

National Parks  
Transportation Alternatives and  
Advanced Technology for the 21<sup>st</sup> Century

Conference Proceedings

June 3-5, 1999  
Big Sky Ski and Summer Resort  
Big Sky, Montana

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## List of Abbreviations

ADA	Americans with Disabilities Act
AFV	Alternative Fuel Vehicle
ATP	Alternative Transportation Planning Program
AVL	Automatic vehicle location
BLM	Bureau of Land Management
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CMAQ	Congestion Mitigation and Air Quality
CMS	Changeable Message Sign
CNG	Compressed Natural Gas
CO	Carbon Monoxide
DOE	Department of Energy
DOI	Department of the Interior
DOT	Department of Transportation
ECU	Electronic Control Unit
EPA	Environmental Protection Agency
EPACT	Energy Policy Act
FH	Forest Highway
FHWA	Federal Highway Administration
FLHP	Federal Lands Highway Program
FTA	Federal Transit Administration
GMP	General Management Plan
GPRA	Government Performance and Results Act
GSA	General Services Administration
GVW	Gross Vehicle Weight
HAR	Highway Advisory Radio
HC	Hydrocarbons
ILEV	Inherently Low Emissions Vehicle
IRR	Indian Reservation Roads
ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation Systems
LEV	Low-Emissions Vehicle
LNG	Liquefied Natural Gas
LPG	Liquid Propane Gas
MOU	Memorandum of Understanding
MPO	Metropolitan Planning Organization
MTBE	Methyl Tertiary-Butyl Ether
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Protection Act
NLEV	National Low-Emission Vehicle
NOx	Nitrous Oxides
NPS	National Park Service
OEM	Original Equipment Manufacturer
OPEC	Organization of Petroleum Exporting Countries
OST	Office of the Secretary of Transportation
PNGV	Partnership for a New Generation of Vehicles
PLH	Public Lands Highways
PRP	Park Roads and Parkways
PRVs	Personal Recreational Vehicles

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RFG	Re-Formulated Gasoline
RFI	Request for Information
RFP	Request for Proposals
RTAC	Regional Transportation Advisory Committees
SAE	Society for Automotive Engineers
SCAQMD	South Coast Air Quality Management District
SILRP	Statewide Intermodal Long-Range Plan
SPR	State Planning and Research
STAA	Surface Transportation Assistance Act
STIP	Statewide Transportation Improvement Program
STP	Surface Transportation Program
TEA-21	Transportation Equity Act for the 21 <sup>st</sup> Century
TIP	Transportation Improvement Program
ULEV	Ultra-Low Emissions Vehicle
UPWP	Unified Planning Work Programs
VOC	Volatile Organic Compounds
VTS	Visitor Transportation System
WTI	Western Transportation Institute
YARTS	Yosemite Area Regional Transportation Strategy
YATI	Yosemite Area Traveler Information (System)
ZEV	Zero-Emission Vehicle

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## Conference Overview

*Chris Strong*

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*Western Transportation Institute, Montana State University – Bozeman*

The impact of our National Park Service (NPS) on regional economies and their transportation systems should not be underestimated. In order to provide a framework on the impact of the NPS consider the following NPS statistics:

- Scale – 374 parks in 49 states, 18 million acres;
- Employees – 19,200;
- Economic activity – \$14 billion, supporting 309,000 jobs; and
- Visitation – 266 million visitors, demand increasing 500 percent over the next 40 years.

With a broad impact and visitation on the increase, the NPS is under extreme pressure to provide increased services with fewer resources, while simultaneously trying to provide stewardship for an environment they are entrusted to protect for future generations. As our National Parks' become increasingly "loved to death," it is apparent that respective transportation systems and associated services are a critical issue.

For this reason, the Western Transportation Institute at Montana State University – Bozeman (WTI), in conjunction with several other organizations, hosted a conference on "National Parks: Transportation Alternatives and Advanced Technology for the 21<sup>st</sup> Century" at Big Sky, Montana on June 3-5, 1999. The purpose of the conference was to exchange ideas between potential partners on the use of advanced transportation technologies that might address the transportation challenges that face the increasingly popular National Parks. The intent was that through the issues and opportunities presented by stakeholders present at the conference that a vision for the future would be developed.

The workshop, co-sponsored with the NPS, the U.S. Department of Transportation, the Federal Transit Administration, the Federal Highway Administration, the U.S. Department of Energy,

Intelligent Transportation Systems (ITS) America, the California Department of Transportation and the American Public Transit Association, had approximately 200 attendees. Those in attendance represented a variety of backgrounds, including federal and state transportation organizations, about forty NPS staff representing fifteen national parks, state tourism agencies, DOE and alternative fuels experts, and many others. Nearly twenty vendors, including GM, Ford, Honda and Kenworth, provided prototypes of innovative technologies, including several alternative-fuel vehicles technologies (including dragsters, buses and pick-up trucks) and ITS technologies.

At the heart of the conference was a series of technical sessions with breakout discussion groups at which ideas and experiences could be shared across the many disciplines that were represented at the conference. Tracks focused on the following themes:

- Regional Transportation Planning and Coordination. The goal of this track was to document local, state and regional planning processes for transportation improvements, and to demonstrate how partnering will achieve mutual missions to achieve a seamless transportation system.
- Traffic and Demand Management Alternatives. Discussion focused on how to provide technology transfer of traffic management alternatives used elsewhere to National Parks, gateway communities and regional transportation system settings and how to gain a better understanding of the needs and issues.
- Transit Alternatives: Shuttles to Light Rail Service. This session sought to provide for increased understanding of the mobility and accessibility issues within and surrounding National Parks, and to discuss potential alternative technologies.

- Traveler and Visitor Information Needs. The purpose of this track was to document perspectives on: what are visitor needs, where visitors want information, how visitors want information delivered, their potential willingness-to-pay, and the technologies and alternatives for providing traveler information.
- Alternative Fuels Panel. This panel focused on how alternative fuel vehicles can be better integrated into the National Parks, by reviewing various vehicle, engine and fuel technology options, and identifying the challenges and barriers to their application.

The discussion groups for each track examined challenges and needs in their respective areas, and identified opportunities for future applications and research. These were presented at the last day of the conference, and provided attendees the opportunity to see how all the pieces may fit together.

This document includes presentations made at the plenary and general sessions, along with summaries from each of the track's workshops.



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## Opening Session

### Welcoming Remarks

*Steve Albert*

*Director*

*Western Transportation Institute, Montana State University – Bozeman*

Welcome to Montana and the Big Sky State. My name is Steve Albert, and I am the director of the Western Transportation Institute (WTI) at Montana State University, your conference host and sponsor. I would like to welcome you to Montana.

I'd like to thank the other sponsors who have helped put this together: the National Park Service, the U.S. Department of Transportation, the Federal Transit Administration, Federal Highway Administration, U.S. Department of Energy, ITS America, California Department of Transportation, and the American Public Transit Association.

This conference was initiated really around two years ago, and it's taken a long time to get together. But it's finally here. It really started as a result of WTI's efforts in five different states – Wyoming, Montana, Idaho, California and Oregon – where we really began to see that there was a huge disconnect between the National Parks, the gateway communities, the state Departments of Transportation and the tourism organizations, to providing regional transportation solutions that are seamless between them. As travelers come into those states and the national parks, they do not care about the institutions; what they want is a seamless set of transportation systems, services and information. What we began to see was that National Parks tended to be treated like an island in a body of water, but it did not consider the body of water around it, or the connections between that body of water and the island.

As such, what we thought of, while working with our partners that I named earlier, was to have a conference to exchange information and provide lessons learned between those institutions so that we can provide more seamless transportation services. As you can see by the tracks that we have, we are really focusing very distinctly on

specific issues in regional planning, traffic and demand management, transit alternatives, traveler and visitor information needs, and alternative fuels, to look at a well-rounded approach to transportation, and to also look at synergistic needs between those individual elements.

The conference that we're having here, I believe, is not a typical conference. We do not want a lot of talking heads up here, providing one-way communication; we want dialogue. So when you hear speakers talk, one of the things you may want to consider is what questions do I want to ask later on. In the technical sessions that we will be having in those five tracks, there will be presenters, but then the presenters will then get out from behind the podium, and we're going to have breakout groups. And in those breakout groups, you will be asking specific questions to address specific needs. So it's very important that you hear what the presenters say, and say, "What issues does that mean to me as a park, as a tourism organization, as a state department of transportation, or as an alternative fuel vendor or provider?" Keep those things in mind when we're having these presentations, so that you can bring that information back to the breakout groups, and we can have meaningful dialogue.

All the dialogue here today and tomorrow will be documented in a report that will help direct future research needs for these specific areas. It is being coordinated with the Transportation Research Board Task Force on the Transportation Needs of National Parks and Public Lands. It will assist in looking at future research needs for these areas. So we will not only just be talking, but we will also be documenting and developing an action plan for the future.

The conference has approximately 200 people here today, so I think we have a fairly good cross-section of individuals. We would also like you to not only talk amongst yourselves, but talk

to the vendors and the suppliers that you see around the room here. They have gone out of their way to come to this conference to provide

you with information. And not only in this room, but there is also an outdoor exhibit.

## **Parks Perspective**

*Marvin Jensen*  
*Assistant Superintendent*  
*Yellowstone National Park*

Good morning everyone and welcome to the Greater Yellowstone area on behalf of Superintendent Finley who couldn't be here, and myself and the park staff. Superintendent Finley is off to Italy, helping other parks in the world with their park management and protection programs.

I'd like to talk just briefly about Yellowstone and our interests and where it fits into transportation systems in working within this particular partnership that we've developed. Yellowstone, as probably many of you know, was the first park in the system, established in 1872. It consists of 2.2 million acres. Yellowstone was established first to protect geologic features; later it was modified to address wildlife in the park. At the same time, because of limited staff back in the early 1800s, the Park Service was authorized to request the military assistance to manage the park and protect these resources, particularly to deal with poaching that was rampant at the time. So the Cavalry came in about 1886, and was there for about thirty years, until 1916, when the Park Service was established. The Cavalry did a lot of good work towards protecting the park and its resources. They also built roads, facilities, and buildings, and they built the headquarters area at what was originally Fort Yellowstone back then, that we occupy today as our headquarters.

We just two years ago celebrated our 125<sup>th</sup> anniversary. We've reflected back on the 125 years and the things that have happened and focused on where do we go from here. One of the primary focuses is the area of how we work with and better provide for the increasing numbers of

visitors that we have in the park while protecting park resources and values. We want visitors to come away from their visit to the park saying it was safe, it was enjoyable, and that they come away feeling more than just having been there.

Yellowstone is an immense place in a lot of different respects. It has 2.2 million acres, but its abundance and diversity of life forms are phenomenal. We think it's the most powerful exhibition of those kinds of things in the lower 48 states. And we're always learning some new things. Recently you may have seen some of the press coverage on things that we're finding in our thermal pools, the hot springs, the geysers. We're learning now that there may be a greater diversity of life forms in those thermals than exist in the terrestrial parts of the park.

There are a lot of issues: you'll see us on the front page above the fold on the Bozeman Chronicle again today. There are issues with bison, wolves, bears, roads and potholes. There are a lot of things to do to bring our roads up to standard, and things that will help visitors enjoy their experience.

The order of magnitude of interest in Yellowstone is tremendous as well. It's interesting that we closed a campground a couple of years ago, and that got on coast-to-coast TV. Are we the only ones who have ever closed a campground? We found out that a number of other parks—Glacier, Grand Tetons, Yosemite, and Great Smokies—that they closed campgrounds and they barely got media attention. Yellowstone is a

place of great interest not only to the people of this country, but around the world as well. The bison environmental impact statement had written 67,000 letters or pieces of comment. So there's a tremendous interest: no matter what we do people are very interested in what happens at Yellowstone.

Those kinds of issues are the things that bring people to the park in tremendous numbers – 3.2 million visitors last year. Those are the reasons why we're very interested in what we can get from this forum, toward better ways of managing

the flow of traffic, providing information at convenient points. We're very excited about this conference. We feel that the partnership of different educational and government entities is very important to our continuing efforts to provide Yellowstone's visitors the highest quality park experience possible in the most efficient way and at the same time integrating programs to protect park resources and values. We look forward to the exchange of information at this conference toward these goals and to our continuing working relationship.

## **Federal Perspective**

*Helen Knoll*

*Regional Administrator*

*Federal Transit Administration – Seattle Office*

Good morning. I'd like to welcome you on behalf of the Federal Transit Administration (FTA), and I would like to thank our hosts, the Western Transportation Institute for bringing us to this wonderful place. And I would also like to thank our hosts from the National Park Service, especially for our tour of Yellowstone the other day.

I want to talk this morning a little bit about who and what the FTA is, because the Federal Transit Administration is actually a very low-profile organization, and a lot of people don't know what we do and don't understand our mission. And I'd like to talk about how our mission and the mission or mandate of the National Park Service converge, how we can work synergistically, as Steve had said this morning, to help make things happen to improve the transportation system in the Parks.

I'd like to talk to you about what FTA is, because you see we're very low profile. We have fewer than 500 employees nationwide, but we do have a lot of money to give away. Under the terms of the Transportation Equity Act for the 21<sup>st</sup>

Century (TEA-21), we have potentially up to \$6 billion a year to give away for use on mass transit purposes. That includes projects that are planning, that are active transit operations or special capital needs, like buses, rail cars, and ferry boats.

Eligible recipients of our funds are the states, funding agencies, transit operators, but typically not another federal agency, like the National Park Service. We do have some special groups of funds that we can use to improve operations in the Parks, but it's going to be necessary for the Parks to find other partners who want to sponsor a project with the park. We will be encouraging all of the managers of federal lands, not just the National Parks, but hopefully the Bureau of Land Management and Fish and Wildlife, to partner with local agencies in the area so that they can get some FTA money. We also have funds for research and development efforts.

I want to quote the mandate of the National Park Service to you, and have you hold that in mind while I talk about the mission statement of the Federal Transit Administration, so you can see

how those two fit together. The mandate of the National Park Service is “to preserve and protect for future generations, while providing for the enjoyment of the people.” Our mission statement is that we are “people moving people into America’s future.” What does that mean? It means we’re very much focused on the future of America. We believe that transit, of course, is the savior of America; we’ve always believed that. You have problems? Come to us, we have the answers. We’ve been waiting for America to come to us for I don’t know how long. We’re still here; we’re still ready. We do believe that if America is going to solve its transportation problems, it’s going to have to turn increasingly to transit. This is true in the Parks. The Parks have had a very successful program for road building under the Federal Lands offices of the Federal Highway Administration. But we’ve seen in our tour of Yellowstone just the other day, that that program still has a way to go – there are still maintenance needs, there are still realignment and redesign needs. And there’s an increasing inability of the capacity of the facilities to serve the visitors of the park, to move them around efficiently and get them where they want to go, while still preserving the resources.

We are also very focused on people: “people moving people.” Transit is first of all for people who cannot drive for one reason or another: the very poor, the very elderly, the disabled, people who can’t afford automobiles. But we also serve people who choose not to drive for one reason or another. Perhaps we can encourage people to choose not to drive into the Parks as well.

People in the FTA very much believe we are working for the benefit of the environment. We believe that in an urban environment if we can lure people out of their automobiles, we will be making our communities more livable, by avoiding traffic congestion, by avoiding pollution. We want to rationalize land-use planning, so that we can begin to limit sprawl, and keep people in more compact areas.

And also at the FTA, we are technicians and we are builders. We really groove on esoteric things like transportation modeling and air quality modeling. We like to know the ins and outs of

the whole of transit operations. We like building things, new kinds of vehicles with the latest technology. We like things like innovative financing. We like things like intelligent transportation. So we are innovators, we are technicians who like to move forward and do better. We like to see exciting things happen, like alternative fuels. We believe that is part of the solution to meeting America’s transportation needs.

So I think you can see how “people moving people into America’s future” is a fit with serving people and helping them to enjoy the Parks while protecting the natural resources. There’s really a synergistic approach in both of our missions.

We would like to work together; we have natural symbiosis. But what are we actually doing to work together? What concrete steps are we taking to work with the managers of the federal lands? First of all, we have a Memorandum of Understanding between the Department of Transportation and the Department of the Interior. Our secretaries signed it back in 1997. It was in recognition that, as successful as we’ve been with the urban program, we need to now have alternative transportation in our federal lands. When you hear that term “alternative transportation,” you should read it as “transit.” Under this Memorandum of Understanding that we have to examine alternative transportation systems, we are providing technical assistance, training, and site-specific assistance at five demonstration parks: Acadia, Zion, Golden Gate, Yosemite, and the Grand Canyon.

- At Acadia, one of the concrete things that we’ve done is that we’ve provided what we call Congestion Mitigation and Air Quality (CMAQ) money, to provide eight propane-powered buses that were recently placed into service. And again, talking about partnering, what really took place was the gateway communities being bought into the project.
- At Zion, we’ve provided assistance in implementing a proposed shuttle service. There’s now a request for proposal ready to go out.

- At Golden Gate, we've involved the National Park Service in the local planning process, to provide transportation in the Presidio area.
- In Yosemite, there's a Department of Transportation staff person who has been placed on a two-year detail to assist in developing and implementing a new valley transportation system.
- At Grand Canyon, we're providing technical assistance in advancing proposals for a light rail / bus system.

In non-demo parks, we certainly can do and are doing projects, through our regular grant program. For example, at Denali, we are now funding the Alaskan Railroad who wanted to put in a new station.

Another interesting thing that we're doing is that we have \$1 million for an intelligent transportation demonstration project in a National Park. And we have proposals from Zion, Acadia and Yosemite.

There are also \$1.2 million of DOT funds that are used to commission a study on alternative transportation needs on federal lands. It's a very comprehensive study. The team that we commissioned will actually visit more than seventy sites. This will be beneficial to the National Park Service, to the Bureau of Land Management (BLM), and to the Fish and Wildlife Service. Their tasks are:

- to study the alternative transportation needs;
- to perform a survey of available transportation technology that would be suitable;
- to identify potential funding, both public and private; and
- to suggest various structures or programs that will be set up in various federal agencies to consider alternative transportation or deal with these issues on an on-going basis.

This study will be completed by June 2000.

These are some of the things we can do and are doing to promote alternative transportation in the National Parks. There are some things we can't do. Unlike the Federal Highway Administration, FTA has only limited authority in funding projects directly in the National Parks. We need to encourage everybody to take part in the local planning process, to make your needs known, to work with the gateway communities, work with the states to try to implement the projects that you would like to see happen in National Parks.

Transit is not a one-size-fits-all solution to all of America's ills. You really need to look at what are the needs in your particular park that you're responsible for. We recognize that transit is only one tool for addressing the transportation problems. But transit could be used to supplement and to shift automobile traffic.

We would like to see the projects that you are implementing be examples of the very best that transit can do. We have a wonderful opportunity to showcase transit technologies in the Parks, to show visitors what transit can do not just in the Parks, but also back home. When folks go to Disneyworld and see that monorail, you know that when they get home that's what they want for their town. You can see how powerful that is. When people are on recreational trips, they may take a form of transportation that they don't normally take back home. We can introduce them to it. We can introduce them to things like alternative fuels and show them how they can work better. If we can provide the traffic and transportation alternatives in our parks, we can all be "people moving people into America's future." We can provide for the enjoyment of the people in the Park, while preserving the natural environment.

## Energy Perspective

*Thomas J. Gross*

*Deputy Assistant Secretary*

*U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, Office of Transportation Technologies*

Good morning everybody. I'd like to add my welcome as a co-sponsor for this conference, and to say how pleased we are, as the Department of Energy, to sponsor this sort of session. We think it's immensely important to get people who are making a difference together to share their experiences, and to talk about where we need to go.

I've got to come clean with my real motivation for coming here. I'm really here to meet someone who works at a National Park and wants to trade places. So raise your hand if you work at a National Park and want to go to Washington for a summer. Seriously, I appreciate the opportunity to spend the day here in this special place.

I'd like to talk briefly about the challenges that get us at the Department of Energy excited about going to work – challenges we're trying to do something about.

- Growing petroleum consumption. Because of the burgeoning demand for transporting people and goods, the demand for petroleum has grown steadily throughout the 1900s, and particularly in the 1990s worldwide. We use 5,800 gallons of petroleum every second for transportation in the United States. This summer I suspect that much of that 5,800 gallons is going to be spent near or inside places like Yellowstone National Park, Rocky Mountain National Park, the Grand Canyon, and other parks around the country. Demand for petroleum worldwide is around 77 million barrels per day, up from 67 million barrels per day in 1993, for an annual growth rate of about 2 percent.
- Urban pollution. Vehicle-miles of travel continue to increase around the world, and urban pollution is becoming more and more serious. In places like Bangkok and Mexico City, millions of people are being affected

health-wise. In our country, while we're in a better situation because we've been paying attention to it for a while, we still have a lot of work ahead.

- Global climate change. Concentrations of carbon dioxide are 50 percent higher today than pre-industrial levels.

Our situation in the United States is a harbinger for what's going to be taking place in the world. Domestic oil production is declining as petroleum use is steadily rising, largely because of the popularity of light trucks, vans, and sport utility vehicles. Because of the increased usage of light and heavy trucks, the average fuel efficiency for cars and trucks combined has been going down since 1987. We now consume more petroleum for transportation than we produce. A few years ago we passed the breakpoint, and the gap is now increasing. The increasing consumption in petroleum comes at a price. In 1995, the U.S. spent \$45.8 billion for oil that we got from somewhere else. The Energy Information Administration predicts that the annual cost will grow to \$95 billion by the year 2020.

Despite improvements in reducing vehicle emissions in recent years, the increase in the number of drivers and vehicles presents a major challenge. The Environmental Protection Agency (EPA) estimates that more than 100 million people in our country live in areas which are not meeting the National Ambient Air Quality Standards (NAAQS). A lot of the National Parks are adjacent to non-attainment areas. For example, in Shenandoah Park in Virginia, the haze that is there now wasn't there a few years back. This is challenging us to respond quickly.

A growing number of scientists believe that the increases in carbon dioxide emissions over the last thirty years have led to increases in global temperatures. The concentrations of carbon

dioxide are 32 percent higher than they were just 150 years ago. So the Kyoto Agreement was hammered out in December 1997, which set the goal of reducing greenhouse emissions to 7 percent below 1990 levels by 2008-2012. In our country, transportation accounts for about one-third of these emissions, and it is the fastest growing contributor. Vehicles in our country now produce 460 million tons of emissions, which is projected in 2020 to be 690 million tons. So the projections and the goal diverge very dramatically. Getting even 100 million tons of reduction in transportation relative to projected emissions is going to take some very dramatic increases in vehicle fuel economy.

There have been some changes in our driving habits that have contributed to increased oil consumption. Low petroleum prices have made our own situation pretty comfortable and non-threatening. Petroleum prices are so low that fuel economy is becoming a less important factor in vehicle purchase decisions. In the 1970s, fuel economy was ranked as the second most important factor in the decision; now it's ranked fifteenth out of sixteen factors, behind things like interior styling.

What's going to happen in the future? The number of worldwide automobile and truck registrations is expected to grow tremendously. In industrial countries, the number will double between now and 2050 to a little more than 1 billion vehicles. But in the developing countries, it's a lot more dramatic. The 670 million vehicles in the world now could increase to 3.5 billion vehicles by the year 2050.

We've got energy security issues. The estimated world oil resources are 1,614 billion barrels, according to the U.S. Geological Survey. With projected demand growth worldwide, we will use half of that by 2018. Most of the world oil resources are consolidating in Organization of Petroleum Exporting Countries (OPEC) nations. They currently have 78 percent of the world's oil reserves, but only 8 percent of world consumption. The U.S. and the rest of the world consume far more oil than they have in reserves or in production.

One solution to that is to increase our usage of alternative fuels. Fortunately, the availability of alternative fuels and advanced technology vehicles is increasing. Pickups and vans can use compressed natural gas, propane, and ethanol as well as running on electricity, and these technologies are spreading to cars as well. Hybrid vehicles, such as the Honda VV and Toyota Prius, are coming on the market soon, and fuel cell vehicles may not be far away.

I'd like to talk to you about a memorandum of understanding (MOU) signed between the Department of the Interior and the Department of Energy in April of this year at the Presidio. The MOU is for Green Energy Parks, and it states a combined goal "to rigorously promote the use of energy efficient and renewable energy technologies and practices in our National Parks, and to educate the visiting public about these efforts." Our office is providing about \$500,000 to push alternative fuel projects in the Parks. We have proposals submitted that are now being reviewed by staff at the Department of Energy on topics such as vehicle acquisition, infrastructure development, demonstration, planning/coordination, outreach and evaluation.

One source of the funds from our office is the Regional Biomass Energy Program. The goal is to increase the production and use of biomass for energy by providing information and technical/financial assistance, and mitigating commercialization barriers. The focus is to create regional markets for biofuels (including ethanol and biodiesel) using local biomass resources. We've been supporting, since 1994, projects in the parks, including "Truck-in-the-Park" and "Snowmobile-in-the-Park." And from the Regional Biomass Energy Program, we're continuing to fund a portion of that \$500,000 for renewable fuel projects in Green Energy Parks. For those of you who want to use biodiesel in fleets that are covered by the Energy Policy Act, you can now use that in your trucks and get credits to satisfy your alternative fuel vehicle requirement.

Our other source for a portion of these funds is the Clean Cities Program. The goal of this program is to expand the use of alternatives to

gasoline and diesel through locally based government and industry partnerships. The focus is to support local decision-making to reflect local and regional situations. We have seventy coalitions designated throughout the country with many stakeholders involved in this program who are committed to alternative fuel vehicles, as well as acquisition and use of infrastructure. Rocky Mountain National Park is the first “clean park” designated under this line item.

In conclusion:

- In oil displacement and preservation of the environment, federal agency leadership is vital. We need less time spent on executive orders and more time on bosses forcing the

issue to make sure federal agencies meet the requirements.

- There are some leaders in some of the National Parks who can provide more support for federal leadership. The National Parks are an ideal venue for clean and efficient vehicles.
- The Green Energy Parks program provides a great opportunity for collaboration. The DOE is more convinced than ever about working with the National Park Service to deploy some technologies that we’re excited about.



## Overview of NPS Challenges

### Great Smoky Mountains National Park

*Shawn Bengel*

*Planner*

*Great Smoky Mountains National Park*

The Smokies are truly on the ground floor regarding the transportation issue. Unlike Grand Canyon, Zion and some of the other parks (which are in an implementation mode), we have just begun articulating our issues. Most of our energies so far have been focused on trying to bring some visibility to the issue, and we've spent quite a bit of time trying to identify many of the partners that we feel to be important to our success. And of course, we're trying to make sure that we can compete for transportation planning dollars. So my part of the presentation is going to be more geared toward planning needs or challenges rather than implementation strategies.

A few months ago we put together a PowerPoint presentation on the transportation issues specific to the Smokies. We did that partly as a marketing tool to spark dialogue with many of our partners, particularly the leadership of our gateway communities. Even though the first slide reads "transportation," one of the things that we are trying to do is not to specifically talk transportation but to talk about access. In our minds, access is the real issue. While congestion and overflow parking areas certainly are byproducts of providing access, by selling it in this way, it allows us to tie back to our mission of protecting resources, and providing access to those resources. In the public's mind, I think, the discussion about access to park resources maybe a little bit more meaningful than any discussion about congestion without that context.

Visitation in the 1940s was about 1.3 million as the Smokies became the most visited national park in the system. Visitation grew until the 1980s, slid a bit in 1990, and grew to about 10 million visitors by 1998. There are three major entrances into the park: Gatlinburg and Townsend on the Tennessee side of the Park, and Cherokee on the North Carolina side of the Park. It's important to note that all three of those major entrances receive between 2 and 3 million

visitors each year. All the major routes in the park during peak season (when the fall colors begin turning) are at a level of service F.

The most congested area in the Park is Cades Cove, located at the western part of the Park. In 1976, the annual vehicle count was around 100,000, and today we have close to 800,000. What that means is that we've had about an eight-fold increase in traffic. Total visitation at Cades Cove is around 2 million per year.

What about our gateway communities? I think the relationship that we have with our gateway community is almost symbiotic. Unlike many of the western parks, there are no visitor services provided in the Smokies. Park visitors totally rely on those services being provided by our gateway communities. In addition to that, some of our gateway communities, such as Gatlinburg and Cherokee, have been so successful in marketing themselves they have become vacation destinations in their own right. They have a constituency of visitors that never set foot in the Park. A lot of the congestion in our gateway communities really rivals that of the Park and in some cases surpasses it. The response to the congestion by many of the communities, and logically so, is to make road improvements. In many cases this has resulted in a two-lane road being improved to a four-lane or even a six-lane road, which many times results in a bottleneck at the Park boundary.

Well, why don't we build more roads and larger parking areas? We're glad to hear the question, because it provides us with an opportunity to explain why that's not appropriate in a National Park. We go through the environmental consequences and the potential for destroying the very thing we are mandated to protect. We also, in that same venue, talk about the purpose of Park roads being different than most roads. Park roads are for more than providing a means of convenient

transportation; rather they're intended to showcase the Park's resources. The point, of course, is that local transportation issues are really a regional problem, and without a major partnership with our gateway communities we will not be successful. I think our gateway communities feel the same way. They understand that road improvements are not the end-all for solving transportation issues and they're willing to work with the Parks to invest in transportation.

The last thing I want to talk a little bit about, in terms of challenges, is decision-making. I'll preface this by saying that this is strictly a Smokies perspective. We've identified three things that we feel should be the driving force behind decision-making and should serve as the measuring sticks for evaluating potential transportation solutions:

- quality of the visitor experience,
- resource degradation, and
- management capacity (for lack of a better term).

It has been suggested, how do we know when we have too many cars? The answer has to be when it affects one or all of these three things.

We also identified some of our challenges and needs. Remember that this is from a planning perspective and not from a transportation strategies point of view.

- Creating an entity with regional transportation responsibilities. We have six counties and nine gateway communities in two states. There is no mechanism in place to take on regional transportation responsibilities in a holistic way. Fortunately, on the Tennessee side of the Park, there is a group recently organized that is looking at regional transportation planning that encompasses the surrounding counties and gateway communities.

- Adequately determining quality of visitor experience and resource degradation. If this is going to be a basis for decision-making, then we need to ensure that we have a good handle on what the quality of the visitor experience is, and what are the advantages or impacts to our resources.
- Need for a Park ambassador to network proactively. Once we started trying to bring some visibility to the issues, the phones started ringing. Our public affairs office started routing calls up to my office because there were just too many. I would advise anybody that will be in the business of transportation planning to find a person who will be responsible for outreach and networking. One of the advantages of the Memorandum of Understanding signed between the Department of the Interior and the Department of Transportation is providing the opportunity to provide a person locally that can take on these responsibilities.
- Most visitors to the Smokies enter and exit the park multiple times per day. Are there alternative modes that can accommodate such behavior? Should we foster a change in this behavior? This is an issue may be more unique to our Park, but these are questions that once we get the money to do this planning process we're going to be asking ourselves. As I mentioned earlier, we do not have any kind of visitor services in the Park.
- What is the feasibility of providing an integrated transportation system given that there are multiple major entrances to the Park, each providing access for more than 2 million visitors?
- Determining alternative modes that can accommodate the Park's high level of visitation and are not cost-prohibitive.

## Acadia National Park

*Len Bobinchock  
Deputy Superintendent  
Acadia National Park*

Acadia National Park, in cooperation with the State of Maine and our local partners, within the next three weeks, will be implementing Phase I of a three-phase regional transportation system. I've been asked to speak today at two sessions. The first one is this session that focuses on the challenges facing the National Park Service. The second session later this afternoon and again tomorrow will be a panel discussion that deals with the relationship between the National Park Service at Acadia and the Maine Department of Transportation. It's somewhat difficult for me, in a very short period of time, to present the issues facing Acadia, how we went about coming up with a cooperative solution and also trying to talk about the challenges that still face us. I'll do my best.

### Acadia National Park

Let me start off by saying that Acadia National Park is the only National Park in New England. It's located in Hancock County in the downeast region of Maine. For those of you who may not be familiar with Maine, it's a rather large and very rural state. The primary industries are tourism and forest products. The number one tourist destination is Acadia National Park.

The Park, by National Park Service standards, is relatively small; containing only about 46,000 acres spread over three geographic units. The Schoodic peninsula contains about 3,000 acres. Another 3,000 acres make up Isle au Haut and the offshore islands. The majority of the park, however, is on Mount Desert Island proper, a 108-square mile island which the National Park Service shares with four towns: Bar Harbor, Mount Desert, Southwest Harbor and Freemont. The Park and the towns are very much intertwined. It's very difficult to know when you're leaving the park and entering some of the communities. There are numerous state and local roads that enter the park.

Acadia protects a wealth of natural, cultural and scenic resources. Air quality tends to be an issue at Acadia – we have a history of being an ozone non-attainment area. We happen to be down wind of most of the major sources of pollution along the eastern seaboard and Midwest industrial areas. We also have severe problems with acid and mercury deposition.

Acadia is an old park. It was established originally in 1916, first as Sieur de Mont National Monument. In 1919 the name was changed to Lafayette National Park. Then in 1929, Congress designated it Acadia National Park, which is how it remains today. The park is unique in the fact that private citizens, for the benefit of the American public, donated 96 percent of the land that makes up the Park. Not only did private citizens donate much of the land; in some cases they actually built and donated some of the infrastructure as well. Among those is a 44-mile system of carriage roads that were built by John D. Rockefeller. There are eighteen massive stone bridges in that system. Major portions of the Park's motor road system were also designed or built by private citizens. Even the Park's 130 miles of hiking trails were built mostly by a local village improvement society and eventually incorporated into the Park.

Because Acadia is an older park, a lot of the facilities that we have are not designed to meet the pressures of today's visitation. This is particularly true with our ability to accommodate motor vehicles. Many of our parking lots are very, very small; in some cases they only accommodate six, eight, or 25 cars. Many parking areas serve multiple purposes such as a scenic overlook and parking for one or more trails. Consequently we get an abundance of overflow parking along the shoulders of roads, parking in the right lane on the Park's historic loop road, and parking on the grass. This has an adverse effect in that it detracts from the visitor experience, and it detracts from the scenic beauty

of the park. In some cases, it can have a great impact on natural and cultural resources, and in other cases it actually generates a public hazard.

### Developing a Plan

In 1987, the Park began a general management planning process. That planning process involved a great deal of public input as well as specialized studies including a transportation feasibility study. What we learned from that general management planning process was very clear. The public felt that (1) traffic congestion was a major problem, (2) the National Park Service needed to do something, and (3) the answer was not to create more parking lots. The public and the NPS felt that the Park was too small and too valuable to sacrifice for more blacktop. The transportation feasibility study determined that in order to have a feasible, workable transit system it would have to be incorporated with a transit system serving the communities. The reason for that is that visitors to Acadia spend as much time in the communities as in the Park. Much like the Smokies, most of the overnight accommodations and support facilities are outside of the Park in one of the four gateway communities.

In 1992, the Park adopted a final general management plan (GMP). The GMP recommended that the National Park Service work actively with the communities and others on Mount Desert Island, to establish an island-wide transportation system that would include loops through the park. Between 1992 and 1995 there was little action taken, primarily because there wasn't any pressure within the community to work with the National Park Service to implement any kind of a transportation system. Then in 1995, traffic congestion reached the point in the communities where residents began complaining to their elected officials. Even the tourist businesses became concerned. They feared that tourists would elect to vacation elsewhere if something wasn't done to retain the character of these quaint little island towns. The concerns were brought to the Mount Desert Island League of Towns. The League consists of the managers of the four island towns, one representative from Acadia National Park, and one representative each from the three communities that surround Mount

Desert Island. The purpose of the League is to look at common issues, such as the transportation issue, and come up with a reasonable, coordinated and hopefully a comprehensive solution.

The problems facing the League of Towns were:

- how do you maintain a strong tourist industry?
- how do protect the Park's natural and cultural resources?
- how do you protect the quality of the Park visitor's experience? and
- how do you preserve the quality of life for island residents?

Fortunately, the GMP had previously come up with a recommendation for an island-wide transportation system. This concept was presented to the League of Towns as a possible solution. The League took the concept and with the help of a local transit planner developed a transit plan that would be implemented in three phases. The transit project would be implemented through a public-private partnership involving the Park, the four towns on the island, the business communities, and two non-profit organizations – Friends of Acadia and Downeast Transportation Inc.,

The first step in the design of the system was to connect the hotels and the campgrounds on the island, where there is adequate parking for overnight visitors, with the business districts of the four island towns and some of the most popular destinations within the Park. The system relies very heavily on encouraging people to leave their cars at their place of overnight accommodations and using the transit system to access the towns and the Park.

The first phase of the system begins June 23 of this year, and involves eight propane buses operating on six routes. Most of the routes will have thirty-minute service. It will be a voluntary system and it will be free for the riders. It will be operated by Downeast Transportation, Inc., a local non-profit transit provider.

The big picture conceived by the League of Towns is for a comprehensive multi-modal

transportation network – a network that would include parking for day-use visitors, a tourist center providing information on alternative transportation modes, and easy connections to various modes of transportation. This network would include frequent local shuttle buses that will begin this summer, which will connect with local and international ferries that now serve the island and a high speed ferry service proposed by the state in the Maine Strategic Passenger Transportation Plan. It also calls for a comprehensive series of bicycle and pedestrian paths, and connections to other forms of public transportation, including air, rail and motor coach.

The second phase of the transportation system provides continuous service within the Park. It also increases the capacity and frequency of service on all routes. Operation of the system will also be extended into the fall season. Serious consideration will be given to providing limited year-round service as well.

The final phase of the transportation system focuses on long-range planning and integration of the local transportation system into the State of Maine's Strategic Passenger Transportation Plan. We are looking at, perhaps, the construction of a multi-modal transportation hub. The concept would be "one-stop shopping" where visitors to the island could park their car and get information on Acadia National Park and the region and learn about alternative modes of transportation. The Hub would also be the place where the public could switch to other forms of transportation, including ferry connections, air or rail.

Also in Phase 3, we will try to address several long-term planning issues such as obtaining a long term funding mechanisms, and providing long-term oversight and management as the system grows and becomes more costly and complex.

So, on June 23rd the Island Explorer will begin service. How successful it will be, I can't tell you now, but a few months from now I'll be an expert. We're hopeful that by implementing this system and working cooperatively with our local partners and the state of Maine that we will be able to achieve the objectives that we established:

to sustain the strong tourist industry, preserve the resources of the Park and a quality of the visitor experience and enhance d the quality of life for local residents.

### Lessons Learned

I think we have learned some valuable lessons in going through the exercise of implementing this transit system. I'd just like to point out a couple of them.

- You can't force your neighbors to take action. What you can do is have a solution ready so that when your neighbors are ready to take action, you can move quickly and offer it to them. In doing so, the odds of having success are greatly increased. We had completed the general management planning process, we had gone through the public involvement process, we had done a transportation feasibility study, and we had concepts in place.
- It pays to have a good transit planner. Very few of us in any of the National Parks are transit planners. It is important to have a transit planner that understands the needs and issues of all the parties involved, and it's very helpful if that transit planner has experience working with tourist communities.
- Prepare a reasonable plan.
- See the big picture. Know where you want to go. But it is equally important to be able to take that big picture, break it into phases or sections, especially if you have to go to others and ask for funding. Very few people are willing to go out on a limb and spend a lot of money for a grand plan when the outcome may be uncertain. It's better to take one small step at a time, build confidence and demonstrate success.
- Identify early on who the stakeholders are and what they can bring to the project. It has been our policy that those who directly benefit from the transit system should also pay for it. To give you an idea who is contributing to our partnership, we have four towns whose

dollars are coming from taxpayers, Acadia National Park, the business communities, campgrounds, hotels, as well as general donations.

- Have the ability to be able to sell the plan and concept. We took our plan on the road,

and we talked to anybody who was willing to listen. For example, early on we went to the Maine Department of Transportation and said, "Here's what we're thinking about doing locally on Mount Desert Island," and they said, "Great – that fits very nicely with what we're trying to do statewide."

## Grand Canyon National Park

*Jim Tuck*

*Transportation Director*

*Grand Canyon National Park*

Overcrowding exists in the Grand Canyon just as it does in many of the other parks. Grand Canyon's challenges, while being very similar to other units in the Park system, are also different. Ninety percent of our almost 5 million visitors enter the South Rim in a very small portion of the Park, where infrastructure has not kept up with the numbers of visitors. All of this is exacerbated by what I perceive of the dilemma of the National Park System. We are operating some of the foulest diesel, smelly buses on our shuttle system. That is changing and I'm glad to see folks together today to share how to do that. I said that our challenges are similar and yet different. The answers we have developed are unique, but at the same time, similar to others. Today I'd like to talk about our big picture: the implementation of our new General Management Plan, and then focus on what we're doing in the alternative fuel fleet with our current visitor transportation system.

### General Management Plan

In 1991 we began a typical general management planning process for the Grand Canyon. During these sessions we talked a lot about overcrowding, the perception that there are too many folks at the Grand Canyon, shoulder to shoulder trying to view that "wonder of wonders." A visitor use management workshop was held with folks from inside and outside the government. The conclusion of that workshop was not that we have too many people, but that we have too many cars.

The infrastructure has not kept up with the needs of cars to find parking places. In fact, the growth that has been projected – up to 7 million visitors by 2010 – could easily and readily be accommodated if we could simply deal with the private automobiles: that's the real problem. The management plan was approved in 1995, and it proposed some major expansions to the existing visitor transportation system.

There were certainly some alternatives to what we considered proper management. One was to follow the tradition of "paving paradise," and there are folks today that would like to see parking lots all around so that they could look at the Rim from the privacy of their car. We could also restrict visitation to a number that our infrastructure could accommodate. We all know the answer to that. Therefore, we concluded that a transit system that would separate visitors from their cars almost immediately on their arrival in the Park was the answer that would allow visitation to increase reasonably, yet preserve the resources.

Basically, if you're a "day" visitor to the South Rim of the Grand Canyon, you will park in a parking lot as you arrive outside the entrance to the Park, and you will get on a light rail vehicle which whisks you around the canyon rim. If you have overnight accommodations such as the campground, RV park or motel, you will drive to those accommodations and at that point use an

expanded shuttle system around the Park. It's a year-round system.

One of the biggest decisions we had to make along the way was how are going to get folks from this big parking lot just south of the Park – the lot will have about 3,500 car spaces– up to the Rim efficiently and effectively without the mode of transportation becoming part of the attraction of the Park. We don't want folks coming to Grand Canyon National Park so they can take a monorail ride; that's not the purpose. So, we performed an environmental assessment and compared rubber tire modes to light rail. We determined that if we were to use rubber tires buses—even articulated ones--we would end up with headways of about 60 to 80 seconds. That sounded a lot like a train to people that were looking at this issue, so that's what we decided.

Our proposal is a light rail system with about nine miles of track, eighteen light rail vehicles – each a hundred feet long, coupled together – and serve three locations, each with a three hundred foot loading platform – the parking lot, the rim overlook and the village.

The cost is high. We have a cost for capital of around \$150,000,000. We realized very early on as we were going through the management plan that we were not going to fund our management plan – much less the transit system – with typical appropriated funds. Our proposal to accomplish this transit system is to use a concessions contract, using concessions regulations developed from an omnibus bill passed in 1998. We will reimburse the concessionaire with a transit fee from visitors, covering the capital costs and operations and maintenance costs. So, that's our innovative alternative financing scheme.

The public has been quite accepting of the proposal except for those folks who refer to their constitutional authority to drive their cars wherever they please, anytime they want to. In response to congressional inquiries, we provided information to the Federal Transit Administration (FTA) to review our process and financial reasoning that we used in order to arrive at this conclusion. That touches on the significant

cooperation we've had with FTA throughout this entire process.

Doing it right is really critical to us all. As Len said, "There ain't no transit planners in the National Park Service." We knew that very early. So, as long as three years ago we started attending the American Public Transit Association's meetings. We sat down with transit representatives, manufacturers, planners and with the FTA through formal meetings like a peer review for assistance to try to figure out what we were doing and if our idea was in fact reasonable. We have received excellent consulting services, first from Peccia and Associates right here in Montana. We've also contracted with Lee & Elliott, HNTB and BRW to cover the areas in the plan that we know that we ought to have but we do not have the expertise to deal with.

At the same time we have this large big view of things, we're also trying to deal with the day-to-day issues. It's sad for us to talk about clean air in Grand Canyon National Park, which is a fine natural resource, and yet drive 1989 or 1984 diesel buses into the Park.

#### Alternative Fuels

I want to talk a bit about the history of visitor transportation system at the park and some of the lessons learned as we tried to help with alternative fuels. We received money in Fiscal Year 1992 appropriations to purchase alternative fuel vehicles. We decided to put some toward electric and some went to natural gas vehicles. We bought three electric buses in 1997. They ran fairly well in 1997: our average range per charge was almost 100 miles, which is excellent for any electric vehicle, particularly with a busload full of people. What did challenge us were three instances where our batteries exploded. The first time it was a problem; the second time we knew it was something we had to look at; the third time caused serious concern. So, we contracted with a forensics engineer and did a formal investigation and arrived at the conclusion that it was not as onerous as we feared. We rehabbed the buses to the tune of an additional \$50,000 over the 1998 season, and are putting them back in order.

But in dealing with electric buses, we've learned lots of lessons that we never knew that we were going to learn: how batteries talk to one another, about charging solutions. We've also learned about the application of alternative fuels to particular uses that do not match the vehicle. Our electric buses do not have the capacity or the power to drive folks around the Grand Canyon on regular shuttle routes. There are also, to my understanding, only about 200 electric transit buses in operation throughout the nation today, which makes each one of those a prototype in ways. We are very happy with our electric buses and we will make them work, but at this point we're not proposing additional electric buses until they solve some of their growing pains.

Natural gas has also been an interesting project and learning situation for us. We worried whether or not we would have natural gas buses on site ready to run before our natural gas fueling station was installed. As it turned out, we received our natural gas fueling station about six months before we had our first natural gas bus. We do not have pipeline gas at the Grand Canyon, which means that we need to truck it in in the form of liquefied natural gas. It's a good, clean, solid fuel that converts easily to compressed natural gas. The station was delivered and you and I as taxpayers are paying quite a bit per month to lease that station compared to the number of gallons of natural gas that we actually pump into our buses now. Dealing with any alternative fuel, one of the challenges is to accept right up front that it is much more expensive and a lot more complex than diesel. We are now

putting nine additional natural gas sedans and vans on line during the summer for the rest of the park staff, so we will begin to mitigate the cost of that fueling station.

Along with this came the rehabilitation necessary for our garage where the natural gas buses are maintained. Natural gas is methane, and is lighter than air, collecting in the ceiling during leaks, and we had propane, open flame heaters, in the ceiling. We completed a natural gas-safe rehabilitation of the garage last spring.

Our alternative line fuel fleet now has three electric buses, five 40-foot low-floor compressed natural gas (CNG) buses, seven 26-foot buses converted to liquefied natural gas (LNG), and some diesels left. Our future is to expand significantly.

I can't stop without addressing ITS. We've been involved with ITS on the Interstate 40 project with the Arizona Department of Transportation for the last two or three years. It's provided significant opportunities for us to get the word out in the region about ice on the road, about forest fire closures because of smoke on the road. We have an ADOT Highway Closure and Restriction System (HCRS) computer now in our dispatch office. Our dispatch office types a road closure into the computer, and it automatically relays to all the other locations within the state. It's also available on the Web site.



## Overview and Application of Intelligent Transportation Systems

### Introduction

*Joni Gallegos*  
*Transportation Planning Program Officer*  
*National Park Service*

First of all, I want to extend my appreciation to Steve Albert and his staff for their hard work and dedication for making this conference a reality. I particularly appreciate the opportunity to visit Yellowstone National Park for the first time. Working in Washington, DC, you are so removed from the resource that coming to a place so rich in history and natural beauty, gives me a sense of renewal and reinforces the mission of the National Park Service (NPS) that we are charged to uphold. I am hoping that we all can see transportation as the crosswalk between our mission to preserve precious resources and our desire to provide an opportunity for the public to enjoy these resources. Transportation can be the solution or it can be the problem. I'm hoping we can see transportation as an opportunity or a tool to carry out our mission.

As most of those from the NPS know (or don't know), the Alternative Transportation Planning (ATP) Program is in its infancy. Thanks to the increase in funds from TEA-21 for the Parks Road and Parkways Program (from \$84 million to \$165 million), this is the first year we have had money to focus specifically on transportation issues in our National Parks. But before you get too excited, only \$5 million to \$15 million per year out of the \$165 million will be allocated to the ATP. This past year, we focused our financial efforts on the demonstration Parks that were identified in the Memorandum of Understanding (MOU) between the Department of the Interior and the Department of Transportation. Those Parks include Acadia, Golden Gate, Yosemite, Grand Canyon, and Zion. For all other Parks that I didn't mention, next year and in upcoming years all Parks will compete for that money.

We have also been working on some other initiatives related to transportation in Parks:

- There is a new transportation web page on the NPS home page, [www.nps.gov/transportation](http://www.nps.gov/transportation), for sharing program information. There you'll find the MOU and the director's memorandum among other things.
- We are developing a transportation planning guidebook for NPS managers on transportation planning issues, options, partnering, and lessons learned.
- The NPS is developing training sessions, in coordination with our partners, for this fall for federal land managers entitled "New Approaches to Transportation Management" to introduce them to the guidebook and focus on transportation planning, TEA-21 programs and partnering.
- DOT is conducting a transit needs study for the NPS and other federal land management agencies to give us a better idea of what our needs are and to support the possible development and funding of a larger transportation planning program, similar to the federal-aid highway program.
- And finally the Rural ITS Joint Program Office in FHWA is generously donating \$1 million to develop a field operational test in a National Park.

## Transportation and the National Park Service

*Mike Freitas*

*Travel Management Coordinator*

*Federal Highway Administration, ITS Joint Program Office*

Even though I work in the ITS Joint Program Office, Steve Albert has asked me to frame this presentation around the new environment for transportation in the National Park Service. Therefore, I'm going to touch on a couple of things. In case anyone doesn't know what the Federal Lands Highway Program is, I will spend a little time putting that into context. I'll talk about the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21), and then I'll go into a little more detail about the Memorandum of Understanding (MOU) between the Departments of Transportation and Interior.

### Federal Lands Highway Program

For those of you who don't know, the Federal Lands Highway Program was created in 1982 out of what was then the existing authorization bill, the Surface Transportation Assistance Act. Its primary purpose was to provide a steady source of funding for federal lands highways. Up until then, there was always a group at FHWA that worked with the federal land management agencies to help them build their highways, but the funding came through those various agencies' annual appropriations. This resulted in a somewhat helter-skelter situation since the programs were subject to annual appropriations that made it difficult to do real transportation planning. So in 1982 the Federal Lands Highway Program was established to provide more of a steady source of funding for transportation needs of federal lands which are not a state or local government responsibility. The program's categories include park roads and parkways (PRP), Indian reservation roads (IRR), forest highways (FH) and Public Lands Highways (PLH).

### TEA-21

TEA-21 is our current authorization bill for surface transportation. TEA-21 created some changes in the relationships between the Department of Transportation (DOT) and the Park

Service. The bill was signed in 1998, and it basically covers all surface transportation funding through Fiscal Year 2003. What does the new transportation law mean for the NPS? There are three major things that TEA-21 did that I want to mention.

- First, it significantly increased funds for transportation projects in National Parks. The bill provides \$940 million for the PRP program: \$115 million in Fiscal Year 1998, and \$165 million annually for the rest of the Bill. That compares to \$84 million that was available in Fiscal Year 1997, so it was a significant ramp up in funding. It also provides funds for a number of priority projects – earmarks – a number of which are either parkways or are related to Parks. Some \$250 million is allocated for priority projects affecting National Parks. There are over fifty projects, including things like the Baltimore-Washington Parkway, the Natchez Trace Parkway and the Foothills Parkway.
- It heralded a new era of transportation planning for Parks. TEA-21 requires transportation planning that is consistent with current statewide and metropolitan planning. In fact, transportation improvements in Parks have to be a part of the Statewide Transportation Improvement Program (STIP). There's also a requirement to study transit needs in all National Parks.
- TEA-21 also provided some opportunities for some other National Park partners. There are several programs in the bill that also had significant ramp ups of funding that are of interest to the Parks: the transportation enhancements program, visitor centers and other facilities, the National Scenic Byways, recreational trails and the priority projects which I already mentioned. There was a big boost in funding for all of those programs.

### Transportation Memorandum of Understanding

There was a Presidential Memorandum issued in 1996 requiring the Secretaries of the Department of the Interior (DOI) and DOT to develop a plan for a comprehensive effort to improve public transportation in the National Parks. The result was a Memorandum of Understanding between the two agencies in 1997. The memorandum had a number of goals.

- Developing and implementing innovative transportation plans
- Establishing personnel exchange and information sharing systems
- Establishing interagency project agreements for developing and implementing transportation improvement initiatives
- Developing innovative transportation planning tools
- Developing innovative policy, guidance and coordination procedures for the implementation of safe and efficient transportation systems that are compatible with the protection and preservation of the NPS's cultural and natural resources.

One of the things that this memorandum did was to broaden the involvement of the DOT in the Park Service transportation issues. Again, the primary group that had direct involvement with the Parks before was the Federal Lands Highway Program of the Federal Highway Administration. With this memorandum of understanding, involvement with the DOT has been greatly expanded. Within FHWA, not only are the Parks talking with Federal Lands, but now they have access to the federal-aid divisions, to the ITS Program and to the Environmental and Planning staff. The Office of Secretary of Transportation's Office of Policy and Intermodalism, the FTA, and the Maritime Administration (MARAD) are also involved. What is the role of DOT involvement to be?

- To provide early involvement and assistance in the cooperative transportation planning processes.
- To provide technical assistance in the development of transportation plans, including General Management Plans (GMPs), and in the project development and implementation of transportation systems.

The implementation action plan was finalized in 1998. This provides a framework for implementing all of the initiatives contained in the MOU. Five demonstration projects are being initiated, and an ITS field operational test is now being initiated. The demonstration projects include the following.

- Acadia National Park: A propane fuel shuttle bus system with combined routes for the Park and gateway communities
- Zion National Park: A propane fuel shuttle bus system with separate routes for the Park and gateway communities
- Grand Canyon National Park: A light rail system
- Golden Gate National Recreation Area: Transportation planning
- Yosemite National Park: Transportation planning and regional and Park transit system implementation

The ITS field operational test is intended to demonstrate the use of intelligent transportation systems technologies in a National Park setting. Three Parks were asked to develop strategies. Acadia, Zion and Grand Canyon are all implementing transit systems to try to mitigate some of their congestion problems, their air problems, etc. All three of these parks have focused on traveler information aspects related to that transit system. They are all different. Their problems are different. In the case of Yosemite, the valley gets very crowded, and they actually have to close the valley to motor vehicles. They are looking at trying to encourage people to use transit or being able to decide when to close the valley and tell

people to use transit. In the case of Acadia, transit is very much a volunteer system. As Len Bobinchock mentioned, the issues they're dealing with are parking, especially at trailheads. Again, we're focusing on the specific type of visitors in terms of emphasizing transit through traveler information. In the case of Zion, at some point they will close the valley to most vehicles like Grand Canyon, so their issues are different. It's not a matter of encouraging them to make a modal shift; it is providing information on what

to do when they get to the Park, and how to use transit. And so in all three parks we're talking about implementing transit, and then traveler information to facilitate that, but all three parks are different in terms of the type of information that is provided, the target audience, etc.

In terms of the MOU, one of the next steps is the development of national initiatives, ongoing work at each demonstration site, and assisting the National Park Service in prioritizing transportation planning efforts.

### **“ITS and the National Parks”**

*Keith Jasper*

*Associate*

*Booz-Allen & Hamilton, Inc.*

Good morning. I'm planning to cover five areas in my presentation this morning:

- Why should the National Park Service (NPS) care about intelligent transportation systems (ITS)?
- What is ITS?
- When and where can ITS support the NPS?
- Who should get involved in my ITS project?
- How do I “do” an ITS project?

When I talk about the National Parks, I mean the whole range of units within the Park Service and, for that matter, Fish and Wildlife, Bureau of Land Management, and probably the Forest Service as well.

So why should the Park Service care about intelligent transportation systems? I don't know who first said that the National Parks are being “loved to death,” but I think the expression is very appropriate. We've looked at three Parks in particular – Acadia, Yosemite and Zion – and looked at their annual recreational visitation in 1997 as well as projections out to 2005 and 2010. We looked at the historical growth of traffic in the National Parks over the last ninety years and projected that forward. In the first seventy to

eighty years, the growth systemwide equated to 1.5 percent. For Acadia, Yosemite and Zion, the range of growth was between 2 and 3 percent, slightly above the systemwide trends but very appropriate for those Parks. Most people come to the Parks via independent modes, such as a car (about 95 percent of visitors come by car), or an RV with a bicycle on the back.

Do we know what months of the year in which that growth will occur? As an example, Yosemite Valley has a carrying capacity of about 3,300 vehicles per day. That equates to roughly 10,500 visitors per day, which at 31 days per month is about 330,000 visitors. In the summer months, Yosemite is already at that level of visitation, so that growth will have to occur in the shoulder months. It will create a difficult situation to manage. And there are different patterns of seasonal visitation in the different Parks: Acadia has a sharper peak in the summer months, while Zion has more visitors in the winter months than the other two Parks.

So what are the primary issues the Parks are facing?

- An increase and change in visitation patterns, which I already mentioned
- How to balance demand versus “carrying
- The “tourist from hell” who wants to engage park rangers in long discussions at the entrance station

All of which result in degradation of the visitor experience

What sorts of problems result from those issues? Obviously there’s an increased demand for parking and there are constraints on the Park’s existing infrastructure – we’ve heard that being mentioned this morning. Within the Park Service there are probably few if any people devoted to transportation planning. Park rangers, for the most part, have other responsibilities.

These problems lead to needs, one of which is providing alternative means to get to the Park. I think there’s going to be a much higher level of attention given to proactive transportation management and automation of operations. All of that is geared toward keeping visitors informed in “near real time” – for example, providing information on a Web site about where parking is available, where congestion is and the like so that they can plan accordingly.

For those from the Park Service, it’s worth asking with what you know about visitation patterns: should we expect growth to increase at an average of 1.5 percent per year, from 3 million visitors now to 4 million visitors twenty years from now? If that is the case, then where the visitors come from, how they get there, how we manage them, and where we put them inside the Park all become important. You may look at transit as an alternative to the private auto, but there are other ways in which you can look at the transportation system to help to try to manage increased demand.

So what are these intelligent transportation systems you’ve been hearing about, and why are they so much smarter than the way we’ve been doing things the last twenty years? Let me give you a fairly simple definition. Intelligent transportation systems offer an alternative approach in

the transportation tool-kit. Technology is an important part, including traffic detectors, weather sensors and other advanced sensor technologies, as well as computer, electronics and communications technologies. Technologies on their own are not going to do it, but when you add them to management strategies; together they can help to save lives, time and money. ITS is a part of the transportation “tool-kit” and some of the areas in which ITS can provide alternative approaches are:

- Travel and transportation management. Some examples of this include en-route driver information, travel services information, traffic control and incident management.
- Travel demand management. This includes pre-trip travel information and demand management and operations.
- Public transportation management. For the customer, en-route transit information and for transit agencies, public transportation management systems.
- Emergency management. This provides the means for coordination of emergency vehicle management, for example during wildfires.
- Electronic payment services. This may not be too relevant right now, but that may change. Typically this would include transit fares, road tolls and entrance or parking payments.

So when and where can ITS support the National Park Service? There are different Parks and different approaches; there’s not a one-size-fits-all solution. What I’ve tried to do is categorize Parks in terms of the ways in which ITS solutions may lend themselves to addressing issues, solving problems, or meeting needs. I’ll talk briefly through what sort of ITS applications might apply to each category.

- Urban. Urban parks lend themselves to public transportation management and integration to other metropolitan ITS initiatives already underway. Perhaps you don’t think of Acadia as an urban park, but it’s nestled among small towns on Mount Desert Island.

For an urban park, ITS can be used to interface the Park with local transit modes and to interface with local freeways and arterials. There may some integration available with local transportation agencies and authorities in their planning processes.

- Linear. This includes parkways. Within a linear park, management of traffic convoys might be a good application, for those cases like on the Blue Ridge Parkway where you can get miles and miles of vehicles during the Fall color season. Advanced warning of conditions impacting access point decisions means that when vehicles approach the Park there is a sign providing some options to direct people to different access points. Incident management is another important application, because blockages along a linear Park may be difficult to route around.
- Remote. Three applications that are particularly important to a remote Park include being able to respond to emergencies quickly, being able to manage incidents, and being able to provide early notice to travelers of adverse conditions.
- Destination. Management of peak season traffic congestion at entrances and parking locations, managing travel demand within the Park, and providing traveler information on approaches to the Park, gateway communities and lodgings are all important. ITS can help in making information available to Park visitors before they commit to traveling by private auto.
- Destination with local traffic. This takes the idea of a destination park one step further and adds local traffic. Yellowstone is a very good example of this: for every two recreational visits that take place there is one non-recreational visit, comprised of people who have to travel through the Park for some personal or work related business. So these Parks have a mix of local and recreational traffic. One application is to separate visitors at the entrance stations from commuters, transit and locals conducting personal business. There may be opportunities for sharing

facilities, such as local transit service. Transportation management strategies must additionally address regular daily peak periods.

- Clusters. This very strongly relates to Zion, where we ran across the “Grand Circle” concept. Travelers visit a variety of recreational facilities across Arizona, Nevada, Utah, Colorado, and New Mexico. These parks provide opportunities for sharing information and resources, and for giving traveler information regarding conditions between Parks and within other Parks.

So who should I get involved in my ITS project? Once you’ve identified what it is you think that ITS can help you with, then building a partnership a very important next step. There are a lot of possibilities here, in alphabetical order:

- Adjacent Parks
- Chamber of Commerce
- Concessionaires
- Emergency Response
- “Friends,” or associations related to supporting the Parks but are not directly a part of the Park Service
- Gateway Communities
- Office of Tourism / Local Tourism
- Private Sector
- State Department of Transportation (DOT)
- Transit Agencies
- US DOT

At some point, there needs to be a champion from each of these groups to nurture the ITS vision within their respective organizations.

So how do I “do” an ITS project? We’ve built a partnership, now there are seven basic steps. There are variations of these but generally ITS projects follow the following steps:

- User needs assessment.
- Define functional requirements.
- High-level design
- Detailed design
- Implementation
- Acceptance testing
- Operations and maintenance

I don't mean any of this to sound complicated, but certainly there is a wide range of resources available to you:

- NPS
- USDOT (ITS joint program office, Federal Highway Administration, Federal Transit Administration)
- State DOTs
- Local agencies
- ITS America, which is a non-profit organization that was mandated through legislation in 1991
- Transportation Research Board
- Academia and Consultants





## Session Reports

### Regional and National Park Service Transportation Planning and Coordination “Federal-Aid Highway Program Overview”

*Sandy Straehl*

*Chief of Program and Policy Analysis*

*Montana Department of Transportation*

Most of the information that I have to share today is generally known by state DOT people. This information is elemental for the state and metropolitan planning organization (MPO) transportation professionals that the Federal Land Management agencies will have to partner with. I would ask that you share it with others involved in transportation planning in your land management agency. However, please keep in mind that this is a general overview, which describes the general structure of the federal-aid highway program and that each state and MPO process is unique.

To begin with, I'd like to spend a little bit of time on funding. Funding for the federal-aid highway program really has a great deal to do with how decisions are made and how decisions are promoted. The federal-aid highway program is really a combination of two different kinds of funding mechanics. One is the multi-year authorization that provides the statutory structure of the program as well as authorizing money to be expended in various program categories. And the funding mechanic is the annual appropriations bill that allows funds to be obligated.

The Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21), which passed into law last year, is a six-year authorization. The program under TEA-21 includes a great deal of funding flexibility. By this I mean funds can easily be transferred between different funding categories. This allows funds to be directed to where the greatest needs are. Besides program transferability, authorization language also establishes the rate of non-federal match for all program categories. Participation in the non-federal match may be an important consideration in establishing partnerships. In addition to funding, TEA-21 also sets up the entire framework for how the expenditure of federal-aid highway funding is regulated. As the regulatory environment is often

difficult to navigate understanding it may also be valuable is partnering.

Let me spend a minute on the funding levels of TEA-21. It provided an overall increase in federal-aid highway program funding of about 40 percent nationwide and the Western states generally did slightly better than the national average in terms of program growth. The other thing that's different in TEA-21 is that there is a very important “firewall” of protection for federal-aid highway money from other parts of the domestic discretionary annual budget. This firewall ensures that all trust fund revenues are distributed into the highway program the following year. In the case of this year, this will increase a roughly \$26 billion authorization by \$1.4 billion. And, a proportionate share of the \$1.4 billion increase should also go to park roads, reservation roads, and forest highways as well as to the core highway programs.

The other thing that's important about the federal-aid highway program is that it is a “contract authority” program. This allows obligations in advance of appropriations. The only thing that the annual appropriations bill does is set a limit annually as to how much each state is authorized to spend. The obligation authority we receive annually can then be spent in any program category. It could all be spent on Interstate maintenance or all spent on bridge repairs. There are other reasons it's not all spent in a single program but the point is obligation authority doesn't specify how funds are expended – simply that funds must be expended within a specific timeframe. If you don't spend all the obligation authority available to a state in this timeframe it is given to another state to spend. Potential loss of obligation authority is a very serious matter and consequently any last minute design changes to incorporate new considerations from a resource agency which have the potential

to delay program delivery are also very serious. The only graphical way I could come up with for explaining apportionment and obligation is LifeSavers. Each color of a “life-saver” represents a different program category such as interstate maintenance, national highway system, surface transportation program, or bridge maintenance. The total amount you get in each color is apportionment through TEA-21; the total you may eat in a year is the obligation limit. On average, obligation limits are set to about 90 percent of apportionment. The amount of program funding that is not obligated in a particular year is carried over and available for another three years before it lapses.

Let me summarize these funding features. Federal-aid highway funding has a high degree of reliability due to contract authority, a high degree of flexibility because you can transfer money between program categories, and a high level of expectation that annual contract authority is used or it’s lost. These characteristics are important for a couple of reasons. First, the program supports large projects with multi-year phasing that have been developed within a significant overlay of regulatory burden. As you move through project development towards contracting and the obligation of funds, the program becomes firmer and firmer. Last minute changes are not easy to accommodate and consequently they’re often not welcome. So if you’re with the National Park Service and are looking to partner with a state on a project you have to look out at least several years beyond the current appropriations cycle. Given how the funding cycles work within the National Parks environment, I urge you to get involved in the state or MPO planning process early and look for those intersections of common interests and complementary time frames for program decisions. Second, the program also provides safeguards against program disruption. If federal appropriations or re-authorization is bogged down, a continuing resolution can keep the program moving. Program disruption can have significant economic consequences and is avoided at all levels.

Regarding the graphic entitled “Federal-aid Highway Program Decision Making Vectors,” there are three ways decision-making is effected

through the Federal-aid highway program. These can be considered as vectors that run through different statutory, regulatory and policy environments.

- First, there is a small region of direct federal decision-making. These funding decisions include most of the Federal Lands Highways programs, some discretionary programs, education and research.
- The second vector runs through the dual regions of federal statutes and regulation, overlaid by state and/or local implementation policy. A significantly larger percentage of the funding decisions are made through this region of decision-making than through the direct federal parts of the program. Decisions made through this vector include programs, planning processes, funding distributions, policies (match, eligibilities, etc.) and performance objectives.
- The third vector again originates in the Federal statutes and regulations but is then overlaid with state level statutes, constitutional provisions and rules, as well as state and local implementation policy. This third decision-making vector represents the vast majority of how funding decisions are made within the Federal-aid program.

Very little of the federal-aid program is directly administered by the US Department of Transportation. If your land managers want to partner with a state or MPO they must understand how the decision-making is done outside the borders of their park or forest. And, they have to expect variability even in the same state. A high level of state statutory overlay and policy discretion makes sense because of the state funding involved – non-federal match, initial advance for federal reimbursement, and all maintenance costs. How federal-aid statutes and regulations are implemented will vary from state to state and may vary between urban areas in the state. Variability makes sense because transportation issues differ around the country.

While each state or MPO planning process is unique, there are some common features. The

normal planning process has a twenty-year horizon. Planning normally involves technical analysis and significant levels of public and stakeholder input. Many states use these plans to articulate performance goals for their future capital programs. Most states' 20-year planning documents are policy-oriented, but there are some cases of 20-year project-specific plans. In all cases, there is significant public involvement.

From the plan it moves into the program. In Montana, there is linkage between the performance objectives identified in the plan and the projects that are nominated for funding. We look at each project to see what it will achieve in terms of overall system performance. And again, there is significant public involvement. This results in a Statewide Transportation Improvement Program (STIP) which must include all the projects in the state. For urban non-attainment areas, a demonstration of conformity between the transportation plan and the state air quality implementation plan is also required. Let me point out that since all federally funded transportation projects must be in the STIP, and the STIP must demonstrate conformity; if a federal lands management agency intends to fund a regional significant transportation project, then this project will have to be part of the conformity analysis. In other words the STIP could get hung up if conformity is not addressed and I urge you to work with the state and MPO to ensure you're aware of the air quality status and any requirements for your area.

After a project is approved for programming through the STIP it moves into project development. During the survey phase, which can take from 8 to 24 months, the National Environmental

Protection Act (NEPA) takes effect. NEPA only comes into play once the project is programmed. Following the survey phase comes the design phase, which results in a "final environmental document" and can take another 24 months. After this comes the right-of-way phase which can take up to a year, and then finally construction which can also take up to a couple of years. In total, the development and delivery of a major highway construction project can take up to eight years. Because late stage design changes cost a lot and disrupt the program, it is important to get involved at the planning stage. Also, it's important to understand that it is almost impossible to see major funding commitments made in the year before a project is expected to be delivered. If you want to begin to develop partnerships with states or MPO get there at the planning level – perhaps as long as seven or more years out. Also, since state and local funds necessarily will be involved any partnered projects must have benefits for the state and local partners.

Before closing, there are several other provisions of TEA-21 that I will bring to your attention. First, TEA-21 requires the development of a transportation planning processes for the federal land management agencies which is consistent with the state and MPO processes detailed in Sections 134 and 135 of 23 USC. Second, TEA-21 provides that how the different planning issues listed in statute are considered cannot be challenged in the court. TEA-21 also provides that neither plans nor programs are subject to NEPA approval. Lastly, TEA-21 puts a heavy emphasis on streamlining program delivery. I'm sure you'd agree that such streamlining is in the best interest of all potential partners.

## “South Dakota State Planning Process”

*Ben Orsbon  
Manager*

*South Dakota Department of Transportation, Office of Planning and Programming*

I'd like to begin by building on what Sandy said, in that every state process is different. I'm going to talk about South Dakota to show you how our process works, but realize that every state process is going to be different.

There are two fundamental planning elements of every state: the statewide transportation improvement program (STIP) and the statewide intermodal long-range plan (SILRP). They may be called something different, but every state is required by law to have these elements. The STIP is to be developed in the following ways:

- In cooperation with the metropolitan planning organization. Cooperation means that the parties involved in carrying out the planning, programming, and management systems work together to achieve a common goal or objective.
- In consultation with the local elected officials. Consultation means that one party confers with another prior to taking action and considers their views.
- In consultation with tribal governments and the Secretary of the Interior.

In South Dakota, the STIP is updated every year, starting in October. Meetings are held frequently with MPOs, tribes, federal agencies, local governments and others throughout the year. Between January and May, there is a needs assessment process which results in a list of recommendations for highway projects. Recommendations for other types of projects are received between May and June. A statewide ranked project list is presented to the Transportation Commission in June, after a review of available funding. The Commission submits a tentative STIP in June to the Federal Highway Administration and the Federal Transit Administration, and is reviewed by regions, local and tribal governments, and public and private

agencies. Public comments are also summarized and reviewed, so that the Commission may develop final recommendations by August. The final STIP is reviewed, prepared and distributed by September.

### STIP

South Dakota's STIP process is comprised of the following elements:

- Needs analysis, prioritization, and planning considerations. This includes a variety of economic, efficiency, mobility, safety and other considerations, such as the following.
  - Support economic vitality and global competitiveness
  - Increase safety and security of transportation system
  - Increase accessibility and mobility
  - Aid environment, energy conservation and quality of life
  - Enhance modal integration and connectivity
  - Promote efficient system management and operation
  - Preserve the existing transportation system
  - Management systems
  - Coordination of transportation plans
  - Concerns of tribal governments
  - Adjoining state and local transportation systems
- Potential projects. Projects in the STIP may include any of the following.
  - State highway projects
  - State rail projects
  - State airport projects
  - Public transportation projects
  - Indian reservation projects
  - Federal lands projects

- Enhancement projects
- County surface transportation program (STP) projects
- City STP projects
- Long range planning considerations.
- Metropolitan Planning Organization (MPO) Transportation Improvement Programs (TIP). This element is involved only in the STIP.
- Public Input. Input is collected through appointed input groups, such as the Transportation Commission, the Aeronautics Commission, the Railroad Board, the Transportation and Coordination Task Force, and the Scenic Byways Committee. Input is also collected from other sources, including citizens, public agencies, transportation providers, MPOs, planning districts, tribal governments, and federal agencies.
- Federal involvement. During the process, meetings are held with various federal agencies to discuss both the STIP and the SILRP. These agencies include the National Park Service, the US Forest Service, the Bureau of Land Management, and the Bureau of Indian Affairs.
- Executive management team. This group drives the process, and is responsible for presenting recommendations to the Transportation Commission.

### SILRP

The SILRP has a twenty-year time frame. It includes planning for all modes, including bicycle and pedestrian. The SILRP is focused on economic development, grain movement, freight, tourism and recreation, the elderly, medical services, global marketing, and public involvement. In its development, the SILRP considers other long-range plan components, including:

- State highway needs analysis
- Statewide airport system plan
- State rail plan
- Local roads needs study
- Public transportation needs study
- Urban streets needs study
- Strategic plan
- Highway systems study
- MPO long-range plan
- Intermodal database
- Financial forecasting study
- Corridor studies

## **“Planning in the National Parks”**

*Warren Brown  
Program Manager – Planning  
National Park Service*

I’m going to talk to you about the National Park Service’s planning and decision-making process, focusing on the general management plans (GMP). We heard this morning how the transportation projects and concepts for Grand Canyon and Acadia National Parks came out of their GMP process. What we’ve been doing in the National Park Service is trying to improve and modernize the way we do general management plans. About five years ago we noticed that there was a popular perception that GMPs took

too long, they cost too much, they were frustrating, they got into a lot of detail about development and implementation plans that were never realized. We’ve tried to come up with a way to improve that process; that new process is reflected in a director’s order, just approved a year ago.

One of the questions that may be asked: why are we planning in the Park Service? The National Parks and Recreation Act of 1978 says that each

unit of the National Park System should have a general management plan. That GMP should address four specific things.

- What measures are you going to use to preserve the park's resources?
- What is the general location and intensity of facilities that is needed in that park, including visitor transportation and circulation systems?
- What is the carrying capacity of the park?
- Are there any adjustments to the boundary of the park that might be needed to provide for sufficient protection?

We have 380 units in the Park System; about 200 of the units do not have any current general management plan and are in need of a plan. We get \$6.5 million per year for doing general management planning in the National Park System. In the past, some GMPs have been costing in excess of \$1 million.

The National Environmental Policy Act (NEPA) and the Historical Preservation Act are the two principal compliance considerations, but there are a number of other ones like the Endangered Species Act that come up in the general management plan. Most parks are very occupied right now with some of the more tedious aspects of reporting which come from the Government Performance and Results Act (GPRA).

We're planning so that we have a logical and trackable rationale, so that when we make a decision about a transportation system, it is based on an adequate analysis of the environmental, economic and other kinds of effects. These decisions will be developed with public involvement, and managers are held accountable for the decisions that result.

Why is planning changing in the Park Service?

- We think that generally transportation problems in the Parks are becoming more complex. Things are changing at a rate that makes it almost impossible to look out 15 years and predict reliably and accurately what's going to happen. Fifteen years ago, I don't think anybody would have anticipated

that Yellowstone would be overrun with snowmobiles.

- The Park Service has been restructured, delegating more authority and responsibility to the Parks. The restructuring program in the Park Service began a few years ago. The main change to those in this room is that planning in the Park Service these days is hopefully seen as a continuous, ongoing part of Park management. It's not something that happens once every year or fifteen years, it's not something brought to the Park by somebody outside the park, but it's an effective tool for management that goes on all the time.
- There is a demand for accountability, and there is an awareness of continual, persistent fiscal constraints. Congress is particularly interested and concerned about how the Park Service spends money. There's been a great deal of attention focused on what's understood to be an enormous backlog in not only maintaining roads, but also other kinds of basic park facilities. There has been a tradition in managing the Park Service in believing that fiscal constraints will "go away" next year or next election. People are starting to question that, realizing that fiscal constraints are likely to be upon us in the indefinite future. Congress is demanding the maximum value of the dollars that we do spend. In addition, GPRA is requiring all federal agencies to be responsible and accountable for results at the top levels of management. That's the new and different thing about GPRA: people are interested in what we actually accomplish, not necessarily how much time and energy we spend accomplishing it. GPRA emphasizes the opportunities to create those results through partnerships within and outside of the Park. GPRA also requires that we have a new document called a strategic plan that defines our measurable results, and report on those on an annual basis.

We think that park planning is becoming more innovative, more collaborative, more linked to management, more focused on what we are going to accomplish rather than how we're going to go

about it, and more efficient to avoid overlap in the implementation and planning processes.

In the past, the traditional approach to planning in the Park Service was the master plan. This was a physical design and layout of where the facilities were going to be in the park. It was static, it looked internally to the park, and it focused primarily on where we were going to build things. The model in the 1960s and 1970s was toward the comprehensive action plan. This listed all the problems we have, listed all the solutions and actions we are going to take, and then tried to list all the consequences of those actions. We think in the years ahead that there will be a different framework for planning in the Park Service. The model is going to focus on results, looking at different time frames and different levels of decision-making. It assumes that we can't predict all that's going to happen even in a five- or ten-year time frame. The other change that is of particular importance to our discussion today is that we are looking not only internally at the park, but in a much broader regional context about how we can accomplish the results that we want to accomplish.

What this framework looks like is a matrix with two dimensions. It focuses on what kinds of results we're looking for in the Parks. We're looking at an indefinite time frame – as far into the future as we can think – what is the condition of Yellowstone National Park, what do we want to achieve, recognizing what we've learned in the past 125 years? In a five-year timeframe, we're looking at exactly at how much of that indefinite time frame can we accomplish in the foreseeable future? In GPRA terms, this looks at specific allocations of dollars and staff time over the next five years, which translates into what we do on an annual basis.

One of the things we are trying to do is avoid duplication and inconsistency in the planning process. If you ask a lot of parks to put all of their plans on the table, you'll find they have a resource management plan, a development plan, a GMP from twelve years ago, and some other kinds of plans. These plans have a lot of different ideas about what the park goals are, what kinds of actions need to be taken, etc. We're hoping

that can be avoided in the future by looking at how these elements carry over.

The types of decisions that were reflected in that last framework are reflected with four different types of planning documents:

- General Management Plan. If it's an indefinite time frame, you're looking at the GMP, the Park mission, and the mission goals. This defines management prescriptions: what kinds of resource condition, visitor experience, and management actions are appropriate in each area of the park. This focuses on desired future conditions, not necessarily the specific details on the actions that will be undertaken. We believe that it is necessary or appropriate to focus on what's really important to the Park, but to allow some flexibility, innovation and responsiveness. It should be more specific about goals and tradeoffs, but less detailed about actions. It does not include detailed development proposals, but provides some general guidance.
- Strategic Plan. This is a new planning tool for managers, which integrates functions across disciplinary lines to produce results. It provides an assessment of the fiscal and other resources that are available for the park to accomplish its goals. This defines what will be accomplished in the foreseeable future – the next three to five years. GPRA defines this as a long-term goal. It establishes priorities on a park-wide basis, so we are not just looking at a transportation plan.
- Implementation Plan. This is not conducted until action is imminent. This plan does not set goals; it adapts goals developed for the GMP and strategic plan.
- Annual Performance Plan. This focuses annual work planning on results.

Overall, we think the framework is going to provide a logical, trackable rationale, so that when we're making decisions about transportation systems in the park that it ties back to how it relates to the visitor experience, resource protection, and capacity of the facilities of the park.

What are we going to do about preserving the resource? How are people going to experience the park? What is the quality of their experience? How will people get around the park? What impact does this have on the experiences of other visitors? What kind of facilities should there be? How are they going to learn about the park?

That's hopefully what we'll accomplish in this new framework. There aren't a lot of models of this type of new GMP in place yet. If any of you have had experience in GMPs, in the past there might be some different expectations of what to look for in that plan, and how you make decisions related to transportation planning.

### **“Transit Planning at Acadia National Park”**

*Len Bobinchock  
Deputy Superintendent  
Acadia National Park*

What I've been asked to talk about today is the relationship Acadia National Park and our local partners have had with the state department of transportation. I believe most of you were present when I spoke about the Acadia/Mount Desert Island Project earlier in the conference: what our problems are, and how we're trying to go about achieving a solution. I'm not going to try to repeat that here today. What I'd like to do is to stress the involvement of the state of Maine's strategic passenger transportation plan, and how it meshes locally with what we're trying to do on Desert Island. The best way to do that is to show a short video. The video script is as follows.

*How do you create and then satisfy more tourism demand without overwhelming an already burdened state highway system? How do you tap into the enormous tourism value of Maine's rocky coast, its diverse coastal islands, majestic mountains and wilderness paradise, without destroying the land's fragile beauty? And finally, how do you build vital new economic links between Maine's rich tapestry of urban centers and small town life and retain the regional character that makes Maine so special?*

*There is a plan – Maine's strategic passenger transportation plan. It offers a new vision for Maine's future: a network of interconnected passenger transportation systems that link urban areas with tourist destinations. Maine's strategic passenger transportation plan calls for:*

- *the establishment of a passenger transportation network anchored by the state's two busiest intermodal transportation hubs: Portland and Bangor;*
- *the creation a marine highway system served by high-speed ferry, riverboat, and inter-coastal service;*
- *the enhancement of existing passenger and excursion train service;*
- *the expansion and re-deployment of train service on underutilized lines;*
- *the creation of new passenger links, including motor coach routes with connections to Maine's intermodal hubs; and*
- *the creation of opportunities for new and beneficial partnerships: business and government working together to develop dynamic passenger links that will create new recreational and travel opportunities for visitors and Maine's citizens to enjoy our state's beauty and unique natural attractions.*

*The plan is to build a passenger transportation network of ferries, trains and motor coach routes that will become destinations in themselves – travel experiences that will attract new visitors to the state every year. This plan has enormous potential.*



*Conservative forecasts are that the initial phase of the plan will bring at least 87,000 new visitors to Maine and more than \$48 million in tourism revenues.*

- *Visitors will be able to board a train in Boston and travel all the way to the shoppers' mecca of Freeport, Maine, without having to worry about traffic and parking.*
- *Travelers to Maine's coast will have the option of traveling by rail or marine highway to Rockland and Acadia National Park. From Bar Harbor, they can travel to Washington County to have a real "down East" experience.*
- *Canadian tourists will be able to travel by motor coach or train to the mountains of western Maine where they will find world-class skiing, mountain biking, golf and hiking. From there they will be able to make passenger connections to the sandy beaches of southern Maine.*
- *Visitors from all points will be able to view the fall foliage from a train or a riverboat, and then explore Maine's rocky coast from the deck of an island ferry.*

*Most importantly, Maine's strategic passenger transportation plan calls for creation of a passenger transportation network that will help bring together the urban and rural communities of Maine. This investment will benefit Maine for many years to come. The system can be expanded over time to provide access to regions and experiences often missed by visitors. Maine's strategic passenger transportation plan heralds economic opportunity, and an enhanced system of clean, safe transportation options – options that create new tourist destinations throughout Maine and help preserve the quality of life that makes Maine a special place to live and to visit.*

What I thought I'd do is run through a timeline, to show you how the Park was integrated in this project.

- In 1987, Acadia National Park began its general management planning process. That

planning process involved a great deal of public input as well as a transportation feasibility study.

- In 1991, the state of Maine enacted the Sensible Transportation Act. This was done by voter referendum. It was done in response to differing opinions as to whether the Maine Turnpike should be widened. The Sensible Transportation Act required the state to consider alternatives to transportation besides highways and bridges. It also created citizen-based Regional Transportation Advisory Committees (RTAC); which are based in different regions of the state.
- In 1992, the Park adopted a general management plan. In that plan, it was recommended that the National Park Service work actively and closely with the municipalities on Mount Desert Island and others to implement an island-wide transportation system.
- In 1995, the Mount Desert Island towns got involved in transit planning because needs in the local communities had reached a level of concern. At that point in time, we were able to take the concept from the Park's general management plan and go forward with it.
- In 1996, as these towns were still putting together a transportation plan, the Maine Department of Transportation came out with a program called T-2000. The intent of that program was to solicit projects for various alternative modes of transportation throughout the state. The idea was to have these proposals channeled through the RTACs.
- That same year, the League of Towns submitted a T-2000 application for the island-wide transportation system. That went forward through our local RTAC. The RTAC recommended the project and the state approved it.
- In 1997, the League of Towns' transportation project was included in the state's biennial transportation improvement program.

- From 1997 to the present, the Park and the local partners in this project have been working very closely with the Maine Department of Transportation.
- In 1998, Congestion Mitigation and Air Quality (CMAQ) funding was finally awarded thus enabling the acquisition of the first eight buses for the transportation system.

What we heard from the states is that it takes between seven and ten years from the time a project is conceived until the time it's implemented. It's been a little longer here, from when the National Park Service first started looking at its general management planning needs in terms of transportation to the point of getting some action.

### **“Programs of the Federal Transit Administration”**

*Robert W. Stout, P.E.  
Director, Office of Planning Operations  
Federal Transit Administration*

Good afternoon. I would like to talk first about the funding programs at the Federal Transit Administration (FTA). Helen Knoll, our Regional Administrator in Seattle, spoke earlier and, in a very magnanimous way, said that the FTA has \$6.0 billion to give away each year. In so saying, she quickly added that those moneys go to states and transit operators – they are the primary beneficiaries of FTA funding programs reauthorized by the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21).

Of the \$6 billion about \$2.8 billion is allocated on a formula basis to States and transit operators, based on population, population density and transit service parameters. This program is called the FTA Section 5307 “Urbanized Area Formula Program”. The monies are available at an 80 percent Federal – 20 percent local funding rate for eligible transit projects in urbanized areas (as defined by the U.S. Census) of over 50,000 population.

FTA also has a large discretionary Capital Program of about \$2.3 billion. This is called the FTA Section 5309 “Capital Program”. Of these funds, \$900 million is available for fixed guideway modernization, \$900 million for the new starts program and \$500 million for the bus capital program. But recently the program has become discretionary in name only. Last year

Congress earmarked almost all of these discretionary bus and new starts funds last year and the fixed guideway modernization funds are allocated by formula to transit systems in cities with existing rail systems.

The other major programs at FTA include the Section 5311 “Nonurbanized Formula Program” at \$177 million, the Section 5310 “Elderly and Persons with Disabilities Program” at \$67 million and the Metropolitan and State Planning and Research Programs at \$44 million and \$10 million respectively. Information on these programs and their funding levels are published annually each fall as a Federal Register Notice and is also available on the FTA web site ([www.fta.dot.gov/program](http://www.fta.dot.gov/program)).

While \$6 billion is a lot of money, it's almost all allocated directly to the States and transit operators. Nevertheless, that doesn't mean you should not be in the hunt for some of that money. For example, we provided funds for Acadia National Park through the Maine Department of Transportation for the purchase of eight 30-foot propane powered buses for use in the Park and surrounding communities.

While the Federal Highway Administration (FHWA) has \$26 billion in annual funding for transportation projects, and that's a large amount

of money, most states will tell you that those funds are insufficient to meet their pressing needs for highway construction projects. The transit community will more than likely tell you that they need \$12 billion a year in federal funding or double FTA's current program level in order to reverse the national trend of declining transit ridership as a percent of total travel. Notwithstanding a number of communities that are experiencing increasing transit ridership, the transit share of travel compared to total trips is decreasing. Nevertheless, there is a large amount of money available for transportation projects and you need to decide the kind of effort you want to undertake in pursuing these funds. Possible Federal funding may be available through FHWA's Surface Transportation Program (STP) and their Congestion Mitigation and Air Quality (CMAQ) Program. I suggest that you need to work with you transportation partners at the State and local level to understand the types of funds available and how to pursue Federal funding through the metropolitan and statewide planning and project development processes.

I want to talk briefly about the Section 5311 "Nonurbanized Area Formula Program," which has about \$177 million annually for rural or non-urbanized areas. The program is administered by the States. In most cases, this is the primary source of FTA funding that may be available of use in gateway communities and in partnership with a Park, since Parks tend to be located in non-urbanized areas. These funds can be used to purchase vehicles and for operating and administrative assistance in rural and small urban areas. If you're in a metropolitan area, such as the Golden Gate National Recreation Area in San Francisco, you should participate in the local metropolitan transportation planning process through the area's Metropolitan Planning Organization (MPO). The process is jointly supported by FTA and FHWA. In San Francisco, the MPO is the Metropolitan Transportation Council. In these metropolitan areas your transportation projects would need a local sponsor, must be included in the MPO's long range plan and the MPO's 3 to 5 year capital or Transportation Improvement Program (TIP), in order to be eligible to receive Federal funding.

Other speakers have talked about the transportation funds available from the National Park Service – about \$300 million annually I'm told. Additionally FHWA's Federal Land Highway Programs (FLHP) including the "Parks Roads and Parkways Program" can be used to support highway, bridge and transit projects. This year about \$150 million is available through this program.

#### Planning Programs

Secondly, I'd like to discuss the joint metropolitan and statewide transportation planning programs. The National Park Service (NPS) for a number of years has had a requirement for the development of General Management Plans for each Park. Now, NPS is re-thinking that approach, based on the Director's Order Number 2 "Park Planning" dated May 1998, the process now includes strategic planning and implementation planning. On the Department of Transportation side, the Federal Transit Administration and the Federal Highway Administration developed a requirement in the 1960s for metropolitan planning in urbanized areas, with urbanized areas as defined by the Census as areas with over 50,000 population. We issued a joint planning regulation to direct that process based on the authorization legislation. The most recent revision was issued in 1993, based on the Intermodal Surface Transportation Efficiency Act (ISTEA). Last year, Congress passed and the President signed the Transportation Efficiency Act for the 21<sup>st</sup> Century (TEA-21), which again made some changes in the statutes that dealt with planning and programs. The two agencies are now in the process of revising the planning regulation and intend to issue a Notice of Proposed Rule Making toward the end of the year.

For over thirty years we have had a good working relationship with the Metropolitan Planning Organizations in doing transportation planning and the planning process has gotten better through that thirty-year history. ISTEA required states for the first time to develop a statewide transportation planning process; we addressed that in the 1993 regulation. Previously there was no federal requirement for statewide transporta-

tion planning before ISTEA, but probably 20 to 30 percent of the states had some form of statewide planning. TEA-21 reaffirmed the process and the development and updating of statewide transportation plans. Now all states have a statewide transportation planning process. Some states see the statewide transportation plan more as a policy document with policy goals and objectives, while other states approached it in a more traditional sense with specific project plans and programs. When you're dealing with your state, you need to understand what kind of statewide planning process they have, what kind of requirements and procedures they have for updating the plan, and what the cycle of the plan update is.

In the metropolitan areas the joint planning regulation requires an update of the long-range transportation plan every five years. If you're in an air quality non-attainment area, we require an update every three years.

Our statute defines the basic objectives of the transportation planning process. In the words of Congress:

“It is in the national interest to encourage and promote the development of transportation systems, embracing various modes of transportation, in a manner which will effectively maximize the ability of people and goods to move in and throughout urbanized areas, and minimize transportation-related fuel consumption and air pollution.”

To accomplish this objective, the regulation calls for the establishment of MPOs – of which there are some 340, one for each area which has over 50,000 population as defined by the U.S. Census. The objective is met in cooperation with the state – it is very important to note that this is a cooperative process between the local MPO and the state – to develop transportation plans and programs for the area. As a result of ISTEA in 1991 the plans and programs have become more intermodal in nature and include pedestrian and bike facilities and intermodal links and terminals. A description of what an MPO is is contained in a recent Government Accounting Office (GAO)

report of metropolitan transportation planning. The GAO said:

“An MPO is not a discrete decision-making body with real jurisdictional powers but can be viewed as a consortium of governments and other bodies – such as transit agencies and citizen groups – that join together for cooperative transportation planning.”

Funding Support for Planning: The National Park Service has about \$6.5 million annually to support general management planning and there are about 380 park units. On the DOT side, we support the development of metropolitan area and statewide transportation plans through our two planning programs. The FTA provides a little more than \$50 million to MPOs to conduct transportation planning on an annual basis. We fund more than \$10 million annually to the states for statewide planning. The programs require a 20 percent local match. FHWA allocates over \$200 million to the states for the use by MPOs and statewide planning. In the aggregate, there is a little less than \$300 million for transportation planning, where the Park Service has a little more than \$6 million.

We require MPOs and States to annually develop a unified work program that tells us what they are going to expending those moneys on. These are called Unified Planning Work Programs (UPWP) and State Planning and Research (SPR) Programs. The work program is jointly reviewed and approved by FTA and FHWA. There is the opportunity for other local agencies such as a National Park to participate in that UPWP or the SPR program and to receive funding for various activities, if you can identify a link between your needs and the transportation planning needs for the region. This can be another source of funding for your transportation planning activities. You need to discuss your planning needs with MPOs if you are in an urbanized area or for rural areas with the state DOT.

For urbanized areas over 200,000 – which we call Transportation Management Areas – there are additional requirements. They have to prepare a congestion management plan, and they are also subject to a detailed review and certification of

their planning process every three years. The purpose of the certification is to determine if the MPO is in compliance with the joint planning regulation.

The key goal of the MPO is the development of the long-range transportation plan with a twenty-year time horizon. They have had to develop a travel forecasting process or a modeling system for use in urban transportation planning and programming. The MPOs have demographic information – population, employment, socio-economic data, traffic data, etc. for the base and forecast year. That data may be useful to you in your planning activities. For rural areas the state should have similar information that could assist you in your planning activities.

The work program results in the development of the twenty-year plan and also the TIP that lists the projects that the MPO intends to implement over the next three to five years.

There are seven planning factors listed in TEA-21 that the MPOs and the states are required by statute to consider in their transportation planning process. These are:

- Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity and efficiency;
- Increase safety and security of transportation system for motorized and non-motorized users;
- Increase the accessibility and mobility options available to people and for freight;

- Protect and enhance the environment, promote energy conservation and improve quality of life;
- Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight;
- Promote efficient system management and operation; and
- Emphasize the preservation of the existing transportation system.

In summary, the products of the planning process will be as follows:

- Unified planning work program: the annual list of activities identified by the states, MPOs, and other participating agencies.
- Transportation plan
- Transportation Improvement Program
- Congestion management systems and other management systems (larger metropolitan areas only).
- Major investment or corridor studies
- NEPA clearance for projects
- State implementation plan for air quality
- Air quality conformity determination

Should you have any questions about either the metropolitan or statewide planning processes in your region please contact the FTA or FHWA field offices. Their addresses are on our web sites ([www.fta.dot.gov](http://www.fta.dot.gov) or [www.fhwa.dot.gov](http://www.fhwa.dot.gov))

## Regional and National Park Service Transportation Planning and Coordination Workshop Summary

*Renee Sigel - Moderator*

*Transportation Planner*

*Federal Highway Administration, Central Federal Lands*

### Session Purpose

1. Document context for decision-making in regional and national parks transportation planning
2. Document opportunities for cooperation/coordination in:
  - Approaches to resource protection
  - Ways to improve visit or experience
  - Support of regional economic goals
3. Document future needs in process design, data collection, methodologies, and research

### Key Challenges / Barriers

- Time
  - Difference in funding cycles
  - Disjointed time frames
  - It takes too long to deliver projects
- Funding
  - Inability / difficulty to merge multiple funding sources
- Communication
  - Intra-agency communication
  - Conflicting solutions for Parks versus Gateway communities
- Consistency
  - Contradictory regulations / policies
  - Each agency has a separate mission
  - Lack of internal consistency within National Park Service (NPS)
  - Agency culture creates staff discontinuity
  - Inability for NPS to develop an annual program
- Staff
  - Lack of NPS staff dedicated to transportation issues
  - Perceived reluctance of NPS to address transportation issues

- Other Barriers
  - Lack of information and knowledge about the planning process and on how to view the problem.
  - Territorial, parochial, and traditional ways of doing business
  - Too much regulatory over burden
  - Congressional earmarking of projects
  - Workshops not leading to action

### Solutions and Opportunities

- Foster communication with others
  - Work with advocacy and citizen groups to gain support
  - More communication with local elected officials and congressional delegation
  - Develop links between NPS Web site and transportation-related Web sites
  - Share success stories
- Coordinate planning efforts
  - Define Scopes of Work as Specifically as Possible and as Early as Possible
  - Proactive NPS involvement in State, metropolitan planning organization (MPO) and local transportation planning
  - Proactive State DOT involvement in NPS general management plan (GMP) planning
  - Multiple Parks in a state/region should cooperatively plan around critical issues
- Data collection efforts
  - Get baseline data
  - Consistent origin-destination studies within Parks and regions
  - Marketing studies
  - Data summit
- Information sharing and technology transfer

- Joint Education/Training of State, Local and NPS Staff on Transportation Processes
- Align With Universities to Utilize Their Resources
- Finish NPS Transportation Guidebook
- Transportation Web site for NPS
- Networking
  - Introduction of National Park Service Staff to State, Regional and Local
  - NPS Should Know the State DOT Staff on a First Name Basis
  - Need Access to Transportation Experts
- TEA-21
  - More Opportunities for Inter-agency Interaction
  - Consider Changing NPS Transportation Planning to a Statewide or Region-wide Approach
  - Transportation Planning Staff TEA-21 Has Created Joint Funding Opportunities
- Update and complete GMPs and other NPS plans
- Consider Carrying Capacity Data in Travel Demand Analysis





## Session Reports

### Traffic and Demand Management Alternatives for National Parks “Yosemite Access & Traffic Congestion”

*Susan Dona*

*Transportation Planner*

*California Department of Transportation, New Technologies Program*

Today I’m going to give a brief description of Yosemite National Park, and then we’ll talk about the Yosemite Area Regional Transportation Strategy (YARTS), and finally Yosemite Advanced Traveler Information (YATI).

Yosemite Park is nearly 2,000 square miles, which is about the size of Rhode Island. The majority of visitors, however, go to the valley, which is a very small area about seven miles long and one mile wide.

The valley was first protected as a public trust for California by an Act of Congress in 1864, which stated, “Yosemite is to be held for public use, resort, and recreation – and be inalienable for all time.” A Congressional Act of 1890 resulted in Federal control of the valley in 1906.

Four million people per year visit the Park. That equates to over 800,000 automobiles and over 14,600 buses annually. During the peak season, around 6,000 vehicles enter the Valley per day; there are only about half enough parking spaces for those vehicles. During the summer months traffic jams have become very common in the Valley. It can take an hour and half to go from the Visitors’ Center to Curry camp, which are less than a mile apart.

Economically, those 4 million people are extremely important. They contribute about \$3 billion to the local economy: \$300 million in retail and \$2.7 billion in services. Park visitation is expected to grow to over 5 million people per year by the year 2010. Yosemite is not the only attraction in the area. There are many visitors that include trips to the quaint and historic Gold Rush communities near the Park on their itineraries. Restricting access to the Park would result in a negative impact to these surrounding communities.

The Yosemite Area Regional Transportation Strategy (YARTS) was formed in 1992 to explore alternatives that would provide unlimited access to the Park and reduce the negative impacts of automobile traffic. The management board includes representatives from the five counties surrounding Yosemite, the National Park Service, the National Forest Service, and ex-officio members from Caltrans, the Federal Highway Administration and the California State Department of Tourism. There are also a multitude of stakeholders on the Technical & Citizens Advisory Committees. The YARTS group was formed to develop with a transportation plan with the following objectives:

- Increase transportation options,
- Reduce reliance on automobiles,
- Support local economies, and
- Improve regional air quality

To accomplish this task, the group identified three different approaches:

- Advanced Traveler Information System
- Automated Traffic Monitoring
- Coordinated Transit

I’d like to talk a little about Yosemite’s Advanced Traveler Information System (YATI). This system has been operational for four years. It includes five changeable message signs (CMS), five Highway Advisory Radio (HAR) stations, Internet-based interactive kiosks, and a Web site. The CMS and HAR provide information as people are approaching the Park. They provide road and weather information, parking expectations, information on emergency conditions, and alternatives at entry points. The kiosks provide traveler information to visitors in the Park and approaching the Park. The web-based kiosks and the Web site also provide information on lodging, dining and services, and special

events. The YARTS/YATI Management Board was formed as a public non-profit corporation to ensure that the revenues obtained from advertisements on the Internet home page are effectively used for support and improvements to the YATI system.

We asked the Institute of Transportation Studies at the University of California at Davis to evaluate YATI's acceptance. Based on surveys of Park visitors and Internet users, the overall impression of each of YATI's elements is positive.

- HAR Rating: 62 percent favorable
- CMS Rating: 61 percent favorable
- Kiosk Rating: 83 percent favorable
- Internet Rating: 87 percent favorable

I would like to add that UC-Davis has had a difficult time evaluating behavioral changes resulting from YATI. About the time YATI was deployed, Yosemite had a series of natural disasters including floods and slides. Anticipating

Mother Nature's cooperation, we hope to obtain better information this year.

Future steps for YATI's development include improving the system by improving the Web site, providing parking information using a parking monitoring system, and providing information regarding transit alternatives that have been adopted by YARTS.

Future steps for YARTS include the following.

- Provide voluntary transit service between the gateway communities and the Park. There will be a demo project for this starting in the summer of 2000.
- Improve traffic management by monitoring vehicles entering and exiting the Park.
- Install closed-circuit television cameras to observe traffic in problem areas.
- Add sensors to monitor parking areas to determine availability.
- Improve the accuracy and timeliness of bulletins disseminated by the YATI system.

### **“Branson TRIP Experience”**

*Tom Ryan  
Assistant Division Engineer, Traffic  
Missouri Department of Transportation*

I appreciate the opportunity to be able to share the experiences we've had in the Branson area. Branson has a lot of similarities to a National Park. It is in a rural setting in the Ozark Mountain range with primary rural roadways serving a very high percentage of visitors. The population of Branson is 3,700 with an estimated visitor attendance of over 6 million.

The Missouri Department of Transportation (MoDOT) is improving the major corridor (US Route 65) that provides primary access to the area to a freeway/expressway standard roadway facility. Local roadways are also being improved, however, the major local roadway that is lined with many commercial attractions is Route 76.

Route 76 is a three-lane roadway that carries about 37,000 plus vehicles per a day, so there's been a lot of effort there to look at how to handle congestion throughout the peak periods.

One of the things I'd like to talk about is how we developed and deployed, or have tried to, a fully operational advanced transportation information system. Integration of this system was a very difficult task. The process included integration of the roadside equipment to gather and collect transportation information, the evaluation and presentation of this information then the dissemination of it out to the traveler. Most of the integration efforts that we implemented could be considered at a National Park. Communication is

also a very important part of this integration effort that includes communications to roadside devices, to the Traffic Information Center and to the transportation users.

Integration leads me to the second item: partnership opportunities. Why were partnership opportunities important to this project? We were able to bring a number of partners together to utilize limited resources in helping address the flow of traffic in the Branson area. These partners helped identify concerns of area transportation users and potential links to advanced technologies to assist in addressing these concerns.

Branson TRIP used an abbreviated system engineering approach. This approach is addressed in the Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21) legislation as a method to use when addressing advanced technology integration. This method could be used when looking at any system in the transportation area. One of the simplest explanations for the systems engineering approach is that it is a set of steps that identifies user needs and then incorporates them into the system. Properly identified systems based on user needs should last the life of the system components.

With technology changing daily, it is very hard to assess and recommend the appropriate level of technology. The system engineering approach is good method to help in this evaluation. We wish that more time could have been spent in the planning of the Branson TRIP project through this method. A better product would have resulted. We pushed to try to get some components going to demonstrate how the system would operate. Expectations were high in this highly commercialized area which resulted in some negative views of the system (we oversold).

There are six elements in the systems engineering approach that we looked at.

- User requirements. This goes back to making sure that we meet our customers' needs. The first thing to understand about user requirements is the type of users. In Branson, we

have a high percentage of first-time visitors, people coming to the area who are not familiar with it. We also have repeat visitors who visit three or four times a year. The other type of user we have is the local user. This includes the regional service providers, such as emergency, transit, ambulance service, or commercial vehicle operations that provide service to the Branson area. The other component of the local users is the work force. I want to mention them because they can be one of your strongest supporters.

Other user requirements are the types of vehicles, which vary throughout the year. Most of the people who come to Branson come from a one-day travel radius in vehicles, from places such as Illinois, Iowa, Kansas, Nebraska, Texas, or Oklahoma. In the summer, families traveling in cars are the primary visitors. In the spring and fall, we have recreational vehicles and buses that bring people to Branson. Commercial vehicles that provide services and products in the area are year-round users. We also have some special vehicles like duck-shaped trolleys.

- System Requirements. Once you identify the user requirements and get to the base of what they need, then you look at what system requirements can help address those user needs. Providing traffic information was a need we identified. In Branson, we have a local roadway system made up of red, yellow and blue routes that parallels the congested Route 76. The city of Branson and MoDOT have improved these routes to provide less congested alternate roadway facilities to help reduce congestion along Route 76. The ability to divert users to and ensure users that these alternate routes will get them to their final trip designation was a requirement. The second part of system requirements, which I'm not going to get into, is transportation facilities. Reliable weather information is critical for the traveler. Incident information is also critical: how do you move people past incidents? The last two things we got into are not really related to transportation. However, our customers out there want to know where the available services (lodging, food, etc.)

and recreation activities and attractions are located.

To meet your system requirements, you need to identify and link all needs back to system requirements. You should explore integration opportunities and partnerships. You need to identify future expectations, so you have a vision of where you're going. This vision should guide you; however, it should not control all future decisions. Don't let resource limits or technologies drive the system requirements. You can't build it all at one time, but you should at least have the vision out there. You also need to identify early winners. Look at what other agencies have done in similar areas.

- System Architecture. The system architecture shows how the system works. It looks at regional and local needs. It uses a national perspective, so it strives to be interoperable, integrated and open. Software or system integration can be a major consideration during this part.
- System Design. The first step in design is to evaluate solutions. That's when you start looking at the technology options and the non-technology options. A non-technology application may mean a static sign that tells you to listen to highway advisory radio. There are a lot of non-technology applications that can be used. For example, we have signs showing where the red route is located and provides route confirmation. You want to look at alternatives: what are the life-cycle costs? Is this technology available and proven? What are the benefits?

You need to identify roadside components, defining the standards and specifications you are seeking. You want to identify the communications components as well. As transportation engineers, we don't deal with communication networks very often. This is also a great opportunity to partner with those who have these capabilities. We are working

with a cable television station to provide communication services. Information from this system can be disseminated over their Vacation Channel. You want to work with complimentary partners.

- Implementation / Deployment. The first part of implementation needs to be increasing awareness, using the media, local supporters, and the political community. They should know what the system is about, how we use it, why we use it. They will in turn transfer that information to the local community.

You want to use proven technology. We made a mistake with our cameras by selecting an untested unit. You need to provide training and staffing for the center early in the implementation process. The next step is acquisition of equipment, including roadside devices, hardware, the software interface and communications. Installation expertise is also important to transfer operation and maintenance information.

- Operations and Maintenance. You will have operational and maintenance costs. Try to use technology transfer for the maintenance and operation of components. In Branson, we would not been able to staff the Traffic Information Center 24 hours a day, seven days a week. The Branson police stepped forward and filled the roles as operators for this level of service. They also provide the facility to house the Traffic Information Center.

Some of the technologies that we implemented as a part of TRIP include:

- Cameras with pan-tilt-zoom features
- Highway advisory radio
- Detector stations using in-pavement traffic loops
- Web site ([www.branson.tripusa.com](http://www.branson.tripusa.com))
- Kiosk – Internet communications
- Dynamic message signs

## “Traffic and Demand Management Experience in Selected National Parks”

*Bill Byrne*  
*Vice President*  
*BRW, Inc.*

I'd like to talk about three examples of visitor and traffic management systems that are already operating in Parks today. Because these systems have been actually operating in parks for some years, you can imagine that they're primarily low-tech or no-tech right now. The three parks I'll talk about are the Denali National Park and Preserve in Alaska, Point Reyes National Seashore near San Francisco on the Pacific Coast, and Mesa Verde National Park in Colorado.

### Denali National Park

Denali is a very large park: about three times the size of Yellowstone at 6 million acres. Despite that, it only has one road providing access. Mount McKinley is a big attraction that gives you some scenic viewing of Alaska. But equally important is the ability to see wildlife in a natural setting. People talk about the “big four” they like to see at Denali: the grizzly bear, the caribou, the moose, and the wolf.

Until 1972 this park was only reached by a very arduous, long trip along an unpaved highway. But in 1972 the State of Alaska paved a highway from Anchorage to Fairbanks, which passes right by Denali. Park staff had the idea that this paved access would create a huge increase in visitation to the park. So they took action that year. The way vehicle access is provided today beyond milepost 13 is to have a permit, and the only way to have permits is to have a campground registration, to be a professional photographer, to have a scientific reason for being there, or to drive a tour bus, which provides access for 95 percent of visitors.

The park manages the annual vehicle trips on the park road to a level of no more than about 10,000 vehicle trips per year. They put this restriction in place as soon as the paved highway access was completed. Why did they restrict vehicles? The road is extremely narrow, in some places it's

only one lane, and it's highly exposed, and they didn't want to disrupt the views. The second and probably most important thing was they saw the potential that more and more vehicle traffic would displace wildlife, and take away the whole purpose of coming to the park. And along with that, there was the potential of actually changing the migration habits and threatening the wildlife of the park. And finally, there was concern about the dust from the traffic along an unpaved road.

The infrastructure is low-tech. There is a check-point that is staffed by park rangers full-time. Those rangers manually check whether there are permits held by the people that are operating the vehicles. They manually take vehicle counts by vehicle type for monitoring purposes. Permits are distributed at a visitor access center. Since they restrict automobile traffic, they use shuttle and bus service as a travel alternative.

Some of the problems at Denali include: there was a lack of visitor understanding in advance of vehicle restrictions and the distribution of tickets for the buses, which are also limited. There were also two bus operators: one was a concessionaire that was largely used by cruise ship passengers, and the other was contracted with a separate entity by the Park that charged no fare. Now they have integrated the operations and they charge a fare such that it recovers the cost of service. Three years ago the Park changed their policy to allow visitors to purchase tickets in advance. They've worked with the travel industry to get the information out as well. Their main challenge now is that their visitation has grown to the point that it is exceeding the capacity of the buses.

### Point Reyes National Seashore

Point Reyes is entirely on the other end of the scale in terms of size: it's fairly small at 54,000 acres. It is located on the Marin coastland, about an hour from San Francisco. Its visitation is highly influenced by the whole San Francisco

Bay area, whereas Denali is a destination by itself. In the summer, it is used for beach and hiking trips. In the winter and spring, the use focuses on whale, elephant seal, and sea lion viewing. This only happens for a few weeks out the year at a couple of locations. So on busy weekends in the winter and the spring private vehicles are prohibited south of South Beach, and are diverted to a large parking area at Drake's Beach. Then there is a shuttle service that provides service to the lighthouse and Chimney Rock from the Drake's Beach parking lot.

Why do they restrict traffic? The parking areas are inadequate for the demand, with the result that there are congestion and safety problems from roadside parking.

The infrastructure is basically no-tech. They have a little portable box they set up at the roadside, and a temporary staff person sits in the box, and flips down a hand-operated a gate. The parking area is staffed by park rangers and sales staff. The only other element is changeable sign boards along the road as you approach showing alternative parking locations. They have bus service that provides an alternative for people who are prohibited from driving to the lighthouse and Chimney Rock.

Problems they've had at Point Reyes: visitation is high when the weather is good, and when the weather is bad nobody comes. They have a wonderful contract wherein they can call the bus operator Friday night and cancel service without being charged, or call Saturday morning and pay only half. So they can turn the system on and off at will. They have a very limited budget; they always run out of money. The roads that provide access have not been maintained as they should be. The condition of the roads makes it difficult to operate the buses. They're not sure of the visitation capacity of the areas served by the buses, and so they aren't sure how many buses they should send to an area. They are conducting visitation studies to address that.

#### Mesa Verde National Park

Mesa Verde is in a very remote location. A long drive from the primary highway is required to

reach the visitor center. The main thing that people come to see is the archeological sites from Anazasi Period. The cultural resources are very fragile and, of course, not replaceable. The Park Service has limited ability to "harden" or protect areas from damage. There are three primary visitor use sites. For each of these sites, visitors must have tickets and take a guided tour for access to the sites. Tours are conducted every half-hour, and tickets are sold same-day, in advance at the Visitor Center. While you're waiting for your ticket time, there are additional sites that may be visited.

Why did they limit visitors? The park is committed to providing guided tours for several reasons: to protect the resources, to provide a good experience for the visitors, and to keep crowding down. They want to protect the fragile resources. And they want to keep the site close to the original condition, without lots of concrete and guardrails to protect the resource that would take away from the experience.

For infrastructure, it's a little more high-tech than the other parks but not much. They have a ticket allocation system, implemented with a computer program. The ticket booth is staffed by volunteers. They use fixed signs at the gate and along the highway to notify people that tickets are required. However, the signs can't let visitors know whether they're going to be able to get tickets at a convenient time. At every park, it's a challenge to provide information transfer to the gate. They use ticket fees to cover the cost of the system.

In terms of problems, it's difficult or impossible to let visitors know before they make the half-hour drive to the visitors center when they might they get to see the sites. There's a long drive to the visitors' center before you know anything about the Park. Visitors get their ticket time and then they congest the areas that are not restricted. Like Denali, there's not an ability to make advance reservations. They're considering a new contact station near the boundary of the park to provide additional information. They're considering a possible transit service from that contact station to the sites. That would help to control the overflow of visitors. A part of that project they

are considering is getting real-time data back to the ticket sellers. They are also considering overall access limits as well, and not just limits for site access.

### Common Issues

The following common issues were found among the three parks.

- You need a basis to decide what the right visitation level is
- You have to balance resource protection with the visitor experience
- You need to consider the capacity of the facility
- There's a short busy season
- You need to look at the spillover to unmanaged areas
- There are potential spillover impacts to neighboring communities, either for visitation pressure or economic impacts
- Visitor management is frequently combined with alternative modes
- At most parks, the limiting factor on facility capacity is not the roadways but the size of parking areas
- You need to provide sites for parking to use alternative transportation
- How do you get infrastructure in remote locations?
- There's an increasing challenge for National Park Service sites to attract employees to work in the Parks
- How do visitors know how to plan their visit?

## Traffic and Demand Management Alternatives for National Parks Workshop Summary

*Lloyd Rue – Moderator  
Traffic/Safety Engineer  
Federal Highway Administration*

### Session Purpose

1. Document existing or planned infrastructure
2. Document typical level of understanding of traffic management alternatives and benefits
3. Discuss example applications to manage challenges (e.g. entrance gate congestion, network capacity, etc.)
4. Discuss thresholds (performance criteria) that may dictate traffic management strategies to be implemented
5. Discuss institutional issues and political concerns of traffic management strategies

### Existing Infrastructure Elements

- Traffic counters/sensors in Parks – need to be tied to central database
- Concession contracts
- Outside information (DOT's and gateways)
- Entrance stations
- Denver service station – STARS (accident records)
- Internal radio (maintenance, emergency)
- TOC from Gateway Communities
- Future cellular coverage – cell towers (service is currently limited)
- HAR coverage incomplete
- Web sites with general info, road information on construction and closures
- Weather stations
- Most Parks currently not adding new infrastructure, mainly making small safety improvements

Each Park unit maintains different sets of devices and technologies that assist in managing and operating the facilities. These technologies provide a non-uniform level of information to the consumer. It does not appear that the devices and technologies are yet designed with system functionality. These elements do present an ever-

increasing set of tools to assist in overall facility and traffic management.

### Planned Infrastructure Improvements

- Entry pullouts with visitor information
- Telephone information lines
- Independent trails/bike routes (not all units)
- Visitor centers at outlying communities, hotels, etc.
- Reservation system (camping, hotel, events)
- Shelter from weather
- Americans with Disabilities Act (ADA) compliance
- Roadside assistance
- Bike racks with locks
- Vehicle security in parking lots
- Child carriers/strollers
- Child seats on buses/transit
- Increased road maintenance with increased bus loading
- Preservation/preventative maintenance (increase to \$160 million, shift to 3R)
- Asset management system

In general, most Park units do not suffer from “congestion” as experienced on non-Park roads. Intersection capacity, for example, is not a limiting factor. Infrastructure improvements are weighed heavily against the potential resource damage or impairment. Parking demand and on-the-road queues from animal sightings are common causes of congestion.

### Barriers to Traffic Management

- Tend to be less understanding of traffic management systems in rural environments
- Denial by managers that pedestrian loading in Parks is approaching urban levels
- Differences in perception of users vs. managers especially related to travel delays (users are much more accepting than staff )



- Demand forecasting needed – funding levels still too low
- Applications of roadside signing differ in Park units – each Park has its own style
- Not enough inter-Park sharing of information
- Land forms and vistas tend to govern transportation decisions
- Regional transportation centers
- Information clearinghouse
- Multi-agency regional planning

Park units do not hire traffic engineers; rather landscape architecture professionals address the traffic challenges. Traffic management solutions seem to always be constrained by resource impairment issues. Competing goals limit the Park's ability to deploy traditional traffic management solutions. Plus, the demands of the moment take away from longer term planning when longer term planning is essential toward developing management systems. Whether or not Park managers value or understand the public's perception is an issue that surrounds the viability and sustainability of proposed Park actions. And, finally, the barriers to traffic management are only worsened by the turnover in the Park Service's upper-management ranks.

#### Example Applications to Manage Problems

- Data collection
  - Loops and other low-tech systems
  - Electronic parking monitoring
  - Live video primary use area/parking
- Pricing
  - Exit charges based on usage duration
  - Value pricing
  - Alternative payment methods
- Support for alternative modes
  - Automatic vehicle location (AVL) for transit vehicles
  - Transit/High-Occupancy Vehicle/Bus Only Entrance
  - Time restrictions on bike use
  - Transit management
- In-vehicle information
  - Tour tapes
  - Virtual ranger or computerized in-vehicle information
- Entry management

- Electronic pre-clearance coordinated with Gateway Communities
- Business process engineering (entrance fee collection by concessionaire)
- Separate staff entrance
- Express entry
- Traffic flow management
  - Demand management
  - Intersections rarely problematic
  - Load and vehicle length restrictions
  - Manage traffic with land use
  - Direct visitors to parking rather than places
  - Call boxes
- Enforcement with education and communication
- Amusement park management styles

Non-typical solutions are difficult to implement within the Park's operating environment. Resource and social equity issues can quickly defeat deployment initiatives. It is within the recent past that the Park units began to look beyond Park boundaries in deploying applications or solutions. The need for a unified approach in implementing technologies is evident, particularly when viewed by the consumer perspective.

#### Thresholds Dictating Traffic Management Strategies

- Environmental Thresholds
  - Air quality
  - Resource condition
  - Noise
  - Wildlife levels
  - Construction
- Visitor Thresholds
  - Access to popular sites
  - Visitor feedback/level of satisfaction
  - Queuing
  - Crowding
- Park Management Thresholds
  - Management support
  - Operations and maintenance
  - Staff utilization
  - Time restrictions
- Transportation Constraints
  - Infrastructure

- Safety
- Parking capacity controls
- Bus parking
- Economic Considerations
  - Money
- Community / Regional Considerations
  - Staffing political support
  - Effect on local economies
  - Gateway Community capacity and resident perceptions

Thresholds would need to incorporate numerous variables. Self-regulation and self-selection can be beneficial. For example, when crowding becomes too much for some consumers, these consumers may opt out of the experience, or choose a less crowded time period. Should traffic management strategies improve accessibility during high-use periods, there is potentially a higher impact on the resource due to increased density of consumers. Also, the difficulty with any instant measure of the quality of a Park resource is that the damage may be irreversible.

#### Institutional Issues

- National Park Service
  - NPS management policy
  - NPS staff external communication skills - training
  - Dialogue between Parks and tour agencies
  - Relationships between Parks and private sector
  - Carrying capacity of infrastructure
  - Traffic demand management
  - Infrastructure maintenance
- Gateway Communities / Visitors
  - Gateway Community awareness
  - Public perception of service
- Coordination

- Multi-jurisdictional cooperation, especially between Parks and Gateway Communities
- Cooperation between wildlife and humans
- Staff shortages for communications with DOTs
- Cooperation with DOTs on transportation improvements
- Conflicting goals (Transportation - Air Quality (see multi-jurisdictional cooperation))
- Interagency forum on important joint issues
- Stakeholder involvement
  - Outreach
  - Stakeholder communication
- Resistance to change
- Leadership turnover
- Priorities
- Difficulty in long-range planning process (“crisis management” prevails)
- Funding
- Political issues (purchasing and procurement contracts, safety and design concerns)

The greatest challenge is not one created by lack of technological capability. It is within and between the institutions that insurmountable obstacles are found. Not only are the challenges within the major institutions, the obstacles are also found between the major institutions, local governments and advocacy or special interests groups. Managing the crises of the moment consumes a tremendous amount of resources. Combined with constant leadership turnover, crisis management blocks the way for longer term planning. Budgeted funds and fiscal constraints diminish the Park’s ability to develop longer-term projects in the event long-term planning defines a workable strategy.

## Session Reports

### Transit Alternatives: Shuttles to Light Rail Service

#### “Inventory and Assessment of Visitor Transportation Systems”

*Tod Rosinbum*

*Parsons Brinckerhoff*

Back in 1996, three years ago, we began a survey of all the visitor transportation systems. We talked about what we were going to define as a visitor transportation system (VTS), because some might think that any part of the transportation system of the National Park Service is a visitor transportation system. We narrowed a VTS down to public transportation in the National Parks System that is typically managed by the park, and is generally required to access the park’s resources. So something like a tour bus operator, for example, is not included in our survey, because that is not something that most visitors would typically need in order to view the park’s resources.

Currently, fifty parks have visitor transportation systems. Parks are expanding their existing VTSs and new VTSs are being implemented in places like Zion, Arcadia, and Grand Canyon. There is tremendous diversity in VTSs. Some are as small as a single bus, a van, or a tour boat. The largest size fleet, at the last count, was at Denali, which has 72 buses. VTS ridership varies quite a bit, too: some as low as less than 1,000 riders per year, up to over 3.6 million riders per year.

Of the fifty national parks that have visitor transportation systems (VTS), there are 63 VTSs that we surveyed overall: 32 of them are surface visitor transportation systems using rubber tires and steel wheels; 30 are water-borne; and there’s one seaplane operation that we surveyed. It’s interesting that there was such a balance between surface and water-borne transportation systems in the National Parks. VTSs are found all across the country: from the Everglades to Denali, from the Virgin Islands to the Hawaiian Islands.

Roles of VTS. As we surveyed, we asked the respondents to rate the development and degree for the various roles for the VTS. Some of the typical roles of a VTS include the following.

- Access to park resources. This is the most obvious role of VTSs in the parks. We asked in our survey how many parks used VTS as the sole access to the park, and a surprising number used VTS as their sole access – 22 percent of the surface VTS systems, and 23 percent of the water-borne VTS systems.
- Visitor enhancement. This includes interpretive opportunities, ways to simplify travel within the park, and making it easier to see the park’s resources. Almost two-thirds of the respondents said that visitor enhancement had a high degree of relevance to the visitor transportation system.
- Resource protection. Another role of the VTS is to protect the resources from traffic congestion, noise, air pollution, and their adverse effects on the resources. About half said that resource protection had a high degree of relevance to the visitor transportation system.
- Cost-effectiveness. VTSs may also be used as a cost-effective alternative to new road construction, roadway widening, or more parking. Forty-eight percent of respondents said that was very relevant to the implementation and operation of their visitor transportation systems.
- Sustainability. We defined sustainability as enhancing the sustainability of the park and increasing energy conservation. A little less than a third said that that had a high degree of relevance to their visitor transportation system.

Of the four elements – visitor enhancement, resource protection, cost-effectiveness and sustainability – we asked which was the primary purpose of the VTS. More than half of the respondents (59 percent) said that visitor enhancement as the primary purpose. Resource

protection had 22 percent of responses, and cost-effectiveness had 5 percent. No one said that sustainability was the primary purpose for the VTS. That may have to do with the definition of sustainability; one could say that a lot of these roles have everything to do with sustainability.

VTS Service Delivery. The number of government-owned and operated VTS, where the government owns the equipment and staff operates the equipment, is 14 percent. Twenty-one percent of the VTSs are where the government owns the equipment, and a contractor or concessionaire operates the equipment. The majority of VTS in the national parks are owned and operated by the concessionaire. That's not to say that one is any better than the other is; it may have a lot to do with how the VTS evolved at that particular park and what the requirements of the VTS are. For example, Jim Tuck from Grand Canyon National Park talked a lot about issues in his system, and the system they're putting in the Grand Canyon will be a concessionaire-owned and operated system. That has a lot to do with how to get financing: to come up with \$150 million is not easy thing for any government to do. But if you get the private sector involved in a concessionaire relationship, it makes it more implementable.

Seasonal versus year-round. The majority of the VTS are seasonal – 58 percent operate during the peak season; less than a third operate year round. Summer is most often the peak season in terms of VTS – 71 percent of them operate during the summer; lesser percentages have peak seasons at the other times of the year.

Route variations. Most of the VTS – 84 percent – are on fixed-route service. There are a few that vary their routes on demand, and all of those are water-borne transportation systems. They vary with demand primarily due to the resource itself.

Schedule variation. The majority – 79 percent – of the VTSs operate on a fixed schedule; however, quite a few have weekly adjustments to their schedule, a third have daily adjustments to the operations schedule of their VTS.

Types of VTS equipment. Forty-one percent of VTSs are rubber tire transportation (including trams, buses and vans); 5 percent are rail or trains; and 40 percent are ferries and boats, with most of those being passenger-only.

VTS fleet propulsion. In terms of propulsion systems of the VTS, most of them – 82 percent – are gasoline or diesel, and only 8 percent at the time the survey was done were alternative fuels, electric, propane or compressed natural gas. I think that percentage of alternative fuel vehicles has grown since this survey. Based upon all I'm hearing today, I think that we'll certainly see a lot more alternative fuel vehicles in the national parks in the future.

Performance assessment. We asked the respondents to give us a performance assessment of their VTS. We asked them how many routes have trips that are filled to capacity – 66 percent said they did. Twenty-eight percent of the routes are completely full for more than 50 percent of the trips. That's pretty good; if you compare that with your typical urban mass transportation system, that's quite a difference. About 47 percent of the routes have riders left behind, albeit that most of the time they don't have riders left behind but 7 percent had riders left behind more than 25 percent of the time.

On-time performance. Fifty percent of the routes operate on-time at least 90 percent of the time. I think this is somewhat less than most urban transportation systems, and that has to do with the nature of the parks; people are more interested in seeing the resources than in keeping on a schedule. Twenty-five percent have service failures due to inoperable equipment, and five percent have service failures due to operator shortages.

Condition assessment. Twenty-one percent of the vehicles or vessels are in poor condition. 75 percent of the vehicles or vessels are twelve years old or older. Twelve years is a typical replacement for an urban transit bus. If you look at the data a little more closely, some of the vehicles are special, antique-type vehicles that create part of the ambiance of the national parks. Fourteen

percent of the VTS facilities are in poor condition.

VTS fares. The condition of VTS facilities gets back to providing the finances, the funding for national parks and their visitor transportation systems to keep in good operating condition. Sixty-eight percent charge a fare for VTS, 8 percent vary their fares by season, and 58 percent charge less for children and seniors.

Financial support. In terms of financial support, if you want to call it subsidy or what have you, 25 percent receive payments from the National Park Service in terms of a percent of the entrance fees, or surcharges, or funds from the general fund. Fifty-eight percent, quite a lot, actually make payments to the U.S. government, to the Treasury. Those are in terms of usually a percent of gross revenues. There are some other sources that are used to fund or support the finances of the visitor transportation systems, in terms of donations, grants and contributions.

Maintenance and safety. We asked them about their maintenance and safety procedures, and found that a surprisingly low number have written maintenance procedures. Fifty-five percent of systems have written maintenance programs. Only about a third – 36 percent – have written safety procedures.

Future modifications. In terms of asking what they felt would be in their future for modification, the VTSs looked to the following major modifications:

- alternatively fueled equipment,
- expanded service coverage,
- higher service levels in terms of hours of service and frequency of service,
- facility upgrades,
- new VTS systems, and
- partnerships.

## “National Parks and the Auto: A Historical Overview”

*Kevin Percival*

*Technical Specialist – Transportation Design  
National Park Service*

As the National Park Service (NPS) establishes formal programs and mechanisms for the implementation of visitor transportation systems (VTS), we must first identify where VTS is truly needed and appropriate, what challenges we face in its implementation, and what the visiting public will expect of the NPS as the agency moves into this new realm of operations and visitor services.

In addressing those issues and challenges, we need to take a historical perspective of access to National Parks in the United States. The National Parks have a long and storied tradition of access, primarily centered around the automobile. The automobile is ubiquitous in American society, being heavily influenced by industry, popular

culture, technological advances, economic prosperity, and federal programs and initiatives. As the NPS moves into alternative transportation systems to the automobile, we can learn from the history surrounding the auto and potentially apply some of its lessons to the alternative modes program.

Access to National Parks cannot be addressed without first speaking of the influence of the railroads. The railroads were greatly influential in introducing the western National Parks to the country, firmly establishing them in American lore and cultural psyche. The railroads attracted a relatively affluent clientele in the early years, one which had both the time and financial resources to partake in an extended trip out west. The

railroad guests were entertained and taken care of as part of a very well orchestrated experience. This experience was very important in establishing future expectations of National Parks. In many cases, the railroads built the memorable visitor facilities, early carriage roads, early interpretive programs, and eventually, a national image of what National Parks were to be. Through magazine ads and announcements in railroad stations across the country, a growing visiting public became aware of the lure and the lore of those great parks out west.

Later years saw the establishment of auto tours in and around the parks, still serving a relatively affluent clientele. The auto tours provided similar highly orchestrated, entertaining, and provocative experiences, along with the ability to travel greater distances in shorter periods of time than with horse-drawn carriages. The auto tour also provided the ability for expansion of services, accommodating greater numbers of guests, and yet larger fleets of buses and auto carriages designed specifically for a touring public.

Eventually, the private auto became affordable and mass-produced, greatly changing the physical and psychological patterns of travel to and through National Parks. Travel to the National Parks was now affordable to a wider audience not dependent upon the schedule or costs associated with the more expensive train vacations. The private auto also provided a great deal of spontaneity, allowing a freedom of choice in schedule, sites to visit served by roads, and of places to camp or stay along the way. Accompanying that freedom of choice and the surge of popularity among private auto ownership was resource damage. Before the private auto, facilities were built ahead of the arriving guest, greeting them as advertised. The private auto transformed the invited guest into the unannounced visitor, creating a situation where facilities and accommodations for the visitor and their cars could not keep pace. The National Parks were quickly transformed into playing a game of catch up, trying to meet the demand so suddenly created by the auto visitor.

In 1920, the concept for a park-to-park highway linking the western National Parks was presented

to Congress in the NPS Annual Report. The concept recognized that private autos were quickly becoming the mode of choice for travel to parks, and that monies were needed to accommodate the influx of cars while, at the same time, protecting the resources. The park-to-park highway concept would make Parks more accessible, thereby building a greater political support, and thus, enhance opportunities for the needed funding to operate and maintain the Parks. In essence, the concept would work toward fulfilling the mission of the NPS in providing access for visitor enjoyment while protecting the resources generating such interest.

The automobile quickly became a ubiquitous, and often necessary, part of the National Park experience. In direct correlation to the auto's popularity was the push by the auto industry to expand road systems, sell support services, and sell more automobiles. Post World War II years expanded upon the early relationship between the National Parks and the automobile, prompting significant increases in visitation to national parks in proportion to the expansion of roads and the auto industry.

From 1946 to 1966, a number of external influences created situations to which the NPS responded. Primary influences included:

- an expanding and affluent American middle class;
- government programs;
- the American auto industry;
- the American tourism; and
- popular culture (television, magazines, movies, music, literature).

The Interstate Highway Act was a significant federal spending program, established primarily in the name of national defense. The effect it had on the NPS is that it served as an extremely efficient system for ultimately linking park roads to the major population centers across the country. It vastly improved the mobility of Americans, and along its edges, it created fertile ground for free enterprise, giving rise to the roadside strip commercial comprised of motels, drive-thru food establishments, the service

station, and other roadside amenities for the traveling public.

As the auto industry carved its niche into the American psyche, it quickly became masterful at promoting image and status. “See the USA in a Chevrolet” with Dinah Shore was one of the most popular and effective advertising campaigns in the history of American advertising. The Texaco Star Theatre with Milton Berle, “You Bet Your Life” with Groucho Marx, and other enormously popular television programs were being sponsored by auto-related industry, selling popular culture, entertainment, and the automobile. Popular literature of the era also extolled the virtues of touring the nation by car in Jack Kerouac’s *On the Road*, and *Travels with Charlie* by John Steinbeck. The country was literally on a roll to its National Parks, in its cars, and in its popular culture.

In 1956, the NPS responded to the onslaught of external influences with its own ambitious program entitled Mission 66. This 10-year improvement program, the largest to date for the NPS, was initiated to usher in the fiftieth anniversary of the National Park Service in 1966 with renewed facilities and, as then-Director Conrad Wirth put it, “to overcome the inroads of neglect and to restore to the American people a National Parks System adequate to their needs.” Like nearly all other major developments being built across the United States at that time, Mission 66 was geared toward accommodating a traveling public in their automobile. Road geometries were adjusted for higher speeds and easy auto travel. Visitor centers and visitor facilities were built for ease of access by auto, located adjacent to new park thoroughfares and expanded to accommodate increasing numbers of visitors and their cars. But it wasn’t long before even Mission 66 facilities were outgrown by an ever-increasing visitation to National Parks. The only real slowdown in growth occurred during the gas crisis in the 1970s, where visitation by auto was directly impacted by the shortage and cost of gasoline. For the most part, no other major NPS infrastructure or development programs have even attempted to keep pace with the continuing growth and presence of the automobile like Mission 66 did.

Today, the NPS faces a similar set of circumstances as it faced in the 1950s and 1960s. Visitation has regularly outpaced the infrastructure capacity to accommodate it, particularly concerning Park roads, parking lots, and other auto-related facilities. The difference today is that it is not environmentally, politically or financially viable to expand Park roads, parking lots, and other auto infrastructure in a similar manner as Mission 66 expanded those facilities. Alternative solutions must be pursued, and VTSs will be part of the answer.

A VTS is only part of the answer, but should be explored as an alternative to the private auto in heavily congested Park areas. The VTS should differentiate itself from ordinary mass transit in National Parks, and serve the visitor and the resources, not simple transportation from one point to another on a fixed schedule. The VTS should strive to engage the visitor with the resource, being designed to maximize views, respond to climate, and respond to changing circumstances (a deer in the road, a herd of elk in a nearby meadow, a bear, or other visitor interest). Early visitor transportation systems in National Parks, often operated by concessionaires, utilized convertible buses to expose visitors to the elements and the views above them. Today, some systems are simple bench seats on a flatbed trailer with no roof and sides, allowing visitors unobstructed views of towering sequoia trees, or to feel the cool, moist air and engage the senses with the aromas of a fern grove at the base of giant sequoias.

Visitor transportation systems in National Parks should not be simply utilitarian, serving merely functional requirements for the transport of people. And VTSs should not focus on quantity over quality. A VTS should not be implemented, as a primary utility, to move as many people as can be moved during “rush hour”. But it still should be dependable, comfortable, cost-effective and efficient. The National Park VTS should incorporate the qualities of general public transit and integrate them with the unique characteristics and needs of National Park resources and visitors, creating a unique visitor experience and transportation system, representative of the finest National Park traditions for access.

How can a VTS fulfill the NPS mission? It should provide a quality visitor experience, preserve and protect resources, and move people from point A to point B and beyond. A VTS can accomplish this in the following ways.

- Incorporate spontaneity. Enable systems to respond to impromptu events and circumstances such as erupting geysers, strolling bears, grazing wildlife, and other important National Park features. Promote system management that allows for flexible schedules and for visitors on the system to enjoy those unique Park experiences.
- Standardized vs. custom vehicle design. Vehicle design and procurement should strive to achieve economy through fleet purchasing agency-wide, yet allow for the unique vehicle purchases and design tailored to specific resources and visitor experiences that simply cannot be accommodated through off-the-shelf technology.
- Make VTS user-friendly. National Park visitor transportation systems must recognize the unique and varied user groups and their needs. VTS vehicles and facilities need to address the physically challenged, foreign visitors, elderly, those with backpacks, bikes, skis, among numerous other unique visitor characteristics and needs.
- Seamless vehicle/facility design. Visitor transportation systems are not simply comprised of vehicles. The facilities in which visitors wait, get information, transfer from their autos, and experience the Park programs, among others, are integral elements of the transportation system. Transportation serves the facilities, resources, and visitors. They should all be designed to work seamlessly and harmoniously with each other as an integrated whole.

As the NPS works toward implementation of VTS, many unique challenges surface which must be addressed in order to achieve success. Specific challenges that must be addressed are as follows.

- Establish baseline knowledge. The NPS has already accomplished a service-wide Alternative Modes Study identifying technology and systems currently available in the transportation industry that could be useful in some National Park units. A VTS inventory of existing NPS systems has also been accomplished, cataloguing the location, type, condition, and funding mechanism of systems currently in use in the agency. A department-wide transportation needs study is currently underway which will identify future needs of Department of Interior units related to alternative mode transportation systems. It will identify units which need to expand or upgrade or purchase new systems, and define programmatic requirements and funding requirements to support the future implementation of those systems in an established department-wide effort. At the local Park and unit level, baseline knowledge about traffic conditions, facility conditions, and future needs is necessary to begin to plan for future transportation systems.
- Maintain cost control. NPS visitor transportation systems are generally funded by revenues and fees at the point-of-service. The NPS must ensure that the systems do not price visitors out of the National Parks, or limit their access to only certain income groups. Whether through subsidies or unique revenue sources, the NPS must be sensitive to the ability to provide affordable transportation, especially in circumstances where systems are mandatory.
- Build partnerships. Transportation regularly transcends park boundaries, requiring coordination and cooperation with many other agencies and constituencies. TEA-21 requires that the NPS be included in statewide transportation planning activities, where appropriate. In this, new opportunities and challenges are presented as the NPS weaves its way into regional, local, and national transportation planning.
- Proactive public relations. The NPS must embark upon a proactive public relations effort. Through such an effort, the NPS can



educate its visitors about the benefits of alternative transportation systems, and the need to support such efforts in Parks, and ultimately, their own communities. The outreach should strive to reach a national audience through magazines, television, radio, and through professional organizations. It should also reach the local level audience at the Park, and with partnering transit agencies and interests. In an organized outreach program, the NPS can build its own constituency, not unlike the early years of road building and automotive constituency.

In conclusion, the implementation of transportation systems in National Parks must continue to fulfill the mission and tradition of the National Park Service. Transportation systems are simply the servant to the greater goals and resources of the agency and the country. Our challenge is not to build monuments to ourselves, but to continue building ourselves in our monuments. We must leave these resources unimpaired for the enjoyment of future generations. Transportation is but one tool to be used in that noble quest.

### **“The Ann Arbor Transportation Authority’s Advanced Operating System”**

*Greg Cook  
CEO / Executive Director  
Ann Arbor Transportation Authority*

(The presentation opened with a video)

*The Ann Arbor Transportation Authority’s (AATA’s) buses are now equipped with on-board computers and advanced data communications. We combined automatic vehicle location with computer-aided dispatch to improve our fixed-route service, and enable prompt pickup and transfer in our paratransit service.*

*With this new advanced operating system, we’re operating safer, more reliable service for the over 4 million rides we provide every year. And we’re operating the AATA more efficiently than ever before.*

*(Driver comment) “We have everything at our fingertips to serve our customers better.”*

*(Passenger comment) “It’s quite advanced, it’s quite advanced. And I think it’s something that doesn’t exist in a lot of other places, in a lot of other countries.”*

- *Advanced Operating System. The AATA’s Advanced Operating System (AOS) is all that and more. It’s the first fully integrated communication, operation and maintenance sys-*

*tem in the United States’ public transit industry. Ninety percent of the system’s cost was funded by federal and state grants to build the next generation of public transit. It was installed in early 1997 after two years of design, development and testing. With the Advanced Operating System, AATA operates and communicates more efficiently. And that means better, safer and more reliable service for all our customers.*

- *Advanced Communications. AOS dramatically improves communication between the AATA operations center and AATA’s buses. Each bus has an advanced on-board computer, and a new 800 MHz radio. This system gives the operating center continual updates on where the bus is, and how it’s functioning. Drivers spend much less time on the radio, and much more time serving our riders. They use a mobile display terminal to monitor the system, read and respond to messages, and interact with the on-board systems. In effect, the mobile display terminal becomes the driver’s fourth mirror.*

*When drivers need to talk with the operations center, they request voice communication. On those rare occasions when there is an emergency on the bus, drivers activate a special system that notifies the operations center. Dispatchers pinpoint the bus' location, and immediately call for assistance. AOS makes our whole system more reliable. Vehicle systems can be monitored in real-time, so the operations center and the maintenance department know immediately when an engine overheats, or oil pressure drops. AOS also improves transfers from one bus route to another. The computerized system keeps track of all transfer requests and passes them on to the drivers who need that information.*

*(Driver comment) "It enables us to make transfers directly from bus to bus, rather than going from bus to dispatcher to the other bus, and thus it's a quicker way of making transfers."*

- Automatic Vehicle Location. With AOS, AATA always knows exactly where all its buses are, and how true they are to their schedules. Complete route schedules are stored in the on-board computers.

*Using global positioning system (GPS) technology, the computers communicate with satellites to determine the bus' location within one or two meters. If a bus is delayed by heavy traffic or weather problems, the operations center can adjust the system to compensate. We use this detailed, real-time information to plan new routes and schedules, so our service always responds to the needs of our passengers. And we can offer better scheduling and reservations for passengers who require door-to-door service.*

- En-Route Information. AOS offers more information – and better information – to everyone who rides “The Ride.” Inside the bus, a new system displays stop requests, route data, the time, the next stop, and other information. Voice announcements supplement the visual display. AATA buses even announce their arrival at bus stops.

*(Passenger comment) "I think it's very convenient, because a lot of times I don't wear a watch. Going from both jobs and school, it helps me to know the time. If I don't know if a bus is coming down the street, flashing a 'No. 7' or a 'No. 5 to Packard' really helps. It's very convenient."*

- Automated Passenger Counters. AOS's automated passenger counting system gives us an accurate picture of ridership patterns, which we use to adjust our routes and plan new services.
- Video Surveillance. For maximum safety on all AATA buses, AOS also includes on-board video systems that record audio and video info for playback if necessary.

*(Driver comment) "For us as drivers, I appreciate it in case something's going on and I don't see it. Somebody comes up and says, 'Hey, we've got a problem here,' I just call dispatch and say, 'Hey, we need to come out and pull this tape.'"*

- Future Enhancements. Major AOS components began operation in May 1997. As the system develops, several enhancements will be added to further improve service and maintenance. With AOS, we will be able to accept cards that pay bus fares when passengers pass them in front of a card reader. AOS will also be integrated with the Ride's Web site and local cable TV systems, so riders see exactly when buses will arrive at their stops and their destinations.

*At AATA, 21<sup>st</sup> century public transportation arrived three years early. As the Advanced Operating System evolves in Ann Arbor and Ypsilanti, it will be installed in more and more communities throughout the United States. And public transit will attract more and more riders as it operates more efficiently, and provides better, safer, more reliable service.*

*How did we pull that off? The real important thing to know is that large systems would probably put together a very technical specification written by engineers. We pulled our staff*

together and wrote a functional specification. We looked at the technology and said that these were the types of things we would like to package together on a total system to make it work. So we wrote a functional specification, circulated it among industry and told them that we only wanted to have technology that was available. The result was that Rockwell was the primary contractor and architect. They integrated the subsystem while Digital Recorders did voice annunciation on LED signs and also automatically set head signs of a bus to go to different routes and reprogram fare boxes. It used to be that the driver would have to flip the head sign and change the fare box every time they would change routes. This is all done by satellite now, so the driver can take care of the business of driving and serving passengers.

Our tracking software is like the software that you see in other current applications, i.e. Hertz, long-haul trucking, etc. Our dispatcher now has three computer screens with one mouse, cursoring between all three screens. The dispatcher can see all the buses real-time. An exception screen will come up to notify the dispatcher that a bus is experiencing problems: it has hot transmission fluid, or is low on oil, or is low on air pressure. The maintenance department has a screen that shows them in real-time what problems are out there on the buses. Maintenance can now pull the bus out of service at the end of the route, so that passengers never know that anything has gone wrong.

We're also connected to passenger counters and various software packages. That was a tough thing to do. We made people know that to tie all this together you need to allow for protocol exchange and an open architecture. Technology is wonderful, but traditionally people don't want to give you their programs and protocols to allow people access from the outside. What we did in our system is place our Manager of Information Systems as our project coordinator. We worked from the bottom up with Rockwell – if we had a problem it wasn't with their top folks, it was with support. So we worked as a team and it has continued to work well.

We realized the key to customer satisfaction was real-time information. One of the kiosks inside our transfer center gives real-time arrival and departure of buses. We put another screen up that shows the location of buses, and people would stand and watch to see their bus coming. It really made clear to us that one of the things we need to continue to try to do is to continue to give real-time information. We've got kiosks at the transfer center, at the University of Michigan student union, at hospitals, at malls. Wherever we have a transfer center with a lot of people, we give them real-time information.

The key to attracting people onto our buses is that if they have a choice, they are more inclined to ride. What's working to our advantage is the decreasing parking availability on the University of Michigan campus with more cars than parking spaces. We have 2,500 passes with faculty and staff. We also have real-time information on our Web site (<http://www.theride.org>). People can use the site to identify routes from one place to another, and the program will tell them on a real-time basis.

We're also putting up "next stop" bus information. We have about 1,500 stops. It looks like a parking meter that has a screen that will say, "Route 5 – 8 minutes," which means that the bus will arrive in eight minutes. This technology is proven, alive and well, and is being used in cities like San Francisco. We are researching cable TV soon versus the Web and in-house information units.

We have a lot of elderly ridership, so we're going to put up kiosks, bus shelters, canopies and walkways in some of the high-rise buildings. We identify customers and trip generators, and then interface them with the aid of technology.

How would technology interface with some of the Parks?

- Real-time information can allow you to space out buses so that they aren't all bunched up.
- Voice annunciation, with digital recorders, allows you to make any kind of announcements. We make announcements of stops and

key sites. It didn't get better than the tour we had at Yellowstone. We had a ranger who knew exactly what he was talking about, and I wouldn't want to go to Yellowstone any other way – I would have missed that experience. But I don't think the Park can afford to have interpreters aboard every single bus that comes through there. But if you had satellite hook-ups, you could have a human voice to alert you to what you are seeing. (Except for "real-time" wildlife sightings.)

- You may want passenger counters as well, so drivers wouldn't have to do counts. We count

passengers with cameras as well as infrared beams. The cameras with video tape you saw in the video are already obsolete. We now have digital color cameras with hard drives that run a lot longer than a VCR does.

I believe that technology has had a lot to do with our ridership increasing but not everything. We've also had more buses, a marketing plan, clean equipment, air-conditioning, and courteous drivers. I do believe that technology has a definite application in the Parks.

### **"Golden Gate Transit and Golden Gate National Recreation Area"**

*Alan Zahradnik  
Deputy Planning Director  
Golden Gate Bridge, Highway and Transportation District*

I'm going to describe Golden Gate transit and its service area; I'll describe the services it has historically provided; and I'll touch on some of the services that are on the horizon.

Not all public transit operators are alike. Our tradition dates back to 1929, when the Golden Gate Bridge District was created to build the Golden Gate Bridge. Voters in San Francisco, Marin, Sonoma, Napa, Mendocino, and Del Norte counties approved property taxes for building the bridge from 1933-1937. The Redwood Empire was then connected to San Francisco by highway. This began dominance of the auto in the area and the end of the railroads and ferries.

In 1969, the Bridge District paid off bridge construction bonds and, with increasing traffic congestion and the fact that the bridge could not be widened, decided to use surplus tolls to own and operate a mass transit system to carry North Bay commuters to San Francisco and back. Today, 50 percent of transit operating revenue comes from bridge tolls, 35 percent comes from

fare and other operations, and 15 percent comes from state and other external sources.

Golden Gate Transit (GGT) was established in 1970 to replace failing private systems and restore ferry service between North Bay and San Francisco. The intent was to provide alternatives to the automobile for travel to and from San Francisco. GGT reestablished Sausalito ferry service in 1970, expanded bus services within and between Marin, Sonoma and San Francisco Counties in 1971 and established Larkspur ferry service in 1976.

What does GGT have to offer the Parks Service? We have resources. We have 60 bus routes with 270 buses, 221 of which are in peak service oriented to the San Francisco commute. There is also basic and local service in Marin County. In addition, we have two weekend recreational bus routes to west Marin parks. GGT buses carry 9 million passengers each year; the system operates on a \$50 million budget. Our ferry service from San Francisco to Sausalito has one vessel carrying many tourists; our service from Larkspur to San Francisco has four vessels carrying

primarily commuters. The ferries carry 1.5 million passengers each year, on a \$15 million budget.

Our first priority as an agency is to maintain the bridge and manage traffic. Transit mobility and preservation of the environment is our second priority, as resources permit. Since no funds for transit are provided from local (county sales tax) sources, there is pressure to keep transit small and cost-efficient and to seek outside sources for subsidies.

What is the transit environment of the North Bay? In the 1970s, San Francisco was the work center, and Marin and Sonoma Counties were bedroom communities. The bus and ferry service combined to carry over 10,000 commuters daily into San Francisco. Most development was concentrated in the central U.S. 101 corridor. West Marin and Sonoma Counties were primarily farms, ranches, vineyards and parks. In the 1980s and 1990s, work started to move to the suburbs, and our efficiency went down as a result of dispersed travel patterns. The needs of the bridge became more acute as the 1989 Loma Prieta Earthquake prompted costly seismic retrofit of Bay Area bridges. In addition, GGT finds itself competing with highway and other transit agencies for limited state and federal funds.

Around 1976, there was national legislation that increased the importance of providing access to the National Parks. Funds were made available for recreational travel subsidies. Accordingly, the National Park Service (NPS) provided funds for the Golden Gate Recreational Travel Study in 1977. NPS also funded expanded bus services in summer 1979 – 1981. After the loss of subsidies from NPS and Marin County, however, Park bus services fell victim to general transit service reductions and fare increases prompted by an economic downturn. The recreational routes were long and expensive, and the fare recovery on these routes was about 20 percent compared to 50 percent for urban routes.

The 1979 recreational bus service had the following components:

- Muir Woods. There were two routes to Muir Woods: Route 60 from San Francisco Transbay Bus Terminal, and Route 61 from Larkspur Ferry Terminal. Route 60 was a 22-mile route taking 80 minutes that had a fare of \$1.25. It carried nearly 140 riders per day on three round trips in 1979, but service was cancelled in 1981 due to private tour bus operator protest. Route 61 was a 14-mile, 45-minute route with a \$1.00 fare and a \$2.00 ferry ride. It did not operate in 1979 because of a ferry strike; service was initiated in 1980 and cancelled in 1982 due to high cost, a loss of subsidy support, and low ridership.
- Point Reyes National Seashore. There were two routes which provided service to Pt. Reyes: Route 64, a 2-hour, 53-mile trip with \$1.50 fare from the San Francisco Zoo, and route 65 from San Anselmo, a 1-hour, 23-mile trip with a \$1.00 fare plus \$2.00 for the ferry ride. Route 64 carried nearly 200 riders per day in 1979 with 4 round trips per day. Route 65 carried less than 30 riders per day in 1979 with three round trips per day. Service was reduced after loss of NPS subsidy and currently carries less than 40 per day with two round trips.
- Stinson Beach and Mt. Tamalpais. Route 63 is a 14-mile, 45-minute route with a \$1.25 fare that carried nearly 400 riders per day in 1979 with a bus every half-hour. Service was continued and currently carries about 200 riders per day with a bus every one to two hours.
- Golden Gate National Recreation Area. Route 64, to the San Francisco Zoo via Presidio and Baker Beach (also serving Pt. Reyes), was cancelled in 1984 due to high cost.

Other, more recent, recreational transit services include:

- Route 63 Ft. Baker (GGNRA) extension (also serving Stinson Beach) began in 1991 but the extension was cancelled in 1998 due to low ridership.

- Angel Island State Park. Service was proposed as a Larkspur Ferry weekend stopover in 1993, but the plan was withdrawn due to private ferry operator protest.

There are three major future services under study.

- Muir Woods Shuttle. There are too many visitors with too little parking and too much traffic on the access road. Therefore, there is a joint NPS and Marin county project to construct a parking garage that would be shared by commuters and park visitors. Bus shuttles would be provided from the garage to the park.
- Ft. Baker Ferry. There is a plan for developing a conference and retreat center within Ft. Baker that has met resistance from Sausalito residents who have traffic concerns. Shuttle buses and ferry services are being considered as mitigation.
- The Presidio. Self-sufficiency, neighborhood interests and public transit are issues for this new urban park. Ferry docks and a transit center are being considered for shuttle access to various mixed-use developments and park attractions.

### Lessons Learned

How do you create and sustain partnerships to plan and implement public transit service to national parks? Here are some key lessons we've learned.

- Identify Potential Partners and Establish Roles. Get to know your neighbors. Identify the entities that exist outside the park gateways and recognize that they have their own interests to look out for. Consider making

them partners and structure the partnership for effective progress toward implementing solutions.

- Set Common Objectives. Parks are for people and leave the cars behind. Define the problem (e.g. traffic congestion) and set a quantifiable objective (e.g. daily traffic reduction target). Again, you need to consider the needs of your partners – such as where do you park the cars? Beware of the not-in-my-backyard (NIMBY) sentiment.
- Select Practical Service Design Parameters. Cut the cloth to fit the pattern, because if you build it they may not come. You should design transit services to meet customers' travel needs. You should plan on conducting market research, and you should consider both public and private transit services.
- Identify Sources of Funds. Public transit requires an operating subsidy. Negotiate an equitable funding agreement. Recognize the service provider's likely need for a multi-year operating subsidy. Allow for annual cost increases consistent with labor agreements. Allow for changes in transit system fare policy.
- Make a Commitment to Cooperate. Remember that it takes more than a handshake, but requires more flexibility than a standard "procurement." Negotiate a performance-based service agreement or memorandum of understanding. Specify quantity of service in terms of hours and frequency of service from point A to point B. Specify quality of service as well: the type and condition of buses and on-time performance. Be sure to allow for adjustments to services as experience is gained during actual operation.

## “Mobility Managers: What Can We Do If We Work Together?”

*Cindy Johnson*

*Director*

*Sweetwater Transit Authority*

What I'm here to talk about today is a coordination effort. First of all, I want to thank the Federal Transit Administration, the National Park Service, the Western Transportation Institute and all the other organizations that brought us all together. Sometimes I talk so much about transit, I don't think about the National Parks and public transportation, and how they fit together.

One of the things that we want to do before we talk about how to coordinate transit services is we want to keep in mind who we're doing this for. We're doing this for the people, and in your case, the National Parks. What we want to make sure is that our focus is on the customer, the people.

Let me give you a little background into the Sweetwater County transit system. We really do not have a National Park next door. But some of the things that we've done in coordination efforts perhaps might pertain to a National Park, when you're thinking about transit signing or a transportation system.

Sweetwater County is larger than the state of Vermont. It only has 44,000 people in it so it's not very populated, so you can imagine we serve as a door-to-door service. If you go out to a street corner, you'd be lucky if one out of every 25 times there's someone standing there waiting for a bus. So we're a little bit different than transit systems in urban areas.

Seventeen years ago, we had no transportation system in Sweetwater County, except for five human services agencies that were doing programs for their own clients. We had a meeting and they said, “We have some money for a transportation system.” So we wrote one grant and made a coalition of all these human services agencies – one grant for our entire county. We were still doing transportation from five agencies, but we were funneling transit dollars into

them from the one grant. It was not a real good situation.

After two years, we looked at that and said, “You know, with as much money as we're spending, we would be able to give a ride, in a limo, to everybody in Sweetwater County who needed a ride.” So that's what we're doing: we're giving limo rides, door-to-door service, etc. We've carried more groceries than you can imagine.

We formed a transportation agency. At the time, we thought, maybe we can provide more service than just to the human services agencies. When we did that, we said we wanted a public transit system, and our legislature allowed it. So we now have Wyoming's first transit authority, which was Sweetwater Transit Authority Resources (STAR). We put all of our resources together. We found what each agency was spending on transportation, and determined that that was what they were going to put into the pot. After asking the five agencies, we ended up with \$500,000 a year in the pot; we thought we were doing very well.

In order to be accountable to the people we were providing transportation for, we thought we would have to be able to show noticeable changes in productivity and service quality, because if we didn't give the user better services than they were doing for themselves, why should they hire us? And we were going to be efficient. What did we find?

- We had buses rolling on the street on April 15, 1990. When we started the system, the cost of rides for the individual agencies was \$8.36 for a one-way ride; now that is without capital equipment. By 1995, we reduced the cost per trip to \$4.22, simply because the volume of rides went up.

- In 1990, our cost per vehicle-hour was \$41.66. In 1995, the cost had declined to \$26.65.
- It didn't cost any less to run the system; it just cost less because we were providing more rides. In 1992, we provided around 18,500 riders; by 1996 we had increased our ridership to over 22,000.
- By coordinating all the services, we were able to keep costs down. Between 1994 and 1998, we have kept our transit costs exactly the same.

You may also look at this from an economic development perspective – I'm also on the board of directors for economic development. What has this meant to the drivers? In 1990 the bus drivers worked part-time on Saturdays. They were aides at the child developmental center, and then they drove the bus for an hour. They worked at the senior center, and they were the maintenance guys who drove the buses for two hours a day. They were typically not trained, they made minimum wage, and they had no benefits. Now, out of the \$4.22 per ride, we're paying our drivers, in 1995, on the average \$8.50 per hour. Understand that earning \$8.50 per hour in Sweetwater County is like getting \$25.00 per hour in a lot of places. In addition to an average of \$8.50 per hour, they have at least three or four weeks of training every year – training is very important to us – 11.25 percent retirement, even part-time drivers have paid vacation. So we had arranged to have benefits for drivers.

Some would say, "You only care about training; we care about riders." We provide rides more efficiently. The average ride time in 1990 was 1.5 hours; now because we have more buses out, the riders are on the bus approximately 25 minutes.

Some of the benefits our service has been able to provide are as follows.

- It gets students to college.
- STAR has moved 20 citizens off of public assistance.
- STAR has moved over 30 citizens out of nursing homes.
- It has provided job access to four citizens who are wheelchair users.
- We have provided job or school access to seven citizens who are blind.

What does this mean for the state? We calculated the economic benefits of each of these results. We have saved Sweetwater County and the State of Wyoming over \$1.6 million every year. That is equivalent to a benefit to cost ratio of almost 4 to 1, without using any economic multipliers.

We also have some technology that has helped us. We have gone from five buses to fifteen buses in the first six years of our existence. We have also installed semi-automated dispatching systems that really help to keep our numbers and our accountability up.



## Transit Alternatives: Shuttles to Light Rail Service Workshop Summary

*Helen Knoll – Moderator*

*Regional Administrator*

*Federal Transit Administration – Seattle Office*

### Session Purpose

1. Document existing or planned technologies
2. Document typical level of understanding of transit planning (alternatives analysis) and benefits
3. Discuss example applications to manage challenges (e.g. shuttles, demand-responsive systems, light rail, etc.)
4. Discuss thresholds (performance criteria) that may dictate transit alternatives to be implemented
5. Discuss institutional issues and political concerns of transit alternatives

### Existing or Planned Technologies

- Understand what's coming on-line
  - Electric hybrid - 2-5 years
  - Compressed natural gas (CNG), biodiesel, fuel cells - 10 years
- Infrastructure costs are high – requires a long-term commitment
- Understanding technology development
  - Force the market to supply product
  - Identify the operators in an area
  - Identify who is responsible for infrastructure development
  - Niche markets like the National Park Service (NPS) are good venues for alternative fuels
- Greenhouse gases are not currently monitored (public perception decides fuel type)
- Quiet technology important to NPS
  - Noise abatement
  - Performance guidelines for decibel levels
  - RFPs to specify or compare results
  - Specifications are used to compare manufacturer responses
- On-board interpretation (instructional vs. informative)

### Transit Planning and Benefits

- Setting quantifiable criteria
  - Recreational travel models (vehicle/pedestrian models, time/cost/service, new tools for mode ling)
  - Carrying capacity/transportation system
  - Integrated modes at visitor centers
  - Spreading the peak season
- Market analysis
  - Turning segment needs and preferences into specifications
  - Travel patterns in the Park and to the Park
- Mandatory vs. voluntary
  - Demonstration phasing
  - Insuring adequate capacity

### Addressing Challenges

- Existing infrastructure presents limits to implementing new technologies – e.g. historic monuments
- Distribution of visitors
- Emerging technologies need to be examined
  - Intelligent vehicles
  - Collision warning systems
- Real-time information for visitors
- Topography limits communication links
- Working with local transit agencies for recreational travel – need to bridge gaps
- NPS personnel – no transportation specialist

### Performance Criteria

- Capacity/frequency
  - Vehicle weight
  - Grades
  - Range
  - Boarding/load time
- Duty cycle
- Visitor experience
  - Global perspective

- Paradigm shift from auto to visitor transportation systems (VTS)
- Accessibility issues – low-floor options
- Availability of maintenance
- Cost
- Decision matrix for alternative fuels
- Vehicle reserves
- Environment

#### Institutional Issues

- Different entities operating systems jointly (i.e. partnerships)
- “Diesel” is still a bad word, even with all the improvements
- Public vs. private financing
- Maintenance and abilities of specialized mechanics and facilities
- Dedication of financial resources

## Session Reports

### Traveler and Visitor Information Needs

#### “Traveler and Visitor Information at Zion”

*Dave Karaszewski  
Special Projects Manager  
Zion National Park*

The first images I want to show you are a snapshot of what has been on the news about Zion recently.

(the following is a transcript of a television news segment)

*You’re watching News 4 Utah. It’s the most visited National Park in Utah and perhaps because of that popularity, things at Zion National Park will change. As Paul Murphy and photojournalist Kevin Barnes tell us, after this year, visiting the canyon in southern Utah may never be the same.*

*Wind, water, and time: the forces that form Zion National Park, the forces of change still at work today. Now another change is on the way but this one will happen fast, right before your eyes.*

*“Zion was named by an early pioneer that came here and found it a place of refuge and quiet and peace and tranquility. But in the summertime Zion Canyon can be anything but peaceful and tranquil.” (Park spokesman)*

*Driving Zion Canyon has long been a highlight of a Utah vacation. But new visitors will have leave their cars behind and leave the driving to someone else.*

*“We’re having problems of noise pollution, air pollution and just not a very tranquil place and so by eliminating private automobiles we think that we are going to be able to restore that peace and tranquility.” (Park spokesman)*

*Starting next Memorial Day, buses will carry tourists from the new Visitors Center to trails and picnic tables within the park. The second loop begins at the nearby town of Springdale. Many park goers support the idea.*

*“Everyone misses being able to drive their own car exactly to the doorstep of every place they want to go, but eventually you have to accommodate some reality.” (Park visitor)*

*“I think there should be hiking, bikes and shuttles.” (Park visitor)*

*“I think it’s getting too congested there to have individual vehicles.” (Park visitor)*

*Others, like the Summerhays family aren’t climbing aboard. “I don’t like it myself because I’ve got too many kids. It’s hard to load all my kids onto a bus, and of course if you have anybody else like myself, that has a bunch of kids, we get a whole bus load of kids screaming and yelling all the way up here.”*

*But parking is at a premium.*

*“There are a lot of people who leave here who are now are current summer time visitors who are not having a very good experience because of the congestion and they leave saying, ‘My experience wasn’t what it should have been and this is my National Park.’” (Park spokesman)*

*Still, like it or not, Utah’s favorite National Park will soon be, “No Parking.”*

The shuttle will operate from May through October the first year, and from March through October in the second year and hopefully, eventually, it will operate 12 months a year. We believe that with this kind of transportation system it’s going to be extremely important for visitors to get information early in planning trips, so they need to know what they’re getting into in the National Park, especially with potential congestion and the shuttle systems. They need to be able make an informed decision on when they will make their trip to the National Park. Will

they come in the middle of a really busy season and get turned away?

We know that most visitors do minimal planning for vacations; they tend to get in the car and go. They rely on several items for information about Parks, including word-of-mouth information, maps, guidebooks, etc. We know they get very good information when they get to the Park, in terms of the transportation system, congestion, delays, and full campgrounds, but they need to have this kind of information prior to getting there. They need to know about services and environmental conditions. Restrictions are a big item too. For example, many people don't know about entrance fees and get extremely angry when they get here and find out they have to pay. We have a tunnel that restricts oversize vehicles in Zion National Park and that's a problem for people in oversize vehicles. Road conditions do change from time to time. Roads actually go away sometimes in Zion National Park, floating down stream and ending up somewhere near the Grand Canyon. Camping conditions aren't always top notch. We'd like folks to know about that before they get there.

Visitors have an idea of what they need and we have an idea of what they need. They don't always coincide. What do they really need? They need good accurate information about Zion National Park (as far as I am concerned) and other park areas. They will get that Park information when they get there, about natural processes and the park's purpose and significance – the reason why it's a National Park.

There are several things that we ought to know about Park visitors in order to provide them with good information, including visitor trip patterns, mode of travel – we know that about 10 percent of all visitors to Zion come on tour buses – length of stay, information needs and service needs. We're not so sure about pre-trip and en-route information needs at Zion. We know there's a big need there but how or what exactly they need is a bit of a mystery to us. In Zion for example – I think this is true of many parks – we spend 80 percent of our interpretive budget on about 4 or 5 percent of our visitors. We also know that anybody who sells anything to travelers along the

way are responsive to their needs. If businesses had a way of getting accurate, up-to-date information they could provide that to visitors. Part of the problem is the numbers. Back in 1972 there were 1 million people visiting Zion, and it wasn't such a big deal; now we're double that and we expect it to go higher. We know that most of our visitors come from the United States, 20 percent from Europe, some from other countries; there are some language issues there in getting information to the visitors. Many visitors come from surrounding states, including California, Utah, Nevada, Texas, as well as bigger Eastern states like New York and Pennsylvania.

The bulk of visitors use simple methods for getting information: travel guides, tour books, maps, newspapers, magazines, word-of-mouth and friends who have been to Zion on vacation and say, "Zion was a great place to go last year; go to Zion." About 70 percent of our visitors are first-time visitors. About two-thirds of the visitors only stay a few hours at Zion National Park. There might be something there we can do with that and try to figure out how in those few hours visitors can do something else. Many visitors are on the Grand Circle of Parks. The Grand Circle was originally a small group of parks in southern Utah, northern Arizona, Lake Mead, Grand Canyon, Glen Canyon, Zion, and Bryce Canyon. In the early years this was promoted as a Grand Circle Tour. Since then, about 23 or 24 National Park areas and State Park areas have included themselves in this Grand Circle of Parks. It's a great opportunity for us to network and provide information to one another also provide information to visitors on conditions or congestion.

Visitors will take information any way that they can get it: from gas station attendants, highway signs, friends, and others. We're working closely with businesses in our gateway community of Springdale to get them to help us get information out to the visitors, primarily about our transportation system. We want them to know about the shuttle bus that will operate from the scenic drive of Zion Canyon and into the town of Springdale, located at the south entrance of Zion. The shuttle functions on a two-loop system. There's bumper to bumper traffic congestion in that the scenic

drive area, with cars parked on both sides of the road and have seen fistfights erupting over parking spots. It's an unbelievable situation.

A lot of travelers and visitors are willing to pay for things, such as entrance fees, printed material, and the use of the Internet. Will they pay for additional information? I don't know.

Out of 2.5 million visitors to Zion, about 70,000 asked for pre-trip information. About 50,000 out of that 70,000 found our Web page so I don't know how many of those are really looking for Park information or just surfing the Web. About 20,000 actually call or write the Park for information. That's a very small number.

Visitors tell us that they're very supportive of our transit alternatives and really like our transporta-

tion system and the whole idea surrounding it to end congestion. Visitors tell us they are looking forward to less vehicles, and more bicycles and hikers going into Zion Canyon.

Intelligent transportation systems (ITS) in the National Parks can help us to get this information out, through traffic management, traveler information, safety and security, emergency services, and road conditions information. In terms of institutional and political issues, it is extremely important to partner with the state Department of Transportation, which we're doing now, working with signage for the transportation system on the state routes. We're also in the initial phases of developing a scenario to work with Zion and other Grand Circle parks.

### **“Greater Yellowstone Traveler Needs Assessment”**

*Pat McGowen*

*Research Associate*

*Western Transportation Institute, Montana State University-Bozeman*

What I'd like to talk to you about today about is one small piece of a project we're working on right now: the Greater Yellowstone Rural Intelligent Transportation Systems (GYRITS) corridor. We did some survey work to try to identify what the traveler information needs were. I'm going to give you a brief background on what the Greater Yellowstone Rural ITS corridor is, and then we'll talk about the traveler needs survey which was a part of this project.

The Greater Yellowstone corridor is the area in and around Yellowstone National Park, it includes portions of Montana, Idaho and Wyoming. More specifically, we have some interstate roads – Interstate 90, Interstate 15 – as well as a variety of other types of roads. The goal of this project is to demonstrate Intelligent Transportation Systems in a rural setting. One of the major challenges of deploying ITS is the institutional issue of trying to bring everyone together in

agreement on key issues. Our vision was to bring all of these organizations together and do some upfront planning and studying to try to break down the institutional issues early on. And that would help to pave the way for demonstration projects. I don't know how well that's worked, but that was our vision.

As part of our upfront studying in trying to get detailed information about the corridor, we conducted a traveler needs survey. Our goal of that survey was to identify what types of information visitors wanted, where they wanted it, how they wanted it. We had some of our students give out the survey, and we ended up with about 481 respondents. It was a 10-minute survey, a little long as far as surveys go, but it still worked well. About 40 percent of the people that we asked actually took the survey. We administered the survey in roughly a dozen areas in the corridor.

There were seven major areas in the survey:

- Demographics. We found that 30 percent of the travelers were from the Montana/Idaho/Wyoming area. There was a pretty good mix of gender and ages among respondents. A little over half of the respondents said they were from urban areas, although we didn't define in the question an urban area as being any particular size. Most of the respondents – 78 percent – normally drive automobiles as their mode of transportation. A good portion of the respondents – 47 percent – were recreational travelers. A little more than half of the respondents are employed full-time. There was a good mix of educational and income backgrounds as well.
- Safety concerns. We asked respondents what their major safety concerns were out a list of issues. They were asked to rank each issue based on the degree to which they were concerned on a 1 to 5 scale. The top three concerns that came out were road conditions in ice and snow (with an average rating of 3.18), passing trucks (3.04), and animals in the roadway (3.01).
- Pre-trip information. We also asked them what were some of their pre-trip information needs. The top three information needs were to know the best route to their destination (3.92), the road conditions due to weather (3.91), and also adverse weather conditions (3.87).
- Planning a trip. We asked respondents when they were planning a trip what information they would collect. The principal types of information they collected were directions to the destination (3.96), trip planning en-route (3.44), information on parking and transit facilities (3.06), and make reservations en-route (3.02).
- Information sources. We asked the respondents, on a percentage basis, where they collected their information. The main sources of information were hotels and resorts (75 percent), travel magazines and newspapers (72 percent), and state departments of tourism

(68 percent). We also asked them what sources of information would they like en-route. The top three sources chosen by respondents, based on the 1-to-5 scale, were changeable message signs (4.13), radio channel (3.66) and a phone number (3.65).

- Transit services. We also asked them what their likelihood was to use transit. The overall impression is that respondents, based on the 1-to-5 scale, were not very likely to use transit. The most likely used services would be buses or vans (2.34), dial-a-ride service (1.93) or public taxi (1.68).

One of the parts of this analysis was to conduct cross-tabulations against the demographic information to see how responses compared across different groups.

- Age. We found that older respondents were more interested in knowing where services were along the road (such as restaurants and gas stations). They were less likely to use the Internet, and they were less likely to use transit.
- Local residents. By local residents, we refer to residents of Montana, Idaho and Wyoming. They tended to worry more about slow-moving vehicles and about encountering animals on the roadway. They were less likely to want locations and directions to a tourist attraction when planning a trip.
- Employment. Retired individuals are less likely to use the Internet, which parallels the finding of our analysis by age. Students were more likely to use the Internet, but less likely to call departments of commerce for information.
- Urban/rural area of residence. Rural residents were more worried about slow-moving vehicles, were less concerned with identifying the best route to a destination and with directions to tourist attractions.
- Miles of travel per day. As the average trip length increased, the importance of knowing

traveler service locations (such as rest stops) also increased.

- Types of road traveler. Freeway users were more concerned with the locations of services and parking facilities. Users of country roads were more concerned with the locations of accidents.
- Income. As household income increased, respondents were more likely to get their information from chambers of commerce, less likely to get their information from the yellow pages and less likely to use transit.
- Education levels. As education level increased, respondents were less worried about animals on the roadway, less often obtained information from the yellow pages, and more often obtained information from the Internet.

- Mode of travel. This was a little confusing because of most of our respondents were automobile drivers. Auto drivers tended to place more importance on obtaining trip planning assistance from rest stops or other places along the route. They were also more likely to use dial-a-van transit services.

Just to give you an idea of where this project is heading, this traveler needs survey was only one phase of this project. We're currently working on the deployment of the following five projects:

- automated vehicle identification and entrance fee collection at Yellowstone National Park entrances,
- touch-screen kiosks,
- dynamic speed warning signing,
- incident hotline signing, and
- an incident management plan.

## “Wyoming Information Centers”

*Joe Coyne*

*Director, Research & Information Services*

*Wyoming Business Council*

The Wyoming Tourism Office manages five Visitors Centers, which sees about 500,000 visitors a year. So, in terms of traveler contact, we are a leading program that can actually collect data and give information out to travelers. By comparison, our fulfillment office, which mails out vacation packages, sends out between 100,000 and 150,000 packages each year in response to requests for information. Our ad campaigns have been very successful, but they clearly don't reach all of the travelers.

Wyoming is the host of two National Parks, Yellowstone and Grand Teton National Park, each of which attracts around 3 million visitors a year. In fact, the first and probably the most common question that we get at the Visitors Centers goes something like this: “I'm going to Yellowstone. What's the best way to get there?” That really opens up the door for us to do several

things. The Wyoming Business Council, which includes our state tourism office, was designed to help foster economic development in the state. In fact, the Visitor Center program and the tourist office historically have had economic development in mind. So one of our primary goals is to keep that visitor in the state longer and get them to spend them more money. So when we get the question “What's the best way to Yellowstone?” we then have an opportunity to go much further.

Dave Karaszewski from Zion hit it right on the head earlier when he said that sometimes visitors think they know what they need, but there's actually a lot of information that they truly do need, and we need to somehow get that information to them as well as answer their question. Now, in Cheyenne, when someone asks what the best way to Yellowstone is, there are four or five different routes to get there. What we need to do

is figure out which one of those alternative routes best suits that traveler.

What we're seeing, in terms of visitor characteristics and trip patterns, is an older crowd. We are seeing a lot more RVs, and we're also seeing a lot more travelers during our colder season. That has created some special problems in and of itself. For example, in the winter we are seeing more and more travelers that want to go to National Parks and use their snowmobiles. One of the institutional issues that we are facing is that we are not in control of that mode of transportation. Environmental groups have sued the National Park System to stop snowmobiling in the Parks, or at least restrict it. So, the National Park System is being forced to react to these environmental groups and that's going to have implications to our winter travelers, certainly. When lawsuits, road closures, or seasonal closures of a Park hit the press, we are adversely impacted. When someone hears that there are mudslides in the Jackson Hole area, they assume that the whole state is closed to visitors. So we react to some things that happen in the press as well as to the environmental issues that are going on out there right now, and that definitely impacts the trip patterns.

Among the pre-trip and en-route information needs that our visitors have, destination planning is most important. The next most common information need that our travelers have has to do with road conditions and weather. The number one concern is basically the road surface: is it going to be wet, is it slippery, is it snowing, is there road construction going on. They want to know how to get there, and how to get there safely. Even if we can somehow get all of the planning information possible out to the traveler, before he leaves, he or she is still going to need road conditions and weather information when they get to Wyoming. Those are the two things that can change even after you've left home. So we try to focus a lot of our efforts in that area.

Some of the existing and planned visitor information systems that we use in Wyoming include some of that I've already talked about. We also have the expertise of Visitor Centers throughout the state. Both seem to have a very high level of

customer satisfaction. Travelers seem to really enjoy talking to a live person, especially someone who's knowledgeable. We have all of our travel counselors go through an intensive training program. Many of them return year after year. Their personal experience is really what travelers are looking for – someone who knows what the roads are like, someone who knows what Yellowstone is like, someone who knows where to go to see wildlife.

We are also using the Internet. My opinion of the Internet is mixed. We thought that it would get more information out to potential travelers so that we wouldn't have to send our expensive vacation package out to them. The opposite has happened. We are seeing a huge volume of traffic growing on the Internet, but we're actually seeing about a 30 percent increase in the number of vacation packages that are requested to be sent. So we're going to be redesigning our Web site and probably take out of our Web site the opportunity to ask for the printed material, to more or less force people to print the information out on their own printer. It's great to have people talk to us, but we're not sure how to get our arms around how many of those folks are actually coming to Wyoming. By comparison we can survey the people that actually receive our vacation package, and we know that more than half of those people are actually coming. That's an effective tool; we're not so sure about the Internet.

One of the other systems that we use in all of the Visitor Centers is a DTN satellite weather system. We have a terminal in each of our Visitor Centers. We're very impressed with its ability to give accurate, timely information. The radar screens that are on that system are updated between every 15 to 30 minutes. We're really surprised at how many visitors are able to walk right up to the terminal and start clicking on those screens and be able to get the information that they need without even talking to us. We're thinking of expanding that system and using it in all rest areas, similar to what Nebraska does. We would like to see a similar system that allows road condition information to be up-linked and downloaded into these terminals. Nebraska currently does that; Wyoming does not. There may be some institutional issues there.



One of our agency needs is to understand the characteristics and demographics of our visitors. We have hired researchers to figure out those visitor demographics for us. We use that information to help package tours. We also use it to identify the potential for products and to identify opportunities. We would like to know how to increase the shoulder season of visitation. It seems that most of the people that come to Wyoming and the Parks are either retirees or families. Fewer and fewer couples are actually taking the time to go to the Parks, unless they're the outdoor type, and the outdoor type may or may not spend a lot of money. We don't know how to market that or whether we should market that.

Looking at the typical level of visitor understanding of information delivery systems, there's probably a mix out there. The older crowd is less comfortable with technology. Some states have developed a kiosk system. Studies have been done of those kiosk systems, and frankly, some of them have not been real successful. One kiosk system was set up with a Visa/MasterCard logo sitting on it; no one would use it because they thought it was an ATM machine. Sometimes it's easier to just turn around and ask the travel counselor, "Look, all I want to do is go to the National Park. What can I see and do between here and there?" So, I'm a little concerned with where the kiosk systems are going.

We have a low population state, with less than half a million people. We have vast open spaces. It's pretty common to drive in the state fifty miles and not see anything in terms of a gas station, restaurants, anything at all. Rather than having congestion problems, our problems are actually just the opposite. In Wyoming a flat tire or running out of gas can become life threatening because you're so far from civilization. Then when you get to the Park, suddenly there's a bottleneck. There are serious traffic jams there, especially when wildlife is visible from the

roadway. Mass transit may or may not work in Yellowstone. It is questionable whether you could get people to stop at gates and hop on a bus, but it's certainly possible. About 85 to 90 percent of Wyoming's visitors travel in personal vehicles. Our experience is that people that are in their own vehicles won't get out. Alternatively, as we see more people flying to Wyoming, Jackson Hole has become the busiest airport in the state. Those people probably are more likely to use transit.

Finally, institutional issues and political issues are important. Our biggest concern politically at the Visitors Centers is to be able to represent the entire state. When a traveler comes in and asks for the best way to Yellowstone, we've got to be careful in how we answer that question. If we send them consistently down one route, we will have pleased every city along that route, but will have angered every city on every other route. So what we present the options and then allow the traveler to choose. Once they've chosen a particular route, we can drill down and give them additional information along that route.

Another institutional issue that we're facing is with our State Highway Department. There is no doubt about it that Wyoming's Department of Transportation is much better funded than any other state agency. We have some of the best roads in the country in Wyoming, but virtually every single sign decision is made by an engineer who may or may not have any information about tourists, about cultural needs, about historic sites, about wildlife viewing opportunities. In other words they're making decisions that are good, sound engineering decisions, but they lack the tourism vision. So one of the things that we've started to do in Wyoming – the new Highway Bill encourages this – is to become more involved with the Highway Department planning process. By strengthening our partnership with the highway department we'll end up with better solutions for all of our issues.

## “Yosemite Area Traveler Information User, Institutional, and System Performance Evaluations”

*Ken Kurani*

*Research Engineer*

*Institute of Transportation Studies, University of California at Davis*

I'm going to talk about YATI today, which is the Yosemite Area Traveler Information system. YATI is an integrated traveler information system designed to improve travel and preserve the “Yosemite experience” in the five county, rural, mountainous, recreational region centered around Yosemite National Park. Some other important acronyms that might come up are:

- YARTS – Yosemite Area Regional Transportation Strategy
- VIP – Valley Implementation Plan

One of the initial primary objectives of YATI was to develop a system to manage information regarding traffic congestion in Yosemite Valley. A new objective that has become important over time is to develop an information system to support a regional transit service.

Who is YATI? One of the things that is different about YATI is that it arose from the private sector – people in the local counties who recognized a need to manage information about travel to Yosemite National Park during the busy summer months. The YATI management board includes representatives from the five counties around the Park, the National Park Service, the Forest Service, three Caltrans districts, and many others. All four gateway communities along the routes into the park are represented through their counties.

YATI was initiated with these four goals for the region in and around Yosemite National Park:

- reduce traffic congestion, primarily in Yosemite Valley;
- enhance mobility;
- preserve or promote tourism; and
- improve air quality.

The information technologies that were deployed for the operational test were:

- changeable message signs (CMS), which provide information about current road, traffic and weather conditions in response to specific conditions, not continuously;
- highway advisory radio (HAR), which provides information about current road, traffic and weather conditions, as well as lodging and camping;
- electronic interactive kiosks, which provide information about current road, traffic and weather conditions, lodging, camping, and transit alternatives and tourist activities; and
- a Web site ([www.yosemite.com](http://www.yosemite.com)), which also provides the same information as the kiosks.

A travelers advisory telephone system was also considered, but not implemented.

One of the key observations that we can make about the project: YATI worked on many levels.

- It galvanized local, state, and national governmental, as well as private sector, interests. This is a central goal of the National ITS Program.
- The field operational test system goals were largely achieved.
- YATI laid the institutional groundwork for the first steps of a regional transit program.
- The system is in period of refinement. Despite its institutional success, its effect on traffic management is still unmeasured or minimal (unmeasurable).

However, a perception remains among some local representatives and constituencies that Caltrans is a 500-pound gorilla, and the Park Service is an 800-pound gorilla. Whether this characterization is fair or not, it reflects local governments' perception that ultimately, the real

decision-making power regarding the management of traffic and visitation to the Park still resides with the state and federal agencies.

Some of the continuing issues YATI is facing:

- Siting problems with the CMS
- CMS message content
- Kiosk siting and maintenance
- Web site design and content
- Financial support
- The “location” of information relative to travelers’ trip planning and execution.

### Evaluation Tests

We conducted several user evaluations to determine the effectiveness of YATI. Several different groups of users were surveyed:

- Automobile visitors baseline and evaluation. A mail-back questionnaire was distributed to visitors in private vehicles as they exited the Park. For the 1994 baseline study, we received 202 responses, with a 48 percent response rate. We received 1,936 responses to the August, 1996 evaluation study, with a response rate of 34 percent.
- Web site users. An “electronic mail-back” questionnaire was posted intermittently on the Web site. We received 262 responses in 1996, and 272 responses in 1998-1999.
- Focus groups. Eight focus groups in four cities throughout California were conducted during the fall of 1998.
- Kiosk users. Questionnaires were distributed by intercepting kiosk users during August 1996.
- CMS and HAR user test. A field test was conducted of CMS and HAR use in July 1998. A mail-back questionnaire distributed to visitors in private vehicles as they entered the Park. We received 681 responses, with a response rate of 38 percent.

- Institutional interviews. We conducted interviews of YATI stakeholders and developers in 1996.
- YARTS data collection. In addition, 7,000 surveys across four seasons were conducted by a consultant to the YARTS project in 1998.

From the data we collected, we found that a significant percentage of visitors – 40 percent – were first-time visitors to the park. Twenty-four percent of respondents had been to the Park ten or more times. For lodging, 38 percent of the respondents were planning to stay overnight in gateway communities, and 28 percent were only in the Park for day use. Each of these groups represent different types of information needs.

### Results

- CMS. In the institutional interviews we explored the disagreements between the communities and Caltrans on the location and message content of signs. This problem required a lengthy period of negotiation, and compromises on both sides. The resulting solutions, however, had long-term impacts on the usefulness of the CMS to travelers.
- There are complex relationships between CMS location, travelers’ routes to the Park, length of stay, driver attention, message content and stakeholder goals. This means that there is no one optimal sign location for each route, and a network of signs may be necessary along each route – especially if new goals, such as supporting YARTS, are added to the system requirements.
- HAR. Illuminated signs announcing HAR locations increase the proportion of people who tune in the HAR. However, in no case did more than about one in four private vehicles along any route report tuning in the HAR. There are similar siting issues with the HAR as with the CMS.
- Kiosks. About 6.7 percent of the 1996 auto visitors’ sample reported using one of the YATI kiosks. Kiosk use was concentrated in

Yosemite Valley – of the six kiosks throughout the five county region, 79 percent of all reported use occurred in Yosemite Valley. This can be explained by the much larger number of people who visit this information center compared to those in the gateway communities. Most visitors didn't know about the kiosks until they had walked into the visitors' centers.

- The kiosks had many design and maintenance problems during the evaluation period and lacked institutional support in some locations, including the Valley visitor center. They should be Web-based, in 24-hour accessible locations which place value on real-time information.
- Web Site. The 1998 focus group participants explained how the Internet is becoming their preferred travel information source. Eighty-seven percent of the on-line survey respondents say they are planning a trip to Yosemite. This is the same as 1996 results. In both 1996 and 1998-99, on-line survey participants want more maps and pictures. People find the site primarily by conducting a keyword search for "Yosemite" (43 percent), following a link from another Web site (17 percent), or by guessing that "www.yosemite.com" must be a valid Web site.
- The Web site is the only pre-trip planning component of YATI system. It provides the greatest breadth and depth of information. However, the real-time information is devalued by the distance from, and time to, the region by most users.

### Current Activities

The YATI Web site is undergoing design improvements. The goals include the following.

- Use graphical user interfaces more extensively, based on maps, as well as more maps of hikes, routes, etc.
- Organize information by travel corridors to Yosemite National Park
- Add more graphics and photos
- Provide easier links to Yosemite National Park and other complementary Yosemite web sites by forming a Web ring
- Provide information on "alternative" travel modes and planning guides, such as transit support information, sample itineraries, and real travel stories from users of buses, trains, and bikes

What lessons can we learn from our experience for next time? First of all, a market model should be developed before developing and deploying technology. The next steps for further improvements to YATI include the following.

- A statewide survey and interview process
- Greater focus on activities and travel planning of visitors
- Study local knowledge of regional and in-park travel patterns and information needs
- Interviews with visitor center personnel and others who deal directly with the public: regional police, lodging personnel, and Park rangers
- Move toward a classification system of Yosemite visitors based on their information needs and the YATI partners' travel management goals

## Traveler and Visitor Information Needs Workshop Summary

*Steve Albert – Moderator*

*Director*

*Western Transportation Institute, Montana State University – Bozeman*

### Session Purpose

1. Discuss types of visitor characteristics (such as trip patterns)
2. Discuss pre-trip and en-route information needs of visitor
3. Document existing or planned visitor information systems
4. Discuss agency needs in order to be more responsive to visitors and their needs
5. Document typical level of understanding of information delivery systems, their applications and benefits
6. Discuss information needs to provide improved support for traffic management and transit alternatives
7. Discuss institutional issues and political concerns of traveler information

- Need to understand reality (time, miles)
- Need to customize information, i.e. “cookie”
- En-route: What?
  - Weather and road information
  - Restrictions and conditions
  - Viable alternative routes
  - Reservation and service information
  - Coordinated regional data
- En-route: Where?
  - Visitor Center (information broker/one-stop shop)
  - Staffed facilities
  - Kiosk
  - HAR/TIS
- En-route: Who?
  - Targeted information based on conditions

### Visitor Characteristics: Trip Patterns

- Destination-specific (Deep South)
- Multi-use opportunities (Western U.S.)
- Multiple visitor experiences and locations (i.e. “Grand Circle”)
- Length of stay increasing
- Shoulder utilization increasing
- Overall visitation increasing
- Mixed occupancy rates
- Need to understand the individual
- Mode changes
- More people using personal vehicle instead of bus

### Information Needs

- Pre-trip requirements
  - Accurate, dynamic and real-time
  - Location specific, but provide for regional information
  - Road and weather information
  - Park specific regulations (fees, restrictions, etc.)

### Existing Technologies

- Information should be accessible, affordable, accurate, and user-friendly
- Low-tech solutions
  - Internet
  - Kiosks
  - HAR/TIS
  - Mail-in
  - Books
  - 1-800 hotline
  - 1-900 hotline
  - Commercial agencies
  - Road/weather hotline
  - Cassette tapes
  - Road cameras
- Need for integrated information

### Future Technologies

- Applications should not be constrained by technology
- Integrated information

- Improved communication mediums (satellite)
- Flexible traveler information systems (handheld or in-vehicle devices)
- Regional/national N11 system (locally driven)

#### Agency Needs

- Ability to collect real-time information (trip patterns, visitor characteristics, and traffic volumes) and forecast conditions
- Mechanism to meet and discuss common issues to provide for coordination
- Training
- Ability to impact and intercept travelers en-route to provide for a safe and convenient trip
- Need to know availability of support services (hotels, etc.)

#### Information Delivery Systems Applications

- Pre-trip (short-term)
  - Internet
  - 1-800 hotline
  - Mail-in
  - Motor clubs
  - Books
- En-route (short-term)
  - HAR/TIS with VMS
  - Welcome center kiosks
  - Staffed facilities
  - Books

- Better partnerships for application of shared resources

#### Information needs for improved support

- Traffic management
  - Ability to collect and disseminate real-time information
  - Ability to forecast anticipated impacts (downstream)
  - Ability to influence traveler arrival and routing to spread peak hour congestion
  - Demographics
- Transit alternatives: provide and inform travelers with:
  - Fees
  - Restrictions
  - Schedules
  - Locations

#### Institutional Issues

- Funding
- Coordination
  - Data collection
  - Perspective
  - Purpose
  - Regional decision-making body
  - Information exchange (i.e. regional server)
- Information drives other systems and operations

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**Session Reports**  
**Department of Energy Session**  
**“Green Energy Parks Program”**

*Terry Brennan*  
*Alternative Fuels Coordinator*  
*National Park Service*

I'm with the Washington office of the National Park Service. My position deals with energy conservation, renewable energy and alternative fueled vehicles. I do a little bit of Federal Highway, as well as being the Washington Office Sign Coordinator. I don't handle the mass transit end; that's another branch of our division, I handle the ones and twos of an alternative fueled fleet, mostly maintenance vehicles. I go around and speak to chiefs of maintenance and superintendents about the use of alternative fuel vehicles. I link up the alternative fuels infrastructure people, which is one of our main hurdles we have to go over with alternative fuels, with the National Parks and we try to get cooperative things going.

The Green Energy Parks initiative started over a year ago. At first we thought that the Office of Management and Budget was going to come up with a pot of about \$3 million to kick this off, and who wouldn't get excited about \$3 million? Well that pretty well died off, but a political appointee with the department had the initiative to push it through. He was very instrumental because he had the ears and the eyes of the higher-ups with whom it was hard for me to obtain a meeting. People from the Department of Energy and the Federal Energy Management Program got together and we toiled for many hours over a Memorandum of Understanding signed by both Department Secretaries. The logistics of linking two secretaries together out of Washington in one spot is a nightmare and a half. It ended up that Secretary Babbitt of the Department of Interior unfortunately took sick in Phoenix, so we had to fly in Don Berry, Assistant Secretary of Fish, Wildlife & Parks. Secretary Richardson was there from the Department of Energy, and spoke very highly of this initiative. You won't hear the word "initiative" a whole lot back in Washington; they're looked upon as the

"initiative-of-the-month" kind of thing. So this is called the Green Energy Parks Program.

Within the Green Energy Parks Program, we have an alternative fuel component. Through funding from DOE, we sent out a request for proposals for alternative fueled projects and the response we had was magnificent. It shows the interest that the Park people have in switching to alternative fuel vehicles. It is a part of our mission: "to preserve and protect." We have to preserve not only monuments, seashores and lakes, but also the air that we breathe in the National Parks.

One of our biggest hurdles in the National Parks is really a societal thing. As a society, we're used to getting in our vehicles and going where we want to go, when we want to go there. Now if we tell the visiting public that they are going to have to park and take this electric tram, take this train, rent this bicycle, or walk on this trail to get to their destination, what are they going to say? They'll say, "I paid my taxes and I paid my entrance fee to this park; I want to drive in this park." So we have to work on changing the mindset of the general public.

One thing we look at in the National Parks Service is how we can help educate the public. Deciding on the alternative fuel vehicles, the photovoltaic systems, the solar hot water systems can prove to the people coming into the National Parks that this technology really does work. Ten years ago this was more space age than anything else; now it's second nature to the National Parks. We have over 100 alternative fuel vehicles in the National Parks Service. A lot of those are dual-fueled, and with the infrastructure we're not sure if they're running on the alternative fuel rather than the conventional. We have over 370 photovoltaic systems, which produce electricity

from sunlight, in the National Parks with many more coming on-line.

The maintenance folks at the parks want to do this. They're not really thinking about the mission; they're thinking about the future of the country, the future of the air. When maintenance is ready to jump in, then we're able to talk to the superintendents and once you have the superintendent behind it, things can get done.

The Green Energy Parks Program is multi-faceted, and we're under the auspices of a large initiative called the Environmental Leadership Initiative.

Alternative fuel vehicles, photovoltaic systems, solar hot water systems, wind, fuel cells – this is

the technology of now and the future. And that's where the National Park Service wants to be; we want to be on the leading edge, we want to be the leaders in education, we want to be the leaders in showing the American public this really does work.

If you have access to the Internet, go to <http://www.nps.gov/renew>. This is the home page of Green Energy Parks. If you run down the page, you'll see case studies, which we are adding on a weekly basis. This will give you an idea of what we're accomplishing to make the National Park Service fully sustainable and environmentally friendly.

### **“Interactive Software for Fleet Management”**

*Roxanne Dempsey  
Clean Cities Regional Program Manager  
U.S. Department of Energy, Seattle Regional Office*

In the Seattle region, we serve eight western states. We have one person dedicated to the program in the state of California, because California has thirteen clean cities coalitions that are designated. There is a long, involved process that a community goes through to become designated. We have seventy coalitions nationwide right now. It takes a good deal of commitment and focus to attain official designation. In the Clean Cities program, we work primarily with clean cities coalitions. The Clean Cities program is focused primarily on fleets.

Today, I'm going to talk about some of the interactive tools, which are available on the Internet for people to use. Some of you might not want to use these tools yourself, but if you're trying to sell alternative fuel vehicles to someone else, this is a good introductory point for them. There are four tools we have on the Internet:

- The Fleet Buyer's Guide,
- Guide to Alternative Laws and Incentives,

- Reporting for the Energy Policy Act (EPACT), and
- The refueling site locator.

The Alternative Fuel Vehicle (AFV) Fleet Buyer's Guide, located at [www.fleets.doe.gov](http://www.fleets.doe.gov), was created by the National Renewable Energy Laboratory. We have an Alternative Fuel Data Center that collects all the data that anyone has about alternative fuels, from the properties of the fuel, to ways to buy fuel, vehicle information and fleet experience.

The Fleet Buyer's Guide program first asks you to specify the fleet type and your zip code. The program will then determine whether or not you are covered by EPACT, depending on where you are located. I realize that a lot of you here today are in National Parks that are not in these areas affected by EPACT, but EPACT covers all federal fleets, regardless of location. You need to find out what the policy is within the National Parks Service on EPACT. The federal fleets



nationwide are covered. You need to know at a local level whether your particular fleet is covered yet or not. Your agency may have decided nationwide to comply by putting all of their alternative fuel vehicles in certain cities; therefore, it may not affect you this year, but it might the next year or the year after that.

The federal fleets are required to have 75 percent of their new acquisitions of their fleets as alternative fuel vehicles; you have to run the formula each year to determine how many alternative fuel vehicles you need. It is important to remember that each fleet has a different set of requirements. For fuel providers, 90 percent of new acquisitions have to be alternative fuel vehicles; for federal fleets as I said it is 75 percent; and for state fleets it is currently 35 percent, but it will continue to go up a little bit each year.

After determining if EPACT applies to your fleet, the program helps you to determine how much EPACT applies. The program asks if you have 20 or more non-excluded vehicles in the local fleet or if you have 50 or more non-excluded vehicles in all U.S. fleets. Excluded vehicles would include emergency medical vehicles, law enforcement vehicles and military vehicles used primarily for defense. This doesn't mean that you can't make them alternative fuel vehicles if you want to, and if you did you could count those vehicles toward your EPACT requirement.

Even though you're a federal fleet, it would behoove most of you to know about the state fleets around you, and understand that the EPACT requirements for them are different. We found that some of the Western states' fleets are primary purchasers of used federal fleet vehicles. When you consider purchasing a vehicle, you should also consider the aftermarket of state fleets.

There is an additional rule that hasn't yet been issued, but could be out later this year, which will impact local government at the county and city level, and private fleets above a certain size. When EPACT was passed in 1992, it gave the Department of Energy the authority and the responsibility to issue several rules. So far, today,

I've discussed the rules for federal, state and fuel provider fleets. The next rule will impact private and local government fleets. This affects you if you're concerned about building up infrastructure to provide fuel for your vehicles. After the rule is issued, there will be a series of meetings around the country to gather comments from all affected parties. If issued, this last rule would not go into effect until 2002.

The Fleet Buyer's Guide program next shows you how to buy an alternative fuel vehicle. You first select an AFV you want to review. You can either specify a specific vehicle (such as a Ford Crown Victoria), or you can select a type of vehicle (like automobile or truck) by fuel type. The program will provide a display of all the vehicles that match your specifications. The program is regularly updated with information from the manufacturers to reflect all of the current models that are available.

The program has a series of questions about incentives to help you decide on which vehicle to buy. The manufacturer's price is already in the program; you are free to enter other values depending upon where you are located. Your state, for instance, might have an incentive to encourage purchase of an alternative fuel vehicle. You will also need to enter the fuel costs for your area in order to calculate the total costs of operating the vehicle. Based on the difference in the vehicle costs and fuel costs, the program will calculate the payback period for you. If you are trying to sell the idea of alternative fuels to someone else in your organization, then this program will give you hard data to convince them.

Another program at [afdcmmap.nrel.gov/nrel](http://afdcmmap.nrel.gov/nrel) allows you to find refueling sites and AFV dealers near you, through a mapping tool. You specify the city that you're in, a radius of how many miles you want to search, and the zip code from which the vehicles will be operated. The program will provide you with the street address for each refueling station, along with driving directions and the phone number. The information about refueling is updated regularly.

We have a guidebook provided on-line that covers federal, state and local incentives and laws. The program lists individuals in your state or community who know about alternative fuels and can give you more information about incentives from the state or utilities/private organizations, laws and regulations, and contacts. Regional contacts for the Department of Energy, Clean Cities, state or regional government and alternative fuels groups are listed.

Five databases are maintained in order to ensure that the Fleet Buyer's Guide is up-to-date:

- Office of Energy Management vehicle specifications,
- Laws and incentives,
- Refuel/recharging sites,
- Points of contact, and
- Alternative fuel vehicle dealers

We're working on further improvements to this tool. We would like a lot more in-depth life-cycle cost analysis for these particular vehicles. We want to add medium and heavy-duty vehicles; we recognize that heavy-duty vehicles have the potential to use large volumes of fuel, which would help support the development of infrastructure. For the people working on air quality, we also want to develop an emissions comparison between alternative fuel vehicles and conventional vehicles, based both on an average lifetime and an annual basis.

#### Other Internet Tools

- Reporting for EPACT. We have a tool on the Internet that provides for electronic reporting

### **“Yosemite Shuttle Bus System”**

*Bill Fay  
Alternative Fuels Coordinator  
Yosemite National Park*

I'm going to talk just a little bit about the history of the four shuttle systems in Yosemite, letting you know what we have and how they developed; a little bit about our alternative fuel shuttle

for EPACT. This has been especially popular with the state fleets and the fuel providers. It indicates which fleets that have earned credits, and allows fleets to trade credits.

- Preferred Fleets Database. This was a specialized piece of software that was done just for the coalition. Once a community goes through the process of becoming designated as a clean city, we have contracted to do a great deal of market research within their communities. We start by SIC code and contact fleets through phone surveys, one at a time, to ask them about their interest in alternative fuels. We create a database and give it to the local coalition. When they try to find other fleets for a station they're trying to develop, or to support one that is already in place, then this database becomes really useful to them. Some National Parks, such as Rocky Mountain National Park and Yosemite National Park, are involved with the Clean Cities coalitions around them. If you're a part of the coalition, then you have access to information from this database we used to help develop infrastructure. Once it is the property of the coalition, it is their responsibility to maintain and update it.
- Additional information about alternative fuels and the Clean Cities Program is available at [www.ccities.doe.gov](http://www.ccities.doe.gov) and [www.afdc.doe.gov](http://www.afdc.doe.gov).

bus project which was started in 1993; and then I'll talk very briefly about what's going on in Yosemite today.

Yosemite started out fairly early in the shuttle business. In 1970, we began providing “free” shuttle service to park visitors and acquired propane powered double deck buses shortly thereafter. Although they ran for more than ten years, both safety and maintenance concerns regarding these buses led the park to look for another type of bus. In 1981, the park received an appropriation to purchase replacement buses. The next year ten 40-foot Gillig Phantom transit buses (diesel) were delivered to the park and are still in use. The park’s General Management Plan, completed in 1980, listed the reduction of vehicular traffic as a major goal. Unfortunately, even with our shuttle systems the problem has become more acute. In 1980 we had 2 million visitors; in 1995, we had 4 million visitors.

Our Valley Shuttle System operates on an 8.5 mile loop on the east end of the valley and has carried over 3 million riders per year. They operated year-around, and run during the summer from 7 AM to 10 PM. During the summer, these buses sometimes operate with standing room only.

In the mid-1980s we started another shuttle service to take people to the Mariposa Grove of Big Trees. We have six shuttles there; that carries over 100,000 visitors per year. We also started running a shuttle in the wintertime up to Badger Pass Ski Area. There are a couple of good reasons for this: one for safety to get people off the snowy roads, and second to give people access to skiing. Yosemite is one of, I think, two parks left in the National Parks System that have ski areas; we have a small one of about 80 acres. We take people up from Yosemite Valley up to Badger Pass in the winter. In 1991 we began a shuttle up in the Tuolumne Meadows area, which is a critical resource location at around 8,000 feet elevation. We had problems with people pulling off the roads by the meadows. We’re hoping to try an experimental shuttle this year. The concessionaire currently operates a full fare service from Yosemite Valley to Tuolumne Meadows and then back to the Valley in the afternoon. We hope to make this a no-fare service in order to increase ridership.

The system is operated by our major concessionaire, Yosemite Concession Services. All of our shuttles operate without any fares. They are funded through a series of add-ons to various services within the valley that the concessionaire provides, primarily hotels. We anticipate the need to explore other funding options as we expand the system.

#### Alternative fuels

I will now discuss Yosemite’s Alternative Fuels Shuttle Bus Project. In 1993, Mike Finley, who was our superintendent at that time, had been in the talking stages with the State of California and Pacific Gas and Electric Company (PG&E) regarding a partnership to demonstrate some alternatively fueled shuttle buses. I was asked to serve as project manager. We were able to develop a partnership with the California Energy Commission (\$740,000), California Department of Transportation (\$250,000), PG&E (\$95,000), and Yosemite (\$250,000). With our project partners we formed a team to look at our needs and determine which alternative fuel technology made the best sense for a demonstration program in Yosemite. Given our desire for minimal emissions, quiet buses, and the availability of electricity (natural gas is not available in the park), we decided to focus on electric bus technology. Rather than putting together detailed specifications, we went out with a request for information (RFI), identifying our performance requirements and some specific needs such as removable windows. We worked with our partners to get as wide a distribution as possible. Two companies provided viable responses: Specialty Vehicle Company out of Downey, California and APS Systems from Oxnard, California. We visited both factories, requested additional information, and decided to purchase one bus from each manufacturer, not wanting “to put all of our eggs in one basket.” We received both buses in 1995. In 1996, we went out with an expanded RFI and we received more responses, including Bluebird Bus Companies, who had started building electric school buses. We ended up ordering two of the Bluebird electric buses that were used in the Atlanta Olympics.

We now have four electric buses which ends the bus procurement phase of this project. So the question is, how are they doing? The answer is, mixed. Specialty Bus Company unfortunately went out of business with another company purchasing their assets. Fortunately another company handled their warranty work and we found them good to work with. After a series of initial problems with this bus, it has had fair performance. Unfortunately, the APS bus hasn't completed a full duty cycle, which probably results from an untested design. Bluebird, as one might expect, has done better – not as well as we hoped; but better than the first two buses. One advantage Bluebird has is a reliable platform. Rather than attempting to develop a brand new design, Bluebird simply took their standard frame and simply changed the propulsion system. A number of the problems that we had with our first two buses were suspension related.

What lessons have we learned from our experience?

- If you're looking to use new technology, it's fine as a demonstration project; I wouldn't recommend it for fleet replacement.
- Partnerships are great. They allow you to stretch your money and utilize others expertise. They don't come free; they take time and a lot of work, but the payoff can be worth it.
- In order for alternative fuels to work well, you need to have support from the top. The superintendent and the management team have to be on-board with it. If they are, that's a big help.
- Get good warranties.
- Make sure you have good training programs as part of your specifications.
- It takes work to get buy-in from your drivers and mechanics. This is critical for the success of any project utilizing new technology. The range for an electric bus is very dependent upon the skill of the driver.

- Match technology to your duty cycle. In retrospect, there wasn't really a bus out there that matched what we needed. We wanted a forty-foot bus that we could handle our summer visitors. As far as we have been able to tell, there is still not a forty-foot electric bus available although there are some decent 22-foot electric buses. Even with the problems that we have had, we still think that there are viable applications for electric vehicles, particularly for light and medium duty vehicles. Battery technology (cost and range) is still a concern.
- If possible, take your time and think about it and try to make the right decision. We had to move fairly quickly on our initial acquisition because some of our funding was time dependent.

Right now, Calstart/Weststart approached us in looking at our infrastructure, vehicles, duty cycles, and will be making some recommendations to us, in regards to what would work well in Yosemite. One of the things we've found in a big park is that it's real easy for staff members to be working in different directions. We've formed an alternative fuel committee to try to make sure that we're all on the same page. We are planning a major bus acquisition after the Calstart/Weststart study is completed. We will be looking at replacing our Gillig Phantoms; they've been real workhorses, but they're "tired," and emissions and noise pollution are a major concern.

We have been involved with the Yosemite Area Transportation Information System (YATI). Caltrans was the major funding source for that, and that started back in 1993. This has provided some good information in terms of changeable message signs, radio, and visitor information contact stations. We're looking at expanding that as time goes on.

We are also involved in the Yosemite Information Transportation Strategy. This is a regional organization where we're working to provide transportation not only within the park, but coordinate mass transit into the park. We should

have a test of this system next summer on one of our road corridors.

We are also looking at various transportation options (including a future vehicle management

system) within the park, which is related to our current Valley Planning Process. In summary, transportation is definitely on “the front burner” within Yosemite.

### **“Alternative Fuels at Yellowstone”**

*Jim Evanoff  
Management Assistant  
Yellowstone National Park*

Good afternoon. Back in 1997, Yellowstone celebrated its 125<sup>th</sup> anniversary, and as park managers we wanted to know what we were going to do for the next 125 years, as far as preserving and protecting this national treasure. We developed a program called the “Greening of Yellowstone.” The biodiesel truck was really the unofficial start of the Greening of Yellowstone in 1995. We’ve expanded to pollution prevention, other alternative fuels, and different modes of transportation, but the biodiesel truck really set things off.

The park was created in 1872. The first road was built in 1883, and basically the road system configuration you see today is the way it was in the beginning. The roads were all dirt until 1920, they were oiled in the mid-1920s, and paved in the 1930s. In 1915 the Park experimented by letting one vehicle enter the Park, to see how it could handle the terrain. In 1916, forty white touring buses were out in the park. They were run by the Yellowstone Park Transportation Company. In 1917, all horse-drawn carriages were put out to pasture, so to speak, and the park was opened up to all vehicles. Between 1917 and now, over 100 million people have visited the park. This has prompted us to examine increases in pollution, both in noise and air, and to be in the forefront in the experimentation of alternative fuels.

In 1995, the biodiesel truck was donated by Dodge Truck Inc. There is a consortium of partners involved in this biodiesel project too numerous to mention, but the Montana Depart-

ment of Environmental Quality was instrumental in spearheading the effort. The vehicle runs on 100 percent rapeseed or canola oil. One interesting fact is that we have done absolutely no modifications to this engine. It currently has logged nearly 100,000 miles. We have had very little maintenance problems with the vehicle. One of our charges from the partnership was to put a lot of miles in a short amount of time on the truck, which is difficult to do when the only place to refuel is in Mammoth Hot Springs. Consequently, we fabricated and installed a 300-gallon tank on the bed of the pick-up truck, which allows us to travel 6,000 miles between fill-ups. We’ve traveled to Nashville and back without refueling. One of the concerns when this project first started was when winter did set in, because of our harsh environment, the truck would either be parked or given to a southern type park. We didn’t like that idea, so the 300-gallon tank is heated so we can use the truck year-round.

The canola oil has the odor of cooking oil, and the exhaust smells like french fries. Consequently there was a concern about the truck being a bear attractant. As a result, the truck was taken to Washington State University, and a series of tests were done with four captive grizzlies and four captive black bears. In a nutshell, the exhaust was piped into their cages, to see if they were in any way attracted to it; the conclusion was they weren’t. To this day, they have not chased us. There was also a concern they might like the taste of biodiesel once they tasted it. The University of Wyoming conducted some tests, and concluded that if the bears drank or ate it, they

wouldn't be able to digest it, and would develop severe diarrhea and a hangover.

Since the beginning of the project, semi-annually we have conducted tests on the truck. There have been no noticeable differences in performance, horsepower or miles per gallon as compared to diesel.

The truck gained a lot of notoriety, first of all, because it was positioned in Yellowstone and it was exposed to over 3 million visitors per year. We actively promoted the truck through conferences, school programs, universities, and even the state capitol of Montana where we showed it to the state legislature, who gave us \$50,000 for the project. The state of Wyoming gave us \$30,000, so it was a regional buy-in by a lot of partners.

Last July, when the truck reached about 98,000 miles, we took the truck to Pocatello, Idaho, and did an engine teardown. One of the few things that we found was that the oil filter housing was displaying a lot of rust. There was no carbon build-up; the cylinders were clean to the point where some of the honing marks were left from when the engine was new. The engine was re-assembled, put back into the truck; it's back into operation now, and we're into Phase 2, which is basically operating it for another 100,000 miles. When Phase 2 is complete, the plan is to add the biodiesel truck to the Park's historical vehicle collection; we've got over 40 vehicles in our collection, a lot of them old touring buses, and most still run.

Yellowstone, contrary to its beginning days, has turned into a two-season park, with the winter evolving into a real problem due to the overuse of snowmobiles and snow coaches, and that presents its own set of challenges. All of our roads are closed in the wintertime to vehicular travel. Our concessionaire operates many snow coaches; they hold six to eight people and average only 25 mph. Most people are traveling to Old Faithful, which is the only part of the Park that has overnight facilities open in the winter. We also have track-converted conventional vans, which are getting more common because they can be used year-round. Another way to get

around is snowmobiles, which has become very popular over the years. Around 1930, in Lamar Valley, the first snowmobile went into Yellowstone National Park. The conventional snowmobile is very noisy and is very polluting. During a typical day in the winter, an inversion occurs because of the cold air, and through the narrow corridor of trees the haze just hangs in the air.

Another associated problem with winter use is that our infrastructure was not built for winter use. A lot of it is over thirty years old. All of the garbage and solid waste that is created at Old Faithful in the winter has to be stored on-site in huge 75-yard dumpsters. Sewage systems are overworked and undersized. Fuel storage for these machines is limited; we've had occasions where sites have run out of fuel before spring arrived.

We have a 10-foot or 12-foot wide corridor on a groomed road that's shared by snow coaches, snowmobiles, bison, and skiers. The bison have realized that it's a lot easier to walk in a groomed road than to travel through 8 or 10 feet of snow. And the snowmobile drivers don't really understand how to deal with them. There's a real concern that the groomed roads have created artificial migration corridors for the bison that migrate into Montana and create other problems once they get out of the park. In many cases, the bison use our groomed roads because we have built the roads over their historic migration routes.

We have begun an aggressive study of the noise and air pollution that snowmobiles create. There are ten different studies currently, a lot of them funded by the Department of Energy. The park has gone to oxygenated fuel. Park Service employees burn over 900,000 gallons of fuel of year. In one year we have reduced by 51 tons the amount of carbon monoxide emissions we would have produced. In addition, we are using bio-synthetic two-stroke lube oil in our snow machines; and we haven't had any associated problems to date. The electric all-terrain vehicle we demonstrated in the Park a couple of years ago has evolved into looking into a prototype of an electric snowmobile. There is one that has been assembled in California; we're proposing to

get a prototype this winter with charging stations throughout the park.

In addition to the biodiesel project, we're looking into compressed natural gas (CNG) and liquefied natural gas (LNG) at several locations. As early as this summer it is planned to operate some other vehicles on biodiesel or a biodiesel blend. The concession contract will expire this year, and we're looking seriously at introducing "green"

verbiage in the contract; including running some of the tour buses on a blend of biodiesel.

Another project under way is the use of vegetable oil as a hydrostatic fluid in snow groomers throughout the park. The groomers work every night in the winter, sometimes in double shifts, on every stretch of road in the park. It is also proposed to convert 35 dump trucks to vegetable oil-based hydrostatic fluid.





## Session Reports

### Alternative Fuels Panel

#### “Clean Diesel Technology for the 21<sup>st</sup> Century: How Far Have We Come, Where Are We Going?”

*Dr. Rodica Baranescu*

*Chief Engineer*

*Navistar International Transportation Corporation*

Good morning ladies and gentlemen. I am very glad to be here in the beautiful décor of Montana and talk about clean diesel technology for the 21<sup>st</sup> century. These images of pristine beauty of the National Parks should remind all of us why we need clean technologies in transportation. We need to preserve the environment for us and for the generations to come and we need to understand how to balance technological growth while keeping the air the land and the waters clean.

I represent Navistar International, a major truck and diesel engine manufacturer involved in commercial transportation technology. We have been in business for over 180 years – most of you may know our old name, International Harvester. Through all these years we have provided leading technology in trucks, and our engines are legendary with the customers. We were constantly working to develop the engines for low emissions. In 1988 we demonstrated for the first time the “smokeless diesel” and we brought it to the market afterwards.

As emission standards tighten, the challenges upon the engine development process increase. The state-of-the-art engine is subjected to several complex and often contradictory requirements, as shown in the slide: performance, reliability and durability, environmental requirements, sociability requirements, and cost requirements.

The technology trail of diesel engine development in the last 25 years was marked by the regulatory trail of the emission requirements. The industry was very successful in reducing both NO<sub>x</sub> and particulate emissions by about 90 percent or more from unregulated levels. These reductions were achieved in spite of the proverbial trade-off between NO<sub>x</sub> and particulates and without any penalty on engine performance and efficiency. Most of the improvement in emission reduction was achieved through the development

of the engine only – combustion processes, combustion chamber design, fuel injection system, turbocharging, and electronic controls – as you can see in the slides.

What is coming upon us beyond the year 2000 is what we call the 2004 stringency “hit”. We call it a “hit” due to the complexity of the requirements and the limitation imposed by the engine system as how to solve it. In 2004, on top of the emissions for heavy-duty vehicles, the Environmental Protection Agency (EPA) has added some additional constraints, requiring compliance over a wider range of ambient conditions and over a wider range of engine operating situations. In addition, “not to exceed” limits above and under the average cycle emissions are required for the heavy-duty transient cycle. This implies flatter emission maps for the engines, as shown in the slide.

For light-duty applications (i.e. passenger cars, minivans, light-duty trucks) the proposed Tier 2 legislation represents the most severe emission standards ever, requiring a reduction of over 90 percent on NO<sub>x</sub> and particulates from today’s levels. Industry has reached the barrier at this point. Further emission reduction cannot be obtained by development of the engine only. One has to consider the development of the total engine system, including the engine, catalytic aftertreatment, and fuel properties. We think that to reach truck compliance in 2004 for heavy-duty engines is problematic and is quite unlikely for a light-duty engine because of the high content of sulfur in fuel today (500 ppm).

In recent past, the aftertreatment systems have shown great potential in reducing pollutants in diesels. Catalytic converters, diesel particulate filters, lean NO<sub>x</sub> catalysts, etc. have the capability of processing about 90 percent of the pollutants in the exhaust. However, all of these systems

are quite sensitive to sulfur in the fuel. In the presence of the catalyst, the sulfur oxidizes to SO<sub>2</sub> and SO<sub>3</sub>, forming sulfates which add to the particulate mass. Sulfur also inhibits the operation of the catalysts. This inhibition is sometimes temporary; however the sulfur can also poison the catalyst rendering it inefficient for its purpose.

Industry is proposing a much lower national sulfur level in diesel fuel for heavy-duty applications. This would reduce the particulate inventory by reducing sulfate emissions in all vehicles in use, new and old. And certainly low sulfur fuel would enable heavy-duty technology development and the introduction of advanced catalytic aftertreatment systems.

If we are able to break through the barrier and have a national low-sulfur fuel, this will alleviate some of the health concerns connected with particulates, it will maximize the potential of “green” diesel technology, and it will provide the best overall value for customers of both heavy-duty and light-duty vehicles.

There are some critical questions to address for the year 2004.

- What would the fuel economy be? So far fuel economy of the diesel has been preserved through the years, along the technology trail. But we have almost reached the limit and it is unknown whether or not, with new developments of the engine and systems, fuel efficiency can be further preserved.
- Oil drain intervals. We don't know yet about oil drain intervals. With cooled exhaust gas recirculation (EGR), there is the possibility that oil drain intervals may have to be shortened.
- Engine durability. We certainly want to keep the high durability for which the diesels are famous.
- Engine costs. As we make the engines more sophisticated, cost reduction measures have to be implemented as a result of competitive pressure and market requirements.

Industry's message is that we are working diligently to develop cost-effective, compliant heavy-duty engines for 2004 that will provide the performance and durability that meets our customers' needs.

There is also great potential for diesel technology to penetrate the light-duty applications under 8,500 pounds gross-vehicle weight (GVW). The challenges for emissions in this market are even more difficult to achieve than the ones in the heavy-duty arena because of the stringent emission standards proposed for 2004-2007. Because of the potential of NO<sub>x</sub> absorbers and advanced particulate traps, we see the potential to meet the challenges of light-duty emissions. However, this requires ultra-low sulfur in the fuel (about 5 ppm).

It is obvious that advanced, clean diesel fuel cannot be made available in large quantities and in a short time frame. Refinery technology and new investments will develop over time. The needs of the engine market are also gradual. For example, one could look at the potential of having ultra-low sulfur diesel (5 ppm) at retail stations for use in light-duty applications only. Later on, as emission standards and engine technology require, a national low sulfur level can be adapted for all diesels.

In conclusion, I'd like to close with the following remarks:

- The diesel emissions regulations are very challenging, but technologically feasible. As a company, we are committed to develop clean, green diesel technology.
- We see low- and ultra-low sulfur fuel as a “technology enabler” which will allow diesel engines to meet stringent standards, allowing for the maximization of the potential of aftertreatment systems.
- We see the diesel technology as a viable technology for both near-term and long-term greenhouse gas benefits. It's a technology that has reached maturity, is based upon a huge infrastructure, enjoys a broad customer

appeal, can certainly reinvent itself and be very, very “green”.

For additional information on the technology, or a profile of Navistar International, please contact

me at (708) 865-3717, or e-mail me at [rodica.baranescu@navistar.com](mailto:rodica.baranescu@navistar.com).

### **“Innovations in CNG Motor Coaches”**

*Ron Aubrey*

*Director, Public Sector Sales*

*Motor Coach Industries*

Good afternoon. I’m involved with the sales of our motor coaches to public agencies throughout the country. The objective of my presentation is to provide some background information on MCI regarding who we are, what we do and describe our first-ever dedicated CNG coach utilizing Detroit Diesel’s new Series 60 400-hp, high torque (1,400 lb ft torque at 1,300 rpm) engine.

Harry Zoltek founded our company, Motor Coach Industries, Inc (MCI) way back in 1932. He was the “hands-on” type, noted for walking the production line with chalk in his pocket, making design changes on the shop floor.

MCI has been manufacturing equipment for Greyhound Lines going back to 1947. Today they run 3,000 of our coaches, logging 200-240,000 miles per coach each year. Our manufacturing facilities are located throughout North America, with the frame built in Winnipeg, Canada, and final assembly in Pembina, North Dakota and Sahagun, Mexico. Our coaches include both 40- and 45-foot lengths, with the design focus being on building them to last with reliable features.

In March 1997, New Jersey Transit (NJ Transit), one of the largest transit agencies in the country, which operates some 1,300 of our vehicles for commuter express service into New York City everyday, came to us with a one-of-a-kind challenge. “The Governor just gave us money to buy fifty MCI coaches, do you want it? It’s to our same spec, except for one small change: it has to use dedicated compressed natural gas (CNG).” I remember someone in our engineering depart-

ment utter, “It doesn’t exist.” Well, I’m here to say, that an MCI with dedicated CNG indeed, “does exist”. This new product development also included a coach with an ADA compliant wheelchair lift and room for 49, forward-facing reclining seats, and, as New Jersey transit put it, “Oh, one more thing, it has to have a 400-mile range.” At that point in our phone call, there was silence on our end of the phone.

By July 1997, we were fortunate to receive the contract; by September we had the testing done for cooling. By January 1998 we had two production coaches built, one for Altoona testing, and the other for a 60-day in-service NJ Transit test. Altoona testing involves very stringent tests, where 12,000 actual miles are logged on the coach to simulate a service life of 12 years/500,000 miles. In March, we passed NJ Transit’s 60-day test and by August, the Altoona test was completed. By December, only 17 months after that first phone call, where our engineer uttered, “CNG doesn’t exist,” the first of fifty (50) MCI CNG-powered coaches rolled off the production line.

We really relied on Detroit Diesel’s expertise and capabilities for CNG. And this just gives you a little background on what they’ve done to get to the point they are today. Looking at their Series 50 CNG natural gas deliveries over the last five years gives you a little perspective on their populations of gas engines throughout North America. They used this experience to branch into the market for the Series 60 12.7-liter 330-400-hp dedicated CNG product offerings.

This gives you a pretty good comparison between the Series 50 CNG and the Series 60 version. There is a lot of commonality between the two gas engines as shown. Both are four-cycle, but the Series 60, of course, is much larger, rated at up 400-hp. The NJ Transit CNG engine is EPA certified at 330-hp, with peak torque of 1,400 lb-ft at 1,200 rpm.

In our experience, our coaches are operated throughout the United States, Mexico, and Canada. For example, it's not uncommon for Greyhound to put 240,000 miles per year on our MCI coach, going from coast-to-coast. This means that this CNG coach must successfully operate at sea level and at altitudes up to 11,000 feet, on mountain grades of 6 to 8 percent. That's why engine torque was very important to us during the development of this project.

- High engine torque also provided New Jersey Transit with outstanding coach acceleration for highway stop-and-go and downtown New York City driving of this 49-passenger coach.
- High torque engines also are necessary to operate a coach at altitudes of 11,000 feet. To put this into perspective a fully loaded coach with 49 passengers will climb a 6 percent grade, at high altitude at 40-45 mph. That's what torque does.

We took our MCI CNG coach that is on display at this convention here and ran it at Yosemite, on some 6,000 feet altitudes and some pretty good grades. Prior to this Yosemite demonstration, we ran this same MCI CNG at 11,000 feet both at Denver and Idaho. Through that experience we determined that we had to increase the horsepower of the engine from 330 to 400. So while at Yosemite, we increased the engine to 400-hp and loaded the coach with 49 people. We ran it at 6,000 feet at a variety of grades – probably 6 to 8 percent on average – just to measure the actual MCI CNG coach performance. As expected, the coach climbed these high grades at 42 mph without shifting between gears. Based on Detroit's extensive testing and testing actual in-service experiences, they are now focused on bringing Detroit Diesel's Series 60 12.7-liter

400-hp dedicated CNG engine to the marketplace in the year 2000. You can expect to successfully operate this MCI CNG coach with this new engine at altitude or anywhere in the country, with product availability in mid 2000.

Some specific Detroit Diesel natural gas features of this engine, are shown here, such as inverted combustion technology, energy emissions technology, etc. I do not profess to be an expert on the engine, so if anyone wants more information about this, please contact Dean Kariniemi, Detroit Diesel Series 50/Series 60 Alternative Fuels Program Director at (313) 592 5604.

To summarize:

- Detroit Diesel's dedicated CNG technology that is available today from MCI includes the Series 60, 330-hp, with high torque and is currently certified to comply with both California Air Resources Board (CARB) and Environmental Protection Agency (EPA) emission standards, without a catalytic converter.
- Our MCI 40-ft. coach with this CNG engine has a 400-mile range between fill ups with the tanks mounted in the baggage compartment rated at 3,600 psi.
- This MCI coach includes an ADA compliant wheel chair lift and has 49 forward-facing reclining seats.
- We have delivered fifty MCI CNG coaches to NJ Transit from December 1998 to February 1999 and now will deliver 27 more in June 2000.
- Through our joint venture testing with Detroit Diesel at Yosemite as well as other high altitude areas in the United States, we know this Series 60 CNG engine must have higher horsepower to operate successfully. Detroit Diesel's goal is to re-certify this engine at 400-hp to the current CARB and EPA emissions standards. If this is completed, Detroit Diesel is planning to have production availability of this higher 400-hp Series 60 CNG engine available in March 2000.

## “Ford’s Environmentally Friendly Vehicles”

*Robert Williams  
Government Sales Manager  
Ford Motor Company*

Thank you all very much for inviting us to participate in your conference. It’s really a delight to come out and meet people that are dedicated to making alternative fuel vehicles (AFV) work. I wish we could say that the challenges are all behind us, but we continue to learn, with your help, and we appreciate that very much. The reason we participate in these conferences is so that you all know who we are and how to contact us to advise how we can assist in your effort to convert to alternative fuels.

Some big news at Ford Motor Company, this year, is a new Chairman of the Board, William Clay Ford, Jr. This is the first time in a number of years that a member of the Ford family has been number one man at the company. William Clay Ford Jr. is the great grandson of Henry Ford the first and the son of William Clay Ford, Sr. William Clay Ford, Jr. is a very, very bright young man and really got the position on merit more so than having his name on the building. He has been the driving force for the environment at Ford Motor Company for a number of years. He is an environmentalist and he is driving the company to new levels of environmental responsibility.

Up front I have a couple of slides that show the government mandates – the Clean Air Act and the Energy Policy Act – and the advantages of AFV. There are potential cost savings for AFV that are not readily apparent because of the additional cost of the alternative fuel option going in; but, in many cases, an alternative fuel has a lower price, maintenance is reduced, and as we learn more and gain wider acceptance of the vehicles, volumes will increase and costs will come down.

We believe that Ford provides the “Environmental Edge” with the widest selection AFV in the industry, using a wider range of alternative fuels – including ethanol, propane, natural gas and electricity.

In addition to the AFVs we have today, we have a string of alternative fuel vehicles that we are working on for future introduction. We also have, today, 29 low-emission vehicle (LEV) certified gasoline vehicles. The motivator behind this was Bill Ford – an example of the direction he’s taking the company. There is no additional cost for the LEV certification option on these vehicles. The list of LEV certified gasoline vehicles will include:

- A new car called Focus to be introduced this fall (with 2.0-liter engine).
- 3.0-liter flexible fuel Taurus (ethanol and gasoline)
- 3.0-liter and 3.8-liter Windstar
- 2.5-liter and 4.0-liter Ranger
- Explorer and Mountaineer with 4.0-liter and 5.0-liter engines
- Expedition and Navigator with 4.6-liter and 5.4-liter engines
- The all-new Excursion, which will be the largest sports utility vehicle on the market
- Many F-Series and Econoline truck models

For alternative fuel vehicles, our 2000 model year lineup will include:

- Compressed natural gas (CNG), bi-fuel Contour. It will have a 2.0-liter, 4-cylinder engine with an automatic transmission and disc brakes. It has a steel natural gas fuel tank with fiberglass overlap. The natural gas fuel capacity is almost five equivalent gasoline gallons and, depending on how you drive, you get 50 to 100 miles range on the natural gas plus you get your full range of up to 350 miles on gasoline. One advantage to a bi-fuel vehicle is the tremendous range.
- Flexible fuel Taurus. This has been restyled for the 2000 model year with more interior room. We believe we will again get a five-star government crash test rating for this vehicle, and we believe we will achieve LEV

certification. All the sedan models will have flexible fuel availability with the 3.0-liter engine. Engine upgrades for flexible fuel include stainless steel fuel systems and on-board fuel mixture assessors so the engine is tuned depending on the mix of gasoline and ethanol that is in the tank. The E-85 range, depending on how you drive, could be up to 340 miles.

- Dedicated natural gas Crown Victoria. This is the first dedicated natural gas powered car built completely in an original equipment manufacturer (OEM) assembly plant; it's assembled in our plant just like any other Crown Victoria. The engine is a 4.6-liter V-8 with 175-hp. It has a unique compression ratio for the CNG and platinum-tipped, nickel plated spark plugs. It will have ultra low emission vehicle (ULEV) and inherently low emission vehicle (ILEV) emission ratings. There is an optional extended range tank that can get you up to 300 miles.
- Dedicated natural gas Econoline van and wagon. This year, we went from the 3,000 to 3,600 psi system. There are four dedicated natural gas vans: the E-250 regular and extended length vans, and the E-350 superduty and superduty extended vans. The Econolines have a 5.4-liter Triton V-8 engine. They have the platinum tipped spark plugs, hardened valve seals, heavy-duty alternator, and very good emission ratings. On the Econoline you'll note that all of the tanks are mounted under the vehicle between frame rails or after the axle, but none of the tanks are packaged in the cargo area, so you have your full cargo capacity.
- F-Series pickups. These will be available with dedicated natural gas and bi-fuel options for either CNG or propane. The F-Super Duty (F-350, F-450, and F-550 models) will also be available in propane bi-fuel chassis cab models beginning in November 1999. One of the next alternative fuel vehicles that we introduce will be a bi-fuel propane version of the new F-650 and F-750 trucks.

- Rangers. All 3.0-liter Ranger vehicles will now be flexible fuel vehicles (gasoline or ethanol). I know many of you buy vehicles under General Services Administration (GSA) contracts, and one of the lowest, most-utilitarian vehicles available on that contract is actually an alternative fuel vehicle – our Ranger pickup. It is available in a regular cab or a super cab and 4 X 2 or 4 X 4.
- Electric Rangers. There is an electric Ranger outside, that some of you will get to drive tomorrow. We've sold about 600 of the electric Rangers to date. The Electric Ranger is rear-wheel drive, like almost all real trucks. It has 4-wheel anti-lock braking systems, second-generation air bags and low rolling resistance tires. We have lead acid batteries that will get to about 50 miles per charge. And there is limited nickel metal hydride capacity but that will only be available in California.

Permit me to take a minute to talk about the U.S. Postal Service. Last fall, the Postal Service awarded Ford a contract for up to 21,000 flexible-fuel mail delivery trucks. Production will start this July with delivery beginning in August or September at the rate of about 1,000 a month. We recently submitted another bid to the Postal Service for 6,000 electric-powered mail carrier vehicles. The Postal Service is extremely motivated to be seen as the leader in introducing alternative fuel technologies. We've talked about partnerships, so I would suggest that if you are close to a USPS Vehicle Maintenance Facility that you contact the manager to determine total AFV availability in your area. If you can partner with the Postal Service, and if there are any other GSA agencies in the area, together you may have enough alternative fuel vehicles to encourage a fuel provider to establish some fueling infrastructure.

We have out in our display a pamphlet that lists all of our alternative fuel vehicles that contain all the data on the range and the fuel capacity. Other important sources of information are:

- Ford AFV Hotline (1-888-ALT-FUEL)
- Ford Fleet Web site ([www.fleet.ford.com](http://www.fleet.ford.com))

- Ford Service Hotline (1-800-34-FLEET)
- Ford Dealers

Many Ford dealers can provide AFV information. For CNG or electric vehicles, a dealer must be certified, undergo special training, and acquire special tools to be able to sell and service those vehicles. Any dealer can sell propane or flexible fuel vehicles. We have over 350 dealers nationwide that are certified to sell and service CNG vehicles. And there are about 40 dealers certified to sell and service the electric Ranger, with fourteen or fifteen more that will be certified soon. We continue to work to find dealers in the right locations to support AFV fleets. If you desire to accept the alternative fuel challenge and there is not a certified dealer in your area, please let us know. We will be glad to assist in recruiting an AFV dealer. Also, if you have a maintenance shop we may even certify your shop and allow

you to do in-house warranty if the vehicle volume is adequate.

Again I would like to thank you for accepting the challenge. I would like also to figure how to get more of your peers into meetings like this and get them as motivated as you all are. I know that we haven't overcome all the growing pains with alternative fuel vehicles, but I think working together we will do that. Another fact about alternative fuel vehicles, especially CNG and electric, is that much of the technology and the knowledge from those vehicles today will be carried over to the next generation hybrid vehicles that are just around the corner. So again we very much appreciate your efforts to launch and gain acceptance of alternative fuel vehicles. Keep in touch with us and we look for bigger and better things. Thank you all again very much for allowing Ford to participate.

### **“Honda’s Alternative Fuel Vehicle Fleet”**

*Steve Ellis  
American Honda Motor Company, Inc.*

It's wonderful to be here in this beautiful part of the country. It's great to meet each of you face-to-face as representatives of the National Parks, because over the last five years I have made a concerted effort to get into your Parks even more, and to take advantage of what's been going on the last five years. Our challenge is a little bit more difficult as we have not ever had the opportunity to present our product to most of you. So I'll start with showing you a little bit about Honda the company, and then being very specific about the natural gas powered Civic GX.

First, what do you expect from an environmental vehicle? We feel like we've got a good handle on this but we don't have all the answers: you're the experts. What do you expect from us? Emission reduction should be the no-brainer. There is the air quality and the beautiful views that you want to preserve. Certainly there should also be greenhouse gas reduction and energy conserva-

tion. They also should promote alternative fuel use in our nation.

So our approach is very clear. We clearly recognize that gasoline will be the dominant transportation fuel; we know it will be hard to change that quickly. We feel electric vehicles have great potential for long-term transportation, that will lead to hybrid vehicles, fuel cells and other pure battery applications. Now obviously they're not all zero emissions. But we are not fuel-neutral, like some others say. We really do like electricity and natural gas as specific alternative fuels. Right now we feel that natural gas has the best potential for near-mid and long-term vehicle applications. We think it is the most promising alternative fuel as it has near zero emissions and is nearly 100 percent North American sourced.

As a company, we've already put over 1,000,000 low-emission vehicles (LEV) on the market.

We're the first automaker with low-emission vehicles in California on gasoline, and that effort was voluntary. Also, we were the first across the nation with LEVs prior to the National Low-Emission Vehicle (NLEV) agreement with other automakers. So when we were asked if we support the NLEV program, well, of course we did because we'd already put, at that time, around 400,000 vehicles on the road.

We also have three of the top ten fuel economy leaders. And this is where our high fuel-efficient technology is applied, with both manual transmission version and with automatic transmissions. We have the only automatic transmission vehicle in the top ten fuel economy ratings. These are not tiny cars. These are compact cars with four-cylinder and 1.6 liter engines. Those three Hondas represent 50 percent of all the top ten vehicles sold.

Contrary to what you may have read, we have not pulled the plug on our Electric Vehicle program. We're in the middle of a research project. The day we introduced the car, we said we would build about 300 cars over about three years. We built more than 300 EVs in less than three years. Of course, that means that we are now committed to continuing research and now, in stage two, to learn more about the cars, to learn more about the batteries and the customer usage. We were the first and only automaker to offer a nickel metal hydride, pure battery-electric to our retail consumers through our dealers. If these are going to be commercially acceptable, dealers will need to be a part of the process.

That has led us to develop the technology that let us announce that we will be the first auto maker with a hybrid sold in the United States, and that will be available this fall. This vehicle, called the Insight, is pretty unique. It's an application of advanced technology and what we've learned from the EV process. Fuel economy in the city and highway mode will be over 70 miles per gallon, as the highest fuel-efficient vehicle offered as a year 2000 product. And it will also be an ultra low emission vehicle, so although it runs on gasoline it will have a tremendous impact on the emissions issues. To give you an example of the range of a vehicle like this, with a ten-

gallons and over 70 miles per gallon, starting in Detroit that will let you drive nonstop to New York or Atlanta or to Omaha, Nebraska, covering quite a tremendous range for a single fuel fill.

The focus of our efforts here in working with you is the Civic GX natural gas vehicle. This vehicle is certified as the cleanest internal combustion engine available in the world. The EPA certified it and actually could not even measure the emissions. How did we do that? Well, we designed our own fuel system for the vehicle, so that it wouldn't have to rely on existing components that may have had a marked history of reliability. The fuel valve is in a conventional place, the compressed natural gas (CNG) cylinder is mounted back in the trunk, and the fuel line runs the same place as our conventional vehicles. We designed and engineered our own fuel pressure regulator and fuel injectors. We put in CNG injectors that we designed and engineered ourselves.

We had at last year's Clean Cities conference this Civic GX. The driver of this car was the first to drive a dedicated CNG sedan coast to coast. He was on a cross-country trip from Sacramento, California all the way to Washington, D.C. using nothing but public CNG fuel infrastructure. That included the infrastructure in the state of Montana, where he had to go up to Salt Lake City across Montana down to Denver. It's something we don't recommend for the average driver, but it shows that it is possible with a little bit of work. And it was really a showcase for the range of this vehicle, this dedicated vehicle using CNG. You can achieve up to a 300-mile range, but we like to back off that and state the "real world" range as 150 to 200 miles. This has a 3,000-psi fill, which is typical of public infrastructure. The vehicle is on Federal Government Services Administration (GSA) contract; it has been for the last three years. That means that it is readily available to you. Inquire through your regional support center or at your local GSA office. If they "do not list it" please call me directly. It is on contract.

As I said, the vehicle is the cleanest on earth. We often think about vehicle emissions just as what comes out of the tailpipe. So a gasoline or a flex



fuel vehicle would have exhaust emissions about 0.12 grams per mile of volatile organic gas or hydrocarbon (HC) emissions. But the bigger story is that we have evaporative emissions that are contributing to the total vehicle emissions. We have running loss emissions, that come as a result from operating the vehicle, and also emissions attributed to the production of fuel, the transporting of the fuel to the gas stations, and filling up the tanks as well. There's a whole or full cycle approach to this. For a gasoline vehicle, these emissions actually exceed what the tail pipe emissions are. So if you have a dedicated natural gas vehicle, you don't have upstream emissions. The Civic GX exhaust emissions are one-tenth of the Ultra Low Emissions Vehicle (ULEV) vehicle emissions standards. We've said that this is a 98.5 percent reduction from today's cars. When you factor it in whole cycle emissions, it's actually a 97 percent reduction even from a gasoline ULEV. It's so clean that in the Los Angeles basin, which has a very clean mix of electricity, they've determined that once you achieve this low level of emissions that it is equivalent to an electric vehicle. That means that if you charge an electric vehicle with coal-generated electricity or even oil, this car is cleaner than an electric vehicle. To put that in perspective, just to say, this is an image of what we refer to as a "negative emissions" effect. The ambient air of the LA basin has this concentration of 2 to 6 parts per million at this level on this section of freeway. So you have emissions that are actually below that with the GX, so you're essentially cleaning the air as you're driving down the road. When we first announced that, we called it negative emissions phenomena in part because people would not believe it. So we put it in a graphic form to show people it can be true.

This is basically to show you that we are very supportive of federal vehicle implementation of alternative fuel vehicles, not that we can claim great confidence. Six markets were targeted as focus efforts within the federal government, in partnership with the GSA and the Department of Energy, to find greater success in alternative fuel vehicle (AFV) market development. We want to show you that we do know where those markets are – Bay Area, California, Salt Lake City, Denver, Albuquerque, Minneapolis-St. Paul, and

basically NASA and all its areas. So we have the six-pack support program for the six target markets. I point this out to you because we will take a similar approach in supporting the Park system.

How about taxi cabs? It's only in America that we have taxicabs that are such huge vehicles. Marco Henry, the owner of the Yellow Cab Company in Connecticut, shows the dedicated Civic GX as his choice of taxicabs. He surveyed the airport fleet and government employees that fly in and out as to how they travel when they're going in and out of a state capitol for a couple of days, carrying overnight bags, maybe a laptop and a briefcase. So there's not a need for lots of big bag storage, like a family flying with lots of kids, but it gets much more extreme as well. This is a unique application that gets these people out and on their way without adding lots of emissions during their ride.

We also recently entered into a partnership with Budget Rent-a-Car in Los Angeles. We started this with electric vehicles. We are not the only one supporting it. You can fly to Los Angeles and rent environmental vehicles like the GX. This has been extended now to the Civic GX. The biggest difference is with this car, if you fly in, to LA, you can drive to any place within the LA Basin, you can drive to Palm Springs, and if you drive to the coast, the infrastructure there is very good too. I point this out to you because we think that this is an opportunity for the Parks. I'm very interested in hearing some of your feedback on this rental opportunity. In your Park operation where people would be flying in, renting a car and then using the facility, this would offer the opportunity for them to rent an environmentally clean vehicle and enter your Park and not add to the emissions.

We have a number of customers buying this car for non-pursuit, security operations. Some of these operations are 24 hours a day, and the car almost never stops. The drivers are telling us that, in their previous vehicles, they would occasionally get headaches because it would sit parked in that security line for a while move to the next one and park and so along the whole loop. Now this

car with the emissions so low, they're saying they don't get headaches as much.

We have a partnership with FuelMaker Corp. We announced last year at the Clean Cities conference that we have committed \$100,000 to leverage with fuel maker credits also. With the Department of Energy benefits, this basically buys the product down from about half. This shows two hose installation for about \$4,500; a large fuel maker is also available. More and more fleets are utilizing that product as it improves range too. It's a very low cost alternative to typical CNG installation, and I know specifically of Forest Service and other Park operations that utilize this device very well. The other benefit is that our system is a 3,600-psi system. When you fill in a time flow manner like this, you get more fuel in it and it increases the range significantly. So that would give you about a 250-mile range instead of a 175- to 200-mile range. That's very significant.

I want to show a little bit of our advertising to kind of put it in perspective how we should be looking at clean fleet vehicles. When we first introduced the GX, we took this approach: "Every government regulation has a silver lining." We recognized the impact of mandates like that are not popular with everyone but our feeling is that with this car you can have your cake and eat it too. Now move to this one which we call: "Simplify." We recognize that you face this stack of papers in everything that you do

including filing and filling out forms and because you have a myriad of mandates to meet, "And this one car stacks up well against them all."

For 1999 we introduced three new ads. The one states: "The best way to reduce gasoline consumption is to eliminate the gasoline." This one says, "A Honda that barely goes over zero." We got a few chuckles out of that. Basically this is really supporting the environmental facts in our graph showing the emissions of the GX way down here and the typical car at a much higher level. The last one says, "The Energy Policy Act and the Clean Air Act are now available in performance, comfort and style." And you have the copy of the Four Star headline.

So pricing on the GX on GSA contract is \$18,798. It's unfortunate that you are charged so much for the incremental cost. GSA uses a different means for calculating these costs for these types of vehicles; vehicles with the most benefits have added cost. It's kind of unfair that you have to bear the burden of the added vehicle costs for procuring cars with the best benefits. It is very difficult for you so I won't stand here and preach about that but if you think it should be changed with the GSA hopefully you can influence them.

Thank you for allowing me to present this information and I hope you are able to deploy this wonderful vehicle in your fleets so air quality can see real improvements.

### **"General Motors 1999 Model Year Alternative Fuel Vehicles"**

*Clay Okabayashi*  
*Regional Sales Manager*  
*General Motors – Advanced Technology Vehicles*

I appreciate the opportunity to be here today. I would like to talk about our General Motors Alternative Fuel products available for 1999 model year. I represent General Motors' Advanced Technology Vehicles. Our group focuses on the development of alternative fuel vehicles for General Motors.

I'll first discuss our natural gas products that we have available. We were the first to enter the natural gas market in 1992. Our initial product in 1992 was a dedicated natural gas fuel system on our full-size truck. After some initial success we evaluated the market and concluded that to assist market development of this new fuel technology

we must provide a product that is flexible to the fleet operators' requirements, especially in the area of fueling infrastructure. Since fueling stations were limited our strategy deployed was to offer a product that operates on natural gas, but also retains the gasoline fuel system, a bi-fuel system. Our strategy has been the bi-fuel format for the last couple years.

Our current product lineup includes a 3/4-ton truck, 8,600 GVW truck, available in two- and four-wheel drives. We also have a unique configuration; a 1-ton crew cab that you see displayed out on the floor here. This is the first 4-wheel drive crew cab, 4-door type AFV truck that is available in the marketplace. It's bi-fuel so it runs on compressed natural gas (CNG) and gasoline. The system actually doesn't allow the driver to switch fuels himself; the computer will run it on natural gas any time there's fuel in the natural gas tank. We take any switching capabilities out of the driver; we're trying to force the driver to run it off the alternative fuel as much as we can. It utilizes a 5.7-liter Vortec 8-cylinder engine.

We utilize a 13-gallon steel-lined, carbon fiber wrap tank rated to 3,600 psi. All General Motors natural gas vehicles are rated at 3,600 psi. This is a very unique tank design for this industry. We did a lot of validation on this tank design since we're storing 3,600 psi. Through our testing we assisted the cylinder manufacturers in developing a tank that exceeded the standard design in terms of durability. We were the first original equipment manufacturer (OEM) to use a carbon fiber wrapped steel-lined tank. The 13 gallons of natural gas gives us a range of approximately 150 miles on CNG. This tank comes equipped with a high-pressure electric lock-off. We have an in-tank thermister for improved accuracy for fuel gauge readings. When fast filling a CNG vehicle you create a lot of heat, which may lead to inaccuracies of your fuel gauge readings. The thermister will compensate for the heat created to give you a true reading. We maintain the standard 34-gallon gasoline tank, so you still have your 350-mile cruise range on gasoline and then you also have an additional natural gas range.

There is one fuel gauge to read both CNG and gasoline. So you start the vehicle and run it on natural gas and it's reading how much natural gas you have. When it switches over to gasoline the fuel gauge reads how much gasoline. There's also a fuel mode indicator which has a LED light in the panel that will light up once it switches over to gasoline, so the driver knows it switched over to gasoline. The indicator also functions to read how much gasoline you have in reserve even when you're running on natural gas.

We have low emission vehicle certification on this vehicle and we've started production. We've basically finished taking fleet orders for the 1999 model year. Now we're looking at 2000 orders and the start of production is scheduled for October for the year 2000 vehicle.

Another vehicle that we have on natural gas is our Cavalier, a 4-door sedan. This is the lowest priced sedan operating on natural gas that's available in the marketplace. It has a 2.2-liter, 4-cylinder engine. We utilize a 6.2-gallon gasoline gallon equivalent tank in the trunk of that vehicle. The approximate range is 150 miles range on natural gas and it has the same tank design that we validated on the truck, so it exceeds all industry standards with a high-pressure lock-off and an in-tank thermister as I described on the truck. This Cavalier is a bi-fuel vehicle. It has maintained the 15-gallon gasoline tank. You still have the 300 miles of gasoline range and once again the added 150 miles on natural gas. We got quite a bit of range on this vehicle in bi-fuel mode. We also have low emission vehicle certification on this vehicle and the start of production for the 2000 model year is also targeted for the crew cab, four wheel drive truck this year too.

We started with our bi-fuel products in 1997. One of the things that we found that we needed to improve along the way was start time. We employ a strategy where we use a minute trace of gasoline upon start up; to give you the same quick starts your accustomed to like a gasoline vehicle. The refuel valve receptacle has a higher flow capacity, so we improved the flow characteristics there. Some of the issues with filling these vehicles on the fast fill is that you're

creating a lot of heat and that leads to inaccuracy in the fuel gauge itself. So we've put a thermister in so we can improve the accuracy of that gauge too. We increased the intensity of the fuel indicator light so you can see it in daylight. We improved the diagnostics with serviceability of the electronic control units (ECU) on these vehicles, so now you can take a tech II scan tool to access that ECU and pull diagnostics codes on that vehicle. This is key in servicing this vehicle. We also added the ability to read how many miles that vehicle has been traveling on natural gas versus gasoline. You could actually track your drivers through diagnostics.

One of the key benefits of these natural gas vehicles is the service system. We give you the three-year, 36,000-mile warranty that GM stands behind the vehicle. The warranty is through all of our dealerships, both GMC and Chevrolet. We provide service training through our service technician group. All the parts are available through our standard service parts organization, so this is a complete OEM structured service process. We want to make sure that the product that we put out there is going to be transparent as far as the service organization – the same way you get your vehicles serviced through our dealerships now. So you've got OEM quality, customer service quality, reliability and consistency.

Designing these natural gas vehicles is not unlike our gasoline vehicles. We utilize the same test facilities that's available to us: Milford proving grounds, desert proving grounds. We do hot weather testing, cold weather testing, altitude testing, individual component testing, subsystem durability testing, and vehicle durability testing. Our focus at General Motors on alternative fuel vehicles is that we build these products on safety, reliability, durability, and performance. We want to have the same image for our alternative fuel vehicles as we've had on our gasoline vehicles. Our engineering validates each and every natural gas component they put on these vehicles. That means that these components go through the same rigorous tests as our gasoline vehicles, so we know that if you're going to put them in these high altitude areas or in these cold weather areas,

the vehicles will start and operate just like our gasoline vehicles.

The current product that we have for propane is a medium-duty truck. We offer dedicated propane, medium-duty truck, our C5500, C6500, C7500 and C8500 series truck. It has a 7.4-liter engine, starts off with 270-hp on gasoline. We utilize a tamperproof, self-adjusting dedicated propane system on this. The diagnostics that we utilize off the CNG truck that I described is also utilized on the liquid propane gas (LPG) unit to assist serviceability. In our engineering process, we're always looking at ways where we can help whoever is going to be servicing these vehicles. We've got cold start strategies to make them operate and not freeze in cold temperature areas and again this is low-emission vehicle certified. We are going to be starting production on this in August 1999 for model year 2000. The medium-duty product in dedicated propane has been our most successful alternative fuel product to date.

Propane systems are certified to California Air Resources Board (CARB) standards. The complete OEM package comes with the three-year, 36,000-mile warranty. The only little difference between this and our CNG program is that Impco, who is our propane system supplier, warrants the base component on the propane systems where our warrant covers the base gasoline engine. Impco certifies our GMC and Chevrolet dealers to do their warranty work. For a lot of the propane customers, it's been a very flexible program because in some cases Impco trained another service garage in that area that's convenient for them.

And on the electric side, we have an S-10 product. It's a front-wheel drive, with a payload of 950 pounds. A 114-hp, three-phase, liquid-cooled AC motor powers it. It does 0 to 50 mph in 10 seconds, and it's governed at 70 mph top speed. It utilizes regenerative braking and we have a battery management system to keep those batteries at a constant temperature for long life. We offer both lead acid batteries and nickel metal hydride batteries. The lead acid batteries has a 40 to 50-mile driving range. We're offering the nickel metal hydride only in California right now, and that's given us a 60-80 mile range. We use

the inductive GM charger, a 6.6-kW charger available throughout the continental US, but again, the nickel metal hydride is only available in California.

We also have a General Motors electric car, the EV1; chances are you've seen this vehicle. This was the first vehicle built from the ground up to be an electric vehicle. This vehicle has some remarkable technology, with 26 patents issued. We've learned a lot in developing this vehicle. It's been a very widely accepted car in California. We market the EV1 only in California and Arizona.

The S10 is also available in ethanol for the model year 2000. So the fall of this year we will have an ethanol S10 compact truck available in the 2.2-liter engine.

We have some exciting new upcoming products. We've got a dedicated propane school bus coming out that we're developing in a project with Bluebird Bus Company and with Impco Technologies, the propane equipment supplier. It's slated after this fall to go through the final tests, and then we'll have this available later this year. For model year 2001 we will have bi-fuel vans out in the marketplace, both the 3/4-ton and 1 ton, both the 135-inch wheelbase and 155-inch wheelbase. The same type of system that I described on our bi-fuel trucks will be available.

Our strategy has always been bi-fuel, but we're really getting pushed strongly, especially in certain market segments where fueling infrastructure has increased to the point where dedicated vehicles are widely accepted. It's really

good news for this industry; that means that the industry has been moving forward. So we're coming out in model year 2001 with dedicated CNG and propane trucks. This will be a 3/4-ton truck 8500 GVW. We are targeting ultra-low emissions vehicle (ULEV) emissions standards for this truck.

We have an alliance with FuelMaker. FuelMaker manufactures a small, compact CNG refueling appliance. It gives you a lot of flexibility, since you can put this anywhere you have a gas pipeline. So you can conveniently locate refueling for your CNG vehicle. I believe this would be a natural fit for the Park Service.

For support we have four regional managers out there. I'm the Western Regional Manager, but we've got managers in each region. We also have an 800 number, 888-GM-AFT4U, and a Web site (<http://www.gmaltfuel.com>). This Web site is actually in the process right now, and we are targeted to have this up and running by July 1.

I appreciate having the opportunity to come here and talk to you because we're trying to develop products that fit your specific needs. General Motors is very serious about this market. We've learned a lot actually since we've first started into this market way back in 1992 with one of the first dedicated natural gas vehicles out in the market. I think we're continually learning here and the feedback that we get from you is very important so we can develop the right products and engineer the right safe products to meet and exceed your expectations.

## **“GSA and Alternative Fuel Vehicles”**

*Patrick McConnell  
Team Leader, Federal Vehicle Policy Division  
General Services Administration*

I'm Patrick McConnell with the General Services Administration, and I'm here hopefully to say, "How can we help?" I'm also going to introduce my esteemed colleague, Cindy Rojas, who is

with our Denver Regional office and her area of responsibility covers Montana, Utah, Colorado, South Dakota, North Dakota and Wyoming.

For those of you might not know, GSA is involved with fleet vehicles in several ways, in what I call the “fleet triumvirate.” What you’re most familiar with, of course, are GSA’s Automotive Center where you buy your vehicles, and GSA Fleet, where you lease your vehicles. The third component is relatively new at about three years old, which is the Federal Vehicle Policy Division, which is included in the GSA’s Office of Governmentwide Policy. We have a management, regulatory and guidance role over the federal fleet.

We feel at GSA that our role, in serving you, our Park Service customers, is kind of two-fold. One aspect is, of course, what we talked about this morning: finding solutions to help move people through the Parks in a way that doesn’t hurt their experience and doesn’t hurt the environment. The other way, the aspect we haven’t talked about yet, is helping you maintain those Parks with the vehicles we provide.

#### GSA’s Automotive Center

As mentioned, GSA’s Automotive Division purchases vehicles. Those of you today who purchase alternative vehicles probably know Robert Blackstone. He is the director of the Automotive Division. He came up with a program called DAVE – Driving Alternative-Fuel Vehicles Easily. I have to give Rob some credit because DAVE is really a great marketing tool, particularly with our agency administrator, Dave Barram. Vehicles with these fuel types are available: dedicated natural gas, bi-fuel natural gas, propane, electric vehicles, and right now biofuel ethanol. In the last six or seven years, we’ve expanded from one vehicle type to many.

Rob, in his infinite wisdom, has come up with a plan for the contract governing the alternative fuel vehicle purchases. What they did, instead of having an initial solicitation and renewing it every year, was to have a base year 1998 with four option years. So we’re not going to have to re-solicit and will know immediately what vehicles are available for the upcoming year. We also get vehicle prices firmed up from the OEM’s by an October timeframe.

Who are your points of contacts? Ira Herman is the person you’ll probably be dealing most directly with in terms of buying alternative fuel vehicles. He’s on the procurement side and can be reached at (703) 305-6305. Tom Martin is on the engineering side and can be reached at (703) 305-6832. If you want an alternative fuel vehicle that needs special equipment or there isn’t anything out there that quite meets your needs, Tom can certainly start on getting your needs met. There’s a customer care hotline, which we implemented in May. Call 703-308-CARS with any questions you have. We’re on the Internet at <http://pub.fss.gsa.gov/motor/automotive/>.

#### GSA Fleet

GSA Fleet owns and leases to other agencies around 157,000 vehicles. You can lease from GSA Fleet just about the same vehicles that you can buy from the Automotive Center. In the past, GSA has steered away from purchasing or leasing dedicated vehicles, primarily because of infrastructure. You also have to understand that GSA Fleet operates on a revolving fund, so a major source of income for us is the vehicles we sell to the public. Dedicated fuel vehicles don’t really sell well – yet. However, we are getting more comfortable with dedicated vehicles, and we will purchase them for you.

We have 71 fleet management centers throughout the country. Through these centers, GSA Fleet is working with the Department of Energy and with all our customers at the Headquarters and Regional levels on an alternative fuel vehicle purchase plan for fiscal year 2000.

One of the challenges in purchasing alternative fuel vehicles is their additional acquisition cost over their conventional-fuel counterparts. In the past, GSA Fleet has given customers two choices in order to pay this additional incremental cost. Customers can pay the incremental cost up front at the time the vehicle is ordered or pay it over a 12-month period as part of their regular monthly leasing charges. There have been many questions as to why the incremental cost can not be spread out over the entire lease of the vehicle (usually three years for sedans). The problem that GSA Fleet faces is that we need to recover the money

up front or as quickly as possible so we can pay for new vehicles. In fiscal year 1999, we are working with some customers to try a third option to pay for the incremental costs. We started applying a \$2.50 surcharge to all of their vehicles, conventional and alternative fuels. Again, we use that surcharge to generate money to pay for the incremental costs of leasing alternative fuel vehicles to those customers. So, eventually, customers won't have to pay for the incremental costs up front. We've actually raised roughly \$400,000 so far through this third option.

We are talking with the Department of the Interior and the U.S. Army about the surcharge. While we are working with agencies to get them alternative fuel vehicles they want or need, GSA Fleet may be forced to make a business decision depending on how expensive the vehicles are to purchase. If it's in the best interests for the Government, GSA will go out and buy the vehicles with no incremental costs regardless of what the agency wants. But we really don't want to do that. We will try to get what you want. As I noted at the outset, GSA has already awarded the alternative fuel vehicle purchase contracts. GSA fleet orders were placed in the January to March timeframe, so we're about to complete delivery of these vehicles.

Your point of contact for GSA Fleet is Mrs. Denise Lenar who can be reached at (703) 308-1457. You can also visit the GSA Fleet web page at <http://pub.fss.gsa.gov/motor/leasing/>.

#### Federal Vehicle Policy Division

Finally, at the Federal Vehicle Policy Division, my office, we're more of a management consultant, so to speak. We will try to help you find the best solution in terms of the Energy Policy Act, the Clean Air Act, and the various executive orders dealing with alternative fuels. Our main source of guidance is Federal Property Management Regulation 101-38. Based on that regulation we see our status, again, as helping you to remove the obstacles that prevent you from doing your job efficiently and cost-effectively. In terms of alternate fuel vehicles, we promote them where possible. One tool that has been very useful is the Alternative Fuel Vehicle Location

report. It's a book about three inches thick that lists about 375,000 light duty vehicles in the Federal government. The goal of that report is to get people talking to each other. For example, Yellowstone National Park may have alternate fuel vehicles, and maybe the Department of Agriculture's Forest Service nearby has alternate fuel vehicles, but they don't know anything about the other. They're both listed in this report, so hopefully they can contact each other. The report contains not only the vehicle but also where that vehicle is located and a contact and phone number for that vehicle.

We also sponsor the Federal Fleet Policy Council. The Council is our main vehicle for sharing information, getting together and solving common problems together. There's a National Council in Washington, D.C. that's primarily composed of the agency fleet managers at the headquarters level. We also have a chapter in San Francisco, our Golden Gate Chapter. Again, these local fleet managers are getting together and talking about common problems and finding solutions. We will expand these councils to other areas in the near future. We are trying to essentially model these councils on the National Association of Fleet Administrators as much as possible in order to create a tool for you to all work together.

We are also involved in alternative fuel vehicle promotion. We recently co-sponsored a contest with Metropolitan Washington (DC) Council of Governments. You'll notice the alternative fuel industry really doesn't have a unified logo for all its vehicles or fuels. One of the things that we wanted to do was raise the awareness of alternative fuels with the general public, to let them know what we're doing to save the environment. One of the ways to accomplish this goal was to design a unifying logo that we, the Federal government and hopefully the Council of Governments, could use on our vehicles to draw attention to the fact that they are operating on alternative fuels. Our chosen logo won out of contest that pulled 210 entries from around the country, with the winning designer living in North Dakota. He was quite happy to get \$1,000 for his efforts. If you want to copy that logo, it will be on our Web site shortly. It can be down-

loaded and used for anything you want ([www.policyworks.gov/vehicles](http://www.policyworks.gov/vehicles)).

Another thing that we do concerning AFV promotion is we put out a training catalog. The catalog itself is comprehensive, covering almost every aspect of fleet management from management classes to maintenance classes. We also have extensive course offerings in alternative fuel maintenance and fuel emissions. We're going to come out with a new version shortly.

Your points of contacts in the Federal Vehicle Fleet Division are myself, Ron Keeling – a colleague of mine who is the author of the Alternative Fuel Vehicle Location report – and John Adams, who is kind of our “green” ambassador to the Washington, DC area. He partners with GSA Fleet and goes to agency fleet manag-

ers to ask what is keeping them from using alternative fuels. That project is called Greening Washington. John is so enthusiastic he'll go out with several vehicles to show what GSA has to offer. We all can be reached at (202) 501-1777. And again, everything we have is on the Web page at <http://www.policyworks.gov/vehicles>.

Hopefully, we're trying to think green together. Hopefully we're driving green. Hopefully, we're greening together. And if we're greening Washington, certainly we want to green the Parks as much as we can and we're willing to work with you. GSA turns fifty this year. This GSA isn't your parents' GSA anymore. We are certainly focusing on customers and I want to borrow a phrase – “We're making customer service job

### **“Clean Transportation Solutions”**

*Fred Silver*  
*Senior Program Manager*  
*WestStart*

I'm going to tell you a little bit about who we are and what we're doing with the Park system. What is WestStart? It's an acronym: Western States Systems, Technology and Advanced Research for Transportation. We're involved in technology development, we're a virtual research and development organization, we are a proven model for economic development, and we are a public-private partnership. Our mission here is to create an advanced transportation technologies industry and markets that will create high-quality jobs, clean the air, and improve energy-efficiency.

We have several partners in our organization, and first we'll come to them with our needs. Our assets are not are own; they're based on what our participants have. We have over 200 participants, including financial institutions, public agencies, transit districts, utilities and many others. We have funding partners who give us money. We have other partners that we work with to help

develop programs and demonstration projects. With our participants scattered through the western United States as well as in the east, you'll see that we have a tremendous ability to tap any of your organizations very rapidly. If you need something done fast, we're the place to come to. We provide increased access to resources throughout the industry and we can reduce risks and cost.

What does WestStart specifically do? We spur technology by managing technology projects; we grow new businesses through operating business incubators; we find solutions as a consultant for fleet managers, airports, and public and private agencies; and we provide context by providing critical industry information services, reports and studies.



## Consulting

We have about 25 analysts, engineers, field technical advisors, and we provide implementation consulting on clean transportation solutions for public and private fleets.

One of our projects is at Presidio National Park, where we are working with them in evaluating a proposed shuttle bus system between the residences and the employment sites. For their application, they said that “anything but diesel” is an option for bus propulsion.

I wanted to raise the issue that comes up a lot with Parks these days, about personal recreational vehicles (PRVs). There’s tremendous growth in the number of these vehicles that are in operation. It takes 1,000 snowmobiles to generate the same amount of nitrous oxides (NO<sub>x</sub>) and hydrocarbons (HC) as 1.7 million cars. The two-cycle engine, used in PRVs, has the most pollution and noise of internal combustion engine technology. The use of PRVs is growing rapidly; it’s up 33 percent in the last ten years. The Tahoe study recently showed PRV damage went beyond air and noise, including water pollution from carbon monoxide (CO) and unburned HC.

We’ve found some emissions surprises. One busy snowmobile day in Yellowstone can produce more emissions than one would achieve in a year of auto emissions. One hour of lawn mower or chain saw use can produce the same emissions as 3,000 miles of auto travel. Carbon monoxide, PM-10, nitrogen dioxide, sulfur dioxide and lead are all areas of concern.

What are we doing about it? CALSTART is involved with an innovative program in Yellowstone and Rocky Mountain National Parks called the Clean Snowmobile Challenge. Ten universities have entered into a competition administered by the Society for Automotive Engineers (SAE). Sled entries will be judged on emissions reduction, noise, fuel economy and range.

We’re analyzing the potential for natural gas as fuel for expanded ferry service at the Golden Gate National Recreational Area. The Maritime Administration is particularly interested in the results.

One of our largest applications is at Yosemite, where we’re doing a top-level analysis of what are the alternative fuel choices over the next ten to fifteen years for buses, National Park Service vehicles, off-road vehicles and concessionaire vehicles. We’ll develop a set of near-term alternative fuel solutions that would meet these various requirements, as well as a long-term look at the needed infrastructure.

Another program that we’re working on is near a National Park; it’s called the Channel Islands. My office is actually located on the California State University at Channel Islands. We’ve started an incubator there. They have a real problem there with congestion mitigation and air quality because of the large student population on the campus, and they don’t want to foul it up with the number of vehicles coming in to the campus. They came to CALSART and asked how we could help them become a green campus and mitigate traffic. Well, what can we do? First, they needed money. We worked with them by preparing proposals for financial support. We received government grants of \$10 million to buy CNG buses, electric bikes, CNG trucks and supporting infrastructure. Since this campus is the first clean transportation campus built in the United States, it uses all alternative fuels for campus vehicles. People park in off-site locations, and continue to campus on a natural gas-powered shuttle route. We will also be deploying station cars and multi-user vehicles. We will also have 50 electric bicycles to move around campus.

We have packaged services for a lot of the National Parks, including Glacier, Grand Canyon, Bryce, Zion and Rocky Mountain. The Federal Transit Administration (FTA) is an important partner in this, and they are supporting current efforts. We’re very interested in hearing about the needs you have and looking into the prospective resources for your goal requirements. We have six offices to support you, three in California (Pasadena, Camarillo and Alameda), one in Denver, Colorado, one in Santa Fe, New Mexico, and one in Moscow, Idaho.

### Research, Development & Demonstration

We have brought in over \$110 million to the table for our partnerships to develop technology. We were very excited to develop the first electric bus, and the first hybrid bus. I'll mention a couple of projects here that we recently rolled out. We rolled out the first Class 8-hybrid fuel truck. It's a CNG/electric truck that will be used in waste hauling applications. We've also developed, in conjunction with Mosaic Industries, natural gas leak detection sensors. This is a critical safety need for the transit / heavy-duty vehicle industries.

### Industry Analysis, Information and Publications

What do we do in terms of providing context? We provide a lot of publications to institutions, including several books that are available for you. We provide information on the industry, trend analysis and market opportunities.

The Web site ([www.weststart.org](http://www.weststart.org)) is the best way to keep up with what's going on with WestStart. It's constantly being updated, with twice daily postings of industry news and information. We also provide a global clean vehicle catalog that is useful for a first-cut look at different vehicles, maps of charging stations, and a listing of industry companies.

We also have several publications available. We have an industry prospectus on electric vehicles and battery technology. We have a natural gas vehicle prospectus. These get you up to speed really well on the basics. We also have other publications including the Conference Digest News and Connections.

### Project Hatchery Business Incubators

We also help start new companies. We buy down the cost of facilities primarily in the area of advanced information technology. There are three "hatchery" locations in California: Alameda, Camarillo and Pasadena. We have over 45 hatchery companies and we're very excited about working with them.

### Heavy Duty Vehicles

Next I want to talk a little bit about what's going on in the industry regarding heavy-duty vehicles.

It appears that natural gas buses are here for the duration, and they are going mainstream. Major transit properties are buying natural gas: 20 percent of all new buses are fueled by natural gas. Seventy to eighty percent of the natural gas buses run on compressed natural gas.

John Deere has entered the natural gas bus market. They have an engine with diesel performance for power and torque, and with fuel economy on par with diesel.

WestStart has left its mark on natural gas buses using high-pressure, direct-injection natural gas technology. This has far lower emissions than diesel but maintains diesel performance and efficiency. Both California Air Resources Board (CARB) and the Bay Area Air Quality Management District (BAAQMD) co-funded development of this project.

You heard Motor Coach Industries (MCI) talk today about what they're doing in natural gas buses; they've got a very exciting program going on in Santa Barbara. These coaches have luggage space, which may have a useful application in the Parks. These buses have achieved a 50 percent emissions reduction.

There's a program to build a CNG/electric hybrid bus on a 40-foot Gillig platform with a 200-mile range. Gillig has the vision that hybrid electric buses will enter the market around the year 2003. A lot of evidence is pointing towards this new technology as a soon to be deployed approach for emissions and fuel reductions as well as using the existing infrastructure.

Another hybrid electric product is the AVS/Capstone hybrid bus. A natural gas-fueled turbo-generator provides the electrical power, which gives you extended range and allows you to consider air conditioning units.

I want to talk to you about infrastructure. One of our participants actually makes CNG trailers so you don't have to use trucks; this makes remote

refueling easier and can reduce compressor needs. Electric vehicle recharge is relatively easy. Liquid derivatives of natural gas, like methanol, can be ideal for reforming into hydrogen for fuel cell vehicles. Liquid fuels are easily transportable and are compatible with existing distribution systems.

The Los Angeles Department of Transportation is adding five 30-foot hybrid electric/propane buses. They hope to double their fuel economy and produce 70 percent less NOx. The FTA and South Coast Air Quality Management District (SCAQMD) contributed funding for this project.

APS has also made a propane/electric hybrid transit bus, which has a 210-mile range in hybrid mode.

Navistar and Lockheed Martin are testing a medium duty, hybrid electric delivery truck. This is a very exciting program as well. These vehicles have better acceleration than a conventionally powered truck, and have 20-30 percent better fuel consumption.

New Flyer wants to deploy diesel/electric hybrid buses in Orange County. New Flyer makes natural gas buses, and this is their first venture in hybrids.

Orion is delivering ten diesel electric hybrid buses to New York, where the Metropolitan Transit Authority has made a commitment to buy 500 new alternative-fueled buses. The Nova bus uses the same Lockheed Martin drive system.

Electric buses have been around for a while, and electric buses do work in certain applications.

This advanced electric transit bus uses a nickel-cadmium battery pack. It has about a 60- to 80-mile range, and it's in use in Santa Barbara and Yosemite.

Toyota is also selling hybrid/electric Coaster buses in Japan. These have gasoline engines, which generate power for electric drive.

People tell me that fuel cell buses are just around the corner. We've got a hydrogen-fueled hybrid electric bus operating in Augusta, Georgia. They presently cost as much as \$2 million due to the fuel cells; however hundreds of millions of dollars are presently being spent to commercialize this technology. Something is going to happen with that money. Several of these vehicles have been deployed and they have captured a lot of interest. In some cases the infrastructure isn't there now, but the infrastructure you deploy now may have to fit your hybrid fuel vehicles in the future.

Ballard has signed a multi-year deal with Johnson Matthey for platinum catalysts for proton exchange membrane (PEM) fuel cells. Three Ballard fuel cell buses are already being tested in Chicago, and three other buses are now in service in Vancouver. Ford and Daimler Chrysler have a fuel cell partnership with California.

I think we have seen that there are CNG buses already happening today and we need to look at deploying those buses. The hybrid electric buses are just around the corner. In the long term make sure your infrastructure contains fuels to support a fuel cell.

### **“Department of Energy Perspective on Alternative Fuels”**

*John Ferrell*  
*Director, Office of Fuel Development*  
*U.S. Department of Energy*

We appreciate your attendance at this session. I'm the Director of the Office of Fuel Development at the Department of Energy. For most of

our program, we receive our funding through the Solar Account of Energy and Water Development, which is really a renewable program. My

part of the equation is really on ethanol and biodiesel. We work closely with the Office of Technology Utilization and others that have a broader focus in terms of programs. Through our various crosscutting efforts we work with the other people that are going to be presenting to you today. We do have some real experts who will give you some insight on the fuel side.

I wanted to give just a little bit of information from a national perspective. I know that you heard my boss, Tom Gross, yesterday present a comprehensive view from the national perspective. I'm going to give it a little more from the biofuel standpoint and from the alternative fuel standpoint as well.

There are a couple of things that I want to mention. I think we've heard about the progress that has been made in alternative fuels, but really I think we have a long way to go until alternative fuels are mainstream in the vehicle world. One of the things that I would suggest is that we need to work much more closely together. We have fuel sessions and we have vehicle sessions, but in order to make this thing fly, we have to do things in a much more integrated way – develop the fuel, the vehicles, building the infrastructure and all these things to come together.

Last week I had the good fortune of being involved with the ethanol vehicle challenge, which is a student competition with fourteen different universities. Besides being around college-age kids and experiencing firsthand their enthusiasm for ethanol, I think that one of the perspectives that they bring to the table is trying to work at the overall total systems. One of the issues, in looking at converting the GM Silverado, the big trucks, to run on E-85, was cold starting ability, because with an 85 percent ethanol blend in winter there can be problems with getting these things started. In fact, Ford recommends a 70 percent ethanol blend mixture to get the cold start. A couple of the students were trying to use a distillation column to separate out the alcohol from the gasoline, which would allow you to produce a sort of gasoline so you could start the vehicle on gasoline and then switch it back to E-85.

I think there are a lot of things that could be done on the vehicle side to make the fuel better. I don't think there's any one fuel that you can say is perfect in all regards. But the more we learn about the vehicle side, the more we look at ways to solve problems, using different blends depending on what you're doing. I think we have more possibilities down the road.

From the national side, we're concerned about energy security. I know Tom Gross talked about energy security yesterday, but I want to give a little bit of my perspective on that as well. If you look at sectors of the economy, transportation is about 98 percent dependent on petroleum products, and a lot of it is imported. So we have a reason from an energy security standpoint to be interested in alternative fuels. I will tell you that there are a number of people in the security field that have become very interested in the last several years with fuels, particularly biofuels but alternative fuels in general. They are looking at the likelihood that two-thirds of the reserves are oil are in a part of the world that's really unstable – look at the wars we've had in the last decade, which have had a strong tie to oil. Jim Woolsey, the former CIA director, is one of the major proponents of looking at ethanol, for example. In fact, I have a January article in the *Journal of Foreign Affairs*, co-authored by Jim Woolsey and Senator Lugar from Indiana. Senator Lugar has held a number of hearings on the energy security aspects of alternative fuels. From a bioenergy standpoint, there is an authorization bill that has been proposed by Senator Lugar that would increase funding by about \$49 million per year, if the appropriations came with it. If you look at the alternative fuels we have, basically you either have to bring down the cost of the fuel, you have to bring down the cost of the vehicle, and in most cases you have to supply the infrastructure. We really need all the options at this point; we need to diversify. We need to get a large enough alternative fuel supply whereby we can be a deterrent to what might go on in the rest of world in terms of keeping a cap on fuel prices.

The other national reason is related to climate change. In some parts of the world, there is a much stronger push toward trying to work climate change into policy options. The federal

government is trying to do that. There have been initiatives that are included in this year's budget, but it's questionable as to how successful they're going to be for a while. On the other hand, whenever a storm comes through or any kind of weather event comes through, people start talking about climate change. There is a growing understanding of the issue of climate change, and I think the alternatives fuels that we are looking at have a role to play in the climate change arena as well.

I think the Parks are a great place to start in terms of alternative fuel and alternative fuel vehicles. We've been involved through the regional biomass program for several years. Howard Haines, who is Montana's Regional Biomass Energy Program Representative, has had a major role in working with the Yellowstone National Park Project that you've heard about. That's what it takes – we need champions out there. I'm sure that Howard and many other people are working on this in other Parks. We're trying to make this linkage, and having the states come forward and

do things and work with the private sector is the only way these things can happen.

My vision is a little bit further out there. When you're talking about bioenergy and other fuels as well, we're talking about integrated systems, we're talking about overall park management. How do Parks create waste, for example? Is there a way to incorporate some of the waste the Parks are into producing various fuels, into biodiesel, ethanol or other fuels we're looking at? How do you tie together waste management, transportation systems and Park management? Then it's not done just because of Energy Policy Act (EPACT) requirements, but because it's a way to help educate the public and it fits in well with the overall Park management.

In terms of Parks, I think it's a great place to begin. People who visit the parks should be willing to pay more for the fuels and vehicles and appreciate the environmental benefits that these fuels hopefully will provide. So it's a logical link between the Parks and other agencies, and really the whole arena of alternative fuels.

### **“Alternative Fuels: The EPA’s Perspective”**

*Deborah Adler*

*Environmental Scientist, Office of Mobile Sources  
U.S. Environmental Protection Agency*

I want to provide an overview of alternative fuels and the Environmental Protection Agency's perspective on them. The mission of the Environmental Protection Agency (EPA) is to improve air quality, increase vehicle efficiency and decrease greenhouse gas emissions. There are multiple pathways to achieve those goals: you can change the vehicle, you can change the fuel, and you can change the behavior of people to reduce vehicle-miles of travel. My team's work, and the focus of my talk today, is on how to meet our environmental goals by changing our fuel. We really feel that alternative fuels are an important part of what we call the integrated

“3E” goals, not only environmental goals but also energy security and national economic goals.

Why do we like alternative fuels? We believe they offer the greatest potential to meet these multiple goals. They can significantly lower ozone precursors and toxics. They can reduce or even eliminate particulate emissions. Alternative fuels are generally more efficient due to some of their chemical properties. And they can be produced from domestic, non-petroleum, renewable feedstocks. These are all very important factors to consider when developing national policy.

However, there are some significant barriers to the use of alternative fuels. Probably the most significant barrier has been the very low price of gasoline; it's at historically low levels. In addition, there's an extensive petroleum infrastructure. Even in the cases of fuels like natural gas and electricity, where we do have a national fuel delivery system, we don't have the ability to readily use these fuels in vehicles. Alternative fuels also have lower energy densities relative to gasoline and diesel, reducing the fuel capacity that can be carried. This means that you have to refuel more often, or vehicles must be bigger and heavier to go the same distance. Another point is that gasoline vehicles are continuing to be able to meet the challenge of tighter emissions standards, particularly with the use of reformulated gasoline. From an automaker's perspective, it is less costly and less risky to continue to make gasoline-powered vehicles.

What can we do to reduce the barriers? Many coordinated efforts are needed. We need to support the federal fleet program for public and potentially private vehicles to meet the Energy Policy Act (EPACT) goals. EPA has formed a task force to ensure that we are meeting our EPACT requirements, and to address the problems fleets face in trying to purchase and use alternative fuel vehicles. This task force will be coordinating with the Department of Energy (DOE), General Services Administration (GSA) and other agencies to make this happen. We also need to continue to build an alternative fuel infrastructure. I think it was stated yesterday that fuel availability is still the number one challenge faced by AFV users. This is not a clear role for EPA, but we will be holding a workshop at the next Clean Cities Conference to learn more about this issue, and how we might be able to help overcome the barriers.

We're trying to offer incentives. We're developing a new policy called voluntary measures, which will allow States to get state implementation plan (SIP) credit for their alternative fuel fleets. This program will also develop a methodology and database for quantifying the air quality benefits achieved with alternative fuel vehicles. EPACT offers tax credits toward the purchase of electric vehicles and we are hoping to expand this

tax credit to include advanced technology vehicles with significantly greater fuel economies. We plan to provide benefit models that help calculate the very real environmental benefits of alternative fuel vehicles (AFVs). We're very interested not only in the MOBILE model but also life cycle modeling. Finally, we need to work on public outreach and education. This is one place where we see in the National Park System an excellent opportunity to reach a large number of people in a positive, friendly way.

One of our objectives with alternative fuel vehicles is that we would like them to meet the tighter emissions standards: ultra low emission vehicles (ULEV), inherently low emission vehicles (ILEV) and zero-emission vehicles (ZEV). We feel that to warrant such a dramatic societal change, these new fuels need to offer significant benefits. It's difficult to justify all this effort for vehicles that are as clean as gasoline, so we need to make this opportunity to get vehicles that are cleaner. They should also provide an opportunity for using advanced technologies that take full advantage of the positive attributes of alternative fuels, such as higher octane. Finally, alternative fuels will have a role in terms of the proposed Tier 2 standards. Once again, we expect such stringent standards to be a real opportunity for cleaner fuels. In general, we support alternative fuel vehicles that are dedicated, clean, efficient, and renewable.

There are several alternative fuel vehicle programs we're involved with, including National Low-Emission Vehicles (NLEV), the Partnership for a New Generation of Vehicles (PNGV), Clean Fuel Fleets, and federal fleet acquisitions. Certification has been quite a big issue for us at the EPA. Alternative fuel vehicle technology advances so quickly that it is difficult for our test procedures and regulations to keep up, and it has been very hard to predict what will come next. There are also issues with how we calculate fuel efficiency. Our certification standards are based on the engine, not the fuel. But we are now faced with fuels and fuel blends which can be used in existing engines with little or no modification, like biodiesel and the P-series fuel. We are still

determining how our programs will address these new fuels.

I want to discuss our PNGV work real quickly. EPA is a partner in the PNGV effort, and our work includes alternative fuel projects. We're looking at ultra-efficient and clean four-stroke (4SDI) engines that are optimized for renewable alcohol fuel. We're also looking at 4SDI engines in hybrid and diesel applications, with and without aftertreatment. We want to demonstrate ultra-efficient and clean 4SDI engines optimized for gasoline, as well as clean diesel engines.

The Clean Fuel Fleet Program was mandated by the Clean Air Act Amendments in 1990. I remember we were so excited at the EPA when President Bush made the announcement of this new program. This program was intended to significantly promote alternative fuels. Unfortunately, the Clean Fuel Fleet Program was not begun until September 1998. You have to be in an eligible carbon monoxide (CO) and ozone non-attainment area, and currently only four cities are involved. The program requires that a percentage of new vehicle purchases of light and heavy-duty vehicles must be ILEV. There are three important objectives of the program. The main goal is to reduce vehicle emissions in non-attainment areas. But it was also intended to promote improved emission control technology, and we are getting there with a much greater vehicle selection, and more technology advancements, than we had just a few years ago. Finally, it is a stated goal of this program to support infrastructure development for clean fuels.

EPACT, enacted in 1992, also has public fleet purchase requirements. It also offered a vehicle tax credit for electric vehicles, as I've mentioned. It also offers tax deductions for building new alternative fuel refueling sites.

There are several other EPA fuel programs that I'm more involved in. The reformulated gasoline (RFG) program has had on-going implementation issues, such as the concern over the use of methyl tertiary-butyl ether (MTBE). We're also beginning the transition to Phase 2, beginning in January 2000. We have completed a vehicle-testing program of RFG-II with no performance

problems found. We have also conducted public focus groups to determine the best message and outreach needs. The Tier 2 proposal proposes lower sulfur levels in gasoline. An Advanced Notice of Proposed Rulemaking is currently seeking comment on the need for lower sulfur levels in diesel as well. The EPA is exploring policy options for promoting low-greenhouse gas fuels. We really want to try to find a way to encourage renewable fuels, because they offer the greatest environmental and greenhouse benefits. So we are seeking to evaluate and develop cost-effective biomass-based fuels.

The OMS Alternative Fuel Team was formed about a year ago. The goal of this team is to advance the use of environmentally beneficial alternative fuels and vehicles. The objectives of the team are to:

- coordinate alternative fuel efforts, both within the agency and externally with other agencies;
- promote and support the use of clean alternative fuels;
- unify the EPA's efforts and message;
- develop policies and programs promoting alternative fuels; and
- cooperate with, and influence, other agencies developing alternative fuels policies.

The team has pursued several efforts in the past year. We held our first modeling workshop last week, which explained the MOBILE model and our ideas for lifecycle modeling. We're also going to be offering an infrastructure workshop, probably at the next Clean Cities Conference in San Diego. We're involved in the EPA's alternative fuel vehicle acquisitions. We're trying to do our part. We're also working on the "Green Cities" pilot program. In this program we're initiating one or two "Green Cities" to try to expand on their current alternative fuel programs and try to get more alternative fuel vehicles into the city. We're going to demonstrate how emission benefits can be measured and SIP credits generated. We're hoping to develop a system where we utilize local fuel feedstocks like biomass. I mentioned that we have a low greenhouse gas fuels initiative. We're also considering

a fuel composition survey, nationwide, to ensure the quality of all alternative fuels.

I myself have been involved in alternative fuels for about 12 years. But this team is pretty new to

this issue, and we would like to hear from you. We have a Web page ([www.epa.gov/oms/fuels](http://www.epa.gov/oms/fuels)).

## **Biodiesel: An Environmentally Friendly Fuel with Potential for Use in National Parks**

*Dr. Charles Peterson  
Professor  
The University of Idaho*

When Craig Chase asked me to give this presentation, he asked that I include a lot of things and then didn't provide very much time. Being a college professor, you know the schedule is about 50 minutes. So we're going cover about 50 minutes worth of "stuff" fairly quickly.

First I will discuss the vehicles that we've fueled with biodiesel. So far in this conference, we haven't heard near enough about biodiesel. We did have Jim Evanoff talk about the "Truck-in-the-Park" project, the 1995 Dodge that now is very close to 100,000 miles. But most of the other alternative fuel presentations have been on compressed natural gas (CNG) and liquefied natural gas (LNG). Biodiesel offers some particularly attractive benefits for the Park setting.

At the University of Idaho, we now have close to 600,000 miles of experience with biodiesel. We have used over 33,000 gallons of biodiesel in various projects. I told Craig Chase one time that 100 gallons was quite a lot for a university project, and he keeps encouraging us to make more and find new ways to increase our production capacity.

We started out with agricultural tractors. One, a small SATOH 27-hp tractor, has had biodiesel in it since 1982. We've had a 100-hp John Deere 3150 tractor working on the farm since 1989, and it's still in use now. One of the things I can say about all these projects with biodiesel is that they've been relatively maintenance-free.

We have a 1992 Dodge with the Cummins 5.9-liter turbo diesel which completed 100,000 miles about a year and a half ago. It was operated by the Idaho Department of Water Resources Energy Division. Also, a 1992 Ford, with the 7.2-liter Navistar diesel V-8, was operated on 20 percent raw rapeseed oil. This is the Navistar engine pre-power stroke engine. Navistar was kind enough to do the engine tear down for us. Even with the raw vegetable oil, the precombustion chamber engine looked very good. The injector pump was disassembled and it also was found to be in very good condition, comparable to use on diesel fuel. The bearings are actually in the condition that they could have been when they were installed in the engine.

This next section is about a 1994 Dodge with the Cummins 5.9-liter diesel. This truck also completed 100,000 miles on biodiesel. The truck was operated on 100 percent biodiesel made from industrial rapeseed oil – i.e., high erucic acid rapeseed oil. Most of our biodiesel work at the University of Idaho was done with industrial rapeseed oil until we got involved with used vegetable oil. The 1994 Dodge was driven from coast to coast on biodiesel. There's only one filling station on that trip and that was in Moscow, Idaho. We filled the truck and drove to Los Angeles, California for emissions tests. We then returned to Moscow where we loaded 320 gallons of biodiesel and drove to Kansas City, Washington D.C., the coast of Delaware and Maryland and back to Moscow, Idaho. Biodiesel, as Jim Evanoff mentioned, is one of the fuels that you could carry on-board a pick-up truck a



sufficient supply to go from coast to coast. Because of its high flash point biodiesel is safe in an accident, and because of its biodegradability it is safe in case of a spill.

Jim Evanoff discussed the truck in the Park project and did a very good job in mentioning the problems they anticipated with bears. One thing I want to mention is that when we pumped this exhaust into the bears' houses they became very aggressive. We actually had to discontinue the study. They didn't like exhaust in their bedroom, diesel or biodiesel, any better than you would.

The last project we've been involved with is this Kenworth truck with a Caterpillar 3406E engine. We've logged 200,000 miles using used vegetable oil produced from used french fry oil from a J. R. Simplot potato processing plant. This could well be one of the only places where this study could have been done. J. R. Simplot produces ethanol from potato wastes in a plant directly across the road from the french fry plant. Used french fry oil was then transported to the ethanol plant where the esterification process took place. Several entities were involved in this project.

- The Department of Energy Office of Transportation Technology was the lead on this project.
- Craig Chase was the project manager.
- Caterpillar Inc. donated two test engines.
- Kenworth Truck donated the truck.
- The University of Idaho produced the fuel.
- The University of California conducted the toxicity analysis.
- The Caterpillar technical center conducted startup and final engine evaluations including internal component degradation and they conducted emissions tests on both the truck engine and a separate engine for certification emissions.
- J.R. Simplot cooperated in the fuel production and truck operation.

This truck only had one fueling station at Caldwell, Idaho and it needed a route that could accommodate that limitation. Simplot used it to haul livestock feed from Caldwell, Idaho to Grandview, Idaho – a distance of about 75 miles. It made that trip about three times a day. At the

conclusion of the test the odometer showed 202,391 miles. The truck averaged 5.3 miles per gallon; we estimated a diesel equivalent at about 5.8. The engine lost about 5 percent power which was found to be not biodiesel fuel-related. The emissions were actually lower at the end compared to the beginning. All things considered we thought this was a very successful 200,000-mile project.

J. R. Simplot provided a 10,000-gallon double-walled stainless steel tank for storing the fuel and a separate tank for storing the glycerol and other waste products. Simplot Transportation, which coordinated the truck use, was located less than three miles away from the fuel production point. We installed a biodiesel nurse tank next to their diesel fueling station. A blending valve was used to mix diesel and biodiesel at a 50 percent ratio as the truck was fueled. The result was a transparent fueling system as far as the truck operator was concerned. The truck, in the words of Caterpillar Engineers, passed all maintenance and wear tests “with flying colors.”

The University of Idaho uses the transesterification process for producing biodiesel. This involves a chemical reaction of ethanol or methanol with vegetable oil, which removes the glycerol from the vegetable oil triglycerides. The alcohol is mixed with the vegetable oil in the presence of a catalyst such as potassium hydroxide. We use a batch process of either 250 or 500 gallons per batch. Following the mixing, the ester layer will rise to the top; the glycerine layer settles to the bottom where it can be removed. This is followed by water washing to remove the remaining tryglycerides, alcohol and catalyst. The yield with rapeseed oil is essentially 100 percent of the amount of oil going in is returned as ester; but with the addition of about 27 percent alcohol, there is a glycerol layer also of about 27 percent the original volume of oil. This layer must be disposed of in some way. Without further processing we have not found anyone willing to purchase it, with further purification, the glycerol would have value

Biodiesel is used extensively in Europe. There are reportedly filling stations in Europe. In this illustration it says, “New Information for Agri-

culture.” It further says, “I have Rapeseed Methyl Ester (RME) in our tank, you can use it with diesel, it will mix with diesel, there is no effect on the motor, there is no effect on the warranty.”

Next let us discuss some of the properties of vegetable oil or biodiesel. Biodiesel has about 10 percent less energy (heat of combustion) than diesel. When you use biodiesel in a diesel engine, there will be either less power or a higher rate of fuel use depending on the engine. Biodiesel has a higher flashpoint – about 100° F higher than diesel – so it is safer to handle and store. Biodiesel from rapeseed oil or canola has a pour point of -10° to -15° F, so at Yellowstone National Park they have been able to use it quite nicely. In fact they have gotten along much better in the winter than we would have expected. The used vegetable oil that we use at J. R. Simplot has a pour point of about 50° F, so it must be kept heated. But by properly planning for this, the truck had an arctic package installed on its fueling system, and by keeping all storage tanks heated we did make it through two January seasons very nicely.

Biodiesel has a number of properties that the National Park Service should be interested in.

- It improves biodegradability.
- It has much reduced carbon monoxide (CO) and hydrocarbon (HC) emissions compared to diesel fuel.
- It has reduced particulate emissions as expected, and the toxic effects of the particulate emissions, are greatly reduced.
- It’s safer for handling, primarily because of the high flash point.
- It improved the efficiency of the catalytic converter used on the 1995 Dodge.
- It recycles the greenhouse gases, because CO<sub>2</sub> is re-used in the growing of the plant.
- It has a very positive energy balance of about 4 to 1.

These are all things that are very important when using the fuel in a pristine environment.

A University of Idaho study looked at the biodegradability. We found that biodiesels biodegraded rapidly. The biodegradation rate is directly proportional to the percentage of diesel and biodiesel. Toxicity studies have also been conducted. A University of Idaho study shows diesel fuel and the different blends of esters and their effect on Daphnia Magna. Diesel fuel has an LD50 of 1.56 where the esters are double or triple that amount. Another study, conducted with CH2M Hill shows that biodiesels are less toxic than salt when introduced with Daphnia Magna. We’ve also done toxicity studies with laboratory animals. In the dermal study the rate was the equivalent, for a 200-pound person, of one cup of fuel rubbed over 20 percent of the body. In the oral study the rate was the equivalent of a pound, or a little bit more than a pint, taken internally. Neither of these studies resulted in the death of any laboratory animals. However, the animals receiving the biodiesel treatment were much healthier than those receiving the diesel treatments were.

We have performed emissions testing on both our 1994 and 1995 Dodges. The testing was conducted at the Los Angeles Metropolitan Transit Authority emission test facility. We used the EPA heavy-duty cycle for each fuel. Results show that as the blend of biodiesel is increased in the blend a very significant reduction in HC and CO occurs. On the other hand we would generally expect, on the chassis dynamometer, a slight decrease in NOx and a slight increase in PM. On the PTO dynamometer, generally the opposite has been found for PM and NOx.

Biodiesel is a fuel that has potential for meeting the needs of the National Park Service. Its biodegradability, renewability and reduced greenhouse gas emissions make it very environmentally attractive. Its disadvantages are price and availability; however, considering the almost zero infrastructure cost and compatibility with existing diesel engines it may be competitive with other alternatives. I believe the Parks are areas where biodiesel may find its niche.

## “Propane: An Alternative Fuel for NPS Transportation Needs”

*Robert Myers  
Consultant  
Propane Vehicle Council*

I thought the context of this particular seminar was appropriate because propane and the Parks really go together. You heard yesterday that propane buses have recently been introduced into Acadia National Park. Some of you in the National Park Service might be interested in moving to propane gas for your transportation needs not only for moving visitors but also for your own fleet requirements.

The first place propane was ever permitted to be sold at retail in a National Park was to supply recreational vehicles at Fishing Bridge in Yellowstone. This required a permit and it took seven years to secure one. Two years later, there were 654 cabins built at Canyon Village in Yellowstone in an effort to move housing away from the rim of the Canyon. The cabins were designed to use propane for heating and water heating. To get those permits it took only 60 days. Today if we go out the East Gate of Yellowstone less than 100 yards off the road, there's a propane tank there that has been used to supply recreational vehicles since 1965. So propane has been a part of the Park Service amenities for a long time.

Propane has a particular uniqueness in National Parks because it is portable. Propane is listed as an alternative fuel in both the Clean Air Act Amendments of 1990 and the Energy Policy Act of 1992. Most parks don't have access to natural gas. Electricity for transportation needs has some severe limitations in terms of driving range and sustained power. Diesel is prominently used in many Parks but particulate matter and toxicity of diesel exhaust seems incompatible with a “green” theme.

Let's talk about the fuel. Propane does work. It's not experimental. It has been used as a transportation fuel for nearly 80 years. We're talking about liquefiable gases operating at moderate temperature or pressure. It has slightly less BTUs in a gallon than, for instance, gasoline. But one

its strongest attributes is a higher octane at 104, compared to 87 or 89 octane for gasoline. Using conventional fueling technology, you can get 75 to 90 percent of the mileage as gasoline. With the new technology, particularly direct injection, electronically controlled closed-loop fuel systems, performance and fuel economy nearly match that of gasoline.

How does propane compare with other alternative fuels? In octane, propane is better than gasoline, but it's not as high as natural gas, methane or liquefied natural gas (LNG). One of the other characteristics of the fuel in making comparisons is to look at the pressures at which they operate. Some fuels, like gasoline and the alcohol fuels, are essentially ambient. LNG operates at roughly minus 260 degrees Fahrenheit. CNG operates at a pressure between 2,400 and 3,600 psi. Propane is called “moderate pressure” because it is something more than ambient but not as severe as the others. Other considerations are the handling, safety, and toxicity of various alternative fuels. Propane is heavier than air, as are a lot of the other fuels with the exception of natural gas. In terms of toxicity both the natural gas and propane are non-toxic. They displace oxygen, but they are not toxic. Therefore, they have some positive attributes when compared to other fuels.

One of the attributes of propane that is sometimes confusing is that it is a liquefied gas. Under this moderate pressure, a unit of propane in the liquid state released to atmosphere will expand to 270 times the liquid volume. You can see this in like a clear butane lighter. Within the lighter the fuel is a liquid but when it is released to atmosphere it immediately reverts to its natural state which is a gas. There's nothing terribly exotic about it.

One of the other attributes in terms of the safety considerations is flammability. It's important to note that propane concentrated in air at somewhere between 2.3 and 9.5 percent gives you a

flammability range. Only within that range will the combination of fuel and the air support combustion. If this room was filled with 50 percent propane and 50 percent air and a match was struck nothing would happen. There's definitely too rich of a mixture to support combustion.

What about propane infrastructure? Because propane has a long history of successful usage, it has a very sophisticated and extensive infrastructure in terms of moving the product from the point of production to the point of use. It is characterized by a lot of underground storage, pipelines, transportation vehicles and tanks. There is somewhere in the area of 100,000 places in the United States where propane is being transferred from a storage vessel into a vehicle every day. Most of those dispensers, however, happen to be on private property. About 10,000 are accessible to the public.

One of the concerns of the Park Service fleet manager is the driving range. For an equal volume of fuel, propane gets between 70 and 80 percent of the driving range of gasoline. We compensate for this by installing a slightly larger propane tank than that of gasoline so there is no driving range penalty. One other consideration of fleet managers is what does the fuel do to the weight of my vehicle? Weight not only affects the carrying load of the vehicle but the fuel economy as well. If we were to compare a car with a 16 gallon tank getting 24 miles to the gallon, we would have a range of approximately 384 miles. If we put propane on the vehicle we're going to add weight in terms of the tank. Propane weighs 4.2 pounds per gallon. So a combination of the fuel and the tank indicates the weight would be about 30 percent over gasoline. In comparing propane to other alternative fuels, however, the additional weight due to the propane system is not significant.

Yesterday Bob Williams from Ford talked about the vehicles that are currently available from the factory. I wanted to talk about the tank configuration because this relates directly to what we just discussed: the range and carrying capacity of the vehicle. The Ford option allows you to have a single tank 20 inches in diameter and 60 inches

long. Or you can get two 10-inch diameter tanks which allows a storage bin to be mounted over the tanks. In the case of both the F150 and F250 pickups, the tank is located in the bed.

The other thing that Bob Williams mentioned is one of my favorites, the super duty F series. These come in the 350, 450, 550 models peaking out at 19,000 lbs gross vehicle weight (GVW). The super duty series has a 6.8-liter dual-fuel engine and certified at the Ultra Low Emission Vehicle (ULEV) level giving you all the credits you're entitled to. I want to show the tank configuration on this particular chassis that goes into production this fall. You'll note that there is a tank configuration on the left side frame, behind the axle, or a combination of both tanks providing a driving range in the area of 500 miles.

Clay Okabayashi from General Motors spoke yesterday. I want to affirm that the GM medium duty truck chassis has a 7.4-liter engine mono-fuel engine. This truck is Low Emission Vehicle (LEV) certified in 49 states and is California Air Resources Board (CARB) certified as well. The chassis is in production right now, it's factory equipped with full service and warranty coverage. So if you're building your fleet specs now, that's what you can use. Clay mentioned yesterday they're in the development of a school bus version of this same chassis in connection with Bluebird which should be available later this year.

The other engine that is becoming popular particularly with the small bus operators is the Cummins 5.9-liter engine. This is the engine used in the buses at Acadia that Len Bobinchock talked about yesterday, and also I believe that's the engine going into the Zion National Park buses. It has a nice torque and power curve, generates 420 lb-ft of torque at about 1,600 rpm, and maximum 195 hp at 2,800 rpm. It's a very, very efficient engine, turbo charged, using a lean-burn combustion strategy.

One of the other comments I want to make in terms of infrastructure is cost. Comparing gasoline, natural gas, and propane for medium duty use, which I would suspect would be a

National Park fleet, a single facility could handle in the range of a 25 to 50 vehicle fleet at less cost than gasoline or CNG. On a comparative scale, the propane refueling facility is relatively inexpensive and quick to install.

Particularly in the case of the National Parks, one of the big obstacles in infrastructure is obtaining permits. The propane industry participated in a test program with Federal Express in the Los Angeles area from 1993 to 1996. The permits for some of the fuels took six months to clear. No problem with propane. One example of a propane refueling facility is a 2,000-gallon propane vertical tank that has a propane dispenser, fits on a stainless steel base, comes all wired with electricity, and includes the fire extinguisher. This system is delivered on a flatbed. You slide it off the flatbed, tip it up on a cement pad, and the only other thing left for installation is to run the electricity to it. If it's delivered to the site at 8 AM, you'll have propane pumping before noon. In all the Parks this is relatively easy because the regulatory officials are familiar with the product. The footprint for this refueling facility is about 8 feet in either direction. So it really doesn't take up much room if space is a premium.

Other typical configurations use a more aesthetic dispenser cabinet in front, like you see for most

recreational vehicles. Fleet models integrate automatic fuel management systems. And unlike what you see for fueling recreational vehicles or barbecue propane bottles, the vehicle fueling systems uses a hose nozzle similar to gasoline. However, the difference is the propane nozzle is screwed on to the vehicle connection. This equipment is common throughout all the vehicular applications in North America, most of western Europe and Australia. So we don't have mismatches between the valves on the vehicle tank and the hose nozzle.

Another attractive alternative for the Parks is a system that includes a modern propane dispenser for filling vehicles as well as a place where the recreational vehicle and bottles for barbecues can be filled. These facilities meet all applicable codes.

Debbie Adler talked about global warming and greenhouse gases. Dr. Mark Delucchi of the University of California-Davis updated a study comparing full life-cycle analyses for different alternative fuels in terms of greenhouse gases. You can see that propane is the cleanest of any of the fossil fuels in terms of production of greenhouse gases.

## **“Natural Gas Vehicles and America’s National Parks”**

*Greg Fine*

*Director, Market Development*

*Natural Gas Vehicle Coalition*

Natural gas, both compressed and liquefied, is readily and widely available and has a wide range of products available. I have put together a basic overview of what we believe natural gas has to offer. I have to give a disclaimer because I am part of a trade association and a lot of you work for the federal government. My job is to make sure that the natural gas industry in the United States is growing, sustainable and healthy. So my

disclaimer is that I am biased; this is what I do for a living.

We're the Natural Gas Vehicle Coalition (NGVC). We are the trade association for the natural gas vehicle industry in the United States. Our objective is to create a profitable, sustainable and growing natural gas vehicle market in the United States. What does the NGVC do as the trade association?

- Market development. We have a large market development function and our goal is to grow the market.
- Government relations. The NGVC has a large government affairs operation where we work very hard to secure funding for research and development in the natural gas vehicle area. We also are working to create federal tax incentives to increase the use of natural gas vehicles (NGVs).
- Regulatory affairs. We work very closely with and spend a lot of time working with them on a variety of issues. We're very excited about being included in the new MOBILE model.
- Communications and public relations (PR). We have a significant communications and PR function where we try to collect case studies. How does this relate to you? If you call us up and ask if anybody out there is using natural gas in a particular type of application – whether it's a police fleet, school or transit – we have the information. We can point you to somebody that's already doing it and you can talk to them specifically.
- Technology. We have a brilliant guy who takes care of all of our technical stuff. The NGVC is responsible for coordinating and setting standards for the industry. Also if you have a technological question and you don't want to go to a particular vendor or you want to make sure that the vendor you're talking to is giving you the right answer, you can call Hank and he'll give you just about any answer technology-wise that you want.

Why NGVs? NGVs help clean the air. NGVs reduce nitrous oxides (NOx), volatile organic compounds (VOCs), particulates, toxics and carbon monoxide emissions. The increased use of NGVs would also help to slow the rate of climate change, and we've heard a lot about that. In addition, one of the things that we think is very important is energy dependence. Almost 98 percent of all the natural gas used in the United States either comes from the United States, Canada, or Mexico, and 70 percent comes from

just the United States. Since natural gas is one of the most domestically produced and abundant fossil fuels, the increased use of NGVs helps to reduce our Nation's dependence on foreign oil. There is also the whole balance of trade issue. I think Tom Gross mentioned in his speech that we are closing in on \$70 billion annually flowing out of this country to buy petroleum. The United States' natural gas industry is on the cutting edge. We export natural gas technologies for vehicles and tanks all over the world.

There are two major policy drivers for us. I think that you probably are familiar right now with the Energy Policy Act (EPACT) and of course the Clean Air Act Amendments' Clean Fuel Fleet Program. There are also several other emissions concerns. One of the things that is important in the heavy duty vehicle area, which I think many of you in the Parks are concerned about, are the new ozone and particulate emission ceilings. There is also the diesel engine settlement, the whole issue that the diesel engine manufacturers have been using technology that made the engines appear cleaner than they actually are. Yet, the most important issue regarding diesel emissions is the fact that California's Air Resources Board (CARB) recently declared diesel particulate as an air toxic. Basically, CARB said that current diesel exhaust is bad. There are a number of other states that are considering similar action. This is putting increasing pressure on a lot of people to look at alternative fuels.

Why should NGVs be considered for use in the Parks?

- Historical leaders as environmental shepherds. The first thing that hit me is that the National Park Service has a long history of being environmental shepherds. I think that this is often taken for granted, but there's no doubt in my mind that this is a number one concern.
- Centralized fleet. NGVs work best in fleets that have high fuel use and are centralized. Well, your fleets are centralized and hopefully you use fuel. Because you are often located in areas without existing infrastructure,

publicly available fueling stations in the parks would allow other people beyond your fleets to come into the Park using NGVs. So if we can get a fueling station at Yellowstone or Grand Canyon that means that private vehicles running on alternative fuels can come into the Park.

- Proven track record in similar applications. One of those applications is certainly transit. Twenty percent of all new transit buses in the United States on order today are natural gas. That was in 1998, and we expect that number to increase in the years ahead.
- Receptive audience. The people who are coming into the Park want to enjoy the natural beauty of the Park, so it's a natural sell. There is no doubt that you have to sell these people on the idea of giving up their car to visit inside the Park. But if there is any time they're going to be receptive to getting out of their cars and trying something different, it's going to be in the Parks.

NGVs are commercially available and have proven reliability and performance. Take a test drive in the Honda Civic and when Steve's not looking, gun the engine and it will come off the line like you won't believe. It's a great car. We have an available and growing infrastructure. There are over 1,300 natural gas fueling stations across the United States. I already mentioned that natural gas is domestically abundant. I think the most important thing for the Parks is that we have partners out there that are very committed to helping you succeed. The automakers have already made the commitment to us that if they don't have a dealer near you, they will work with you to get your mechanics certified to do the work. We also have a lot of fuel providers that will bend over backwards for you.

We have many light-duty NGVs available for model year 1999:

- Ford: Crown Victoria sedan, Contour/Mondeo sedan, Econoline vans, F-series pickups and Expedition SUV
- Chrysler: Mid-size van (dedicated) and maxi-van (dedicated)
- GM: GMC/Chevy 2500 pickup and Chevrolet Cavalier sedan
- Honda: Civic sedan
- Toyota: Camry sedan

I know most of you are more concerned with heavy-duty vehicles, so we can go on to them. Heavy-duty natural gas engines are currently available from Caterpillar, Cummins, Deere Power Systems, Detroit Diesel, Mack and Crusader. In addition, several companies offer natural gas models in medium and heavy-duty trucks, including Freightliner, Mack, Volvo, Industrial Truck Corporation, Crane Carrier, Athey, Elgin, Ottawa and SISU. We have such a wide variety available that it's hard for me to talk about every model. There's also a long list of bus manufacturers in the United States that currently offer a natural gas option, including transit buses, school buses and shuttles. Blue Bird can make a shuttle bus that works well in the Parks. Every year the NGVC publishes a buying guide that lists the commercially available NGV original equipment manufacturer (OEM) products. We're just getting ready to release the guide for model year 2000.

I can get a little more technical, but I just wanted to talk a little bit about what we offer, what's out there and let you know that more than anything we are your one-stop shop. We have a great Web site ([www.ngvc.org](http://www.ngvc.org)) that can answer just about any question you may have. The site includes a fueling station locator and a clearinghouse for people trying to sell used vehicles, so if you're interested in maybe trying a vehicle we can even sell you a car.

## “Ethanol and the National Parks”

*Tom Koehler  
Celilo Group*

Ethanol is an ideal for the National Parks system. The nice thing about ethanol as a fuel, when you think about the National Park System, is that it is available now and the infrastructure is here right now. Ethanol can be used in any car that runs today and in fact is used quite a bit across the country. Currently, there's 1.5 billion gallons of ethanol produced annually. We think the production of ethanol is going to increase dramatically over the years. This situation with methyl tertiary-butyl ether (MTBE) has been referenced. It looks like MTBE will be phased out certainly in California, and potentially it will be phased out across the country. As that happens, the usage and production of ethanol will increase.

E-10 is a fuel that can be used right now at no added cost with no added infrastructure. Anywhere gasoline can be sold, ethanol can be sold. In Yellowstone, the Howard Haines' program of getting E-10 in off-road vehicles has dramatically reduced emissions of carbon monoxide, hydrocarbons and also particulate matter.

E-85 vehicles are produced by virtually all the car manufacturers. Many of those vehicles in the light-duty market are being produced at virtually no added cost compared to the other vehicles.

Ethanol is a renewable fuel. It reduces greenhouse gases – the Argonne National Laboratory recently did a study showing a 30 to 40 percent reduction in greenhouse gases, with corn ethanol.

When you derive your ethanol from a cellulose base material, the reductions are closer to 110 percent of greenhouse gases; with ethanol as a motor fuel there is the potential to drastically reduce greenhouse gases.

The other unique quality of ethanol is that it can be made from a variety of products, whether it's corn or grain or cellulose. The future of ethanol is bright. I am always reminded of the movie – *Back to the Future*. Ethanol and the technology to produce it are literally 100 years old. Now we might be getting smart enough to realize that it should be used in large scale. The next technology for ethanol is converting cellulose material, such as waste paper. In California, you'll see rice straw being converted into ethanol. As part of the whole issue of forest health, thinning out the forests to create a healthy forest can result in materials that may produce ethanol. It's all very viable, and it creates a very integrated system where you're using materials that will help you in waste reduction, you're producing ethanol and then you're using ethanol as a clean-burning fuel.

The other issue that I will close on, in particular for the National Park System, is that I believe fuel cells are going to be coming along in a very strong way in the next ten years. Fuel cell vehicles have tremendous emissions performance and ethanol as a renewable fuel is a wonderful fuel in fuel cells.



## Alternative Fuels Panel Workshop Summary

*Craig Chase – Moderator  
Consultant  
Technology & Engineering Management*

### Session Purpose

To develop a general alternative fuel implementation strategy through the identification of:

- general challenges in terms of the fuel and vehicle systems as they exist today;
- vehicle, engine and fuel technology options;
- key issues and opportunities;
- key stakeholders (groups not present);
- needs and actions to be taken; and
- top five priorities to be incorporated into an action plan.

### Session Results

- The infrastructure to support alternative fuels such as natural gas, propane, electric vehicles, and E-85 is lacking. Requirements, costs and technical considerations need to be better understood, and plans need to be developed to support this alternative fuels. Alternative fuels that can be splash blended offer immediate application. However, storage and blending facilities need to be acquired.
- Alternative fuels usage may bring new or unfamiliar technology into use. We need to have people trained to service and maintain alternative fuels vehicles and equipment. This presents a significant challenge particularly in remote and rural locations.
- What type of alternative fuel technology is appropriate? The answer to this concern is driven by such considerations as: long-term vs. short-term plans and requirements, light-duty vs. heavy-duty applications, safety and regulatory requirements, costs and environmental impacts, fuel availability and transportation requirements, and of course demonstrated success – tell the entire story.

- Bring the affected players to the table – verifying that all the interested parties are part of the process. In addition to the technical people, original equipment manufacturers (OEMs), fuels suppliers and equipment vendors, it is important to involve the local governments, concessionaires, environmental interests and the gateway communities.
- When assessing needs and actions to be taken, the Work Groups found the need to involve local decision-makers into the process, to coordinate development activities both internal and external to the NPS, to share information that identifies success or failure and the associated causes, to put vehicles on the ground, and to focus on technical issues and answers. There is a real and definite need to have a champion within the particular Park with the authority to make things happen.

### Top Five Priorities

- Providing understandable reliable technical information – telling the entire story, both the pros and cons, not just selling.
- Funding and developing the technical and supporting financial plan. This is the key to placing vehicles on the ground.
- Identification of a point person to address technical and regulatory requirements.
- Identification of each parks requirements; one size will not fit all.
- Top down support – U.S. Department of Interior/National Park Service, U.S. Department of Energy, U.S. Environmental Protection Agency, Government Services Administration, state and local governments and the private sector. This is a multiple partnership.



## Vision for the Future State DOT Perspective

*Roy Bushey*

*Program Manager, New Technology and Research  
California Department of Transportation*

Many of the issues that were discussed here are common to both rural and urban settings. When many people think of California, they think of Southern California with heavily traveled freeways, traffic congestion, and associated problems. But we also have a rural side of California, and a lot of the issues discussed here apply to both environments. Some examples include cleaner fuels, reducing congestion, improving communications, and developing a smarter infrastructure. It is important that we work together as partners, where necessary, in deploying technology to achieve the vision of all our customers having an enjoyable, reliable, and safe trip to their destination.

One common theme discussed is the lack of communication between the various jurisdictions, as well as between the agencies and the travelers. The vision that I have for the future is that we have traveler information systems that are available in the home, auto, and at the points of interest. The systems that are developed at the various agencies must be interoperable and be based on a common architecture.

So the one message I want to leave today is that we do the necessary up-front work in system

requirement specifications and adhere to system architecture and standards so that we give ourselves the best chance for an integrated system whereby communication of information between the various agencies is optimized.

Another concern I have, and Steve mentioned this earlier, is that we don't focus too much on the technology as it exists today, but that we look into the future as much as possible. We should talk to people developing business plans for products coming on-line in their respective areas. I know we have interest in and a lot of discussion regarding cell phone coverage. We have extensive rural areas with no cell phone service. Whether or not we will have that cell phone coverage in the future is questionable. Some people say it is imminent; others say it is a long-term issue. We want to try to get a handle on that. There are also a lot of products coming down the pike with regard to in-vehicle devices that will provide accurate and reliable traveler information.

In summary, we have a lot of work to do, and the more we can coordinate our efforts and partner where necessary, the sooner we will realize the benefits that technology can provide us.

## Park Service Perspective

*Warren Brown*

*Program Manager, Park Planning and Special Studies  
National Park Service*

I'd like to offer the following comments.

- Models for transportation systems at demonstration parks such as Zion, Grand Canyon, and Yosemite inform other units of the Na-

tional Park System about how their problems might be solved.

- Models for transportation solutions at National Park System units provide ideas that

visitors can take home and apply in their own communities.

- Congestion problems on Park roads are solved or mitigated without just transferring them to other areas or management problems. That is to say that we don't just solve traffic problems and create more crowding on trails, in visitor facilities, or otherwise overwhelm the ability of Park resources to accommodate visitors.
- Transportation is a motivating force in building partnerships between Parks and gateway communities, other federal agencies, and other Parks. Transportation planning provides an opportunity to better link visitor

experiences at National, state, or local parks in the same area.

- Funding for transportation improvements provides new perspectives on regional approaches to solving park management problems. Most of our Parks are experiencing impacts from the changes in surrounding land uses, for example where suburban sprawl is impacting Civil War battlefields. Funding for transportation studies and projects can help focus on the desired results for National Parks: better quality visitor experience, better quality of resource protection, and a better sense of environmental stewardship for visitors.

## Federal Perspective

*Robert Stout, P.E.  
Director, Office of Planning and Operations  
Federal Transit Administration*

Good afternoon. These are clearly not my agency's perspectives; these are my perspectives. What I'd like to talk about first are three C's: communication, coordination and cooperation.

- Communication. I think we're beginning to establish communications with most transportation agencies and federal land management agencies. This conference certainly is a good starting point. TRB's Task Force on the Transportation Needs of National Parks and Public Lands is meeting tomorrow in an effort to identify recommendations for research activities in this area.

We need to go beyond that. Federal land management agencies need to become familiar with their counterparts in state Departments of Transportation. In an urbanized area, they need to be familiar with their Metropolitan Planning Organization (MPO). They are certainly beginning to interact with their gateway communities to try to continue

to build a cooperative relationship. I'd also include transit operators. I think there's an excellent opportunity for partnerships for the provision of transit services. We need to communicate with the public, seek their involvement and assistance in identifying transportation problems and possible solutions. So I think that communications is something that we ought to work hard at developing and maintaining with your state, local partners, private sector and the public. Certainly the tools and technology are available today. Faxes and e-mails give us the opportunity to communicate with one another a lot more easily than even a few years ago.

- Coordination. Once we start talking with one another, we need to do better coordination of our various transportation-related activities, so we can share information about our goals and objectives and programs.

- **Cooperation.** We need to explore cooperative relationships among the various agencies and institutions. For example, the Department of Transportation and the Department of the Interior executed a Memorandum of Understanding (MOU) in 1997 to provide mutual support and assistance to one another.

After we have mastered the three C's of communication, coordination and cooperation we need to consider the three P's: plans, programs and partnerships. We need to plan together and develop joint transportation improvement programs. Partnerships for planning, designing, building, operating and maintaining transportation facilities are extremely important today with limited resources available for most public agencies. We need to partner with each other. We need to partner with the private sector. We need to use innovative financing techniques through private/public partnerships.

Staffing is another area that should be addressed I think at the state and metropolitan level. There

are a lot of transportation specialists involved because FTA and FHWA provide financial support for planning. I don't think we see the same level of expertise in the federal lands management arena. Staffing is always at a premium, but I think that if we somehow helped to get Federal Lands better staffed, and use employee exchange and training programs, the Parks and other Federal lands management agencies will be better equipped to deal with their transportation problems.

Lastly, I was asked to state my Vision for the Future. My vision is that in the year 2005 there should be a "Transit in the Parks" program at the Federal Transit Administration. DOT and DOI are currently undertaking a needs study of alternative transportation systems in the parks. Hopefully the results of the study will point in that direction and provide information and guidance to Congress for the next authorization cycle that will result in a transit program for the Parks comparable to the Federal Lands Highway Park Roads and Parkways Program.

## **Tourism Perspective**

*Chick Warner*

*Associate Project Manager Senior, Research  
Mississippi Division of Tourism*

Many of us from other states have a little difficulty relating to some of the problems I have heard expressed during this conference, regarding the over-use and/or crowding in the National Parks causing physical and environmental damage. We, in Mississippi, estimate that our visitors number around 3 to 3.5 million per year – similar to the Yellowstone area – and we are spending several million dollars a year doing what we can to attract more. But then, we do have many more roads and highways for ingress, egress and travel in and around the state. We also have a considerable number more hotels, motels and B&B's to accommodate our overnight guests. Not only that, but our land area is around 31 million acres all of which makes a big

difference on the impact the traveling public has on our environment.

Regarding the information that the typical traveler needs and when he/she needs it. It would seem to me that there are different types of data the traveler needs and different times that it is needed. There is the pre-trip planning – general data. Pre-trip data is most often needed to assist in the planning, logistics, routes, clothing needs, and other equipment that might be useful, and/or reservations, general weather for the time of year of the trip, short-term weather predictions for the days of travel, etc. Much of this can be and is received from Web sites, as well as from State and local tourism organizations.

During the trip there is a need for “real-time” information regarding bad weather and/or negative road conditions ahead. At times there may well be a need to have some type of notification of over-crowding that may cause extended waiting periods, such as at the entrances to some of the National Parks discussed during this seminar. This might follow the “Six Flags” and “Disney” examples of signage – i.e. “From this location you have a wait of ‘X’ minutes to get on ride.” At these locations along the route people will have to have the ability to get out of line should they choose to do so and go elsewhere. This would be an ideal time for the gateway communities to take advantage of the potential frustration of the visitors and suggest a visit to local sites and attractions, or have lunch, etc. The major attraction and the local gateway communities will have to and should work closely together to coordinate their efforts – not always an easy thing. But it would be to both their advantages and would make the visit much more pleasant for the tourists, not to mention the potential increase in the amount of dollars spent in the local economy. There are a number of possible methods for alerting the public of these situations – low-watt radios, electronic message signs, combinations of the two, etc.

Along the route, there could well be a system, in the future, that will access internal auto-trip-GPS-computers as they evolve and improve to add information on local attractions and location data as well as ideal route/detour information to get to these sites. There will also have to be a system by which one can remove this informa-

tion or transfer it to a CD, or floppy disk while en route.

Group travel is a growing segment of tourism visitations and all indications point to this continuing to increase on a national basis. This may well make it easier to get the traveling public at the more crowded and sensitive areas – like Yellowstone – to park their personal vehicles and tour the parks via buses or other conveyances with audio information and/or a step-on guide. Generally speaking the personal auto is a part of the American psyche and I do not think we are going to give our cars up.

With regard to a change to alternative fuels: there are past examples before us that could be utilized. The examples are the education of the public to the need to use seat belts by getting our school kids involved in a “Buckle Up for Safety” type of program. There are an awful lot of us that first got in the habit of buckling-up because of our kids. Future alternative fuel vehicles will have to be as practical and usable as today’s personal cars and trucks in order for the general public to get on the bandwagon. That requires that they be in line with gasoline-powered vehicles in initial cost and the cost of overall operation. As the practicality/popularity of these vehicles grows the access to the fuels required will also grow much like the demand/access for diesel took place a few decades ago. It doesn’t matter if the alternative fuel is vegetable oil, natural gas, propane or whatever product – it will have to be seen by the general public as equal to today’s fuels.

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