STATE OF CALIFORNIA

DEPARTMENT OF INDUSTRIAL RELATIONS

REPORT ON

THE DIVISION OF INDUSTRIAL SAFETY

DECEMBER 1971

JOINT LEGISLATIVE AUDIT COMMITTEE

VINCENT THOMAS, CHAIRMAN

ROOM 4126

STATE CAPITOL

Joint Legislative Audit Committee

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California Legislature

VINCENT THOMAS
CHAIRMAN

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The Honorable President of the Senate
The Honorable Speaker of the Assembly
The Honorable Members of the Senate and
The Assembly of the Legislature of California

Sirs:

Transmitted herewith is a performance audit report on the Division of Industrial Safety of the Department of Industrial Relations. The division is responsible for the administration of the state laws dealing with the safety of employees in places of employment.

In 1969 there were 170 fatalities and over 75,000 lost time injuries of manufacturing and agricultural employees. Statistics not released at this late date by the division show that in 1970 fatalities increased to 220 and injuries decreased to 72,274.

The industrial section of the division which is responsible for the prevention of these fatalities and injuries has 80 employees and a budget of $1.4 million. The same resources are allocated to the pressure vessel section which, in 1969, reported three accidents involving air tanks causing 2 injuries and no fatalities. Comparative data for 1970 and 1971 is not yet available. The report gave no reasons as to why up-to-date information is not available.

No priorities are established by the division as a whole. Each of the seven sections specializes in its own area regardless of where the greatest safety hazards exist.

Each engineer makes up his own work schedule. The frequency and types of inspections vary considerably among the individual engineers. A selective system of inspection designed to concentrate

on those plants and industries with the most injuries has been developed by the division but has not been implemented.

About 40 percent of the field engineers time is spent in travel and office work. Savings in time and travel expenses could be realized if inspection trips were better planned and controlled.

Performance standards have not been established. No effort is being made to evaluate the work of individuals or of the division as a whole. The report discusses seven recommendations which need to be implemented by the division to improve its operations.

Respectfully submitted,

Vincent Thomas

VINCENT THOMAS, Chairman
Joint Legislative Audit Committee

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INTRODUCTION

The Division of Industrial Safety was created in 1945 as a part of the Department of Industrial Relations. The purpose of the division is to administer laws dealing with the safety of employees in places of employment.

The division has the responsibility to enforce all safety orders adopted by the Industrial Safety Board. The Industrial Safety Board consists of the Director of Industrial Relations as chairman, and four members appointed by the Governor.

The division is administered by a chief who is appointed by and serves at the pleasure of the Governor.

The division's activities are largely decentralized, with 19 offices throughout the state, a main office in Los Angeles and headquarters in San Francisco. Of the more than 275 personnel authorized to the division, about 215 are safety engineers. The main functions of the safety engineer are to inspect businesses to assure that they are a safe place to work and that these businesses are in compliance with California safety laws.

The objective of the Division of Industrial Safety is the prevention of industrial injuries and deaths to California workers. The division is organized into seven sections, each of which carries out a specific safety program designed to meet the division's overall objective. The seven programs of the division and the budgeted expenditures for the 1971-72 fiscal year as listed in the Governor's budget are as follows on the next page.

I.	Safety for Employees from Pressure Vessel Failure or Malfunction	$1,423,496
II.	Safety for Employees in Industrial Plants and Operations Including Mineral Industries	1,422,054
III.	Safety for Employees in Construction	1,069,512
IV.	Safety for Employees While Using or Repairing Elevators, Escalators, or Aerial Tramways	553,387
V.	Safety for Employees Exposed to Electrical Hazards	234,260
VI.	Safety of Employees from Radiation, Dust, Fumes, Vapors, Gases, Etc.	183,180
VII.	Education and Engineering Research Activities for Industrial Safety	77,499
		$4,963,388

Departmental administration in the amount of $275,382 has been allocated and shown as part of the expenditures of the seven programs.

RECOMMENDATION NUMBER 1

RE-EVALUATE THE USE OF MANPOWER RESOURCES

It is our observation that manpower resources are not always allocated to the areas of greatest need. One reason for this is that the division has not established priorities for the safety division taken as a whole. The scope and procedures of carrying out the safety programs are left generally to the discretion of individual sections. The total needs of the safety program are often overlooked. Even within the individual sections, efforts are not always directed toward areas which have exhibited the greatest degree of hazard.

Primarily, the division approaches its goal of reducing accidents by inspecting workplaces for compliance with safety regulations. The number of places to be inspected is so vast, however, each safety engineer is required to cover a territory of considerable size. Because of this restriction and also because of the limited number of safety engineers that are available, it has not been feasible for the division to accomplish complete coverage of all potential safety hazards. Therefore, it is important that available manpower be directed to areas where they can do the greatest good. We have found that this is not always the case.

The division allocates its manpower resources to seven operating sections. These sections, with estimated budget costs and personnel man years, are shown on the next page.

	Program Costs	Man-Years
Construction	$1,070,000	60.1
Electrical	234,000	13.3
Elevators	553,000	30.3
Environmental	183,000	10.4
Industrial	1,422,000	80.0
Pressure Vessels	1,424,000	79.7
Education and Research	77,000	3.4
Total	$4,963,000	277.2

Engineers assigned to each of these sections are specialists in the field of their assignment. For example, those engineers assigned to the construction section are responsible only for work hazards within the construction industry, and those engineers assigned to the pressure vessel section are responsible only for the inspection of pressure vessels. The deployment of safety engineers in this manner greatly reduces the flexibility of management because each section requires the capability of supplying inspection coverage throughout the state. As a consequence, the areas of hazard which exhibit the greatest need for inspection services are not always the ones that are most adequately served.

Two sections, pressure vessels and elevators, receive about 40 percent of the funds allocated each year to the division. However, less than one percent of all work injuries come under the surveillance of these two sections. Other statistics show that about 70 percent of the resources of the pressure vessel section are directed toward the inspection of air tanks. During 1969, there were only three accidents involving air tanks, causing two injuries.

In terms of work injuries, the operating funds made available to the pressure vessel and elevator sections are incompatible with the amount of funds made available to the other operating sections of the division. This becomes most apparent after a review of work injury statistics that are developed each year by the department's Division of Labor Statistics and Research. These statistics show that the frequency of injury to employees is most substantial in the construction, manufacturing, agriculture, and mineral extraction industries. In 1969, the manufacturing and agriculture industries alone produced over 75,000 lost time injuries, 170 of which were fatalities. Yet, the industrial section, which is responsible for the prevention of injuries to employees working in these industries, is provided only about the same amount of operating funds as that provided to the pressure vessel section.

Part of the reason divisional resources are so heavily allocated to the pressure vessel and elevator sections as compared to the other sections is because of requirements in the Labor Code. The Labor Code mandates that certain elevator and pressure vessel inspections be made on a cyclical basis. Consequently, the division is forced to maintain substantial inspection capabilities in these two areas, which over the years have shown a favorable accident record.

In 1955, the inspection period for most pressure vessels was changed from two years to three years. In 1968, this inspection period was further advanced to a five-year period for most of these vessels. Because of the continuing installation of new vessels, however, the extended inspection periods have not decreased the workload of the section. In fact, the backlog

of required inspections is near an all-time high. Even with this substantial backlog of uninspected vessels, however, the accident rate associated with pressure vessel malfunction remains extremely low. It appears to us that this favorable accident experience justifies the need for the division to reevaluate the manpower requirements of the pressure vessel section.

In this section we have pointed out some of the areas that management should evaluate to assure that the safety program meets its greatest potential. In summary we suggest that the division:

1. Explore the possibility of training present engineering personnel and recruiting new replacement personnel so that these personnel have inspection capabilities in more than one specialty. This would enable management to reduce the inspection territories of individual engineers and at the same time promote greater flexibility to the management of the division.

2. Restructure program elements so that funds and manpower can be directed toward the areas of greatest hazard.

3. Reevaluate the manpower needs of the pressure vessel section. Indications are that the overall needs of the division could be better served by restricting the number of required pressure vessel inspections and placing some of the engineers assigned to these tasks into inspection areas which statistics show are more hazardous.

RECOMMENDATION NUMBER 2

DEVELOP AND IMPLEMENT SELECTIVE SYSTEMS OF INSPECTIONS

At present, most of the survey and inspection work is left to the discretion of the individual safety engineers. The motivation for the type of inspection to be made varies among engineers. Except for accident investigations and complaints, there is often nothing that specifically directs an engineer to a particular place of inspection.

About two years ago safety division, in conjunction with the department's management analysis section, undertook a study to determine the proper direction for the division. This study resulted in the development of a selective system of inspection for the industrial section. This system is designed to focus division efforts in those plants and industries where the injury record is above normal. So far, this program has not been put into operation.

The principal advantage to be derived from programs of this type is that the worst hazard areas are the ones that receive the most attention from the division. This approach to inspection would also enable management to utilize manpower more effectively as it would eliminate much of the "guesswork" approach now used.

The selective system of inspection developed for the industrial section utilizes accident and injury statistics. These statistics are then analyzed and summarized to formulate an "inspection value index". Under this system consideration is given to:

1. The employer's accident rate
2. The number of employees
3. The date of last inspection.

Depending upon the numerical value assigned to each of these three considerations, an index is developed which will show a priority listing of individual companies. Inspectors would then be expected to arrange their inspection based on this priority listing.

As mentioned earlier, this index has been developed only for use by the industrial section. Though certain changes would be required, the principles employed in the inspection value index should be adopted by other sections of the division.

RECOMMENDATION NUMBER 3

REVIEW AND IMPROVE THE FIELD OPERATIONS AND PROCEDURES OF FIELD ENGINEERS

In order to familiarize ourselves with the field operations and procedures of the division, we interviewed field engineers, accompanied them on visitations, and reviewed their time records. This review revealed that operations and procedures varied considerably among sections as well as individual engineers.

The inspection time devoted to original inspections (those inspections initiated by the engineer) ranged from a high of 76 percent of inspection hours for the pressure vessel section to a low of 13 percent of inspection hours for the electrical section. Inspection time that is not spent on original inspections is used for making an intermixture of special visits. Special visits include the time spent on reinspections, consultations, complaints, and accident investigations.

A comparison was also made of the amount of field time spent on the job site against office and travel time. This comparison shows that, overall, about 40 percent of a field engineer's time is used for office work and travel to and from job sites. For the five largest sections this comparison is shown below.

	Percentage of Travel & Office Time	Percentage of Field Time
Industrial	34	66
Construction	42	58
Elevators	38	62
Electrical	47	53
Pressure vessel	39	61

Much of our audit time was spent in reviewing operations of the pressure vessel section. The operating procedures of this section are somewhat different from those of the other sections because (1) fees are collected for some of the inspections and (2) certain inspections are required to be made on a cyclical basis by provisions of the labor law.

Generally, a fee is charged only for those inspections for which a permit is required to be issued. However, much of a safety engineer's time is spent on inspection services for which no fee is charged. These non-fee inspection services include the following activities:

- Consultations with pressure vessel owners, operators, and manufacturers
- Reinspections of previously inspected vessels found to be in an unsafe condition
- Inspections of certain types of vessels which are not specifically required to have a permit
- Accident investigations
- Inspection of vessels owned by governmental agencies
- Fee collection
- Miscellaneous calls.

Overall, pressure vessel engineers spend about one-fourth of their available time on the non-fee producing activities outlined above. The amount of time spent on these services by individual inspectors, however, varies

considerably. For instance, we noted that one inspector spends as much as 38 percent of his available time on special visits of the type shown on the previous page. Another inspector spends only four percent. The reason for this is unclear.

The disparity in hours spent on special visits, from a sample of 19 inspectors, is shown in the table below:

Number of Inspectors	Percentage of Time on Special Visits
3	Over 35
2	30 - 35
3	25 - 29
6	20 - 24
3	15 - 19
1	10 - 14
0	5 - 9
1	Under 5
19	

Even more confusing is the variation in the type of special visits. In a month's time, some inspectors make as many as 50 "consultations" while others make none. A study of the type of special visits made by 16 individual inspectors during a one-month period of time is shown below:

Number of Visits	Number of Inspectors by Type of Inspection			
	Miscellaneous	Reinspection	Consultation	Other
Over 50	2	0	1	0
40 - 49	1	0	0	0
30 - 39	2	3	0	0
20 - 29	6	4	1	1
10 - 19	1	4	2	4
1 - 9	4	5	6	10
Under 1	0	0	6	1
	16	16	16	16

As can be seen from the foregoing tables, inspection operations in the pressure vessel section do not form a consistent pattern of activity.

Further analysis of individual inspector activity in the pressure vessel section shows that individual fee inspection activity varies from a high of 65 percent of available inspection hours to a low of 23 percent of available inspection hours.

Time spent in the office also varies widely among individual inspectors. This time varies from a high of 22 percent for one inspector to a low of five percent for another.

Randomness toward inspection activities does not always produce inspections on the most logical basis. For instance, it is not unusual for an inspector to make from 10 to 15 separate visits to the same employer over a one-year period. Often, these repeat visits do not result in a fee-producing activity and in most cases cannot be shown to have produced any meaningful accomplishment at all.

Each engineer formulates his own inspection itinerary. Often these itineraries are ill planned. The motivation of planning an itinerary should be to promote the most productive work schedule possible. We have found, however, that most engineers show little concern in this area.

Potentially large savings in engineers' time and travel costs could be realized if inspections were:

1. Arranged in a manner to promote inspections at contiguous sites each day.

2. Pre-arranged with the person to be inspected.

3. Arranged in a manner to eliminate unnecessary back tracking and repeat calls.

Summary

It is evident that the survey and inspection work performed by individual safety engineers is not controlled by divisional management. Each engineer makes up his own work schedule and as a consequence the types of inspection activities vary considerably among the individual engineers. Little effort is made to evaluate the work done by these engineers and plans have not been developed to assure that the most essential inspection functions are being carried out.

RECOMMENDATION NUMBER 4

DEVELOP PERFORMANCE MEASUREMENTS AND PERFORMANCE STANDARDS FOR EACH PROGRAM ELEMENT

To use resources most effectively, programs must be measured in terms of what they yield. Work effort must be identified in order to measure and evaluate the results of work done.

Safety division does not use the proper standards to measure the results of work done. Without the use of standards to determine the results of work done a proper allocation of manpower resources cannot be made.

Currently, safety division is able to provide statistics of work performance in terms of how time was spent. For instance, most sections are able to provide information on the number of unsafe conditions corrected, accident investigations, special calls made, complaints investigated, and the number of speeches made. This information, however, does not provide the necessary vehicle for determining if and to what extent the division is meeting its objective of preventing accidents and deaths to California workers.

Select and Define Attainable Objectives

Before performance can be measured, the division needs to select and define attainable objectives. Within the division, all but one of the program elements has as its stated objective the prevention of employee injuries. Objectives that are defined in terms this general, however, serve only to state the long range goal or mission of the division. To be effective, objectives should represent achievable results within a given time

period. For instance, it should be important for safety division to know the extent to which each program element contributes to the prevention of injuries. Only in this way can the division properly allocate its resources to the areas of greatest need. To achieve this proper allocation of resources, divisional objectives need to be stated in terms of short range goals which can be measured.

Identify Performance Measurements

Performance effectiveness cannot now be calculated. The division needs to redefine its programs into measurable terms. Measurements are necessary so that management can determine to what degree established goals have been achieved. Before this measurement can be made, however, performance standards need to be established.

Set Performance Standards

Performance standards are needed in order for management to determine if objectives have been met. The standards that are set up must be flexible enough to be modified and refined. The development of performance standards requires a great deal of care and should be initially developed from predetermined criteria. Employee participation and judgment are also essential elements to the development of proper standards. Standards should be set out in a manner that comparisons can be made not only to the effectiveness of the program taken as a whole, but, also to the effectiveness of individual employee performance as well.

Compare and Measure the Results

The main purpose of developing performance standards is to provide the means by which actual results can be compared and measured to pre-set goals. For instance, in safety division it should be important for management to know the number of injuries in a given industry. An objective might be to reduce this injury rate. Once the objective has been determined a program to meet the problem would need to be initiated. Performance standards should be outlined to devise the approach and means of achieving a reduction in the injury rate. Measurements can then be made to determine how actual performance compared to the pre-set standards.

By using standards as the means by which actual performance can be compared, management is able to make decisions as to the effectiveness of the program. In addition, these standards can be used to evaluate the performance of individual personnel.

Summary

In order to insure that available resources are used to the best advantage programs need to be properly defined. Properly defined programs should help to:

- Accomplish objectives
- Improve policy and management decisions
- Allocate resources among competing demands
- Evaluate costs of services.

To develop better programs requires more and better information, which should come from performance evaluation, and to evaluate performance properly it is necessary to:

- Select and define attainable objectives
- Identify performance measurements
- Set performance standards
- Compare and measure the results.

RECOMMENDATION NUMBER 5

REVISE THE PRESSURE VESSEL FEE SCHEDULE

The Labor Code has established a fee schedule setting forth the amounts to be charged for services performed by the pressure vessel section. This schedule sets out varying rates with the amount to be charged dependent upon the type of inspection, the size of the vessel, and the time required for inspection. For the most part these fees are in the range of $8 per inspection or $8 per inspection hour, whichever is greater. Since most inspections require less than one hour per vessel inspected, the hourly income from fee inspections is somewhat more than $8 per hour.

The fees to be collected from these inspections during the 1971-72 fiscal year is estimated at $345,000. In order to absorb its full pro rata share of the division's expense, the pressure vessel section should be collecting fees amounting to about $1,400,000 annually. Based on the hourly rate now in effect this would mean an increase in fees of about four times the current charge.

We estimate that the operating costs attributable to the maintenance of an inspector in the field is about $16 an hour. Assuming each engineer devoted all of his working day to fee inspection activities, this amount would be the minimum charge needed for full recovery of operating costs. In actuality, however, each engineer currently devotes less than one-half of his available time to fee-producing activities. Consequently, increasing fees to $16 would cover the cost of fee inspection services, but would absorb total operating costs only to the extent of one-half of the amount needed.

Currently, the total inspection time available to the pressure vessel section is about 85,000 hours annually. However, total time devoted to fee inspections is only around 43,000 hours annually. The following table shows the potential revenue to be derived from current and potential inspection hours at assumed $8 and $16 per hour rates.

Inspection hours	Fee	Revenue
43,000	$ 8	$ 344,000
43,000	16	688,000
85,000	8	680,000
85,000	16	1,360,000

Obviously, the assumption that every hour in the year of a field inspector's time would be devoted to a fee inspection is impossible. Also, it is probably unlikely that inspection fees should be increased to $32 per fee inspection hour ($1,400,000 current operating costs divided by 43,000 current fee inspection hour) in order to absorb the full operating costs of the section.

Because of the high operating costs of inspection services, a significant increase to the fee amount appears to be justified. In addition, a revision of the present fee schedule to provide for other sources of fee income may be in order. Some alternatives to the provisions of the current fee schedule are offered below.

- Charge a fee for all reinspections - Currently up to 10 percent of an inspector's time is spent on reinspecting vessels for which a previous inspection revealed an unsafe condition. No charge is made for

this added service. In addition to increasing revenue it would seem that a charge for these services would also have the effect of promoting increased compliance by pressure vessel owners.

- Charge a fee to employers requesting consultations - An undetermined amount of an inspector's time is spent in providing consultive services to pressure vessel manufacturers and users. These services are currently provided without a fee.

- Charge a fee for inspection services rendered to other governmental agencies - Inspectors spend as much as seven percent of available time providing inspection services to other governmental agencies. The cost of these services is absorbed by the division. These non-fee services are rendered to schools, hospitals, other state agencies, cities, and counties.

- Charge a penalty fee to employers operating on unregistered pressure vessel - Inspectors spend considerable time attempting to locate unregistered pressure vessels. Many vessels are in use which have either never been registered with the division or have been registered at one time but, because of various reasons the current user is unknown. Section 7750 of

the Labor Code does provide that it is a misdemeanor to use an unregistered vessel; however, the provisions of this section are seldom invoked.

- Charge license fees in lieu of permit fees -

As now structured, the existing fee schedule hampers inspection efficiency.

Most pressure vessel permits are valid for periods of either three or five years. Generally, fees are charged only for those inspections that require the issuance or the renewal of a permit. During the period between these required inspections, the division is frequently requested by pressure vessel owners to make additional inspections of their vessels. These interim inspections are not subject to a fee, nor is the permit expiration cycle of the vessel extended. Due to these special inspection requests many pressure vessels are inspected far more often than is required by law because the inspector will also have to make an additional inspection when the permit expires.

A further disadvantage to the makeup of the current fee schedule is that division inspectors are unable to inspect on a single visit all pressure vessels that may be located at a contiguous location. This disadvantage occurs because most pressure vessels have different expiration dates

which preclude fee inspections until the permit renewal is due. One solution to reduce the number of inspections is to extend the inspection cycle of a vessel each time an inspection is made. In order to do this, the division would either have to charge a fee each time an inspection is made, whether the permit has expired or not, or charge a fee based on a measurement other than one related to the actual inspection date.

We propose that the division explore the feasibility of collecting revenues through the issuance of annual licenses rather than the current method of collecting fees based on inspection services. Under this method inspection services would still be provided, but the number of "excess" visits would be substantially reduced.

RECOMMENDATION NUMBER 6

PREPARE PRESSURE VESSEL AND ELEVATOR INVOICES THROUGH DATA PROCESSING OPERATIONS

At the present time the clerical staff in the Pressure Vessel and Elevator sections manually type each individual invoice. This entails the preparation of about 45,000 invoices each year. Each invoice requires the typing of the description and location of the object inspected, the amount to be billed, and the owner's name and address.

Two previous studies, one by the Governor's task force and one by the department's management analysis section, proposed that this work be converted to an electronic data processing application. Each of these proposals was rejected by the division on the basis that many of the details had not been satisfactorily resolved.

The division's objections to the previous proposals are minor. These objections are only delaying the eventual conversion to electronic data processing which after a period of time will provide a more efficient and rapid billing system.

RECOMMENDATION NUMBER 7

ELIMINATE DUPLICATE RECORDKEEPING IN THE PRESSURE VESSEL AND ELEVATOR SECTIONS

At the present time the pressure vessel and elevator sections manually maintain an inventory card on each air tank, liquid petroleum gas tank, boiler, and elevator which have ever been inspected and still is in use in California. There are approximately 150,000 air tanks, 16,000 LPG tanks, 15,000 high pressure boilers, and 38,000 elevators, for which an inventory card is prepared and later updated after each inspection. Each card maintained for a pressure vessel contains the tank number, the owner's name and address, the due date of the next inspection, maximum allowable pressure, or whether there is a requirement on the tank. The type of data entered on the elevator inventory card is very similar; however, it is characteristic of elevators.

The pressure vessel clerical staff currently expends approximately 50 percent of their total work hours on coding and problems related to coding of these cards. The elevator section expends about the same amount of time. Coding procedures provide for the entering of information into the data processing system for the maintenance of inventory and the preparation of reports.

It is feasible that keypunch operators could obtain all necessary data for the maintenance of inventory records directly from inspection reports. Such an application would result in the elimination of the coding function process now required. As a further benefit much of the duplicate record keeping now inherent in the current system would be eliminated.

William H. Merrifield
Auditor General

January 7, 1972