

Carpool**MATCH**NW.org

Monitoring and Verification Plan

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INTRODUCTION

Project Description

In response to growing regional transportation problems, the City of Portland Office of Transportation, in conjunction with the Tri-Country Metropolitan Transit District of Oregon (Tri-Met) and the area's five Transportation Management Associations (TMAs), have developed an innovative web-based carpool/vanpool matching service. The service is primarily designed to curtail the emission of 70,000 metric tons of carbon dioxide over a ten-year period by decreasing single occupancy vehicle commute trips. Known as CarpoolMatchNW.org, it is a fully automated Web site (<http://carpoolmatchnw.org>) that efficiently integrates the uncoordinated ridesharing programs of several public and private groups throughout the region.¹

CarpoolMatchNW.org seeks to overcome the steady *decline* in commuter ridesharing that has occurred in this region during the last twenty years. In spite of extensive community-wide efforts to discourage solo commuting, far more individuals drive to work alone today than in the 1980s. For example, Census Bureau data indicate that 65% of the workers who live in Portland drove to work alone in 1990, compared to 55.9% in 1980. Carpooling declined from 16.5% to 12.9%, while transit use decreased from 15.9% to 10.9%. More recent Statewide 2000 Census Commute Data suggests there has been very little change in these trends.²

¹ CarpoolMatchNW.org is expected to draw the largest number of clients from Multnomah, Washington, Hood River and Marion Counties in Oregon and Clark County in Washington State.

² The 2000 Census Commute Data for Oregon can be found at <http://usf.edu/clearinghouse/commutedata.htm>. These data reveal that 73.57% of the commuters in the State drove to work alone, only fractionally greater than 73.32% in 1990. The same marginal differences holds for ridesharing. In 2000 12.59% of Oregonians commuted to work with someone else, compared to 12.76% in 1990. However, there is reason to believe the data for the Portland Metropolitan Region differs somewhat from these

Project Operation

CarpoolMatchNW.org matches individuals who register at its Web site with others who live in their area and then takes matching one step further by allowing them to send a "Rideshare Wanted" e-mail to any or all of the commuters on their matchlist. A matchlist is created when a registered user enters their departure address, destination, schedule and travel time information. The Web site then displays a map with the locations of other registered users who share a similar commute pattern, whereupon these individuals can begin the process of communicating with each other. While there are a number of independent carpool programs in the Portland Metropolitan region, none is as comprehensive or as user friendly as CarpoolMatchNW.org. The service will also contain up-to-date user information, thereby avoiding the antiquated databases of many of the existing rideshare programs.

The process of finding a car or vanpool match at CarpoolMatchNW.org will also overcome many of the limitations of existing programs in the region.

- It is anonymous, so users can feel secure about finding a car or vanpool match.
- It is user-driven and thereby doesn't depend on a coordinator to find suitable riders from several different databases.
- It is fast and convenient, as the integrated database makes it possible to find a suitable match much more quickly than is currently possible.
- It offers a choice between car or vanpooling, depending on the user's preference.

statewide values. For example, it is estimated that less than one in ten Portland-area commuters carpool to work at this time. Specific figures for the local area will not be available for 2-3 years.

Three existing rideshare programs will fold their operations into this service: Mid-Valley Rideshare, Tri-Met's rideshare program, and C-Trans' program in Clark County, Washington. One known employer, the Intel Corporation, is not expected to include its rideshare service in CarpoolMatchNW.

Project Goals

If CarpoolMatchNW.org meets with widespread acceptance, it is expected to have a number of salutary effects on the region's transportation problems. This will occur primarily from a significant *reduction* in the number of commuters who drive to work alone. It is anticipated that this will avoid the carbon dioxide emissions of 1,000 cars traveling 15,000 miles a year. This is expected to lead to a reduction of approximately 70,000 metric tons of carbon dioxide over the course of its planned ten-year operating period.

To the extent that solo commuting is reduced, the Project will have a number of additional co-benefits. A reduction in vehicle miles of travel will diminish traffic congestion, fuel consumption, and parking pressures. In addition to reducing carbon dioxide emissions, it will also decrease other auto-generated components of air pollution (carbon monoxide and hydrocarbons) and runoff contaminants, such as oil. Both carpooling and vanpooling will also be a financial saving for most commuters. Finally, in a larger sense, the project also represents an effort to maintain the region's livability by reducing the pressures of highway expansion and urban sprawl.

Project Monitoring & Verification Plan

In order to determine if CarpoolMatchNW.org is meeting its objectives, an ongoing assessment process will be carried out during each operating year. The report presented herein, known as the Monitoring and Verification *Plan*, specifies each of the steps the City of Portland Office of Transportation and an independent research firm will employ to verify that the Project's targeted emission reductions have occurred.

The Monitoring and Verification Plan describes the projected Carbon Dioxide Offsets that are expected to occur during each Project Year and the methodology employed to calculate them. This includes the formulation of baseline measures against which to judge the impact of the Project-induced emission reductions.

The Plan also enumerates the data collection specifications to be incorporated into the CarpoolMatchNW.org Web site by the software developer. This includes the requirements for online-administered user surveys that will be a key source of data for assessing the Project's impact. The Plan also formulates several research designs that will be employed to verify its effects. Finally, the Monitoring and Verification Plan outlines the requirements for the Annual Monitoring and Verification *Report* based on the evidence provided by the City of Portland Office of Transportation and the annual verification study. The following sections of the Plan describe in detail each of these components.

II. MONITORING AND VERIFICATION PLAN

Predicted Carbon Dioxide Offsets

Annual Targets The Project's emission reduction goals are specified in the contract between the Climate Trust and the City of Portland Office of Transportation. In this agreement, the City guarantees that the operation of CarpoolMatchNW.org will avoid the emission of 70,000 Metric Tons of Carbon Dioxide over the course of the ten-year project.

The Guaranteed Offsets are to be confirmed at the end of the fifth and the tenth Project Year. Portland guarantees that 30,000 Metric Tons of Carbon Dioxide Offsets will be produced from the operation of the web site during its first five years of operation and 40,000 Metric Tons will be reduced during the second five years. Table 1 shows the Annual Target in Metric Tons of Carbon Dioxide Offsets for each year of the Project.

Table 1
Annual Target in Metric Tons of CO₂ Offsets

<u>Project Year</u>	<u>Annual Total</u>
1	2,000
2	4,500
3	7,500
4	8,000
5	8,000
6	8,000
7	8,000
8	8,000
9	8,000
10	8,000

Calculating Variables These projections are based upon the following factors.

- The number of *new* carpools and vanpools generated by CarpoolMatchNW.org each year.
- The number of avoided single occupant vehicle trips produced by the newly created car/vanpools.
- The number of reduced vehicle miles of travel generated by the avoided trips calculated on the basis of 252 workdays (the standard number of commute days used by transit providers.)
- The cumulative carbon dioxide emission reductions based on the reduced vehicle miles of travel, adjusted annually for the fleet average miles per

gallon for cars, light trucks and vans as determined by the Oregon Department of Transportation. (See Appendix D)

Specific Projections By taking account of these factors, the City has made the following carbon dioxide offset projections for carpools and vanpools.

Carpools: A 1999 Tri-Met survey found that the average number of people in a carpool is 2.7. Since one person is driving the car, the number of passengers is 1.7. According to the region's most recent and accurate transportation survey (Metro's 1994 Household Activity Study), the average distance for a carpool commute trip is 14 miles round trip. Assuming a very conservative carpool growth rate (about 2 percent each year), CarpoolMatchNW.org is projected to reduce 42,153 metric tons of CO₂ over ten years.

Vanpools: According to VPSI, the region's primary vanpool provider, the average number of people in a vanpool is 11 (one driver and ten passengers) and the average vanpool commutes 90 miles per day round trip. Assuming a very conservative growth rate (ten new vanpools each year for three years and then holding steady for seven years) the vanpools generated by CarpoolMatchNW.org are projected to reduce 27,614 metric tons of CO₂ over ten years.

Taken together the total CO₂ that is projected to be reduced as a result of the vanpools and carpools formed by CarpoolMatchNW.org is 70,000 metric tons during the ten-year Project period.

Web Site Data Collection Specifications

In addition to its commuter matching components, the CarpoolMatchNW.org software incorporates several data collecting techniques designed to measure the

impact of the Project. The data collecting software is based upon assumptions employed in calculating the carbon dioxide emission reductions as described in the preceding section of the Plan.

The Web site specifications consist of two broad categories: (1) Participant survey data collected at the time of registration and on the 30 Day, 6 month and annual follow-up surveys, and (2) Commute trip data derived from registration information and responses to these three surveys. Each of these data sources is listed below.

Participant Survey Data

- Information about the commuter's route, miles traveled and schedule requirements
- User's baseline (pre-program) commute mode (car, transit, bike, walk), frequency and distance.
- User's program-induced car/vanpool frequency, distance and number of passengers.
- User's personal vehicle miles of travel (odometer estimates) before and after one year in program
- Sale or avoided purchase of personal vehicle as a result of program participation

Summary Commute Trip Data

- The number of new carpools and vanpools formed
- The commute frequency of each such car/vanpool
- The number of passengers commuting in each car/vanpool
- The number of miles traveled by each car/vanpool

- Program-induced reductions in the number of trips, vehicle miles of travel³ and gallons of gas
- Program-induced reductions in the total amount of CO₂ emissions⁴
- The surveys (Registration, the 30 Day and 6 Month Survey and the Annual Follow-Up Survey) that provide the data for each of the preceding measures are shown in Appendix A, B and C, respectively.

Measuring Program Impact

Overview of Design

A Pretest-Posttest Design will be employed to assess the overall impact of the CarpoolMatchNW.org service. In this quasi-experimental design the Pretest is the baseline period, ranging from a year to several years, before individuals begin participating in the Project. The Posttest is each subsequent year they continue to participate. The success of the matching service in decreasing the Posttest frequency of single occupant vehicle commuting will be evaluated against the Baseline values for this measure.

There are a number of potential threats to the validity of results obtained with this design. The most serious in a project of this duration is *history*. Over the course of the Project's ten-years, many possible events could intervene to produce CO₂ emission reductions, other than the mode shifts induced by the Project's Web site. The ideal test for this rival hypothesis is a control community similar in as many respects as possible as the region covered by

³ The calculation for determining each client's VMT reduction is based on the following formula: $[(M \times D)] - [(M \times D)](1/P)$, where M = miles driven to and from work, P = number of people in the carpool and D = the number of days/week driven in the car/vanpool.

⁴ The *annual* carbon dioxide emission reduction is based on the following formula: $VMT/MPG (18.67) \times 19.4$ (lbs. CO₂/gal.) \times 252 days = lbs. CO₂/yr divided by 2,205 lbs. per metric ton, where VMT = vehicle miles of travel and MPG = miles per gallon.

CarpoolMatchNW.org, with the exception that it does not have a comparable Web based rideshare service.

An effort will be made to include a control community or group of individuals in evaluating the effects of CarpoolMatchNW.org. Ideally, the controls should come from the same general geographical area as the participants. But given the extensive promotional campaign that is planned for the Project, it is unlikely that a comparable group of *uninformed* individuals can be located in this region. Nor would they likely to be equally motivated to carpool. Had they been so, it is likely they would have learned about the carpool matching service.

In light of these difficulties, it may be more fruitful to seek a control community in other areas of the state, such as Eugene or Medford or in another state that *does not have a web based carpool matching service*. Insofar as possible, the Project participants and controls should also be matched in terms of motivation to carpool, as well availability of non-web based carpool programs. Motivation to carpool could be measured by average number of hours per capita to commute per year and/or by average distance of commute.

Once such an area is identified, it will be important to obtain the same measures for both groups. However, if the control group is in Oregon, this comparison will only be possible during the first year, since it is possible that the matching service will be offered on a statewide basis after the Project's initial year of operation. This constraint suggests it may be more desirable to seek a comparison community outside the State, making it possible to conduct a long-term comparative analysis. Regardless of its location, the task of identifying a true control region will require some degree of methodological ingenuity.

The Interrupted Time-Series Design is an alternative method for evaluating a new policy or practice when a control group is not possible. With this design, the measures used to assess the impact of the program are compared with their value during several years before the program is introduced. For example, the carpool/vanpool measures observed after the current Project is initiated would be compared with their values during the previous 5-10 year period, assuming they can be obtained. A pre-program period of that duration would provide a stable baseline against which to assess both the immediate and long-term effects of CarpoolMatchNW.org. At the same time, it would minimize the influence of an unusual or dramatic event that might have occurred during the year before the Project was launched.

Baseline Measures. In order to determine the overall CO2 emission reductions brought about by CarpoolMatchNW.org, it is necessary have information about the participant's commute behavior *before* they found a ride sharing match. We need to know whether or not a participant had commuted to work alone or in a shared ride and if the latter, the frequency, distance and number of individuals in the shared ride. Each of these baseline measures is shown in Table 2, where both the value and the source of the measure are identified. Because the effects of carpools differ from vanpools, they are distinguished in Table 2.

Originally, we had hoped to obtain the carpool baseline measures from household transportation surveys conducted by Metro and Tri-Met or from United States Census Bureau statistics. Unfortunately, on review, we found each of these data sources inadequate. The information was either incomplete, not

current, or based on population estimates with limited value for this assessment.⁵ Accordingly, we will rely on participant reports of their previous (Baseline) carpool behavior in the Project’s statistical analysis.⁶ (The Table 2 values for the number of individuals in a carpool (2.7) and its round trip distance (14 miles) are shown for illustrative purposes only.) Finally, the vanpool measures shown in Table 2 are based on information provided by VPSI.

Table 2
Baseline Measures⁷

Measure	Value	Source
Carpool Frequency per Week	Variable	Participant Survey
Vanpool Frequency per Week	52 ⁸ trips	VPSI & Enterprise
Number of Individuals in Carpool	2.7	Tri-Met 1999 Survey
Number of Individuals in Vanpool	11	VPSI

⁵ There is reason to believe that the Metro and/or Tri-Met samples may not be representative of potential CarpoolMatchNW.org clients. For example, an analysis of long term clients of RIDES, the Bay Area matching service, found that in general, RIDES clients tended to have longer commutes in both distance and time. They were also less likely to drive alone than the Average Bay Area commuter.

⁶ On the survey to be automatically administered 30 days after Registration, the participants will be asked about their previous (baseline) carpool behavior. Instead of simply classifying individuals as a carpooler or non-carpooler, the survey will generate a quantitative measure of the number of months in the previous year that the participant had carpooled, ranging from 0 to 12 months. (See Appendix B.). This procedure will allow us to distinguish the savings derived from CarpoolMatchNW.org per se from any other carpool program that the participant may have been a member of.

⁷ Two standard measures will be employed during both the Pretest and Posttest. The first is the value of 252 for the number of car/vanpool days per year. The second is the Fleet Average vehicle miles per gallon. For 2000 it is considered to be 19.071 mpg. See Appendix D for a Table of the fleet average miles per gallon estimated for cars, light trucks and vans for each subsequent year of the Project. These estimates were obtained from the Oregon Department of Transportation.

⁸ This value is based on the latest information from VPSI and Enterprise Car Rental. Taken together they operate 26 vanpools in the region, 21 at VPSI and 5 at Enterprise Rental Car. This number will need to be updated with information from these two organizations and other corporate or government agencies that may operate vanpool programs.

Distance of Carpool (Round Trip)	14 miles	Metro 1994 Survey
Distance of Vanpool (Round Trip)	90 miles	
User personal vehicle(s) VMTs	Variable	Registration Survey

It is important to note that each of the baseline measures to be employed in this investigation will be modified in light of additional survey information provided by the participants. Annual adjustments standard measures used in calculating CO2 emissions may also be warranted if major shifts in travel behavior occur as a result of factors such as rising fuel costs or road pricing policies. For example, such an adjustment will be made in the annual fleet average miles per gallon measure employed in this calculation. (See Appendix D and Footnote 7.)

Posttest Measures. Table 3 below lists the two general classes of Posttest Measures of commuter travel behavior. They are distinguished in terms of software generated values and those reported by the participants in response to the Web site surveys automatically administered at 30 and 60 days after registration and at the end of each year.

Table 3
Impact Measures of CarpoolMatchNW.org

<p>Web Site Generated New car/vanpools Number of people in car/vanpool Distance of car/vanpool⁹ Number of avoided commute trips per day/year Number of reduced commute miles per day/year</p> <p>User Survey Responses Reduced personal vehicle(s) VMTs Commute Trip Mode & Frequency Avoided vehicle purchases Disposed personal vehicle</p>
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Note that the measures shown in Table 3 are not based on population estimates or modeling projections, but rather on actual measures of commuting behavior as reported by CarpoolMatchNW.org participants. The same is true for their non-commute, personal travel behavior. It is important that these measures be as factually correct as possible, since they are used to calculate the annual metric tons of CO₂ reduced by the *new* carpools and vanpools formed by the matching service.

⁹ It is important to distinguish the pretest (baseline) from the posttest measure of distance. The distance from the participant's residence to place of work constitutes the *baseline* value for this measure. It will be calculated automatically by the GIS software. In contrast, the *posttest* distance of the car/vanpool route will be reported by the participant in response to the survey automatically administered 30 days after registration. These two values will not be the same, since the baseline distance is likely to be less than the shared ride measure, because the carpool/vanpool will travel additional miles to collect each member. However, the total number of miles per/participant will be less, since only a single vehicle will be used for the trip.

Comparison with Other Programs

The Monitoring and Verification Plan calls for an ongoing comparison of CarpoolMatchNW.org with other Web based ride matching services. As Internet usage increases, it is anticipated that rideshare Web sites will become more numerous throughout the country. Table 4 lists the name, location and Web address of four of the programs that served as models for the current Project.

Table 4
Comparable Carpool Matching Services

Name	Location	URL
Canadian Ride Share	Nationwide in Canada	http://www.carpool.ca
Ride Quest	Redmond, WA	http://www.ridequest.com
Seattle Ride Share Online	Puget Sound	http://rideshareonline.com
RIDES	Bay Area Region	http://www.rides.org

Each of these programs provides potential ridesharers with information about alternatives to single occupant vehicle commute trips, as well as a range of other transportation services. They also distribute a list of individuals who have similar commute routes and schedules. Some have Web based calculators that allow individuals to determine the financial savings derived from a commute mode shift. The Canadian program has also incorporated a CO₂ savings component to their calculator. Communication with the client is by mail, telephone, or e-mail, depending on the client's preference.

A good deal of commute travel data is available from the RIDES Program in the San Francisco Bay Area and the RideQuest Program in Redmond, WA. RIDES conducts an extensive survey each quarter of individuals who contact their program. For example, in the July Quarter of 2000, 75% (16,734) of their clients made a "positive" change in commute mode after receiving at least one of the RIDES's services. In a recent longitudinal study, RIDES also reported that "somewhere between 8% and 13.7%" of the individuals who changed their commute behavior had maintained that mode shift for at least 1.6 years.

Comparable data is beginning to be reported from recent surveys of clients of RideQuest.com in Redmond. According to the presentation slides on their Web site, as of April 2000, there were 592 Active Users of the program, with a match rate of 84%. An analysis of client travel behavior revealed that single occupant vehicle use had declined to 50% from a Pre-RideQuest Level of 69%. Carpool trips per week increased from less than 10% before clients entered the program to more than 30% after they registered with RideQuest. A similar trend was also reported for vanpool placements.

At this time, it appears that RIDES is the only program that measures the emissions and fuel effects of their program. Their calculations are based on the following procedure:¹⁰

- Each month RIDES *estimates* the number of clients placed in a non-single occupant commute mode.
- The number of clients placed in each mode is multiplied by the average number of trips a client makes in that mode during the year.

¹⁰ Based on an e-mail message from Ginna Smith, Associate Planner for RIDES, August 28, 2001.

- These numbers are then multiplied by the average trip distance for each mode which yields the vehicle miles reduced for a full year.
- All of the categories are then added together to find the total vehicle miles reduced.
- Finally, that number is entered into the formula used to calculate the relevant fuel or emission reductions.

Each of these programs, as well as other comparable Web based rideshare programs, will be closely monitored throughout the ten year Project period. Relevant findings from investigations of their effects will be incorporated into the Annual Monitoring and Verification Reports. In addition, adjustments in annual average fleet mpg and average car/vanpool distance will be made in the CarpoolMatchNW.org baseline measures and calculating methodology, should they be suggested by their findings.

Annual Verification Strategies

Goals A multi-method approach will be employed in reviewing and verifying the Project's findings as recorded in the Annual Monitoring and Verification Report. While confirming the accuracy of the carbon dioxide offsets is the primary objective of this yearly review, it also has a number of secondary objectives. They include:

- Determining whether there is a shortfall or surplus in the Project's Target CO₂ offsets
- Insuring internal consistency in the measures (e.g. new carpools, vmt changes, fuel savings) associated with reported CO₂ emission reductions
- Measuring the magnitude of any rebound vmt effect that may be associated with the formation of new carpools

- Comparing the Project's results with the contemporaneous findings of other studies conducted by agencies, such as Metro, Tri-Met and ODEQ
- Assessing the adequacy of the Project's operation in such areas as promotional activities, client satisfaction, data base maintenance and completion rate of online surveys.
- Compiling data on the number of car and vanpools formed by rideshare programs that are not participating in the Project but operate within the Project area.

Specific Methods Several methods will be employed to verify the reported emissions reductions. Each is described, in turn, below:

Accuracy of Reported Offsets. To confirm the accuracy of carbon dioxide offsets, the calculations used to derive the findings reported in the Monitoring and Verification Reports will be carefully checked on an annual basis. The internal logic (assumptions) of these calculations will be reviewed and, should they be warranted, adjustments will be made in the Baseline measures (e.g. Oregon fleet average rate of vehicle miles per gallon) employed in making them.

Target Offsets Verification. To verify whether there is a shortfall or surplus in the Project's Target CO₂ offsets, annual comparisons will be made between the projected offsets and the reported reductions in CO₂ emissions. These values will be used to determine the annual shortfall, surplus or any other metric that is adopted during the course of the Project. The matrix shown in Table 5 represents a model of the comparisons to be made in this process.

Table 5
Annual CO₂ Offset Assessment

Year	Annual Target	Actual Offsets	Shortfall	Surplus
2002	2,000			
2003	4,500			
2004	7,500			
2005	8,000			
2006	8,000			
2007	8,000			
2008	8,000			
2009	8,000			
2010	8,000			
2011	8,000			

Consistency of Measures. Year-to-year trends will be analyzed to monitor the degree of consistency among the inter-correlated measures that are responsible for the reduction in CO₂ emissions. A family of curves will be plotted on an annual basis to compare each of the components that go into the determination of CO₂ offsets. As shown in the spreadsheet shown in Appendix E, this includes each of the factors shown in Table 6.

Table 6
Components of CO₂ Offset Calculations

Vanpools	Carpools
New vanpools	New carpool trips
Passengers not driving	Passengers not driving
Miles not driven per day	Miles not driven per day
Total mileage reduction per year	Total mileage reduction per year
Total gallons of gas saved per year	Total gallons of gas saved per year
Total annual CO ₂ reductions	Total annual CO ₂ reductions

Supporting evidence for the internal consistency of these measures will also be obtained from the online surveys administered to all active clients when they register and 30 and 60 days later, as well as at the end of each year. The Registration and Annual Surveys are especially important in this regard, since they will monitor the overall change in the total vehicle miles of travel for each of the personal vehicles used by the client and his or her family.

Consistency will be present if an annual reduction in commuting vehicle miles of travel is positively correlated with a comparable reduction in all personal vehicle miles of travel. At the very least, the rideshare project should *not* give rise to an increase in this measure. Such an increase would indicate the program is inducing a rebound effect in so far as the miles not driven as a result of the Project are compensated for, in some way, by the increasing use of personal vehicles. In turn, depending on its magnitude, such snapback evidence would require an adjustment in the CO₂ emission reduction benefits claimed by the

Project. Additional techniques to assess potential snapback effects will be described in the next section of the Plan.

Project Operation. To monitor the operational components of CarpoolMatchNW.org a detailed examination of its success in matching clients and their satisfaction with the received matchlists will be undertaken on an annual basis. The completion rate of the online surveys will also be closely monitored during each year. A low completion rate may make it necessary to incorporate an incentive program or telephone survey format to obtain the requested information.

In addition, following a procedure¹¹ suggested by the RIDES program, a matching index will be created that tracks the success rate of matchlists from a representative sample of commuters segregated by region, destination, and demographic profiles. The RIDES matching list index is designed to monitor the success of its database in matching clients drawn from a cross-section of geographic locations in the Bay Area. The index is derived from a sample of RIDES' clients who are judged to be representative of the larger database. Each month, RIDES tracks their database for the origins and destinations of high-, medium-, and low-density geographical areas served by the program.

Their model includes nine destinations (three high-density, three medium density, and three low-density geographical areas). For each destination, RIDES selects a corresponding point of origin of high-, medium, and low-density. In addition, the effectiveness of the systems matching procedures is assumed to vary as a function of the motivation level of clients. Client motivation is assessed primarily by the following question on the Annual Client Survey: On a scale of

¹¹ RIDES' Database Monitoring Report, April 2001.

one to ten, one for not important at all and ten for very important, how important is car or vanpooling to you? The most recent RIDES Client Survey results (May 2001) indicate that clients who were identified as having a higher level of motivation had a placement rate of 37.9% which was significantly greater than the 29% placement rate of those clients identified with lower motivation levels.

Adjustment in Measures. Finally, updating baseline measures derived from US Census, Metro, Tri-Met and State agencies will constitute an important part of the annual verification process. In the light of this evidence, adjustments may be required in the methods employed to calculate the annual CO₂ offsets. It may also suggest modifications in the surveys automatically administered on the CarpoolMatchNW.org Web site.

Small Sample Verification Techniques

The previous methods of reviewing and verifying the results of the Project have drawn upon data from *all* of the active participants registered at CarpoolMatchNW.org. Three additional studies with a smaller sample of participants will play an important, supplementary role in the monitoring and verification process. These studies are designed primarily to probe, in-depth, the impact of the Project on the user's vehicle miles of travel and provide a further test of its impact on CO₂ emissions. The following techniques could be employed:

- Random Sample Telephone Survey
- Modified Trip-Diary Record
- Focus Group Analysis

Telephone survey. A follow-up telephone survey will be conducted to confirm the findings collected from participant responses to the software generated online surveys and to provide an independent measure of the vehicle miles traveled and CO₂ emission reductions reported in the Annual Monitoring and Verification Report.

A random sample of active matchlist clients will be contacted at the end of each year. The size of the CarpoolMatchNW.org client pool will determine the sample size. Every effort will be made to collect a statistically reliable sample (5-15% of the participants) with an error margin of 5% and a 95% confidence factor. The survey will be administered by telephone in order to maximize its completion rate. Project partners Tri-Met and C-Tran may assist in data collection.

The survey will seek information on the following representative topics:

- Number of successful van/carpool matchlist placements
- Past and current commute mode and duration of Project-induced mode change
- Past and current commute vehicle miles of travel (vmt)
- Past and current commute distance
- Total vehicle miles of travel (vmt) of all personal vehicles before and after registration
- Motivation to seek a rideshare match on CarpoolMatchNW.org
- Overall satisfaction with CarpoolMatchNW.org service
- Recommendations for improvement

Trip Diary Study. During the first year and subsequent years as required, a modified trip diary technique will be employed as a further check on any potential rebound effect induced by a shift from single occupant vehicle commuting to a carpool or vanpool mode. It is important to insure that such a

shift does not induce a compensatory increase in the client's personal vehicle miles of travel. This would occur, for example, if previous solo commuting normally included additional personal trips that are no longer possible once the participant has switched to a rideshare commute.

In this test, a random sample of 50 clients will be asked to respond to a pair of telephone requests to report the odometer readings of their personal vehicles. The requests, one at the beginning of the week and one at the end, will be made on two separate occasions, separated by approximately one year. The first pair will be made immediately following the client's registration, before they have been able to find a suitable match. The same pair of requests will be made one year later, provided they have been active participants in a rideshare group during this period. Project partners Tri-Met and C-Tran may also assist in collecting data for this study.

In this way we will have a before and after measure of the degree to which a change in commute mode led to a snapback or rebound effect. While it is relatively unlikely that shared commuting will lead to this sort of "leakage," it is of sufficient concern to obtain as much evidence as possible that conclusively rules it out as a potential threat to the CO₂ reduction benefits of the Project.

Focus Group Analysis. If the Project experiences operational problems, it may be desirable to employ focus group research techniques to examine its procedures in a more systematic fashion. First-hand accounts from a small sample of representative clients in a focus group setting are likely to be most useful during the early years of the Project and only if it is not running smoothly.

Approximately 2-3 focus groups at the end of the first two years and, intermittently thereafter as needed, should be sufficient to obtain the maximum benefits from this approach. A quota of participants will be prescreened to represent the larger population of CarpoolMatch.NW.org clients. They will be asked to engage in a small group discussion about the Project and given a modest stipend for their participation. Usually ten individuals per group are sufficient to achieve the information sought by this non-judgmental open-ended discussion.

Evidence from a small number of focus groups will also provide insights about the attitudes and motivations of the clients. By offering an open forum for them to discuss CarpoolMatchNW.org, as well as their own ride share experience, a focus group analysis should point the way toward improving its operations and/or eliminating problems that might have developed during its early stages. They will also serve as an additional, cost effective method to check for possible snapback effects and, should they be reported, the reasons for their occurrence.

III. Annual Report Outline

Within sixty (60) days following each anniversary of the Commercial Operation Date of CarpoolMatchNW.org, the City of Portland Office of Transportation will submit a Monitoring and Verification Report. This Report will be reviewed and verified by an independent third party. The following outline lists the items of information to be provided in this Report:

- Annual target tracking in metric tons of CO₂ offsets
- Number of CarpoolMatchNW. matches
- Annual and cumulative VMT, fuel and CO₂ emissions reductions
- Adjustments in baseline measures based on changing trends in commuting patterns, updated survey, including census, data and standard measures such as Oregon fleet average rate of mpg

- Results of independent research studies including small sample surveys, focus groups and trip diary data, results of annual review of carpool matching Web sites
 - Effects of Project promotion campaign
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- Results of database monitoring procedures
 - Number of processed information requests
 - Results of special project related special events
 - Project outcome comparisons with results of other transportation surveys, such as those conducted by Metro, Tri-Met, or ODOT
 - Program modifications including changes in Web site, survey techniques, and marketing strategies, as well as improved methods for tracking transportation mode shifts and snapback effects.