RAILROAD INDUSTRY JOB ANALYSIS

Section Laborer

Jobs which are common throughout the railroad industry have major similarities from property to property. While minor variations do cxist from railroad to railroad, and sometimes from location to location on thc samc railroad, the underlying personnel requirements of a spcciflc job classification tend to remain relatively constant throughout the industry. With this fact in mind, the Railroad Pcrsonnel Association has developcd this job analysis consisting of three basic parts:

PART A - Duties and Responsibilities; this is a list of core tasks which arc normally the "backbone" of he job.

PART B - Critical Personnel Rcquircmcnts; this list defines the underl)ring behaviors that are requircd of the incumbent to perform the core tasks.

PART C Job Setting Characteristics; this part describes the conditions under which most incumbents perform the job.

Job information was supplied by a Task Force (PART Dl made up of (1) jcb incumbents and (2) sLipervisors or others intimately familiar with the job; they were drawn from several different railroads. Professional direction was provided by C. H. Lawshe, PhD, Licensed Industrial Psychologist, 1005 Vine Street, West Lafayette, Indiana 47906. General procedures used and technical data are included in Part E.

Prior to release for distribution to the railroad industry, the document was reviewed and approved by the job Analysis Project Steering Committee of the Railroad Personnel Association.

GENERAL OVERVIEW

Job Summary. Works as a member of a crew to maintain, repair, and replace rails, ties, switches, and ballast, using hand tools and hand operated equipment.

Dictionary of Occupational Titles. The DOT does not list a comparable job. It does list Track Repairer 910.682-010 which more nearly conforms to what many railroads call Section Machine Operator

Scope. Increased mechanization in right-of-way maintenance and repair has resulted in the evolution of the Section machine upgraded from Section Laborer, the two jobs differ significantly. This job analysis applies only to Section Laborer.

For information or copies contact Mr. H. Stephen Dewhurst, Assistant Vice President, Association of American Railroads, American Railroads Building, Washington, D.C. 20036

PART A - DUTIES AND RESPONSIBILITIES

The statements in this part are work behaviors or actions performed to achieve the objectives of the job. They were identified by the Task Force and are sometimes called tasks or job activities. The Importance Degree following each statement was assigned by the Task Force and indicates its relative importance on and industry wide basis. (5 = Most Important)

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1. Uses claw-bar to pull spikes from tie (Importance Degree: 4)

2, Removes and replaces defective ties and rails (Importance Degree: 5)

3. Uses tie-adz to cut portion of tie so that tie plate can be leveled (Importance Degree: 3)

4. Drills holes through rails for insertion of bolts using hand or power drill (Importance Degree: 4)

5. Uses spike maul or jack hammer to drive spike into tie and secure rail (Importance Degree: 4)

6. Uses track wrench to tighten or loosen bolts at joints that hold ends or rails together (Importance Degree: 4)

7. Operates rail saw to cut rails to specific lengths (Importance Degree: 3)

8. Applies creosote to ties to protect them from weather (Importance Degree: 1)

9. Sprays switches, angle bars, and joints with oil for lubrication or to protect them from weather (Importance Degree: 2)

10. Cuts brush and vegetation from right-of-way (Importance Degree: 2)

11. Unloads or assists in unloading ballast, spreads and tamps by hand, and removes excess or fouled ballast, using shovel and other hand tools (Importance Degree: 4)

12. May replace, repair and adjust track switches, using wrenches and specified replacement parts (Importance Degree: 4)

13. Sorts used track material for loading and sometimes loads by hand (Importance Degree: 2)

14. Corrects deviations in track surface, alignment, and gage

(Importance Degree: 5)

15. Installs and repairs street crossing and railroad crossings (Importance Degree: 3)

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16. Unloads and/or assists in the unloading and distribution of track material including rails, ties, spikes, plates, joint bars, bolts, and rail anchors (Importance Degree: 3)

17. Assists related departments in replacement or repair of such items as bridges, power-operated switches, and insulated joints (Importance Degree: 2)

18. Establishes and maintains drainage and may install, repair, and clean small culverts (Importance Degree: 1)

19. Restores track after derailments (Importance Degree: 4)

20. May remove snow from inoveable track parts, roadways, and walkways/platforms (Importance Degree: 4)

21. Clears right-of-way of junk, litter, and cargo spillage (Importance Degree: 1)

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PART B - CRITICAL PERSONNEL REQUIREMENTS

Each nunibcred and underlined item in this part is a generic catcgory of behavior (a) which can be observed and/or reported, (b) which is common to a variety of jobs, and (c) which was judgcd by the Task Force to be critical for performing this job in a safe and satisfactory manner. It is sometimes called a performance domain.

Listed under each general category is one or more specific job elements identified by the Task Force (a) as commonly occurring and (b) as representative of the category. Collectively, those under a particular category constitute an operational definition of that category and delineate a personnel requirement of the job.

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1. understanding Oral Communications

- Receives oral job assignments and instructions from foreman
- Receives oral on-the-job training from foreman or co-worker
- Receives oral explanation of rules and regulations from foreman
- Coordinates work with co-workers, orally, where effectiveness depends upon understanding others

This performance domain is a component of each of the following "Duties and Responsibilities" listed in PART A: No's. 2,

4, 5,
7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, & 21

2. Exercising Physical Strength and/or Endurance

- Lifts rails with co-workers (Rails vary in weight from 65 lbs. to 155 lbs. per linear 3 ft.)

- Lifts railroad ties, normally with co-worker (Mainline ties vary in weight from 250 lbs. to 300 lbs.) May, on occasions, drag tie alone

- Unloads, loads, and carries a variety of heavy tools! equipment including: rail drill, rail saw, track jack, and claw bars

- Unloads and carries a variety of track material such as: kegs of bolts, kegs of spikes, and joint bars

- Classified as heavy work: Defined by the U.S. Department of Labor as "Lifting 100 pounds maximum with frequent lifting and/or carrying of objects weighing up to 50 pounds

2. Exercising Physical Strength and/or Endurance (continued)

NOTE: An earlier Task Force classified the Section Laborer job as very heavy work (reported in Consulting Report No. 54 by C.H. Lawshe, PhD, dated October 24, 1979 and distributed by the Association of American Railroads). This shift appears to be due to (a) the continuing mechanization of right-of-way maintenance work and (b) growing emphasis on reasonable limits of strength requirements.

This Performance domain is a component of each of the following "Duties and Responsibilities" listed in PART A: No's. 2, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 & 21

3. Using Hand Tools

- Uses common hand tools such as shovel, pick adz, and sledge hammer

- Uses specialized hand tools including: four-ball spike, spike mahi, track jack, claw bars, tie tongs, track wrench, rail tongs, rail fork, track chisel, aligning bar, track gage, switch broom, level board, rack fork, and rail bender

Th4~s performance domain is a component of each of the following "Duties and Responsibilities" listed in PART A: No's. 1, 2, 3, 4,5, 6, 7, 8, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21

4. Exercising Eye-Hand Coordination

- Coordinates visual cues with handand arm movements when driving or pulling spikes

- Coordinates visual cues with muscular movements while applying rail anchors

- Exercises eye-hand coordination when tightening bolts with wrench, when using chisel to cut track bolts, and when using adz to shave ties

- Exercises eye-hand coordination when tamping ballast

- Exercises eye-hand coordination when aligning track

This performance domain is a component of each of the following "Duties and Responsibilities" listed in PART A: No's. 1, 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, & 21

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PART C -JOB SETTING CHARACTERISTICS

Each item in this part is a job setting characteristic. It is a structural, physical, or psychological condition (normally extrinsic to the work behavior itself) which impinges on the comfort, saftey, or well being of the job incumbent. Included are any conditions which elicit from the incumbent affective reactions which influence productivity/job performance or which otherwise have significant impact. The Task Force identified these as normally being characteristic of the job.

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1. Job Schedule Characteristics

- Schedule includes both day and night hours

- Schedule is regular with the same basic hours each week with possibility of extended hours/overtime

- Schedule includes some Saturdays, Sundays, and holidays

2. Physical Environment Characteristics

- Work is constantly performed out-of-doors involving exposure to weather conditions

- Work is performed in the presence of noisy power equipment including: automatic tampers, air compressors, spikers, and snow blowers

- Operation of equipment such as air hammers and hand tampers subjects the incumbent to vibrations

- Work is performed in the presence of dust from unloading ballast

- Work is performed in the presence of equipment which generates dust including: ballast regulators, ballast cleaners, and yard cleaners

- Work is seasonally performed in the presence of pollen from ragweed and other vegetation

3. Characteristics with Safety Implications

- Work involves lifting and straining tasks which may result in bodily injury*

- Work involves walking and carrying tasks, often on irregular ballast/ground, which may result in bodily injury*

- Work involves exposure to creosote which may result in burns and to irritants such as chemicals and poison ivy*

- Work is performed in the presence of moving equipment and in the presence of other employees engaged in such activity as spiking, removing and applying anchors, picking, and tamping, any of which could result in bodily injury*

4. Other Job Setting Characteristics

- Work requires extended time away from home for low seniority incumbents, Particularly in districts covering large geographic areas

- Work involves frequent revisions in assignments, sometimes seemingly contradictory, due to changing priorities

- Work may need to be performed in unfamiliar locations

- Work may need to be performed when incumbent is fatigued because of extra long or continuous hours

- Work consists of frequent routine or highly repetitive duties, Particularly in production gangs

- Work involves frequent interruptions, obstructions, or changes

- Work requires protective clothing and/or devices including: hard hats, safety glasses/goggles, and sometimes safety shoes, gloves, and rain gear

*
Items designated in this manner were identified by an earlier Task Force. Findings are presented in Consulting Report No. 54 by C.H. Lawshe, Ph.D., dated October 24, 1977, and distributed by the Association of American Railroads.

This job analysis identifies the major duties/responsibilities, personnel requirements, and job setting characteristics which are common to most railroads. It has been reviewed and approved for distribution by the Job Analysis Project Steering Committee of the Railroad Personnel Association. It is the province of individual railroads to determine the completeness and adequacy of this description for their own property.

Date _____

Robert L. Wilson for t e Committee

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PART D - CERTIFICATE

We, the undersigned, met at the place and on the date indicated below to develop this job analysis. After extensive discussion we developed that attached document under the general guidance of Dr. C.H. Lawshe

We individually and collectively certify that the duties and responsibilities, the critical personnel requirements,and the job setting characteristics presented in the document accurately and fairly describe the job and we know it.

BURLINGTON NORTHERN, INC.

G. L. Sheets, Roadxnaster

Gordon Thompson, Machine Operator

Patrick David Beinor, Assistant Track Supervisor

Eddie Lee, Laborer

CHICAGO AND NORTH WESTERN TRANSPORTATION COMPANY

Richard Wilkinson, Track Foreman

Arthur Corral, Machine Operator

CONSOLIDATED RAIL CORPORATION

Steven R. Stoneberg, Track Supervisor

McArthur Major, Engineer-Work Equipment

ELGIN, JOLIET AND EASTERN RAILWAY COMPANY

Matthew Mihalick, Supervisor of Track

FAMILY LINES SYSTEM

William J. Marietta, Section Foreman

ILLINOIS CENTRA GULF RAI OAD COMPANY

MicHael M. Hickman, Track Supervisor

Larry Martin, Section Laborer

MISSOURI PACIFIC COMPANY

R. E. Ellerd, General Roadinaster

SANTA FE RAILWAY

Mike C. Villa, Section Foreman

Thomas B. Schmidt, RoadlnaSter

UNION PACIFIC RIALROAD

Aralda Jones, Supervisor-Track Foreman Training

400 West Madison Street
Chicago, Illinois

March 3, 1981

PART E. PROCEDURAL AND TECHNICAL NOTES

Thc first three parts of this document include all the information provided by members of the Task Force. PART E does not contain additional data about the job itself; instead, (1) it outlines in general terms the procedures employed in generating the information and (2) it provides technical informationt hat supports the validity of the results. More detailed information on these topics is presented inthe publication, The Railroad Industry Job Analysis Project: A Final Report, distributed by the Association of American Railroads.

Note No. 1: The Task Force

The Task Force which provided the job information for this job analysis was composed of four job incumbents and twelve officers intimately familiar with the job from ten different railroads. They met March 3,1981 at the offices of the Chicago and North Western Transportation Co., 400 West Madison Street, Chicago, Illinois.

Note No. 2: Task Analysis (PART A)

Members of the Task Force were supplied with a first draft

list of tasks which had been developed in prior study of the job. In conference fashion, they reviewed and analyzed these statements. Indicated modifications and additions were made, and inappropriate ones were deleted. The resulting consensus of the group provided the 21 tasks in PART A of this document.

Importance Rating. Once the list was finalized, members of the Task Force, independently, rated each task in terms of its importance to the job, using a zero to five rating scale. Subsequently, individual ratings for each task were averaged and rounded; these means appear as "Importance Degree" values after the listed tasks. Reliability coefficient: r = .92.

Note No. 3: Personnel Requirements Analysis (PART B)

Initial Criticality Rating. Members of the Task Force were supplied with a personnel requirements questionnaire listing the 36 "performance domains" which appear in Table 1 on the next page. They rated each of these as "C" (critical for the safe and satisfactory performance of the job) , "H" (helpful but not critical), or "N" (not involved in the job) . Ratings were tabulated and four of the domains were retained for further consideration. A domain was retained if at least twelve of the sixteen members said "critical" and the remainder said "helpful." Reliability coefficient: r = .96.

Relative Criticality Rating. The four performance domains which survived the initial rating process were again submitted to members of the group. Following extensive discussion, each member distributed 100 points among the four domains based upon personal judgment of relative criticality. Individual point awards were averaged. Reliability coefficient: r = .93.

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Table 1

Results of Task Force Criticality Ratings

Job	Number orig.b	Personnel Requirememt	Critical Yes	Critical No
	1	Understanding/applying mechanical principles		x
	2	Understanding printed/written information	x	
	3	Understanding oral communication		x
	4	Making oneself understood orally		x
	5	Understanding quantitative information		x
	6	Understanding Visual displays		x
	7	Judging condition or status of objects/parts		x
	8	Understanding graphic information		x
	9	Exercising fine physical coordination/dexterity		x
	10	Recognizing sounds/changes in sounds		x
	11	Climbing and balancing		x
	12	Making logical choices and/or drawing logical conclusions		x
2	13	Exercising physical strength and/or endurance	x	

	14	Taking actions and/or making decisions affecting security/well being of others			x
	15	Performing mathematical computations			x
	16	Recalling information required for work activity			x
	17	Making oneself understood in writing			x
	18	Recognizing colors			x
	19	PrQcessing data/information (by hand)			x
	20	Judging speed and/or distance of moving objects/ parts			x
	21	Estimating quantity/size without precise infor- mat ion			x
	22	Understanding/applying electrical and/or electronic principles			x
	23	Using mechanical measuring devices			x
	24	Dealing with customers/clients/public			x
	25	Handling money			
	26	Using hand tools			x
	27	Operating motor vehicle		x	
	28	Discriminating fine visual detail at eight inches or less			x
	29	Typewriting verbal and/or numerical material			x
	30	Performing stenographic activity			x
	31	Performing general clerical activity			x
	32	Performing administrative activities			x
	33	Operating office machines/equipment			x
	34	Performing computer related activities			x
4	35	Exercising eye-hand coordination		x	
	36	Planning/directing work of others			

a. These numbers correspond to those in PART B.
b. These are the numbers in the original questionnaire*
c. The relative criticality of each is reflected in the graph on the next page.

Critical personnel Requirements. Each performance domain receiving five percent or more of the total points assigned was considered to be critical to the satisfactory performance of the job. Because all met this minimum, none was eliminated. Resulting percentages are shown in the graph below and reflect the relative criticality of the critical personnel requirements.

Numbers outside the circle correspond to the numbers of the respective requirements listed in PART B.

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Percentage values in the segments reflect the relative criticality of the critical personnel requirements.

Operational Definition. Each performance domain is "a generic category of behavior that is common to a variety of jobs." For a particular job it needs to be "operationally defined"; that is, specific work behavior elements characterizing the performance domain need to be identified. Members of the group agreed on work behavior elements (a) which are commonly occurring in this job and (b) which are representative of the generic category. These are listed under the several performance domains in PART B.

Component Analysis. Following the operational definition of a performance domain, each member independently examined that domain against the tasks in PART A. Using an answer sheet, each member recorded "is" or "is not" a component of each of the tasks. Results were subsequently tabulated, and a domain was considered to be a component of a specific task if eleven or more of the sixteen task force members so indicated. Results are recorded after the elements for each performance domain in PART B.

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Note No. 4: Job Setting Analysis (PART C)

Those structural, physical, or psychological conditions in which or under which the job activity is performed were identified by the Task Force. This was accomplished with the aid of "a thought starter" check-list of characteristics which were extensively discussed and analyzed. Those listed in PART C represent the group consensus as to what is normally characteristic in the job.

Note No. 5: Reliability of Results

Any job analysis activity is subjective in nature in that it utilizes the judgments and/or perceptions of human beings. For this reason, the consistency of the judgments of the Task Force members was examined. Members were assigned to two sub-groups and the various statistical values discussed in the above notes were determined separately for each group. The degree of agreement between the sub-groups was examined by computing the Pearson product-moment coefficient of correlation between the two sets of values. The resulting coefficient can range from zero (no agree ment between the groups) to 1.00 (perfect agreement between the groups) . A standard statistical adjustment (Spearman-Brown formula') was applied to the coefficient in order to estimate the degree of agreement between the entire group of sixteen and another group of the same size. Results obtained in this manner are reported as reliability coefficients (r) in Note 2 and Note 3 above. All obtained reliability coefficients (r's = .92, .96, and .93) are extremely high and exceed generally accepted professional standards. Coefficients of this magnitude indicate a very high degree of rater consistency (or agreement), and lead

to the conclusion that the Task Force members are either "all right" or "all wrong" in their judgments and/or perceptions about what is important in the job and what the critical personnel requirements are. With a Task Force composed of both incumbents and officers, with members drawn from several different railroad properties, and with the demonstrated high degree of agreement between the members, there is no reasonable basis upon which to refute their findings. All of these facts combine to give credibility to these job analysis results.

C. H. Lawshe, Ph.D.
Licensed Industrial psychologist

April 10, 1981
West Lafayette, Indiana