June 4, 1980

In Reply Refer To:
EGS-Mail Stop 710

Dr. Linda W. Little
L. W. Little Associates
P.O. Box 10025
Raleigh, North Carolina 27605

Dear Dr. Little:

At the request of Dr. Germain LaRoche of the Nuclear Regulatory Commission we are forwarding to you, and to Ivan Smith, one copy each of black-and-white, and color 8 x 10-in. photographs of the USGS 46 x 58-in. exhibit panel featuring the computer-plotted land use map of Three Mile Island (TMI) and Vicinity. A copy of the two-color printed exhibit caption on 8.5 x 11 in. paper is also enclosed.

The photographic exhibit will give you some idea how some exhibit copy appears at standard text page size.

For the TMI Reactor No. 1 Re-start Hearings this summer we have proposed five map exhibits. Dr. LaRoche has shared with you my proposed specifications for these exhibits. Note that for each map there is a rigid-mounted version for display at the hearings plus a 40 x 30 in. cloth-mounted copy, and six 8.5 x 11 in. black-and-white photo copies, similar to the one enclosed. The full size cloth-mounted copies and/or the page-size photos are proposed for testimony documentation. The cloth-mounted copies are hand made Cromalin color proofs that could be rolled and stored as a set in a map tube 30 in. or 40 in. long; folding is not recommended. Moreover, Map 2 has a film overlay showing road pattern.

Perhaps you feel that neither the unfoldable cloth-mounted full-size copy nor the greatly reduced page-size photographic copy will meet documentation needs? Dr. LaRoche informed me today that NRC is likely to require full-size testimony duplicate copies for each of three NRC Document Centers. These copies are in addition to the requirements of

the TMI Atomic Safety and Licensing Board. One possible alternative for both needs would be to prepare an 8 x 10-in. color internegative of the rigid-mounted "original" of each map. Then make at least four photographically enlarged color prints; (I have shown such an enlargement to Ron Ballard and Gerry LaRoche). One set would be folded for binding with other testimony documentation. It would not, however, sustain much opening and closing. Perhaps it could be cut into page-size sections, then mounted on cloth and folded. The road "overlay" would be an opaque, folded, paper positive print. Three unfolded prints of each map would be for the NRC Documents Centers, but I have a hunch even more copies will be required. The production photographic reproduction is not likely to be done in USGS labs, but by some contractor. Before the additional cost can be estimated it would be necessary to specify kind, size, and number of prints, a delivery date before or after the hearings, and whether the photo contracting work would be handled by NRC or by USGS. After you and Mr. Smith have examined the enclosed samples, I would be happy to discuss your future requirements in a conference call with the parties involved.

Sincerely,

James D. Wray
Office of Geographic Research
National Mapping Division

Enclosures

cc: Ivan Smith, ASLB c/o NRC
Germain LaRoche, NRC
Acting AD, Engineering Geology
NMD
RMS (2)
Lenox
Baxter
Wylie
IDA
Branch of Exhibits
Morris
E. Anderson
Wray
OGR

JDWray:kst

Gerry LaRoche

United States Department of the Interior

GEOLOGICAL SURVEY
RESTON, VA 22092

Treat this as a draft. It shows work underway since our meeting. Your comments are needed.

April 29, 1980

Memorandum for the Record

*Used 1978 Pop Estimates by Minor Civil Division in Pennsylvania & Maryland Jim 2 Nov 80

From: James R. Wray,
Office of Geographic Research

Subject: Discussion of Map Exhibit Needs for the Three Mile Island Re-Start Hearings

Dr. Linda W. Little, consulting environmentalist and member of the Atomic Safety and Licensing Board Panel for the Three Mile Island nuclear powerplant, met with members of the the Nuclear Regulatory Commission (NRC) and the USGS National Mapping Division at Reston on April 10, 1980. Representing NRC were Ronald Ballard, new chief of the Environmental Engineering Branch, and Dr. Germain LaRoche, Senior Land Use Analyst in that Branch. Representing NMD were Frank Baxter, Steve Guptill, Richard Witmer, and James Wray. LaRoche and Wray had arranged this meeting with Dr. Little following earlier discussion of NRC's over all mapping needs. The emphasis on exhibit needs specifically for the TMI Re-Start Hearings was a new development. LaRoche and Ballard had not met Little before this meeting. LaRoche was anxious that USGS staff members act in a technical capacity only and not express opinions about TMI that might prejudice a Board member.

The primary purpose of the meeting was to review Dr. Little's "shopping list" --prepared at La Roche's urging--of required themes for map exhibits for use at the Board's hearings soon. These will consider the case for re-starting Reactor Number One at the Three Mile Island nuclear powerplant near Harrisburg, Pa. This reactor was shut down a year ago as a result of the accident involving nearby Reactor Number Two. The Re-Start Hearings are expected to begin in July 1980 and to last for two months. Because of plant safety matters to be reviewed first, the map exhibits outlined here are not likely to be needed until about the fourth week of the hearings; however, it was acknowledged that the map exhibits could be useful references from the outset.

A secondary purpose of this meeting was to consider the TMI map exhibits as models for similar treatment of over 50 other plant and waste disposal sites. The discussion didn't actually get to this subject. However, the USGS staff members were mindful of the production implications as elements for the TMI exhibits were being considered.

Dr. Little's requirements had been outlined in a letter of April 12 to Dr. LaRoche. She confessed it was somewhat a "wish list," and did "... not envision collection of any new information ... ." (She had not seen the full-size USGS TMI exhibit before this meeting.) A copy of the requirements was available at USGS prior to the meeting, and is available from Baxter or Wray. LaRoche brought samples of source materials for some of the themes and which would be useful to USGS in compiling the overlays. Copies of these samples are also available from Baxter or Wray. They cover the following topics:

a. Site and Environment description, two pages.
b. General Area Map of Three Mile Island Nuclear Station Unit.
c. Plot Plan and Local Area Photo of Three Mile Island Nuclear Station Unit.
d. Map of Site Topography within a 5-mile radius.
e. Map of Counties and Communities within a 50-mile radius.
f. Diagrams of Population, Totals for 1970 and Estimates for 2014, by 22-1/2° Sectors at distances of 1, 2, 3, 4, 5, 10, 20, 30, 40, and 50 miles.
g. Wind Rose at TMI Tower, Two Years, 1967-1969.
h. List of Metropolitan Edison Dosimeter Stations, and site maps, 1-mile radius, 1-5 mile radius, and 5-50 mile radius.
i. Map and List of Reservoirs and Lakes within a 50-mile radius.
j. Map of Industrial and Military Facilities, and Number of Employees, within a 5-mile radius.
k. List of Industrial and Manufacturing Facilities within a 5-mile radius.
l. List of Schools, Enrollments, and Number of Employees within a 10-mile radius.
m. List of Hospitals, Number of Beds, and Number of Employees within a 10-mile radius.
n. Description and map of regional Seismicity.

The meeting mainly reviewed and discussed the individual map themes nominated by Dr. Little. Much of this discussion was actually between Dr. Little and the NRC representatives. There was also some discussion of base maps, scales, and exhibit size and format, all topics of main concern to the USGS representatives. Dr. Little agreed to write a memo listing her understanding as to disposition of the requirements. Beyond this, there was no commitment as to what USGS actually would do, what the work would cost, nor when it could be delivered. Interest to help was keen, but severe constraints were readily acknowledged.

The conclusions and comments which follow are observations by Wray, based in part on the meeting's consensus, but extended to considerations not yet discussed. Wray is also preparing a re-tabulation and priortization of the requirements, grouping those themes which might be combined on a single overlay. We still lack an assessment of the limits of the source materials, so it is very hard to estimate USGS resources needed to produce the TMI exhibits, and to project the task to other sites.

Summary of Requirements for TMI Hearings.—There are four general requirements which NRC is asking USGS to fulfill for the TMI Re-Start Hearings:

a. Mounted map exhibit and pin-registered overlays, for display in courtroom, 40x30 in., 20-mile radius in square 40x40 mile neatframe, 1:100,000, plus multiple copies of base only (including land use), unmounted, for court records and use of intervenors. The principal overlay will show population distribution.

b. Mounted map exhibit and pin-registered overlays, for display in courtroom, 40x30 in., 50-Mile Radius in square 100x100 mile neatframe, 1:250,000, plus multiple copies of base only (including land use), unmounted, for court records and use of intervenors. The principal overlay will show population distribution.

c. Printed version of the 20-mile radius portion of the 50-mile radius base map (land use plus selected planimetric features) in square 40x40 mile neatframe, perhaps in two colors, on 14x11 in. paper, for wider distribution to intervenors and attendees, plus mounted copy for display in courtroom. (The population distribution information--if needed--would probably have to be printed as a separate map in the same scale and format.)

d. USGS Expert Witness at the hearings to tell how maps were made, to describe the limits of their accuracy, and to answer questions raised by the Court, and by adversary groups as well as by advocate groups.

Dr. Little is checking to see if the Board and/or Court also require for the testimony records unmounted copies of the exhibit overlays. (They probably will, adding to the design and production challenge to USGS.)

From the discussion of the requirements, it became clear that the Board's list was not that of either advocate or adversary trying to establish a case. Instead, it was an attempt to cover, first, the concerns of the conscientious environmentalist, and second, to anticipate questions (and answers) likely to be raised by intervenors, whether advocates for or adversaries against re-start of the reactor.

Rationale for the exhibit and handout format and scales is described elsewhere under "Choice of Base Maps," and "Prospective Hazard Mitigation Atlas." The need for an Expert Witness places demands on the procedure for "Review and Release of Map Exhibits," a topic also discussed separately elsewhere below.

Requirements for the 10-Mile Radius Map.--The Licensing Board member's original requirements called for separate map exhibits of three area sizes, each centered on the particular reactor being considered:

Evacuation Planning Zone ..... 10-Mile Radius
Evacuation Planning Zone ..... 20-Mile Radius
Ingestion Pathway ..... 50-Mile Radius

After some discussion, requirement for the 10-Mile Radius map was withdrawn, so far as exhibits for the Three Mile Island Re-Start Hearings are concerned. However, LaRoche of NRC and Baxter of USGS have discussions underway concerning a separate NRC requirement for a 10-mile radius topographic map of all plant and disposal sites. This requirement is thus not specifically related to the TMI Re-Start Hearings. However, such a map would also be a useful reference at the TMI hearings. Besides, the TMI site would be the logical first such area to be mapped, not only because of the widespread interest and timeliness, but also because of the availability of fairly recent source material, including

the relatively advanced state of compilation of intermediate-scale topographic maps of pertinent Pennsylvania counties at 1:50,000, or 1:100,000; some pertinent 30'x60'-minute quads at 1:100,000 are also in preparation. In addition, the 10-mile radius topographic map could serve most of the needs for this area initially listed by Dr. Little. Moreover, source material and compilation effort for base map update and emergency theme data would be much simpler for a 10-mile radius (or 20x20-mile square) than for a 20-mile radius (or 40x40-mile square), if only the smaller area really needs to be covered.

Center of the Plant Radius Maps.--Technically, radii are centered at the actual reactor site. About half of the powerplant sites have more than one reactor. TMI has two. The up-coming Re-Start Hearings are for Reactor One, centered about 96 meters (315 feet) north of Reactor Two where the accident occurred and which is not ready for re-starting. The distance between the two is 4 mm (3/16 in.) at 1:24,000. This is plottable but barely distinguishable at scales proposed for the 20-mile and 50-mile radius maps. So, separate base maps for each reactor site--as distinguishable from the overall powerplant site--should not be necessary. Mappable theme differences for each reactor could be handled by different overlays or different overprints. Moreover, as mapping is extended to other plant sites, many 20- and 50-mile radii overlap. This suggests that economies in compiling and framing base maps can be realized by careful planning of sheets for a prospective Hazard Mitigation Atlas. A 50-mile radius circle covers 7,850 square miles (or 10,000 square miles if centered in a square 100 miles on a side). A standard 1°x2° map between latitudes 40° and 41° N, such as the Harrisburg Quad where TMI is located, covers only 7,269 square miles! A 20-mile radius circle covers 1,257 square miles (or 1,600 square miles if centered in a square 40 miles on a side).

Choice of Base Maps.--The discussion of map requirements listed by Dr. Little made it clear that most are (or can be) covered by the base map for each exhibit. "Base map" in this context consists of thematic land use and land cover as underlay or underprint (preferably in colors and screens), plus appropriate point, line, and place name detail as overprint or overlay. If we don't question their adequacy for emergency management, many of the desired themes can be covered neatline-to-neatline by a likely existing base, but only the gross land use pattern would really project in the courtroom. Sets of theme data pertinent to emergency management (perhaps limited by a specified radius, not a square neatframe) would be shown with emphasis on pin-registered overlays.

For the map of the 50-Mile Radius area (100x100 mi.), there was unanimous acceptance of the planimetry of the 1:250,000 topographic map as the base map, also at 1:250,000, with 10-km Universal Transverse Mercator (UTM) grid and with selected annuli centered on TMI. Hydrographic line features would be included, marsh symbols would be optional. Planimetry would be shown in combination of solid black and bi-angle screen of black. Contours would be omitted, and tints of urban, water, and forest areas would be omitted. Instead, area theme cover data would be the land use map with color fill, either with polygon outlines in red (as on the present TMI exhibit), or without the polygon outlines (as on the Harrisburg demonstration map prepared on the large format laser plotter).

Note, however, that county and minor civil division boundaries and names useful in compiling or interpreting population distribution are obscure or absent. If emphasis is needed for use with the population density map, a separate overlay would have to be compiled. The "LUDA" associated map would be useful, but compiling and mounting the type labels would be a big job. See separate discussion on "Options for Compiling Maps of Population Density."

For the map of the 20-Mile Radius area (40x40 mi.), the choice of base at 1:100,000 is a real dilemma. Usually lacking a topographic base at that scale, the existing land use and land cover polygons were fitted to a base made by enlarging the existing 1:250,000 map to the scale of source photos, about 1:130,000. The smallest unit of mapping is ten acres (4 ha) for urban polygons, water bodies, strip mines, and feed lots; elsewhere the minimum mapping size is 40 acres (16 ha). Some water body features and road alignments agree with the source photos but not with the corresponding symbols on the base. The resultant overlay is available on open file and in L-Series two-color format at 1:250,000 the publication scale of the topographic base. The prototype TMI exhibit for the 20-mile radius at 1:100,000 does not show base detail other than the 10-km UTM grid, census tract boundaries (without area codes), and custom-compiled minor civil division names. For a base for the new TMI exhibit, one option is to add the enlarged planimetry from the existing 1:250,000 base, perhaps as a screened film overlay or overprint. Double-lined water features would have to be removed to avoid conflict with Water as a land cover class. Because the TMI land use polygons were computer-plotted and reproduced (and some scale-juggling has occurred to fit digitized file sections from different quads), it is possible that the computer-plotted polygons and the separately enlarged base may not fit too well. Also, the 1:250,000 base might require updating to include comprehensive treatment of base features desired for the intended use.

Baxter proposes an alternate base for the 20-mile radius map: Either use reductions of the 1:50,000 topographic maps already in preparation for some Pennsylvania counties and compiled with double-lined road symbols, etc. from the 7½ quads at 1:24,000. Or, use the 1:100,000 county maps or 30x60-minute quads with single-lined road symbols, also in preparation. Preparation of the 1:50,000 base for the 20-Mile Radius area (40x40 mi.) is not complete. Preparation of the 1:100,000 base is essentially complete. It would be an ideal base except that it lacks minor civil division boundaries and labels. The existing land use polygons might look like cartoons on such a base, but we should try it anyway. Polygons converted to cells, as on the Harrisburg demonstration map, would look much better. This digitized land use data base does cover the entire 20-mile radius area. A back-up alternative for the 20-mile radius map, especially in the very short time available, is to show no planimetric base at all. Instead, let the land use, UTM grid, census tract boundaries, TMI annuli, and civil division place names be the base map, as we used for the prototype map.

For the 10-Mile Radius map--an optional requirement for the TMI Re-Start Hearings--the 1:50,000 topographic base would be ideal, whether reduced from 1:24,000 or enlarged from 1:100,000. Baxter has proposed this to NRC. The main problem would be to complete area coverage and to update pertinent theme information, especially the nuclear powerplant site symbols. Wray recommends

that the 1-km UTM grid be full-drawn, and that the neatframe be a square 33x33 km. (20.5x20.5 mi.) limited by UTM grid lines, or 66x66 cm (25.98x25.98 in.) at 1:50,000. Such a map, with legend panel on the right, covers the 20x20-mile square neatframe, and would fit within the suggested 36x28 in. map copy area and 40x30 in. exhibit board limits. The 1:50,000 base reduced from the 1:24,000 quads is best for Township and other Minor Civil Division boundaries and names, and would be useful for interpreting population distribution (especially if later allocated by land use). Unfortunately, the requirements for such information are for the 20-mile and 50-mile radii areas which are much larger and for which source material is not yet ready.

NRC operations personnel--for requirements not directly related to the TMI hearings but probably including TMI as a first demonstration--have told Baxter they want a mounted and laminated mosaic of the 7 1/2-minute topographic quads at 1:24,000 covering the 10-mile radius area in a 20x20-mile square (33x33 km). The UTM 1-km grid and 2-, 5- and 10-mile annuli would be included. Preparation and reproduction of such maps for all 50 sites using existing lithoprinted quads could be done by contractor with some guidance provided by USGS. These maps, too, could have the same 33x33 km neatframe (20.5x20.5 mi.) limited by UTM grid lines. The neatframe square would measure 137.5x137.5 cm (54.13 x 54.13 in.) at 1:24,000. Legends could be placed in the right (east) panel on a page 72x56 in. in horizontal format. For wider distribution, the contractor could reproduce provisional copies by color or black-and-white photography, or by color or black-and-white lithography, at 1:50,000, on paper 36x28 in., the same size as exhibits proposed for the TMI hearings.

The Three Mile Island scenario is a good illustration of the need and rationale for on-going NMD plans for standardized base maps at 1:24,000 (or 1:25,000), 1:50,000, 1:100,000, and 1:250,000. It also illustrates the need for integration of the spatial or locational-data and use of a rectangular coordinate system in a geo-information applications context. The adaptations implied in these overall requirements for NRC are also likely to apply to those of other agencies having related emergency management responsibilities, especially the Federal Emergency Management Agency (FEMA), the National Transportation Safety Board (NTSB), and their State and local counterparts.

Choice and Use of UTM Coordinate System.--The use of the UTM rectangular coordinate system simplifies location designation in field use throughout a site locale. It also offers an opportunity to standardize map neatframes and sheet sizes in a series covering different area sizes at different scales. It also aids area measurement needed for spatial analysis and may simplify some "searching" by computer. The use of any geodetically controlled rectangular coordinate system for location and direction designation, however, and for defining map neatframes, can be complicated somewhat where a grid zone boundary crosses the area of central concern. As study of Appendix B suggests, the problem will occur on maps of several NRC plant sites, especially for the 50-mile radius maps. The advantages of the UTM system for emergency management applications, however, far outweigh the disadvantages. To minimize the inconvenience, there are two main options for resolving the two-zone situation where it occurs. One option is to use both zones as indexed on existing maps.

A second option is to give precedence to one zone and to extend its grid over a limited area of the adjacent zone for the rest of an individual map, and for not more than about 50 miles, to avoid increasing scale error. These options and their consequences need to be discussed among USGS and user-agency personnel before a decision is made. Fortunately, this problem is not present in the Three Mile Island 50-mile radius area, which lies entirely within UTM Zone 18.

Options for Compiling Maps of Population Density.--The dilemma over choice of base maps for exhibits at 1:50,000 and 1:100,000 carries over to the choice of base maps for the population density overlays for the 50-mile radius at 1:250,000 and the 20-mile radius at 1:100,000. An additional dilemma is introduced by the option to use the 1970 census tract boundaries in the GIRAS digital data base or to use an entirely different approach.

Considering the short time available, that two population density maps are required, and that plotting and labeling minor civil division boundaries and names is a very time-consuming task, Wray recommends that we not try to make these maps this time by demonstrating what GIRAS ultimately will be able to do. While a digital census tract data base is already available for the 20-mile TMI radius, it is not complete for the 50-mile radius.

Consider an alternate approach that will produce both population density maps and also avoid plotting and labelling census county subdivision boundaries and names: The official U.S. Bureau of the Census maps of 1970 Census County Subdivisions for Pennsylvania and Maryland (both published at eight miles to the inch) are the latest available; copies are on hand. They show States, counties, and minor civil division boundaries and names [illegible] census tracts, as GIRAS uses for LUDA in counties comprising Standard [illegible]ropolitan Statistical Areas.

The County Subdivisions map, for example, shows only one statistical area for the City of Harrisburg, Pa. The LUDA and Census Tract maps show about thirty polygons in the same area. We could mosaic the two Census County Subdivision maps for Pennsylvania and Maryland, photographically juggled to fit, if necessary. Frame the 100x100-mile neatframe area for the 50-mile TMI radius. Make two copy negatives at 1:250,000, and make two contact stable-base positive prints from one of them. While someone designs neatframe, UTM grid, TMI annuli, and marginalia, someone else would opaque place names on one of the negatives, and retouch broken line symbols. Meanwhile, someone else would asssemble 1970 MCD land areas and 1979 population estimates by MCD (-already on request), calculate densities, and assign classes (-not more than eleven). On a contact print from the opaqued negative, add a color spot code in each polygon for the appropriate population density category. Then, using services of a contractor having Sci-Tex equipment, scan-digitize the color-coded 100x100-mile map, and also the corresponding base with place names. Both maps should have common register marks. Edit. Then plot appropriate screen densities on one or two film positives at 1:250,000 to achieve, say, a two-color separation and thematic color fill. Combine boundaries and names from the second film and prepare composite Cromalin proof. Treat as a separate, stand-alone map exhibit, not as an overlay for the land use map. The photo enlargement of the boundaries and place names--minus the population density shading--might be used as an overlay on the land use base. The local fit should be good, but the overall fit might not be good, or vice versa.

Meanwhile--whether separately scanned and plotted, or only separately plotted --prepare from the same source material the color-fill separations and boundaries-and-names overlay for a map of population density in the 40x40-mile neatframe area containing the 20-mile TMI radius at 1:100,000. This, too, would be a stand-alone exhibit, but the jurisdictional boundaries and names could also be used as an overlay to the land use map. The local fit should be good, but the overall fit might not be good, or vice versa. Because the population distribution information for the 20-mile radius map exhibit cannot be handled as an overlay (but as a separate, s' 'd-alone map), the corresponding 14x11 in. handout piece (if needed) would a. have to be on a separately printed map at the same scale and format. As for the handout version of the land use base at 1:250,000, the population distribution handout version for the 20-mile radius area at 1:250,000 would be the 40x40-mile center square lifted out of the 100x100-mile area of the population map exhibit for the 50-mile radius area. There would be no change in scale and no new type would have to be set for the map area proper.

At some future time we could demonstrate how GIRAS could generate the population density by census tract in metropolitan areas, or map population distribution by place of residence (night-time), versus place of livelihood activity (day-time), both using land use to model each distribution.

Prospective Hazard Mitigation Atlas.--In a separate memo (March 20, 1980), Wray proposes format and compilation measures which adapt the standard base maps and integrate the 20-mile radius and 50-mile radius exhibit maps and 20-mile radius handout map. The proposal can also accommodate the 10-mile radius topographic map. Many combinations of area size and map scale are possible within standard sizes for compilation, exhibit, handout (or newspaper) distribution, and for use with computer tabulated spatial data. All could be elements of a prospective Hazard Mitigation Atlas which can accomodate the needs of other emergency management agenc .es, not just those being addressed by NRC.

The recommended size for mounted exhibits is 40x30 in., horizontal format. This is a stock s ze for illustration board, and standard for USGS exhibits for Budget Hearings. Map reproductions mounted on the exhibit boards will accommodate the 10-mile, 20-mile, and 50-mile radii at 1:50,000, 1:100,000, and 1:250,000 (respectively), on reproduction materials cut from 30-in. or 36-in. rolls. The handout page size, 14x11 in., retains the square neatframe and horizontal page format of the larger exhibit. Within limits, map copy at one useful scale at the larger size can be reduced to another useful scale at the smaller size without symbol re-design or re-setting of type labels. The 14x11 in. page size is also one standard computer printout page size, permitting maps and tabular material to be combined in a working atlas and to be assembled in stock-size binders. As one measure of emergency preparedness, the maps and tables could be updated locally, reproduced on standard office equipment, and printed in the local newspaper to assign population to shelters, evacuation routes, and crisis relocation centers. For insertion in court records or other text in standard 8.5x11 in. page size, the 14x11-in. page can have one or two pleats parallel to the 11-in. sides so that outside dimensions, folded, are also 8.5x11-in. With two pleats, one down, one up, the exposed right-hand panel may contain title, legend, and page number while the left edge is held by the same binding as the rest of the document.

Appendix A is a set of drawings at one-tenth scale that shows the relationships among the standard sheet sizes, radii and area sizes, and map scales discussed in the foregoing. Many other "standard" combinations are possible to meet other NRC requirements, and also those of the National Transportation Safety Board and the Federal Emergency Management agency.

Appendix B is a base map of the U.S. in National Atlas format at 1:7,500,000. The base shows county boundaries and names and the $1^{o}x2^{o}$ USGS topographic map quads. NRC plant sites have been plotted as shown on USGS open file map 80-502, "Nuclear Power Reactor Sites in the United States, March 1980," by Mareta West and Carol Shifflett. The 20-mile and 50-mile radii for each plant are shown. Plant name and status are omitted but appear on the source map. This base is useful for assessing status of source materials, planning map coverage where radii overlap, and estimating the task of producing for other plant sites the products decided to be required for TMI.

Proposal for an Atlas derived from a set of map exhibits, however, should not be allowed to over-emphasize map-making. Hazard mitigation maps are not ends in themselves. They should be regarded as by-products of locational information in a geo-information system--such as GIRAS--which permits spatial analysis of point, line, and area data. It also allows for interactive video display, and for computer-assisted preparation of maps for reproduction.

Review and Release of Map Exhibits.--The need for an Expert Witness from USGS at the licensing hearings, and the use of the maps as exhibits at those hearings, probably requires that the maps be properly reviewed and released by USGS (as for Open File). Separate formal clearance by NRC or the Licensing Board may not be required--or even desired--because the maps will be considered as part of the expert testimony, unprejudiced by NRC, or especially by the Licensing Board, which must remain objective. The National Mapping Division and USGS probably should consult DOI Counsel for guidance in this matter. Time for review and clearance--not to mention time for map compilation (!)--places another very critical limit on what we say we can deliver.

Moreover, because the map exhibits and handouts are needed in multiple copies, and that interest is keen and not limited to TMI, we probably should be thinking about I-Series or "L"-Series publication, or an NMD equivalent. Such maps could be forerunners of a looseleaf Hazard Mitigation Atlas.

James R. Wray
Office of Geogr[illegible] Research
National Mapping Division

Attachments: Appendix A
Appendix B

cc:

Acting AD, Engineering Geology	PO	Witmer
NMD files	I&DS	E.Anderson
Chief Geographer	Baxter	Guptill
RES (2)	GP	Wray