



# NBS TECHNICAL NOTE **1114**

U.S. DEPARTMENT OF COMMERCE / National Bureau of Standards

## Prospects for An OSHA/ETIP Project to Facilitate Technological Innovation

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# Prospects for An OSHA/ETIP Project to Facilitate Technological Innovation

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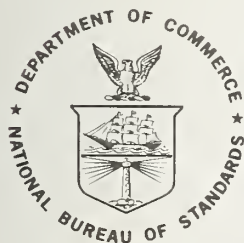
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## ABSTRACT

This document describes the results of research performed to identify and screen candidate interventions for administrative experimentation with the Occupational Safety and Health Administration (OSHA) of the Department of Labor. It is one product of the Regulatory Processes and Effects Project of the Center for Field Methods (ETIP). The broader project, described elsewhere, is analyzing the effects of change in regulatory processes on industrial innovation. The report presents preliminary conclusions regarding the appropriateness of experimental variances as a possible means of facilitating the introduction of new technology by industry.

The first two chapters provide an introduction and a brief history of ETIP/OSHA work. Chapter III describes the basic logic of expanding the use of OSHA's experimental variance authority to facilitate innovation, types of variances, variance application and review processes, and limitations on the use of experimental variances to facilitate innovation. Chapter IV describes alternative OSHA policy change processes. The fifth chapter discusses OSHA's role in the equipment market, and Chapter VI describes possible future work. It is recommended that future work, if any, not focus exclusively on variances, but rather explore the full range of OSHA policies for updating standards and enforcement policies relative to new technology.

Key words: Administrative experimentation, evaluability assessment, evaluation, Experimental Technology Incentives Program, experimental variance, Occupational Safety and Health Administration, regulatory experimentation, regulatory policy, standards, and technological innovation.

## PREFACE

Regulatory agencies and regulatory reform are subjects of great interest today, and the effects of regulation on technological innovation and productivity in American industry are of special concern. Many reforms and changes in the regulatory process are being proposed, and some are being made. Each change represents an "experiment" in the operation of our society, even if no one carefully determines the result of that "experiment."

Since 1972, the Experimental Technology Incentives Program (ETIP) --located in the Center for Field Methods of the National Bureau of Standards--has pursued an understanding of the relationships between government policies and technology-based economic growth. This goal is based on three premises:

- Technological change is a significant contributor to social and economic development in the United States.
- Federal, State, and local government policies can influence the rate and direction of technological change.
- Current understanding of this influence and its impact on social and economic factors is incomplete.

ETIP seeks to improve public policy and the policy research process in order to facilitate technological change in the private sector. The program does not pursue technological change per se. Rather, its mission is to examine and experiment with government policies and practices in order to identify and assist in the removal of government-related barriers and to correct inherent market imperfections that impede the innovation process.

ETIP assists other government agencies in the design and conduct of joint projects. Key agency decision makers are intimately involved in these experiments to ensure that the results are incorporated in the policy-making process. ETIP provides its agency partners with both analytical assistance and funding for the experiments while it oversees the evaluation function.

In 1977, The Urban Institute's Program Evaluation Group was awarded a significant contract (\$856,000 over 15 months) as a result of competitive bidding on a U.S. Department of Commerce Request For Proposal. Under this contract the Program Evaluation Group provided analytic support and data collection services to ETIP. This work was the foundation for the Regulatory Processes and Effects Project (RPE). The Regulatory Processes and Effects Project, through this analytic support work, will analyze the process and attempt to

document the results of ETIP's regulatory projects, which investigate whether private sector innovation is generated by changes in regulatory agencies. In December 1978, the Regulatory Processes and Effects Project moved from The Urban Institute to the Performance Development Institute (PDI) as the result of a competitive award process.

Regulatory Processes and Effects Project teams are conducting short, exploratory efforts, significant explorations of expectations and reality, and assessments of fully developed regulatory process changes under various regulatory situations.<sup>1</sup> The following regulatory agencies are (or have been) involved:

Environmental Protection Agency (Air, Pesticides, and Water),  
Federal Communications Commission,  
Food and Drug Administration,  
Federal Energy Regulatory Commission,  
Federal Trade Commission,  
Interstate Commerce Commission,  
Nuclear Regulatory Commission,  
Occupational Safety and Health Administration, and  
State Public Utility Commissions (Electric Power).

The Regulatory Processes and Effects Project not only helps to develop actual regulatory administrative experiments, but also helps formulate a generalizable body of methods for implementing and assessing the effects of regulatory changes on commerce, industry, and technological innovation.

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1. ETIP prefers to use the strategy of "administrative experimentation" when applicable. An administrative experimentation strategy (1) helps to bring about a change in the performance or operation of an agency, and (2) improves the understanding of the relationship between the change introduced and the results observed. Thus, an administrative experiment is conducted more in the sense of carefully evaluated change, and not in the social sciences sense of change controlled by the researcher, according to certain prescribed rules, solely for research purposes. A "quasi-experimental" research design may be the best that one can do. See, for example, Campbell, Donald T., "Administrative Experimentation, Institutional Records and Non-reactive Measures," Improving Experimental Design and Statistical Analysis, Stanley, J.C., ed., Chicago: Rand McNalley, 1967. Thompson, Charles W. N., and Rath, Gustave J. "The Administrative Experiment: A Special Case of Field Testing Or Evaluation," Human Factors, Vol. 16, No. 3, June 1974, pp. 238-252. Thompson, Charles W. N. "Administrative Experiments; The Experience of Fifty-Eight Engineers and Engineering Managers," IEEE Transaction on Engineering Management, Vol. EM-21, No. 2, May 1974, pp. 42-50.

In each situation, team members from ETIP, the ETIP contractor (PDI), and the regulatory agency jointly analyze an initiative in regulation, or its implementation as an experiment, and/or perform an assessment of its effects. Other interested parties are also involved, and the work is conducted under the management and review structure of the Regulatory Processes and Effects Project. Consequently, knowledge gained from similar projects can be shared. This document concerns the development of an effort with the Occupational Safety and Health Administration (OSHA). It was prepared and submitted under Department of Commerce Contract #7-35822 by the Regulatory Processes and Effects Project. Statements in the report do not necessarily reflect the views of the participating regulatory agencies. The report represents work in progress at this point in time. As part of the longer term development of both methodology and experimental results, these reports are used for information exchange. They are revised and updated periodically, as further progress and validation occur.

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VARIANCE IDEA



## I. INTRODUCTION AND SUMMARY

This paper describes ETIP/Urban Institute background work performed to identify and screen candidate interventions for administrative experimentation at the Occupational Safety and Health Administration in the Department of Labor. It briefly discusses the history of ETIP's work with OSHA leading eventually to a focus on OSHA authority to grant experimental variances to its health and safety standards. The results of background work to determine the appropriateness of experimental variances as a possible area for regulatory administrative experimentation are presented.

While this document reports on the substantive implications of ETIP/Urban Institute work, the conclusions stated are based upon very limited interviewing within OSHA and limited document review. Conclusions stated are tentative and preliminary. They would be strengthened through validation by direct observations of OSHA processes and careful review of OSHA records. This is an obvious limitation of the work done to date in OSHA. However, as this paper strives to illustrate, such background work, involving a modest level of effort, can generate useful information at the screening and selection stage for candidate regulatory administrative experiments.

The information gathered during this background work suggests several points relevant to the feasibility and desirability of treating an expansion of the experimental variance process as the basis for an OSHA/ETIP regulatory experiment:

- In the past, OSHA has granted only one experimental variance. However, OSHA hopes to use this variance as a test case possibly leading to a general policy (standards) change applicable to an entire mode of production.
- Interviews with OSHA staff indicate serious conceptual problems on the part of the agency regarding the systematic use of experimental variances as part of more general policy making. These problems revolve around possible increased worker exposure to risk, and a related preference for laboratory experimentation with new health and safety equipment or techniques.
- Characteristics of the variance process as a whole appear to limit the scope of variances as a mode of OSHA policy making. First, variance orders apply solely to individual employers on a case-by-case basis. Further, OSHA staff state that permanent and experimental variances should be considered only in the case of design standards, not performance standards.
- Use of the variance process to introduce new equipment or processes is limited by the ineligibility of equipment manufacturers to apply for variances in order to field test innovative equipment or processes in actual work settings.

In short, variances per se are not a mode of general OSHA policy making, although they may directly lead to policy of wider scope in the form of standards modification or revocation (see Figure III-1). In particular, experimental variances currently have a very tenuous link to more general OSHA policy making, and there appears to be significant barriers to establishing that linkage more firmly.

In light of these observations, this paper recommends that future OSHA/ETIP work, if any, to develop an administrative experiment should not be focused solely on OSHA's experimental variance authority. If further work is contemplated to develop an OSHA/ETIP experiment, the next phase of effort which appears necessary is a broadly focused study

of (1) the extent to which OSHA standards are a factor in the development and introduction of new technologies,'and (2) the full range of OSHA processes and practices used to adapt standards to changing technologies.

## II. BRIEF HISTORICAL BACKGROUND

### A. INTRODUCTION

The Occupational Safety and Health Act of 1970 created the Occupational Safety and Health Administration within the Department of Labor. OSHA's mandate is "to assure as far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources."<sup>1</sup> These goals are pursued through the promulgation and enforcement, at the federal or state levels,<sup>2</sup> of safety and health standards, and through research, training, and technical assistance in the occupational safety and health fields. The fiscal year 1978 Budget of the U.S. Government estimated a permanent personnel level of 2,717 OSHA employees. Federal workplace inspections were expected to total 90,000 in 1978, with an estimated 140,000 inspections occurring under the jurisdiction of the state governments.<sup>3</sup>

This section describes the process by which ETIP and OSHA decided to investigate the experimental variance process as a possible candidate for administrative experimentation. This process is divided into several phases:

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1. P.L. 91-396, Sec. (2)b.

2. States may in whole or in part assume jurisdiction for safety and health laws provided they have an OSHA approved state plan for doing so. The major requirements for such state plans is that the standards contained in them and their enforcement are "at least as effective in providing safe and healthful employment and places of employment" as comparable federal standards and enforcement, and which do not "unduly burden interstate commerce." P.L. 91-596, Sec. 18 (c).

3. The Budget of the U.S. Government, FY 1978, Appendix A, p. 513.

- Background Research Started by ETIP
- ETIP Contact with OSHA
- OSHA/ETIP Decision to Focus on Experimental Variances

## B. BACKGROUND RESEARCH STARTED BY ETIP

The variance project described in this report is the second subject area in which ETIP and OSHA have attempted to formulate a joint project. Previously, ETIP and OSHA discussed the possibility of a project involving the use of computers to speed the standards development process, and ETIP made \$200,000 available to OSHA for that project. However, the interest of both OSHA and ETIP in this idea declined, and in the Fall of 1976, ETIP began to investigate ideas for reformulation of an OSHA/ETIP project.

Several potential contractors who had done work in the occupational health and safety area had ideas for experimental projects with OSHA. These contractors included: the Public Interest Economics Center (PIE-C); Nicholas Ashford, of the MIT Center For Policy Alternatives; and SRI International. By February, 1977, both MIT and PIE-C had submitted proposals to ETIP to do preliminary background work on possible OSHA/ETIP experiments. The ideas, and the rationales, were as follows:

- Economic Incentives In Noise Regulation (PIE-C)

The idea proposed here involved the use of economic incentives to gain compliance with OSHA's noise standard, including the differentiation of penalties across industries. It was reasoned that such a regulatory approach would create a continuous and more flexible incentive structure for firms to reduce workplace noise levels in ways more appropriate to their specific situations than would engineering standards alone.

- Worker Committees (MIT)

This idea involved committees made up of both workers and management which would jointly develop innovative approaches to meeting OSHA standards. These innovative approaches could be implemented using the experimental variance provision of the OSHA act.

- Multipurpose Health Maintenance Organizations (MIT)

The approach proposed here was the use of HMOs to meet federal occupational health and safety requirements, including recordkeeping; health monitoring, maintenance and prevention; and safety engineering. The rationale was that these HMOs would reduce the regulatory burden on regulated firms, especially small firms which find it most difficult to meet regulatory requirements, and would serve as an incentive to compliance with health and safety standards.

These ideas were reviewed internally in ETIP in March, 1977 and small purchase order contracts were awarded in June to investigate their feasibility.

### C. ETIP CONTACT WITH OSHA

The ETIP Director, the regulatory area chief, and Dr. Ashford of MIT met with Basil Whiting, the deputy designate to Assistant Secretary Bingham, and OSHA staff (including the head of the Office of Policy Analysis, Integration, and Evaluation) in June 1977. At this meeting, OSHA expressed interest in working with ETIP to develop an experimental project. Several weeks later, ETIP staff gave a more formal presentation to OSHA on ETIP's mission and the administrative experiment process.

Over the ensuing several months, ETIP worked with its contractors to develop the economic incentives, worker committees and HMO ideas.

A brief status report was given to OSHA in September, and contacts re-established. The contractors completed their work by January, 1978.

#### D. OSHA/ETIP DECISION TO FOCUS ON EXPERIMENTAL VARIANCE

An initial briefing on the results of the ETIP contractors' work was given to OSHA in February, 1978, and detailed OSHA reactions were discussed in March. The consensus of these meetings was:

- Experimental Variances

The "Worker Committee" idea originally proposed by MIT was reformulated to one involving OSHA issuance of guidelines for the use of experimental variances (which might include a requirement for the use of worker committees). The rationale was that these guidelines would encourage firms to come to OSHA with alternative, innovative approaches to standards compliance requiring additional testing. If the approach in question worked under an experimental variance in practice, that firm and others would be allowed to use it. A particular concern was obtaining worker involvement in the process. OSHA suggested it might be willing to fund experimental or demonstration projects testing new safety technology. It was agreed that the initial approach to further development of this project might include ETIP's doing a case study of OSHA's existing experimental variance.

- Economic Incentives

The PIE-C report concluded that it would not be worthwhile, or at best would be very difficult to carry out an economic incentives experiment in the area of noise regulation. However, OSHA staff had some alternative ideas which warranted further discussion.

- Multipurpose HMO

It was agreed that a feasibility study would be required before this idea could be pursued further, and that ETIP would only keep abreast of any work which OSHA might initiate in this area.

It was thus agreed in May, 1978 that ETIP would investigate the feasibility of the experimental variance idea in more detail.<sup>1</sup>

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1. Additional OSHA/ETIP meetings held to discuss the prospects for a joint project involving experimental variances are synopsized in the appendix to this paper.

### III. OSHA EXPERIMENTAL VARIANCE AUTHORITY AS A CANDIDATE AREA FOR ADMINISTRATIVE EXPERIMENTATION

#### A. INTRODUCTION

OSHA's statutory authority to grant experimental variances to its standards was chosen as a candidate area for administrative experimentation because of its explicit connection to both experimentation and innovation in the health and safety fields. The ETIP/Urban Institute background work in this candidate experimental area was guided by a preliminary idea for a possible intervention. Although never specified in detail, this intervention would involve the increased use by OSHA of its experimental variance authority.<sup>1</sup> Figure III-1 describes the basic logical sequence of both steps necessary to implement such an OSHA policy change and some of the possible consequences.

In addition to authority to grant experimental variances, OSHA also has statutory authority to grant orders of temporary and permanent variance. Background work on these types of variances was also performed by the ETIP/Urban Institute team because (1) initial discussions with OSHA staff indicated that some variance applications which could have been treated as experimental in nature were instead treated as temporary or permanent variances, and (2) all variance applications are processed in the same office.

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1. There has been one experimental variance granted during OSHA's existence. It is discussed below.

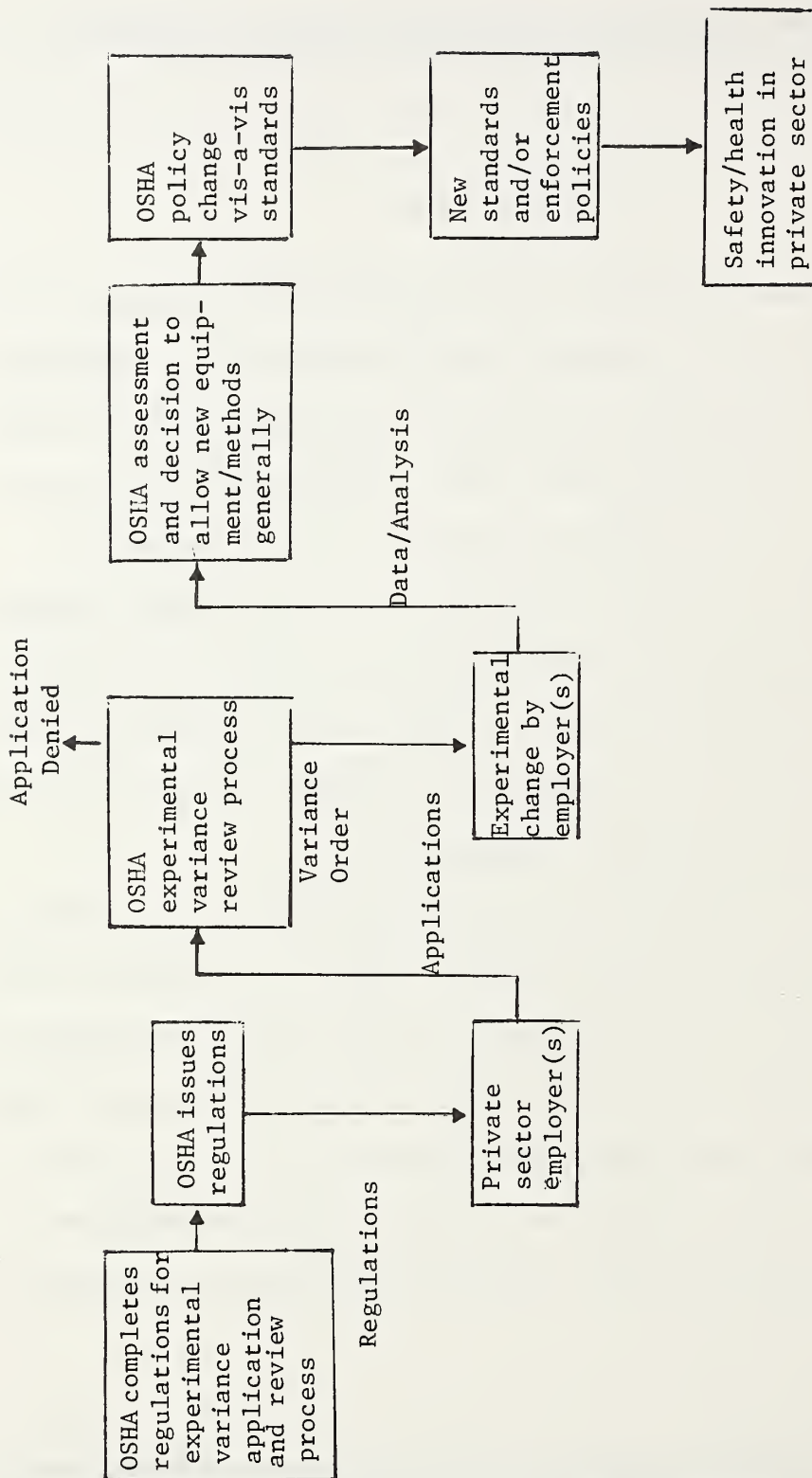


FIGURE III-1: BASIC LOGIC OF CANDIDATE EXPERIMENT OF EXPANDING OSHA'S USE OF EXPERIMENTAL VARIANCE AUTHORITY

## B. TYPES OF OSHA VARIANCES

The Occupational Health and Safety Act authorizes OSHA to grant three types of variances from its standards: experimental, temporary, and permanent.

Section 6(b) 6(c) of the OSHA Act which authorizes experimental variances, reads as follows:

The Secretary is authorized to grant a variance from any standard or portion thereof whenever he determines, or the Secretary of Health, Education, and Welfare certifies, that such variance is necessary to permit an employer to participate in an experiment approved by him or the Secretary of Health, Education, and Welfare designed to demonstrate or validate new and improved techniques to safeguard the health or safety of workers.

Temporary variances orders are granted when (1) an applicant employer cannot come into compliance with a standard by its effective date due to "unavailability of professional or technical personnel or of materials and equipment needed to come into compliance with the standard or because necessary construction or alteration of facilities cannot be completed by the effective date;" (2) the employer is taking "all available steps" to guard employees against the hazard covered by the standard; and (3) the employer has "effective" plans to come into compliance with the standard "as quickly as practicable."<sup>1</sup> Temporary variance orders may place conditions upon employers' practices during the period of the order.

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1. P.L. 91-596, Sec. 6 (b) 6(a).

Permanent variance orders may be granted by OSHA upon application by an employer showing that conditions of employment or processes used or proposed will result in employment which is "as safe and healthful as" that which would exist if the employer were in compliance with the standard.<sup>1</sup> These orders also may prescribe conditions which must be met by the employer.

### C. OSHA's VARIANCE APPLICATION AND REVIEW PROCESS

OSHA's variance application and review process is managed in its Office of Variance Determination located within the Office of the Technical Directorate (formerly located in the standards development office, then in the compliance office). Much of ETIP/Urban Institute's background work in the experimental variance area focused on the work of this office. This work consisted of interviews with staff concerning the nature of the variance process, and a review of the regulations governing the variance process.<sup>2</sup> In all instances, variance office personnel were in attendance at ETIP/OSHA meetings to discuss the prospects for experimental variances as an administrative experiment intervention.<sup>3</sup>

Interviews were also conducted at the supervisory level in OSHA's Office of Compliance Programming,<sup>4</sup> which is responsible for the

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1. P.L. 91-596, Sec. 6(d).

2. Interviews were held with James Concannon, Director of the Office of Variance Determination, and Dorothy Pulmer of that office on May 29, 1978 and June 7, 1978. The regulations for variance application and review appear as 29 CFR 1905.

3. These meetings are briefly described in the Appendix to this paper.

4. An interview was held with Donald Shay, Director of the Office of Compliance Programming, on June 30, 1978.

development and implementation of guidelines for OSHA field inspection operations, and in the Office of Safety Standards Development,<sup>1</sup> responsible for the development of new or modified safety standards and the revocation of existing ones. These interviews were conducted due to the substantial involvement of these offices in the variance application review and decision making process.

The purpose of this work was to gain an understanding of the context of agency process within which the intervention might be introduced; the role of experimental variances in carrying out the agency's mandate, as perceived by OSHA staff, the perceived utility or potential of experimental variances in addressing agency problems; and potential problems with expanded use of OSHA's authority to grant these variances.

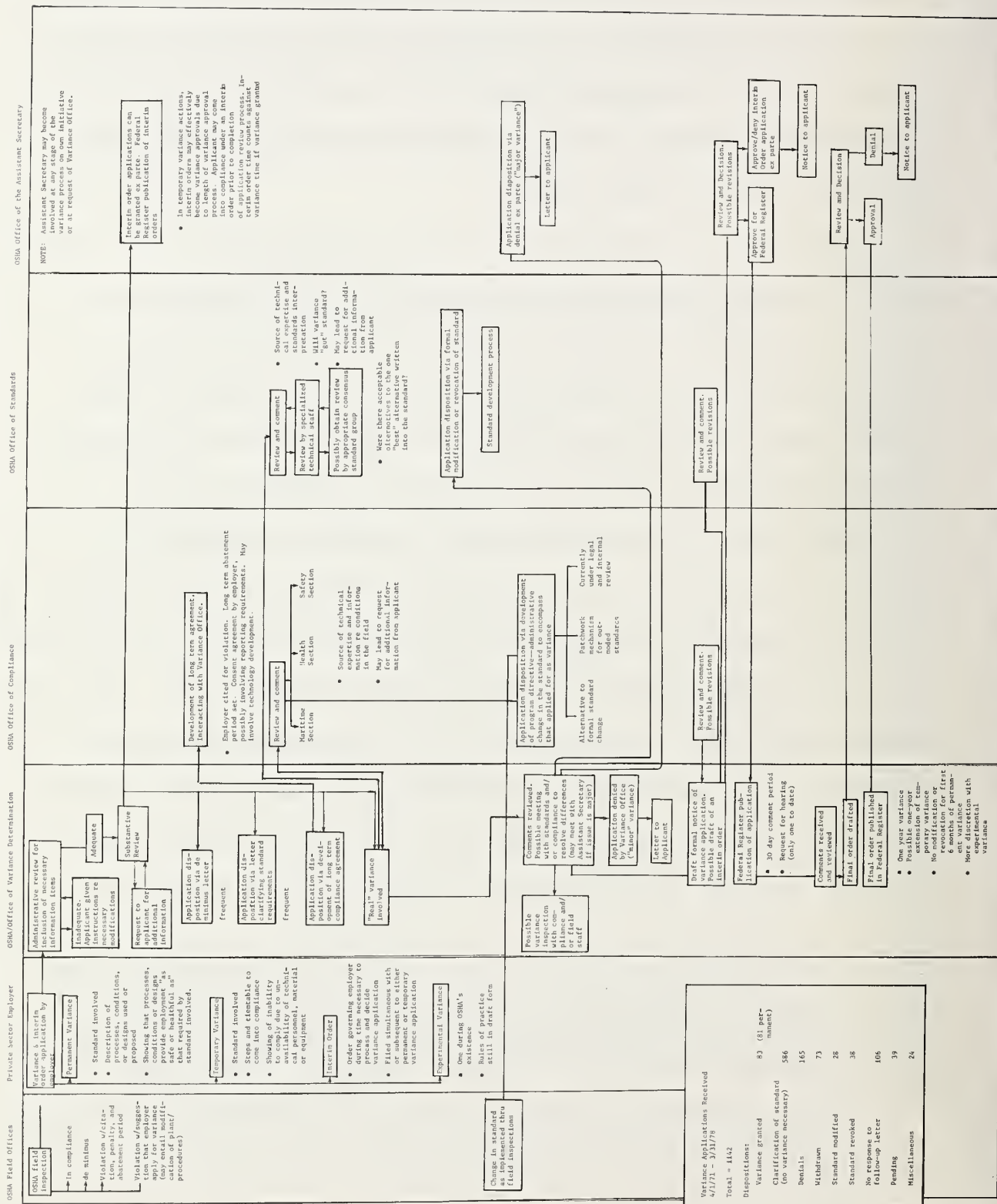
Part of the results of this work are presented schematically in Figures III-2 and III-3. These figures outline the activities involved in OSHA's temporary and permanent variance application and review process<sup>2</sup> and the agency's standards development process, respectively. These figures are based solely on information from the OSHA staff interviews referenced above, and have been validated through follow-up interviews with these same staff. These figures have not been validated through direct observation of the processes or through study of a sample of

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1. Interviews were held with John Proctor, Deputy Director of the Office of Safety Standards Development on June 23, 1978 and August 15, 1978. Additional information on standards development was gathered during a July 6, 1978 interview with Alice Suter of OSHA's Office of Health Standards Development concerning revision of OSHA's noise standard.

2. OSHA has not published regulations for the exercise of its experimental variance authority, although a draft of these regulations is in existence.

FIGURE III-2: RHETORICAL MODEL OF OSHA'S VARIANCE APPLICATION AND REVIEW PROCESS (7/13/78)



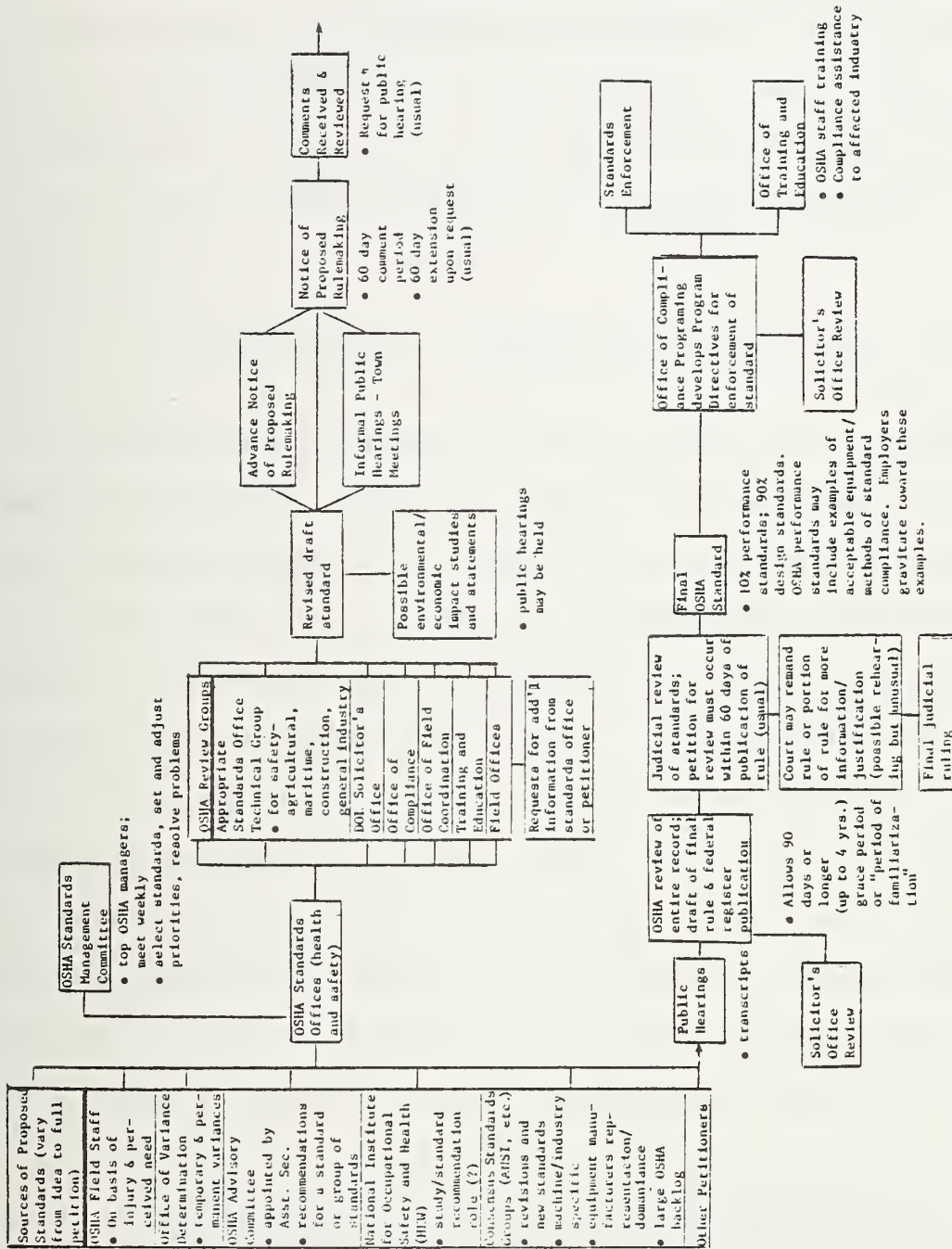


FIGURE III-3: ROUGH SCHEMATIC OF OSHA STANDARDS PROMULGATION PROCESS (AVERAGE TIME FROM INITIATION TO FINAL STANDARD APPROVAL, INCLUDING CHALLENGES, IS TWO TO FOUR YEARS)

OSHA's records on variance applications or developed standards. Further ETIP work, if any, on variances or standards in OSHA should include such a validation step. The result would undoubtedly lead to changes and/or elaboration of Figures III-2 and III-3. Further, OSHA is now in the process of reviewing and revising its variance application and review process, which will probably lead to changes in Figure III-2.

#### D. OSHA's USE OF ITS EXPERIMENTAL VARIANCE AUTHORITY

OSHA has granted one experimental variance during its existence. The variance order was issued on August 31, 1976,<sup>1</sup> and allows the Interlake Stamping Corporation of Willoughby, Ohio to equip and operate five mechanical power presses with electronic light curtain sensing devices. These devices function both to safeguard the press operator at the point of operation and as a tripping mechanism for the power presses. OSHA standards permit the use of presence sensing devices to guard the point of operation, but explicitly prohibit the use of such devices as a means of tripping a stroke of the press.<sup>2</sup> Initially, Interlake applied for a permanent variance. This application was published in the Federal Register on May 20, 1974.<sup>3</sup> After some debate within OSHA and in light of the express prohibition against presence sensing devices as tripping

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1. See 41 Federal Register 36702. The following discussion of the variance is based upon Federal Register documentation and interviews with variance office staff. The ETIP/Urban Institute team did not receive access to OSHA's file on this variance.

2. See CFR, Sec. 1910.217(c) (3) (iii).

3. 39 Federal Register 17804.

mechanisms, the application was modified to request an experimental variance and republished in the Federal Register on February 3, 1976.<sup>1</sup>

The variance order notes that the light curtain device has been used as a tripping mechanism in several European countries with satisfactory results. It also notes that OSHA, during the initial review of Interlake's application, considered the possibility of deleting from its mechanical power press standard the prohibition on such usage. This possibility was rejected, however, because European countries allowing this use of light curtains have procedures and facilities for the certification and approval of these devices, which the United States does not. The order states that one purpose of granting the experimental variance is to evaluate the safety of the light curtain as a tripping mechanism to determine whether the OSHA standard should be changed to authorize this use. It also notes that light curtain use as a tripping mechanism may increase productivity, which would serve as an incentive for employers to voluntarily comply with OSHA's power press standard if it were modified to allow this use.<sup>2</sup>

The Interlake variance was granted for a one year period ending August 31, 1977. OSHA staff have indicated that a two-year extension of the variance will soon be granted. During this forthcoming period, OSHA hopes to gather sufficient data for a decision on revising the mechanical

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1. 41 Federal Register 4994.

2. The OSHA notice granting the variance to Interlake states that: the increased productivity possible under this system may also help provide safer working conditions for power press operators, if the experiment should justify general use of the system, in that it would provide an incentive for employers to voluntarily comply with the standard.

See 41 Federal Register 36703.

power press standard. Perceived problem areas include necessary limitations, if any, on the press sizes for which light curtains can be used to trip operation, the types of presses on which it can be used, and OSHA enforcement of any such limitations.

OSHA staff have stated that there have been a few additional instances in which experimental variances might have been appropriate, but were handled by OSHA as other types of variances (one involved saw guarding and the other OSHA's cotton dust standard). As noted, OSHA has not published regulations for experimental variances, although draft regulations have been in existence for some time.<sup>1</sup>

The limited use of experimental variances and the absence of published regulations seem to be related to OSHA's concerns about variances generally and experimental variances particularly. On the basis of our limited interviewing of OSHA staff, apparent concerns include the following:

- Large scale granting of variances, prima facie, undercut OSHA's mandate. Therefore, variances are generally "frowned upon" by OSHA, and the number of variances granted has been limited by design.<sup>2</sup>

Permanent variances, in particular, are perceived as potentially "gutting" standards and/or as surrogate revisions of standards outside the formal process for standards change.

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1. Plans call for the publication of experimental variance regulations as part of an overall review and revision of OSHA's variance processes by the Spring of 1979.

2. See Figure III-2; in the period from April 1, 1971 to March 3, 1978, 1,100 plus applications were received and 83 variances granted. However, the variances granted figure is misleading because temporary variances are largely granted in the form of interim orders. That is, the applicant employer typically comes into compliance with the standard(s) in question during the term of an interim order but before completion of OSHA's variance application review and decision process. In such cases, the temporary variance application becomes moot.

- Experimental variances carry the additional potential of OSHA's appearing to deliberately allow involved workers to be exposed to higher levels of risk or hazard than that allowed under the applicable standard. The term "experimental" itself, to some, apparently suggests the use of workers as "guinea pigs," and exposes the agency to criticism from parts of its constituency.

These concerns are consistent with frequently stated preferences among most interviewees for a strict laboratory approach to experimentation with new safety or health devices or processes as a way of determining the appropriateness of OSHA's approval of new techniques. Such an approach would not involve the exposure of volunteer workers to hazard or risk levels higher than those proscribed under OSHA standards.<sup>1</sup> The OSHA staff interviewed exhibited concern with the distinction between laboratory and field testing, and the possible need for human factors engineering. In light of this, variance office staff stated that experimental variances might, if necessary, play an ancillary role in future OSHA-initiated health and safety research and development, which in the past has been very limited. That is, OSHA may wish to have some particular process or product field tested, and seek a firm to do so under the experimental variance provision.

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1. Note that in the light of experimental variance, substantial prior evidence existed in the form of European experiences to form a firm justification for the variance and substantially reduce the potential that the experiment would expose workers to higher risk of injury.

## E. LIMITATIONS ON THE USE OF EXPERIMENTAL VARIANCES TO FACILITATE TECHNOLOGICAL INNOVATION

Three additional considerations suggest limits on the extent to which experimental variances can be used to facilitate technological advances.

First, OSHA standards are of two generic types, performance standards and design standards. The two types are difficult to define and, at times, to distinguish in practice. Performance standards place quantitative limits on the level of hazard to which a worker may be exposed; an example is the maximum dba exposures contained in OSHA's noise standard. A design standard, on the other hand, specifies minimum equipment characteristics or design specifications that must be met by employers to safeguard workers; an example is specifications in OSHA's standard for ladders. Performance standards are more prevalent in the health area. In the safety area, one interviewee estimated that 90 percent of the standards are design standards and 10 percent are performance standards. However, in some cases, performance standards contain examples of acceptable approaches, techniques, or designs known to meet the performance criteria. These examples are provided as a guide to both OSHA enforcement activities and industry compliance. They also are thought by some to make it easier for small firms to comply. Interviewees suggested that there may be a tendency for industry to adopt the example(s) contained in such standard as known, unrisky means of compliance, rather than develop

or adopt different approaches.<sup>1</sup> OSHA interviewees also stated that while variances might be appropriate for design standards, permanent and experimental variances should not be granted for performance standards because these would represent a deliberate lowering of the standard by OSHA.

Constraints on OSHA's regulatory authority also appear to limit the extent to which variances can be used to facilitate technological innovation. OSHA has authority over employers, not over equipment designers and developers (except in their capacity as employers). As a result, variances of any type may be granted only to employers. Therefore, an equipment manufacturer desiring to introduce, through a various application, new equipment of uncertain compliance with OSHA's design specifications would first have to persuade an employer to apply for a variance. This employer would necessarily become involved with OSHA's administrative processes for variance application review, including the possibility of a variance inspection by OSHA. Such an application also can lead to the involvement of the employer's workers and their union representatives. Further, the eventual result may be OSHA rejection of the application. In short, the cost and risk for the employer seem significant. In addition, from the equipment manufacturer's perspective, the variance, if granted, would only apply to one of his customers and would not necessarily expand his potential market, absent a more general OSHA policy

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1. Performance standards were perceived by interviewees as allowing more flexibility and room for compliance innovation than design standards. However, any approved design example contained in a performance standard may be a disincentive to innovation. One OSHA staff person stated that performance standards in effect state a problem which industry can solve in numerous ways, while design standards state a solution to a perceived problem and tend to put a lock on innovative ways of dealing with that problem.

or enforcement change approving the new design. This appears to be an inherent limitation on the exercise of variance authority to approve the introduction of innovative equipment of unknown compliance with OSHA design standards. Nevertheless, one OSHA source stated that some equipment manufacturers have in the past attempted to introduce innovations through the use of variance applications, but abandoned the effort due to the amount of "red tape" involved (no examples were given). A cautionary note about this scenario is necessary, however. The nature of interaction between OSHA and equipment manufacturers seeking to innovate was not examined by the ETIP/Urban Institute team, and further work is needed to understand the extent and nature of this relationship. These manufacturers may not regard OSHA standards as inhibiting innovation, or they may have found acceptable ways of innovating within the framework of OSHA standards and processes (see Chapter V below).

Last, as noted above, the variance process may only allow change or innovation on a case-by-case basis limited to individual employers. Unless variances lead to a more general OSHA policy or enforcement change, which they may, innovation through variances appears only one step removed from a prohibition of the innovation in question.

#### F. IMPLICATIONS FOR AN OSHA/ETIP REGULATORY EXPERIMENT FOCUSED ON EXPERIMENTAL VARIANCES

The work performed to date suggests several points relevant to the feasibility and desirability of treating an expansion of the experimental variance process as the basis for an OSHA/ETIP regulatory experiment:

- In the past, OSHA has granted only one experimental variance. However, OSHA hopes to use this variance as a test case possibly leading to a general policy (standards) change applicable to an entire mode of production.
- Interviews with OSHA staff indicate serious conceptual problems on the part of the agency regarding the systematic use of experimental variances as part of more general policy making. These problems revolve around possible increased worker exposure to risk and, relatedly, a preference for laboratory experimentation with new health and safety equipment or techniques.
- Characteristics of the variance process as a whole appear to limit the scope of variances as a mode of OSHA policy making. First, variance orders apply solely to individual employers on a case-by-case basis. Further, OSHA staff state that permanent and experimental variances should be considered only in the case of design standards, not performance standards.
- Use of the variance process to introduce new equipment or processes is limited by the ineligibility of equipment manufacturers to apply for variances in order to field test innovative equipment or processes in actual work settings.

In short, variances per se are not a mode of general policy making, although they may directly lead to policy of wider scope in the form of standards modification or revocation (see Figure III-1). In particular, experimental variances currently have a very tenuous link to more general OSHA policy making, and there appears to be significant barriers to establishing that linkage more firmly.

A regulatory experiment involving an intervention which is not well connected to more general OSHA policy suggests that any agency impacts and commercial/technological consequences which might result would be of limited scope. The area of experimental variances appears to fall into this category. For this reason, experimental variances do not appear to

be an appropriate focus for an ETIP/OSHA regulatory experiment. Further, focusing on the general variance process per se without consideration of its connection to more general OSHA policy likewise seems inappropriate. Any further ETIP/OSHA work to develop a regulatory experiment involving the variance process should consider the potential connection to more general forms of OSHA policy.

## IV. SOME MECHANISMS OF POLICY CHANGE AT OSHA

### A. INTRODUCTION

During the interviewing of OSHA staff, it was suggested that variance orders are one among several OSHA processes for adapting OSHA policy to special circumstances and/or attempting to insure that OSHA standards are not outmoded vis-a-vis developing industrial processes and equipment. Chapter III of this paper suggests that variances per se are a limited mode of OSHA policy making, due to their case-by-case applicability to individual employers, and therefore probably have limited commercial and technological impacts.

These interviews allowed the ETIP/Urban Institute team to identify alternative decision making processes, in some cases involving more general policy, which exist at OSHA to achieve flexibility and currency in the standards, and which may affect the rate and direction of technological change in OSHA-regulated industries. This chapter presents that information as an initial identification of alternative modes of policy making at OSHA. Selection of an optimal intervention promising measurable and significant commercial and technological consequences requires understanding of the full range of regulatory policy modes or options. This chapter is a beginning step toward gaining such understanding about OSHA regulation.

## B. IMPETUS FOR OSHA POLICY CHANGE

Several sources of impetus for OSHA policy change were identified in the course of interviewing OSHA personnel. The introduction of new technology in the workplace or changes in manufacturing processes may require the interpretation or modification of existing standards or OSHA enforcement practices. Discovery of new hazards may likewise necessitate the promulgation of a new standard. Either of these sources of change may lead national consensus standard setting groups to modify their standards. Such modification may create discrepancy between consensus group standards and OSHA standards. OSHA may, in turn, be encouraged to review and, if appropriate, change its standards to reduce such discrepancy to avoid confusion among employers, manufacturers, and builders.

Another source of change in OSHA policy is the discovery that original standards as adopted by OSHA were too narrowly drawn. As indicated in Figure III-2, this realization may occur in the course of the variance application review process. The Occupational Safety and Health Act of 1970 provided an initial period of two years following the effective date of the Act during which OSHA could adopt existing national consensus standards and federal standards as OSHA standards without following the requirements of the Administrative Procedures Act.<sup>1</sup> OSHA's original body of standards was largely created through this grandfathering procedure. However, in some instances, the consensus groups drafting standards adopted the option perceived as best among several acceptable alternatives. When OSHA, in turn, promulgated the standard in toto, the one

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1. See Sec. 6(a) of the Act, P.L. 91-596.

the one option became the federal standard, despite the existence of acceptable alternatives. The identification of such alternatives acceptable to the original consensus group drafters but falling outside the OSHA standard creates pressure for OSHA to interpret or modify its standards to allow the alternative(s).

### C. MECHANISMS FOR OSHA POLICY CHANGE

OSHA has several mechanisms which allow it to adopt standards in response to a perceived need for change. OSHA variance orders are one such mechanism. We have noted that the capability of OSHA to use variances, per se, as a tool of policy change is limited by the case-by-case applicability of variances. Variance applications, as indicated in Figure III-2, also involve policy making on a case-by-case basis in the form of letters clarifying standards or stating that the standard deviation in question is "de minimus" in nature, that is, of no serious consequence to worker safety or health. Additionally, variance applications may result in the formulation of a long term voluntary compliance agreement between OSHA and an employer not in compliance with OSHA standards. Variance orders require a plan for the employer to come into compliance within, at most, a two year period. Long term voluntary compliance agreements are used in situations where an employer requires more than two years to come into compliance and/or has no definite plan for doing so (see Figure III-2).

Another case-by-case source of OSHA decision making is the exercise of discretion by field inspectors on site. These inspectors may also decide that deviations from standards are de minimus in nature.

The variance office appears to play an important role within OSHA as a sensor of the need for broader policy change. Variance applications may result in the initiation of formal standards modification, standards revocation, or in the development of OSHA program directives (see Figure III-2). Program directives are administrative guidelines for standards enforcement at the field level and are written in the Office of Compliance Programming. In effect, they are administrative interpretations of the standard. Each new OSHA standard is accompanied by the issuing of a program directive for its enforcement. A variance application may lead to a program directive instructing OSHA acceptance of the device or practice in question. Program directives are not published in the Federal Register, but appear in a Commerce Clearinghouse publication, with copies made available to employers (usually large ones) who might be interested. These directives are a mechanism for broader OSHA policy making, but their use has recently been brought into question by legal and internal OSHA review.

OSHA's standards development process is another mechanism for broad policy change, but may be complex and time consuming (see Figure III-3). Some OSHA staff stated that the agency's capability to use its case-by-case mechanisms and program directives in lieu of formal standards change to adapt standards to technological innovations and changing industrial processes is declining. Interviewees reported a backlog of needed

changes in OSHA standards, and increasing pressure on the agency to take a more direct approach to standards revision through comprehensive reviews of groups of standards and through its formal standards development process. OSHA is reportedly hindered in its attempts to reexamine and update standards by limited resources (especially legal resources) and the growing complexity of the formal standards change process. OSHA interviewees indicated that the process has become more time and resource consuming with additional requirements for environmental and economic impact statements and the increased frequency of court challenges of new standards. One OSHA source stated that the result has been a significant decline in OSHA's capability to promulgate new or modified standards, particularly in the health area, which generally involves more complex issues. It was suggested that OSHA is losing its flexibility to adapt to new technological developments within the framework of existing standards, particularly if the use of program directives becomes more limited, and that the agency may have to develop new means of rapidly deciding and announcing what it will accept as a means of compliance. That may prove difficult due to a perceived lack of technical expertise available at the agency, compounded by the lack of an OSHA certification program or capability,<sup>1</sup> or a workable accreditation standard for testing laboratories.

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1. See the light curtain experimental variance discussion above.

## V. OSHA'S ROLE IN THE EQUIPMENT MARKET

The extent and nature of the impact of OSHA policy, including variances, on technology partially depends upon the agency's role in the marketplace for industrial equipment and manufacturing processes. As noted in Chapter IV, OSHA does not have direct jurisdiction over developers, designers, and manufacturers of industrial equipment. However, the interviewees felt that the agency is inextricably, though indirectly, involved in the market place for this equipment.

OSHA's acceptance or rejection of a new process, machine, or device is reportedly crucial for developing equipment of uncertain compliance with OSHA standards. Interviewers indicated that companies often want some form of OSHA approval for their innovations. Without such approval, marketing of the innovation can become considerably more difficult or impossible.<sup>1</sup> Also, established equipment manufacturers reportedly desire tight OSHA standards and strict enforcement because this helps protect their markets and limits their legal liability in the event of worker injury.<sup>2</sup> Particularly in the past, OSHA has received requests from developers (referred to as "widget builders" by one interviewee) for approval

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1. In this context, one OSHA interviewee stated that it was amazing how many problems seem to "blow away" with a piece of paper from OSHA's national office approving the use of some device or process.

2. This suggests the possibility that narrow, strictly enforced OSHA standards are a means of restricting competition through design innovation by increasing the risk involved to manufacturers attempting to enter a market through the development of new equipment.

of new safety devices, but current OSHA policy is not to approve or disapprove the equipment in question.<sup>1</sup> OSHA has the authority to grant such approvals if a piece of equipment has successfully gone through tests by an OSHA accredited laboratory, but OSHA has no testing capability of its own upon which to base approval. Further, while OSHA has a testing laboratory accreditation standard, it reportedly has never been implemented due to lack of resources.

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1. At one time, OSHA did approve equipment designs through letters to requesting manufacturers, but discontinued this practice on the basis of lack of expertise and the burdensomeness of that approach.

## VI. POSSIBLE FUTURE OSHA/ETIP WORK

As noted above, it appears that OSHA's variance authority, including its capability to grant experimental variances, is only one among several available case-by-case or more general mechanisms through which standards can be interpreted or modified so as to be current with the technological state-of-the-art and not serve as barriers or disincentives to innovation. In general, variances, by virtue of their case-by-case applicability, appear to be inherently limited as a mechanism to facilitate advances in technology. In addition, the granting of experimental variances by OSHA is a source of substantial concern to the agency.

In light of this limitation and these concerns, it is recommended that if there is to be any future ETIP work in OSHA, that work should not focus solely on experimental variances or the general variance process as areas for regulatory experimentation. Any future work, including the identification and selection of an intervention(s), would more fruitfully examine the full range of OSHA administrative processes for updating their standards and enforcement policies relative to new technology or industrial processes.

To date, ETIP/Urban Institute work has not been sufficient to gain an understanding of the nature in which the full range of OSHA's standards adaptation mechanisms operate and any associated problems; of whether or not the full range of available change processes has been identified; or to determine the circumstances under which one mechanism is preferable to others, given procedural restraints (that is, how these

mechanisms are managed by OSHA). Any further ETIP work with OSHA should strive to gain an understanding of the extent to which there is lag between OSHA standards and state-of-the-art technology or industrial processes, how OSHA reacts to changing technologies, and how the agency's adaptive mechanisms operate. The objective of such further background work would be the identification and screening of possible candidates for an OSHA/ETIP regulatory administrative experiment.

This work would involve a substantive effort, since it would cut across almost all of the agency's functions from the national office to the field level. Of particular concern and difficulty is the nature, exercise and management of discretion available to OSHA inspectors in the field. The field compliance staff is reportedly an important source of information on the need for OSHA acceptance of new technology and the extensiveness of innovation in the private sector. Also, OSHA inspectors reportedly play a primary role in the agency's equipment approval function.

Although some OSHA staff feel that the agency's policy plays a significant role in shaping the market for industrial equipment, this role has not been examined by the ETIP/Urban Institute team. In addition to the work suggested above, future ETIP work with OSHA, if any, should include some effort to determine the importance and nature of OSHA's role in this marketplace as baseline information to assist in the identification of experimental interventions with links to technology. This work could begin with interviewing of equipment manufacturers and purchasers, and study of the work of consensus standards setting organizations.



APPENDIX

SYNOPSIS OF OSHA/ETIP MEETINGS ON THE  
EXPERIMENTAL VARIANCE IDEA

A brief synopsis of OSHA/ETIP meetings to discuss experimental variances as an area for possible administrative experimentation is presented below in chronological order:

May 29, 1978: Roland Weiss, John Waller, Mike Mulkey from ETIP/Urban Institute; Peggy Richardson (Office of Policy Analysis, Integration, and Evaluation), James Concannon (Director, Office of Variance Determination), and Dorothy Pulmer (Office of Variance Determination) from OSHA.

This was the initial meeting with OSHA staff to gather preliminary information on OSHA's use of experimental variance authority and prospects for expanded use of that authority.

Variance office staff indicated significant OSHA reluctance to grant experimental variances involving deliberate exposure of workers to increased hazard; OSHA wants to avoid accusations of treating workers as "guinea pigs." A preference was expressed by OSHA staff for laboratory experimentation with new workplace health and safety devices or approaches. There is a possibility that OSHA will use its grant authority to encourage safety and health technology advances. This might involve experimental variances as needed. It was noted that an experimental variance is appropriate only if (1) a standards violation would be involved in an experiment, and (2) there is a reasonable expectation that the experiment could lead to health or safety advances.

OSHA staff stated that the purpose of experimental variances is to determine the appropriateness of changes in the standards.

Although the light curtain experimental variance is the only one in OSHA's history, OSHA staff felt that there would be others.

June 7, 1978: Roland Weiss and Mike Mulkey; James Concannon and Dorothy Pulmer.

This meeting with variance office staff was to obtain more detailed information on OSHA's process for variance application review and decision making.

OSHA staff expressed a preference for firmly trying expanded use of experimental variances, if needed, to a program of OSHA grants for health and safety research and development. It was also noted that in many cases, such research and development could occur wholly within a laboratory setting without the need for an experimental variance in an actual workplace setting.

OSHA staff stated that the need for granting an experimental variance depends upon the nature of the standard in question. Experimental variances (and permanent variances) imply the involvement of design standards. There should be no variances (except temporary variances) involving performance standards. OSHA currently emphasizes the development of performance standards.

July 6, 1978: Roland Weiss and Mike Mulkey; Alice Suter (Office of Health Standards Development), Ray Donnelly (Office of Policy Analysis, Integration, and Evaluation), and Peggy Richardson.

This meeting focused on the involvement of experimental variance in the development of a new OSHA noise standard (now on-going), and on the standards development process generally.

Alice Suter stated that experimental variances could possibly play a role in the development and implementation of a modified noise standard, but did not offer specific suggestions. She also suggested that ETIP could become involved in studying the new noise standard in its entirety as an experiment; an experiment involving variable noise standards across industries; or experimentation involving variance in noise abatement strategies. However, she did not conceive of experiments to involve monitoring the impact of experimental policy and using the results to modify OSHA policy.

Peggy Richardson suggested that a problem assessment in the noise area is needed prior to any decision on experimentation involving the noise standard.

August 21, 1978: Roland Weiss and Mike Mulkey; Haze Bell (head of the Directorate of Technical Support), Don Lyons (Directorate of Technical Support), Peggy Richardson, and James Concannon.

This meeting was held to review ETIP's work on experimental variances; to brief Haze Bell, the new director of the division which contains the variance office, on ETIP's mission and approach; and to get OSHA comments on ETIP's recommendations for the future direction of the project.

In general, the ETIP/Urban Institute team recommended that future work should be more broadly focused on the full range of OSHA's

processes, including experimental variances, to adapt standards to changing technology and processes in the workplace. It was recommended that a broadened focus include other variances, program directives, the exercise of discretion by field inspectors, and OSHA's standards development process.

The OSHA staff present expressed disinterest in such a broadened approach. Peggy Richardson was surprised that ETIP/Urban Institute's background work on experimental variances has led to an interest in the standards development process. She also suggested that it might not be an appropriate time for any ETIP project with OSHA.

OSHA staff again expressed misgivings about the appropriateness of focusing on experimental variances as an OSHA process. Several new possible foci for ETIP's work were suggested, including OSHA's fines process and the effects of legislative changes in the maximum amounts for willful standards violation, if such legislative changes occur. Haze Bell and James Concannon expressed interest in an engineering study of the light curtain variance, with a particular emphasis on whether the use of light curtains on power presses increased productivity. The ETIP/Urban Institute team were unsure of the appropriateness of such an engineering study from ETIP's perspective.

The meeting concluded with an agreement to meet again to discuss some type of case study of the light curtain experimental variance.

August 31, 1978: Dan Fulmer (ETIP), Roland Weiss and Mike Mulkey;

Don Lyons, Ray Donnelly, James Concannon, and Dorothy Pulmer.

This meeting was held to further discuss the prospects for a case study of the light curtain variance.

Dan Fulmer briefed OSHA staff on ETIP's role and mission, emphasizing interest in projects relating to generic regulatory issues which will produce results useful to decision makers in ETIP's partner agency. Skepticism was expressed by Don Lyons about the utility to OSHA from its involvement with ETIP and expressed apprehension that ETIP's role was similar to that of the General Accounting Office. Dan Fulmer attempted to assure him that ETIP's method was to work closely with agency partners to the mutual benefit of both.

Variance office staff again stated that experimental variances should be used only where needed as an ancillary tool in OSHA research, development or demonstration efforts to test new technology on its own initiative. They saw little utility in a study of the experimental variance process, because all variance processes were now under review and subject to change, and because the prospect is for experimental variances to play a very limited role in OSHA efforts to update its standards and policies to the technological state-of-the-art. Interest was again expressed by OSHA in an engineering case study of the light curtain to assist OSHA in deciding upon the need for a change in the applicable standard. ETIP stated that such a study is too particularistic and is not appropriate given ETIP's interest in generic regulatory issues.

The ETIP/Urban Institute team suggested an administrative case study of the light curtain variance involving access to OSHA's files on that variance. We suggested that such a study might inform changes in OSHA's

variance process now under consideration and would provide a firm basis for deciding upon future ETIP/OSHA work in this area, if any. OSHA staff were assured that any ETIP/Urban Institute report on such a case study would be submitted to OSHA for review and comment prior to any release outside of ETIP. There was reluctant agreement by OSHA to such a study and to ETIP/Urban Institute access to the light curtain variance file. The ETIP/Urban Institute team agreed to contact the variance office within the next few weeks to review the file, upon the availability of OSHA staff time to assist.

October 17, 1978: Roland Weiss and Mike Mulkey; Ray Donnelly.

Approximately two weeks following the August 31st meeting, ETIP/Urban Institute team members contacted OSHA staff to arrange access to the light curtain file, and were informed that a meeting among the involved OSHA staff led to a decision that OSHA would not participate in an administrative study of that variance. Reasons given were the perceived lack of utility for OSHA; that the experimental variance focus was too narrow; and, ETIP should take a broader perspective on how OSHA can stimulate advances in health and safety technology; and that experimental variances are passive incentives to technology, not positive incentives.

The meeting with Ray Donnelly was held to discuss OSHA's ideas for an alternative ETIP/OSHA project. He suggested that ETIP undertake a general background study of OSHA mechanisms to adapt standards to changing technology. This study would be geared to the identification of

regulatory changes by which OSHA might improve the currency of its policies with the technological state-of-the-art in the regulated industries. The mechanisms identified would in turn become candidates for implementation on an experimental basis by OSHA. Mr. Donnelly indicated that the possibility of this study had only been discussed informally with other OSHA staff, and suggested that we jointly draft a brief concept paper outlining the work. The concept paper would be reviewed by OSHA.

The ETIP/Urban Institute team expressed misgivings about this idea, noting that it would mean beginning a new and lengthy search for an intervention with no guarantee of success. It was noted that such a study would bring ETIP full circle to the beginning of its work with OSHA, and that ETIP was not optimistic about the prospects for generating an experimental intervention in light of past work with the agency.

The ETIP/Urban Institute team agreed to consider the study idea and respond in the the near future.

No further meetings have been held between ETIP and OSHA as of February, 1979.

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