ENVIRONMENTAL ASSESSMENT FOR THE

GAMMA-RAY OBSERVATORY (GRO)

January 15, 1982

ABSTRACT

The Gamma-Ray Observatory (GRO) is a free-flyer orbiting the earth in a circular orbit at an altitude between 350 km and 450 km. The GRO is to be placed in orbit by the Space Transportation System (Shuttle) and is to be returned to earth by a controlled re-entry using its own propulsion system. This assessment concludes that the GRO will produce no significant environmental impact. It is recommended that a Finding of No Significant Impact (FONSI) be prepared.

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GAMMA-RAY OBSERVATORY (GRO)

I. SUMMARY AND CONCLUSIONS

A. Gamma-Ray Observatory (GRO) Advantages

The GRO provides an opportunity to advance to the next major step in astronomy. Gamma-Ray astrophysics is at the very frontier of science. It allows the observation of the highest energy radiation emitted by celestial objects, including the line signatures of nuclear interactions, matter-antimatter annihilation, and phenomena related to elementary particles and superdense objects. These quantities can only be observed in the gamma-ray regime. Also, gamma-ray observations hold the greatest potential for unlocking the mysteries of the various esoteric phenomena recently found at other wavelengths, such as black holes, quasars, neutron star pulsars and fast celestial transients.

Experimentally, the value of observations in the gamma-ray portion (greater than approximately 100 keV) of the electromagnetic spectrum has been established with gamma-ray instruments aboard the Explorer XI, OSO 3, SAS 2, COS-B, OSO 7, OSO 8, HEAO 1 and HEAO 3 satellites, as well as numerous balloon flights. These observations have established the presence of both diffuse and discrete source emissions both from our galaxy and from extragalactic space. Interpretations of these data have already contributed significantly to our astrophysical knowledge. Lines have been seen from the sun and from interstellar space and hints of several other types of line emission have been reported. Also, many different types of transient phenomena have been observed. To take the next step forward in the measurement of gamma-ray requires the use of large, heavy complex instruments whose detector area is greater than instruments previously flown. The Space Shuttle provides the opportunity to place instruments in orbit with sufficient sensitivity resolution and dynamic range to address the following crucial topics in astrophysics:

- Study of the dynamic evolutionary forces in compact objects such as neutron stars and black holes.
- Search for evidence of nucleosynthesis--the fundamental building process in nature--particularly in the environment of supernova.
- Study of gamma-ray emitting objects whose nature is not yet understood.
- Exploration of our galaxy in the gamma-ray range, especially with regard to regions difficult to observe at other wavelengths; the orgin and dynamic pressure effects of the cosmic rays; and structural features, particularly related to high-energy particles.
- Study of the nature of other galaxies in the energetic realm of gamma-rays, especially radio galaxies, Seyfert galaxies, BL Lacertae objects and quasars.

- Study of cosmological effects through the detailed examination of the diffuse radiation and the search for primordial black hole emission.

- Study of intense gamma-ray bursts of many types whose origins remain a mystery.

B. Alternative Actions

There are no alternative actions available for the measurements of gamma-rays. The measuring devices must be lifted above the earth's atmosphere for extended periods of time. The mass near each device must be kept to a minimum to reduce background radiation. A long period of time, 2 weeks to a month, must be used to accumulate a sufficient statistical sample of data on a given target. These restrictions make a free-flyer the only known method of achieving the needed environment to satisfy the present day instrumental needs.

C. Conclusions

The GRO is needed to continue the study of astronomy in the high energy range of the spectrum, i.e., in the gamma-ray range. This project will greatly increase man's knowledge in this existing area of astronomy.

The environmental effects of the GRO Project are summarized in terms of ground operations and space operations.

Ground operations includes the manufacturing integration and test of the GRO, transportation to the launch site, checkout and integration with the Space Transportation System (STS) Orbiter, and launch operations. The ground operations were found to present no significant environmental hazard; however, accidental spillage arising from servicing the hydrazine system or leakage of the NE 213 Nuclear Enterprises scintillation fluid would cause localized hazardous effects for short periods of time. Because of the hazardous nature of these substances, appropriate safety procedures will be used to control handling operations, limiting the effects in case of accidental spills or leakage.

Space operations include launch and ascent of the Orbiter to release altitude; checkout and release of the free-flyer (GRO) into a parking orbit; ascent from parking orbit to operations orbit; and controlled re-entry from operational altitude. The space operations were found to present no environmental hazard of any significance. The spatial release of hydrazine decomposition products of ammonia, hydrogen and nitrogen, all of which reduce ultimately to or are naturally occurring constituents of the atmosphere, does not present any environmental hazard.

The re-entry of the free-flyer will be controlled so that any surviving part will impact in a non-inhabited area. The items most probably not burning up in the atmosphere are large portions of the aluminum structure, pieces of the sodium iodide and cesium iodide crystals and miscellaneous electronic equipment. None of these items are of significant quantity to cause any significant environmental impact.

II. SPACE PROGRAM NEEDS

The synergistic relationship of the measurements made in different regions of the spectrum in astronomy make it exceedingly important to have data that encompasses all areas of observation. The major area where such further data is needed at the present time is the gamma-ray end of the spectrum. This data can easily be achieved by using sophisticated instruments in orbit. The slow growth in gamma-ray research is because of instrument technology. The instruments used to make the measurements are very large and heavy and must be designed to limit background radiation.

The GRO has instrumentation that has been designed to meet the needs of refining the spectrum in gamma-ray region to the high end of the gamma-ray regions.

III. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

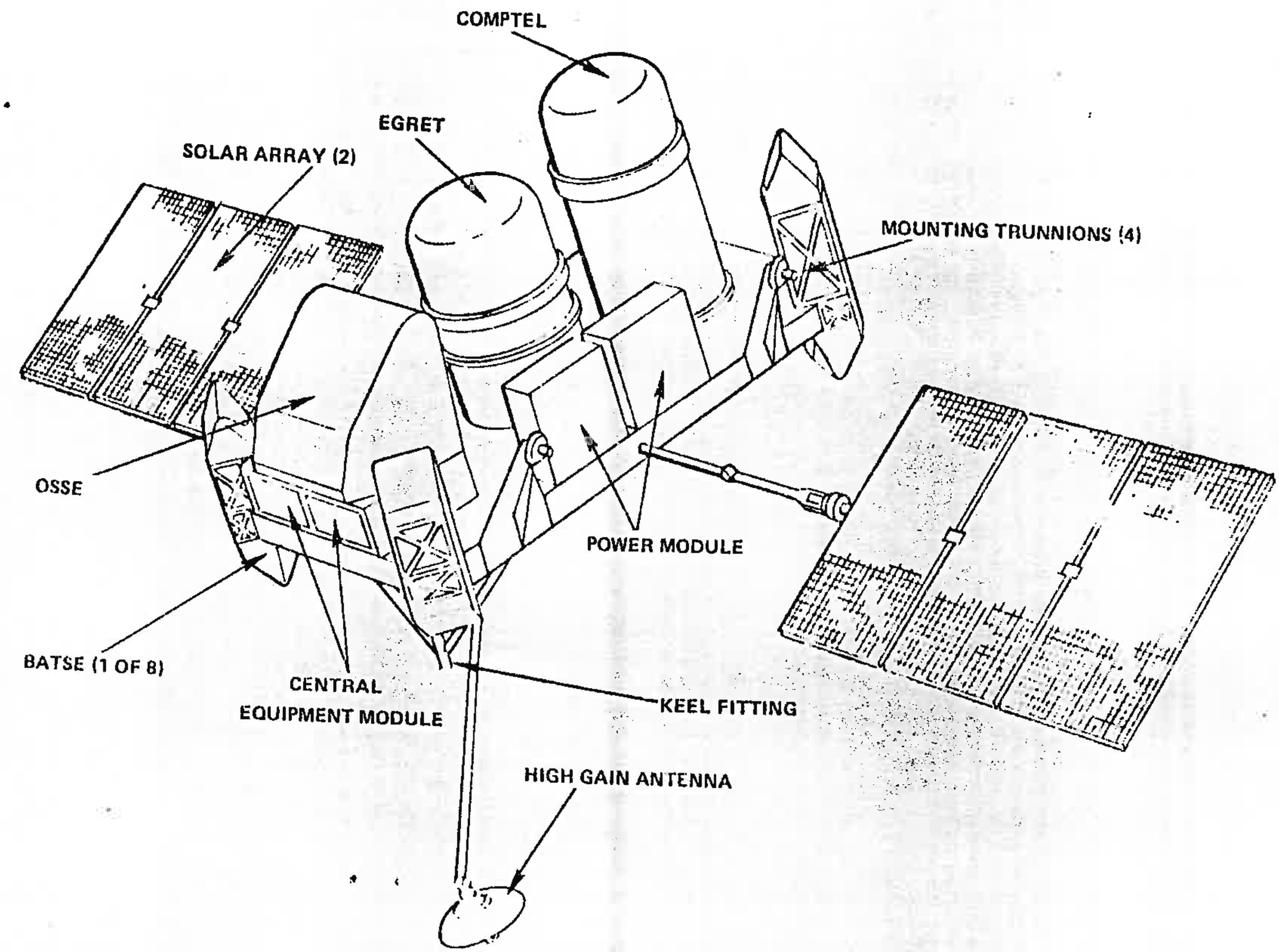
A. Description of Proposed Action

(1) Spacecraft. The GRO is a free-flyer, single spacecraft mission (Figure 1). The payload consists of four sets of instrumentation supplied by four principal investigators (See Figures 2 through 9). The four GRO experiments represent an integrated complement of instruments whose common goal is the detailed study of celestial gamma rays. The spacecraft has an attitude control system, a power system, a communication system, a propulsion system and a data system.

(2) Instruments. The four instruments currently being defined are:

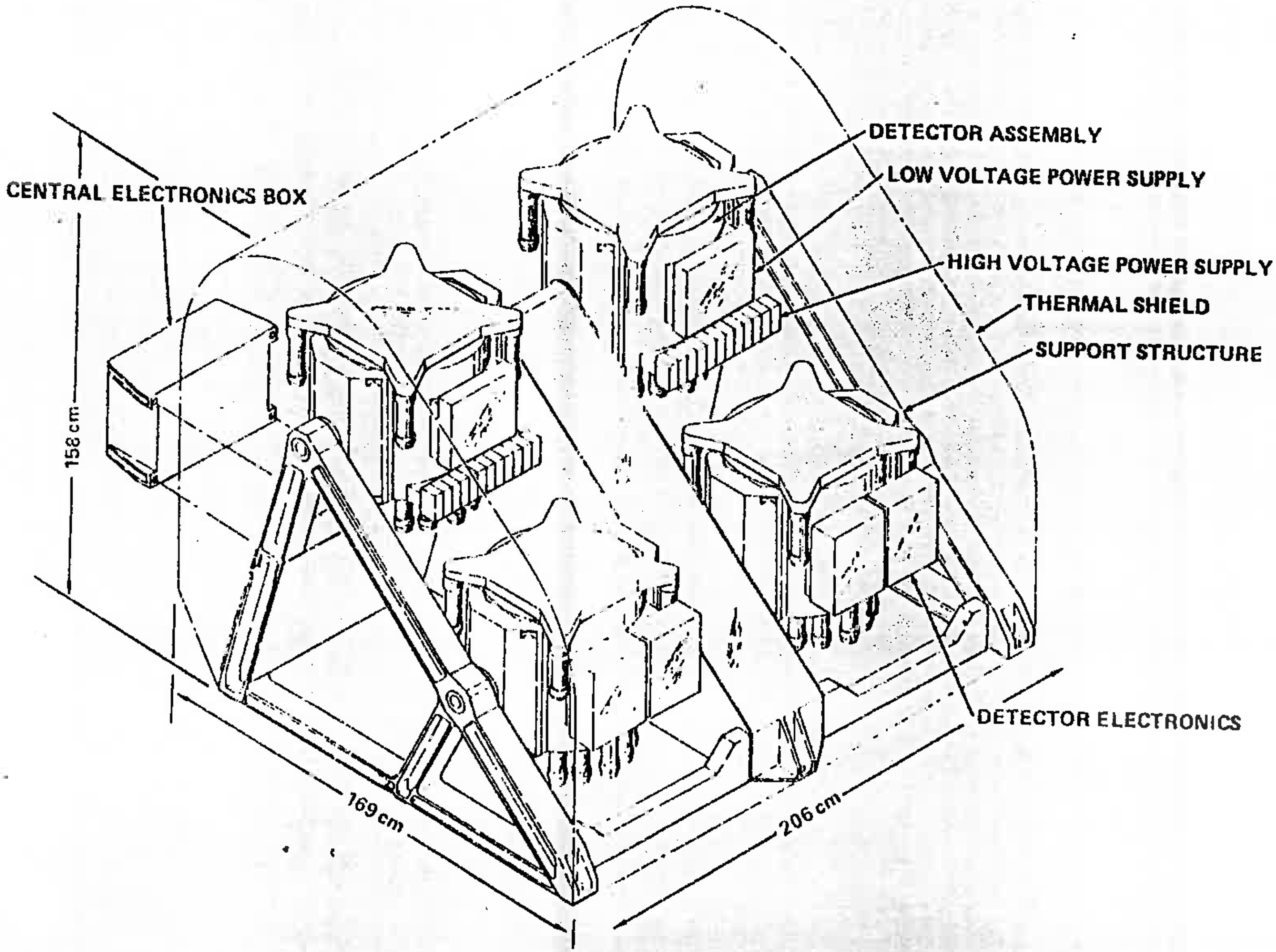
- Oriented Scintillation Spectrometer Experiment (OSSE).
- Imaging Compton Telescope (COMPTEL).
- Energetic Gamma-Ray Experiment Telescope (EGRET).
- Burst and Transient Source Experiment (BATSE).

These instruments collectively span the photon spectrum from 0.05 to 3 x 104 MeV, over five decades in energy. Each experiment has been chosen such that its sensitive region overlaps those of its nearest neighbors, thus allowing for complete continuity of spectral measurements and cross-calibration of each of the instruments. Without exception, each instrument represents a major step forward in experimental capability. The photon sensitivity over the entire energy range will be improved by more than an order of magnitude over existing measurements.



Gamma-Ray Observatory

Figure 1



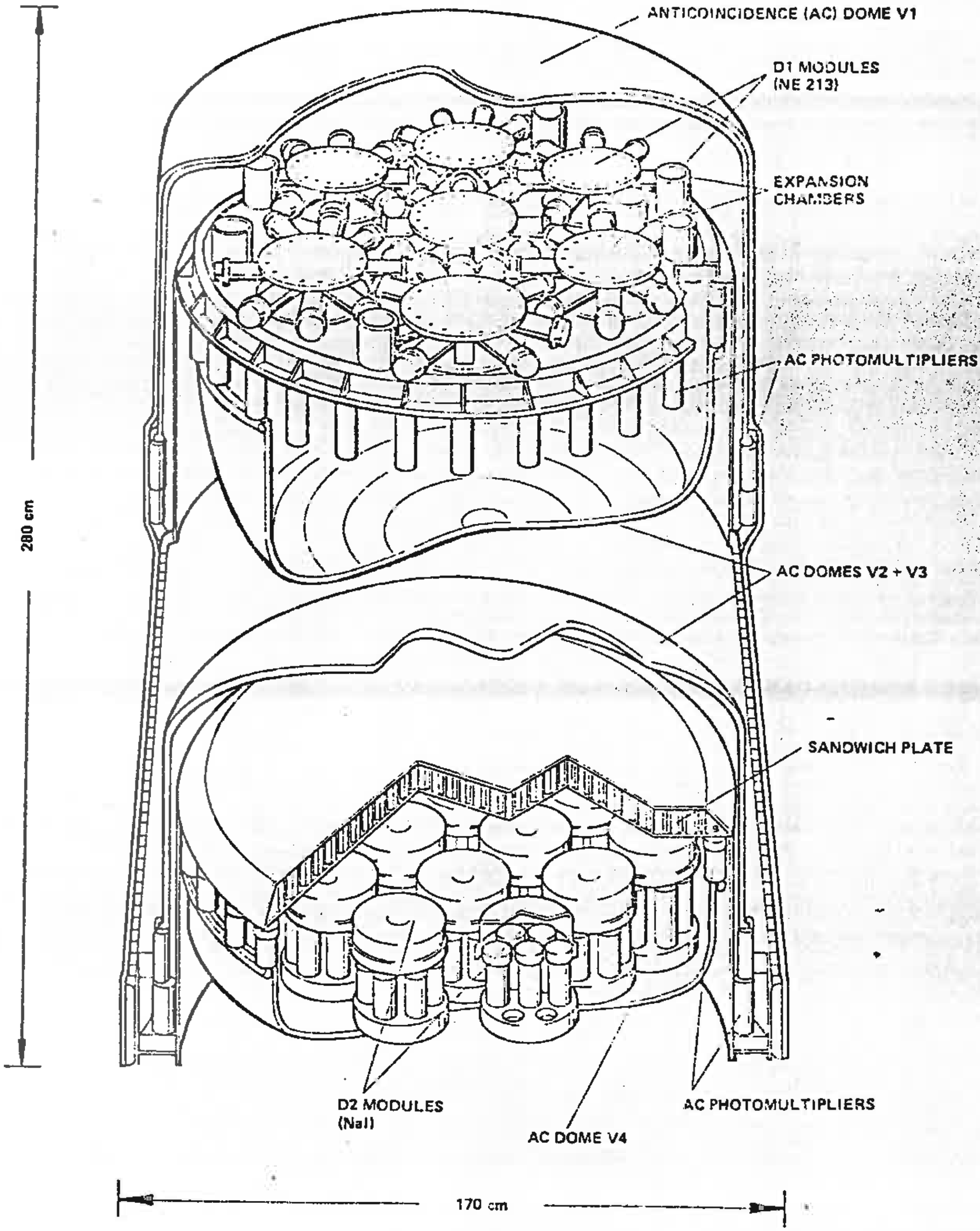
Oriented Scintillation Spectrometer Experiment (OSSE)

Figure 2

Oriented Scintillation Spectrometer Experiment (OSSE) Capabilities and Requirements

Detectors	
Type	4 identical NaI-CsI phoswiches, CsI annular shield passive collimation
Aperture Area (total)	2683 cm^2
Effective Area	2310 cm^2 at 0.51 MeV 567 cm^2 at 4.43 MeV
Field-of-View	$5° \times 10°$ FWHM
Energy Range	0.1-10 MeV γ-rays (primary objectives) 10-150 MeV γ-rays (secondary objectives) > 10 MeV solar neutrons (secondary objective)
Energy Resolution	8.0% at 0.661 MeV 3.2% at 4.43 MeV
Time Resolution	4 s in normal mode 2 ms in pulsar or burst mode
Experiment Sensitivities	
0.1-10 MeV Line γ-rays (10^6 s)	$\sim 2 \times 10^{-5}$ photons $cm^{-2} s^{-1}$
0.1-1 MeV continuum γ-rays	0.005x Crab
1-10 MeV continuum γ-rays	0.02x Crab
Gamma-Ray Burst	10^{-7} erg cm^{-2}
Solar Flare Line γ-rays (10^3 s flares)	5×10^{-4} photons $cm^{-2} s^{-1}$
Solar Flare Neutrons (> 10 MeV)	5×10^{-3} neutrons $cm^{-2} s^{-1}$
Pointing System	
Type	Independent Single Axis
Drive System	Redundant Stepper Motor
Maximum Drive Speed	$2° s^{-1}$
Torque to spacecraft	Cancelled by counter-rotation
GRO-Experiment Interface Data	
Weight	1730 kg
Dimensions	1.5m × 1.5m × 2.3m
Power	140 watts (average)
Telemetry	5000 bps

Figure 3

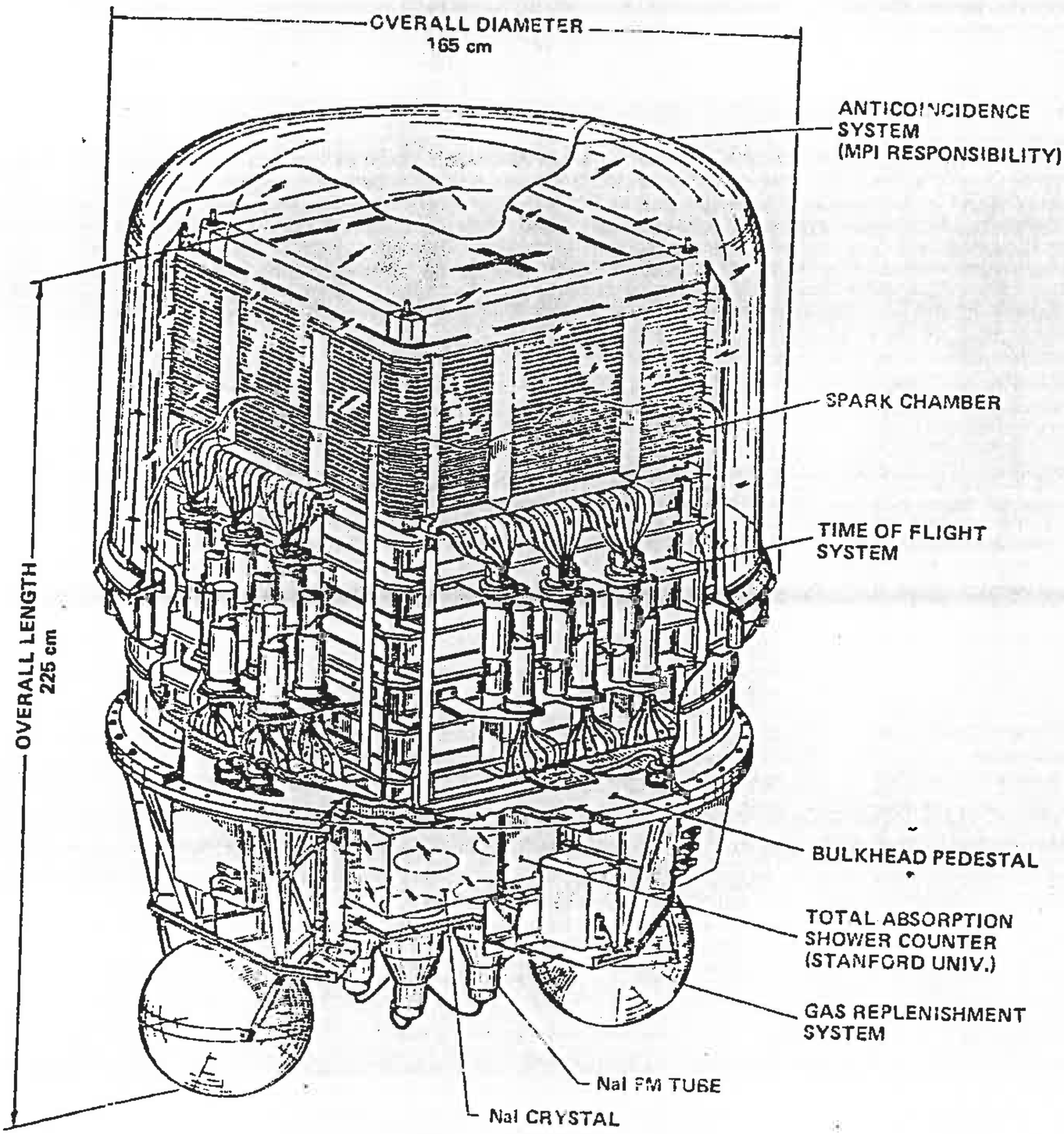


Imaging Compton Telescope (COMPTEL)
Figure 4

COMPTEL Instrument Capabilities and Requirements

Detectors	
Upper detector D1	Liquid scintillator NE 213
Lower detector D2	NaI (Tl)
Geometrical arrangement	
D1	7 cylindrical modules 28 cm in diameter and 8.5 cm deep, total geometrical area 4310 cm^2
D2	14 blocks with about 28 cm diameter and 7.5 cm thickness, total geometrical area 8620 cm^2
Sensitive area	20-50 cm^2
Energy range	1-30 MeV
Energy resolution	5% - 8% (FWHM)
Angular resolution	1.7°-4.4° (FWHM)
Geometrical factor	5-30 cm^2 sr
Field of view	≈ 1 sr
Position resolution	5-30 arc min
Experiment Sensitivities	
Minimum source detectability	5 σ above 1 MeV (1.3 X 10^6 s actual observation time) 5 X 10^{-5} photons $(MeV)^{-1}$ cm^{-2} s^{-1} (= 2% of the expected total Crab emission)
Line sensitivity:	3 X 10^{-5} to 3 X 10^{-6} photons $(MeV)^{-1}$ cm^{-2} s^{-1}
GRO-Experiment Interface Data:	
Weight	1477 kg
Dimensions	2.80 m X 1.7 m diameter
Power	195 W
Telemetry	4500 bps

Figure 5



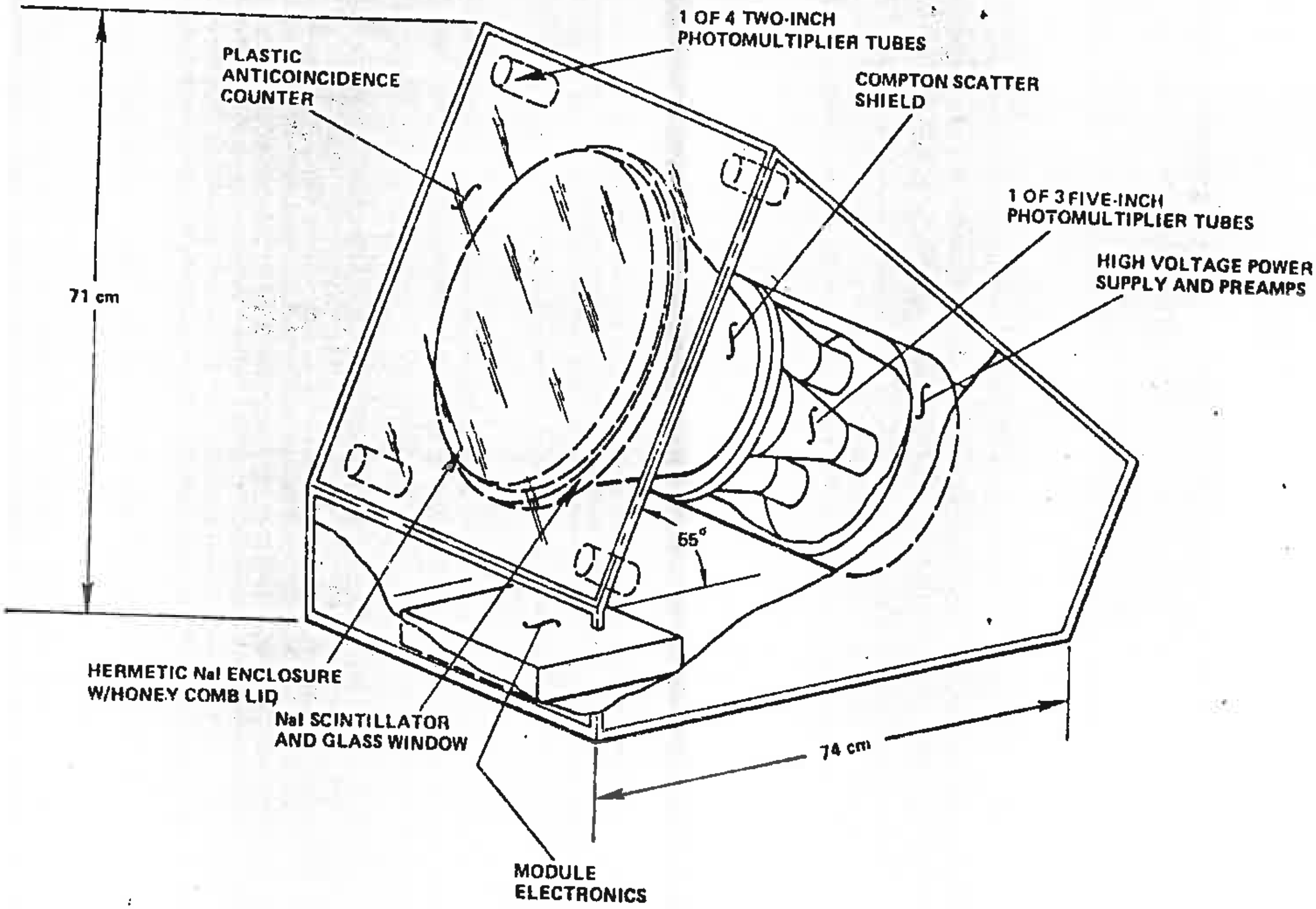
High Energy Gamma-Ray Telescope (EGRET)

Figure 6

Energetic Gamma-Ray Experiment Telescope (EGRET)
Capabilities and Requirements

Detectors	
Type	Spark Chambers with NaI total energy counter and time-of-flight scintillator system
Energy Range	20 to 30 × 10^4 MeV
Energy Resolution	15 percent above 100 MeV
Total Detector Area	6400 cm^2
Area Efficiency Factor	2000 cm^2 above about 200 MeV
Threshold Point Source Sensitivity	5 × 10^{-8} photons $cm^{-2} s^{-1}$
Angular Resolution	1.6° at 100 MeV; 0.3° at 1 GeV
Source Resolution (Strong Source)	5 arc min
Field of View	Maximum opening angle ~ 45°
Time Accuracy	0.1 ms absolute
GRO-Experiment Interface	
Weight	1708 kg
Dimensions	2.25 m × 1.65 m diameter
Power	170 W
Telemetry	5000 bps

Figure 7



Burst and Transient Source Experiment (BATSE) Detector Module

Figure 8

Burst and Transient Source Experiment (BATSE)
Capabilities and Requirements

Detectors	
No. of Detectors	8
Field-of-view	Full unocculted sky
Total Sensitive Area	1.6 m^2
Energy Range	50 keV-600 keV
Time Resolution	0.1 ms
Burst Location Accuracy	0.5° - 10° (depending on intensity)
Experiment Sensitivities	
Sensitivity (Bursts)	6×10^{-8} erg cm^{-2} for a 10 s burst
Sensitivity (Discrete Sources)	0.1 Crab (for Crab-like spectrum)
GRO-Experiment Interface Data	
Weight (total)	570 kg
Dimensions	0.7 m × 0.6 m × 0.7 m each detector 0.5 m × 0.3 m × 0.3 m central electronics
Power	100 W
Telemetry	1500 bps

Figure 9

B. Description of Alternatives

"No action" is the only alternative to the gamma-ray investigations proposed. There does exist an option, however, between recovery and uncontrolled re-entry of the observatory. Since there is no plan for future use of this spacecraft or its payloads and it can be de-orbited so that its impact occurs in a non-inhabited area, it has been decided not to retrieve the observatory by the STS but to have it returned to earth by controlled re-entry to a sparsely populated area such as the Pacific South Atlantic or the Indian Ocean. Re-entry of this type is state-of-the-art.

IV. ENVIRONMENTAL IMPACT

A. Gamma-Ray Observatory (GRO) Effects

Environmental effects must be considered in each of the four phases of the program: manufacturing, prelaunch, orbiting, and re-entry. The basic documents governing these activities are the various safety documents required during each phase. These safety documents are:

(1) GSFC 302-S-007, "Performance Assurance Requirements for the GRO Flight Segment."

(2) GSFC 302-S-003, "Performance Assurance Requirements for the GRO Instruments."

(3) NASA Headquarters, NHB 1700.7, "Safety Policy and Requirements for Payloads Using the Space Transportation System."

B. Manufacturing Phase

The manufacturing phase on both the scientific instruments and the observatory will be done at existing facilities with existing equipment and will be done by employing standard manufacturing techniques. All the scientific instruments have had mechanical models built. These models have been tested to insure design integrity.

(1) Air Pollution. Standard solvents will be used to clean the observatory and scientific instruments. Normal procedures will be used to protect personnel and the immediate environment. The quantity of solvents used in a cleaning process is exceedingly small and venting of fumes to the atmosphere will cause no environmental hazard.

Special handling of the NE 213 (Nuclear Enterprises) fluid used in the COMPTEL instrument will be done. NE 213 is $C_6H_3(CH_3)_3$ identified as 1, 2, 4 Trimethylbenzine (psuedocumene or psuedocumol). The fluid contains a small quantity of "POPOP" [phenyl-oxazolyl-phenyl-oxazolyl-phenyl 1, 4-BIS (2-5 phenyl oxyzolyl)-Benzene] for spectral shifting. This fluid is considered mildly toxic, combustible, and corrosive. The fluid is contained in a sealed container under low pressure. These fluid scintillators are contained in a sealed container identified as the D-1 unit (see figure 4) which is contained along with the D-2 unit inside a sealed dome structure. The NE 213 fills approximately 300 cu. inches and weighs approximately 10.1 lbs. The molecular weight is 120.19, flash point is 130°F, ignition temperature is 959°F, and the vapor density of NE 213 is 4.5.

(2) Water Pollution. There is at this time no known water pollution problem directly associated with the manufacturing effort under the control of the GRO Project.

C. Prelaunch Phase

The prelaunch operations of servicing the propulsion system involves the use of hydrazine. These activities have a potential effect on the local environment. The hardware involved with these operations will have undergone many inspections and tests to insure against leakage, spills, and failures which would discharge these fluids to the environment. The launch facility procedures cover both of these fluids. The GRO will carry approximately 5,000 lbs of hydrazine fuel.

(1) Air Pollution. Hydrazine, like many industrial chemicals, is toxic and a suspected carcinogen. It is also flammable and potentially explosive. Accidental spillages will be contained and treated, minimizing the release of hydrazine vapors into the atmosphere. The potential for occurrence of these hazards at the launch site is small since all operations are rigorously controlled by safety requirements. In any event, the amount of propellant would not produce any permanent effect on the environment, and any temporary effect would be localized. All facilities associated with the handling of hydrazine are sited to ensure that in the event of spills, populated areas are not affected.

(2) Water Pollution. A spill of hydrazine as a result of a transportation accident on the roads leading to the launch site would probably be washed off the roadway for safety reasons and could enter surface water. This type of incident is highly unlikely and the effect on the receiving waters would be localized and would not persist for an extended period.

D. Orbiting Phase

(1) Reboost Subsystem. In orbit the GRO will be using hydrazine for altitude adjustment maneuvers. The reaction products of hydrazine are nitrogen, hydrogen, and ammonia. These by-products are released in relatively small volumes and will disperse very rapidly. Hydrazine was chosen because of its low contamination potential. All of the exhaust products reduce ultimately to naturally occurring constituents of the neutral atmosphere at the altitudes of interest, 350 km to 400 km. The ammonia and hydrogen molecules, however, react with the normal constituents

of the ionosphere to reduce the electron population. A study was performed to investigate the effects of a small hydrazine fueled thruster with results as follows:

- At 350 km altitude in the nightside ionosphere:
  - Maximum depletion of the electron occurs at about 1.2 seconds after release.
  - Electron population is reduced, at maximum, by less than 0.1 percent over a region extending about 500 meters radially from the source.

The uncertainty in the cited values is as much as a factor of 10; however, the cited values are upper limits. In both cases the anticipated effect is less than naturally occurring short-term fluctuations (approximately 10 percent) in F region electron densities. In neither case would they be detectable, normally, from the ground and no adverse effects are expected.

(2) Solar Array. The solar array creates a corona-like off-surface current of electrons, mainly, to flow in the plasma sheath surrounding the GRO. In the steady state, as many electrons leave the surface as return, albeit at different locations on the GRO. Electrons will leave at the most negative points (intercocnnets), and return at more positive locations. Postivie ions play a minor role in the process. No significant net change in the charged particle population is expected in the ionosphere in low earth orbit and no long range electromagnetic interference is expected to result.

E. Controlled Re-Entry

The exact location on the GRO impact area has not been chosen; however, it will probable be either the South Atlantic Ocean, the Indian Ocean, or the Pacific Ocean. Controlled re-entry of spacecraft has been done a number of times. A complete plan for re-entry of the GRO will be published 1 year prior to launch. The spacecraft will have redundant modes for implementing a controlled re-entry.

(1) Scientific Instruments

a. Air Pollution. The outside shells of the scientific instruments are very thin and will probably burn up in re-entry, exposing the internal parts of the instruments. A good deal of these internal parts will also burn during the re-entry. In particular, all gases or liquids will be dissipated over a large track in the atmosphere. Detailed studies will be conducted on the probable effects and will be published 1 year prior to launch. The quantity of material is very small and negligible impact on the atmosphere is expected.

b. Water Pollution. A maximum of 4,000 lbs. of CSI/NaI may be dumped into an ocean at a great distance from any inhabited land site. This small amount of material should cause no environmental hazard. The remaining portions of the observatory are common metals such as aluminum and copper along with electronic parts. These items will be subject to slow corrosion in the ocean and will have no significant effect. A maximum of 12,000 lbs. of this type of material can impact.

(2) Spacecraft

a. Air Pollution. Hydrazine would be released during probable disintegration of the tanks due to re-entry heat. As explained earlier, the release of hydrazine will make no significant environmental impact. The spacecraft is made of aluminum and the vaporization of this metal during re-entry will cause no environmental impact.

b. Water Pollution. No water pollution should occur from the impact of the observatory. Slow corrosion of the aluminum structure would occur. The structure will weigh less than 20,000 lbs.

F. Effects of Alternatives

No action. No action would result in the loss of the opportunity to gain critical scientific knowledge. The GRO is a significant mission which can confidently be expected to produce important and unique results. The GRO addresses problems of fundamental importance to all astrophysics. Advances in other areas of astrophysics, such as nucleosynthesis and studies of active galaxies, depend on advances in gamma-ray astronomy, and in particular on the capabilities of a comprehensive gamma-ray mission like the GRO. The gamma-ray portion of the spectrum is still in the exploratory phase of human understanding and the GRO represents an opportunity to gain critical knowledge in this area.

V. AGENCIES AND INDIVIDUALS CONSULTED

The Environmental Assessment for the Gamma-Ray Observatory was prepared under the direction of the GRO Project Manager, Mr. Jeremiah J. Madden, and reviewed by Messrs. John A. Hrastar, the GRO Systems Manager, Donald L. Miller, the GRO Observatory Manager, and Frederick Kolb, the Project Safety Officer and Representative of the Goddard Space Flight Center's Office of Flight Assurance. No other government agencies were consulted.

VI. REFERENCES

1. Military Specification Propellant, Hydrazine, MIL-P-26536C, July 25, 1974.

2. Pollution Control Guide, Commerce Clearing House, October 23, 1978.

3. Atmospheric Halocarbons, Science, Volume 203, March 2, 1979, p. 899.

4. *KSC Space Transportation System Ground Safety Plan, Launch Complex-29, GP 1098.

5. KSC Ground Safety Plan Industrial Area, GP 1099.

6. Environmental Impact Statement, Space Shuttle Program, April 1980.

7. *Gamma-Ray Observatory (GRO) Program Cost Assessment for Phase D Mission Contractor Program Baseline, June 1981, TRW Contract NAS5-26514, June 12, 1981.

* Limited availability.

NASA

Management Instruction

NMI 1410.10D

Date February 19, 1982

Responsible Office: NSM/Management Processes and Directives Branch

Subject: FEDERAL REGISTER: DELEGATION OF AUTHORITY AND REQUIREMENTS FOR PUBLICATION OF NASA DOCUMENTS

*1. PURPOSE

This Instruction continues in effect NASA delegations and sets forth revised policy, responsibilities and procedures for publication of NASA documents in the Federal Register. It incorporates procedures required to implement Executive Order 12291.

*2. APPLICABILITY

This Instruction is applicable to NASA Headquarters and field installations. Procedures in this Instruction apply only to those procurement regulations that deal with automatic data processing and telecommunications.

3. DELEGATION OF AUTHORITY

a. Delegation. In accordance with the requirements of the Office of the Federal Register (1 CFR Part 16), the following officials are authorized to represent NASA with the Office of the Federal Register in the capacities indicated:

*(1) The Director, Procurement Policy Division, Office of Procurement, to act as the Liaison Officer and the Certifying Officer for the publication of the NASA Procurement Regulation and the NASA Grant and Cooperative Agreement Handbook in the Federal Register for republication in the Code of Federal Regulations.

(2) The Directives System Manager, Management Processes and Directives Branch, Information Systems Division, Office of Management, to act as the:

(a) Liaison Officer and the Certifying Officer for all other documents for publication in the Federal Register in the "Notices Section" or in the "Rules and Regulations Section" (for republication in 14 CFR Chapter V) or for publication in the U.S. Government Manual.

(b) The Authorizing Officer for NASA.

*Changed by this revision

*6. MAJOR RULE

A major rule means any regulation that is likely to result in:

a. An annual effect on the economy of $100 million or more;

b. A major increase in costs or prices for consumers, individual industries, Federal, State or Local government agencies, or geographic regions; or

c. 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.

*7. REGULATORY IMPACT ANALYSIS

a. In connection with every major rule, a Regulatory Impact Analysis will be prepared. Each preliminary and final Regulatory Impact Analysis shall contain the following:

(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, 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 subparagraph (4) an explanation of any legal reasons why the rule cannot be adopted.

b. Regulatory Impact Analysis of major rules shall be prepared and transmitted, along with all notices of proposed rulemaking and all final rules, to the Director, OMB, as follows:

*Changed by this revision

required regulations, the issues to be considered, the alternative approaches to be explored, a tentative plan for obtaining public comment, target dates for completion of steps in the development of the regulations, the responsible official, proposed coordination and the determinations made under subparagraph a. Subsequent changes in this information will be reported in a timely fashion.

c. For those regulations requiring a regulatory impact analysis, the initiating office will submit a draft analysis to the Administrator as part of the report required in subparagraph b. The draft regulatory impact analysis will incorporate the urban and community impact analyses required by OMB Circular A-116.

*d. The Director of Small and Disadvantaged Business Utilization will review all regulations to determine whether the regulations are likely to have a significant economic impact on small entities.

*9. <u>DOCUMENTATION FOR APPROVAL OF MAJOR RULES</u>

In the Administrator's signature package for each proposed or final major rule, the initiating office will document that:

a. The proposed regulation is needed;

b. The direct and indirect effects of the regulation have been adequately considered;

c. Alternative approaches have been considered and the least burdensome of the acceptable alternatives has been chosen;

d. Public comments have been considered and an adequate response has been prepared;

e. Proposed regulations which may impact small business have been reviewed and concurred in by the Director of Small and Disadvantaged Business Utilization;

f. The regulation is written in plain English and is understandable to those who must comply with it;

g. An estimate has been made of the new reporting burdens or recordkeeping requirements necessary for compliance with the regulation;

*Changed by this revision

11. OPPORTUNITY FOR PUBLIC PARTICIPATION

a. Policy. NASA shall give the public an early and meaningful opportunity to participate in its rulemaking activities.

*b. Major Rules

(1) To give the public an early opportunity to participate in the development of NASA's major rules, initiating offices will consider the following:

(a) Publishing an advance notice of proposed rulemaking;

(b) Holding open conferences or public hearings;

(c) Sending notices of proposed rules to publications likely to be read by those affected; and

(d) Notifying interested parties directly.

(2) Public comment period for proposed major rules will be at least 60 days unless the Administrator determines in a given case that this is not possible. Should this occur a brief statement of the reasons for a shorter period will be included in the preamble to the regulation.

*c. Other Regulations. For other than major rules, proposed rules for which a public comment period is required will provide a 60-day public comment period whenever possible. If this is not possible, at least a 30-day comment period will be provided unless the Administrator authorizes a shorter time period.

d. Consideration of Comments. Relevant comments will be considered and incorporated into the final regulation as appropriate. A response to substantive public comment will be included in the preamble to the final rule.

12. REGULATORY AGENDA

Each Program and Staff Office, through its Directives Manager, will submit a report (RCS 10000000774), including a negative response, to the Directives System Manager (Code NSM) by the second Monday of September and the second Monday of March. The report will include proposed regulations that have been issued or are to be issued, and a list of the currently effective rules that are scheduled for review in accordance with paragraph 15.

*Changed by this revision

14. FIELD INSTALLATION DOCUMENTS

a. Chief Counsel. The Chief Counsel at each field installation will identify field installation regulations which may require publication in the Federal Register and forward copies of such regulations to the Office of General Counsel, NASA Headquarters, for determination.

b. Headquarters. The Office of General Counsel, NASA Headquarters, will forward to the Directives System Manager (Code NSM) any field installation directives which it determines requires publication in the Federal Register. The Directives System Manager will ascertain whether there is an agency directive on the subject. If there is not, the installation directive will be forwarded to the Official-in-Charge of the Headquarters Office having primary responsibility for the subject matter with a request that an agency regulation be developed.

15. REVIEW

Review of existing regulations in the Code of Federal Regulations will be accomplished through the annual review of the NASA Management Directives System. In this review initiating offices shall also consider:

a. The continued need for the regulation;

b. The type and number of complaints or suggestions received;

c. The burdens imposed on those directly or indirectly affected by the regulation;

d. The need to simplify or clarify language;

e. The need to eliminate overlapping and duplicative regulations; and

f. The length of time since the regulation has been evaluated or the degree to which technology, economic conditions or other factors have changed in the area affected by the regulation.

16. GENERAL RESPONSIBILITIES

a. The Associate Administrator for Management is responsible for updating annually, on a timely basis, the information concerning NASA's internal organization required for publication in the U.S. Government Manual.

b. The Director of Procurement is responsible for:

(1) Establishing with the Office of the Federal Register a plan for the codification and publication of NASA Procurement and Grant Regulations in the Federal Register.

TYPES OF MATERIAL TO BE PUBLISHED IN THE FEDERAL REGISTER

NASA shall publish the following in the Federal Register system:

1. Descriptions of its central and field organization and the places, employees and methods for the public to obtain information, send comments or requests, or obtain decisions;

2. Statements of its operating methods, including the nature and requirements of all formal and informal procedures available;

3. Rules of procedure, descriptions of forms available or where they may be obtained and instructions as to the scope and contents of all papers, reports, or examinations;

4. Substantive rules of general applicability adopted as authorized by law, and statements of general policy or interpretations of general applicability formulated and adopted by the agency;

5. Significant regulations;

6. Each change in any of the foregoing; and

7. Certain other documents such as notices on advisory committees, intents to grant patent licenses, and miscellaneous agency announcements containing no codified material.