Southern Pacific
Transportation Company

PACE

MANAGEMENT ACCOUNTING
SYSTEM

Revised January 1, 1977

PACE MANAGEMENT ACCOUNTING SYSTEM

Southern Pacific has developed a cost information system to improve the planning, controlling and decision-making process affecting operating expenses. A new accounting structure, or chart of accounts, was required to link expenses to specific responsibility centers, and identify other significant relationships. This approach falls under the general concept of responsibility accounting, where expenses are charged to the individuals responsible for their incurrence and control. The new structure satisfies the requirements of management for improved use of company resources through an accounting system responsible to its needs and, at the same time, meeting the accounting demands of the Interstate Commerce Commission and other regulatory bodies. A simplified diagram of the system is attached (Appendix A).

The Emerson Consultants were hired to assist in designing the new system which was named PACE, meaning Planning And Control of Expenditures.

A. SYSTEM DEVELOPMENT

An information system consists of data prepared as input to a processing unit, with output usually in the form of reports. The guidelines established by management for the general concept of the system required that four characteristics be present in reports to be furnished: accuracy, timeliness, relevancy and availability. A discussion of the application of these characteristics to the PACE system follows:

1. Accuracy

A detailed analysis of field (or source) reporting was was made. As a result of this analysis, it was determined to employ field terminology, as far as possible, in reporting inputs from the field or source. The field forwards reporting documents in terms of work functions it understands, as

simplified and standardized by PACE; further conversion to accounting-type terms is considered the work of the computer.

As PACE developed, it was found that certain codes could be more easily applied in the Accounting Department itself, but the long-run goal is to minimize manual input requirements. The field personnel are required, however, to report a minimum of data: the cost center code (EAC); the work activity code (EIN); and, when applicable, a five-digit work order number. Augmentation of this basic data is done by the computer to the greatest extent possible, particularly with respect to the labor distribution input documents from the Engineering and Mechanical Departments. Also, management decided that pre-existing systems and data should be integrated into PACE to avoid delay in getting basic reports produced. Redesign or upgrading of these preexisting systems could follow later, if desirable.

2. Timeliness

Timeliness of information feedback is essential in any business, but particularly in a railroad where unbuffered variations in workload and traffic volume are translated directly to net income.

Toward this end, PACE uses the data base concept for storage and integration of fiscal and production figures. The computer translates field reporting terms into technical accounting and statistical terms. It performs extensive editing and validity checking of input data, traces for missing or erroneous entries where possible, etc. Items of an expense nature are augmented with specific codes from accounting tables in machine storage and placed in the Data Base as a 245 character record, subsequently extended to 320 characters. Items of a capital nature are similarly augmented and provision is made for various types of project reporting. Further development work is in progress to bring all types of investment accounting within the PACE

system. In order to avoid heavy data rejection resulting from minor discrepancies, erroneous or non-valid input is adjusted automatically and processed within the system where possible. These adjustments are printed on turnaround documents for review and manual correction where needed. Considerable effort was devoted to designing the error system in order to be able to correct easily the inevitable errors turned up when handling several hundred thousand transaction items monthly.

3. Relevancy

The reports distributed to the field employ the same terminology under which inputs were forwarded to the computer. For example, a report to a roadmaster refers to such work activities as renewing rail, replacing switch ties and replacing frogs, etc. A report to a trainmaster shows dollars related to the train runs in his district. A report to a master mechanic shows dollars related to the locomotive and car repairs by types of work done.

4. Availability

Availability relates to the efficiency of information retrieval from the Data Base. In any one month, the Data Base contains several hundred thousand individual transaction records, coded to enable efficient segregation and reporting. This large store of data is available on demand; therefore, the system avoids production of excessive detail on recurring reports. In addition, principles of report pyramiding are followed wherein the costs identified with individual cost centers are reported in some detail to the first level of management; these reports are then further summarized in reports to the next higher level of management, etc. The report pyramiding process now extends from the first level of management to the department head.

B. IMPLEMENTATION

The Accounting Department provided the professional staff to work cooperatively with the systems analysis and programming staff and with other departments of the company in developing the above principles and in doing the actual work.

Reports and data necessary for the monthly closeout of accounts on an ICC basis were produced approximately six months prior to the actual cutover. This provided experience useful in the implementation of a fully PACE coded closeout.

In approaching implementation, it was decided that the PACE system would be put into effect department by department rather than in one consolidated cutover. This was necessitated by limited availability of professional manpower resources and, in addition, it was felt that the experience gained in implementing one department would identify errors and pitfalls to be avoided in subsequent implementation phases.

1. Engineering

Work started with the Engineering Department because of the interest it expressed in developing better controls over labor and material cost. Also, this department had already initiated studies along these lines, aimed particularly at improved budget planning.

The labor distribution document (Form 203) was revised to incorporate a management account (EIN), a cost center (EAC), and a work order number (GMO or project identification.) Field training in the use of the revised document involved a group from the Engineering Department traveling throughout the railroad presenting the forms at group meetings and answering questions. A review function was established in San Francisco to analyze the data quality on the revised forms, make corrections and notify the field of the corrections.

Documents involving work orders are manually pre-coded with the appropriate work functions before being distributed to the field. Work of an ordinary

operating expense nature is coded on pre-printed forms. Each foreman fills out the forms for his gang using his supervisor's cost center designation (EAC) and reports the hours expended by work function (EIN) and work order if applicable. The same data is coded on material requisitions and direct charge documents. Approximately 6,000 individual labor reporting forms are received monthly and matched against payroll data for distribution to the accounts. Each separate item processed is placed in the Data Base in a uniform 320 character record. Material charges are also processed and placed in the Data Base in the same format. A detailed explanation of the Data Base record is attached. (Appendix B).

Simultaneously, a rail and tie inventory and production report system was developed providing suitable controls over these activities. These records are also placed in the Data Base. This system, and the reporting forms, were revised in January 1976 to provide finer detail of materials used in track maintenance.

The report structure for Engineering was the first developed. The lessons learned from it were of value in subsequent Transportation and Mechanical Department applications. Improvement of the initial reports continues coincident with the development of new reports. Unit cost reports and analysis of superintendence expenses are examples of recently developed reports.

2. Mechanical

The Mechanical Department presented a number of special problems in establishing a responsibility accounting system. A labor reporting system had been installed several years previously which enabled distribution of expenses to the ICC accounts and the identification of charges incurred under work orders or shop orders. It was decided to convert data in this existing system to PACE terms within the computer, thereby avoiding field re-training.

Accordingly, PACE codes were developed for locations and work functions, etc., in detail, for application to the present labor system. The same type codes apply to materials based on requisitions, etc., and here some field education was required to encode documents at the shops and at Mechanical Department facilities on the divisions. Presently Mechanical material is expensed when charged out of inventory, which doesn't necessarily correspond to the time it is applied to locomotives or cars, thereby presenting difficulties when trying to cost out repairs to particular locomotives or cars. It was decided to prepare reports using the present method of reporting material charges which would be acceptable for budgeting purposes and later to construct a material reporting system along cost accounting lines.

3. Transportation

The existing payroll system for Transportation Department labor includes a large number of codes which enabled PACE codes to be applied by the computer. PACE codes for cost centers (EAC's), work functions (EIN's) and work orders (recollectible, joint facility, etc.) are stored in computer tables and applied to each wage item (approximately 90,000 per month), based on run numbers. Construction of these tables required a major effort, but enabled a number of improvements to be made in the data. For example, in the Transportation reports, initial and final terminal delay and switching are now charged to the terminal where incurred rather than to the operating run. No charges of these types are prorated on a mileage or any other basis. The train supervisors' cost centers (EAC's) encompass complete runs to avoid further arbitrary pro rates. Reports are furnished to train supervisors, yard supervisors and station supervisors for their respective cost centers. These cost center reports are summarized upward to division and department level reports.

4. Salaried and Non-Operating Payrolls

The Engineering, Transportation, Mechanical and Staff Departments include salaries and wages of management, clerical and service employes. The work functions of these employes vary little from month to month and their wages are distributed on predetermined account splits. PACE applies responsibility codes to these payroll items based on audit, location and position and places the item in the Data Base for use in PACE reports.

5. Material Charges

The material requisition forms were revised to allow space for PACE codes which are used to derive all direct accounting. The present material system, however, prices and encodes ICC account distribution on most inputted requisitions. This data was adapted for inclusion in the Data Base with full PACE codes. It is planned to reprogram this system in the Spring of 1977 and improve the interface with PACE.

6. Payments, Collectibles and Journals

The records produced in the payments, collectibles and journals accounting streams were adjusted to allow PACE codes to come through on the input or to be applied within the PACE system and placed in the Data Base.

7. Staff Departments

The various staff departments were converted to a PACE basis as the final step in implementing the corporate financial Data Base. Cost centers (EAC's) were reviewed and defined in discussions with representatives of Traffic, Treasury, Real Estate, Personnel, etc. The programming was completed to produce a report for each cost center showing actual and budgeted expenses in various labor, material and other categories. The cost centers pyramid up to a department level report showing total costs for each subordinate cost center.

8. Universal Computer Processing

Records from all of the above systems are handled through a Universal (or central) processing system which edits, traces and validates input data, adds ICC account codes if not on the input and completes the final record with PACE codes before placement in the Data Base. The Universal Processing procedure is run frequently. Entry of new records into the Data Base is on a continuing basis.

The heart of the Universal Processing System consists of tables maintained on disk storage from which ICC account and PACE code information is obtained from other codes present in the various types of input records. A detailed structure of internal controls for Universal Processing as well as for the input systems was developed. The controls apply at various checkpoints during, as well as at the end of, computer processing. Each time Universal Processing is run, a formal printed report is produced, showing debits and credits inputted (and processed) by form number. This provides a comparison with previous periods in addition to routine balancing controls.

An elaborate error correction system is incorporated in Universal Processing. Error reports and correction documents are produced each time records are handled through Universal Processing. Since Universal Processing is run during a closing out period, errors in a month's account can be corrected via turnaround correction documents up to the night before the final closeout date. This ability to obtain readouts of errors before the accounts close enables the Accounting Department to improve the accuracy of a month's accounts and reduces the need for adjustments through subsequent accounting periods.

C. USE OF DATA BASE

The aim of a management information system is to organize data useful in making business decisions and make it available in a variety of ways within a reasonable time. The PACE Data Base produces several types of information, among them:

- recurring reports for various cost centers and departments.
- detail listings to assist in analyzing recurring reports.
- special studies to assist in economic decision making.

PACE furnishes information for the following company departments:

1. Transportation

   Operations reports for Trains, Yards, Stations, divisions and total department are produced. Constructive Allowance (penalty payments) are assigned to cost centers, divisions and total department. Budget reports are printed for cost centers, divisions and total department.

2. Mechanical

   Operations reports are produced for cost centers, mechanical plant groups, divisions and total department. Budget reports are produced for cost centers, mechanical plant groups, divisions and total department. A special set of reports showing components applied to locomotives is produced along with a cumulative repair record by locomotive unit number.

   Based on AAR car repair billing records, a separate data base of records relating to repairs made and material applied to system owned cars by other carriers was established in 1974. A report generator provides access to this Data Bank for users.

3. Engineering

   Operations reports are produced for cost centers, divisions, and department. Project cost reports are produced for each responsible cost center comparing actual expenditures to a planned estimate. Budget reports are produced for cost centers, divisions and department. Rail and tie application and inventory reports are also furnished each cost center involved in track responsibilities.

4. Staff

   A combined operations and budget report has been developed for each cost center in the non-operating departments.

5. Accounting

   Reports are prepared based on ICC account classifications for various accounting purposes and to satisfy accounting requirements mandated by regulatory authorities.

6. A Condensed Operating Expenses Report and a Summary of Wages and Other Expenses, by department, are prepared for the Executive Department. Expenses are reported by OCA for each Operating Department.

D. EXTENDING MANAGEMENT CONTROL

1. Increase Reporting Frequency

PACE can report both financial and production information as often as required. If financial data, such as dollars, or production data, such as hours of work, were reported weekly, or even daily, reports could be generated on the same basis. The frequency and timeliness of reporting is constrained only by economic consideration and technical methods of data transmission. The question of "what" information to gather still remains a harder one to resolve than "how fast."

Many PACE reports are distributed two to three weeks after the end of a particular calendar month, usually the day after the accounts have been closed. The reports are of two general types: those related to operational conditions and those related to budgetary comparisons. The budget reports tend to be of a more summary type than the operations reports. A continuing goal is to reduce the time lag for operations reports. As an example, this has been done for Transportation Operation and Constructive Allowance reports by producing interim reports based on payroll data for the first half of each month.

2. Strengthen Budget Control Structure

Management has extended budgeting to the field level. With a current year's actual figures available (by months) along with a management estimate of monthly work volumes to be handled in the upcoming year, each cost center is required to project next year's expenditures by months. This initial submission from the field is adjusted and incorporated in the report structure, thereby providing the cost center manager with a comparison of actual versus planned expenditures for his own and his superiors' use. The budgets are customarily revised quarterly.

Budget comparison reports generally are for longer periods than flash-type production reports provided by operating systems such as TOPS. This is due to the difficulty of creating a useful short-term financial control on, for example, a weekly cycle and relating this to actual. It is important also that short-run changes are smoother when presented to higher management, so that developing trends and patterns are truly identified when the actual figures are measured against the budget control. At this level, year-to-date budget comparisons are particularly valid.

The aim of budget analysis should be to protect the corporate objectives assigned when the budget was approved. The analysis should assist in identifying need for:

A. Adjustments to Operations - reflecting performance.

B. Adjustments to the Budget - reflecting changed conditions.

In many cases, however, it is harder to identify and isolate a problem than to provide a solution. The budgets provide a monitoring system for indicating trouble spots and for raising red flags. A budget control system doesn't tell "how" to correct the trouble. The manager's experience and capability have to be relied upon to apply corrective action, although the control system can sometimes make the corrective action obvious.

As the budget system develops, PACE expects to be able to respond quickly to ever-changing financial information requirements. Cost centers and PACE codes will be restructured and reports improved as experience is gained by those responsible for planning and budgeting financial goals.

3. Subsidiary Companies

PACE accounting and budget systems have now been implemented for major subsidiaries; i.e., SSW Ry. Co., NWP RR Co. and SD&AE Ry.Co. The subsidiary companies' system closely parallels that of Southern Pacific Transportation Company, providing uniform methods and reporting systems for all. SSW Ry.

PACE input data originating in Tyler is keyed, batched and transmitted to San Francisco Data Center over communication lines; data for Tyler PACE reports is returned over the communication system and printed there.

E. FURTHER GOALS

1. Develop Unit Costs

An important part of a budget system is the relationship of production units, such as cars or train miles, to the financial cost of producing those units. This type of data is needed by the field to estimate expense for future periods. It is difficult for a manager to plan a budget based on volume figures provided by his upper management without relevant, finely-tuned unit cost data applying to his cost center.

In addition, unit cost type reports enable comparative productivity statistics to be developed for each cost center. The reports furnish the manager a measurement of his center's productivity in which financial factors, such as inflationary trends, can be isolated.

2. Budget Extension

Extension of PACE budgeting to remaining smaller railroad subsidiary companies and to non-railroad subsidiary and affiliated companies is being planned for 1977 and 1978.

3. Uniform System of Accounts (USOA) - Revision

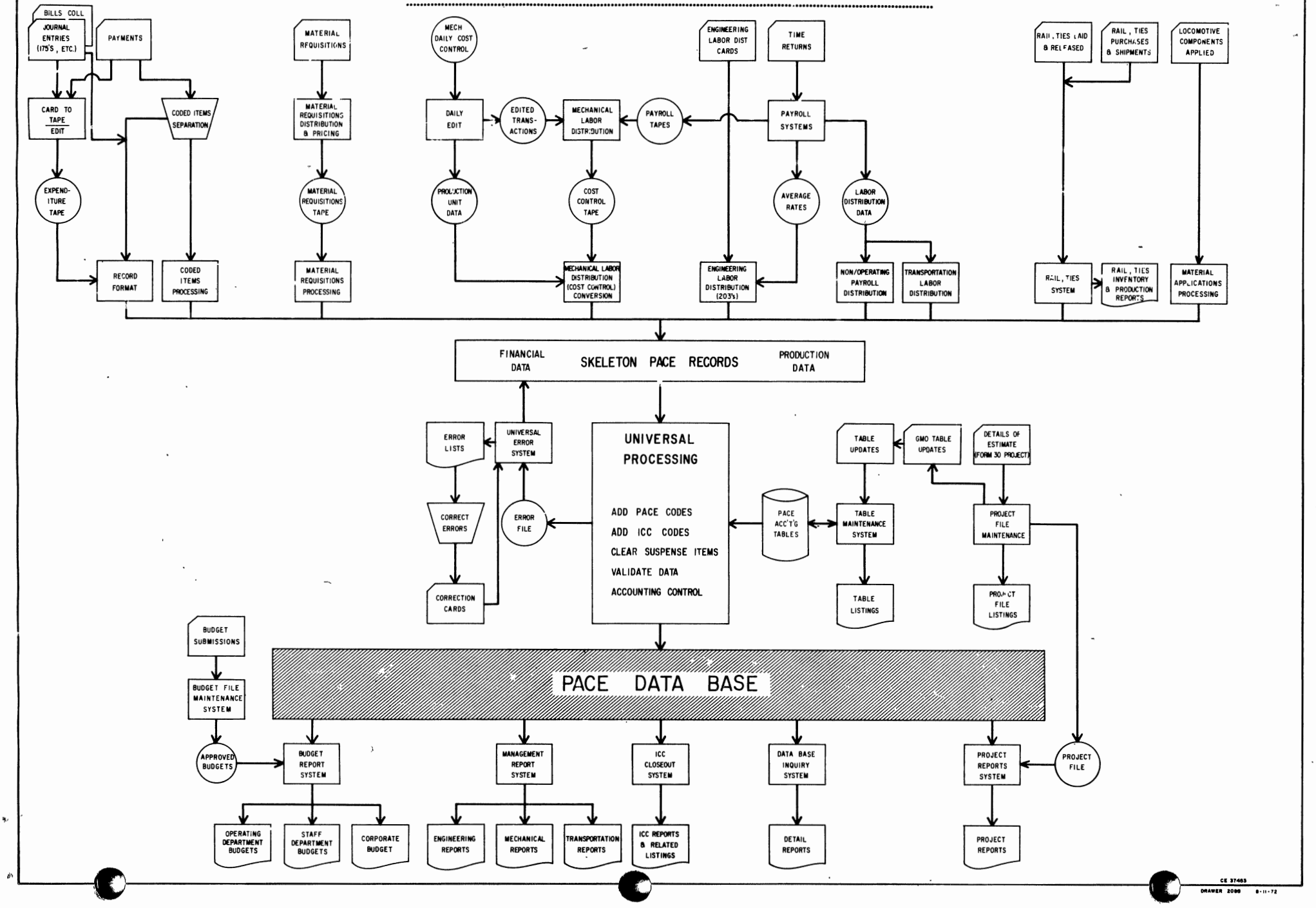
Planning is under way to implement a revised USOA, effective January 1978.

SUMMARY

Southern Pacific has developed a system of responsibility accounting using a common data base for both management and government accounting. Operations and budget reports are also produced from this data base. Unit cost reports will be developed by interrelating the data base records with production information available through operating systems such as TOPS as the next step toward improving managerial efficiency. Concurrently, the continuing work of refining coded input, maintaining and improving systems, and reducing manual input requirements is being accomplished.

APPENDIX A

PACE MANAGEMENT ACCOUNTING SYSTEM



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APPENDIX B

UNIFORM FORMAT OF PACE RECORDS IN DATA BASE

	CODE	NO. CHARACTERS	ALPHA/ NUMERIC	SOURCE Input	SOURCE Derived	SOURCE Tables	EXPLANATION
1.	Work Order Number	5	A/N	X	X	X	Identifies projects, facilities, recollectible and special work orders.
2.	Expense Item Number (Line No.)	3	N	X	X	X	Functional activity in management terms (management account.)
3.	Expense Allocation Code - Incurring	4	A/N	X	X	X	Supervisor incurring expense (cost center.)
4.	Expense Allocation Code - Responsible	4	A/N	X	X	X	Vouchers: Approving Supervisor; R-T-B: EAC to
5.	Operations Cost Account	3	N	X	X	X	Group of related work activities (Expense Item Numbers.)
6.	Expense Description	4	N	X	X	X	Designation for nature of expenditures; e.g., labor, material, services, etc.
7.	Expense Class	1	N		X		Designation for class of expenditure; e.g., investment, Operating expense, etc.
8.	ICC Account	6	N				
	Major Account	3	N	X		X	Interstate Commerce Commission account classification.
	Major Sub-Account	3	N	X		X	Company sub-account of I.C.C. account.
9.	Account Reference	6	N	X	X	X	Balance sheet account, etc.
10.	Bill Number	4	N	X	X	X	Joint Facility or recollectible identification number.
11.	Accounting Period	4	N				
	Accounting Year	2	N	X		X	
	Accounting Month	2	N	X		X	
12.	Liability Code	1	N		X		Identification of current month, prior month, prior year, etc., charge.
13.	Liability Date	4	N				
	Liability Year	2	N	X			
	Liability Month	2	N	X			
14.	Document Reference	14	N				
	Form Number	4	N	X		X	Input form standard numerical description.
	Lot Number	4	N	X			Control designation for groups of forms forwarded to Data Processing.
	Document Number	6	N	X		X	Particular record identification.
15.	Service	1	N	X		X	Freight, passenger or common designation.
16.	State	2	N	X			State identification.
17.	Cash Symbol	1	N	X			Cash/non-cash record.

APPENDIX B (Continued)

UNIFORM FORMAT OF PACE RECORDS IN DATA BASE (Continued)

	CODE	NO. CHAR-ACTERS	ALPHA/ NUMERIC	SOURCE Input	Derived	Tables	EXPLANATION
18.	Accounting Purpose	1	N		X		Designation for financial, production and management data.
19.	Error Input Code	1	A/N		X		Code value indicates type of error(s) detected.
20.	PACE Flag	1	N		X		Determines source of PACE codes.
21.	Company	2	N	X			Identifies record as Southern Pacific Transportation Co. or subsidiary company.
22.	Division	2	N	X		X	Code for specific railroad operating unit.
23.	Unit identification	2	N			X	Identifies unit of property.
24.	Valuation Element	4	N			X	Construction Code.
25.	EIN Description	30	A/N			X	Description of work function, e.g., laying rail, repairing wheels, etc.
26.	Pyramid Key Incurring	9	A/N			X	Output report key related to supervisor incurring expenditure.
27.	Pyramid Key Responsible	9	A/N			X	Output report key related to manager responsible for project.
28.	Record Number	5	N		X		Identification assigned to each PACE record.
29.	Error Sequence Number	2	N		X		Keys multiple errors in individual PACE record.
30.	GMO Expense Allocation Code	4	A/N			X	Supervisor responsible for GMO expense.
31.	EIN Flag	1	N		X		Processing signal determined by high order digit of work order number.
32.	Material Class	2	N	X		X	Category of inventory.
33.	Catalog Item Number	7	N	X			Part or component number used by Purchases and Materials.
34.	General Ledger Sub-Account	2	N	X		X	Company sub-account to I.C.C. Balance Sheet account.
35.	Caps Code	2	N	X			Processing code for investment or capital expenditures.
36.	Pyramid key for GMO.	9	A/N			X	Output report key related GMO expenses.
37.	Department Code	1	N		X		Segregates expenditures by departmental operating and non-operating.
38.	Amount	12	N	X			Dollars and cents.
39.	Quantity	10	N	X			Number of units.
40.	Unit of Quantity	2	A	X			Usage quantity modifier, e.g., gross, dozen, each, etc.
41.	Reference Information	18	A/N	X			Variable information depending on department or input.

APPENDIX B (Continued)

UNIFORM FORMAT OF PACE RECORDS IN DATA BASE (Continued)

	CODE	NO. CHAR-ACTERS	ALPHA/ NUMERIC	SOURCE Input	SOURCE Derived	SOURCE Tables	EXPLANATION
42.	Source Code	2	A		X		Identification of input system.
43.	GMO Group Code	4	N			X	Identify GMO purpose.
44.	Item Price	7	N	X			Base price.
45.	Unit Price	2	A	X			Unit of pricing measure, e.g., gross, dozen, each, etc.
46.	EAC Group	4	A/N			X	For assignment of ICC Acct. codes for non-GMO records.
47.	Item Description 1	25	A/N	X		X	Optional description of item processed.
48.	Record Status	1	A		X		Indicates status of record with respect to error and error correction.
49.	Item Description 2	26	A/N				Optional description of item processed.
50.	Item Description 3	36	A/N				Optional description of item processed.
51.	Alternate Divn/ICC/Serv. Codes	9	A/N	X	X	X	Retains alternate data or codes.