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MFEM Project

ASSESSMENT OF URBAN TRANSPORT SERVICES: NIZHNY NOVGOROD

By
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1. INTRODUCTION

In response to a request by the city of Nizhny Novgorod, USAID is providing technical assistance for the city's public transportation sector through the Research Triangle Institute (RTI). This report summarizes the findings of the author during a visit to the city from October 31 to November 5, 1994. The purpose of this assignment was to undertake a preliminary assessment of the municipal transport issues in the city, develop an initial strategy for improving the quality and quantity of transport services, and recommend means to reduce municipal subsidies to the transport companies.

The data and information upon which the report is based, were provided by the Department of Transport and Communications, the management of transport companies and obtained through field observations. In addition, the report prepared by A. T. Kearney on Nizhny Novgorod as part of the World Bank's Russian Urban Transport Project provided useful background for the consultant's work in the field.

During his visit, the consultant held meetings with senior officials and staff of the Department of Finance of the City, the Department of Transport and Communications, the Metro Company, the Tram and Trolley Company, the Bus Transport Association, and the Taxi Garage, to identify issues to be examined and to discuss prevailing plans and strategies for municipal transport in the city. Time did not permit a visit to the car manufacturing plant to determine its readiness and willingness to assemble and/or produce vehicles suitable for urban transport. The consultant was informed, however, of the cooperation between Cummins, a U.S. based engine manufacturer and Liaz, a Russian bus manufacturer. Currently, Cummins engines are being tested on several Liaz buses.

On November 4, 1994, at the conclusion of the visit, a meeting was held at the RTI's field office with the Directors of the Department of Transport and Communications, the Deputy Director of the Department of Finance and Mr. William Fuller, the RTI Resident Advisor and Project Manager of the Municipal Finance Project (MFP). The consultant presented the initial findings and recommendations developed during his mission. The city officials also made a request for USAID technical assistance in urban transport to include support in the development of:

- (1) institutions and effective organizational structures to manage cost, enhance financial independence, accountability and efficiency of urban public transport enterprises;
- (2) strategies for improving collection efficiency and other means of cost recovery in order to provide sustainable sources of funds for increasing quality and level of municipal passenger transport service;

- (3) programs to reduce the cost of service by rationalizing routes among all modes of public transport, increasing vehicle maintenance productivity, reducing staffing levels through automation and reorganization, and introducing cost accounting and computerization;
- (4) training programs in management, operations and maintenance to achieve the objectives described above;
- (5) options and strategies for privatization of transport enterprises;
- (6) a capacity to implement and manage the World Bank program.

This report describes the current situation of public transport in the city, discusses options for improving service levels, provides recommendations for the scope of future work and projects level of effort requirements.

The consultant would like to express his appreciation to the officials and the staff of the Department of Finance of the City, the Department of Transport and Communications, the Metro Company, the Tram and Trolley Company, the Bus Transport Association, the Taxi Garage and the management and the staff of the RTI field offices in Nizhny Novgorod and Moscow for the assistance and support provided during his visit.

2. THE SUPPLY OF PUBLIC TRANSPORT

Population in the city of Nizhny Novgorod is estimated at approximately 1.5 million. The city is divided by the Volga/Oka rivers into two parts with major industries and approximately 75 percent of the population and the jobs located to the West of Oka River. The administrative center of the city as well as the remainder of the population and jobs are located to the East.

2.1 The Organizational and Institutional setting

Until recently the central government was responsible for all means of public transport in Russia. In 1992, local governments, the municipality and the oblast, inherited the responsibility and authority to provide urban transport services.

The municipality, through its Department of Transport and Communications (DoTC) guides and coordinates the services of oblast-owned buses, and city- owned trams, trolleybuses and the Metro. The schedules and level of service is determined by DoTC. In addition, DoTC sets the fares for all modes of public transport with the condition that the fare it establishes may not be lower than the oblast-determined minimum fare for buses.

In coordination with the Department of Finance (DoF), DoTC also develops investment programs and recommends the levels subsidies to be provided to the transport entities. Based on the budgets approved by the city council, DoF releases funds through DoTC to the operating entities.

As in other Russian cities, the transport fleets for all types of urban transport in Nizhny Novgorod (except the Metro) are old and inefficient. The transport companies are heavily subsidized by the local governments, and with increasing fare evasion and aging fleets, subsidy levels from the city budgets to the transport companies are expected to rise in the foreseeable future. Consequently, there is significant scope for improving the supply of transport services, reducing cost and increasing revenues.

2.1.1 Bus System

The oblast-controlled bus system includes seven independent garages. Each garage is responsible for hiring its staff and operating and maintaining its fleet. These independent garages are members of the Bus Transport Association.

2.1.2 Bus Transport Association (BTA)

In addition to the municipal bus companies, 30 other enterprises belong to BTA. The BTA is responsible for maintaining all the bus stations and providing various services for the independent garages. These services include:

- Procurement of new equipment, spare parts and materials. The management of BTA argues that this system of centralized procurement has several advantages due to economies of scale helps in obtaining reduced prices.
- Centralized dispatching and monitoring: BTA has a computer driven real time dispatching and monitoring system. Each bus is equipped with a transmitter sending signals to the central computer on their location. Through this system dispatchers are able to monitor the movements and deviations from the schedules. Detailed information is available on the performance of each vehicle and or garage. However, it is not clear how this information is used to guide planning or improving service.
- Route designing and bus scheduling for all the garages.
- Driver training for BTA members.
- Acting as the oblast's disbursement agent for subsidies to garages.

BTA also owns an engine repair plant and social and educational facilities for the use of its members. The legal basis of the relationship between BTA and its members warrants further study to determine how the existing structure can be used to improve efficiency in providing bus services.

2.1.3 The Electrical Transport System

The city owned electrical transport system consists of two independent companies, the Tram and Trolley Bus Company and the Metro. Both companies have responsibility for operations and maintenance of their respective systems.

The Tram and Trolley Bus Company provides its services from three tram and three trolleybus depots. The central dispatching unit for the tram and trolleybuses monitors the movements of the electricity based fleet in a manner similar to that of the BTA described above.

Both, the Tram and Trolleybus Company and the Metro, have their own support facilities for operations and maintenance. Capital improvement funds for Metro comes from the central government while the city is responsible for all improvements for the tram and the trolley system.

2.2 Bus Service

Bus service, the dominant mode of public transport in Nizhny Novgorod, encompasses seven bus depots (companies) and a fleet of 1195 vehicles providing passenger transport services on 100 urban and suburban lines. The fleet includes 275 small, 835

standard size and 85 articulated buses. The small buses are used as route taxis. The fleet consists of 251 Ikarus, 156 Laz, 547 Liaz and 241 Paz buses with an average age of over 5 years. Vehicle availability for buses is about 70%, very low by western standards. The total number of personnel per bus is 3.8, of which 1.7 are drivers, 1.4 maintenance staff and 0.7 administrative/auxiliary staff.

Officials of the Bus Transport Association (BTA) reported difficulties in finding qualified drivers. In addition, the consultant was informed that each bus is assigned to a specific driver, and as a result a portion of the fleet remains underutilized with vehicles standing idle on the lot when the assigned driver takes his/her vacation or sick leave. Clearly bus service can be increased by raising the driver to vehicle ratio and using reserve drivers. Although time did not permit an examination of bus scheduling in detail, the management of BTA indicated that service during peak hours can be increased by reducing service during off-peak hours and shifting the use of available drivers to the peak period.

There are approximately 1000 additional buses, owned and used by other state enterprises to transport their own workers and staff. These buses may also be used to supply municipal transport provided that the state enterprises are compensated satisfactorily for their services by the municipality.

2.3 Trams and Trolleybus Service

Trams and trolleybuses serve only the urban routes and operate from three tram and three trolley depots. The fleet includes 249 standard size trolleybuses and 415 trams of which 154 are articulated. Trams operate on 18 lines, with trolley-buses providing service on 19 lines. The average age of trams is over 10 years. For trolleybuses, the average age is over 6 years. Vehicle availability for trams and trolleys is 66 and 74% respectively.

The total number of personnel per tram is 5.5, of which 1.2 are drivers, 2.7 maintenance personnel and 1.5 administrative/auxiliary staff. Total personnel per trolleybus on the other hand is 5.6, of which 1.6 are drivers, 2.3 maintenance personnel and 1.7 administrative/auxiliary staff. The management of Tram/Trolleybus company also reported difficulties in finding qualified drivers.

2.4 Metro Service

The Metro currently provides service to 8% of the total travel demand and operates on two lines. The second metro line, which opened on 20 December 1994, is 3 km long and has two stations. Construction of an eight km extension of the second line is underway and will be completed by 1996. Three new stations will be opened on this line.

The city plans to open the third line to connect the Moscow Railway station with the city center across the river. Such an investment, however, appears to be ambitious and expensive; more cost effective means of connecting the two parts of city should be explored.

The metro system operates 82 Russian-made carriages, 90% of which are typically available, while 10% are being maintained. The quality of the service provided by metro is good. The system operates on time and interruptions through power and mechanical failures are rare. The carriages and the stations are well maintained and clean.

2.5 Utilization of the Bus, Trolleybus and Tram Fleets

Information on existing fleet utilization for the year of 1993 is provided in Table 2. Based on static and dynamic utilization ratios, the service level of the buses appears to be adequate, while the levels for tram and trolleybus are low.

TABLE 2.1

**Vehicle Utilization & Ridership
Nizhny Novgorod Municipal Passenger Transport System
1993**

	Bus	Trolleybus	Tram
1 Passenger trips per working day	1,401,670	571,740	1,274,060
2 Passenger trips per peak hour	196,235	80,045	178,370
3 Passengers at the most busy part of the lines	70,085	28,590	63,700
4 Average capacity per vehicle @ 8 pass./sqm	104.32	117.8	183.8
5 Actual number of vehicles during peak	820	182	275
6 Capacity per peak hour	85,542	21,440	50,545
Static utilization ratio (3/6)	81.93%	133.35%	126.03%
7 Average trip distance per passenger	6.63	2.77	2.56
8 Average operational speed (km/hr)	20	17.4	17
9 Total vehicle kilometers per peak hour (8*5)	16,400	3,167	4,675
10 Capacity-kilometers at 8 pass./sqm (9*4)	1,710,848	373,049	859,265
11 Passenger kilometers per peak hour(7*2)	1,301,038	221,725	456,627
Dynamic utilization ratio (11/10)	76.05%	59.44%	53.14%

Source: A.T. Kearney

3. THE DEMAND FOR PUBLIC TRANSPORT

Very low levels of car ownership in Nizhny Novgorod necessitate a high dependency on public transport. Statistics relating to the demand for public transport for 1993 is presented in Table 3.1.

The relatively high average trip distance for buses of 6.63 km reflects the longer suburban services provided by the buses. It is expected that the average trip distance on urban routes is similar to that of tram and trolley buses.

During peak hours trams and trolleybuses are overcrowded, as reflected in the high average of the number of passengers per square meter.

The average waiting times for the passengers at the stops are reported in the range of 5 to 15 minutes.

TABLE 3.1
Demand for Public Transport
Nizhny Novgorod, 1993

	Bus	Trolleybus	Tram	Metro
Number of trips/ year(million)	420.5	169.5	323.2	62.3
Number of passenger trips/day	1,401,670	571,740	1,274,060	207,670
Average trip distance	6.63	2.77	2.56	4.68
Number of passenger kilometers/ day	9,293,070	1,583,720	3,261,595	971,895
Number of passengers/sq. m. during peak	6.6	10.7	10.1	7.4
Number of trips per year/per inhabitant	292	118	225	43

Source: A.T. Kearney

Data for 1994, obtained from the Department of Transport of the City of Nizhny Novgorod, reveal about a 30% drop in ridership for the first three quarters of 1994. Time did not permit the consultant to determine the cause of such a significant drop

in ridership. While reporting error may account for the apparent decline in ridership, another explanation may be a change in policy regarding the exempt status of pensioners. Since January 1994, pensioners receive a fixed amount each month to purchase tickets for public transport. It is possible that pensioners may actually be traveling

less and using the money for other purposes. Nevertheless, it is essential that ridership information and related vehicle utilization ratios for each mode of transport be updated during any follow-up work with the city.

The demand for public transport services is projected to remain fairly stable in the near future, since population and car ownership are not expected to increase. However, with the planned full extension of the second metro line, it is anticipated that the number of metro passengers will double, as the number of bus passenger trips will decrease by about 60 million trips per year. In addition, discussions with the metro officials revealed that the ridership on metro may be increased further by another 20%, if some of the duplicate bus and tram services were eliminated.

It should be noted, however, that there is also scope for reducing the number of passenger trips demanded through improved route design to reduce the need for transfers.

4. FARES, SUBSIDIES AND FARE COLLECTION EFFICIENCY

Fares for public transport are set by the municipality. The oblast, however, sets the *minimum* fare for the buses. Since January 1992 bus, trolleybus and tram fares were increased from 0,3 Rbls to 150 Rbls for a single trip. In addition to the single trip ticket, monthly passes are also available at a significant discount. No distinction is made between peak and off-peak fares.

On route taxis, current fares are 300 Rbls with no exemptions. In contrast to bus, tram and trolleybuses, no tickets are issued and the cash fare is collected by the driver. In general, route taxis are considered to be a comfortable upscale service. There is significant scope for expanding and privatizing route taxi service thus reducing the need to subsidize its operations.

Policy regarding exemptions generally is made at the central government level, although the local government may also grant some exemptions. About 40% of all passengers are exempt from paying fares, with pensioners and military personnel accounting for about 50% of exemptions. Although the decision on exemptions is made at the central level, local governments bear the financial burden of exempt passengers, since they are responsible for subsidizing the transport operations.

The city feels that the Ministries of Social Security and Defense should compensate the city for the cost of exempt passengers. No official figures were available on the amount of this compensation, however, it estimated that the compensation could be as high as \$5.0 million US.

As shown on Table 4.1, after accounting for exempt passengers, there is a significant difference between the collected revenue and estimated revenue based on ridership on all modes of public transport except metro.

It appears that the uncollected revenue, which results from fare evasion and lack of enforcement, could be as high as \$10.8 million US, an amount nearly equal to two thirds of the total annual subsidies provided to the public transport in the city. Although these estimates are preliminary in nature, they help to illustrate the significance of fare evasion problem.

TABLE 4.1

**Ridership and Fare Collection on Public Transport
Nizhny Novgorod, 1994**

	TOTAL	TRAM	TROLLEY	METRO	BUS	ROUTE TAXI
1. EXCHANGE RATE	3000					
2. NUMBER OF VEHICLES		260	180	72	780	200
3. PASSENGERS/DAY/VEHICLE		3,470	2,000	2,528	1,250	272
4. TOTAL PASSENGERS/DAY (000)	2,473	902	360	182	975	54
5. PERCENT OF TOTAL TRIPS (%)	100.0%	36.47%	14.55%	7.36%	39.42%	2.20%
6. PERCENT OF POPULATION EXEMPT FROM FARE		40%	40%	40%	40%	0%
7. PAYING PASSENGERS/DAY (000)	1,484	541	216	109	585	54
8. AVERAGE FARE PER TRIP (rubles)		75	75	75	75	300
9. ESTIMATED REVENUE/DAY (millions of rubles)		111	40.5	16.2	843.8	16.3
10. ESTIMATED REVENUE/MONTH (millions of rubles)	3,339	1,217	486	245	1,316	489.6
11. ESTIMATED REVENUE/YEAR (millions of rubles)	45,066	14,615	5,832	2,948	15,795	5,875
12. ESTIMATED REVENUE/YEAR (000s USD)	15,022	4,871	1,944	982	5,265	1,958
13. REVENUE COLLECTED (millions of rubles)	12,481	1,733	800	2,948	4,900	2,100
14. COLLECTION EFFICIENCY (%) (line 13 divided by line 10)	27.70%	11.86%	13.72%	100.00%	31.02%	35.74%
15. LOST REVENUE (billions of rubles) (line 11 minus line 13)	(32.5)	(12.8)	(5.0)	0	(10.8)	(3.7)
16. LOST REVENUE (million USD)	(10.8)	(4.2)	(1.6)	0	(3.6)	(1.2)

Note: Estimated ridership and collected revenue figures are estimates based on data for the first three quarters of 1994.

The average fare in these calculations may be over-estimated. The consultant believes the lost revenue figures may indicate an upper limit for uncollected revenue. Nevertheless, the above estimates are useful to illustrate the magnitude of the problem, but require updating during future work.

Source: Department of Transportation and Communications, Nizhny Novgorod

5. RECOMMENDATIONS

5.1 Institutional/organizational Restructuring

The existing institutional/organizational structure does not allow for the separation of the regulatory and operational functions. The Department of Transport, the city's organization for the administration of transport, is responsible for transport planning, financing and regulation of all electric based transport systems. For the bus company, DoTC is responsible only for coordination, while the oblast has the ultimate decision power. All transport enterprises operate as separate units responsible for their own accounting, budgets., except for route planning and fares.

The Bus Transport Association currently plays a significant role in the provision of bus service, through route design, scheduling etc., plus purchasing of spare parts and vehicles. The future role of BTA in relation to its member bus companies needs to be defined in order to improve the performance and efficiency of independent bus garages.

The management staff at each of the transport entities visited by the consultant expressed their concern over lack of incentives for transport entities to improve their financial and operational performance. In their view, a corporate structure would create an environment which would allow a system of rewards and incentives for improved performance to be established. Certainly, corporatization should be viewed as a first step towards financial independence, accountability and efficiency of public transport entities.

5.2 Measures to Increase Revenue

Alternative methods for increasing fare collection efficiency must be examined and implemented. At major terminal points, erection of covered bus stops should be considered, where bus stop conductors could be employed to sell tickets and control monthly passes. In addition, the passengers would be forced to queue, thus allowing for orderly boarding of the buses, trams and trolleys, and improving the service quality.

Direct financing of exempt passengers through social budgets in lieu of subsidies would also increase the number of paying passengers.

The relatively high fares charged by route taxis is an indication of the willingness of consumers to pay for quality service. Fare increases, in real terms, are readily justifiable and will be acceptable if accompanied by a noticeable increase in service quality.

Additionally, non-fare revenues may be increased through the sale of advertising space on the vehicles, tickets, route maps and at the bus stops as well as through the rental of kiosk space at bus stops. Some suburban routes and most route taxi routes can be operated by private companies and/or route associations. The city could generate some revenue from licensing fees collected from these independent operators.

5.3 Measures to Decrease Cost

A number of improvements to transport services would contribute significantly to lowering operating costs and increase revenue. These would include, rationalization of routes, coordination of schedules, restructuring fares, appropriate utilization of vehicles to meet the demand and elimination of service duplication. City officials and staff of transport entities recognized the value of undertaking studies to rationalize routes and schedules. The tram and a trolleybus company management estimates that the savings could be as high as 25% of current operating expenditures. The process of route rationalization requires a coordinated effort among all transport entities and DoTC.

Additional savings may be also realized through computerization and reduction in personnel. The introduction of computers is also essential for accounting and management information. Currently, none of the transport entities use cost accounting.

Maintenance costs can also be lowered through the introduction of modern methods and tools. A majority of the vehicles in the fleet are powered gasoline engines. Retrofitting these vehicles to use natural gas should be examined. Natural gas is not only environmentally friendly but also less costly. In addition, it is suggested in the A. T. Kearney study that some savings on the usage of tires can be realized as well.

Better integration of metro with the trams and buses would not only enhance metro ridership, and increase fare collection, but also improve quality of service by reducing waiting times during transfers from one mode of transport to the other. In particular, there appears to be an opportunity to extend metro service by inter-connecting metro to the tram system at two metro stations. The technical, operational and financial feasibility of connecting the two parts of city by integrating the metro and the tram system should be examined.

5.4 Improve Public Information on Transport Services

New route maps and schedules displayed at bus stops will help to better inform the public on the availability of services. In addition, uniform painting of the transport vehicles with the city's logo would enhance the image of transport companies and would be a first step towards improved service.

5.5 Privatization

5.5.1 Privatization of Taxi Service

Taxi service is already privatized. A lease-purchase type of arrangement exists between the drivers and the taxi garages which own the vehicles. Under the lease purchase agreement the drivers are responsible for all the costs associated with the operation and maintenance of their vehicles. Taxi maintenance is provided under contract by the taxi garages. BTA, under a contract, also provides radio dispatching support to the taxi operations.

5.5.2 Privatization of Route Taxis

A fleet of buses of 40 passenger (28 seated and 12 standing) capacity are used as route taxis. Based on the information provided by the management of the Taxi/Route Taxi garage, there have been several attempts to privatize the route taxis. However, drivers showed no interest in purchasing the existing fleet of buses. Together with the management and staff of the garage, the consultant prepared initial estimates for profitability of a private route taxi operation in Nizhny Novgorod. The results of these estimates indicate that on most routes, route taxis could operate profitably.

In addition, route taxis could operate under contract with the city or the bus companies, particularly, during afternoon and evening hours and on routes unprofitable for large buses. Such reforms will lead to a reduction in service costs and subsidies required for the bus service.

5.5.3 Privatization/contracting of Equipment Maintenance and Rehabilitation

There is also scope for privatizing or contracting out equipment maintenance and vehicle rehabilitation services. This would yield not only savings in maintenance cost but also result in higher maintenance productivity and lower "out of service" ratios for the transport fleet.

Potential financial impacts of the above recommendations are difficult to estimate at this point. However, it is expected that the successful implementation of the above measures would substantially reduce the need for transport subsidies and improve the level of service.

6. IMPACTS OF THE PROPOSED IMPROVEMENTS

It is anticipated that the proposed improvements would enhance the quality and level of transport service, while reducing the subsidy burden on the local governments. Estimated financial impacts of these improvements are presented below. These estimates, however, are preliminary in nature and should be viewed only as targets to be achieved. Nevertheless, they illustrate the opportunity for reducing transport subsidies.

Improvement	Potential Change in Revenue (billion Rbls)
Increase collection efficiency by 75%	25.0
Increase fares in real terms	7.5
Increase non-fare revenues	3.0
Reduce operating cost	4.0
Total	39.4

The financial impacts of the program presented above do not include additional revenues which can be raised locally, such as through vehicle registration taxes/fees. It is anticipated that with the increase in car ownership, vehicle registration taxes could represent a significant source of revenue for the local governments.

7.0 PROPOSED SCOPE OF WORK AND LEVEL OF EFFORT

A two phased approach is proposed for the implementation of the USAID assistance in urban transport to the city of Nizhny Novogorod. With the exception of Task 1 which addresses organizational and institutional issues, it is proposed that all tasks will be accomplished through pilot projects with individual companies and/or on specific routes. etc. Based on the results of Phase I, it is proposed that the assistance be extended to all transport enterprises in the city during Phase II. Proposed Phase I tasks are independent of one another, but linked. Depending upon priorities and or budgetary constraints, the Phase I scope of work would be finalized in conjunction with RTI.

PHASE I

Task 1. Assist the development of institutions and effective organizational structures to manage cost, enhance financial independence, accountability and efficiency of urban public transport enterprises, including but not limited to a review of and recommendations for:

- regulatory and operational functions among the central government, the municipality, the oblast, Bus Transport Association and operating entities,
- authority and responsibility of government departments related to the provision of the transport services,
- organizational structures, and
- management policies and procedures.

It is proposed that a three-day workshop be organized around the institutional and organizational issues related to the provision of public transport services. Participation in the workshop by key decision makers in the transport sector will allow the creation of a highly focused atmosphere in which the identification of major issues and development of a strategy to improve services can be accomplished with the assistance of USAID consultants.

Estimated Level of Effort: 50 person days

Task 2. Develop strategies and methods for improving collection efficiency and cost recovery in order to provide sustainable sources of funds for increasing quality and level of municipal passenger transport service. The following options would be examined:

- Fare structuring
- Reinforcement of fare collection
- Increase of non-fare revenues

Estimated Level of Effort: 50 person days

Task 3. Develop programs to reduce the cost of service by rationalizing routes among all modes of public transport, increasing vehicle maintenance productivity, reducing staffing levels through automation and reorganization, and introducing of cost accounting and computerization;

Estimated Level of Effort: 150 person days

Task 4. Develop training programs in management, operations and maintenance to strengthen transport from capacity to implement the methods and programs developed under Tasks 2 and 3.

Estimated Level of Effort: 100 person days

Task 5. Develop options and strategies for privatizing transport enterprises;

Estimated Level of Effort: 50 person days

Task 6. Assist in the development the capacity to implement and manage the World Bank program.

Estimated Level of Effort: To be determined during Phase I in association with the World Bank and the municipality

Total PHASE I evel of Effort: 400 person days

PHASE II

Phase II would involve a roll out to other transport enterprises in the city. and would build upon the successes and lessons learned from Phase I.