

Managing Flood Risk: Technical Uncertainty in the National Flood Insurance Program*

Michael S. Baram**
J. Raymond Miyares***

The national flood insurance program has been in operation a little more than a decade. . . . [T]his is a suitable time to ask how far it has come toward meeting its objectives, what problems it has encountered, and what that experience suggests as to its further development. . . .

Of the total number of 1,800,000 policies in force . . . [o]f the more than 16,500 communities with policies in force. . . . [a] program of \$73 billion coverage. . . . is bound to encounter troublesome questions of policy and operating procedure.¹

I. INTRODUCTION

Congress established the National Flood Insurance Program ("NFIP")² to prevent flood damage and to provide relief after such damage has occurred. The NFIP is administered by the Federal

* The research forming the basis for this publication was conducted pursuant to a contract with the Federal Emergency Management Agency. The substance of such research is dedicated to the public. Any opinions, findings, conclusions, or recommendations expressed in this publication do not necessarily reflect the views of the Federal Emergency Management Agency. The authors wish to thank the following for their cooperation and assistance: Messrs. Arthur Zeizel, William Cumming, Brian Mrazik, Robert Sokolove, Edward Thomas and John Schiebel of FEMA; Jerome Degen and Robert Langen of Anderson-Nichols; and Dr. Willie Vicens of Camp, Dresser & McKee.

** Partner, Bracken & Baram, Boston; Adjunct Professor of Law, Boston University Law School; B.S. 1957, Tufts University; L.L.B. 1961, Columbia University.

*** Associate, Bracken & Baram, Boston; Research Associate, Boston University Law School; S.B. 1971, Massachusetts Institute of Technology; J.D. 1974, University of Virginia.

1. *Flood Insurance and Crime and Riot Reinsurance: Hearing Before the Subcomm. on Insurance of the Senate Comm. on Banking, Housing and Urban Affairs*, 96th Cong., 2d Sess. 4-5 (1980) (on oversight and the reauthorization of the three insurance programs) (statement of Dr. Gilbert F. White).

2. The program was established in substantially its present form in the National Flood Insurance Act of 1968 ("NFIA"), Pub. L. No. 90-448, 82 Stat. 572 (codified at 42 U.S.C. §§ 2414, 4001-4128 (1976 & Supp. III 1979)).

Emergency Management Agency ("FEMA" or "Agency")³ and has become a major influence on state and local land use regulation and a critical factor in private land use decisions across the nation.

This innovative program seeks to control the risk of flood damage by inducing local government to take land use control and other "police power" measures. It offers, as the inducement for such measures, the availability of federal flood insurance at low cost to property owners within the jurisdiction of the local government. Community compliance with NFIP requirements establishes the eligibility of property owners for the benefits of federal insurance coverage, and thus advances the congressional objective of flood risk reduction.

This program involves the federal government significantly—but indirectly—in local land use and private development. Although the program is highly structured, it is based on incomplete and changing data as to flood risk potential, and involves the use of analytic methods for predicting flood risk that produce good "estimates" at best. Further, its success depends upon the vigor of local efforts to control development in flood-prone areas, which will vary considerably with local values, legal authority and private development pressure. Finally, extra-community developments constitute an inevitable dynamic condition which lies beyond the control of FEMA and its member communities, and may dramatically change the potential flood risk. An upstream development, for example, may change the flood potential of a river for a number of downstream communities struggling to comply with NFIP requirements.

Nevertheless, Congress chose to provide the benefit⁴ of subsidized flood insurance, and has affirmed this decision consistently.

3. Reorganization Plan No. 3 of 1978, 43 Fed. Reg. 41,943 (1978), reprinted in 5 U.S.C. app., at 360 (Supp. III 1979), and in 92 Stat. 3788 (1978), established the Federal Emergency Management Agency. The plan was activated effective April 1, 1979. Executive Order 12,127, 44 Fed. Reg. 19,367 (1979). The plan transferred to FEMA the functions of the Federal Insurance Administration which had been a part of the Department of Housing and Urban Development. The powers of the Secretary of Housing and Urban Development were transferred to the Director of FEMA.

4. A "benefits" program is one involving a "benefit . . . , whether in money or in kind [such as the availability of insurance coverage], which is made available out of federal funds or with respect to which a federal agency has assumed the responsibility for determining . . . entitlement." Mashaw, *Quality Assurance Systems in the Adjudication of Claims of Entitlement to Benefits or Compensation*, in 3 ADMINISTRATIVE CONFERENCE OF THE UNITED STATES, RECOMMENDATIONS AND REPORTS 161 (1974) [hereinafter cited as Mashaw]. Cf. *Rainbow Valley Citrus Corp. v. Fed. Crop Ins. Corp.*, 506 F.2d 467, 470 (9th Cir. 1974) ("The Federal Crop Insurance Act does not create a system of statutory benefits; rather, it authorizes the FCIC to make contracts under certain circumstances.").

To deal with these and other implementation problems, it vested the Agency (originally the Department of Housing and Urban Development) with considerable discretion for designing the NFIP and its insurance eligibility requirements.⁵

This article addresses two problems that have emerged under the NFIP. Both problems are attributable in large part to the technical uncertainties and changing circumstances which beset the program.

First, the article gauges the bases for rejecting existing flood hazard reports in favor of "restudy." When should a FEMA flood insurance study ("FIS") of a community's flood risk, insurance availability, floodplain mapping and community compliance requirements be corrected, amended or superseded by a restudy? What procedures should be employed in making that decision? This is a problem of growing importance to FEMA, because the FIS is central to FEMA determinations and the availability of insurance, and the rising demand for restudies claims an increasing share of the Agency's budget. Indeed, restudies may soon be capturing virtually all study funds to be committed for the NFIP.⁶

Second, the article sets up parameters for the Agency's response to new technical or methodological developments which promise greater accuracy in floodplain mapping and predictions of risk. Under what circumstances should FEMA adopt new engineering assumptions and methodologies for its studies and restudies, and what criteria should the agency employ to make these generically applicable decisions?⁷

5. See, e.g., 42 U.S.C. §§ 4015(a)(1), 4101, 4102(a) (1976) (authorizing the establishment of premium rates, the identification of flood risk zones, and studies for land management purposes, respectively).

6. By mid-1981 about 6,500 community FISs had been completed. In addition, approximately 4,200 communities had FISs in progress, bringing the total number of communities studied or under study to 10,700. This represents approximately 53% of the 20,300 communities identified as having special flood hazard areas.

As of May, 1981, 650 communities (10% of the communities with completed FISs) had been restudied at least once. Ninety-five communities had been restudied two or more times. FEMA has projected that about 750 restudies will be performed in 1981, and that a similar number of restudies will be required each succeeding year just to maintain up-to-date information. Anderson-Nichols & Co., Identification of Promising Approaches, Methods, and Procedures for Performing Riverine Flood Insurance Restudies, Report to the United States Federal Emergency Management Agency § 1.1 (forthcoming).

7. Both problems involve legal issues as well as issues of cost-effectiveness, technical accuracy and reliability, and efficacy in achieving the congressional objectives. This analysis focuses on the legal issues, but incorporates some of the technical findings of Anderson-Nichols & Co. *Id.*

Although stated as abstract propositions, both issues concern real property, property owners, development potential and the spectre of loss of life and property. Intense local controversies are arising across the nation over the validity of older FISs still used to justify restrictions on the development of specific properties. FIS determinations and local compliance measures face challenges and litigation. In the midst of this upheaval, FEMA is actively seeking an efficacious and cost-effective strategy for its program.

This article identifies the legal framework and technical considerations governing the issues stated and weighs possible solutions. The findings, while of direct relevance to FEMA, local communities and affected private interests, also should contribute to an improved understanding of federal programs which seek to manage risk through the provision of benefits.

II. COMPELLING A RESTUDY OR NEW STUDY METHOD BY LEGAL PROCESS

A. *The Flood Insurance Study*

The FIS for a community provides the analytical and evidentiary basis for risk determinations and all that follows from them: insurance eligibility and rates, actual placement of subsidized insurance, the claims to be paid for covered damage that occurs, community controls on facility siting and land use, and the achievement of the NFIP's risk management objectives. In addition, the FIS provides data which is later used by other federal, state and local agencies and private institutions for, among other goals, the provision of disaster assistance, the protection of wetlands, and mortgage financing for developers. In order to explore the dynamics of restudy, it is first necessary to consider these uses and to define the legally required characteristics of an FIS.

1. Uses of an FIS

Many of the statutory and regulatory provisions of the NFIP either expressly or implicitly require that the FIS be fit for certain uses. The National Flood Insurance Act of 1968 ("NFIA" or "Act")⁸ secures its coordination with the vital function of insurance.⁹ Upon

8. 42 U.S.C. §§ 2414, 4001-4128 (1976 & Supp. III 1979).

9. Pursuant to 42 U.S.C. § 4071 (1976), the old NFIP assumed operational responsibility for flood insurance on November 2, 1977. As presently operated, FEMA contracts with a private consultant for certain ministerial functions of the program and

completion and adoption of the FIS, the Agency establishes insurance rate zones for the community.¹⁰ Thereafter, when the community joins the "regular" flood program, the zones so established and the flood elevations determined in the study form the basis for actuarial rate determinations.¹¹ These rates then apply to all new construction in the community.¹²

Less clearly described in the Act is the use of the FIS in the formulation of land use controls. Local approval of the FIS triggers a six-month period, established by regulation, during which the community must adopt certain land use measures if its residents are to enjoy the program's flood insurance benefits.¹³ The measures are mandatory only in that they require the community to direct development by and large away from high-risk tracts. The specific implications for a community and its landowners depend in large part on the measures chosen.

The key features of the required response relate to new construction in the "base flood area"¹⁴ and in another zone, the "floodway."¹⁵ In the base flood area, new construction must be

continues to rely on private insurance agents, brokers and adjustment organizations. However, FEMA no longer underwrites flood insurance jointly with the privately-organized National Flood Insurers Association. Rather all flood insurance is publicly underwritten. For a description of the events leading up to the November 2 decision, see *Nat'l Flood Insurers Ass'n v. Harris*, 444 F. Supp. 969 (D.D.C. 1977).

10. 44 C.F.R. § 64.3 (1980).

11. *Id.*

12. Existing structures will continue to be eligible for subsidized insurance, as they were in the "emergency" program. 44 C.F.R. § 64.5 (1980). Flood elevation determinations thus presumably serve as an economic deterrent to any new construction within the boundaries of the base flood. For example, for new structures built substantially below the base flood elevation, actuarial premiums may be as high as \$25 per \$100 coverage. Federal Insurance Administration, Dep't of Housing and Urban Development, *Flood Insurance Manual* at app. B (May, 1978) (rate tables).

13. 44 C.F.R. § 59.24 (1980). The Act requires the adoption of:

adequate state and local measures which, to the maximum extent feasible, will—

- (1) constrict the development of land . . . exposed to flood damage . . . ,
- (2) guide the development of proposed construction away from locations . . . threatened by flood hazards,
- (3) assist in reducing damage caused by floods, and
- (4) otherwise improve the long-range land management and use of flood-prone areas.

42 U.S.C. § 4102 (1976).

14. "'Base flood' means the flood having a one percent chance of being equalled or exceeded in any given year." 44 C.F.R. § 59.1 (1979).

15. "'Regulatory floodway' means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height." *Id.*

above the base flood level.¹⁶ In the floodway, it is prohibited if the construction would have the effect of inhibiting the flow of the base flood's waters.¹⁷ Both of these restrictions, and especially the latter one, are stringent and controversial. Their validity, if challenged, must rest mainly on the FIS.¹⁸

Beyond these direct uses of the FIS are several others. Key among these is mandatory resort to the FIS pursuant to the Water Resource Council's Guidelines¹⁹ for Implementing Executive Order 11,988.²⁰ These guidelines require all federal agencies to explain a decision to "conduct, support or allow an action to be located in a floodplain."²¹ They designate the flood insurance rate map, a component of an FIS, and the study itself as the primary sources of information on the base flood area.²² Thus, virtually any federal participation in "an action to be located in the floodplain" might be held to a standard of rational basis in the pertinent FIS.

16. 44 C.F.R. § 60.3(c)(2) (1979).

17. *Id.* § 60.3(d)(3) (1979).

18. Implicit in these two uses of the FIS is a third: to stimulate a larger commitment by the community to manage its floodplain and associated resources, such as land, wetlands, water and waste water systems, and to develop a more comprehensive basis for growth management.

Within six months of the study's completion and adoption, the community must decide whether to join the "regular" program. 44 C.F.R. § 59.24 (1980). It cannot remain in the "emergency" or interim phase of the flood program. If it chooses to enter the "regular" program, it must signify that choice by adopting the required land use controls. If it does not, the community is subject to suspension from the program. The most serious consequence of such a suspension is that no new flood insurance policies, even at actuarial rates, will be available in the community, and any existing policies will be deemed to expire on their anniversary date. *Id.* See also *Town of Falmouth v. Hunter*, 427 F. Supp. 26 (D. Mass. 1976).

There are other consequences. Under the Flood Disaster Protection Act of 1973, 12 U.S.C. §§ 24, 1709-1 (1976), 42 U.S.C. §§ 4001-4003, 4012a, 4013-4016, 4026, 4054, 4056, 4101, 4104-4107, 4121, 4128 (1976 & Supp. I 1977), all federal financial assistance to state, local and private interests for acquisition or construction in the special flood hazard area of a studied community is ended. 42 U.S.C. § 4106 (1976 & Supp. I 1977). This includes grants from the Environmental Protection Agency, the Department of Housing and Urban Development, or the Small Business Administration, as well as federally insured loans from the Federal Housing Administration, the Farmer's Home Administration and the Veterans Administration. It also includes federal disaster assistance for reconstruction after a flood disaster. In addition, federally-insured banks are required to notify new or renewal mortgagors that such disaster assistance would not be available for their properties in the event of a flood. *Id.* § 4106(b).

19. 43 Fed. Reg. 6,030 (1978).

20. 42 Fed. Reg. 26,951 (1977), as amended by Exec. Order No. 12,148, 44 Fed. Reg. 43,239 (1979).

21. 43 Fed. Reg. 6,034 (1978).

22. 43 Fed. Reg. 6,033 (1978).

Similarly, the National Environmental Policy Act²³ requires that all major federal actions significantly affecting the human environment be based on full consideration of environmental consequences.²⁴ Such assessments commonly include FIS study data and have considerable influence on the design and implementation of federal actions, ranging from providing federal money and licensure to private parties, to federal construction and other agency developmental activities.

A number of federal agencies also have separate mandates to engage in floodplain management activities. These agencies, at their discretion, use FIS findings in developing their own programs and making project decisions. Chief among these are the Department of Agriculture's Soil Conservation Service, the Army Corps of Engineers, the Department of Interior's Geological Survey, Bureau of Reclamation and Bureau of Land Management, and the Department of Housing and Urban Development.²⁵

2. Characteristics of an FIS

An FIS for a particular community involves an "examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations."²⁶ Its primary purposes are to:

1. investigate the probability of occurrence and severity of flood hazards in the community;
2. delineate the geographical extent of flood-prone areas;
3. establish actuarial rate zones for flood insurance;
4. determine minimum safe elevations for structures in special flood hazard areas;
5. recommend the floodway or channel required to discharge the 100-year flood for riverine areas; and
6. otherwise inform community authorities in order to foster preventative approaches to flood risk management.

Despite FEMA's mandate to study "all flood plain areas . . . which have special flood hazards,"²⁷ the Agency retains considera-

23. 42 U.S.C. §§ 4321-4361 (1976).

24. Section 102, 42 U.S.C. § 4321 (1976), sets forth the requirement of incorporating such consideration into agency decision-making.

25. Other agencies with flood hazard responsibilities include the National Weather Service, Tennessee Valley Authority and the various federal regional river basin commissions.

26. 44 C.F.R. § 59.1 (1980).

27. 42 U.S.C. § 4101(a) (1976).

ble discretion to determine "the types, classes, and locations of any such properties which shall be eligible for flood insurance"²⁸ as well as to limit insurability to certain "States or areas (or subdivisions thereof)."²⁹ Before FEMA insures properties in a region, the Agency must find that accomplishment of the statutory mandate in the area is feasible. The finding must be based on "[s]tudies and investigations undertaken . . . and information received" and on "such other information as may be necessary."³⁰

The regulations explain that studies "will provide the data upon which floodplain management regulations shall be based,"³¹ and will "enable [the Administrator] to estimate the risk premium rates necessary to provide flood insurance."³² However, the regulations are drafted so as to preserve agency discretion. For example, they promise flood elevation findings, but do not require that these be translated into maps of special flood hazard areas³³ within a community or on special floodway and coastal high hazard areas.³⁴

3. The Inevitability of Correction

Significantly, the Agency may base mandates imposed upon a studied community on information not contained in the FIS.³⁵ This tends to cushion the Agency in the exercise of its discretion to limit the FIS's specificity. But it also builds into the FIS a quantum of incompleteness, which may make the need for restudy more likely.

Another anomaly in the restudy requirements arises from the statutory provision indicating that an FIS need only identify the floodplains and elevations and map flood risk zones for insurance

28. 42 U.S.C. § 4013(a)(1) (1976).

29. 42 U.S.C. § 4012(c) (1976).

30. 42 U.S.C. § 4012(b) (1976).

31. 44 C.F.R. § 60.3 (1980). *See also* 44 C.F.R. §§ 60.4, 60.5 (1980).

32. 44 C.F.R. § 61.7 (1980).

33. A special flood hazard area differs under the regulations from a floodplain or "flood-prone area." Under 44 C.F.R. § 59.1 (1980), a special flood hazard area is that portion of the floodplain that is subject to flooding by the base flood. The floodplain includes any land area susceptible—even at probabilities less than one percent per year—to inundation by water from any source.

34. 44 C.F.R. § 60.3(a) (1980).

35. The Act clearly authorizes FEMA to develop its comprehensive land use criteria on the basis of "such other information as [the Administrator] deems necessary." 42 U.S.C. § 4102(c) (1976). Thus, for example, available information on wetlands or on mudslide hazards might be used as the basis for requiring controls specifically addressed to those concerns. However, as a practical matter, such information may frequently be incomplete or not provided in the FIS.

purposes. Because the Act places the burden on FEMA to provide technical assistance to communities for the adoption and enforcement of the required controls,³⁶ the Agency has an incentive to pare down studies which grow beyond the minimum proportions required by law.

The statute does not address the need for or timing of restudy. Instead, it provides for ad hoc corrective action during a limited period. It allows ninety days for the pursuit of administrative appeals. The "sole basis" permitted for such appeals is "that the elevations . . . are scientifically or technically incorrect."³⁷ It also provides for later appeal to a United States district court by "any appellant aggrieved by any final determination . . . upon administrative appeal."³⁸ FEMA is required to respond to timely charges that its elevation data are scientifically or technically incorrect.³⁹

The statute does not expressly prohibit later challenges and corrective responses by the Agency. Nor does it limit the possibility or timing of restudies to the prescribed appeals process. Indeed, the Flood Disaster Protection Act of 1973,⁴⁰ which amended the NFIA, provides that notification to communities and restudies may become necessary whenever "information becomes available . . . concerning the existence of flood hazards in communities not [originally] known to be flood-prone."⁴¹ FEMA has developed detailed

36. *Id.*

37. 42 U.S.C. § 4104(b) (1976).

38. 42 U.S.C. § 4104(g) (1976 & Supp. I 1977).

39. 42 U.S.C. §§ 4104(d), 4104(e) (1976).

40. 12 U.S.C. §§ 24, 1709-1 (1976), 42 U.S.C. §§ 4001-4003, 4012a, 4013-4016, 4026, 4054, 4056, 4101, 4104-4107, 4121, 4128 (1976 & Supp. I 1977).

41. 42 U.S.C. § 4105(c) (1976). FEMA regulations specify that a restudy will be conducted when a community's base flood elevations change as a result of physical changes affecting flooding conditions. 44 C.F.R. § 65.5 (1980). In this one circumstance, the regulations make explicit what the statute only implies: that when certain risk attributes change, at least to some unspecified level of significance, insurance rates should be adjusted to reflect those changes and a restudy is therefore a proper course of action. This is consistent with the statutory basis for an administrative appeal—that FIS elevations are "scientifically or technically incorrect."

This open-ended feature of the NFIP and the lack of finality of agency determinations are mirrored in the requirements of the Administrative Procedure Act ("APA"), 5 U.S.C. §§ 551-558, 701-706 (1976 & Supp. II 1978), which is applicable to all agencies engaged in rule-making and adjudicatory actions. "Each agency shall give an interested person the right to petition for the issuance, amendment, or repeal of a rule." *Id.* § 553(e). Thus, the Agency has the continuing responsibility to respond adequately to petitions for corrective action on any FIS in effect, since both the Agency and the federal courts have construed FIS determinations as a form of rule-making. For example, in *Texas Landowners Rights Ass'n v. Harris*, 453 F. Supp. 1025, 1032

regulations that suggest other circumstances under which the Agency may find it advisable to enlarge, correct or otherwise modify an original FIS.⁴² For example, because an FIS is primarily designed to determine insurance premiums,⁴³ it may not deal fully with other aspects of comprehensive floodplain management, such as information on human safety, flood warning, emergency preparedness, construction design specifications and setbacks for new construction.⁴⁴ Community insistence on such additional informa-

(D.D.C. 1978), *aff'd mem.*, 598 F.2d 311 (D.C. Cir.), *cert. denied*, 444 U.S. 927 (1979), the court described the program as "quasi-legislative." *But cf.* K. DAVIS, ADMINISTRATIVE LAW TEXT §§ 7.03, 7.05 (3d ed. 1972).

The APA reinforces the requirement for agency responsiveness to such petitions by providing a continuing right to judicial review for any "person suffering legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute [e.g., the NFIA]." 5 U.S.C. § 702 (1976). Therefore, agency accountability for necessary corrective measures such as a restudy is of a *continuing* nature, and can be triggered by petitions to the agency and appeals to federal courts.

42. 44 C.F.R. §§ 59-75 (1980).

43. *See, e.g.*, 44 C.F.R. § 64.3(a) (1980).

44. FEMA regulations list a number of factors to be considered in adopting floodplain management regulations:

- (1) Human safety;
- (2) Diversion of development to areas safe from flooding in light of the need to reduce flood damages and in light of the need to prevent environmentally incompatible flood plain use;
- (3) Full disclosure to all prospective and interested parties (including but not limited to purchasers and renters) that (i) certain structures are located within flood-prone areas, (ii) variances have been granted for certain structures located within flood-prone areas, and (iii) premium rates applied to new structures built at elevations below the base flood substantially increase as the elevation decreases;
- (4) Adverse effects of flood plain development on existing development;
- (5) Encouragement of floodproofing to reduce flood damage;
- (6) Flood warning and emergency preparedness plans;
- (7) Provision for alternative vehicular access and escape routes when normal routes are blocked or destroyed by flooding;
- (8) Establishment of minimum floodproofing and access requirements for schools, hospitals, nursing homes, orphanages, penal institutions, fire stations, police stations, communications centers, water and sewage pumping stations, and other public or quasi-public facilities already located in the floodprone area, to enable them to withstand flood damage, and to facilitate emergency operations;
- (9) Improvement of the local drainage to control increased runoff that might increase the danger of flooding to other properties;
- (10) Coordination of plans with neighboring community's flood plain management programs;
- (11) The requirement that all new construction and substantial improvements in areas subject to subsidence be elevated above the base flood level equal to expected subsidence for at least a ten year period;

tion may bring about further agency study.⁴⁵

Thus, while the Agency's duty to maintain FIS accuracy is a continuing one, the statute presently offers only a variety of correction alternatives, including the formal restudy option, without providing real guidance to the Agency. This approach has not prevented litigation;⁴⁶ indeed, it may even have promoted it.

B. *Substantive Grounds for Restudy*

The NFIA states the substantive grounds for administrative and judicial review of an appeal of FIS conclusions: "[t]he sole basis for such appeal shall be the possession of knowledge or information indicating that the elevations . . . proposed . . . are scientifically or technically incorrect. . . ."⁴⁷ This provision establishes a qualitative standard by which FISs are to be evaluated and, if found deficient, are to be improved upon or replaced with a restudy. However,

- (12) For riverine areas, requiring subdividers to furnish delineations for floodways before approving a subdivision;
- (13) Prohibition of any alteration or relocation of a watercourse, except as part of an overall drainage basin plan. In the event of an overall drainage basin plan, provide that the flood carrying capacity within the altered or relocated portion of the watercourse is maintained;
- (14) Requirement of setbacks for new construction within Zones VI-30 on a community's FIRM;
- (15) Requirement of additional elevation above the base flood level for all new construction and substantial improvements within Zones AI-30 and VI-30 on the community's FIRM to protect against such occurrences as wave wash and floating debris, to provide an added margin of safety against floods having a magnitude greater than the base flood, or to compensate for future urban development;
- (16) Requirement of consistency between state, regional and local comprehensive plans and flood plain management programs;
- (17) Requirement of pilings or columns rather than fill, for the elevation of structures within flood-prone areas, in order to maintain the storage capacity of the flood plain and to minimize the potential for negative impacts to sensitive ecological areas;
- (18) Prohibition, within any floodway or coastal high hazard area, of plants or facilities in which hazardous substances are manufactured.

44 C.F.R. § 60.22(c) (1980).

45. The Agency has conceded, at least as a discretionary matter, its amenability to such entreaties. 44 C.F.R. § 60.3 (1980) provides that the Agency "will provide the data upon which flood plain management regulations shall be based." Virtually identical language appears in 44 C.F.R. §§ 60.4, 60.5 (1980).

46. *Roberts v. Dep't of Housing and Urban Development*, 473 F. Supp. 52 (N.D. Miss. 1979); *Texas Landowners Rights Ass'n v. Harris*, 453 F. Supp. 1025, 1032 (D.D.C. 1978), *aff'd mem.*, 598 F.2d 311 (D.C. Cir.), *cert. denied*, 444 U.S. 927 (1979); *Town of Falmouth v. Hunter*, 427 F. Supp. 26 (D. Mass. 1976).

47. 42 U.S.C. § 4101(b) (1976).

from a practical perspective, restudies may also be compelled by reference to constitutional or administrative law standards governing local land use controls, where such controls are either based on an FIS, or designed to demonstrate community compliance with NFIP requirements. Court-ordered invalidation of land use controls, where FIS deficiencies are the cause, could defeat a community's efforts to conform to NFIP requirements until legally defensible restudies are prepared.⁴⁸ Thus, when the elevation findings of an original study are found to be "incorrect" or otherwise fail to support the challenged floodplain regulatory measures, restudy is needed to give the community a legal basis for participating in the NFIP.

What follows is a survey of the statutory and constitutional grounds for restudy summarized in the previous paragraph.

1. "Scientifically or Technically Incorrect"

The phenomenon most likely to reveal the flaws in an FIS is, quite aptly, a flood. Flood levels in excess of the predicted base flood should prompt reconsideration of the methods or data used in the FIS. Even a flood which is statistically foreseeable and does not contradict the conclusions of an FIS—even one which largely verifies the study—may provoke doubts, and it may therefore be reasonable for the Agency to restudy the flood area.

Courts may require that actual flood data be used as a basis for changing community floodplain management, and thereby indirectly promote FEMA restudies. In *A.H. Smith Sand & Gravel Co. v. Department of Water Resources*,⁴⁹ community floodplain regulations were based on a fifty-year base flood,⁵⁰ as determined by the Maryland Department of Water Resources. In the wake of Hurricane Agnes, a storm which produced flood conditions thought to occur less frequently than once in fifty years, the trial court ordered modification of the regulations to reflect the actual extent of flooding. The Maryland Court of Appeals affirmed this order. It rejected an argument that the lower court should have deferred to agency expertise, stating:

48. See, e.g., *Town of Falmouth v. Hunter*, 427 F. Supp. 26 (D. Mass. 1976).

49. 270 Md. 652, 313 A.2d 820 (1974).

50. That is, "waters of the state" was statutorily defined to include "the floodplain of free-flowing waters on the basis of a fifty (50) year flood frequency," and regulations prohibited the placement of structures within that floodplain. *Id.* at 655-56, 313 A.2d at 822-23.

[t]he conclusion reached by an administrative agency, with all of its expertise, can be no more solid than the factual basis upon which it rests. . . . [T]he Department at the time it made its determination as to the floodplain just did not have before it information as exact as was available after storm Agnes.⁵¹

Thus, as common sense would suggest, a flood, by showing the fallacy in scientific predictions, can sweep away an FIS along with the property the FIS was meant to protect.

Another, but less common, factor promoting restudy is change in a community's boundaries or authority. Often in such circumstances, existing studies continue to justify their corresponding insurance rates.⁵² However, the new community to be covered by flood insurance must have its boundaries integrated into the prior study and insurance rate structure. When annexation or jurisdictional change brings "new land," such as previously unstudied and federally-owned land, into a community, restudy of part or all of what has been studied before, as well as initial study of the new area, may be needed.

Finally, community requests for greater factual detail from FEMA can also lead to restudy. If a community initiates floodplain management regulations and desires additional information, FEMA regulations acknowledge its responsibility to develop such data, possibly by means of a restudy.⁵³ Discretion in this matter continues to rest with FEMA,⁵⁴ but without a restudy, community efforts at floodplain regulation may be undermined and become more vulnerable to legal challenge.

In sum, a restudy may become necessary because of scientific or technical error, the sudden availability of new data, judicial mandate, or community request.

2. "Arbitrary and Capricious" Administrative Action

Because FIS determinations constitute informal rule-making,⁵⁵

51. *Id.* at 667, 313 A.2d at 828-29.

52. See 44 C.F.R. § 64.4 (1980).

53. See note 45 *supra*.

54. The regulations cited in note 45, *supra*, use the future tense ("will") rather than the imperative ("shall"), suggesting a statement of intent rather than a regulatory mandate.

55. In *Texas Landowners Rights Ass'n v. Harris*, 453 F. Supp. 1025, 1032 (D.D.C. 1978), *aff'd mem.*, 598 F.2d 311 (D.C. Cir.), *cert. denied*, 444 U.S. 927 (1979), the court, in denying plaintiff's constitutional claims that the NFIP violated the sovereign powers of the state and local governments and that it constituted a taking of

they are also subject to review under the "arbitrary and capricious" standard⁵⁶ of the Administrative Procedure Act ("APA").⁵⁷ This test has been held to incorporate as well as enlarge upon the "scientifically or technically incorrect" test specifically set out in the NFIA.⁵⁸

Neither test, however, is very stringent. Neither, for example, requires judicial disapproval of FIS determinations which are not the most accurate or reliable, as long as the determinations are not "incorrect." Indeed, the NFIA may limit a litigant's prospects for relief under the more broadly worded APA standard. The NFIA test's emphasis on scientific and technical factors would appear to render irrelevant proof of an "arbitrary" formulation of policy, so long as "correct" facts could be adduced to support it.

In *Roberts v. Department of Housing and Urban Development*,⁵⁹ the court stated what it felt were the basic principles governing judicial review of an FIS:

[u]nder the "arbitrary and capricious" standard of review of agency action, the reviewing court is to search for clear error of judgment. . . . [I]t is not for the reviewing court to supply its own interpretation so long as the interpretation or determination applied by the agency was reasonable, even though that interpretation might not appear as reasonable as some others. . . . A decision, to be "arbitrary and capricious," must be based on facts not supported by the record. . . .⁶⁰

their land without compensation or due process protections, characterized the NFIP as a program which "appears to fit well within the quasi-legislative [rule-making] decision-making process." *Id.* at 1032 (citing *Am. Airlines, Inc. v. CAB*, 359 F.2d 624, 633 (D.C. Cir.), cert. denied, 385 U.S. 842 (1966)). This terminology is normally applied to denote rule-making rather than adjudication or at least to denote that an adjudicatory process is not involved. B. SCHWARTZ, *ADMINISTRATIVE LAW* § 55, at 143 (1976). In *Roberts v. Dep't of Housing and Urban Development*, 473 F. Supp. 52 (N.D. Miss. 1979), the court granted summary judgment to HUD after finding that the plaintiff failed to raise any genuine issue to support his claim that an FIS was arbitrary, capricious and an abuse of discretion (because the agency had failed to take into account potential changes in the Tombigbee Waterway Project and related highway and bridge projects). The court did not, however, reject the "arbitrary and capricious" standard of the APA as the applicable standard. Under the APA, which applies to all agencies, this standard is the judicial standard for the review of informal rulemaking. 5 U.S.C. § 706 (1976).

56. 5 U.S.C. § 706 (1976).

57. 5 U.S.C. §§ 551-558, 701-706 (1976 & Supp. II 1978).

58. *Roberts v. Dep't of Housing and Urban Development*, 473 F. Supp. 52 (N.D. Miss. 1979). This is particularly true since the APA now clearly requires a "substantial inquiry" in administrative rulemaking. *Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 415 (1971).

59. 473 F. Supp. 52 (N.D. Miss. 1979).

60. *Id.* at 54, 55.

When applying these principles, the court construed the NFIA standard, "scientifically or technically incorrect," as a specific element of the "arbitrary and capricious" standard.

3. Constitutional Claim: Police Power Infringement of Due Process

An FIS may also be challenged as violative of due process under the fifth or fourteenth amendment. This sort of claim might arise where a property owner believes the risk estimate in an FIS impairs the value of his land. The federal flood surveys are intended to shape land use; a consequent impact on market values is inevitable. However, an attack on the NFIP as a whole is unlikely to succeed. The grievance procedures set forth in the statute are probably ample to withstand a generic charge of "arbitrary" federal action such as failure to afford substantive or procedural due process.

Moreover, the only court to address the question has upheld the NFIP. In *Texas Landowners Rights Association v. Harris*,⁶¹ the United States District Court for the District of Columbia determined that the NFIP provides reasonable measures for protecting public health and safety and "equitably spread[ing] the costs of flood disaster among those landowners who most benefit from publicly funded disaster relief,"⁶² and was not an irrational exercise of Congress's powers.

Of course, similar claims may still be made against particular applications of the NFIP, or against the FIS for a particular community. However, in light of *Texas Landowners*, such claims are likely to be rejected where the Agency substantially follows its articulated procedures.

In turn, state and local land use controls based upon the FIS may face the same constitutional attack. But harm to the value of one owner's land will not usually rise to the stature of a due process violation. Professor Allison Dunham, when considering whether floodplain regulations can withstand due process challenges, concluded: "[w]herever it is *reasonable* to conclude that a particular use of a floodplain or . . . channel is likely to increase flood damage to other users of land, there would seem to be no due process objection to restricting² or even prohibiting the opportunity to make

61. 453 F. Supp. 1025 (D.D.C. 1978), *aff'd mem.*, 598 F.2d 311 (D.C. Cir.), *cert. denied*, 444 U.S. 927 (1979).

62. *Id.* at 1032.

the use causing the harm."⁶³

Thus, land use control actions taken to prevent floods and flood damage will generally be upheld against due process challenges as long as these actions can be reasonably related to the objective of protecting the public health, safety or welfare. As the Supreme Court of Georgia recently stated when it upheld the denial of a construction permit under a floodplain regulation: "exercise of the police power [is] subject to the limitation that the ordinance [restricting land uses] bear some 'reasonable relation' to the public health."⁶⁴

In this constitutional setting, the "reasonableness" of the FIS may become the underlying issue. That is, the federal flood study may, as a practical matter, be the only means of relating the ordinance to the necessary public interest in flood hazard mitigation. The courts have not yet explored the distinction, if any, between a "reasonableness" test of an FIS and the statutory standards for review discussed heretofore in this article.

4. Constitutional Claim: "Taking" of Private Property

The guarantee against public "takings" of private property is closely related to the due process safeguard.⁶⁵ The different connotations are, however, of legal significance. The former involves devotion of property, through regulation, to public purposes; the latter, an impingement on property rights which is unreasonable when compared to the hindrance presented to other private owners.⁶⁶

One test for ascertaining whether a particular regulation amounts to a taking is the "balancing test" stated in *Texas Landowners*. In that case, in which the court found the NFIA to be facially constitutional, the court stated that, like the due process and equal protection guarantees, the taking clause basically requires a test of reasonableness. Thus, it concluded, whenever the government acts to protect the safety and welfare of a community or area, the action will not be considered a taking so long as it "is shown to be related

63. Dunham, *Flood Control via the Police Power*, 107 U. PA. L. REV. 1098, 1123 (1959) (emphasis added).

64. *Pope v. Atlanta*, 242 Ga. 331, 334, 249 S.E.2d ¶16, 19 (1978), cert. denied, 440 U.S. 936 (1979).

65. See *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393, 415 (1922).

66. See *Fred F. French Inv. Co. v. City of New York*, 39 N.Y.2d 587, 593-94, 350 N.E.2d 381, 384-85, 385 N.Y.S.2d 5, 8, cert. denied, 426 U.S. 990 (1976).

to a legitimate public interest."⁶⁷ Obviously, an FIS would be used to make the necessary showing and its reasonableness could therefore come under attack.

Some state courts have used an alternative test for takings, a jurisprudence which addresses the diminution of value or economic hardship associated with a regulation. In *Dooley v. Town Plan and Zoning Commission*,⁶⁸ this test was applied to a flood control restriction which permitted only parks, playgrounds, wildlife sanctuaries, clubhouses, docks and agriculture.⁶⁹ The court found a taking, relying for its holding on the magnitude of the diminution of property value. This test does not typically look at the quality of FIS elevation determinations; it focuses on the *results*, not the underlying data or analyses, of agency action.

While the courts have not always been explicit about which test is being applied when considering a taking issue,⁷⁰ under at least some formulations the reasonableness of the FIS upon which a regulation is based may affect the resolution of that issue. Thus, the quality of an FIS may be evaluated in a judicial proceeding under a variety of constitutional standards, as well as the APA's "arbitrary and capricious," and the NFIA's "scientifically or technically incorrect," standards.

5. Constitutional Claim: Equal Protection

The equal protection clause, which requires that any classification created by statute or regulation be rationally related to a valid statutory objective, can form the basis for challenging an FIS. The essence of the federal study is as a basis for classifying tracts of land by their pregnability to floodwaters. It is further used to draw zoning boundaries, to designate floodways, or to demark the base flood for a community.

Of course, the law recognizes that no system which involves classification is perfect. In zoning and wetlands cases involving equal protection claims, the courts have generally deferred to legislative

67. *Texas Landowners Rights Ass'n v. Harris*, 453 F. Supp. 1025, 1032, *aff'd mem.*, 598 F.2d 311 (D.C. Cir.), *cert. denied*, 414 U.S. 927 (1979).

68. 151 Conn. 304, 197 A.2d 770 (1964).

69. *But see Brecciaroli v. Comm'r of Environmental Protection*, 168 Conn. 349, 362 A.2d 948 (1975); *Turnpike Realty Co. v. Town of Dedham*, 362 Mass. 221, 284 N.E.2d 891, *cert. denied*, 401 U.S. 1108 (1972).

70. *See, e.g., Morris County Land Improvement Co. v. Township of Parsippany-Troy Hills*, 40 N.J. 539, 193 A.2d 232 (1963); *Just v. Marinette County*, 56 Wis. 2d 7, 201 N.W.2d 761 (1972).

as well as administrative decisions. This deference to the legislature typically rests on one of two grounds. First, it is often said that classification, as a means of effecting policies to protect the public health or safety, is a function constitutionally granted to the legislature. Second, the electoral process is seen as assuring that legislators will be more sensitive to community needs than might be those in other branches of government. Deference to agency decisions rests commonly on the ground of agency expertise.

On these bases, state courts have usually denied equal protection challenges to land use classifications and boundaries set by local authorities.⁷¹ The issue is somewhat more difficult, however, when the boundary is set, not on policy grounds (*e.g.*, residential and commercial zones), but on the basis of engineering judgment. It has been observed:

[i]f a prestated flood regulatory approach is used for flood plain zoning with boundary lines forming the final limits of the hazard, imprecise location of the lines based upon poor data should not be excused on the basis that more conventional zoning district boundaries are more or less arbitrary. In contrast to more conventional zoning boundary lines which reflect broad community land use goals, flood hazard district lines reflect physical conditions by engineering techniques if time and money are available. Line locations differ somewhat, depending upon the engineering methods, data used for calculations, and assumptions in flood calculations. In a given situation, various engineering techniques will produce varied results. But flood zoning lends itself to some degree of technical precision.⁷²

Thus, courts may be more willing to scrutinize boundaries or other land use classifications based on engineering analysis than those based on policy choice. Consequently, the constitutional validity of FIS-based classifications may depend on whether the FIS itself can be regarded as a rational and objective basis for land classification and its resultant differential impact on similarly situated persons.

C. *Justification to Adopt New Study Methodology*

Probing for legally cognizable flaws in study methodology is an exercise usually conducted quite apart from review of scientific or technical correctness. While the latter inquiry concerns itself with

71. See NATURAL RESOURCES DEFENSE COUNCIL, INC., *LAND USE CONTROLS IN THE UNITED STATES* 12 (1977).

72. 1 U.S. WATER RESOURCES COUNCIL, *REGULATION OF FLOOD HAZARD AREAS TO REDUCE FLOOD LOSSES* § 3-322 at 333 (1970).

the aptness of study conclusions, the former focuses on the very processes of engineering logic. To be sure, the cases do not reveal great zest on the part of the judiciary to delve into such complexities. But it is apparent that a study based on assumptions known by the Agency to be untrustworthy may for that reason be invalidated pursuant to the NFIA. On the other hand, where the Agency can show that a more perfect methodology would require unduly expensive studies, a court may not disturb otherwise vulnerable agency conclusions.

1. Incorrect Assumptions

In preparing to conduct an FIS, the Agency must make certain assumptions to provide the mode of investigation or "methodology" for the study. Some of these assumptions have been required by applicable law, while others are the result of agency considerations of cost, consistency or practicality. Regardless of their source, however, such assumptions can increase the inaccuracy and uncertainty of the FIS, because they may have been developed for quite different circumstances and purposes. Obviously, a complex legal problem arises where the law mandates or tolerates such assumptions while, at the same time, demands that results not be "scientifically or technically incorrect."

One aspect of an FIS which vividly illustrates this problem is the estimation of the dimension of the base flood. This involves questions of hydraulics, that branch of physics having to do with the mechanical properties of water and other liquids. In hydraulic modelling, a key assumption presently made is "steady state gradually varied" flow, *i.e.*, that the flow estimated in the analysis will enter and leave the study area at a constant rate, and that changes in the water surface slope are not abrupt.⁷³ In legal terms, this assumption can be "incorrect," as the flow typically does not actually enter and leave the study area at a constant rate. Indeed, a key explanation of flooding is that the flow enters at a faster rate than it leaves. In engineering terms, however, the uniform-flow assumption is a rough approximation of reality that greatly reduces the complexity of the hydraulic model at a cost-justifiable reduction in accuracy. Moreover, the assumption is most accurate at the moment of peak flooding, presumably the moment of most interest in

73. See Office of Federal Insurance and Hazard Mitigation, Federal Insurance Administration, Dep't of Housing and Urban Development, Statement of Work for Flood Insurance Studies ch. 2 (Apr. 1979) [hereinafter cited as Statement of Work].

an FIS. Thus, the use of the assumption is a reasonable exercise of engineering judgment.

The legal difficulty with this engineering judgment is that the steady state approximation is *known* to be incorrect in some circumstances. While other steps in FIS methodology introduce uncertainty into the study because their degree of correctness is unknown, this assumption is known at the outset to be false. This fact leads to the inquiry whether, as a legal matter, an elevation determination based on a steady state assumption is "scientifically or technically incorrect" *by definition*, even without any further showing on the part of a challenger.

Even in the absence of a statutory requirement to be scientifically and technically correct, courts have been reluctant to approve regulations based on studies using assumptions known to be incorrect. In *Weyerhaeuser Co. v. Costle*,⁷⁴ for example, the court invalidated a portion of the EPA's effluent limitations for the pulp and paper industry because they were based on an analysis which relied on an "assumption that it [EPA] now admits is erroneous."⁷⁵ Similarly, in *FMC Corp. v. Train*,⁷⁶ the court remanded part of the EPA's synthetics and plastics industry effluent limitations for reconsideration because of "substantial questions" that had been raised concerning the use of a uniform flow assumption for modelled discharges, when actual discharges varied widely from the assumed rate.⁷⁷ Both of these cases support the view that an FIS for which the Agency knowingly incorporates dubious assumptions can be invalid. However, the *FMC* decision also suggests that even an assumption which is subject to substantial deviation can be utilized if sufficiently justified by engineering considerations and its inaccuracy is explained and understood. Indeed, the court insisted that the EPA be given "latitude to make . . . assumptions."⁷⁸

2. New Federal Guidelines

Presently, federal agencies and advisory bodies such as the United States Geological Survey⁷⁹ and the Water Resources Coun-

74. 590 F.2d 1011 (D.C. Cir. 1978).

75. *Id.* at 1029.

76. 539 F.2d 973 (4th Cir. 1976).

77. *Id.* at 980. Note, however, that the court stopped short of holding that the EPA could not use its uniform flow assumption.

78. *Id.* at 984-85. Of course, in *FMC* no statutory "incorrectness" standard applied.

79. See U.S. GEOLOGICAL SURVEY, DEP'T OF INTERIOR, NATIONAL PROGRAM FOR MANAGING FLOOD LOSSES § 4 (rev. ed. 1976).

cial⁸⁰ are empowered to recommend or adopt methodologies for certain aspects of FISs. These methodologies frequently apply to prototypical floodplains and, when the real case resembles the prototypical, FEMA may suggest or require use of the methods in its contracted studies.⁸¹ However, these methodologies are updated from time to time in order to incorporate new developments and policy assumptions.⁸² When this happens, it is prudent to adopt the new methodology as the basis for future studies. By implication, the Agency may also be under a legal duty to do so, or to conduct a restudy which incorporates the new guidelines.

Where a great many completed studies relied on the obsolete methodological regime, it may be uneconomical to undertake programmatic restudy. But at a minimum, the new methodological guidelines should, during case-by-case review, serve as a basis for restudy.

D. *Inherent Technical Uncertainty*

Uncertainty is a condition familiar to physicists, engineers and lawyers. Hence reported judicial decisions have, in a few cases, recognized that technical uncertainty in land use regulation cannot be avoided, and, where it leads to errors, must sometimes be forgiven. These cases have not, as yet, satisfactorily explained how much error is too much, *i.e.*, "scientifically or technically incorrect." As a starting point, however, this article suggests that the Agency disclose the likely areas of technical uncertainty, so as not to prejudice the interests of those who would be affected by errors.

Technical uncertainty arises from several factors: the random nature of floods, the incomplete data base available to the Agency, the limitations of the available analytical models and assumptions, and purely computational error. This technical uncertainty may be compounded by other factors: for example, the Agency's desire for consistent study results for all communities located in the same river basin, and the Agency's hesitancy to restudy merely because better hydrological or other data or improved methods have become available.

80. HYDROLOGY COMMITTEE, U.S. WATER RESOURCES COUNCIL, BULL. NO. 17, GUIDELINES FOR DETERMINING FLOOD FLOW FREQUENCY (1976) [hereinafter cited as BULL. NO. 17].

81. See Statement of Work, *supra* note 73, at ch. 2.

82. See, *e.g.*, HYDROLOGY COMMITTEE, U.S. WATER RESOURCES COUNCIL, BULL. NO. 17A, GUIDELINES FOR DETERMINING FLOOD FLOW FREQUENCY (1979) [hereinafter cited as BULL. NO. 17A], replaces BULL. 17, *supra* note 80. BULL. 17A apparently offers more flexibility than its predecessor in utilizing other data beyond gauge records, where special circumstances justify their use.

Despite the technical uncertainty, the results of FISs are frequently utilized, both by FEMA and the communities participating in the flood program, as if they were completely accurate. An example is the determination of the boundaries of the base flood area. On one side of these boundaries, insurance for new construction may be available only at actuarial rates, while on the other, no such restriction may exist.⁸³ On one side, land use and building restrictions may be imposed, while on the other, they may not. Further, within the boundary of the regulatory floodway, building is essentially prohibited.⁸⁴ Thus, while the exact location of a particular boundary may be open to scientific debate, the regulatory consequences of the boundary directly affect specific private property rights. Therefore, it is reasonable to assume that such regulatory consequences are occasionally imposed on landowners whose properties are not actually within the applicable boundaries.

Legal challenges to the FIS can be expected to arise, at least in part, because technical uncertainty inevitably results in some divergence between results and objective reality. If the party challenging a floodplain management decision is successful in overcoming the usual judicial deference to agency expertise and secures judicial invalidation of the challenged decision, this can reduce or destroy the credibility of the underlying FIS.

However, in the few reported decisions thus far concerning NFIP, courts have shown much solicitude for the difficulty of the Agency's mission, and somewhat less for incidental injury to landowners. The court in *Roberts* stated: "factual certainty is not necessary, and an agency may regulate even though facts do not illuminate a clear path."⁸⁵ The question of whether a single number (or elevation) can be the basis of regulation when, because of unavoidable technical uncertainty, only a range of numbers can be supported by the underlying studies has been considered by courts in other contexts. In *E.I. DuPont de Nemours & Co. v. Train*,⁸⁶ the Supreme Court answered this question in the affirmative when it was posed in the context of the EPA's industrial effluent limitation regulations.⁸⁷ Thereafter, in *Weyerhaeuser Co. v. Costle*,⁸⁸ the

83. 44 C.F.R. § 64.5 (1980).

84. 44 C.F.R. § 60.3 (1980).

85. 473 F. Supp. 52, 55 (N.D. Miss. 1979).

86. 430 U.S. 112 (1977).

87. However, the Court's analysis turned primarily on an interpretation of applicable statutory language and legislative history, and thus does not directly support

D.C. Circuit undertook to set a standard for reviewing a technical analysis underlying a regulatory limitation. The court noted the problem of "technological and scientific uncertainty"⁸⁹ that must be overcome when conducting such an analysis. The court then quoted its own earlier statement: "[w]here existing methodology or research in a new area of regulation is deficient, the agency necessarily enjoys [a] broad discretion to attempt to formulate a solution to the best of its ability on the basis of available information."⁹⁰ Indeed, in *Permian Basin Area Rate Cases*,⁹¹ the Supreme Court approved the simultaneous use of more than one analytical methodology when an agency is deciding how to regulate.

The statutory appeals process offers landowners the chief vehicle for overturning incorrect and injurious findings. But a preventative measure by the Agency—namely, disclosure of areas of significant technical uncertainty—would supplement the grievance procedure in a useful way.

Because of the various technical problems inherent in the NFIP, it is a major responsibility of FEMA to understand and disclose this uncertainty when conducting FISs. As the D.C. Circuit noted recently: "the lack of scientific certitude about modeling techniques increases rather than reduces the need for the agency to critically examine all substantial questions of fact and science. . . ."⁹²

III. INITIATIVES

Compulsory legal process is not the only means for bringing about restudy of an FIS. The Agency has authority to initiate a restudy even in the absence of a legally binding order to do so.

the proposition that FEMA may require land use controls everywhere in the base flood area without making individual determinations that each property is subject to flooding.

The decision would be more helpful if the Supreme Court had directly addressed the issue of whether single number limitations may be promulgated when the underlying studies support a range of limitations. The Court seems to have assumed that a single number would be authorized if the FWPCA were construed to authorize it. However, the Court did not indicate whether it was aware that the EPA's data would better support a range of limitations.

88. 590 F.2d 1011 (D.C. Cir. 1978).

89. *Id.* at 1026.

90. *Id.* (quoting *Indus. Union Dep't v. Hodgson*, 499 F.2d 467, 474-75 n.18 (D.C. Cir. 1978)). Similarly, in *FMC Corp. v. Train*, 539 F.2d 973, 978 (4th Cir. 1976), the court stated that its evaluation of the technical analysis underlying the EPA's regulations must be conducted in light of the serious time constraints imposed on it.

91. 390 U.S. 747 (1968).

92. *Alabama Power Co. v. Costle*, 636 F.2d 323, 387-88 (D.C. Cir. 1979).

This power supplements statutory notice and appeals procedures which are available to individuals and communities seeking redress of specific grievances. But at present the Agency lacks formal criteria to decide whether or not to make a discretionary commitment to restudy. The NFIA is also without provisions which might encourage the Agency to improve accuracy through restudy. Adoption by the Agency of clear criteria for the exercise of the discretion to restudy would be in the public interest.

A. *Current Status of Discretionary Criteria*

1. Structured Response to Individual Grievances

The NFIA and FEMA regulations provide a highly structured administrative appeals process⁹³ which enables individual property owners and lessees and the community to challenge the flood elevations of the FIS while it is in "proposed status."

Following the determination of "projected flood elevations" and notice,⁹⁴ the statute provides for a ninety-day period during which appeals may be brought.⁹⁵ Such appeals must be brought initially to the community's chief executive officer or delegate, and must "set forth the data that tend to negate or contradict the . . . finding."⁹⁶ The official has the responsibility to review and consolidate all appeals filed during the statutory period and reach a decision as to whether or not the community itself should appeal to FEMA on behalf of such persons.⁹⁷

If the community decides to appeal, FEMA must respond either "by consultation with [local] officials . . . , by administrative hearing, or by submission of the conflicting data to an independent scientific body or appropriate Federal agency for advice."⁹⁸ In any case, so long as the Agency proposes to extend NFIP benefits to the community, FEMA is responsible for making a final determination on such an appeal. The information relied on by FEMA in dealing with the appeal must be made publicly available.⁹⁹ If the

93. 42 U.S.C. § 4104 (1976 & Supp. I 1977).

94. *Id.* §§ 4104(a), 4104(b).

95. 42 U.S.C. § 4104(b) (1976).

96. 42 U.S.C. § 4104(c) (1976).

97. *Id.*

98. 42 U.S.C. § 4104(e) (1976).

99. *Id.* The responsibility for the final elevation determination rests with the administrative law judge, in cases where appeals are resolved by administrative hearing.

community or its aggrieved citizens are not satisfied with FEMA's final determination, either or both may appeal to a federal district court within sixty days of receiving notice of the final decision.¹⁰⁰

If the community decides not to appeal, FEMA must nevertheless review the individual owner/lessee complaints along with the community's decision, and ultimately must reach its own decision.¹⁰¹ In reaching its decision, it must follow one or more of the same three courses of action prescribed for community appeals: consultation, administrative hearing, or reliance on an independent scientific body or other federal agency.¹⁰² Following notice of a final decision, aggrieved individuals may appeal in federal district court within sixty days.¹⁰³

Short of these formal procedures, aggrieved persons or communities have several alternate modes of recourse. One route is immediate protest of published "notifications" of flood elevation or of insurance rates. A second involves correction of pure cartographic error by invoking a specified map amendment proceeding. These are explained below.

FEMA has a continuing opportunity to identify new data and resolve problems even before promulgating its FIS findings. This opportunity arises from an NFIA provision requiring FEMA to "publish notification of flood elevation determinations in a prominent local newspaper" during the period in which the community con-

100. 42 U.S.C. § 4104(g) (1976 & Supp. I 1977).

101. 42 U.S.C. § 4104(d) (1976).

102. *Id.*

103. 42 U.S.C. § 4104(g) (1976 & Supp. I 1977). These two appeals processes involve the same substantive issue and evidentiary considerations, and the statute imposes similar procedural responsibilities on FEMA. The Agency has established regulations to implement the statute, 44 C.F.R. §§ 67, 68 (1980), which are substantially consistent with the statutory requirements, but which also reflect certain agency priorities.

For example, the regulations provide for an *administrative hearing* "only . . . if a community appeals . . . and the Administrator has determined that such appeal cannot be resolved by consultation with officials of the community, or by submission of the . . . data to an independent scientific body or appropriate Federal agency for advice." 44 C.F.R. § 68.3 (1980). Similarly, for any "owner or lessee" who appeals, the regulations provide for submission to the community of a "written appeal" with technical data, 44 C.F.R. § 67.5 (1980), community review and consideration, and issuance of a written opinion, 44 C.F.R. §§ 67.7(a), 67.7(c) (1980); if the community decides not to appeal, FEMA will independently review the individual claims pursuant to its procedures for reviewing community appeals. 44 C.F.R. § 67.9(a) (1980). Thus, while the regulations offer the same administrative hearing option for both community and individual appeals in accordance with the enabling statute, such a hearing is clearly more readily available when a community appeals.

siders adopting the land use controls.¹⁰⁴ The Agency is also required to disseminate insurance coverage and rate information, including "the basis for and differences between such rates,"¹⁰⁵ and to consult with local officials and encourage them to disseminate study information.¹⁰⁶ These provisions enable property owners and lessees to appeal "scientifically or technically incorrect" elevations. Moreover, by stimulating local awareness of ongoing FIS research, these provisions also allow certain errors to be disclosed and corrected before final administrative action.

FEMA regulations also provide a "map amendment" procedure for handling grievances from individuals who claim inadvertent inclusion in special flood hazard areas due to map application errors.¹⁰⁷ Therefore, certain individual appeals based, for example, on "the transposition of the curvilinear line to either street or to other readily identifiable features"¹⁰⁸ will be handled by submitting technical data specified in the regulations to FEMA for review and determination. No opportunity to appear, make oral presentations,

104. 42 U.S.C. § 4104(b) (1976).

105. 42 U.S.C. § 4020 (1976).

106. *Id.*

107. 44 C.F.R. § 70 (1980).

108. 44 C.F.R. § 70.1 (1980). A basic due process principle governing mapping for land use management purposes is that every owner of property is entitled to ascertain, with reasonable certainty, what uses he may legally make of any portion of his property. *Town of Lebanon v. Woods*, 153 Conn. 182, 215 A.2d 112 (1965). In order to achieve this result, most courts require that zones be described with reasonable certainty and have definite boundaries. *See* Annot., 39 A.L.R.2d 766, 769 (1955). Where it is not possible to define boundaries with certainty from an ordinance itself and a zoning map, the ordinance cannot be enforced and is invalid. *Slattery v. Township of Caldwell*, 83 N.J. Super. 317, 199 A.2d 670 (1964). *See also* *City of Benton v. Phillips*, 191 Ark. 961, 88 S.W.2d 828 (1935); *Auditorium, Inc. v. Board of Adjustment*, 47 Del. 373, 91 A.2d 528 (1952); *Moon v. Smith*, 138 Fla. 410, 189 So. 835 (1939); *Rock Island Metal Foundry, Inc. v. Rock Island*, 414 Ill. 436, 111 N.E.2d 499 (1953); *Householder v. Town of Grand Island*, 114 N.Y.S.2d 852, 36 Misc. 2d 862 (Sup. Ct. 1951), *aff'd*, 280 A.D. 874, 114 N.Y.S.2d 262 (1952), *aff'd*, 305 N.Y. 805, 113 N.E.2d 555 (1953); *Westlake v. Elrick*, 83 N.E.2d 646 (Ohio App. 1948).

Thus, two difficulties with present flood plain mapping practice are that their scale translates into zoning boundaries with widths from 20 to 100 feet and that the boundaries are incapable of further specification by metes and bounds description. In these regards, the typical map produced in a flood study is similar to the map at issue in *Adams v. Town of West Seneca*, 280 A.D. 1038, 117 N.Y.S.2d 235 (1952), *appeal denied*, 281 A.D. 942, *appeal denied*, 119 N.Y.S.2d 591 (1953), where the use districts under the town zoning ordinance were not defined by metes and bounds, but were shown on the zoning map, drawn on a scale of 1" = 1000'. The court held that the property owner was entitled to a building permit for a business use because there was doubt as to whether the premises were unzoned, unrestricted farmland or whether a small portion was zoned as residential.

cross-examine or otherwise confront FEMA is offered to such aggrieved individuals. Rather, the regulations obviously are intended to preclude, or at least discourage, full-blown administrative hearings for cases which do not necessarily relate to whether the elevations are "scientifically or technically incorrect."

Thus, FEMA's procedures offer a structured response to individual grievances related to alleged flood elevation errors and to alleged inadvertent inclusion cases.

However, these are only two of several circumstances where FEMA findings and procedures may be alleged to be incorrect. Resort to this system of grievance adjustment does *not* appear to lie, for example, for substantive challenges to the insurance rate zones in the proposed FIS. Moreover, even where an individual obtains a remedy for his specific complaint, no mechanism exists to preserve the impetus for review which a single successful challenge should generate. These factors make all the more worrisome the core problem of restudy: the absence of clear criteria for the exercise of this variety of agency discretion.

2. Existing Criteria for Comprehensive Restudy

The restudy of most or all of a community is the most complete response FEMA can make to problems encountered with an initial FIS. The Agency can pursue this option when faced with one or more appeals of the elevation findings in the initial FIS.¹⁰⁹ Launching a restudy to resolve an appeal is a response created by the Agency, for this expensive form of relief is not prescribed in the NFIA. Indeed, the word "restudy," and the decision process and criteria for restudy, are not to be found in FEMA's regulations, despite the fact that the Agency now conducts several hundred restudies each year. However, the Agency can also launch a restudy before any challenges have been filed if it perceives significant FIS weaknesses and a likelihood of numerous, and particularly successful, appeals.¹¹⁰

The difficulty of the latter, discretionary course lies in the ab-

109. See *Town of Falmouth v. Hunter*, 427 F. Supp. 26 (D. Mass. 1976) (challenge to a restudy which had been initiated in response to administrative appeal). Cf. 44 C.F.R. § 67.8(b) (1980).

110. In response to flooding from a 1978 blizzard, FEMA has launched restudies for the towns of Scituate and Marshfield, Massachusetts. Letter from Edward Thomas, Regional Director, Federal Insurance Administration, to Edward Reese, Chairman, Board of Selectmen, Marshfield, Mass. (December 7, 1978) (copy on file at the offices of Bracken & Baram). Cf. 44 C.F.R. § 66.1(c)(1) (1980).

sence of criteria to help the Agency decide when to elect it. Empirical studies illustrate how variable these criteria can sometimes be. Two major FEMA contractors who perform restudies were asked to list their restudies and the major reasons for which they were taken. The responses¹¹¹ revealed that FEMA presently undertakes restudies to correct outdated or erroneous data inputs; to accommodate topological or hydrological changes caused, for example, by storm damage or new construction; to utilize improved analytic methods; to accommodate greater or changed community demands; to harmonize separate studies done for the same riverine area; or to respond to strong community opposition. Clearly, FEMA is undertaking restudies for reasons related to program acceptance (study consistency, community demands, local opposition) as well as for reasons related to the "correctness" of the existing study.

The elevation appeal and map amendment proceedings also illustrate the problem.

The map amendment process noted above does not normally involve a challenge to the scientific or technical correctness of the flood elevation findings of an FIS. The process offers assurance that any parties who have some data to establish their locations outside of the special hazard areas will have appropriate amendments made to the applicable maps.¹¹²

111. The most commonly cited reasons for restudy included:

- 1) hydraulic and/or hydrology outdated;
- 2) original study had only approximate, rather than detailed, zones;
- 3) original study had only limited coverage (e.g., corporate limits of community had changed);
- 4) errors in floodway data and cross-sections;
- 5) storm damage and topological changes;
- 6) need to add floodways to original study;
- 7) coordination of detailed and approximate studies done for same riverine area;
- 8) significant new construction (assumed to change hydrology) and channel improvements;
- 9) strong community disagreement with FIS sometimes taken into appeals process;
- 10) new analytic methods available, or new topological data/maps available, to improve accuracy of findings; and
- 11) state/local requirements changed.

Memorandum from Bernie Claveloux, Dames & Moore, to Brian Mrazik, Federal Insurance Administration (September 24, 1979); Memorandum from William G. Fry, Dewberry, Nealon & Davis, to Brian Mrazik, Federal Insurance Administration (September 25, 1979) (copies of both memoranda on file at the offices of Bracken & Baram).

112. The premise for this procedure is "the technical difficulty of accurately

It is unlikely that any single request for a map amendment will disparage the FIS sufficiently to warrant a restudy. But such requests from several owners in a community may cumulatively cast doubt on the accuracy of the flood boundaries. This in turn could put in question the accuracy of the FIS elevations, and therefore lead to a broader internal review of the FIS. Yet no criteria exist to weigh the gravity of multiple map application errors.

Restudy and appeal procedures with respect to elevation findings are more specific than those for map amendment, but the criteria employed are similarly vague. Such appeals may involve substantial challenges to the FIS based on alleged errors or omissions in FIS data and analyses which have been developed since FIS completion. When handling such appeals, the Agency is required to "review and take fully into account any technical or scientific data submitted . . . that tend to negate or contradict the information upon which [the elevation] determination is based."¹¹³ Nevertheless, no specific criteria are applied to decisions to make discretionary amendment or restudy. In practice, most appeals are resolved without a hearing, through (1) FEMA refusal to revise the FIS-inspired map, (2) FEMA acceptance, in whole or in part, of appellants' data, and revision of the map, or (3) FEMA suspension of all or a portion of the map and commencement of a restudy. Especially where issues are resolved without the formal protections of a hearing, it is important that objective criteria for case disposition be in place. Fairness is one value at stake in the creation of objective bases for decision; economy is another. Restudy may be too costly in one setting, but in other circumstances contesting an appeal may prove just as extravagant a use of agency resources.

To date, FEMA has not established a structured restudy decision process with articulated criteria of a generic nature. As a result, agency response to substantial challenges or problems with its FISs remains an ad hoc and unpredictable process conducted on the basis of uncertain and variable criteria. A structured and consistent approach is within the Agency's capabilities, and would provide the benefits of cost-effectiveness to the Agency, and predictability and accountability to the public.

delineating [a] curvilinear line on either a FHBM or FIRM." 44 C.F.R. § 70.1 (1980). Thus, FEMA has created a procedure for relief for "any owner or lessee of property (applicant) who believes his property has been inadvertently included" in the Special Flood Hazard Area. 44 C.F.R. § 70.3(a) (1980). In practice, agency responses indicate that relief is routinely available for single-property challenges.

113. 44 C.F.R. § 67.8(a) (1980).

3. "Forcing" Accuracy by Statute

Some enabling statutes, such as the Federal Water Pollution Control Act of 1972¹¹⁴ and the Clean Air Act,¹¹⁵ expressly provide for "technology-forcing." This may appear as a requirement for the agency to set performance standards without regard to technical or economic feasibility, or for the agency to use "best available" technology. Agencies subject to such mandates have responded by adopting new and sometimes unproven technical methods which are "available," by adapting techniques from other fields or by developing their own new techniques.¹¹⁶

The analogue to pollution control "technology" is flood control predictive "accuracy." The analogy, though, exists in logic but not in life. That is, the NFIA is not "accuracy-forcing," though if it were, flood control might more readily work.

Simply put, the NFIA does not create "accuracy-forcing" pressure because the Agency is not required to consider or adopt innovations in survey method. Instead, the NFIA demands that FIS findings be not scientifically or technically incorrect. The Act establishes procedures to assure that allegedly better data and analytical methods are brought to the attention of the Agency by aggrieved parties.

The NFIA approach is designed to foster agency mastery of technical questions on a site-specific, local basis. However, the success of this strategy is dependent on the perseverance, resources and technical information available to those aggrieved by an FIS, since the statute does not impose on the Agency itself any broad affirmative duty to improve its methodologies and data on its own initiative.

The statute does not, for example, establish any timetables or other mandatory requirements for the Agency to deal with certain types of technical uncertainty, as does the Clean Air Act.¹¹⁷ Nor does it require the Agency to use "best available" or "best practicable" techniques, as required by the Federal Water Pollution Control Act of 1972.¹¹⁸ Certainly it does not affirmatively require com-

114. 33 U.S.C. §§ 1251-1376 (1976 & Supp. I 1977 & Supp. II 1978 & Supp. III 1979).

115. 42 U.S.C. §§ 7401-7642 (Supp. I 1977 & Supp. II 1978).

116. La Pierre, *Technology-Forcing and Federal Environmental Protection Statutes*, 62 IOWA L. REV. 771 (1977). See also Note, *Forcing Technology: The Clean Air Act Experience*, 88 YALE L.J. 1713 (1979).

117. See 42 U.S.C. §§ 7409-7411 (Supp. I 1977 & Supp. II 1978).

118. See 33 U.S.C. §§ 1311(b)(1)(A), 1311(b)(1)(B) (1976).

pletely accurate determinations, or total or even partial but specific prevention of risk, as required by the Delaney Clause of the Food, Drug and Cosmetic Act.¹¹⁹

The statute requires only that FIS results be "not incorrect." This translates to the minimum requirement that the Agency seek methods of greater predictive accuracy only when (1) such improved methods have been accepted by the relevant profession, and (2) the use of such improved methods has demonstrated that prior methods yield incorrect results. The requirement of professional acceptance typifies the approach of this statute with regard to methodological innovation: its innate conservatism is accuracy-restraining rather than accuracy-forcing.

This, too, suggests the need for objective agency criteria for commencement of restudy and for adoption of new study methods.

B. Structuring Agency Initiatives

1. Affirmative Criteria

From the perspective of caseload management, determination of the need for restudy could usefully be instituted during internal review, wherein agency personnel seek to resolve potential problems, rather than waiting until community or individual challenges are filed. Members of FEMA's staff have drafted policies and sets of criteria for this purpose,¹²⁰ but FEMA has not conclusively cho-

119. 21 U.S.C. §§ 348(c)(3)(A), 360b(d)(1)(H), 376(b)(5)(B) (1976).

120. For example, one such proposal stated:

In establishing priorities, the following criteria should be considered when a community is being evaluated for restudy.

- *development*—is there pressure for development in the flood prone areas?
- *physical changes*—is the request for restudy based on significant physical changes or simply a reanalysis of the watershed hydrology?
- *recent flood*—has a recent major flooding event occurred which indicated a need for re-evaluation of the base flood evaluations?
- *length of available record*—if a lengthy historical record was available when the initial study was performed, the new information may not have a significant impact.
- *difference in base flood elevations*—if the physical changes or hydrologic reanalysis (presently available data) would result in a change in the base flood elevation of less than one foot, we would not consider performing a restudy. The impact of establishing these criteria is that there will be some base flood elevation differences at contiguous community boundaries.

Memorandum from Richard W. Krimm, Assistant Administrator for Flood Insurance, IF, to Federal Insurance Administration Regional Directors (March 13, 1978) (copy on file at the offices of Bracken & Baram).

Nevertheless, FEMA staff continue to question whether the current system, which incorporates relatively subjective evaluations of various criteria, is any less effective

sen any by promulgating regulations or decision standards.¹²¹

One FEMA contractor, Anderson-Nichols & Co., suggests that the primary criteria for restudy should include extension of study areas, revision of base data, and update of prior studies due to improved methods. Each of these would be arguably more objective than the community acceptance criteria noted above, and Anderson-Nichols has developed "measurable factors for identifying restudy need" under its criteria. The factors could be used, Anderson-Nichols suggests, to evaluate where the need for restudy is most acute. They include: (1) *changes in land use affecting flow*, e.g., changes in population, building permits, land annexations, and major construction; (2) *requests from the field* from staff inspectors and citizens; and (3) *changes in flow magnitude and frequency* (per stream gauge records).¹²² These factors address two of the three restudy criteria suggested by Anderson-Nichols. With respect to the third, Anderson-Nichols suggests regular internal reviews (e.g., every five or ten years).¹²³

than a highly structured decision-making process which relies on specific data elements and fairly rigid decision criteria.

121. A proposed regulation was drafted for internal review, but was never officially released in accordance with APA requirements for rule-making:

§ 1915.7 Revision of Flood Insurance Rate Maps (FIRMS). When the Administrator publishes a final flood elevation determination under the provisions of Part 1917 of this subchapter, this determination is considered the regulatory flood elevation(s) for at least 10 years from the date of the determination. It is possible that communities may have different established flood elevations at their contiguous boundaries, but as a matter of policy the Administrator will not modify flood elevations unless:

- (a) significant physical changes in the basin or flood plain have substantially altered the flood elevations; or
- (b) a simulated model or other detailed flood elevation study prepared at the community's expense has provided adequate data to determine what the revised flood elevations should be; or
- (c) a significant number of flood insurance claims have been paid for properties located outside the special hazard area.

The depiction of the flood elevations on the Flood Insurance Rate Map (FIRM) may be made more accurate, however, if more detailed topographic information becomes available.

122. Issue Paper on Riverine Flood Insurance Restudies (May 25, 1979).

123. *Id.* FEMA's staff has been especially concerned about conducting a restudy merely because there have been detectable changes in discharges: "[i]f the discharges used in the Flood Insurance Study are not significantly different statistically [from] the revised discharges, FIA should not conduct a restudy or issue revised maps. This policy should apply broadly to all situations where claims or revised hydrology are submitted as cause for appeal or restudy." Memorandum from Brian Mrazik, IFE, to Charles A. Lindsey, Studies Supervisor, IFE (June 11, 1976) (copy on file at the offices of Bracken & Baram).

In the same issue paper, Anderson-Nichols also developed several criteria for evaluating new study methods available for incorporation into FISs. These criteria include: accuracy; time and cost; the legal defensibility of the study results; whether the method adequately responds to the needs and requirements of users of FIS data; and whether the method is likely to give rise to the need to restudy in the short- or medium-term future. Neither these evaluative criteria, nor other possible criteria such as damage claims made, are reflected in present FEMA regulations or interpretive guidelines. Without passing judgment on the Anderson-Nichols suggestions, criteria of an objective nature would be useful.

2. Restrictive Criteria: Regulatory Impact

There are significant practical reasons why FEMA seeks to restrict the extensive rule-making processes necessary to improve FIS results. Most importantly, a "better" FIS can nearly always be produced at some increased cost. Agency resources are not unlimited, however, and only a fraction of the possible studies can be financed.

The policy of examining the effectiveness of a rule-making activity before adopting a new rule is reflected in President Reagan's Executive Order 12,291.¹²⁴ That order calls on executive agencies to conduct a "regulatory impact analysis" prior to promulgating a "major rule."¹²⁵ Such an analysis, at a minimum, must include:

- 1) A description of the potential benefits of the rule, including any beneficial effects that cannot be quantified in monetary terms, and the identification of those likely to receive the benefits;
- 2) A description of the potential costs of the rule, including any adverse effects that cannot be quantified in monetary terms, and the identification of those likely to bear the costs;
- 3) A determination of the potential net benefits of the rule,

124. 46 Fed. Reg. 13,193 (1981) (to be codified in 3 C.F.R.). For a description of FEMA procedures for adopting rules in accordance with the Executive Order, see 46 Fed. Reg. 32,583 (1981) (to be codified in 44 C.F.R. § 1).

125. A "major rule" is any regulation likely to result in:

- (1) An annual effect on the economy of \$100 million or more.
- (2) A major increase in costs or prices for consumers, individual industries, Federal, State, or local government agencies, or geographic regions; or
- (3) Significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises in domestic or export markets.

46 Fed. Reg. 13,193 (1981) (emphasis added).

including an evaluation of effects that cannot be quantified in monetary terms;

- 4) A description of alternative approaches that could substantially achieve the same regulatory goal at lower cost, together with an analysis of this potential benefit and costs and a brief explanation of the legal reasons why such alternatives, if proposed, could not be adopted; and
- 5) Unless covered by the description required under paragraph 4 of this subsection, an explanation of any legal reasons why the rule cannot be based on the requirements set forth in Section 2 of this Order.¹²⁶

Similar requirements existed under the Carter Administration's Executive Order 12,044.¹²⁷ In practice, those requirements led the agencies to conduct formal cost-benefit analyses as a part of their rule-making procedures.

As a matter of law, the Reagan regulatory impact evaluation probably need *not* be made before restudy or adoption of new FIS methodology. That is, Executive Order 12,291 is not binding upon "independent" agencies such as FEMA but only upon departments of the Executive Branch.¹²⁸

There are, as well, a number of policy grounds to refrain from the regulatory impact evaluation. The cost-benefit analysis is methodologically imprecise in the valuation of life, health, property and

126. 46 Fed. Reg. 13,193-94 (1981). Section 2 of the Order states:

In promulgating new regulations, reviewing existing regulations, and developing legislative proposals concerning regulation, all agencies, to the extent permitted by law shall adhere to the following requirements:

- (a) Administrative decisions shall be based on adequate information concerning the need for and consequences of proposed government action;
- (b) Regulatory action shall not be undertaken unless the potential benefits to society for the regulation outweigh the potential costs to society;
- (c) Regulatory objectives shall be chosen to maximize the net benefits to society;
- (d) Among alternative approaches to any given regulatory objective, the alternative involving the least net cost to society shall be chosen; and
- (e) Agencies shall set regulatory priorities with the aim of maximizing the aggregate net benefits to society, taking into account the condition of the particular industries affected by regulations, the condition of the national economy, and other regulatory actions contemplated for the future."

Id.

127. 43 Fed. Reg. 12,661 (1978). For extensive discussion, see Baram, *Cost-Benefit Analysis: An Inadequate Basis for Health, Safety, and Environmental Regulatory Decisionmaking*, 8 *ECOLOGY L.Q.* 473 (1980) [hereinafter cited as Baram].

128. See *Independent Meat Packers Ass'n v. Butz*, 526 F.2d 228, 234-36 (8th Cir. 1975), *cert. denied*, 424 U.S. 966 (1976); *Nat'l Renderers Ass'n v. EPA*, 541 F.2d 1281 (8th Cir. 1976).

various amenities, and the discounting of future costs and benefits.¹²⁹ Other major questions are whether the Agency should routinely conduct such analyses when (1) they would involve large commitments of agency personnel and funds; (2) they would slow the pace of overall NFIP progress; and (3) they would highlight certain methodological issues, such as how to value the unquantifiable attributes of its intended actions and how to discount future costs and benefits.

A final problem for FEMA is that its statutory mandate will not permit "scientifically or technically incorrect" elevation findings. Any balancing between assuring "correctness" and minimizing economic impacts would tend to weaken the defensibility of elevation determinations when challenged by aggrieved parties. Evidence that economic tradeoffs were made in selecting the FIS methods employed could be used to demonstrate that the Agency deviated from its major objective of making its FIS actions scientifically or technically correct.

Nevertheless, it would obviously be unwise for the Agency blatantly to disregard either economic considerations or its statutory authority, and the burden of developing some sort of practical accommodation now rests with the Agency. A review of the NFIA indicates that the Agency's actions are to be grounded in considerations of "feasibility"¹³⁰ as well as scientific or technical correctness. Since the feasibility criterion has usually been construed under other statutes to allow consideration of economic factors,¹³¹ it appears that FEMA is permitted by the NFIA to conduct and use regulatory impact analyses in its decision processes.

Whatever accommodation is made, FEMA needs to structure its decision-making with respect to restudies and methodological improvements.¹³²

129. Baram, *supra* note 127, at 481-82.

130. *See, e.g.*, 42 U.S.C. § 4012(b) (1976).

131. For an extreme and controversial case, *see* *Am. Petroleum Inst. v. OSHA*, 581 F.2d 493 (5th Cir. 1978), *aff'd sub nom. Indus. Union Dep't AFL-CIO v. Am. Petroleum Inst.*, 448 U.S. 607 (1980). *But see* *Am. Textile Mfg. Inst., Inc. v. Donovan*, 101 S. Ct. 2478 (1981).

132. Three studies deserve consideration as to policy guidance for "good benefits program practices:" Gilhooley, *Standards and Procedures for the Discretionary Distribution of Federal Assistance*, in 3 ADMINISTRATIVE CONFERENCE OF THE UNITED STATES, RECOMMENDATIONS AND REPORTS 422 (1974); Kurzman, *Uniform Minimum Procedures for Agencies Administering Grant Programs*, in 2 ADMINISTRATIVE CONFERENCE OF THE UNITED STATES, RECOMMENDATIONS AND REPORTS 181 (1970); Mashaw, *supra* note 4.

IV. CONCLUSION

The National Flood Insurance Program has since its creation in 1968 exerted a constructive influence on flood risk management and insurance across the United States. But the program, having financed 16,500 studies of local land use in floodplains, now is beset by growing pains. Changes in topography, innovations in flood study methods, and the imprecision inherent in measuring an environment in flux, all operate to strain the reliability of completed studies.

The Federal Emergency Management Agency has, by regulation, set up workable administrative appeal procedures for individuals to obtain redress of grievances. Once those remedies are exhausted, an individual or his community has additional recourse to the courts by virtue of established statutory and constitutional standards for judicial review. But neither of these avenues offers clear guidance as to when isolated defects in a community-wide study become so weighty as to justify a comprehensive new study by the Agency. The Agency's own regulations likewise are devoid of clear criteria for restudy. Moreover, the Agency's enabling legislation tends not to encourage innovation in study methodology.

This article proposes that criteria be articulated to govern the Agency's discretion to restudy or adopt new study methods. The existence of such articulated criteria and a structure for applying them would enhance the clarity and acceptability of FEMA's decisions on whether to restudy or to adopt a particular methodological innovation. A structured decision process would also likely improve the cost-effectiveness of the Agency's program and result in a greater degree of accountability and predictability to the public.