PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Consumer Protection & Safety Division
Safety & Reliability Branch
Rail Transit Safety Section

RESOLUTION ST- 68
December 18, 2003

R E S O L U T I O N

RESOLUTION ST--68. GRANTING NORTH COUNTY TRANSIT DISTRICT AN EXEMPTION TO GENERAL ORDER 143-B, SECTION NOS. 4.03 BRAKE RATES, 5.02 STOP LIGHTS, 6.01 ANTI CLIMBER, AND 6.02 CORNER POST REQUIREMENTS.

SUMMARY

This Resolution grants the North San Diego County Transit District (NCTD) request for authority to deviate from the provisions of General Order 143-B, Section Nos. 4.03 Brake Rates, 5.02 Stop Lights, 6.01 Anti Climber, and 6.02 Corner Post requirements. The deviation is contingent on Commission staff verifying the safety certification and braking performance of the proposed vehicle.

BACKGROUND

NCTD is constructing a passenger service line between Oceanside and Escondido on the existing 22-mile Escondido Branch Line with a new loop extension in San Marcos. The Escondido Branch Line is currently used by the Burlington Northern and Santa Fe (BNSF) for freight service several nights a week. The project known as the Sprinter will be operated pursuant to a Federal Railroad Administration (FRA) approved waiver allowing the mixed use of the common trackage with the BNSF by means of the temporal separation of operations[1].

[1] 18-hours of Sprinter passenger service, followed by 6-hours of BNSF freight service during a 24-hour period. Sprinter and BNSF Operations will never be conducted simultaneously.

The Sprinter Rail Project will utilize a diesel driven, self-propelled, light rail vehicle(s) known as a diesel multiple unit (DMU). Operation of the DMU vehicle is widely used in Europe for branch line commuter service. Diesel driven light rail equipment has not been operated in the United States[2]. NCTD is planning on operating the Seimens VT-642 DMU currently build and operated in Germany.

NCTD requested clarification from the CPUC in May 2001, as to whether the Sprinter service and vehicles would be considered light rail transit. Commission staff responded on July 20, 2001 that the service would be considered a "rail fixed guideway system" and thus subject to the Commission's oversight, including General Orders (GO) 143-B and 164-B[3].

On July 3, 2003, NCTD requested Commission authority to deviate from GO 143-B Section Nos. 4.03 Brake Rates, 5.02 Stop Lights, 6.01 Anti-Climber, and 6.02 Corner Post. NCTD's exemption request provided their analysis of each non-compliant section and proposed mitigation factors by design approach. In response, staff requested additional information to support NCTD's request. NCTD provided supplemental information on August 6 and September 12, 2003, as well as additional documentation on October 24, 2003 that combined and clarified the three previous submittals.

GO 143-B, Section 4.03, Brake Rates:

> Every LRV shall meet or exceed the deceleration rates shown in Table No. 3 when tested at the designated brake entry speeds. Tests run at speeds between those designated in the table shall meet the average deceleration rates listed for the next higher brake entry speed.

[2] In 1999 the State of New Jersey approved a DMU type transit system on the Southern New Jersey Light Rail Transit System scheduled for revenue service 2004. .

[3] This understanding was contingent upon receiving FRA approval of NCTD's petition for waiver pursuant to 49 CFR Parts 209 and 211, Shared Use of the Tracks of the General Railroad System by Conventional Railroads and Light Rail Transit Systems: Notice and Final Ruled dated July 10, 2000. On July 1, 2003, NCTD received FRA approval for the requested waiver.

The DMU[4] does not comply with Section 4.03 requirements of Full Service Brake for all entry speeds; Emergency Brake for all entry speeds; and Dynamic Brake cut-out below 25 mph.

NCTD provided several system components as mitigation for the non-complying brake rates. These include:

Sprinter Line right-of-way is semi-exclusive, meaning it is separate from street or pedestrian traffic although it does have 38 grade crossings. NCTD intends to provide fencing or other barriers along the entire right-of-way to prevent unauthorized access to the railroad right-of-way between grade crossings.

NCTD plans to provide an extensive public education program and ongoing enforcement activity in cooperation with the San Diego Sheriff's Department, who will be patrolling the railroad right-of-way.

NCTD's Train Control System (TCS)[5] enables the remote control of switches, establishing routes and clearing signals via a communications link between the control operator and each wayside control point. The wayside Automatic Block Signal system (ABS) will not allow wayside signals to display proceed indications for opposing trains on the same track. In addition the signals maintain adequate spacing from following trains by displaying restrictive signals (yellow = SLOW or red = STOP) if the following train gets too close to the train ahead. The ABS design incorporates sufficient spacing between signals to theoretically compensate for operator reaction time as well as the DMU braking rate. Timetable speeds are calibrated accordingly to ensure the DMU will be able to adequately reduce speed or stop before passing any wayside signal displaying a restrictive signal.

NCTD performed an analysis demonstrating that the DMU is capable of coming to a complete halt prior to a grade crossing, if the grade crossing is blocked. The

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[4] Unless otherwise noted, the term DMU as used in this resolution is in specific reference to the Siemens model VT-642 selected for service by NCTD on the Sprinter project.

[5] NCTD deviation request documents refers to the signal control system as Centralized Traffic Control (CTC), which is actually a brand name subset of the Federal Railroad accepted control system term of Train Control System herein referred to.

analysis took account of the stopping capability of the DMU, sight lines at each grade crossing, and operator reaction time. As a result of this analysis, NCTD reduced the allowable speeds approaching some grade crossings to ensure the DMU can stop in the available distance.

NCTD claims the primary benefit of reducing speed on approach to a grade crossing is to enable the DMU to stop within the same distance as other LRV's currently in operation on other transit systems in California that are in compliance with G.O.143-B emergency brake rates. The proposed mitigation for brake rate assures that the Sprinter vehicles will be able to stop short of automobiles, pedestrians or other obstructions present, when approaching any grade crossings.

GO 143-B, Section 5.02, Stop Lights:

> Every LRV shall be equipped with at least two (2) red stoplights in addition to the taillight. The stoplights shall be illuminated whenever any brake, except for the parking brake, is applied.

The DMU does not have a stop light at the rear of the vehicle; however, the vehicle does have taillights as required by Section 5.02. NCTD's stated understanding of the intent of the stoplight requirement is to provide a signal indication to automobile traffic following a street-running LRV that it is braking. NCTD asserts existing system design justifies the absence of stoplights insofar as the DMU will only operate within a semi-exclusive right-of-way, with fencing and / or other barriers throughout the entire alignment; and, with the exception of highway grade crossings, will not share the tracks with automotive traffic at any time.

NCTD further supports the stop light deviation by noting the Sprinter system will operate at thirty-minute headways equating to 10-miles of separation between trains. In the event that one train slows or stops and the following train approaches, NCTD identifies two different systems that will automatically detect this condition and maintain separation between the two trains: the ABS, and the TCS monitored remotely by the control operator.

GO 143-B, Section 6.01, Anti-Climber:

> Every LRV shall have installed on each end of the vehicle an anti-climber designed and constructed with projecting steel corrugations that will interlock with a similar device on another LRV in the event of a collision.

The DMU does not include projecting steel corrugation type anti-climbing devices as described in Section 6.01. Anti-climbing protection is provided on each DMU, however, by a combination of coupler, under-frame and front skirt design.

In the event of a two-vehicle collision, the coupler of two DMUs will engage by means of the coupler horn, designed to guide each couple to align. The DMU couplers feature a gas-hydraulic type shock absorbing drawbar, designed to continually absorb energy as it is compressed. If the collision energy exceeds the absorbing energy capacity of the couplers and drawbars, the under-frame behind the couplers will deform to absorb additional energy and further reduce the transfer of collision forces to the passenger compartment or operator compartment positioned approximately 5 feet behind the coupler face.

NCTD notes that the use of these type of "tightlock" couplers (in lieu of the corrugation type anti-climbers) is an approved anti-climbing device under 49 Code of Federal Regulations Part 238, Section 25, Passenger Equipment Standards.

NCTD further supports the anti-climber deviation by noting the Sprinter system will operate at thirty-minute headways equating to 10-miles of separation between trains, as well as the TCS and ABS systems that establish an automatic train separation as previously discussed.

<u>GO 143-B, Section 6.02, Corner Post</u>:

> Every LRV shall be equipped with collision or cab-end corner posts. The connections of the posts to the supporting structures and the supporting structure itself shall be able to develop the full blending capacity of the collision or corner posts.

The front end of the DMU is a single-piece reinforced fiberglass plastic monocoque structure absent framing members and an outside skin. The monocoque "egg shell" structure is designed to resist impacts by spreading the load throughout the entire unit, rather than on a single corner or collision post.

Siemens, the vehicle manufacturer, attests the DMU meets European Standard EN 12663. EN 12663 is a European Standard for Railway Applications and Structural Requirements of Railway Vehicle Bodies.

NCTD states the Eisenbahn Bundesamt (EBA) is Germany's railroad inspectorate. Documents must be submitted by car builders to the EBA for review. The EBA reviews the design practices used by the car builder, verifies applicability of car design, and reviews all listed drawings and documents. Once the vehicle is built, the EBA also reviews safety relevant commissioning test results such as braking distances, running stability, clearance, operational and safety issues noted by the national Railroad Construction and Operation requirement, Eisenbahn- Bau-undBetriebsordnung (EBO). The EBA is Germany's equivalent to the Public Utilities Commission and the EBO is equivalent to California's G.O.143-B.

NOTICE

Notice of this request was made by publication in the Commission's Daily Calendar on November 6, 2003.

PROTESTS

No protests were received to the exemption request.

DISCUSSION

The Consumer Protection and Safety Division staff (Staff) reviewed NCTD's analysis and the proposed safety mitigations. NCTD's proposed safety mitigations take into account the entire transit system and the hazards specific to that system. There is not a clear one-to-one relationship between any single mitigation and a specific hazard increased by a failure to meet the requirements of GO 143-B. Overall, Staff believes the proposed safety mitigations will adequately protect the public if the underlying assumptions present in the analysis are supported. In order to ensure appropriate safety certification rules are followed, Staff recommends the following activities be verified by Staff:

1. Safety Certification of DMU, with testing performed in California and all Safety Certifiable elements closed as acceptable.

2. Final approval of Siemens documentation by a qualified registered California Professional Engineer that accepts the tests and approvals.

GO 143-B, Section 4.03, Brake Rates:

Staff reviewed the NCTD analysis and believes the proposed mitigations will adequately protect the public if the vehicles and systems operate as described. Staff recommends that the Commission approve NCTD's Exemption Request pending Staff verification that the following conditions have been met:

3. Perform live field brake rate tests in California to verify that the DMU meets or exceeds the brake rates stated in the table below. These brake rates were used in NCTD's analysis:

	Average Deceleration Rate (MPHPS)		
Brake Entry Speed	Service Braking System	Dynamic Brakes Cut-out	Emergency Braking System
55 mph	2.46	2.26	3.53
45	2.39	2.17	3.44
35	2.28	2.04	3.33
25	2.12	1.97	3.13
20 or less	1.99	1.99	2.97

4. Publish a timetable of maximum authorized speed that restrict DMU operating speeds to those verified by full load testing as enabling the DMU's to stop prior to all grade crossings.

To verify the tests in 3 and 4 above, Staff shall approve the criteria and conditions of each test before the test is performed, witness the test, and ensure that the vehicle passed the test.

GO 143-B, Section 5.02, Stop Lights

The intent of this requirement is to provide a visual indication to following vehicles (other rail vehicles or automobile traffic in the case of a street running operation) that the light rail vehicle is slowing or stopping. Staff agrees with the

NCTD analysis and believes the proposed system design adequately mitigates the hazard resulting from the absence of stoplights

Staff recommends that the Commission approve NCTD's Exemption Request pending Staff verification that the following conditions have been met:

5. The ABS senses the presence of the DMU vehicle within the limits of various "blocks" or sections of track.

GO 143-B, Section 6.01, Anti-Climber

Staff reviewed drawings and a letter from Siemens verifying that the coupler gathering ranges (range of motion) between two opposing DMUs will effectively engage to provide the intended anti-climbing protection adequately under all operating conditions, and over the most severe gradient and curvature present on the Sprinter line. The couplers on the proposed DMU will automatically engage and lock during normal coupling such that accidental disengagement is not possible. Staff believes this system adequately meets the intent of the general order, and recommends that the Commission approve NCTD's Exemption Request.

GO 143-B, Section 6.02, Corner Post

NCTD's proposed mitigation for Section 6.02, Corner Post is to use a single-piece Reinforced Fiberglass Plastic monocoque structure that NCTD claims accomplishes the same safety protections as a single corner or collision post. NCTD provided a letter from Siemens, the vehicle manufacturer, claiming the DMU meets the European Standard EN 12663 for crashworthiness.

Staff has reviewed European Standard EN 12663 and believes the front end protection requirements are roughly equivalent to American industry standards and those embedded in GO 143-B.

COMMENTS

Public Utilities Code section 311(g)(1) provides that this resolution must be served on all parties and subject to at least 30 days public review and comment prior to a vote of the Commission. The draft resolution was mailed to all parties on November 18, 2003.

"The 30-day comment period for the draft of this resolution was neither waived or reduced. Accordingly, this matter will be placed on the Commission's agenda directly for prompt action."

FINDINGS

1. By letter dated July 3, 2003, NCTD requested a deviation from GO143-B Section Nos. 4.03 Brake Rates, 5.02 Stop Lights, 6.01 Anti-Climber, and 6.02 Corner Post.

2. The DMU will operate in a semi- exclusive right-of-way, meaning it is separate from street or pedestrian traffic although it has 38 grade crossings. NCTD intends to provide fencing or other barriers along the right-of-way to prevent unauthorized access to the railroad right-of-way between grade crossings.

3. NCTD plans to provide an extensive public education program and ongoing enforcement activity in cooperation with the San Diego Sheriff's Department, who will be patrolling the railroad right-of-way.

4. The Sprinter system will operate at thirty-minute headways equating to 10-miles of separation between trains. In the event that one train slows or stops and the following train approaches, NCTD asserts the Automatic Block Signal system will automatically detect this condition and maintain separation between the two trains: the wayside Automatic Block Signal system.

5. The proposed wayside Automatic Block Signal system will not allow wayside signals to display proceed indications for opposing trains on the same track.

6. The proposed wayside Automatic Block Signal design incorporates sufficient spacing between signals to theoretically compensate for operator reaction time as well as the DMU braking rate.

7. NCTD performed an analysis demonstrating that the DMU is capable of coming to a complete halt prior to a grade crossing, if the grade crossing is

blocked. Proposed timetable speeds are calibrated accordingly to ensure the DMU will be able to adequately reduce speed or stop before passing any wayside signal displaying a restrictive signal.

8. Staff recommends approval of NCTD's deviation request from GO143-B Section Nos. 4.03 Brake Rates, 5.02 Stop Lights, 6.01 Anti-Climber, and 6.02 Corner Post.

9. Staff recommends verifying the conditions of the deviation before revenue operations begin.

THEREFORE IT IS ORDERED THAT:

1. The North County Transit District's request for authority to deviate from the provisions of General Order 143-B, Section Nos. 4.03 Brake Rates, 5.02 Stop Lights, 6.01 Anti-Climber, and 6.02 Corner Post Requirements is approved.

2. North County Transit District shall not operate the DMU vehicle, except for testing, until the following conditions have been verified by staff:

   - Safety Certification of DMU, with testing performed in California and all Safety Certifiable elements closed as acceptable.
   - Final approval of Siemens Vehicle Acceptance and Safety Certification documentation by a qualified registered California Professional Engineer that accepts the tests and approvals.
   - Perform live field brake rate tests in California to verify that the DMU meets or exceeds the brake rates stated in the discussion section of this Resolution.
   - A timetable is published containing the maximum authorized speed that restrict DMU operating speeds to those verified by full load testing as enabling the DMU to stop prior to all grade crossings.
   - Perform tests of the Automatic Block Signal system to determine that it senses the presence of the DMU vehicle within the limits of various "blocks" or sections of track.

3. This Resolution is effective today.

I certify that the foregoing resolution was duly introduced, passed and adopted at a conference of the Public Utilities Commission of the State of California held on December 18, 2003; the following Commissioners voting favorably thereon:

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William Ahern
Executive Director