Roseville Yard Update

PCAPCD Board of Directors

April 14, 2005

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Good Corporate Citizen

- Union Pacific Is the 5th Largest Employer in Placer County
- 1,262 Employees, $97.9M Annual Payroll in Roseville / Sacramento Area
- UP Procures Many Products and Services in the Area to Support Its Operations
- Roseville Employees Are Active & Involved in the Communities in Which They Live
- UP Is Committed to Protecting the Health of Our Employees & Neighbors

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Key Concerns with the ARB report

- Union Pacific is committed to protecting the environment for our employees, customers and neighbors and has cooperated fully with ARB and Placer County APCD to complete this study
- However, the ARB analysis used very conservative assumptions that results in an unrealistic estimation of the risk to Roseville neighbors

Key Concerns with the ARB report

- **The study:**
  - Reflects conditions in CY 2000; reductions of 15% have been achieved since that time
  - Based on maximum risk estimates that assume emissions at the Yard would stay constant for 70 years
  - Assumes that someone would stay outdoors near the yard 24 hours per day, 350 days per year, for 70 years
  - Contains uncertainties related to the computer modeling
  - Ignores US EPA conclusion that estimates of cancer risk from diesel emissions are too uncertain to quantify

What Is UP Doing to Reduce Diesel Emissions From Our Operations?

- Since January 2000, Union Pacific will have purchased more than 2,400 new fuel-efficient locomotives by 1-1-06 (1,900 @ 10-14-05); remains the cleanest US fleet
- Over 2,000 UP locomotives are currently equipped with auto start-stop devices to limit idling (1,800 @ 10-14-05)
- Since 1989, UP has invested more than $ 37M in locomotive research and development

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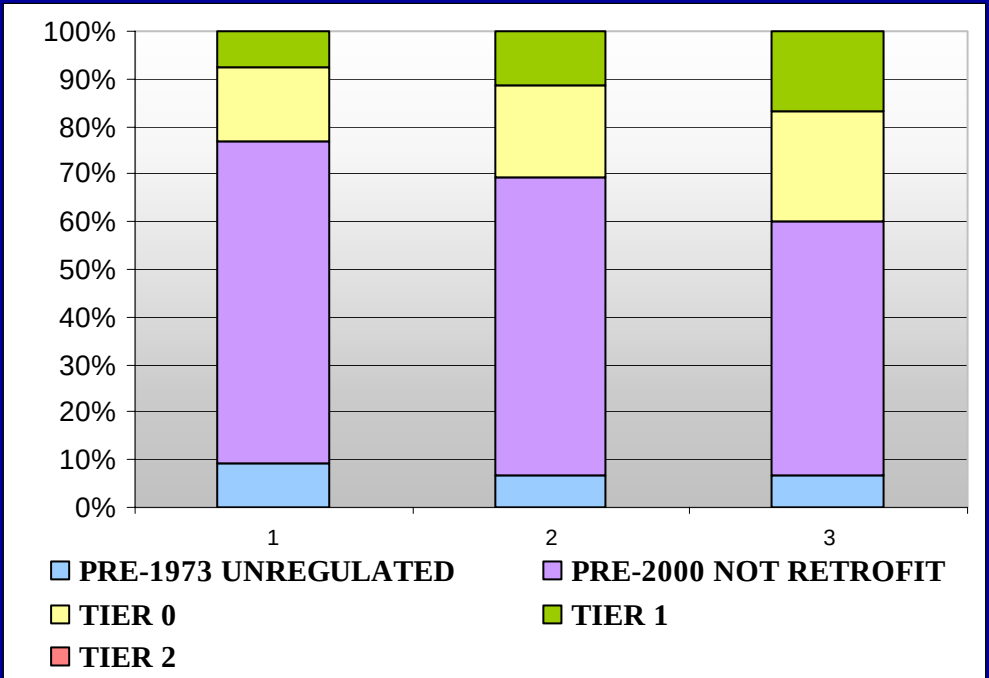
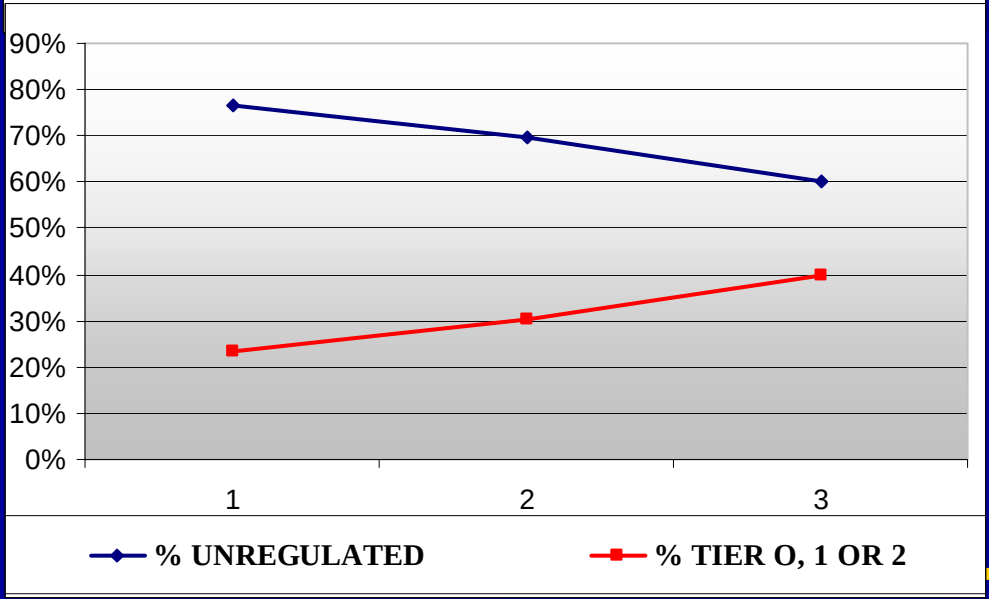
REPORTING YEAR	2002	2003	2004
Fleet Inventory as of 12/31			
TOTAL LOCOMOTIVES	7095	7115	7451
PRE-1973 UNREGULATED	669	470	491
% PRE-1973 UNREGULATE	9.4%	6.6%	6.6%
PRE-2000 NOT RETROFIT	4775	4476	3991
% PRE-2000 NOT RETROFI	67.3%	62.9%	53.6%
TOTAL UNREGULATED	5444	4946	4482
% UNREGULATED	76.7%	69.5%	60.2%
TIER 0	1121	1375	1725
% TIER 0	15.8%	19.3%	23.2%
TIER 1	530	794	1239
% TIER 1	7.5%	11.2%	16.6%
TIER 2	0	0	5
% TIER 2	0.0%	0.0%	0.1%
TOTAL TIER 0, 1 OR 2	1651	2169	2969
% TIER O, 1 OR 2	23.3%	30.5%	39.8%
TEST OR EXPERIMENTAL	1	5	0
% TEST OR EXPERIMENTA	0.01%	0.07%	0.00%
RETIRED	332	267	62
% RETIRED THIS PERIOD	4.7%	3.8%	0.8%
Planned Changes during the coming year			
PLANNED UPGRADE/REBU	268	457	497
% PLANNED UPGRADE/RE	3.8%	6.4%	6.7%
PLANNED TIER 1 PURCHA	218	343	0
PURCHASES AS % OF FLE	3.1%	4.8%	0.0%
PLANNED TIER 2 PURCHA	0	0	329
PURCHASES AS % OF FLE	0.0%	0.0%	4.4%
TEST / EXPERIMENTAL	5	0	12
% TEST / EXPERIMENTAL	0.07%	0.00%	0.16%
PLANNED RETIREMENTS	417	100	74
% PLANNED RETIRE	5.9%	1.4%	1.0%





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What Is UP Doing to Reduce Diesel Emissions From Our Operations?

- About 45% of all emissions at Roseville are from idling locomotives (clarify & update)
- Cooperative project with SMAQMD has retrofitted 21 low-horsepower units with SmartStart® idle control devices (+/- 90% of switchers at Roseville)
- UP continues to stress the critical importance of reducing locomotive idling time - revised shut down policy 4-3-05

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What Is UP Doing to Reduce Diesel Emissions From Our Operations?

- Moving more cars with fewer locomotives
- Using about 10% fewer low horsepower units
- Purchasing more CARB diesel fuel
- Funding manufacture of a Truck Engine Switcher
- Data from modeling used to develop process for identification and evaluation of options for reductions

Mitigation Plan

- Reduce emissions by an additional 10% over three years, for a total of 25% since 2000
- Evaluate specific mitigation measures, and present results to the public in April 2005 (today's discussion)
- Grant at least $50,000 each year during 2005, 2006 and 2007, to achieve immediate PM reductions in the Roseville area (paid 3/2005)

Emissions Reduction Analysis - J.R. Davis Yard

Source Area	ARB Estimated DPM Emissions1 (tpy)	Reconstructed Emissons 12 wk sample	1999-2000 12 mo. data	2003-2004 12 mo. data	Area Description	Activity Description
TOTAL	23.408	24.664	22.344	20.412	All Area Total -- Does not yet reflect AESS/ZTR effects for Ready Track, Departure, or Hump/Trim backup units	
1	**1.536**	**2.113**	**1.881**	**1.755**	Movement into and out of the Yard	
1a	0.286	0.693	0.594	0.619	Receiving Yard	Movement
1b	0.148	0.199	0.155	0.039	City Yard	Movement
1c	0.014	0.024	0.017	0.009	Rockpile	Movement
1d	0.252	0.402	0.343	0.281	Departure Yard	Movement
1e	0.836	0.795	0.772	0.807	Northside	Movement
2	**4.621**	**4.821**	**4.202**	**3.506**	Idling and movement within identified locations	
2a	0.844	0.608	0.522	0.483	Receiving Yard	Idling
2b	0.446	0.412	0.318	0.168	City Yard	Idling
2c	0.193	0.252	0.211	0.223	Northside	Idling
2d	0.058	0.043	0.030	0.015	Rockpile	Idling
2e	2.274	2.591	2.210	1.831	Departure Yard	Idling
2f	0.806	0.914	0.912	0.785	Subway	Idling

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Source Area	ARB Est DPM Emissions1 (tpy)	Est NOx Emissions2 (tpy)	Area Description	Option Number
4	7.146	235.802	Hump & Trim Operations	
4a	2.045	67.485	Hump Operations	
				1
				2
	PI		POSSIBLE - LONG TERM INITIATIVE	3
	PI		POSSIBLE - LONG TERM INITIATIVE	4
	PI		POSSIBLE - LONG TERM INITIATIVE	5
	PI		POSSIBLE - LONG TERM INITIATIVE	6
	PI		POSSIBLE - LONG TERM INITIATIVE	7
	PI		POSSIBLE - LONG TERM INITIATIVE	8
	OE		POSSIBLE	9
				10
				11
				12
	PI		POSSIBLE - LONG TERM INITIATIVE	13
				14
				15
4b	5.101	168.317	Trim Operations	

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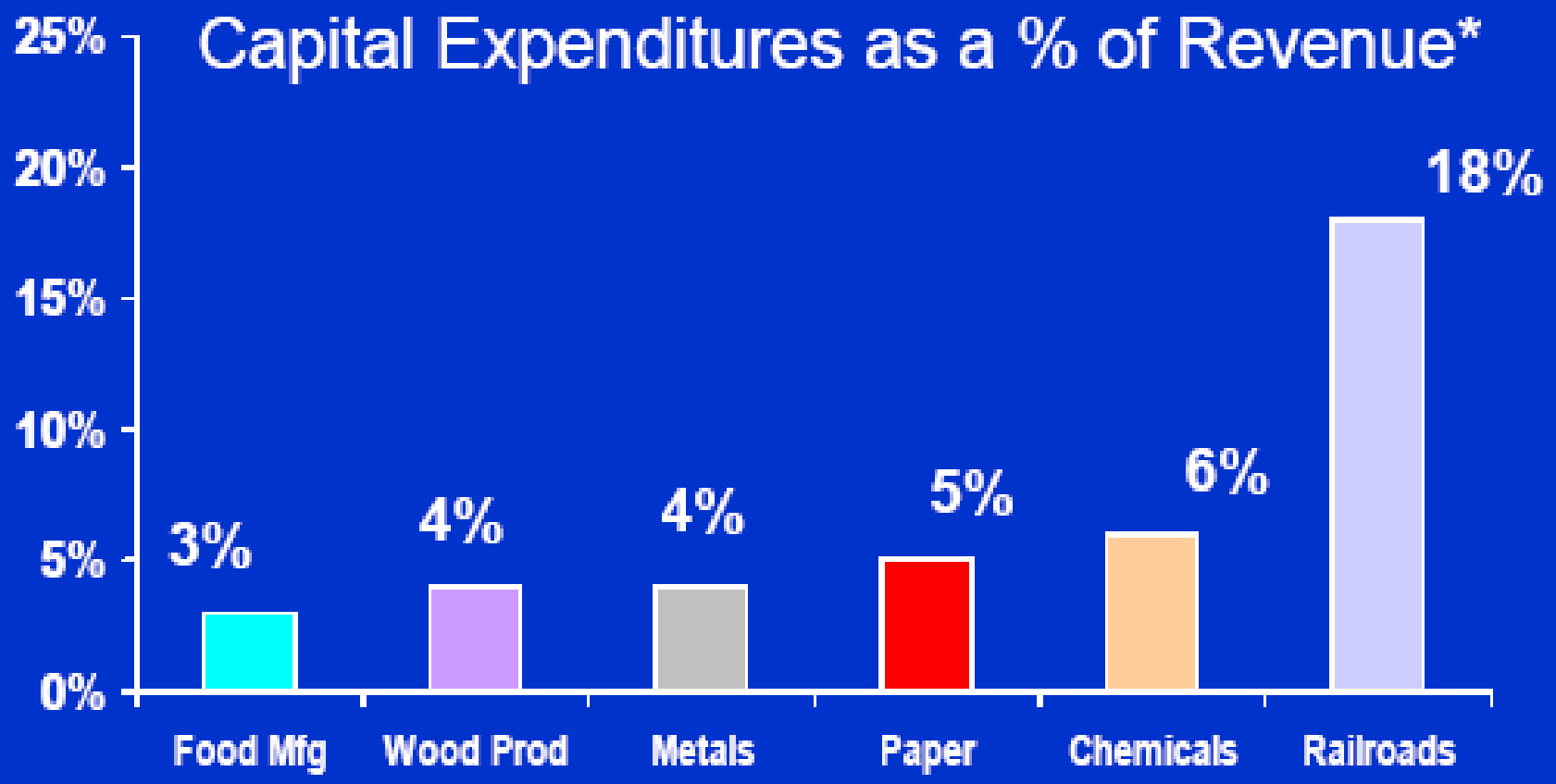
Option Number	Description of Option	Is the Option Feasible for UPRR??					
		Technically	Legally	Operationally	Economically	Safety	Other
1	Discontinue use of area	-	-	No	No	-	-
2	Dedicate Tier 2 units	Yes	Yes	No	No	-	-
3	Dedicate Goat (GG20G's)	Yes	Yes	No	Yes	Yes	-
4	Dedicate TES's	Yes	Yes	Yes	Yes	Yes	-
5	Dedicate CAT Switcher	Yes	Yes	Yes	Yes	Yes	-
6	Dedicate MK Switcher	Yes	Yes	Yes	Yes	Yes	-
7	Dedicate Tier 2 Retrofit	?	Yes	Yes	?	-	-
8	Retrofit w/ AESS	Yes	Yes	Yes	?	-	-
9	Enforce shutdown policy	Yes	Yes	?	Yes	-	
10	Use LNG units	No	Yes	No	No	?	No*
11	Use CARB diesel	Yes	Yes	No	-	-	-
12	Electrify the hump	Yes	Yes	?	?	No	-
13	Use control cars	Yes	Yes	?	?	-	-
14	Use specialty fuels	Yes	Yes	No	-		-

Option Number	Description of Option	PM					Notes
		tpy reduced	effect years	cost x $1000	CE, $/ton	time frame	
							N2 @ 5.5 hrs/8.0; rest @ idle
1	Discontinue use of area						
2	Dedicate Tier 2 units	0.25	30	1600	213,333	12 mos	6 axle units @ curves = concern
3	Dedicate Goat (GG20G's)	0.84	20	750	44,643	order	assumes Goats will 'work'
4	Dedicate TES's	0.15	20	650	216,667	12 mos	assumes TES will 'work'
5	Dedicate CAT Switcher	0.15	20	1,400	466,667	order	likely that GP20D will 'work'
6	Dedicate MK Switcher	0.15	20	1,100	366,667	order	likely that MP20D will 'work'
7	Dedicate Tier 2 Retrofit	0.1	15	150	100,000	order	GETS Kits
8	Retrofit w/ AESS	0.07	10	30	42,857	order	Will require more evaluation
9	Enforce shutdown policy						Will require more evaluation
10	Use LNG units						*technical/safety/logistics issues
11	Use CARB diesel						Cannot get CARB out of state
12	Electrify the hump	1	20	2000	100,000		
13	Use control cars						
14	Use specialty fuels						biodiesel, lubrizol, purinox, etc.
							6 locos idle 10 hrs/day

Mitigation Efforts

- Coop'ed w/ SMAPCD, PCAPCD, and ACTI to submit application to West Coast Diesel ER Collaborative for 'proof of concept' scrubber
- Will submit application by April 18th deadline for Moyer funds to repower hump/trim switchers w/ new technology
- Will also team up with 2 other companies to submit an application for Moyer funds to retrofit an existing uncertified switcher to a Tier 2 NOx and Tier 0 PM performance level

Railroading is America's Most Capital-Intensive Industry



*2000, U.S. Bureau of the Census

ILLINOIS DEPARTMENT OF TRANSPORTATION
CHICAGO DEPARTMENT OF TRANSPORTATION
NORTH AMERICA'S FREIGHT RAILROADS

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Monitoring Plan

- Grant access to UP property for a diesel monitoring program (ongoing w/ TAC)
- Provide technical assistance the design and implementation of the monitoring program (ongoing active support)
- Provide at least $100,000 financial assistance for the design and implementation of the monitoring program (paid 3/2005)

UP's investment for low-emissions

- By year-end, 38% of the UP locomotive fleet will be EPA Tier 0, 1 or 2
- Includes purchase of at least 340 Tier 2 locomotives in CY2005 (315 HHP/25+/- LHP)
- We lead the industry, developing and investing in low-emissions switching locomotives
  - UPY 2004 is our first low-emissions switcher
  - TES (2 Cummins 700 HP Tier 2 engines)

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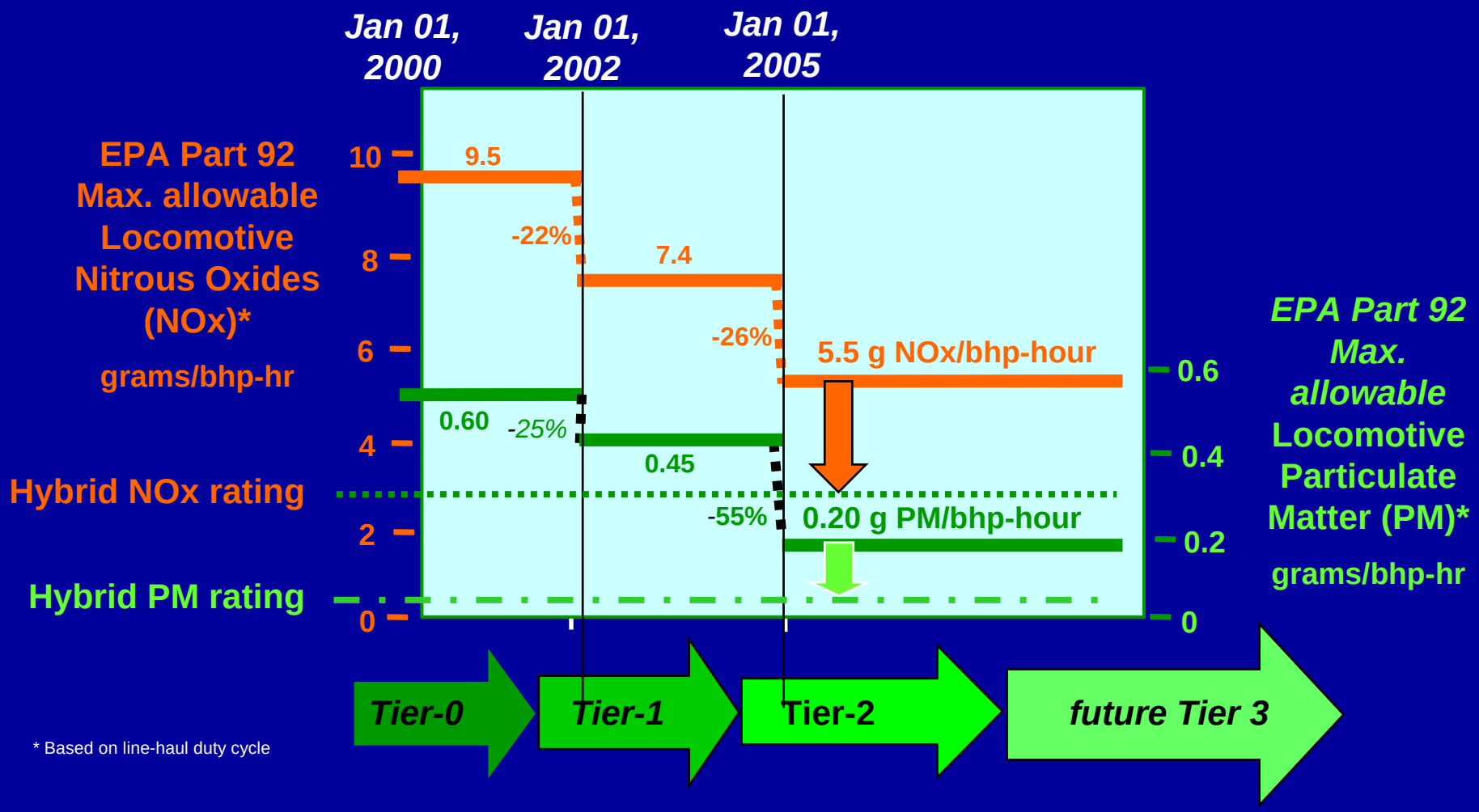
Hybrid emissions *v* EPA loco reg's



* Based on line-haul duty cycle

The California Air Resources Board has declared UPY 2004 to be an "Ultra-Low Emitting Locomotive" (ULEL) because its NOx rating is *less than* 4.0 g/bhp-hour.

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How the hybrid locomotive works

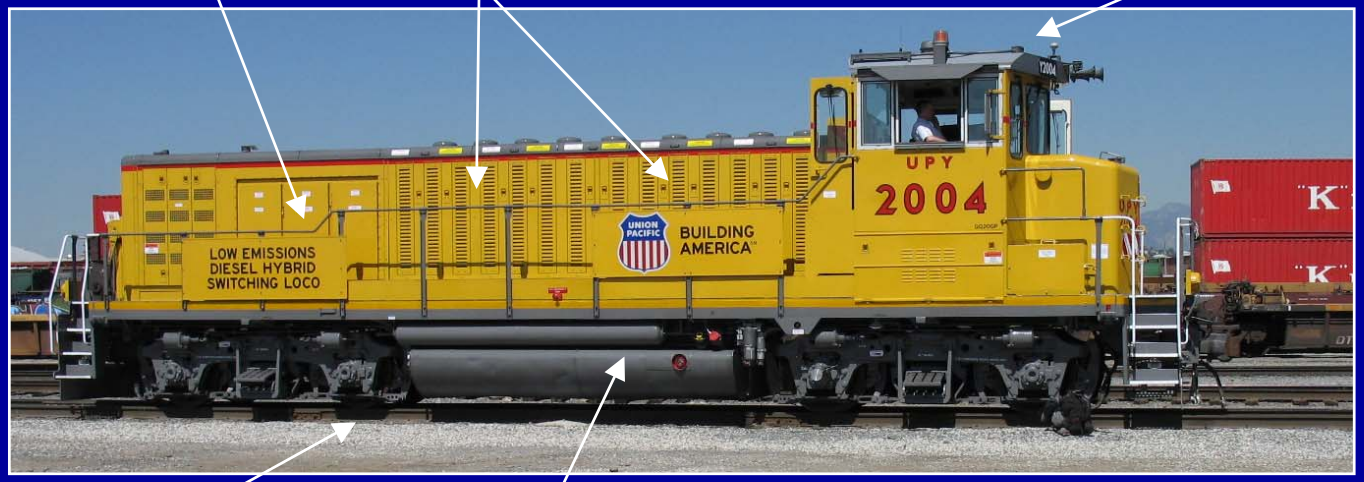
- The low-emissions “truck” diesel engine drives a generator which recharges the large battery banks.
- The diesel engine runs *only* when battery recharging is required.
- The batteries provide electrical energy, thru a sophisticated control system, to the (4) traction motors which propel the loco.

Diesel hybrid switching locomotive

Cat™ C9 truck-type low-emissions diesel engine (290 HP) & generator

Two large banks of storage batteries (2000 HP for low-to-medium duty cycle)

Operator's cab



(4) DC motors

Fuel tank

UPY 2004 measures 56' long and weighs 265,000 pounds.
The platform was originally built by GM-EMD as part of a "GP9" locomotive in February 1958. The hybrid was assembled during 2004 by Railpower in Calgary, Alberta, Canada.

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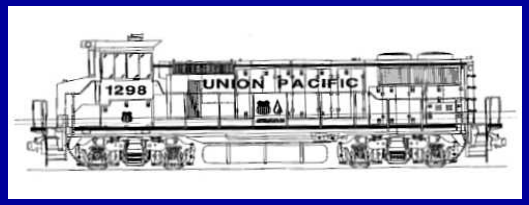
Diesel-Hybrid versus Natural Gas?

Left: UPY 2004 diesel-hybrid

Right: One of 2 LNG switchers tested by UP 1993-98



- **Lower emissions!**
  - **The diesel-hybrid switcher has NOx and particulate emissions which are at least as good as a switcher using "clean burning" Liquified Natural Gas (LNG) fuel. *UP spent $15 million researching LNG as a loco fuel '93-'98, including (2) LNG switchers.***
- **Common fueling source as with regular locos**
  - **UPY 2004 is a versatile locomotive: *it can be refueled with diesel fuel at any of thousands of railroad refueling stations across the nation* … LNG locomotives require special LNG refueling stations (only 1 exists on all US railroads).**

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Lowering emissions: *what next?*

- **All-diesel low-emissions switcher**
  - UP is separately funding construction of a prototype low-emissions "truck-engine switcher" (using a pair of low-emissions truck diesel engines for 1400 HP), to enter service in California by mid-2005.
- **Diesel Particulate Filter for older switchers**
  - UP is co-funding research for the experimental application of diesel particulate filters (DPF) to <u>older</u> switching locomotives … first 2 California switchers may be retrofitted by fall 2005.

“Mobile source” emissions req’mts

	Trucks	Off-Road	Ships	Aircraft	Buses	Locos
NOx inventory in So Cal	21%	17%	7%	4%	2%	2%
New unit stds?	Yes	Yes	Yes	Yes	Yes	Yes
Retrofit existing units required?	No	No	No	No	Yes	Yes
Rebuild to new standards?	No	No	No	No	No	Yes
In-use emissions testing?	No	No	No	No	No	Yes
FAA @ SC?	No	No	No	No	No	Yes
APCD’s\Industry Collaboration?	No	No	No	No	No	Yes!

* Memorandum of Understanding (“MOU”) between CARB, EPA, Union Pacific Railroad and BNSF Railway, mandating annual fleet average NOx to not exceed EPA Tier 2 levels by January 1, 2010.

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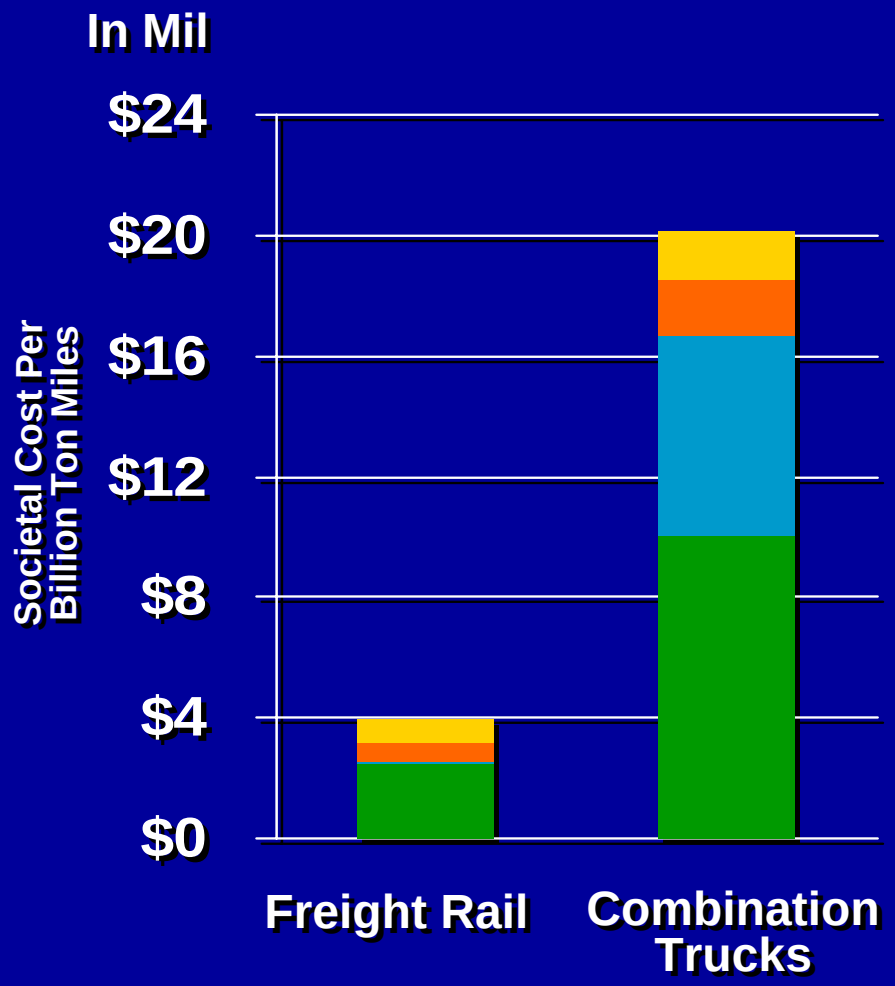
Public Policy Should Encourage Use of Freight Rail



Advantages of Rail: A Ratio of 5 to 1

- Air Pollution
- Noise
- Congestion
- Accidents

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THE ROAD TO THE FUTURE ISN'T A ROAD AT ALL.