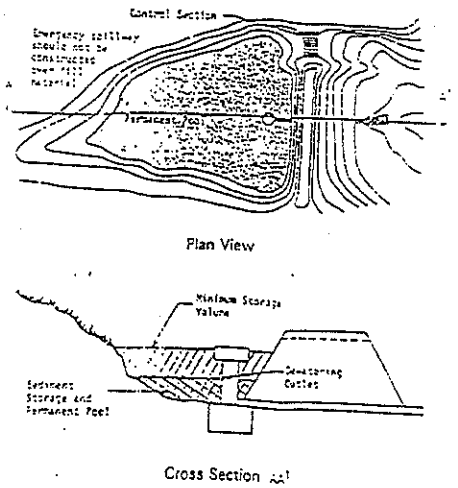

Figure 4.2.5 Temporary Sediment basin

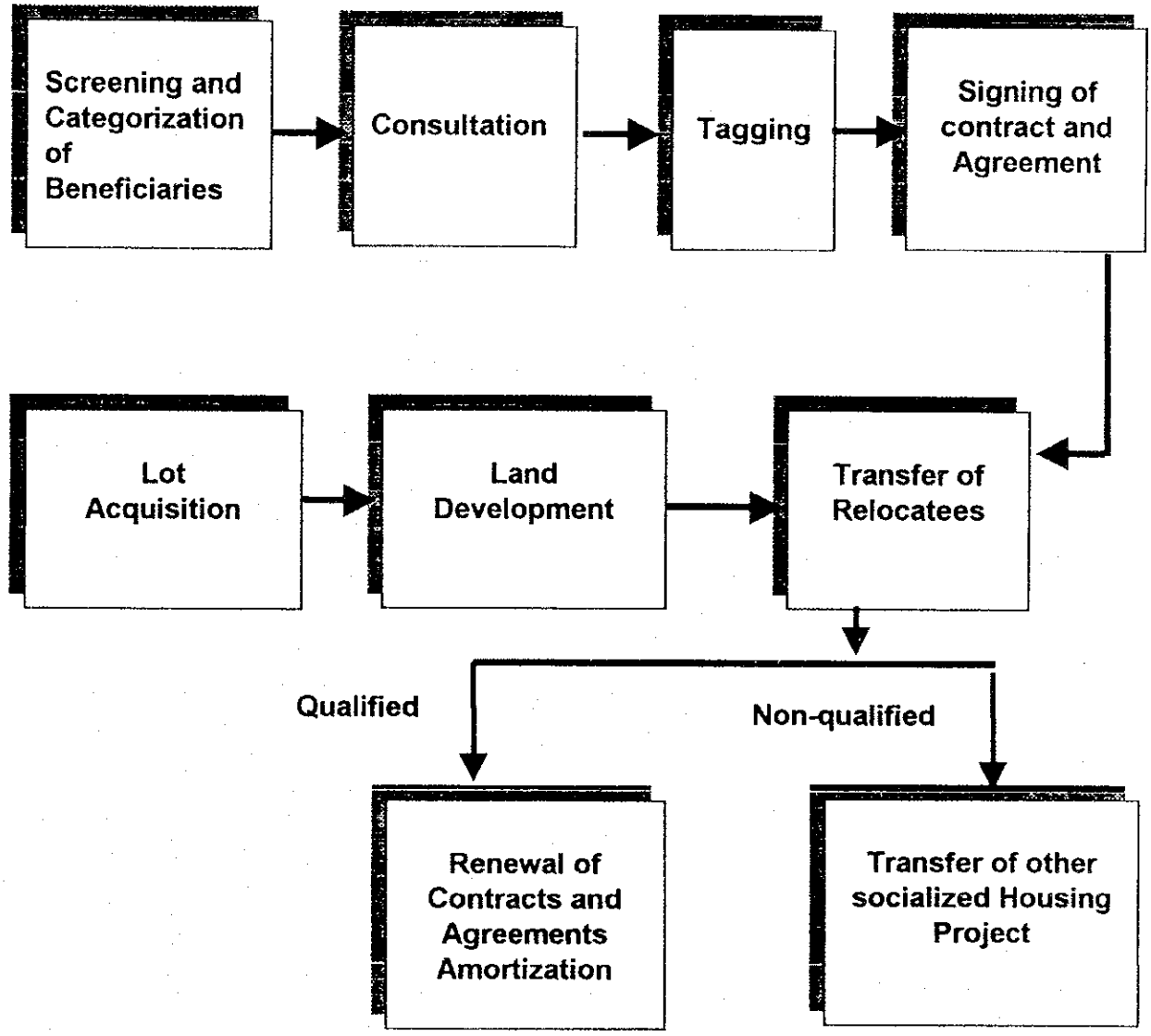

Figure 4.2.6. Screening and Selection Scheme of Potential Resettlers for Relocation and/or Resettlement

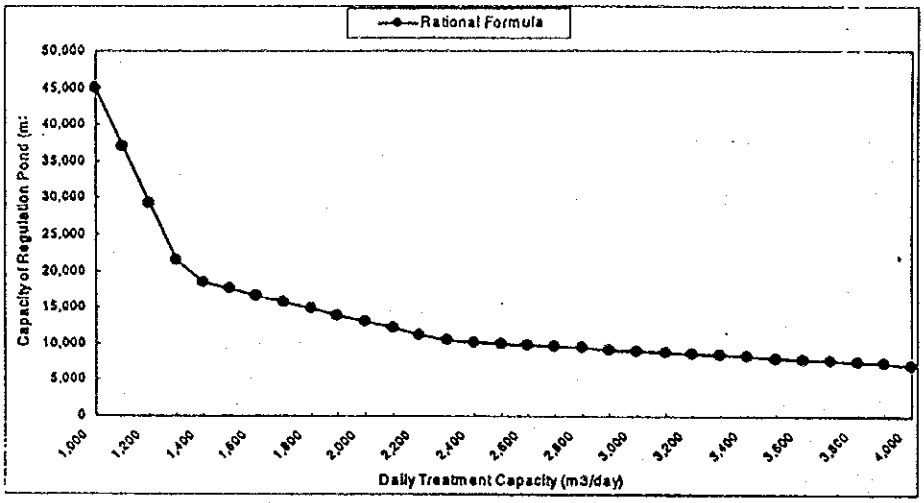

Figure 4.2.7a Storage and Treatment Volume

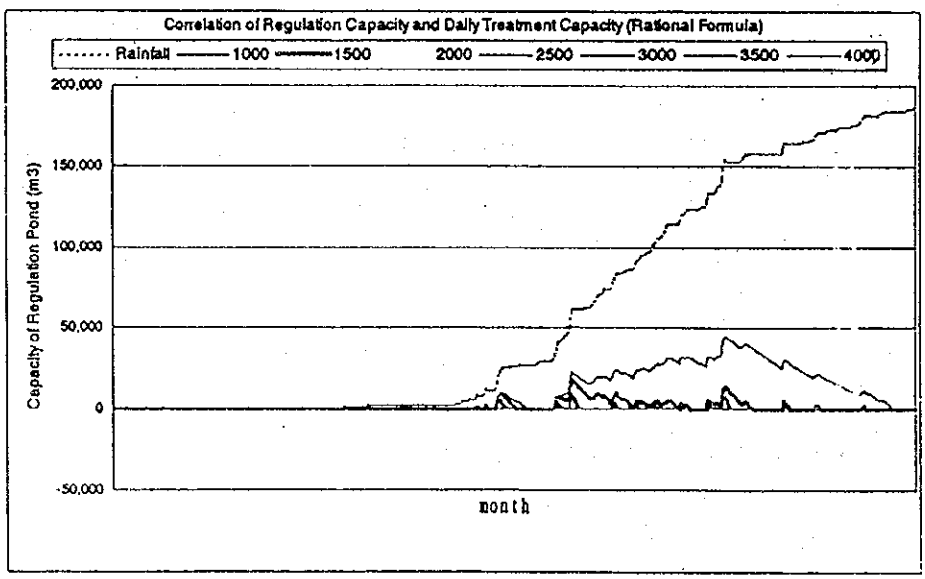

Figure 4.2.7b Regulation Capacity and Daily Treatment Volume

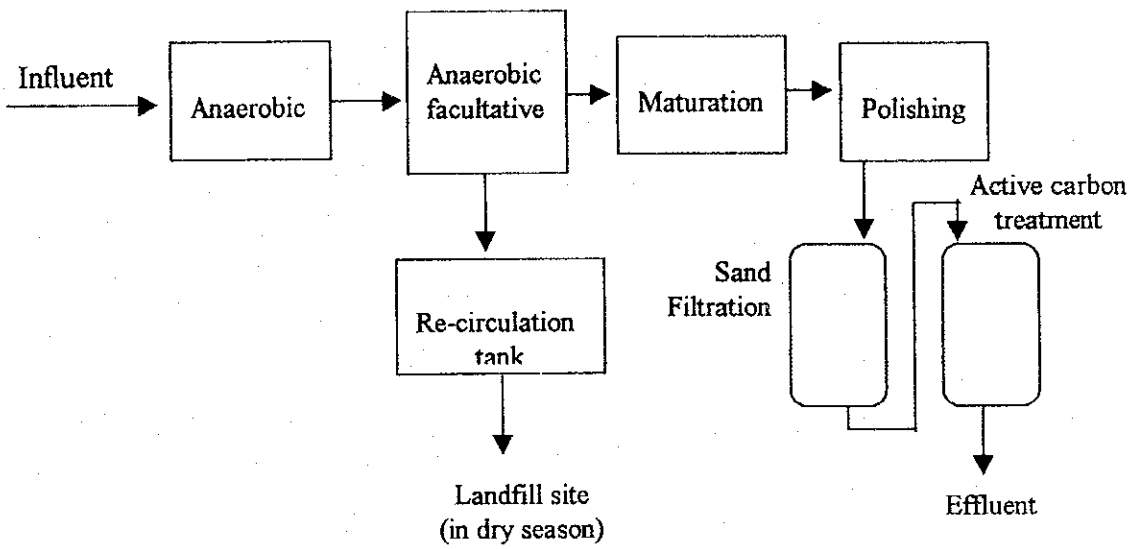

Figure 4.2.8 Proposed Leachate Treatment Scheme

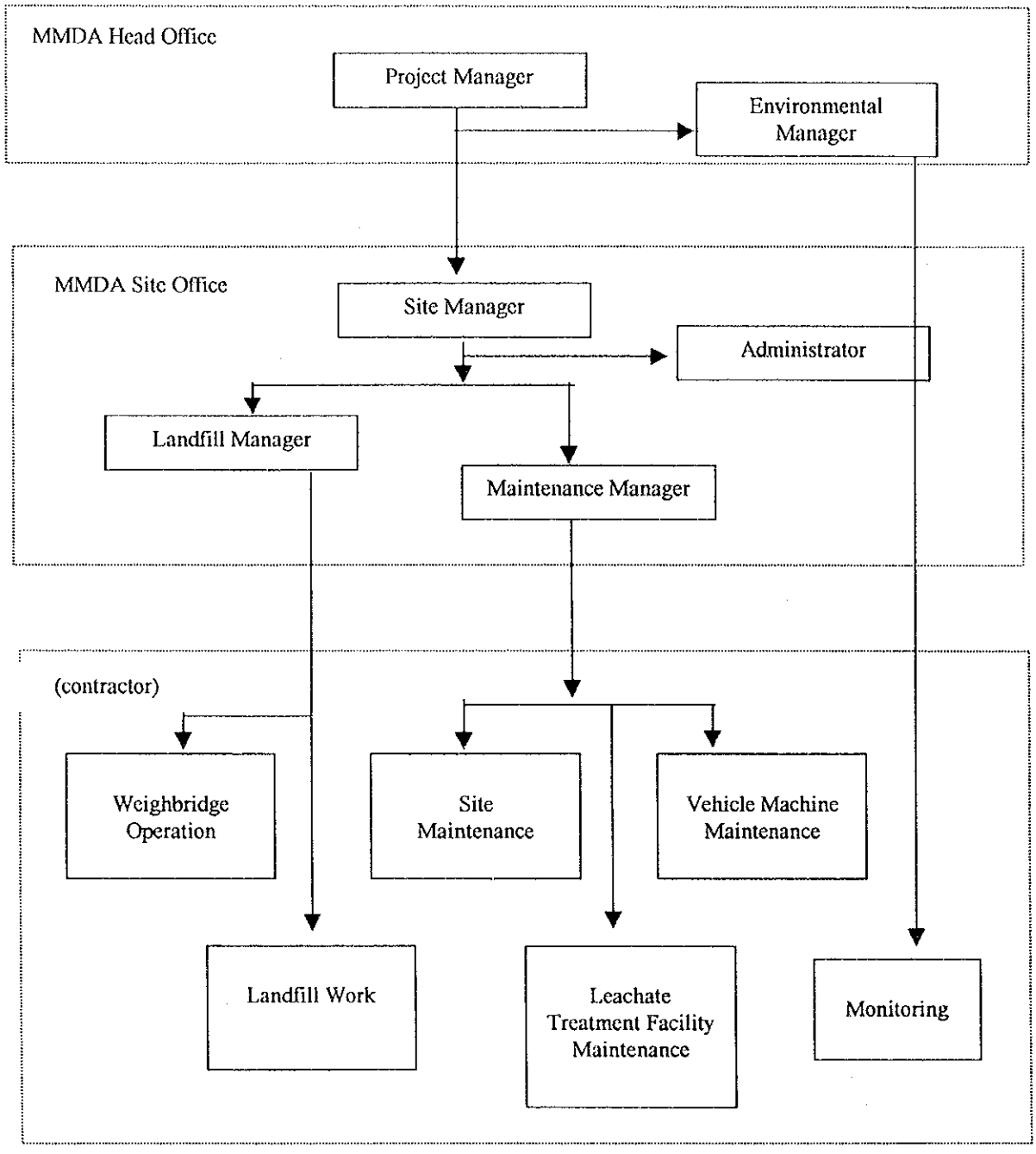

Figure 4.5.1 Organizational Structure of Landfill Operation

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REFERENCES

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ATTACHMENTS

ATTACHMENT A

Figures of Vibration Investigation, Traffic Count and Noise Survey

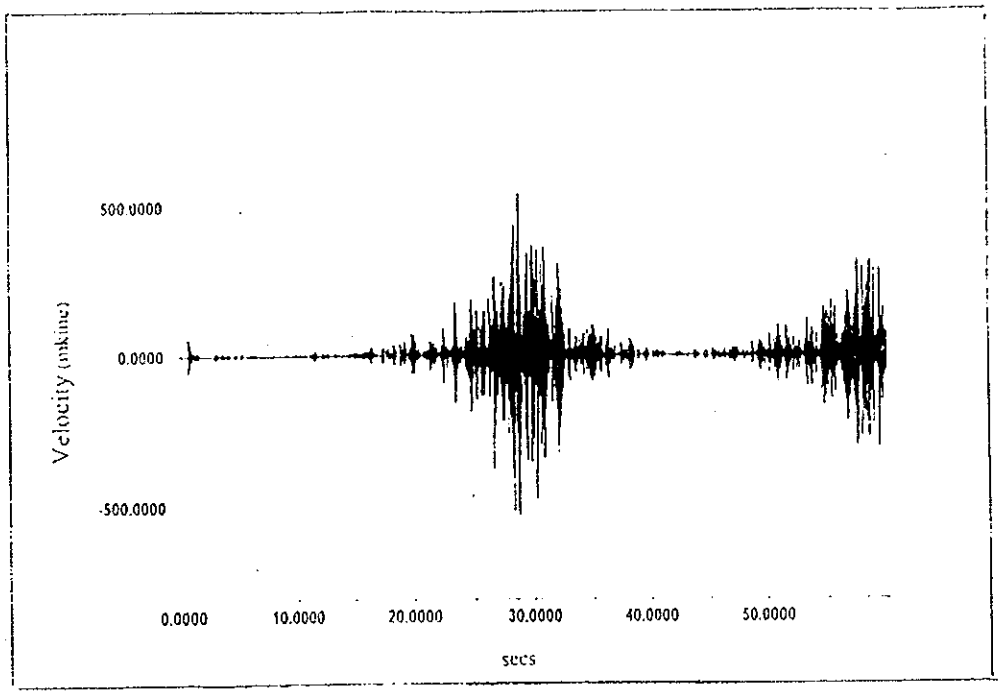


Figure 2.6.2 Typical waveform (with smooth onset and tail) generated by a moving vehicle recorded at point P1. Y-axis represents the amplitude levels of velocity values in mkine and X-axis represents the duration in seconds.

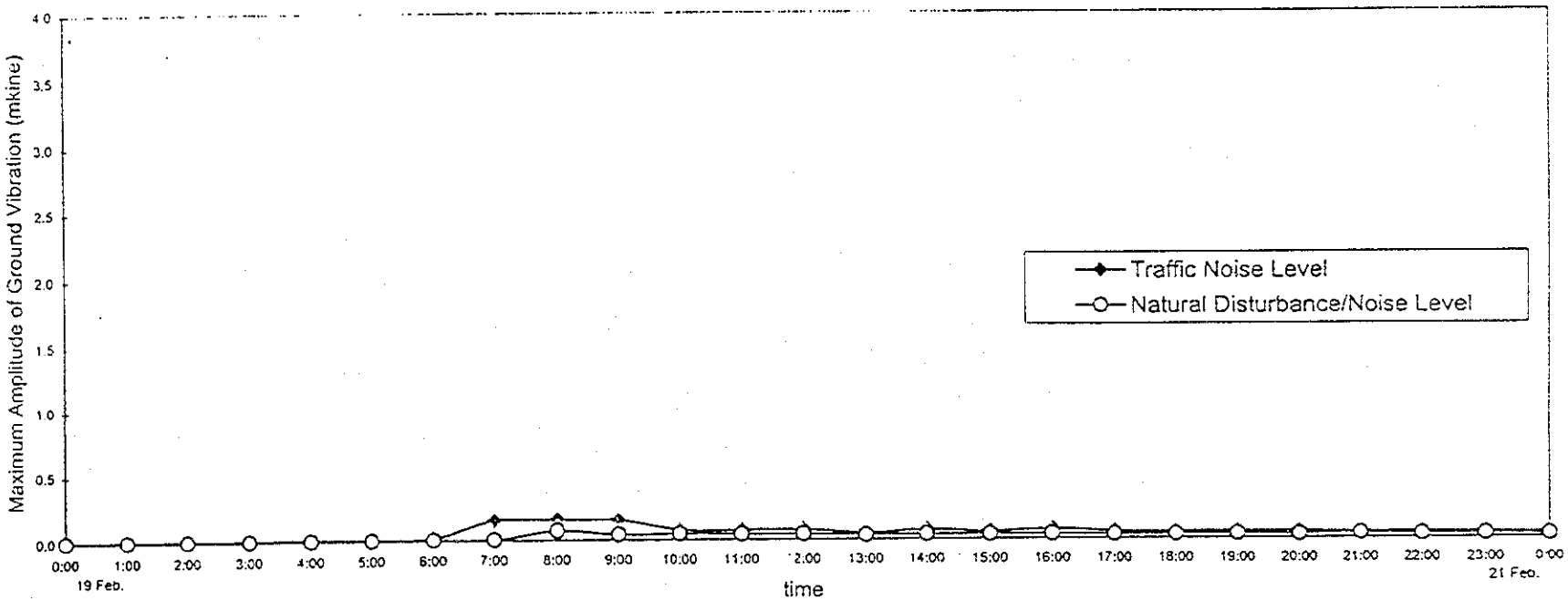


Figure 2.6.3 Plots of maximum amplitudes of the ground vibration and the natural disturbance/noise level within 24 hours at point S5. It can be seen that there's no significant variation between natural noise level and other source feature. Slight change can be seen during day time which corresponds to other day time activities including traffic within the area.

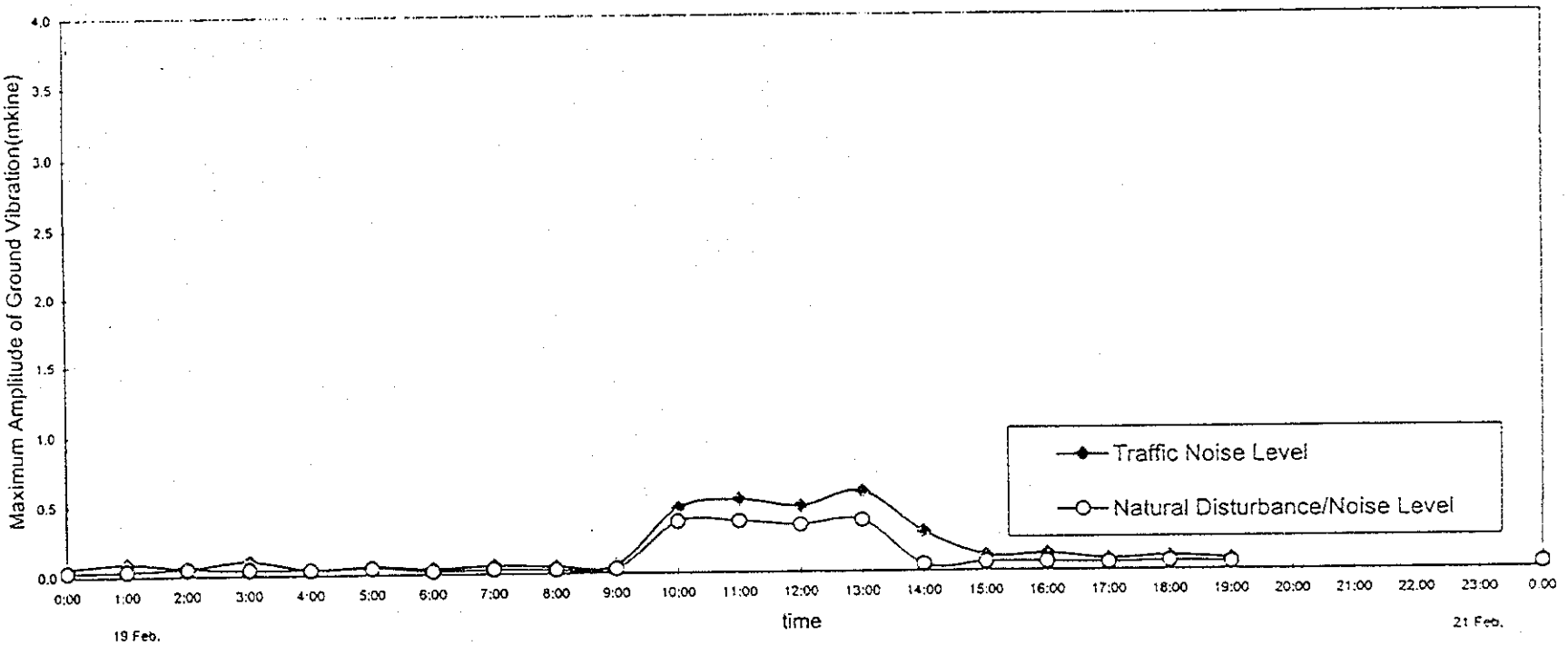


Figure 2.6.4 Plots of maximum amplitude of the ground vibration and the natural disturbance/noise level within 24 hours at point **S1**. Slight variation between the natural noise level and other disturbances, and their simultaneous fluctuation in amplitude can be attributed to the oscillation of liquid in the nearby leachate treatment ponds and the operating heavy equipment and traffic from distant places.

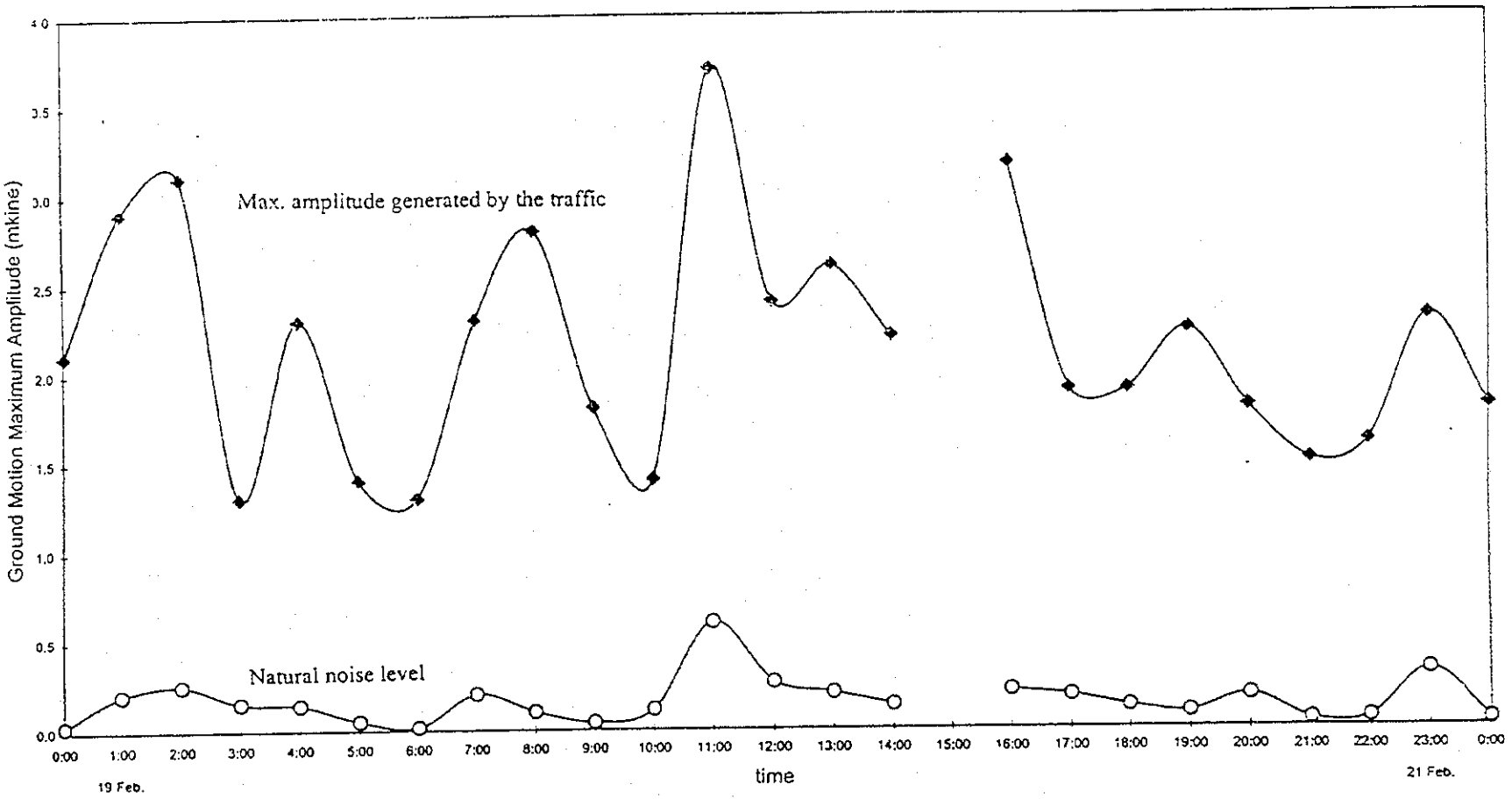


Figure 2.6.5 Plots of maximum amplitudes or maximum velocity values from hourly samples of both with vehicular activity and natural noise level at point P1.

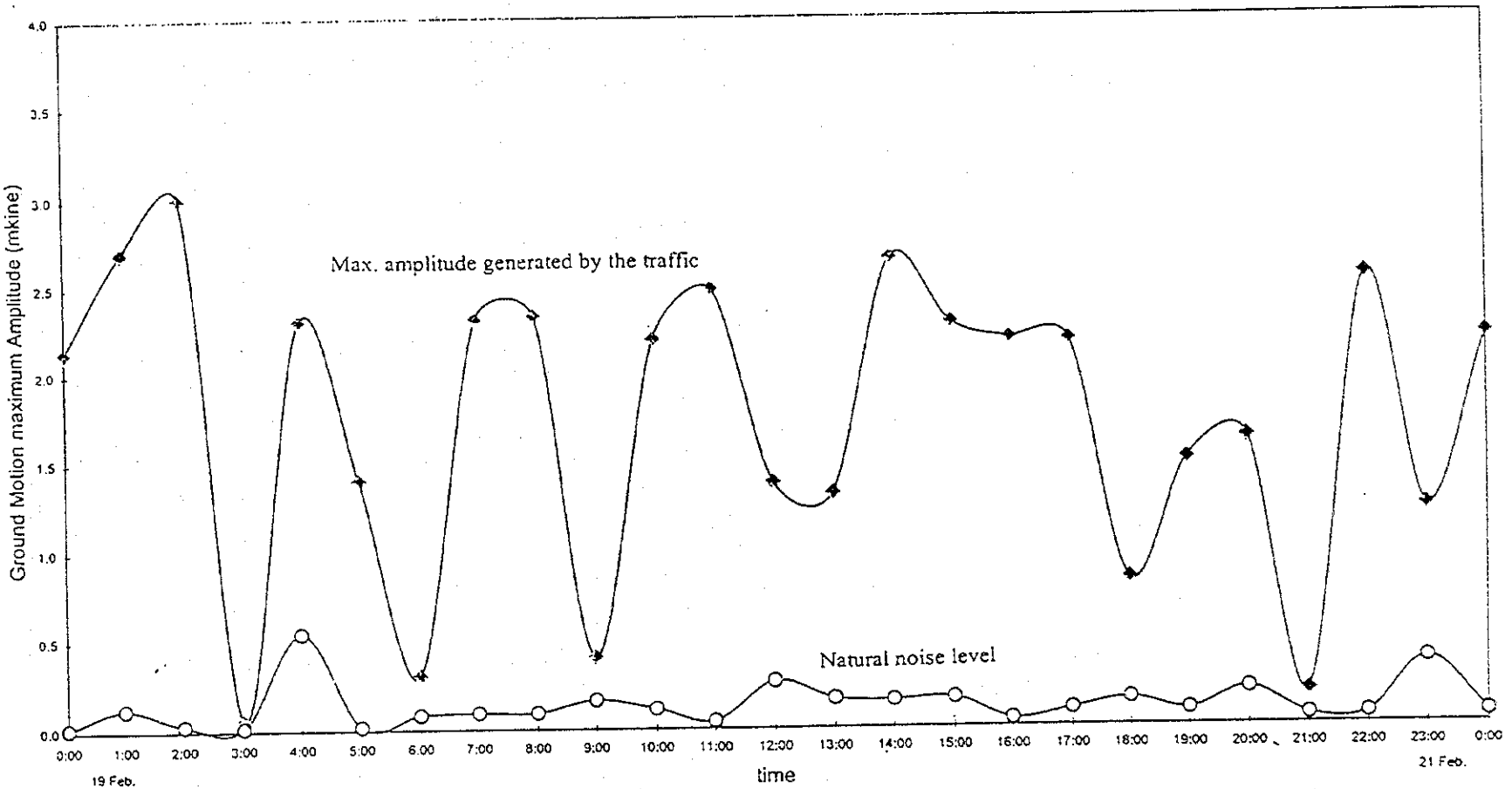


Figure 2.6.6 Plots of maximum amplitudes or maximum velocity values from hourly samples of both with vehicular activity and natural noise level at point S6.

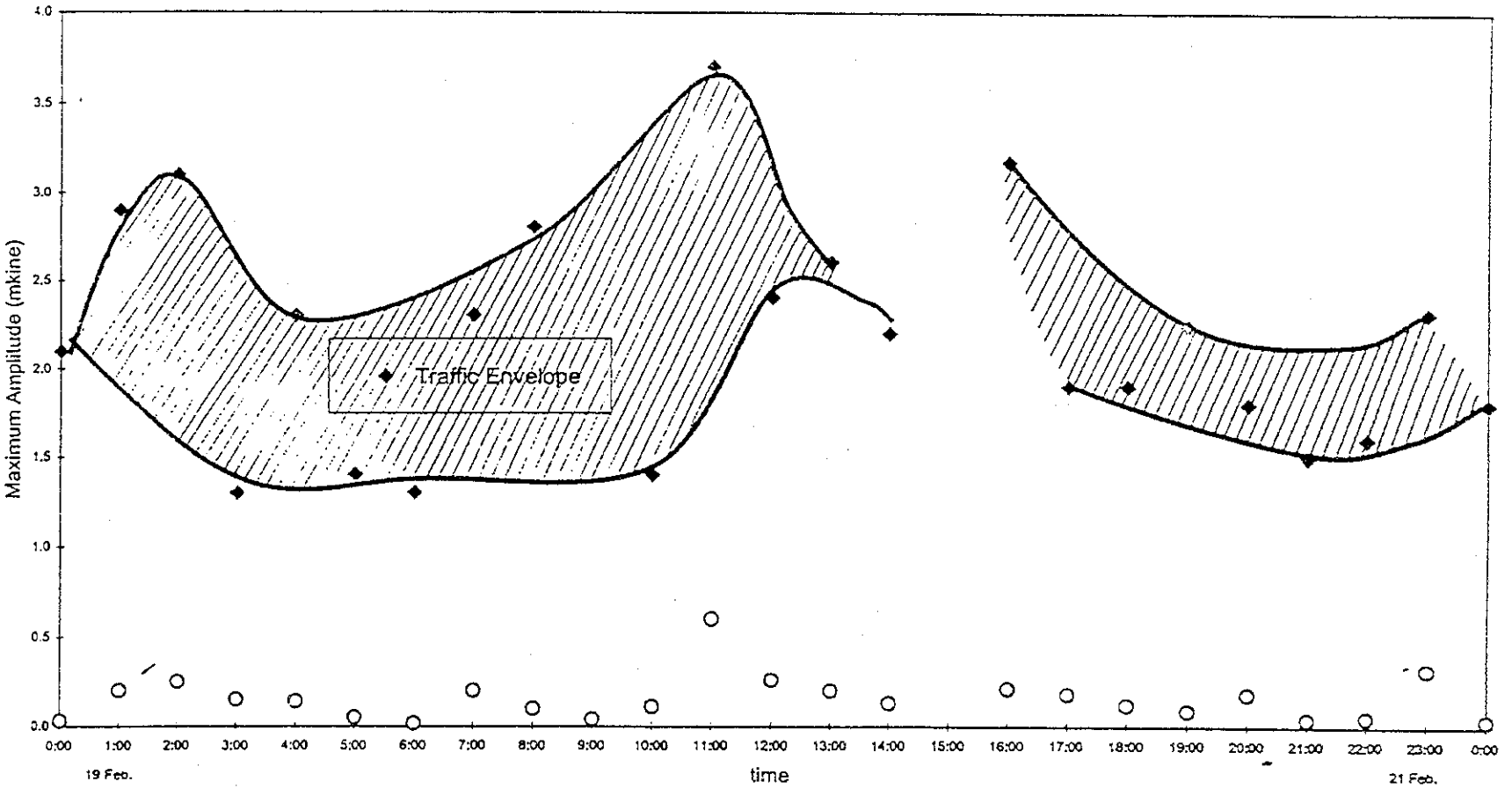


Figure 2.6.7 Envelope of the highs & lows of the hourly maximum amplitudes of vehicular activity at point P1 which correlates with the hourly traffic count.

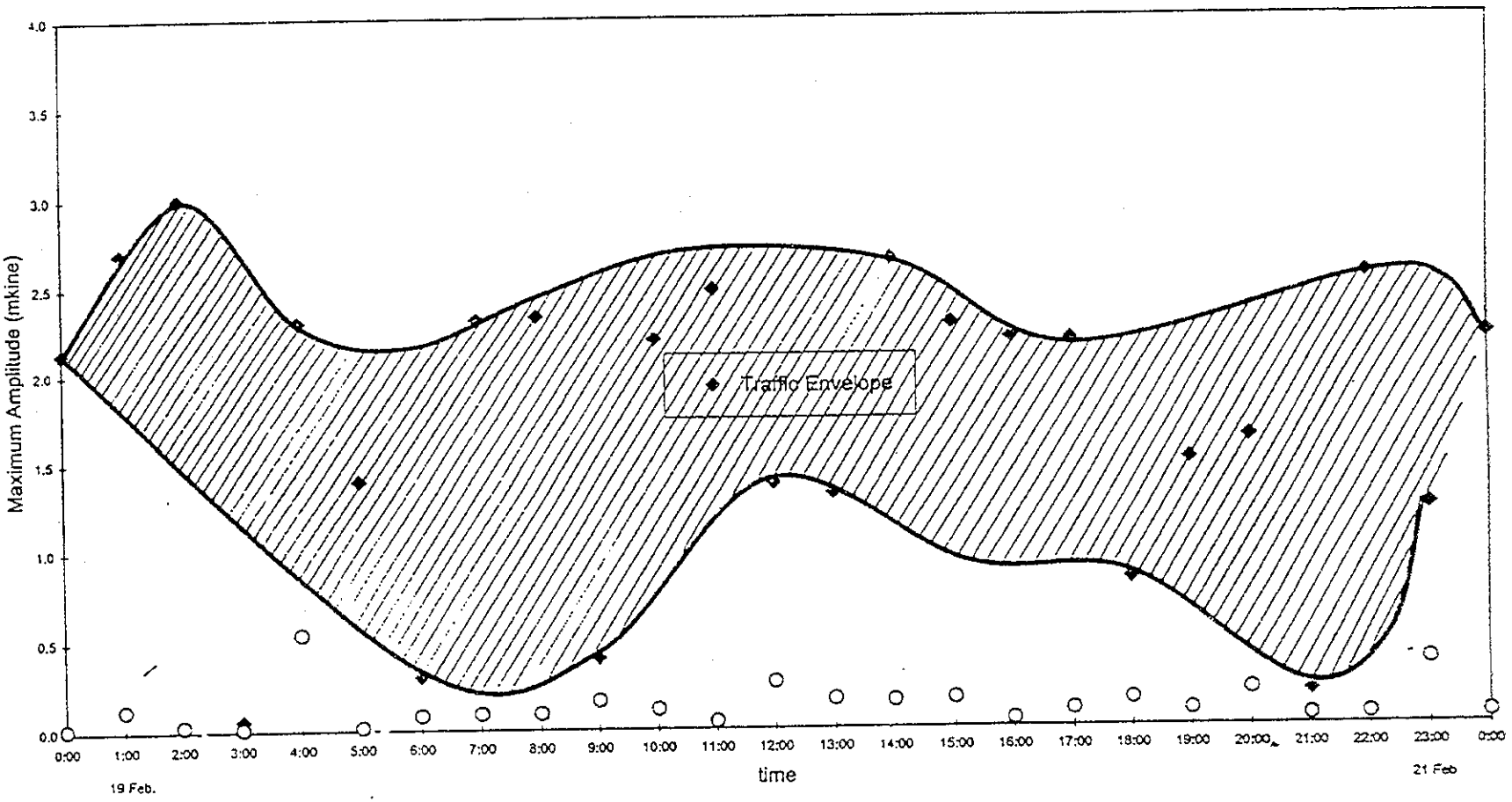


Figure 2.6.8 Envelope of the highs & lows of the hourly maximum amplitudes of vehicular activity at point S6 which correlates with the hourly traffic count.

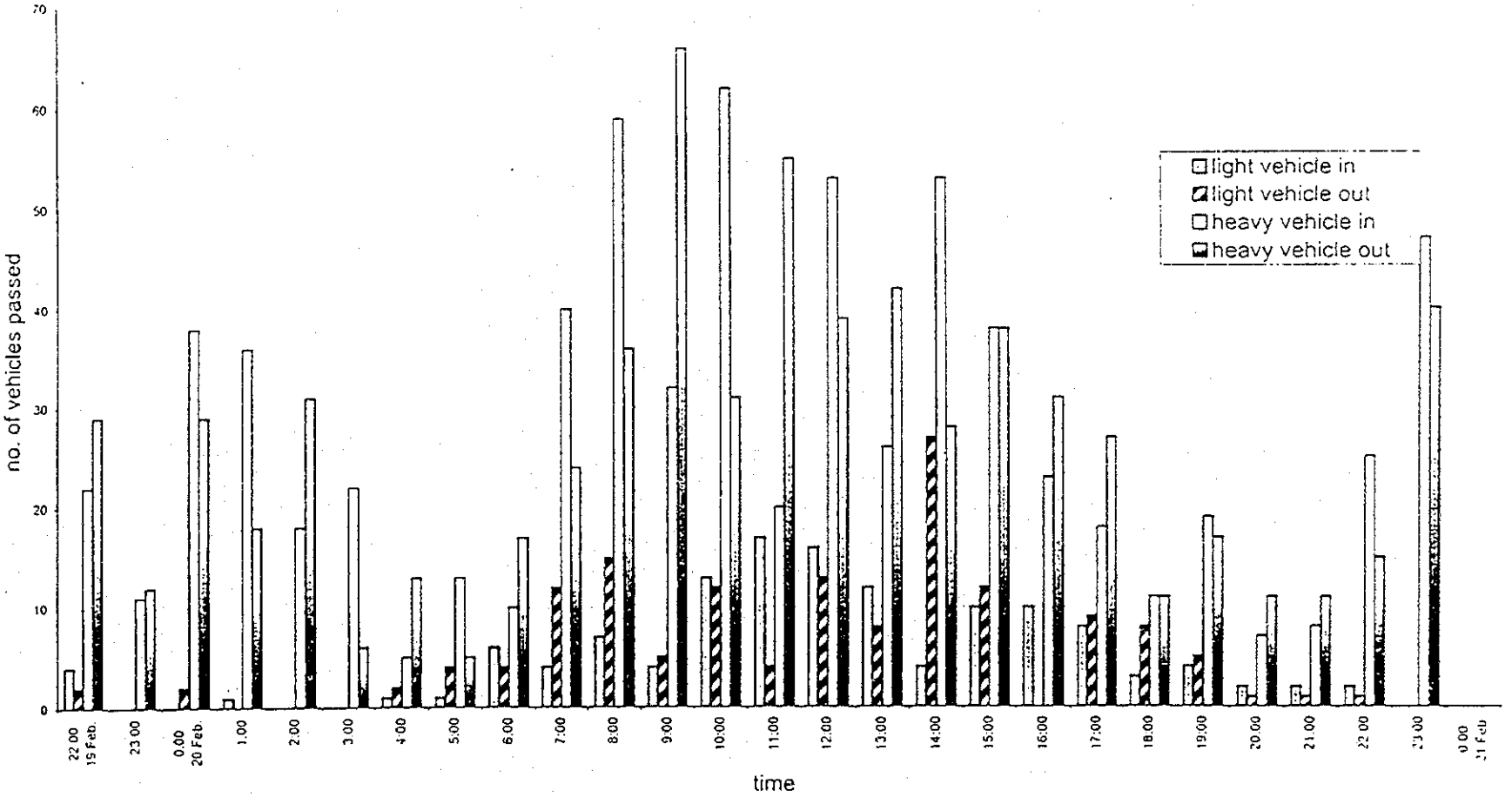


Figure 2.6.9 Hourly traffic count monitoring within 26 hours at point P1 (landfill entrance/exit). Maximum amplitudes of the ground vibration is being dominated by successive incoming & outgoing heavy trucks particularly garbage delivery trucks. Increased in number during daytime includes vehicles other garbage trucks.

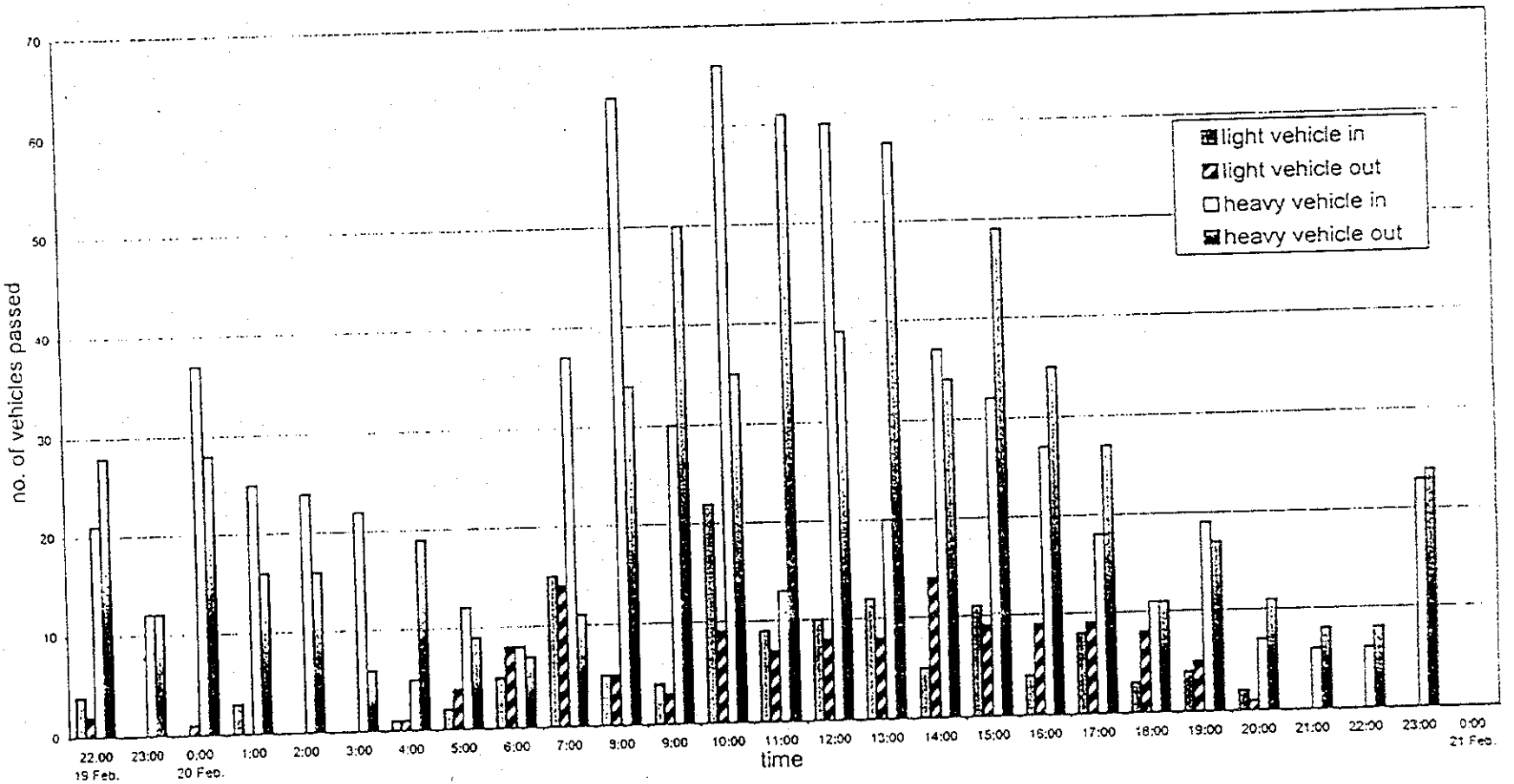


Figure 2.6.10 Hourly traffic count monitoring within 26 hours at point S6 (Sapinit Elem. School). Heavy vehicles at night time are dominated by garbage delivery trucks. Increased in number during daytime includes vehicles other than garbage trucks.

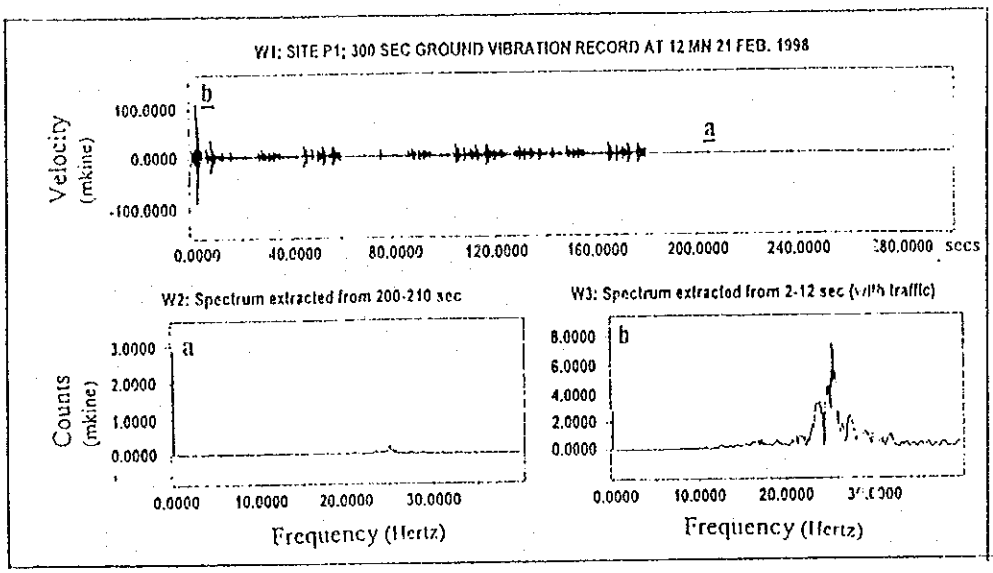


Figure 2.6.11a

Figure 2.6.11 Temporal variation of spectral content within 25 hours at point P1. Predominant frequency of all activities in the area lies within 25 Hertz. Boxes "a" show the spectral contents for the natural frequency of the site and boxes "b" show the spectral contents of vehicular activity. It can be observed that the increase in natural noise level was during episodes of increased vehicular activity.

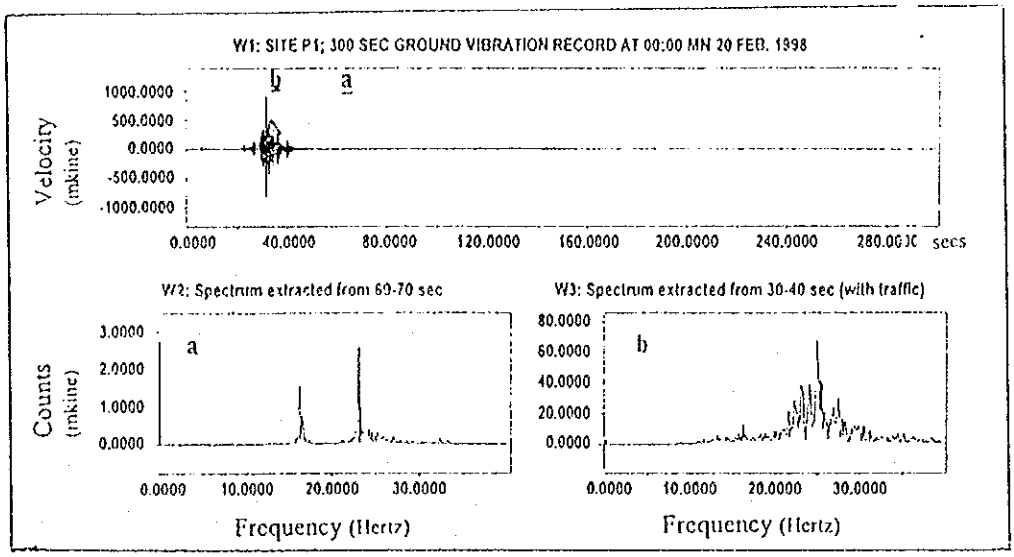


Figure 2.6.11b

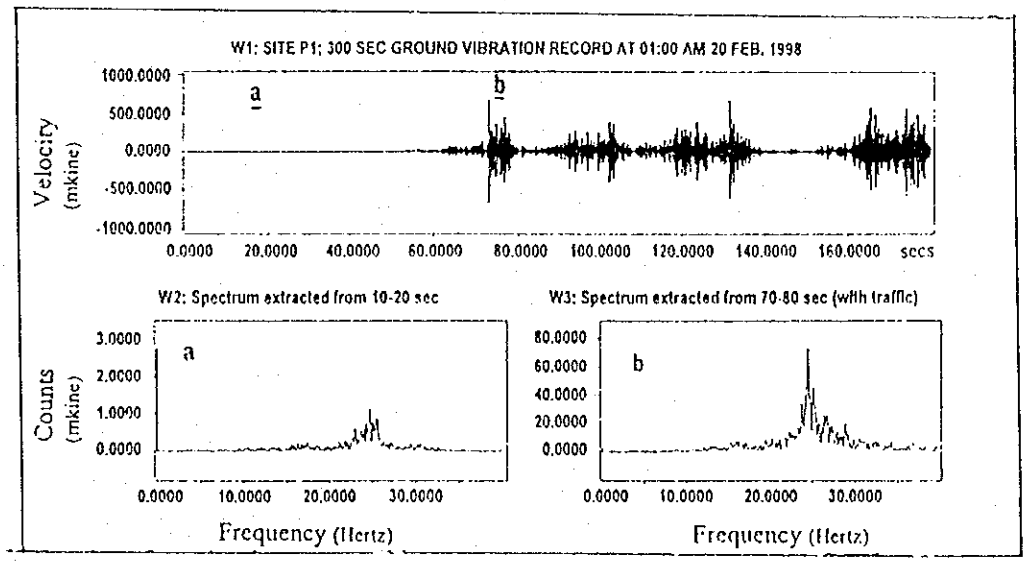


Figure 2.6.11c

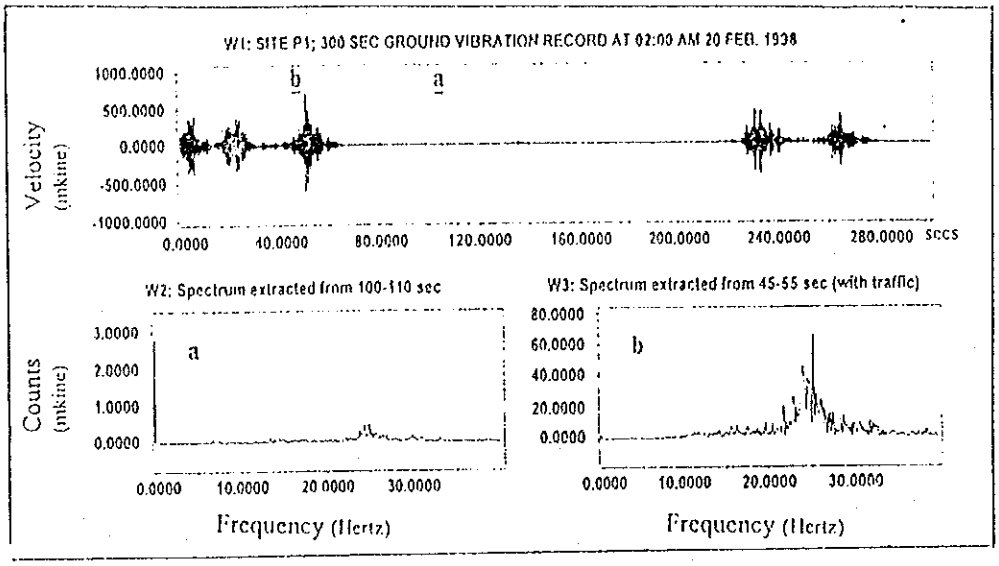


Figure 2.6.11d

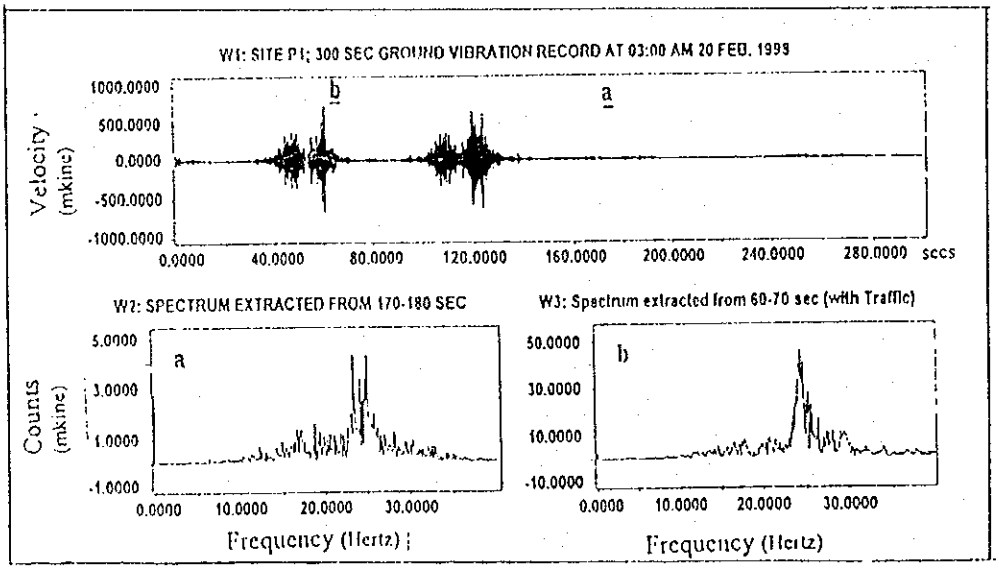


Figure 2.6.11e

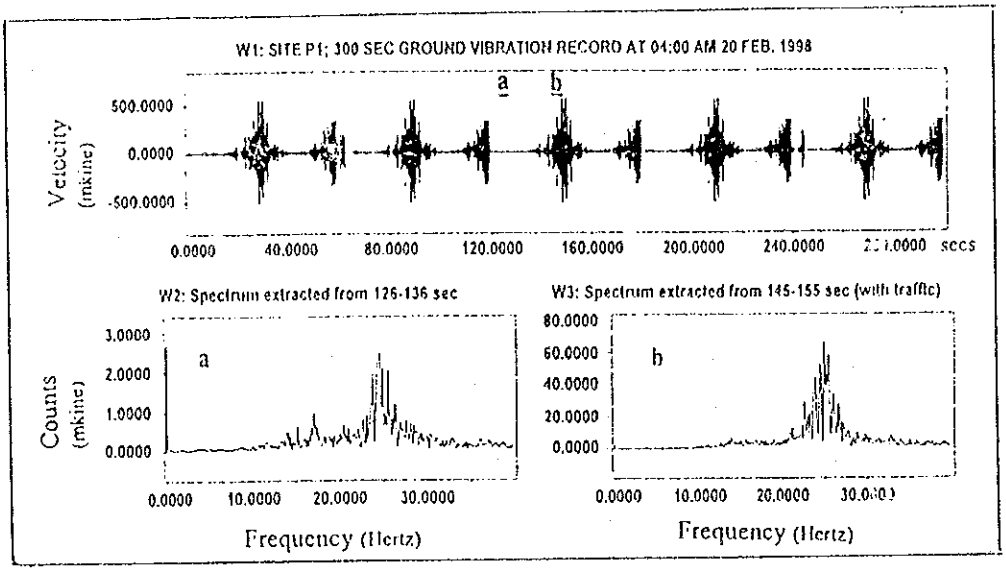


Figure 2.6.11f

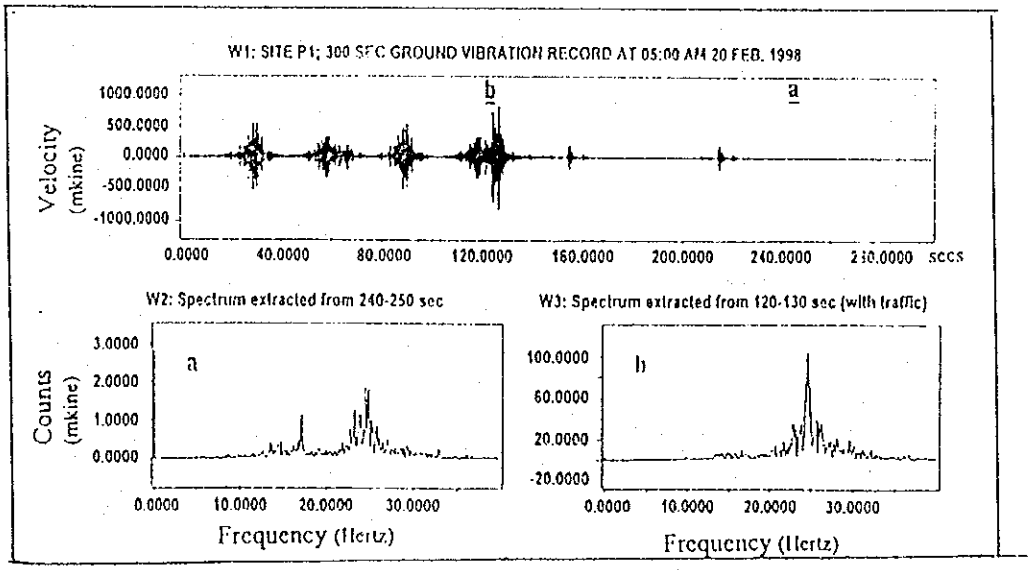
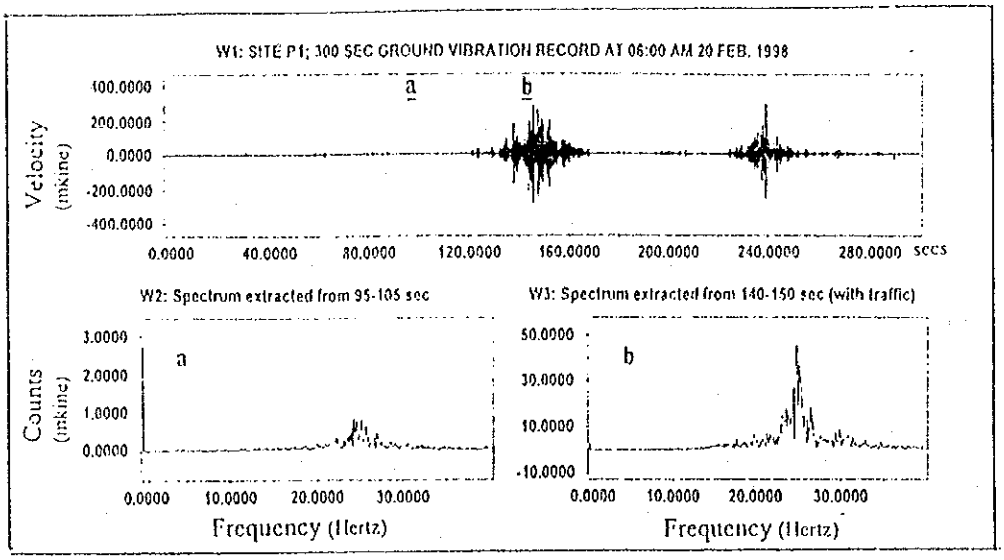


Figure 2.6.11g



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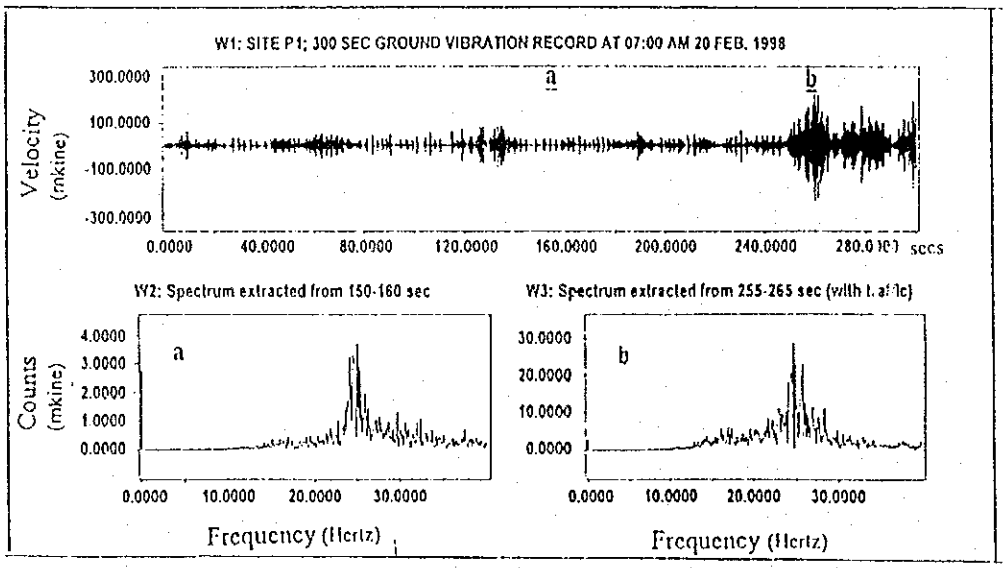
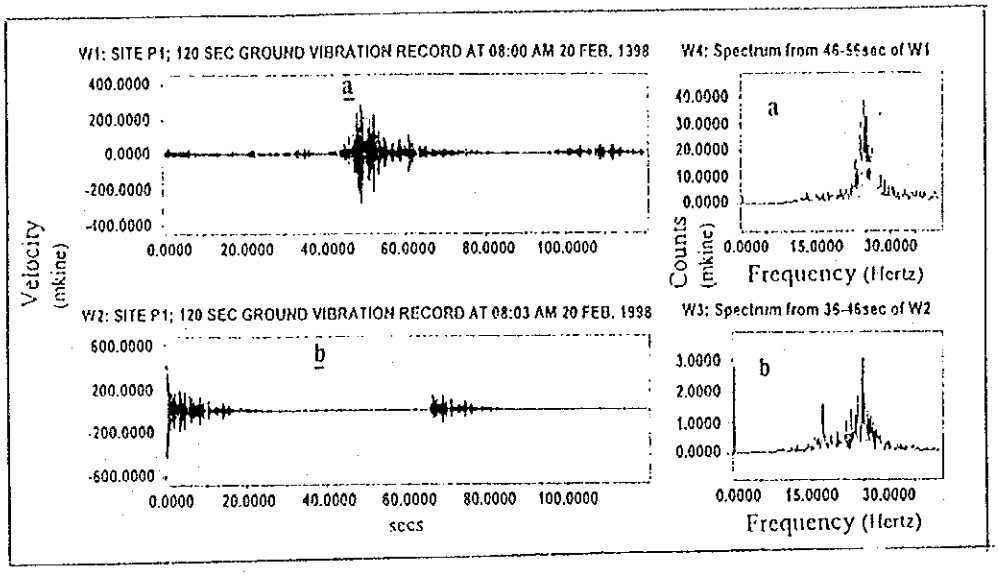


Figure 2.6.11i



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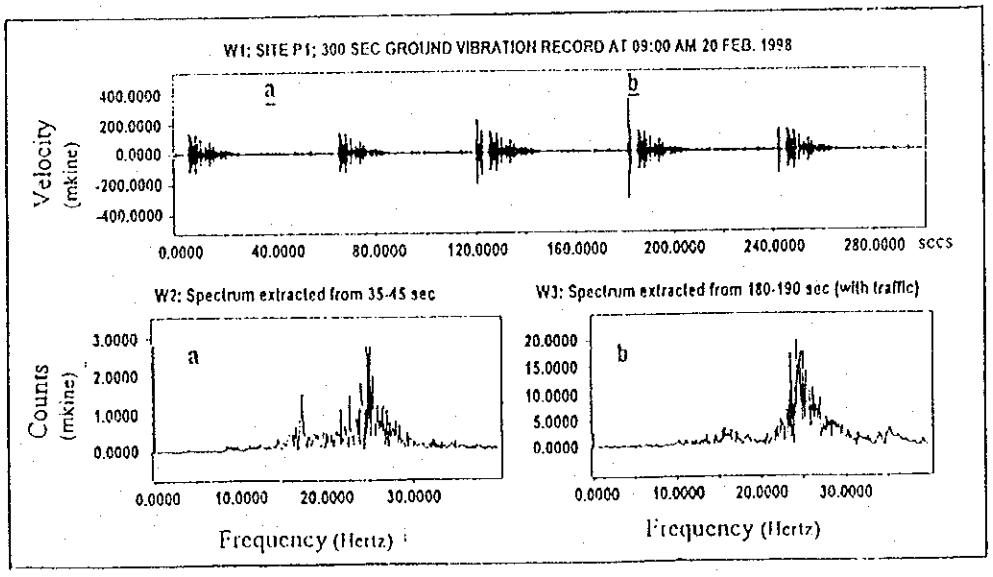

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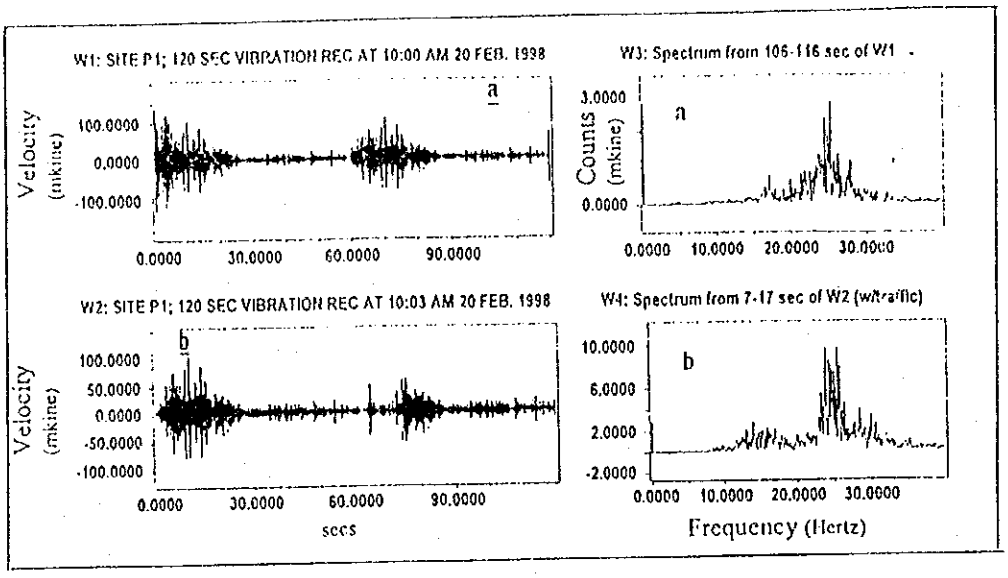

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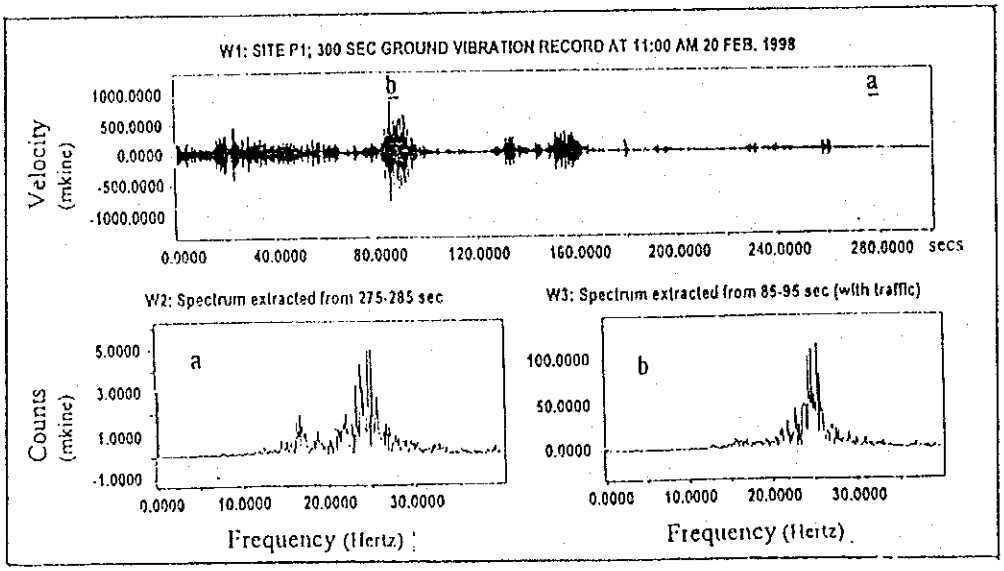
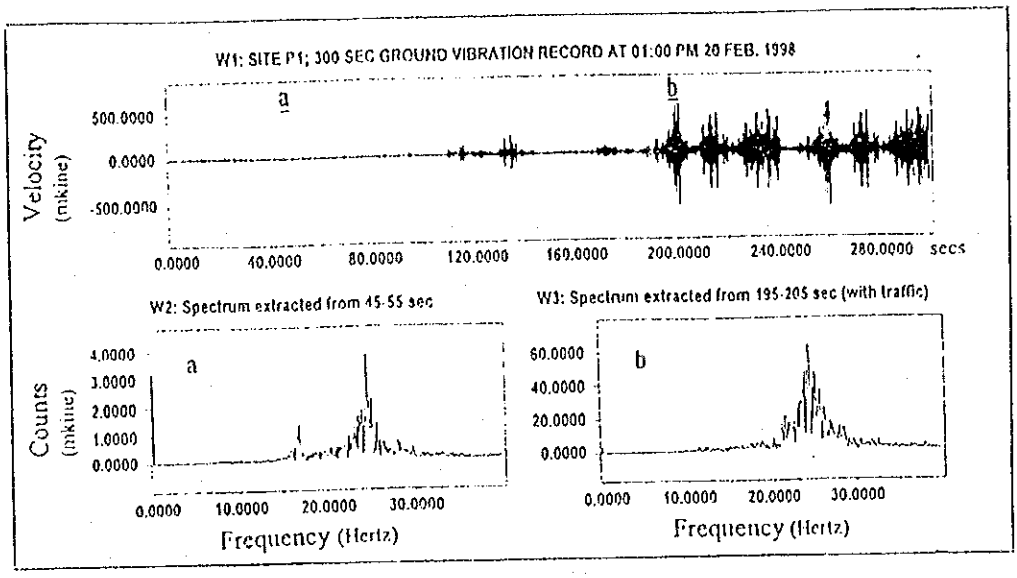


Figure 2.6.11m



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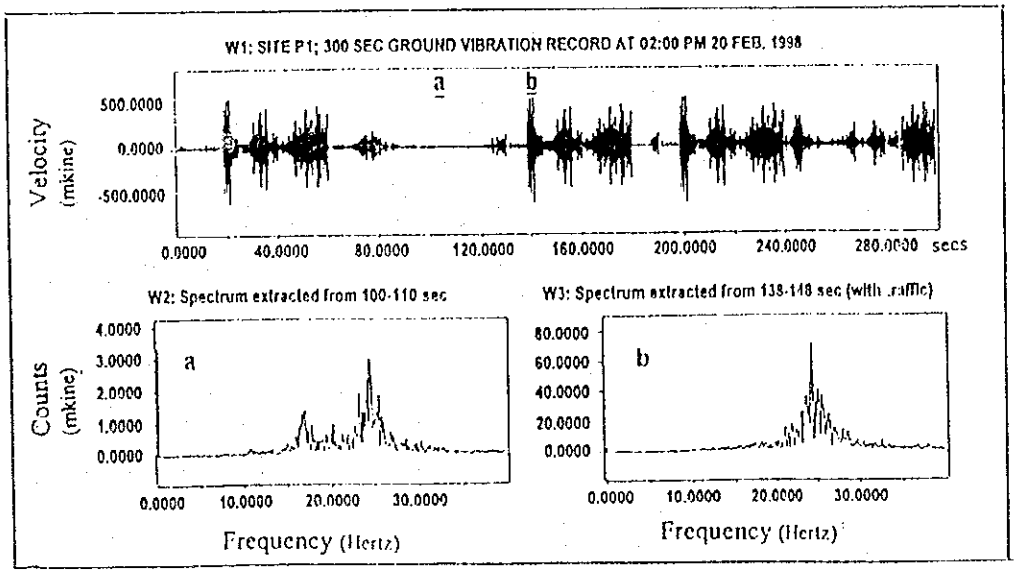
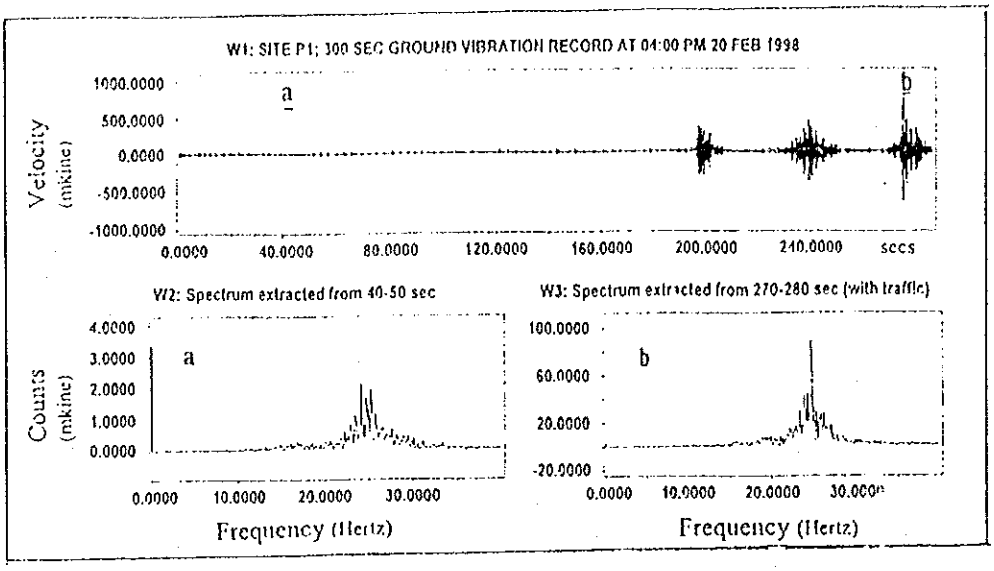


Figure 2.6.11o



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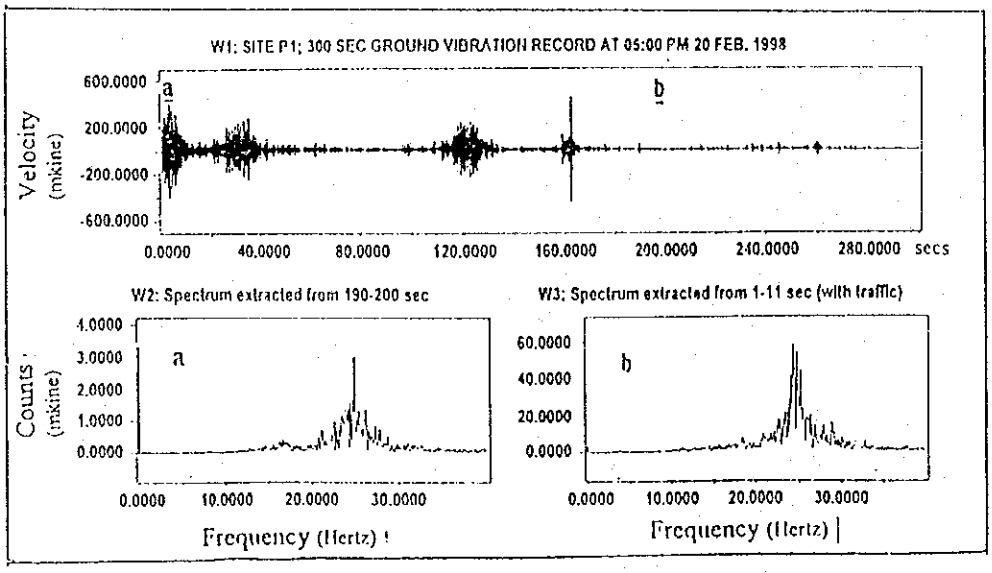

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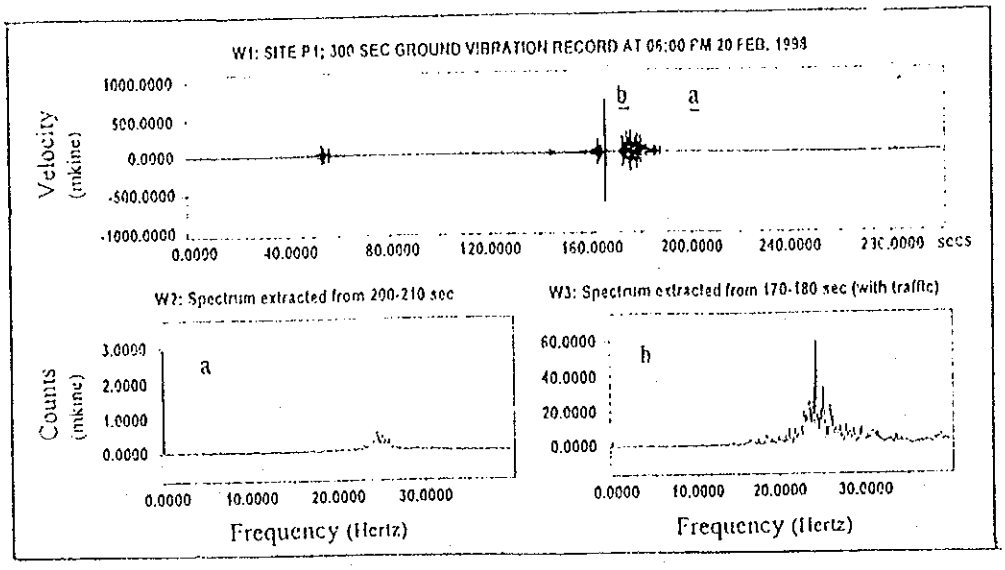

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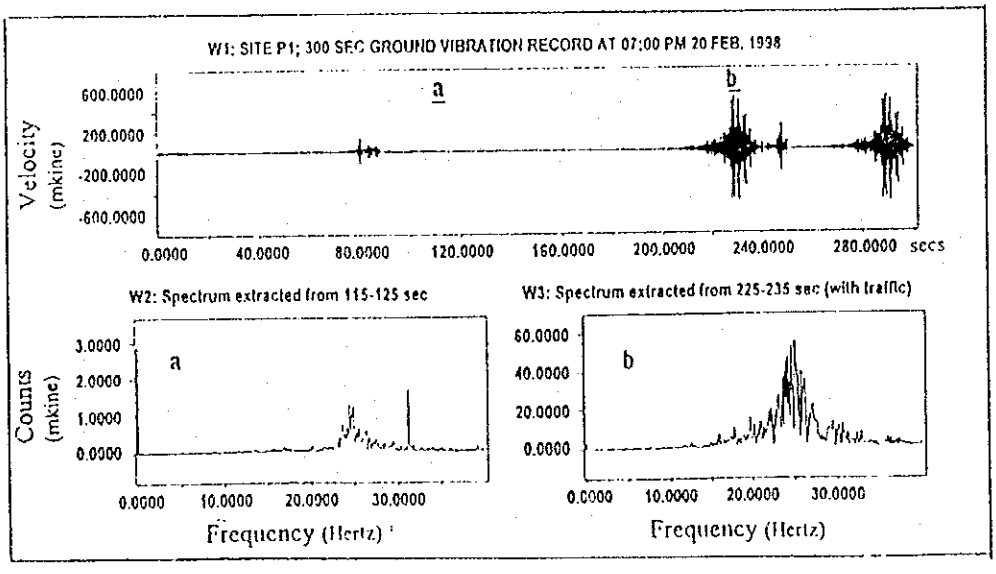

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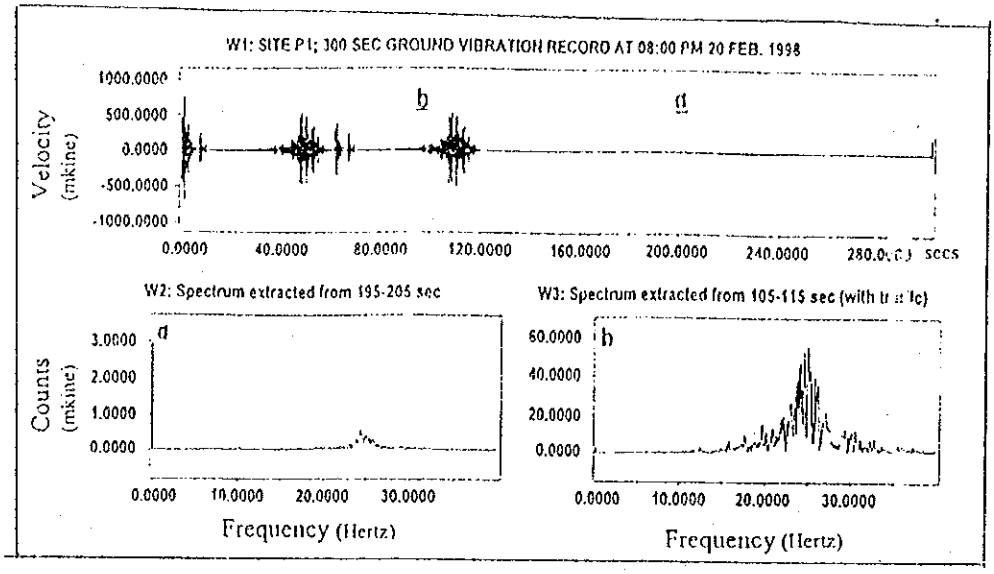


Figure 2.6.11t

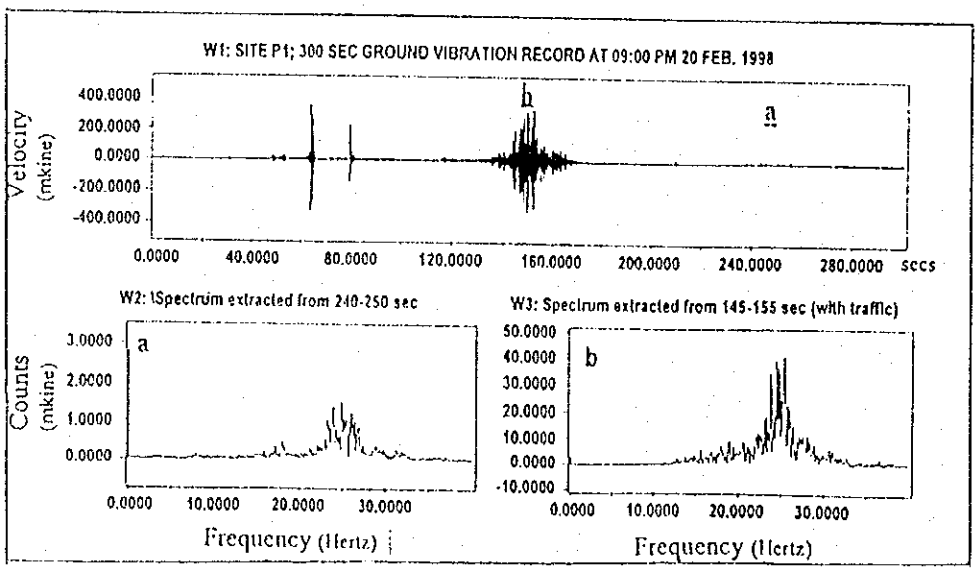


Figure 2.6.11u

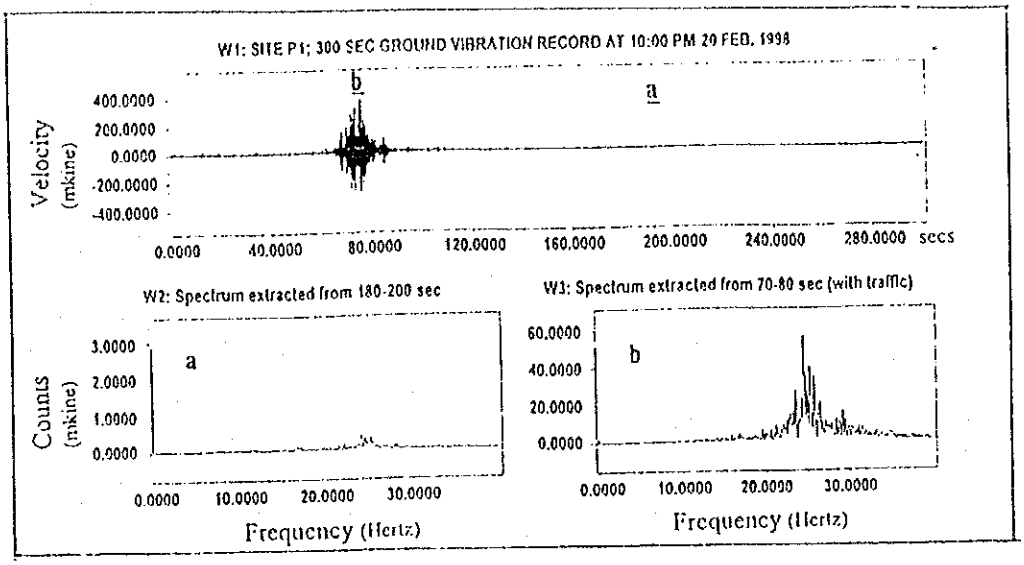


Figure 2.6.11v

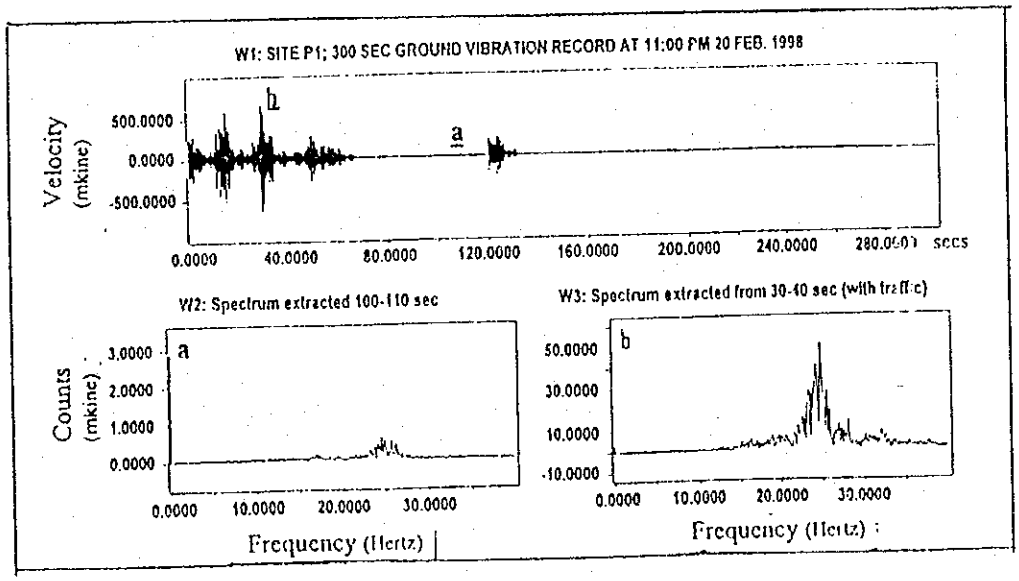


Figure 2.6.11w

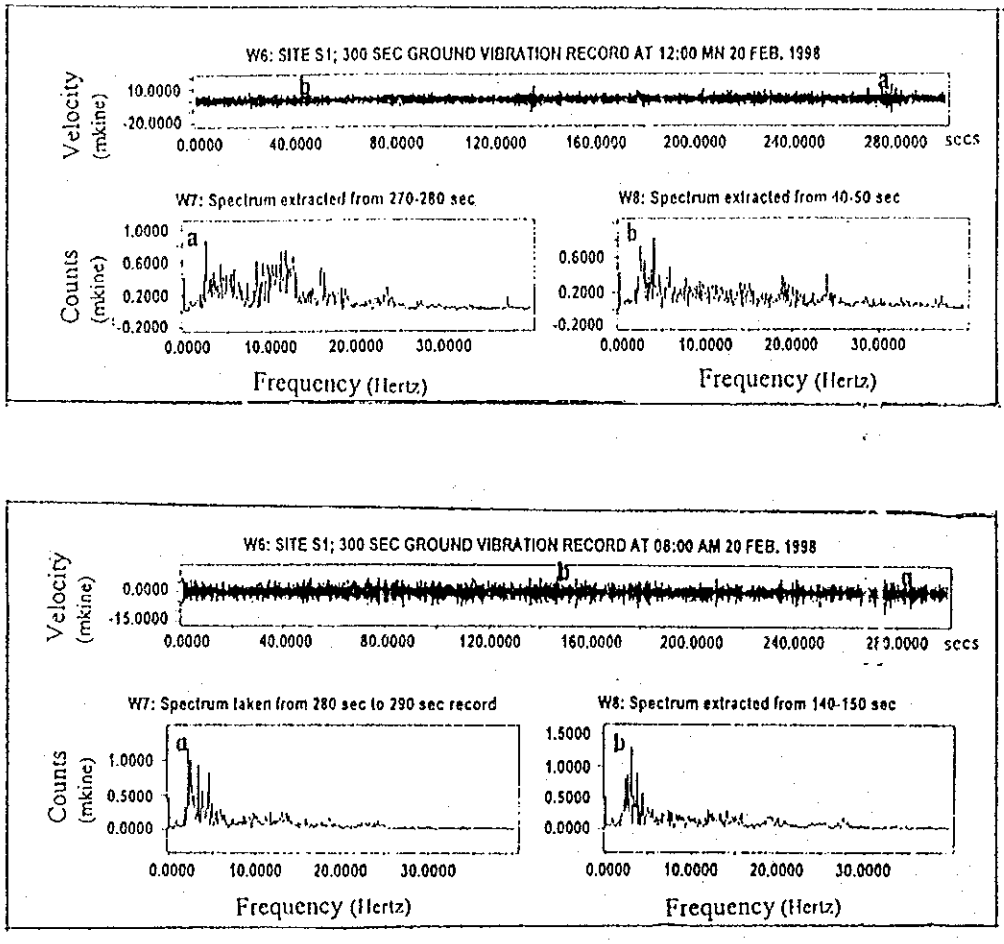


Figure 2.6.12 Spectral content at point S1 extracted from 2 different recording times.Predominant frequency lies within a bandwidth from 3 Hz to 20 Hz. Low frequency corresponds to liquid oscillation in the leachate treatment ponds while high frequency is from other source such as traffic and other equipment.

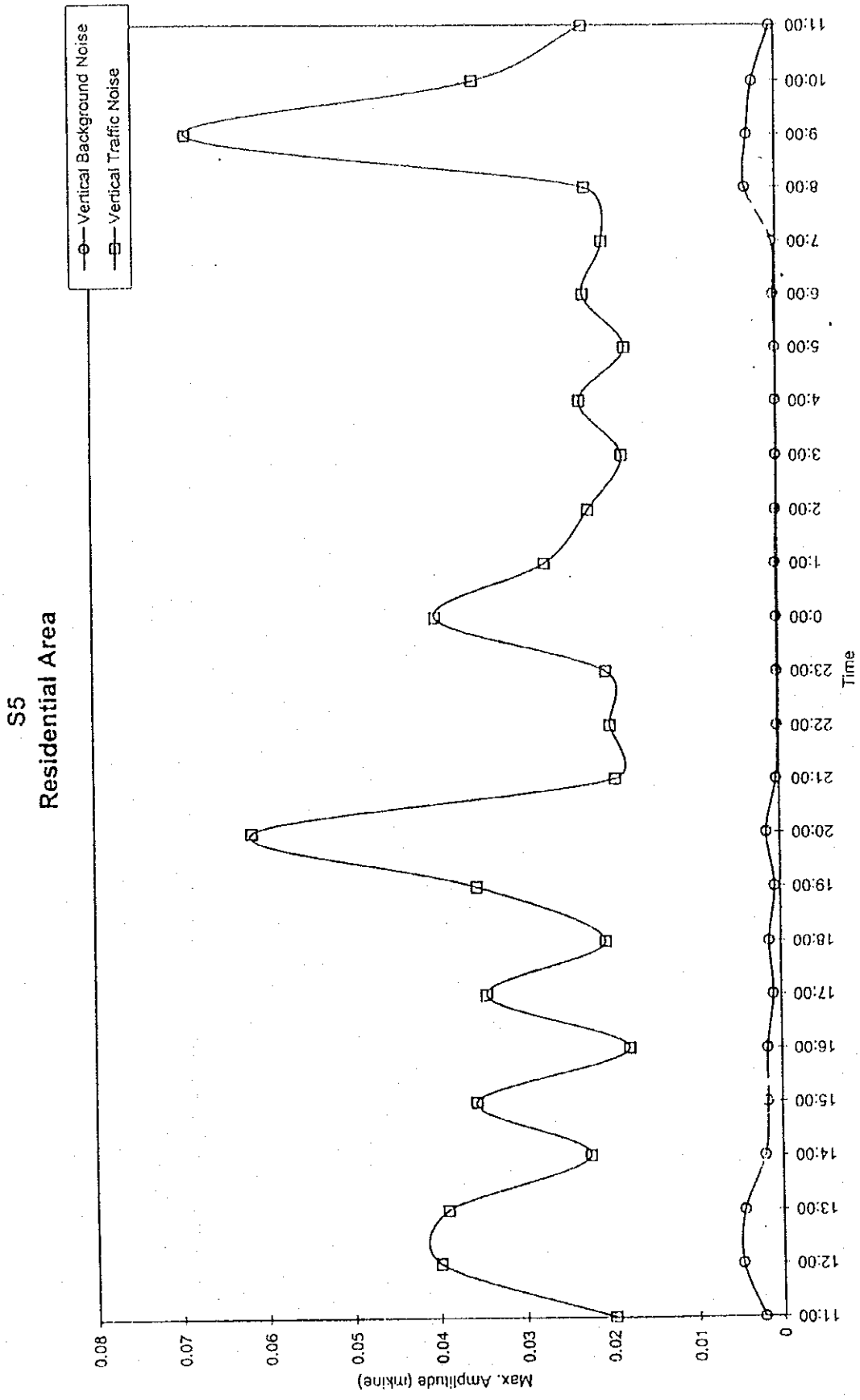

S5
Residential Area
Vertical Background Noise
Vertical Traffic Noise
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Time
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00

Figure 2.6.15

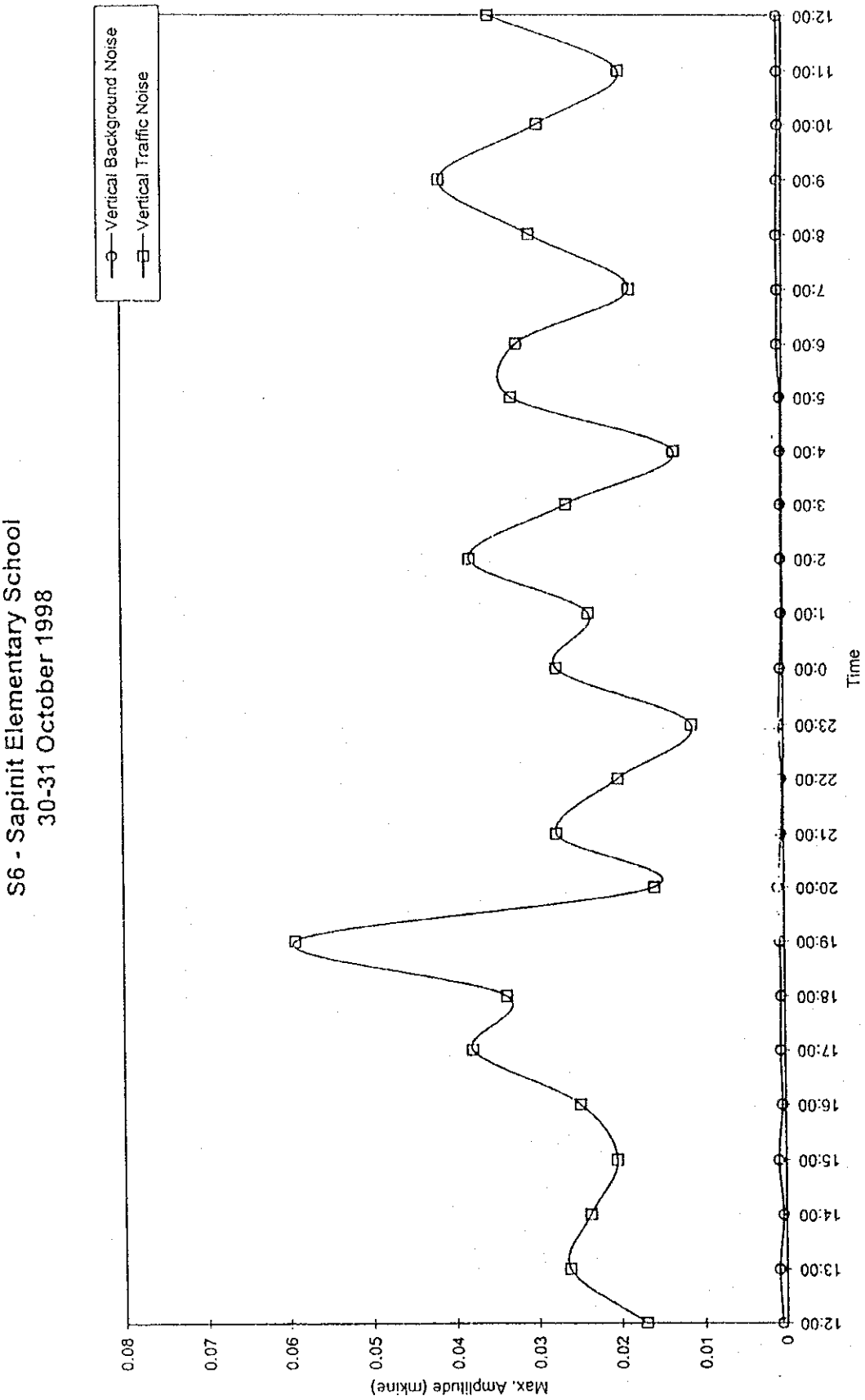

S6 - Sapinit Elementary School
30-31 October 1998
Vertical Background Noise
Vertical Traffic Noise
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Time
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00

Figure 2.6.16

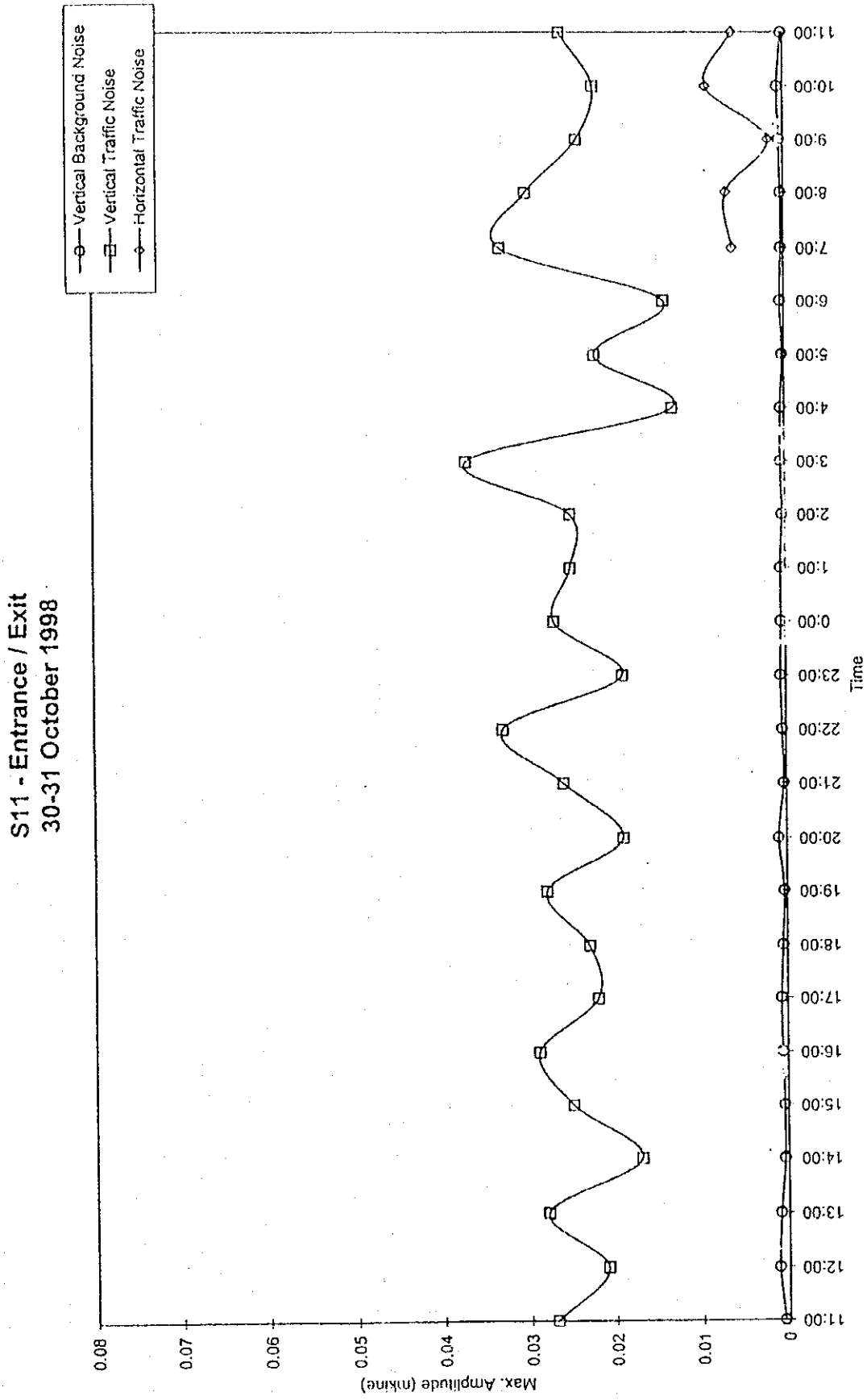

S11 - Entrance / Exit
30-31 October 1998
Vertical Background Noise
Vertical Traffic Noise
Horizontal Traffic Noise
Max. Amplitude (nkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Time
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00

Figure 2.6.17

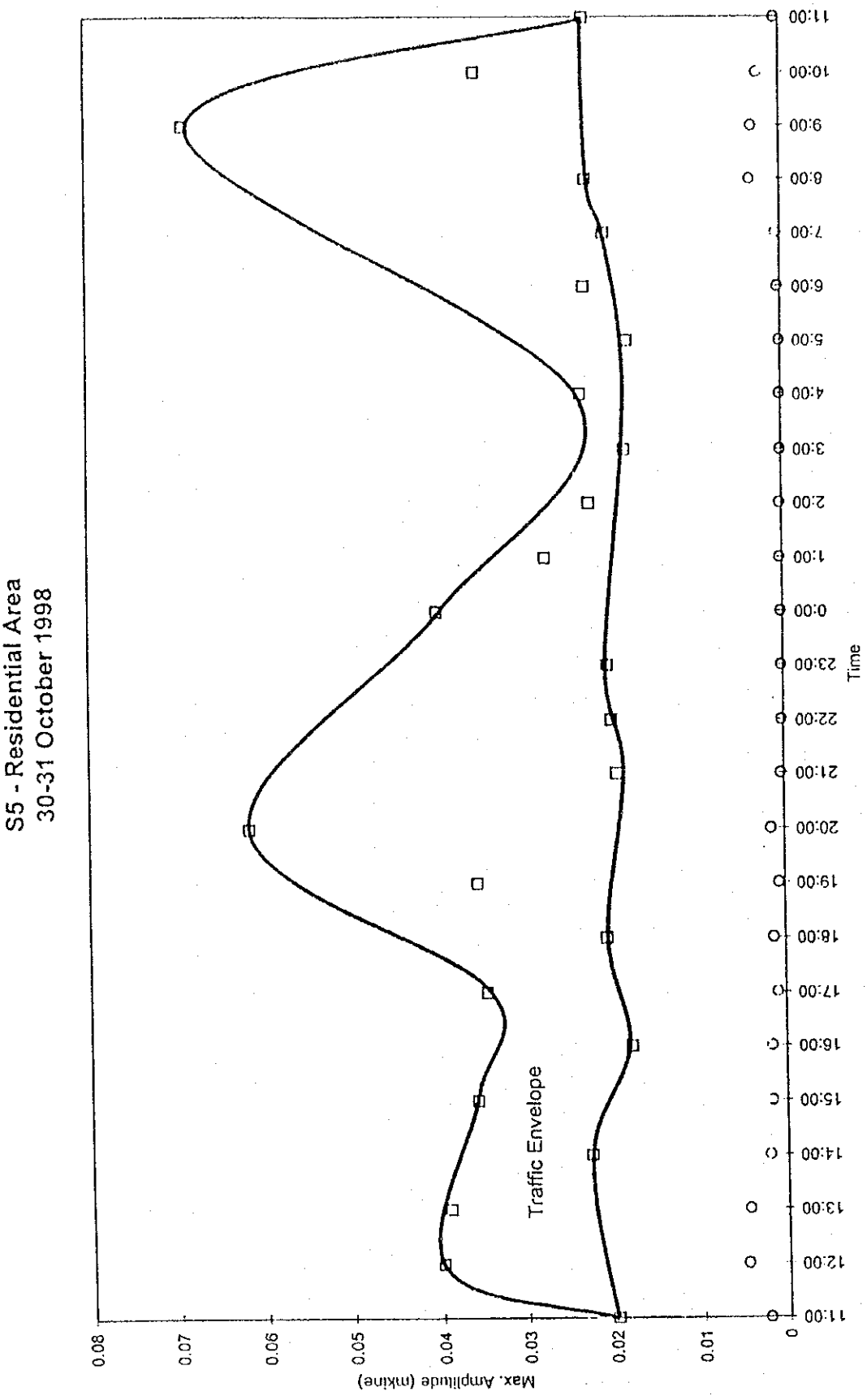

S5 - Residential Area
30-31 October 1998
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Traffic Envelope
Time
11:00
10:00
9:00
8:00
7:00
6:00
5:00
4:00
3:00
2:00
1:00
0:00
23:00
22:00
21:00
20:00
19:00
18:00
17:00
16:00
15:00
14:00
13:00
12:00
11:00

Figure 2.6.18

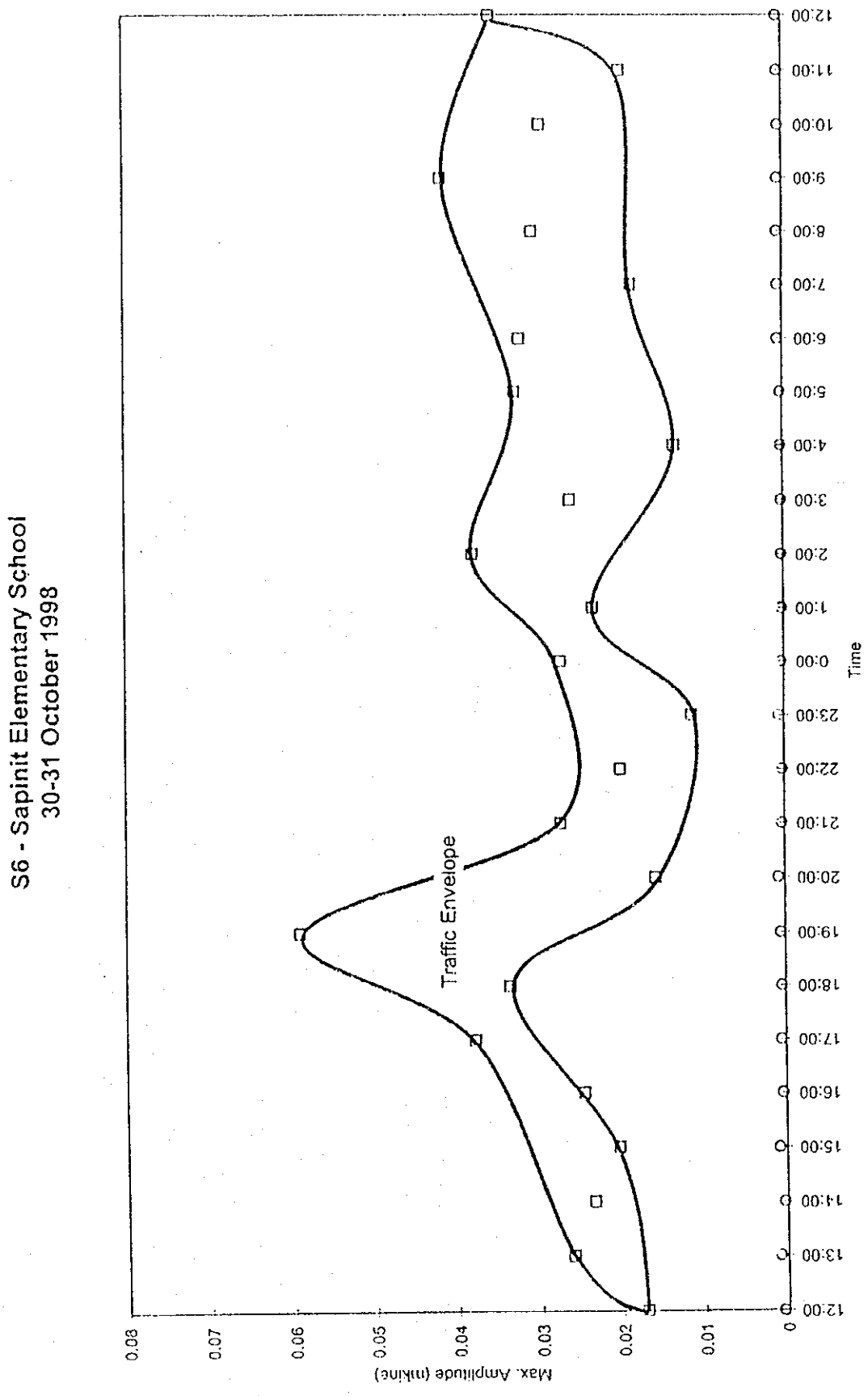

S6 - Sapinit Elementary School
30-31 October 1998
Traffic Envelope
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Time
12:00
11:00
10:00
9:00
8:00
7:00
6:00
5:00
4:00
3:00
2:00
1:00
0:00
23:00
22:00
21:00
20:00
19:00
18:00
17:00
16:00
15:00
14:00
13:00
12:00

Figure 2.6.19

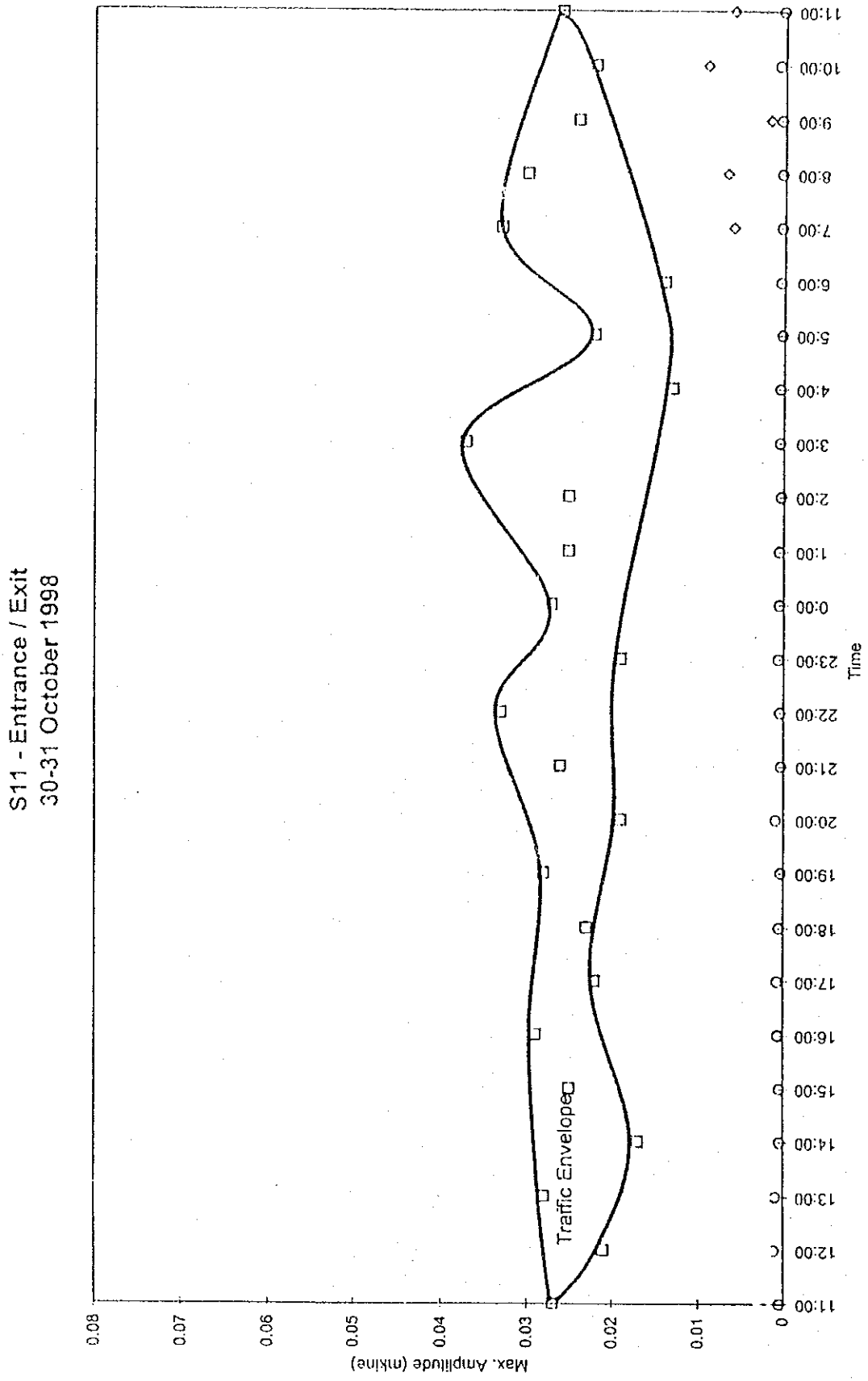

S11 - Entrance / Exit
30-31 October 1998
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Traffic Envelope
Time
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00

Figure 2.6.20

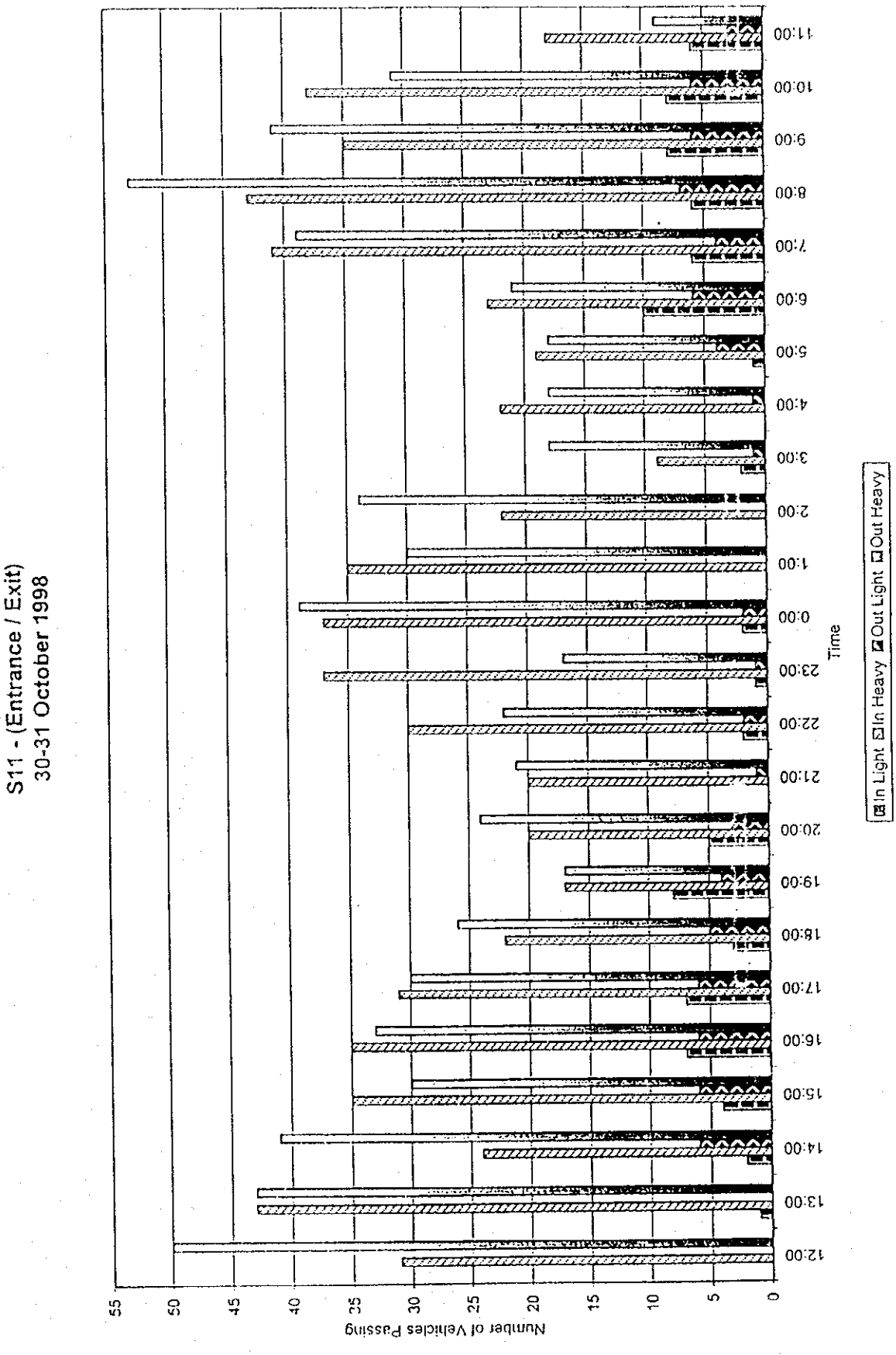

S11 - (Entrance / Exit)
30-31 October 1998
Number of Vehicles Passing
55
50
45
40
35
30
25
20
15
10
5
0
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
Time
In Light
In Heavy
Out Light
Out Heavy

Figure 2.6.21

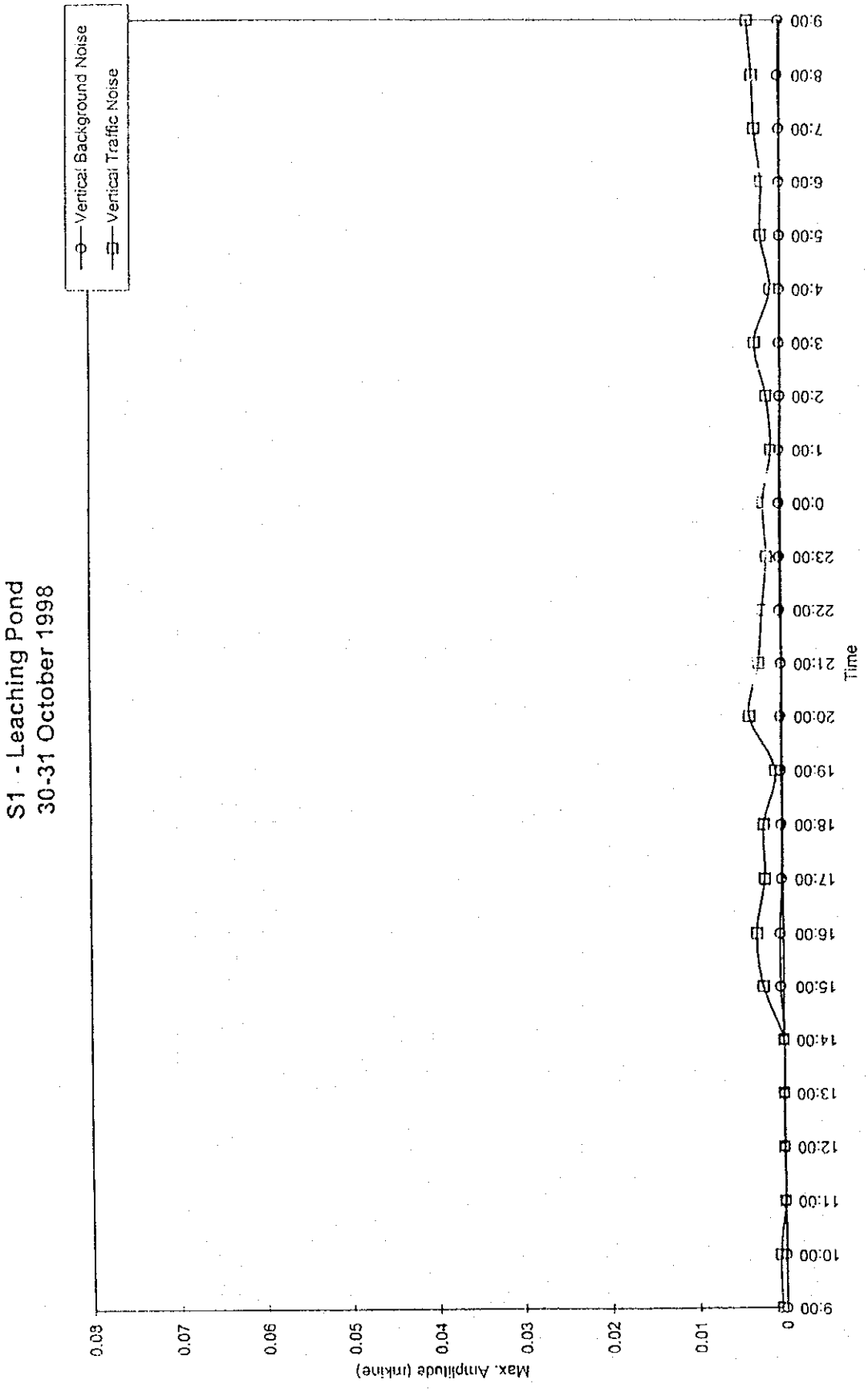
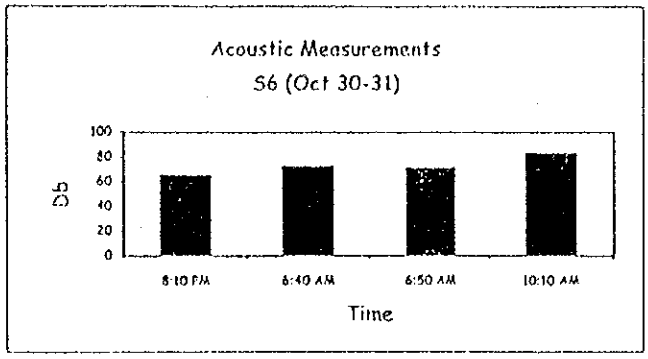
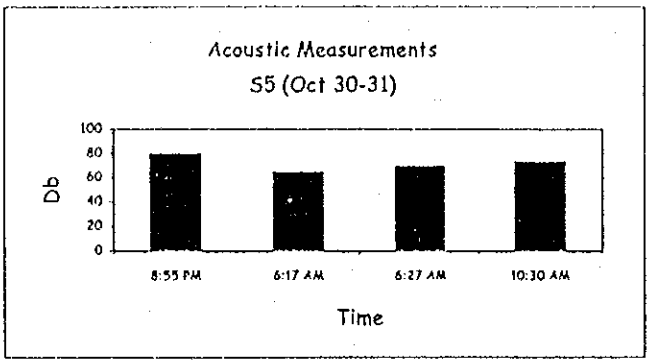
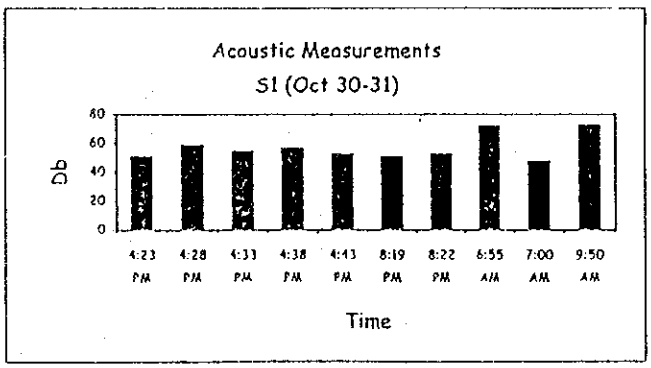

S1 - Leaching Pond
30-31 October 1998
Vertical Background Noise
Vertical Traffic Noise
Max. Amplitude (inline)
0.03
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Time
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00

Figure 2.6.22







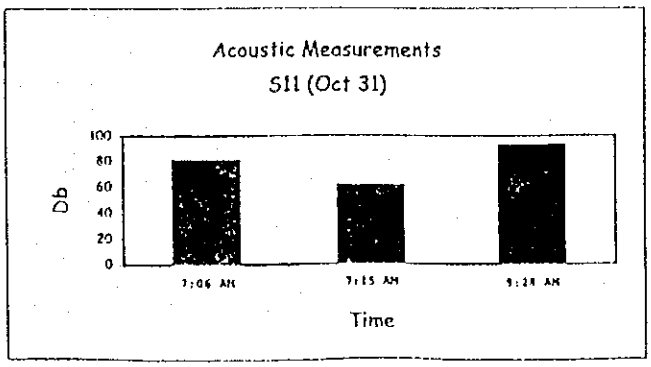


Figure 2.6.23 . ACOUSTIC NOISE LEVEL AT POINTS ON TOP LANDFILL PROPER

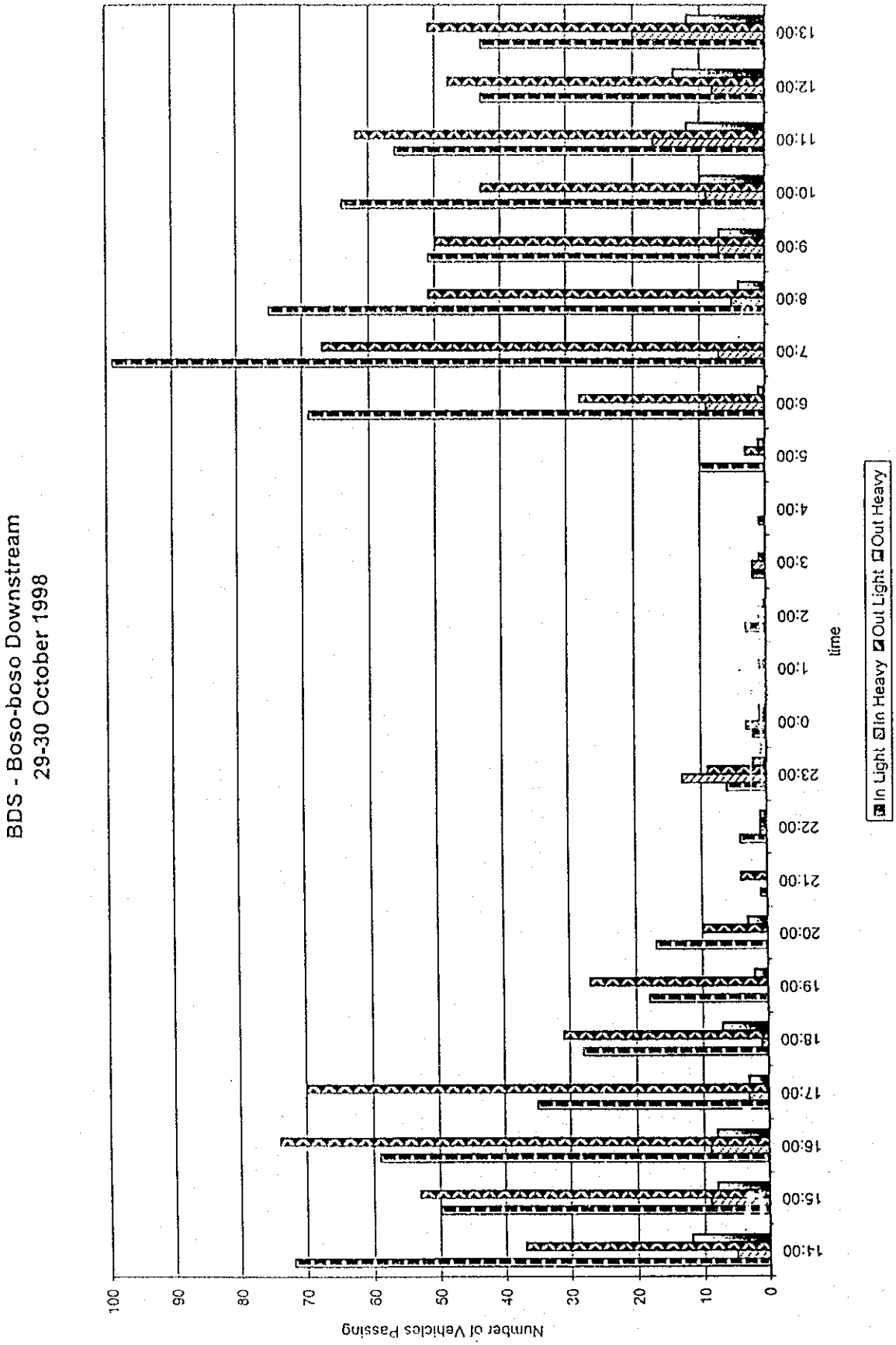

BDS - Boso-boso Downstream
29-30 October 1998
Number of Vehicles Passing
0
10
20
30
40
50
60
70
80
90
100
time
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
In Light
In Heavy
Out Light
Out Heavy

Figure 2.6.24

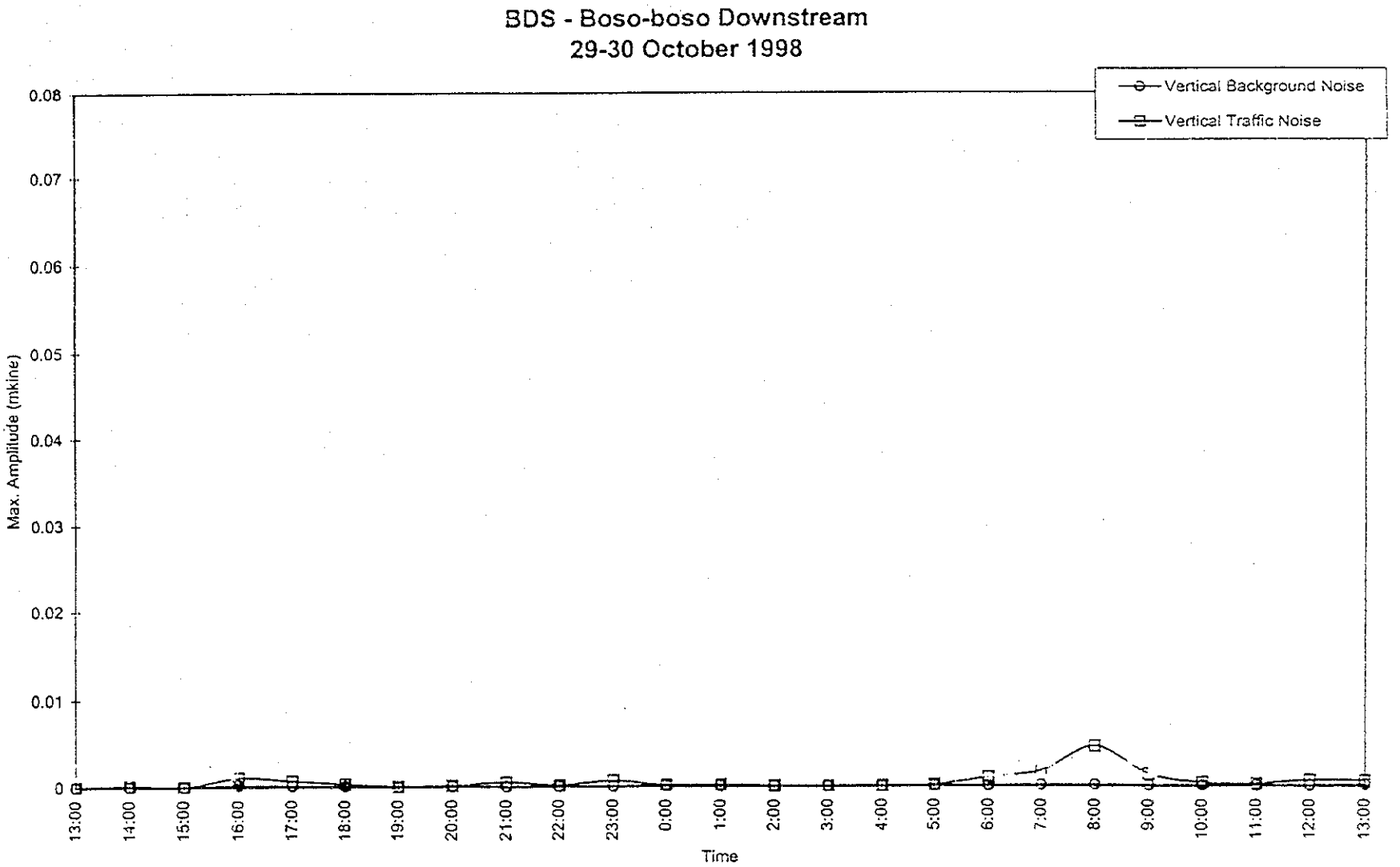

BDS - Boso-boso Downstream
29-30 October 1998
Vertical Background Noise
Vertical Traffic Noise
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
Time

Figure 2.6.25

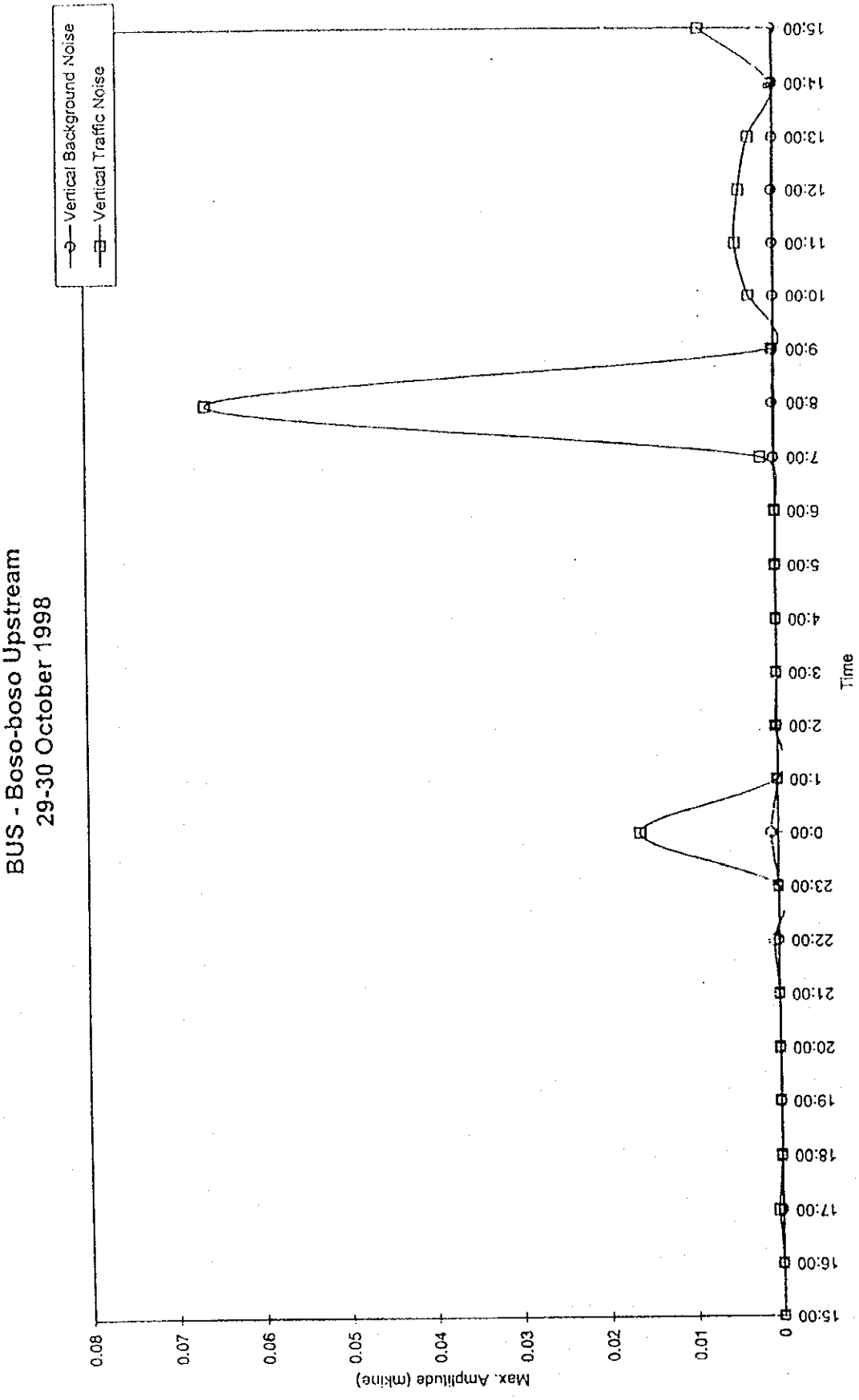

BUS - Boso-boso Upstream
29-30 October 1998
Vertical Background Noise
Vertical Traffic Noise
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Time
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00

Figure 2.6.26

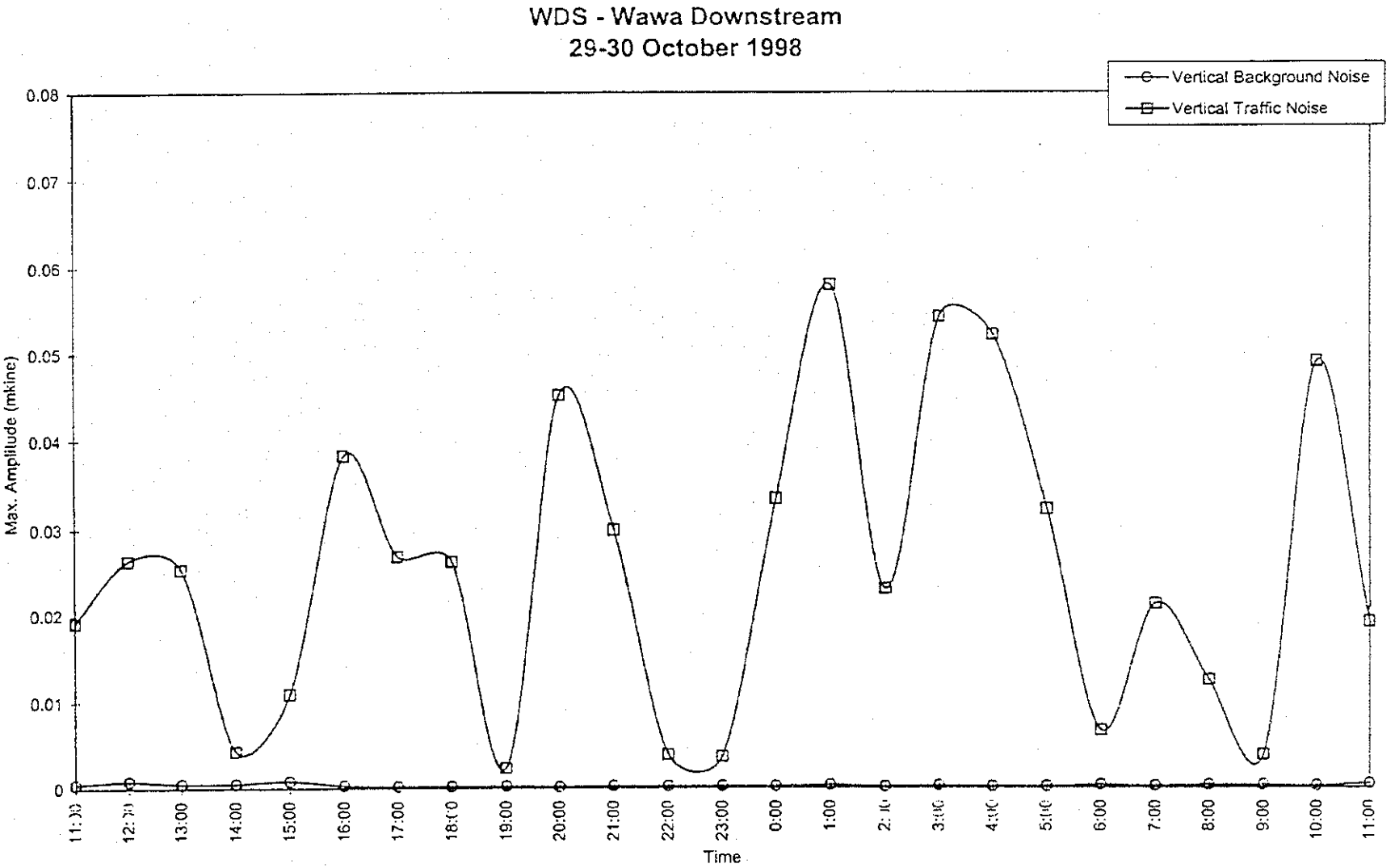

WDS - Wawa Downstream
29-30 October 1998
Vertical Background Noise
Vertical Traffic Noise
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Time
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00

Figure 2.6.27

WDS - Wawa Downstream
29-30 October 1998

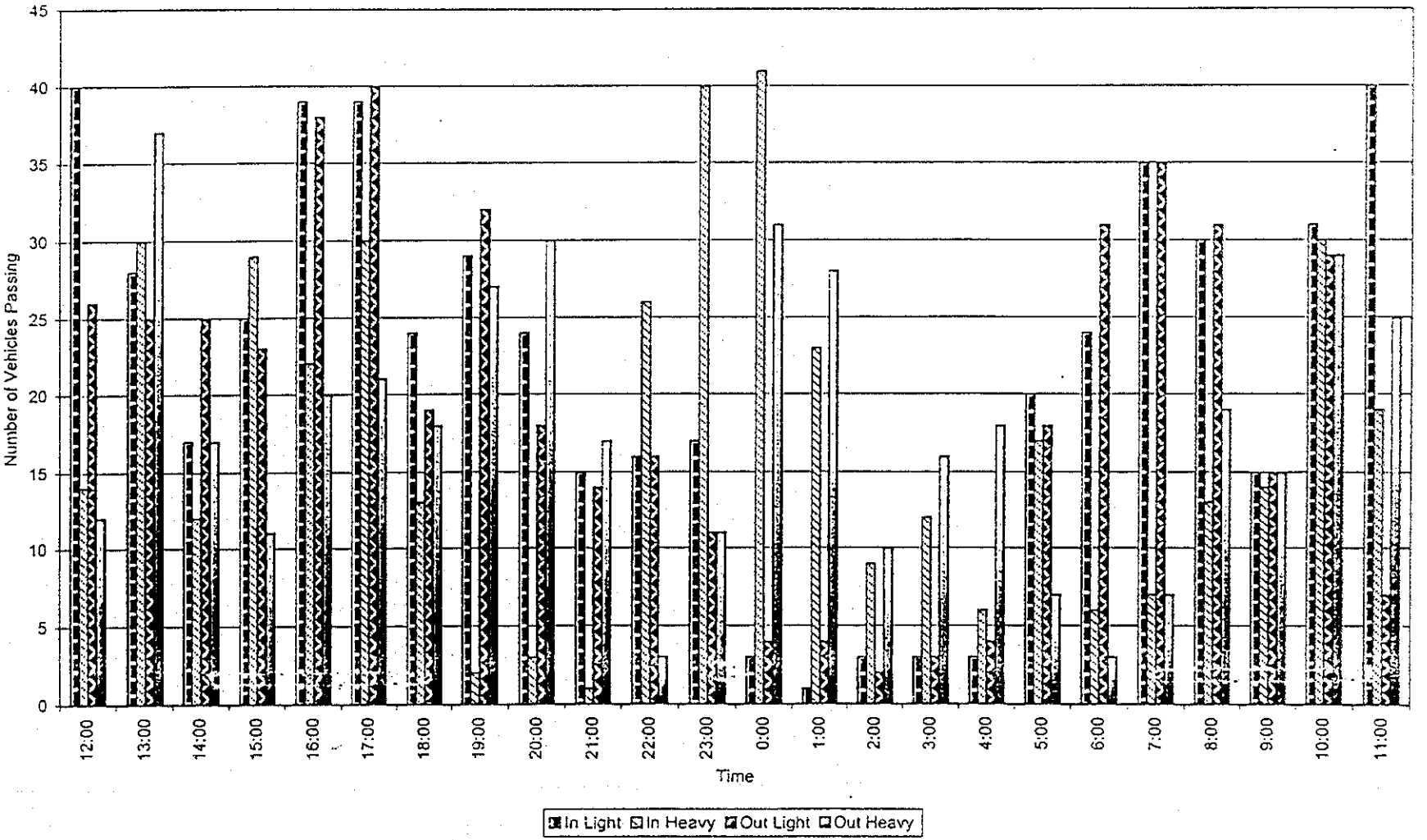


Figure 2.6.28

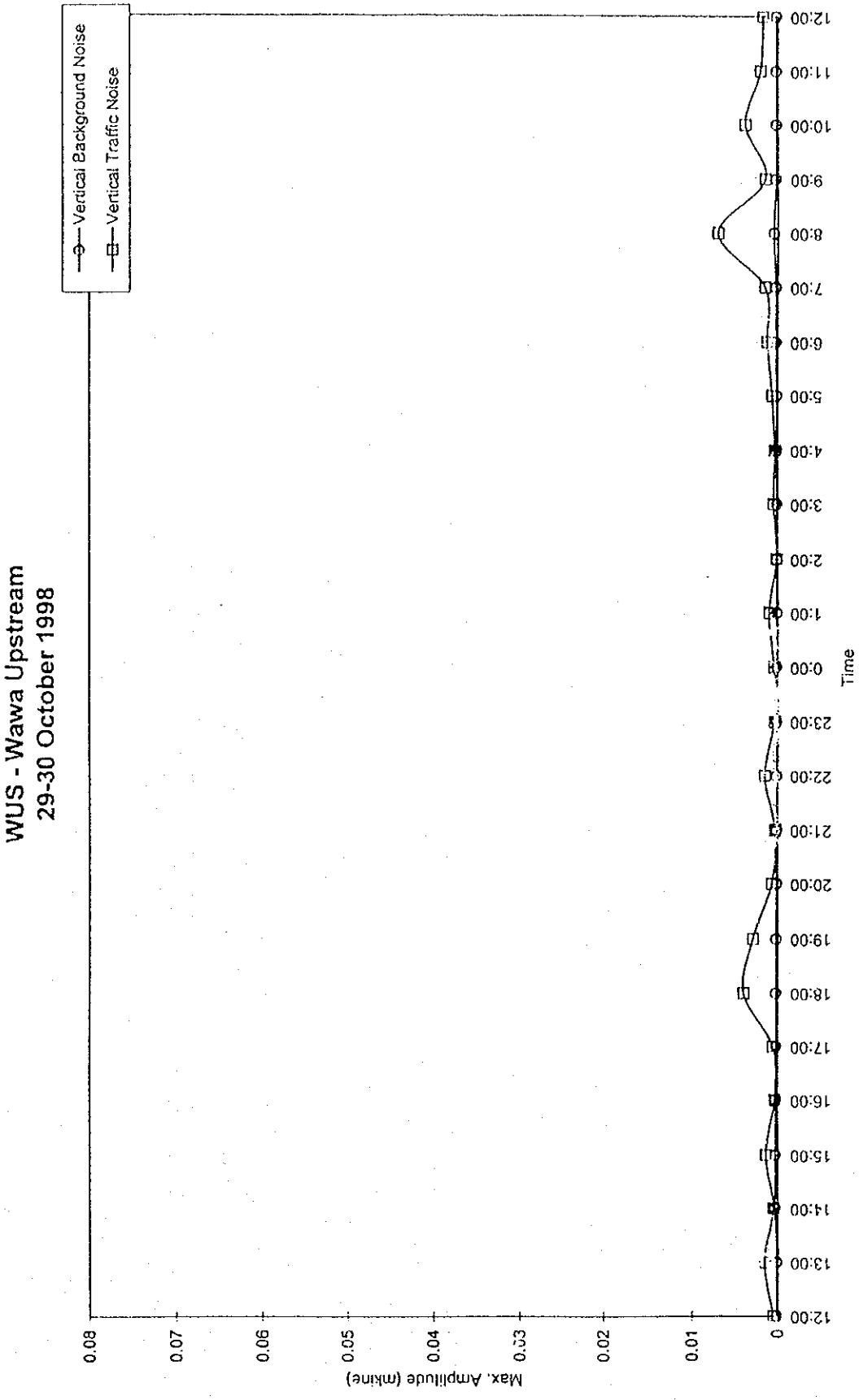

WUS - Wawa Upstream
29-30 October 1998
Vertical Background Noise
Vertical Traffic Noise
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Time
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00

Figure 2.6.29

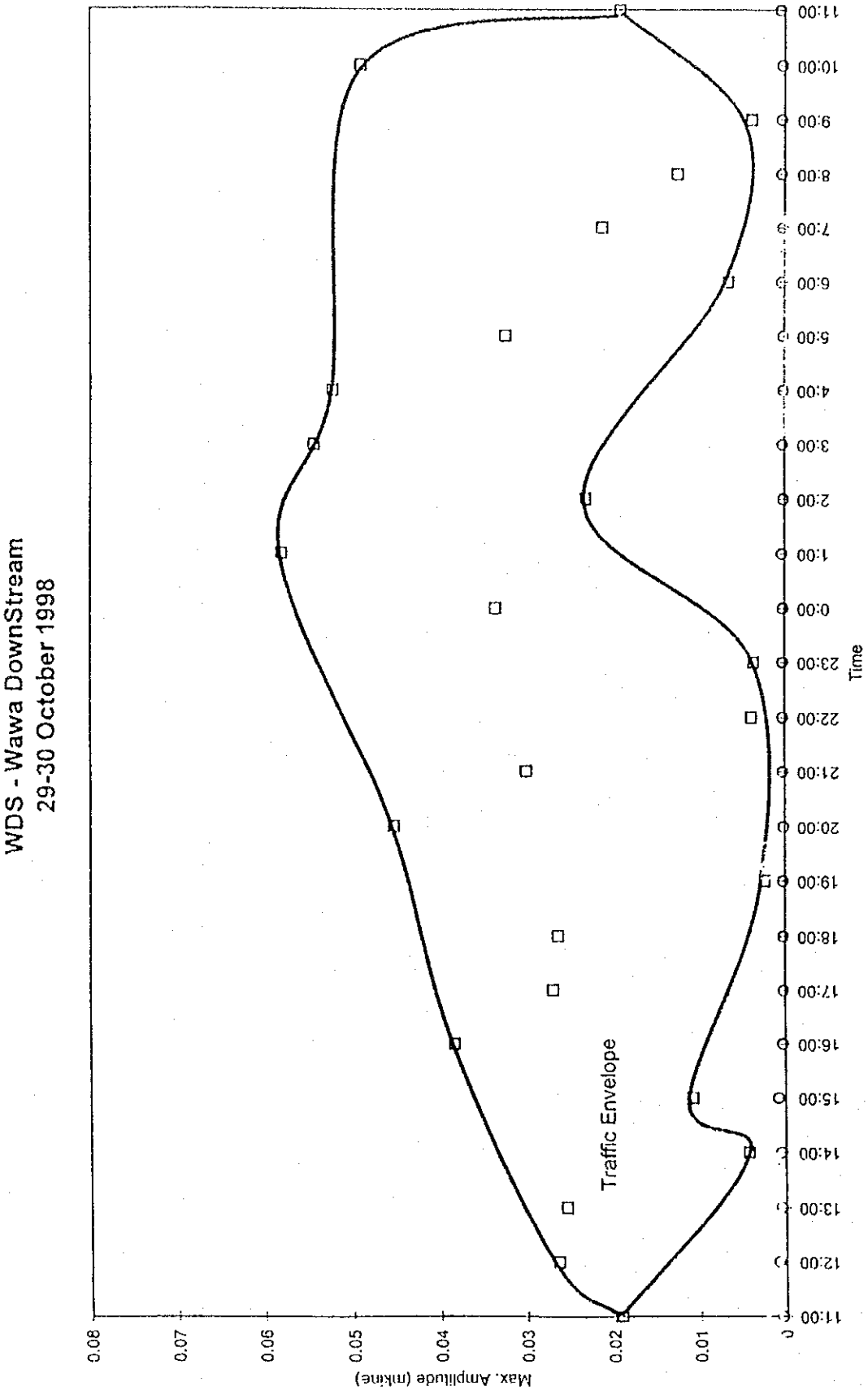
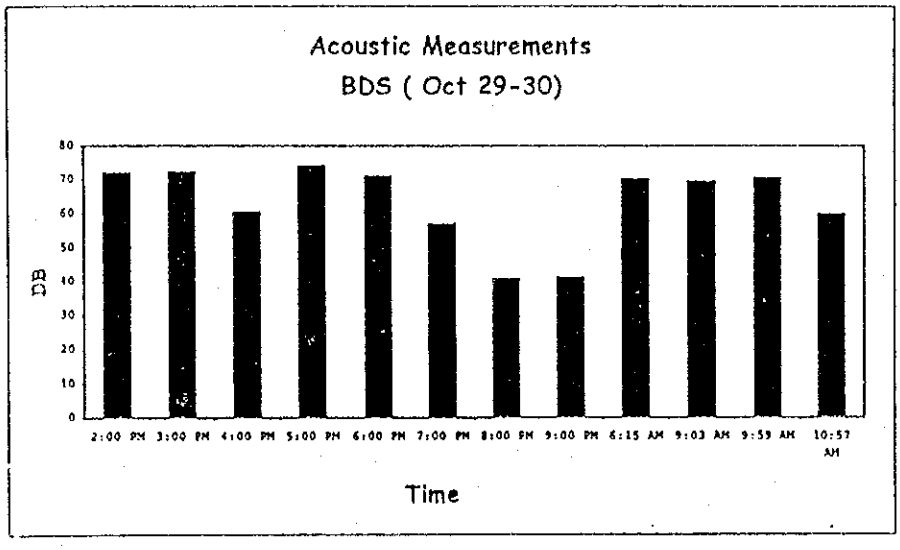

WDS - Wawa DownStream
29-30 October 1998
Traffic Envelope
Max. Amplitude (mkine)
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
Time
11:00
10:00
9:00
8:00
7:00
6:00
5:00
4:00
3:00
2:00
1:00
0:00
23:00
22:00
21:00
20:00
19:00
18:00
17:00
16:00
15:00
14:00
13:00
12:00
11:00

Figure 2.6.30



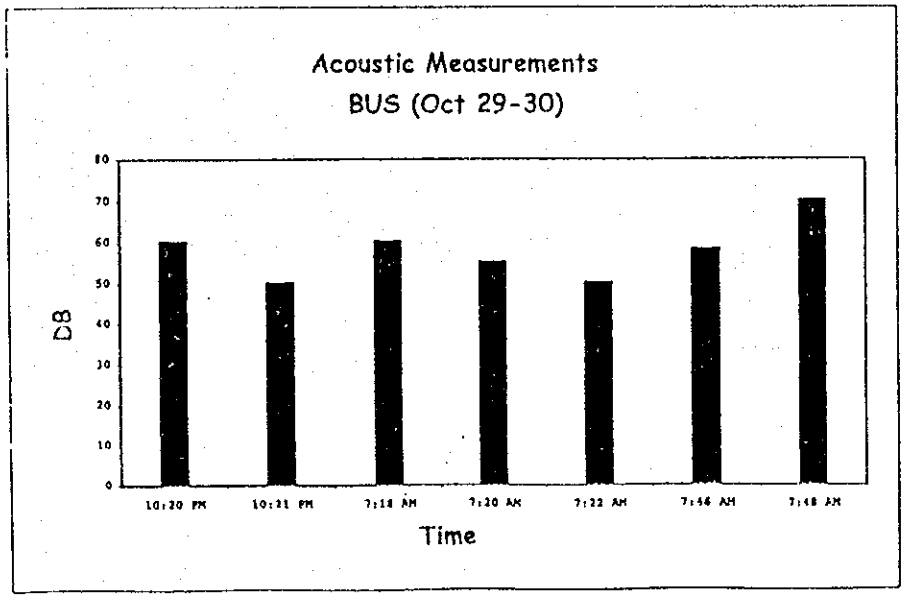


Figure 2.6.31 ACOUSTIC NOISE LEVEL ALONG BOSO-BOSO RIVER (UPSTREAM AND DOWNSTREAM)

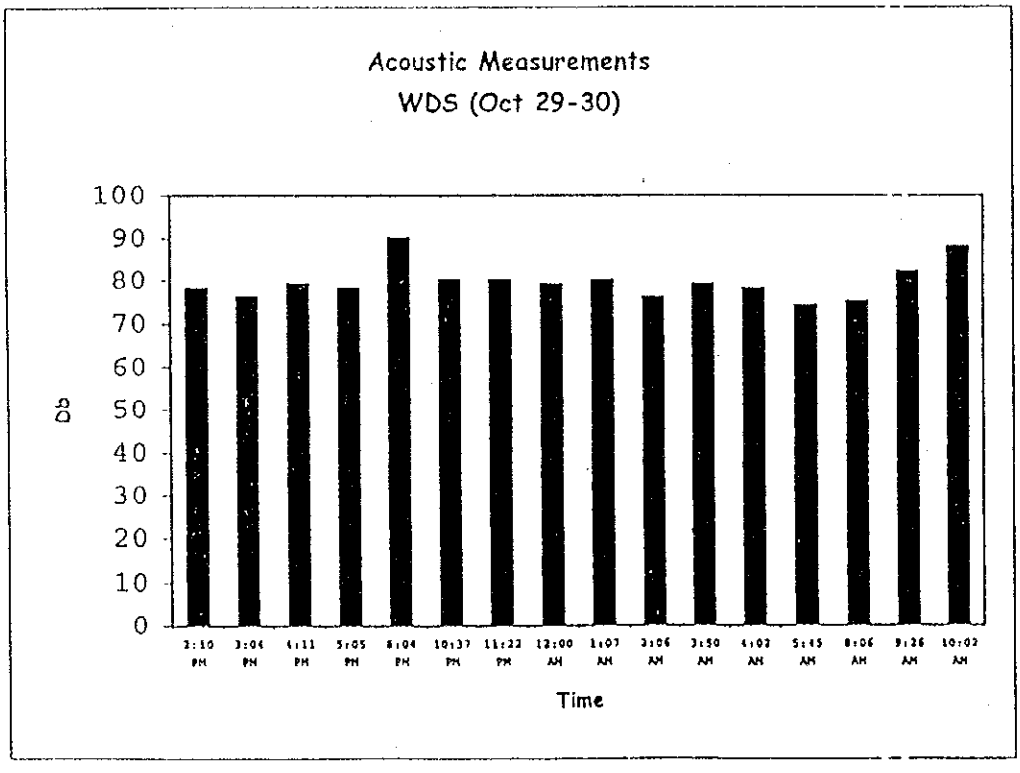


Figure 2.6.32 . ACOUSTIC NOISE LEVEL ALONG WAWA RIVER (DOWNSTREAM AND UPSTREAM)

ATTACHMENT B

Results of Air Quality Modeling

01/29/99
15:03:59

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

CH4 Emissic- Five Years After Landfill Closure

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.304400E-05
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF LARGER SIDE (M)	=	1140.0000
LENGTH OF SMALLER SIDE (M)	=	570.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
100.	355.6	6	1.0	1.0	10000.0	1.00	24.
200.	377.8	6	1.0	1.0	10000.0	1.00	24.
300.	398.2	6	1.0	1.0	10000.0	1.00	23.
400.	416.7	6	1.0	1.0	10000.0	1.00	23.
500.	425.0	6	1.0	1.0	10000.0	1.00	23.
600.	441.5	6	1.0	1.0	10000.0	1.00	22.
700.	384.8	6	1.0	1.0	10000.0	1.00	26.
800.	309.0	6	1.0	1.0	10000.0	1.00	26.
900.	266.2	6	1.0	1.0	10000.0	1.00	25.
1000.	238.0	6	1.0	1.0	10000.0	1.00	25.
1100.	217.0	6	1.0	1.0	10000.0	1.00	25.
1200.	200.8	6	1.0	1.0	10000.0	1.00	24.
1300.	187.8	6	1.0	1.0	10000.0	1.00	24.
1400.	177.1	6	1.0	1.0	10000.0	1.00	23.
1500.	167.9	6	1.0	1.0	10000.0	1.00	23.
1600.	160.0	6	1.0	1.0	10000.0	1.00	23.
1700.	153.1	6	1.0	1.0	10000.0	1.00	22.
1800.	146.8	6	1.0	1.0	10000.0	1.00	21.
1900.	141.3	6	1.0	1.0	10000.0	1.00	21.
2000.	136.3	6	1.0	1.0	10000.0	1.00	20.
2100.	131.8	6	1.0	1.0	10000.0	1.00	20.
2200.	127.7	6	1.0	1.0	10000.0	1.00	20.
2300.	123.8	6	1.0	1.0	10000.0	1.00	18.
2400.	120.4	6	1.0	1.0	10000.0	1.00	18.
2500.	117.3	6	1.0	1.0	10000.0	1.00	18.
2600.	114.2	6	1.0	1.0	10000.0	1.00	16.
2700.	111.6	6	1.0	1.0	10000.0	1.00	16.
2800.	109.2	6	1.0	1.0	10000.0	1.00	16.
2900.	106.7	6	1.0	1.0	10000.0	1.00	14.
3000.	104.6	6	1.0	1.0	10000.0	1.00	14.
3500.	95.16	6	1.0	1.0	10000.0	1.00	5.
4000.	88.36	6	1.0	1.0	10000.0	1.00	0.
4500.	82.38	6	1.0	1.0	10000.0	1.00	0.
5000.	76.91	6	1.0	1.0	10000.0	1.00	0.

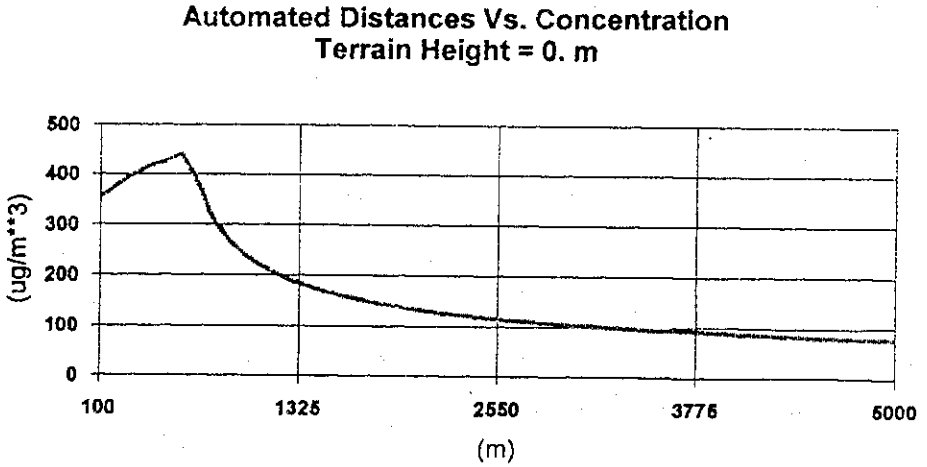
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 100. M:

639.	447.3	6	1.0	1.0	10000.0	1.00	26.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	447.3	639.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

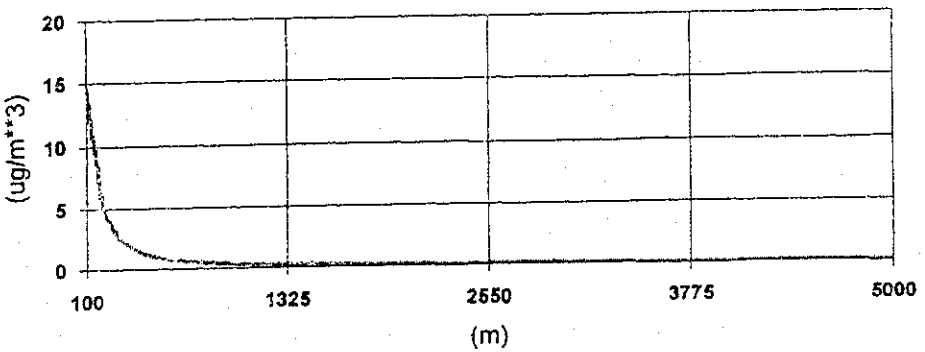


Project: CH4 Emission Five Years After Landfill Closure

01/30/99
07:13:20

```
 ***  SCREEN3 MODEL RUN  ***
 *** VERSION DATED 95250 ***

CO Emission From 1,200 Trucks

SIMPLE TERRAIN INPUTS:
   SOURCE TYPE                =          AREA
   EMISSION RATE (G/(S-M**2)) =      .147600E-05
   SOURCE HEIGHT (M)          =        1.0000
   LENGTH OF LARGER SIDE (M)  =       50.0000
   LENGTH OF SMALLER SIDE (M) =        7.0000
   RECEPTOR HEIGHT (M)        =         .0000
   URBAN/RURAL OPTION         =         RURAL
   MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION


BUOY. FLUX =      .000 M**4/S**3;  MOM. FLUX =      .000 M**4/S**2.

*** FULL METEOROLOGY ***

**********************************
*** SCREEN AUTOMATED DISTANCES ***
**********************************

*** TERRAIN HEIGHT OF     0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

  DIST      CONC                 U10M   USTK  MIX HT   PLUME  MAX DIR
   (M)   (UG/M**3)   STAB      (M/S)  (M/S)    (M)   HT (M)   (DEG)
-------  ---------  ----      -----  -----  ------  ------  -------
   100.   14.48        6        1.0    1.0 10000.0    1.00       0.
   200.   4.933        6        1.0    1.0 10000.0    1.00       0.
   300.   2.532        6        1.0    1.0 10000.0    1.00       0.
   400.   1.566        6        1.0    1.0 10000.0    1.00       0.
   500.   1.078        6        1.0    1.0 10000.0    1.00       0.
   600.   .7920        6        1.0    1.0 10000.0    1.00       1.
   700.   .6109        6        1.0    1.0 10000.0    1.00       1.
   800.   .4935        6        1.0    1.0 10000.0    1.00       1.
   900.   .4092        6        1.0    1.0 10000.0    1.00       0.
  1000.   .3463        6        1.0    1.0 10000.0    1.00       0.
  1100.   .2989        6        1.0    1.0 10000.0    1.00       0.
  1200.   .2614        6        1.0    1.0 10000.0    1.00       0.
  1300.   .2310        6        1.0    1.0 10000.0    1.00       0.
  1400.   .2061        6        1.0    1.0 10000.0    1.00       0.
  1500.   .1853        6        1.0    1.0 10000.0    1.00       1.
  1600.   .1678        6        1.0    1.0 10000.0    1.00       0.
  1700.   .1528        6        1.0    1.0 10000.0    1.00       1.
  1800.   .1400        6        1.0    1.0 10000.0    1.00       0.
  1900.   .1288        6        1.0    1.0 10000.0    1.00       0.
  2000.   .1190        6        1.0    1.0 10000.0    1.00       0.
  2100.   .1109        6        1.0    1.0 10000.0    1.00       0.
  2200.   .1036        6        1.0    1.0 10000.0    1.00       0.
  2300.   .9717E-01    6        1.0    1.0 10000.0    1.00       0.
  2400.   .9135E-01    6        1.0    1.0 10000.0    1.00       0.
  2500.   .8610E-01    6        1.0    1.0 10000.0    1.00       0.
  2600.   .8134E-01    6        1.0    1.0 10000.0    1.00       0.
  2700.   .7701E-01    6        1.0    1.0 10000.0    1.00       0.
  2800.   .7306E-01    6        1.0    1.0 10000.0    1.00       0.
  2900.   .6944E-01    6        1.0    1.0 10000.0    1.00       0.
  3000.   .6612E-01    6        1.0    1.0 10000.0    1.00       0.
  3500.   .5355E-01    6        1.0    1.0 10000.0    1.00       0.
  4000.   .4462E-01    6        1.0    1.0 10000.0    1.00       0.
  4500.   .3799E-01    6        1.0    1.0 10000.0    1.00       0.
  5000.   .3291E-01    6        1.0    1.0 10000.0    1.00       1.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND   100. M:
   100.   14.48        6        1.0    1.0 10000.0    1.00       0.

      ****************************************
      *** SUMMARY OF SCREEN MODEL RESULTS ***
      ****************************************

 CALCULATION      MAX CONC   DIST TO  TERRAIN
  PROCEDURE      (UG/M**3)   MAX (M)   HT (M)
--------------  -----------  -------  -------
SIMPLE TERRAIN     14.48        100.       0.

**************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
**************************************************
```

Automated Distances Vs. Concentration
Terrain Height = 0. m



Project: CO Emission From 1,200 Trucks

01/30/99
07:06:52

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

NOx Emission From 1,200 Trucks

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.149000E-05
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF LARGER SIDE (M)	=	50.0000
LENGTH OF SMALLER SIDE (M)	=	7.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
100.	14.62	6	1.0	1.0	10000.0	1.00	0.
200.	4.980	6	1.0	1.0	10000.0	1.00	0.
300.	2.556	6	1.0	1.0	10000.0	1.00	0.
400.	1.581	6	1.0	1.0	10000.0	1.00	0.
500.	1.088	6	1.0	1.0	10000.0	1.00	0.
600.	.7995	6	1.0	1.0	10000.0	1.00	1.
700.	.6167	6	1.0	1.0	10000.0	1.00	1.
800.	.4982	6	1.0	1.0	10000.0	1.00	1.
900.	.4131	6	1.0	1.0	10000.0	1.00	0.
1000.	.3496	6	1.0	1.0	10000.0	1.00	0.
1100.	.3017	6	1.0	1.0	10000.0	1.00	0.
1200.	.2639	6	1.0	1.0	10000.0	1.00	0.
1300.	.2332	6	1.0	1.0	10000.0	1.00	0.
1400.	.2081	6	1.0	1.0	10000.0	1.00	0.
1500.	.1871	6	1.0	1.0	10000.0	1.00	1.
1600.	.1694	6	1.0	1.0	10000.0	1.00	0.
1700.	.1543	6	1.0	1.0	10000.0	1.00	1.
1800.	.1413	6	1.0	1.0	10000.0	1.00	0.
1900.	.1300	6	1.0	1.0	10000.0	1.00	0.
2000.	.1202	6	1.0	1.0	10000.0	1.00	0.
2100.	.1119	6	1.0	1.0	10000.0	1.00	0.
2200.	.1046	6	1.0	1.0	10000.0	1.00	0.
2300.	.9809E-01	6	1.0	1.0	10000.0	1.00	0.
2400.	.9222E-01	6	1.0	1.0	10000.0	1.00	0.
2500.	.8692E-01	6	1.0	1.0	10000.0	1.00	0.
2600.	.8212E-01	6	1.0	1.0	10000.0	1.00	0.
2700.	.7774E-01	6	1.0	1.0	10000.0	1.00	0.
2800.	.7375E-01	6	1.0	1.0	10000.0	1.00	0.
2900.	.7010E-01	6	1.0	1.0	10000.0	1.00	0.
3000.	.6675E-01	6	1.0	1.0	10000.0	1.00	0.
3500.	.5406E-01	6	1.0	1.0	10000.0	1.00	0.
4000.	.4504E-01	6	1.0	1.0	10000.0	1.00	0.
4500.	.3835E-01	6	1.0	1.0	10000.0	1.00	0.
5000.	.3322E-01	6	1.0	1.0	10000.0	1.00	1.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 100. M:

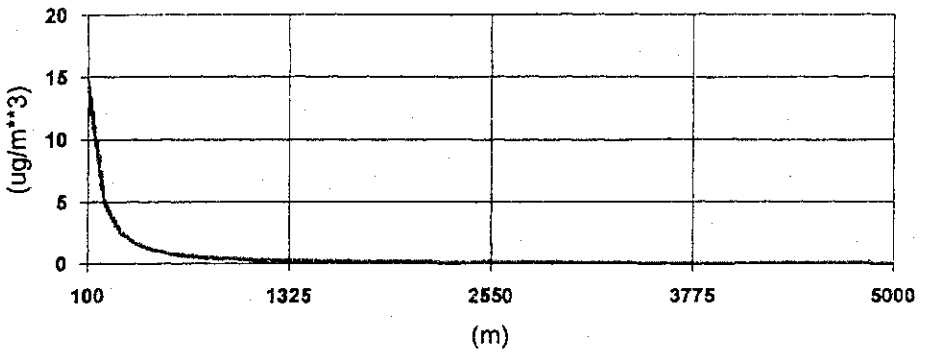
100.	14.62	6	1.0	1.0	10000.0	1.00	0.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	14.62	100.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Automated Distances Vs. Concentration
Terrain Height = 0. m



Project: NOx Emission From 1,200 Trucks

01/29/99
14:57:37

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

TSP Emission from Soil Cover Work

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.280000E-04
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF LARGER SIDE (M)	=	1140.0000
LENGTH OF SMALLER SIDE (M)	=	570.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL
MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION		

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

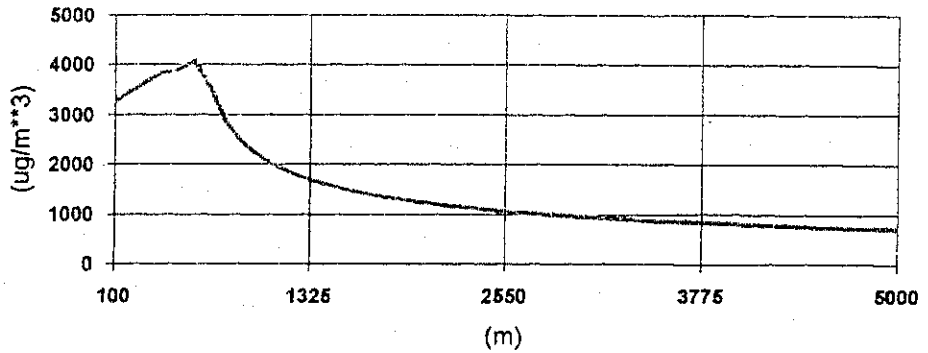
DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
100.	3271.	6	1.0	1.0	10000.0	1.00	24.
200.	3476.	6	1.0	1.0	10000.0	1.00	24.
300.	3662.	6	1.0	1.0	10000.0	1.00	23.
400.	3833.	6	1.0	1.0	10000.0	1.00	23.
500.	3910.	6	1.0	1.0	10000.0	1.00	23.
600.	4061.	6	1.0	1.0	10000.0	1.00	22.
700.	3540.	6	1.0	1.0	10000.0	1.00	26.
800.	2843.	6	1.0	1.0	10000.0	1.00	26.
900.	2449.	6	1.0	1.0	10000.0	1.00	25.
1000.	2190.	6	1.0	1.0	10000.0	1.00	25.
1100.	1996.	6	1.0	1.0	10000.0	1.00	25.
1200.	1847.	6	1.0	1.0	10000.0	1.00	24.
1300.	1728.	6	1.0	1.0	10000.0	1.00	24.
1400.	1629.	6	1.0	1.0	10000.0	1.00	23.
1500.	1545.	6	1.0	1.0	10000.0	1.00	23.
1600.	1472.	6	1.0	1.0	10000.0	1.00	23.
1700.	1408.	6	1.0	1.0	10000.0	1.00	22.
1800.	1350.	6	1.0	1.0	10000.0	1.00	21.
1900.	1300.	6	1.0	1.0	10000.0	1.00	21.
2000.	1253.	6	1.0	1.0	10000.0	1.00	20.
2100.	1212.	6	1.0	1.0	10000.0	1.00	20.
2200.	1174.	6	1.0	1.0	10000.0	1.00	20.
2300.	1139.	6	1.0	1.0	10000.0	1.00	18.
2400.	1107.	6	1.0	1.0	10000.0	1.00	18.
2500.	1079.	6	1.0	1.0	10000.0	1.00	18.
2600.	1051.	6	1.0	1.0	10000.0	1.00	16.
2700.	1027.	6	1.0	1.0	10000.0	1.00	16.
2800.	1004.	6	1.0	1.0	10000.0	1.00	16.
2900.	981.4	6	1.0	1.0	10000.0	1.00	14.
3000.	961.8	6	1.0	1.0	10000.0	1.00	14.
3500.	875.3	6	1.0	1.0	10000.0	1.00	5.
4000.	812.8	6	1.0	1.0	10000.0	1.00	0.
4500.	757.8	6	1.0	1.0	10000.0	1.00	0.
5000.	707.4	6	1.0	1.0	10000.0	1.00	0.
MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 100. M:							
639.	4114.	6	1.0	1.0	10000.0	1.00	26.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	4114.	639.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Automated Distances Vs. Concentration
Terrain Height = 0. m



Project: TSP Emission from Soil Cover Work

01/30/99
07:28:32

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

VOC Emission From 1,200 Trucks

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.440000E-06
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF LARGER SIDE (M)	=	50.0000
LENGTH OF SMALLER SIDE (M)	=	7.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
100.	4.316	6	1.0	1.0	10000.0	1.00	0.
200.	1.470	6	1.0	1.0	10000.0	1.00	0.
300.	.7548	6	1.0	1.0	10000.0	1.00	0.
400.	.4669	6	1.0	1.0	10000.0	1.00	0.
500.	.3213	6	1.0	1.0	10000.0	1.00	0.
600.	.2361	6	1.0	1.0	10000.0	1.00	1.
700.	.1821	6	1.0	1.0	10000.0	1.00	1.
800.	.1471	6	1.0	1.0	10000.0	1.00	1.
900.	.1220	6	1.0	1.0	10000.0	1.00	0.
1000.	.1032	6	1.0	1.0	10000.0	1.00	0.
1100.	.8910E-01	6	1.0	1.0	10000.0	1.00	0.
1200.	.7792E-01	6	1.0	1.0	10000.0	1.00	0.
1300.	.6887E-01	6	1.0	1.0	10000.0	1.00	0.
1400.	.6144E-01	6	1.0	1.0	10000.0	1.00	0.
1500.	.5524E-01	6	1.0	1.0	10000.0	1.00	1.
1600.	.5002E-01	6	1.0	1.0	10000.0	1.00	0.
1700.	.4556E-01	6	1.0	1.0	10000.0	1.00	1.
1800.	.4172E-01	6	1.0	1.0	10000.0	1.00	0.
1900.	.3839E-01	6	1.0	1.0	10000.0	1.00	0.
2000.	.3549E-01	6	1.0	1.0	10000.0	1.00	0.
2100.	.3305E-01	6	1.0	1.0	10000.0	1.00	0.
2200.	.3089E-01	6	1.0	1.0	10000.0	1.00	0.
2300.	.2897E-01	6	1.0	1.0	10000.0	1.00	0.
2400.	.2723E-01	6	1.0	1.0	10000.0	1.00	0.
2500.	.2567E-01	6	1.0	1.0	10000.0	1.00	0.
2600.	.2425E-01	6	1.0	1.0	10000.0	1.00	0.
2700.	.2296E-01	6	1.0	1.0	10000.0	1.00	0.
2800.	.2178E-01	6	1.0	1.0	10000.0	1.00	0.
2900.	.2070E-01	6	1.0	1.0	10000.0	1.00	0.
3000.	.1971E-01	6	1.0	1.0	10000.0	1.00	0.
3500.	.1596E-01	6	1.0	1.0	10000.0	1.00	0.
4000.	.1330E-01	6	1.0	1.0	10000.0	1.00	0.
4500.	.1133E-01	6	1.0	1.0	10000.0	1.00	0.
5000.	.9810E-02	6	1.0	1.0	10000.0	1.00	1.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 100. M:

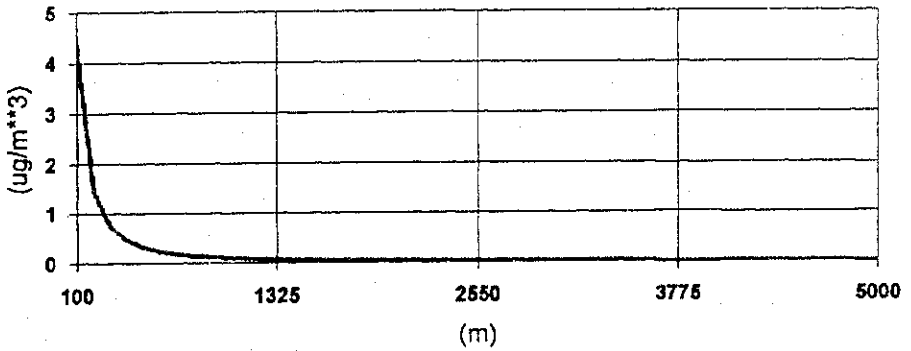
100.	4.316	6	1.0	1.0	10000.0	1.00	0.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	4.316	100.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Automated Distances Vs. Concentration
Terrain Height = 0. m



Project: VOC Emission From 1,200 Trucks

01/30/99
07:31:38

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 95250 ***

PM10 Emission From 1,200 Trucks

SIMPLE TERRAIN INPUTS:

SOURCE TYPE	=	AREA
EMISSION RATE (G/(S-M**2))	=	.172000E-06
SOURCE HEIGHT (M)	=	1.0000
LENGTH OF LARGER SIDE (M)	=	50.0000
LENGTH OF SMALLER SIDE (M)	=	7.0000
RECEPTOR HEIGHT (M)	=	.0000
URBAN/RURAL OPTION	=	RURAL

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
100.	1.687	6	1.0	1.0	10000.0	1.00	0.
200.	.5748	6	1.0	1.0	10000.0	1.00	0.
300.	.2951	6	1.0	1.0	10000.0	1.00	0.
400.	.1825	6	1.0	1.0	10000.0	1.00	0.
500.	.1256	6	1.0	1.0	10000.0	1.00	0.
600.	.9230E-01	6	1.0	1.0	10000.0	1.00	1.
700.	.7118E-01	6	1.0	1.0	10000.0	1.00	1.
800.	.5751E-01	6	1.0	1.0	10000.0	1.00	1.
900.	.4769E-01	6	1.0	1.0	10000.0	1.00	0.
1000.	.4035E-01	6	1.0	1.0	10000.0	1.00	0.
1100.	.3483E-01	6	1.0	1.0	10000.0	1.00	0.
1200.	.3046E-01	6	1.0	1.0	10000.0	1.00	0.
1300.	.2692E-01	6	1.0	1.0	10000.0	1.00	0.
1400.	.2402E-01	6	1.0	1.0	10000.0	1.00	0.
1500.	.2160E-01	6	1.0	1.0	10000.0	1.00	1.
1600.	.1955E-01	6	1.0	1.0	10000.0	1.00	0.
1700.	.1781E-01	6	1.0	1.0	10000.0	1.00	1.
1800.	.1631E-01	6	1.0	1.0	10000.0	1.00	0.
1900.	.1501E-01	6	1.0	1.0	10000.0	1.00	0.
2000.	.1387E-01	6	1.0	1.0	10000.0	1.00	0.
2100.	.1292E-01	6	1.0	1.0	10000.0	1.00	0.
2200.	.1208E-01	6	1.0	1.0	10000.0	1.00	0.
2300.	.1132E-01	6	1.0	1.0	10000.0	1.00	0.
2400.	.1065E-01	6	1.0	1.0	10000.0	1.00	0.
2500.	.1003E-01	6	1.0	1.0	10000.0	1.00	0.
2600.	.9479E-02	6	1.0	1.0	10000.0	1.00	0.
2700.	.8975E-02	6	1.0	1.0	10000.0	1.00	0.
2800.	.8514E-02	6	1.0	1.0	10000.0	1.00	0.
2900.	.8092E-02	6	1.0	1.0	10000.0	1.00	0.
3000.	.7706E-02	6	1.0	1.0	10000.0	1.00	0.
3500.	.6240E-02	6	1.0	1.0	10000.0	1.00	0.
4000.	.5200E-02	6	1.0	1.0	10000.0	1.00	0.
4500.	.4427E-02	6	1.0	1.0	10000.0	1.00	0.
5000.	.3835E-02	6	1.0	1.0	10000.0	1.00	1.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 100. M:

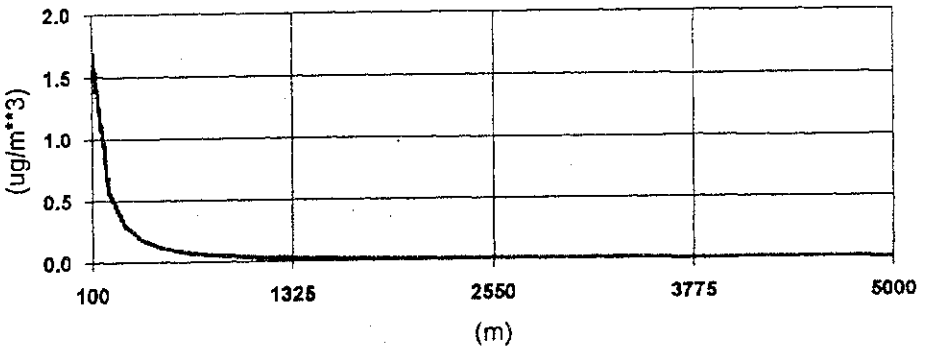
100.	1.687	6	1.0	1.0	10000.0	1.00	0.

****
*** SUMMARY OF SCREEN MODEL RESULTS ***
****

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	1.687	100.	0.

****
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
****

Automated Distances Vs. Concentration
Terrain Height = 0. m



Project: PM10 Emission From 1,200 Trucks