



National Aeronautics and
Space Administration

Curatorial Branch

Lyndon B. Johnson Space Center
Houston, Texas 77058

Publication 62

JSC 18221

COSMIC DUST CATALOG

(PARTICLES FROM COLLECTION FLAG W7029)

COMPILED BY

COSMIC DUST PRELIMINARY EXAMINATION TEAM (CDPET)

APRIL 1982

Volume 2
Number 1

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Compiled By

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April 1982

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1. INTRODUCTION

Since May, 1981, the National Aeronautics and Space Administration (NASA) has used aircraft to collect cosmic dust (CD) particles from Earth's stratosphere (altitude ~ 18 km). Specially designed dust collectors experience pre- and post-flight handling in an ultraclean laboratory constructed for this purpose at the Lyndon B. Johnson Space Center (JSC) in Houston, Texas. Particles are individually retrieved from the collectors, examined and cataloged, and then made available to the scientific community for research. Cosmic dust thereby joins lunar samples and meteorites as an additional source of extraterrestrial material for scientific study.

This catalog summarizes preliminary observations on some of the particles retrieved from collection surface W7029. W7029 was one of eight flat plate "flags" (each with ~ 30 cm² surface area) which were coated with silicone oil and then flown aboard a NASA WB57F aircraft during a series of flights across the western United States from September 15, 1981, to December 2, 1981. The flags were installed in specially constructed wing pylons which ensured that the necessary level of cleanliness was maintained between periods of active sampling. During successive periods of high-altitude ($\sim 60,000$ ft.) cruise, the flags were exposed to the atmosphere by pilot command and then retracted into sealed storage containers prior to descent. In this manner, a total of 35 hours of stratospheric exposure were accumulated for Flag W7029.

Flag W7029 is notable for its content of large friable particles which occur as "clusters" of small particles and which may include sufficient material for sampling and analysis by a variety of techniques. One such particle, as initially observed on the collector, was 50-60 μm in size, porous, but generally opaque. Upon mechanical probing by micro-

manipulator, the particle fragmented into numerous smaller particles, one of which is included in this catalog as particle W7029B13. A second "cluster" of approximately 100 μm size on the collector is composed of opaque, irregular particles up to 40-50 μm in size but which appear more coherent than those in the B13 cluster. A sample of this second cluster is included in this catalog as particle W7029C1. Descriptions of both clusters were published in the Cosmic Dust Courier, No. 1 (March, 1982), copies of which may be obtained upon request to the address given in the "SAMPLE REQUEST" section of this catalog.

Details of particle collection, processing, and examination techniques will be published in the future. However, the following information summarizes these techniques so that the catalog can be more fully understood and utilized.

2. PROCESSING OF PARTICLES

Particle mounts designed for the JEOL 100CX scanning electron microscope (SEM) are currently the standard receptacles for CD particles in the JSC laboratory. Each mount consists of a graphite frame (size $\sim 3 \times 6 \times 24$ mm) onto which a NucleoporeTM filter is attached. A conductive coat of carbon is vacuum-evaporated onto the mount and then a microscopic reference pattern is "stenciled" onto the carbon-coated filter by vacuum evaporation of aluminum through an appropriately sized template. CD particles are individually removed from collection flags using micromanipulators under a binocular stereomicroscope. Each particle is positioned on an aluminum-free area of a Freon-cleaned, carbon-coated mount filter and washed in-place with hexane to remove silicone oil. Each mount is normally limited to 16 particles. All processing and storage of each particle is performed in a Class-100 clean room.

3. PRELIMINARY EXAMINATION OF PARTICLES

Each rinsed particle is examined by optical microscopy before leaving the Class-100 clean room processing area. Each mount is studied with a petrographic research microscope equipped with transmitted, reflected and oblique light illuminators. At a magnification of 500X, size, shape, transparency, color, and luster are determined and recorded for each particle.

Next, each mount (with uncoated particles) is examined by SEM. A JEOL 100CX instrument, equipped with PGT 6000 solid-state x-ray analyzer, is used to obtain a secondary electron image and an energy-dispersive x-ray spectrum (EDS) of each particle. The SEM is operated at an accelerating voltage of 40 kV and the EDS is obtained for the range of 0-10 keV by a standard integrated count of 100 sec. SEM images so obtained are necessarily of relatively low resolution due to the deliberate avoidance of conventionally applied conductive coats (carbon or gold-palladium) which might interfere with later elemental analyses of the particles.

Following SEM preliminary examination, each mount is stored in a dry nitrogen gas atmosphere in a sealed cabinet.

4. CATALOG FORMAT

Each page in the main body of the catalog is devoted to one particle and consists of an SEM image, an EDS spectrum, and a brief summary of preliminary examination data obtained by optical microscopy. The unique identification number assigned to the particle appears at the top of the page. Sources of the descriptive data are as follows:

SIZE (μm) is measured using the original SEM image and its known magnification factor. For an irregularly shaped particle, the minimum dimension in the plane of the field of view is located and determined; then a second (maximum) dimension is measured at a right angle to the first. For a spherical or equidimensional particle, only a single size is recorded.

SHAPE is generalized to be spherical (S), equidimensional (E), or irregular (I). Particles having shape intermediate between S and E or E and I are not uncommon and may be denoted as S/E or E/I, etc.

TRANSPARENCY (abbreviated TRANS.) is determined by optical microscopy to be transparent (T), translucent (TL), or opaque (O).

COLOR is determined by optical microscopy using oblique (fiber-optic) illumination supplemented with normal reflected illumination. Although color perception may vary with observer, the distinction of dark (Dk.) from light (Lt.) particles is unambiguous. Similarly, the distinction of colorless (CL) from colored particles is only occasionally in doubt. Complex colorations of individual particles may be noted in the "COMMENTS" column.

LUSTER is determined by optical microscopy using reflected normal illumination and supplemented with oblique (fiber-optic) illumination. Commonly applied descriptions, adopted from mineralogical usage, include dull (D), metallic (M), submetallic (SM), subvitreous (SV), and vitreous (V).

Lusters transitional between categories or difficult to identify are indicated accordingly (D/SM, SV/V, etc.).

TYPE indicates a provisional first-order identification of each particle based on its morphology (from SEM image), elemental composition (from EDS spectrum), and optical properties. We emphasize that, for catalog purposes, types are defined for their descriptive and curatorial utility, not as scientific classifications. These tentative categorizations, which reflect judgements based on the collective experience of the CDPET, should not be construed to be firm identifications and should not dissuade any investigator from requesting any given particle for detailed study and proper identification. In the absence of any generally accepted taxonomy for stratospheric dust, the precise identification of each particle in our inventory is beyond the scope and intent of our collection and curation program. Indeed, the reliable identification and scientific classification of cosmic dust is one of many important research tasks which we hope our program will stimulate. We indicate particle "TYPE" only to aid the users of this catalog (especially those new to small-particle analysis) in distinguishing possible cosmic dust particles from other particles which are invariably collected during stratospheric dust sampling. Categories used in this catalog are defined as follows:

AOS: Aluminum oxide sphere. An AOS is transparent, subvitreous to vitreous in luster, colorless to pale yellow and at least approximately spherical. However, shape may range from nearly perfect sphericity to pronounced ellipticity and surface texture may range from very smooth to rough. Other spheres or irregularly shaped material may be attached to its surface. Al is the distinctively dominant (or only)

peak in its EDS spectrum. A sphere displaying the attributes of an AOS except with major elements in addition to Al (e.g., W7029B15) may be listed as "AOS?" or "?". Transparent Al-rich particles of irregular shape would probably be listed as "?" or "TCA?". (Based on work by D.E. Brownlee and collaborators, AOS particles are thought to be products of solid-fuel rocket exhausts. They are included here to provide a complete description of the W7029 collection.)

C: Cosmic dust (variety unspecified) or other extraterrestrial material. In the strict sense, "cosmic dust" refers only to those particles which have not been modified during passage from interplanetary space to Earth's stratosphere. In this catalog, though, particle type "C" is used to conveniently group together all particles which are judged to be of extraterrestrial origin, including those that have apparently experienced strong ablatational heating or melting. Type "C" particles are provisionally identified as those having one of the three following sets of attributes:

- (a) irregular to spherical, opaque, dark colored particles composed mostly of Fe with minor Ni or S.
- (b) irregular to spherical, translucent to opaque, dark colored particles containing various proportions of Mg, Si, and Fe with traces of Al, Ca, S, or Ni.
- (c) irregular to faceted or blocky, transparent to translucent particles containing mostly Mg, Si, and Fe but with traces of Al or Ca.

Category (a) and (b) particles commonly display either complex,

porous aggregate-type morphologies or distinctively spherical shapes and dull to metallic lusters which distinguish them from terrestrial minerals. Their EDS spectra are reminiscent of those exhibited by meteoritic Fe-Ni or FeS minerals, or combinations of Fe-Ni-S phases with olivine and/or pyroxene. Category (c) particles display morphologies and EDS spectra which suggest that they are fragments of olivine or pyroxene crystals, neither or which are significant components of stratospheric volcanic ash. Particles which do not fall easily into categories (a), (b), or (c) but which possess some of the same attributes may be classified here as "C?".

TCA: Terrestrial contamination (artificial or man-made). Particles included in the "TCA" category are commonly irregular in shape (though a few may be spherical) and may be transparent, translucent, or opaque. Their EDS spectra commonly show Al, Fe, or Si as the principal peaks but with a variety of minor peaks including those of Ti, Cr, or Ni. The abundances of Ti and Cr are frequently much greater than those expected in common minerals. Furthermore, the Cu peaks may be much more intense than can be attributed to SEM hardware artifacts (see "IMPORTANT NOTE" below). In some cases, a high intensity (relative to intensities of characteristic x-ray peaks) of continuum radiation occurs in the EDS spectrum, suggesting that low atomic number elements not detectable by the EDS (e.g., H, C, N, O) are abundant in the particle. Such "TCA" particles are tacitly inferred to be

synthetic carbon-based materials. (This category probably includes particles produced by or derived from aircraft operation or collector hardware, or possibly spacecraft debris.)

TCN: Terrestrial contamination (natural). "TCN" particles may be transparent to opaque and may exhibit a variety of colors. However, they are commonly irregular in shape and distinctively rich in Si and Al with minor abundances of Na, K, Ca, or Fe. Morphologies and EDS spectra of most "TCN" particles compare favorably with respective properties of quartz, feldspar, or silicic volcanic glass, three phases which are principal components of stratospheric volcanic ash. In addition, platy or porous aggregate-type particles of light color and Si, Al-rich composition may be silicic clay minerals, common phases in Earth's surface soils. Recognition of these phases as "TCN" particles is based mostly on CDPET's collective mineralogical experience and comparison with some of the reference particles described in "ANALYSES OF REFERENCE MATERIALS".

Less commonly, the "TCN" category may include distinctive particles with apparently non-random shapes which are rich in low atomic number elements (as inferred from their EDS spectra having high levels of continuum x-radiation and relatively small peaks for characteristic x-rays). Such particles are distinguished from "TCA" particles by their unusual morphologies and probably represent biological contaminants.

?: Identification uncertain. This category includes particles which do not unequivocally resemble those grouped together as AOS, C, TCA, or TCN. In addition, the "?" symbol is liberally used to reiterate the tentative identifications of other types of particles.

Again, this system for provisional classification of particles is presented only as a first-order attempt to distinguish particles which are probably extraterrestrial in origin from those which are probably contaminants. Many particles, especially those cataloged as type "?", will require careful research examination before they can be satisfactorily identified.

COMMENTS are included for particles with special features or histories. Particles lost during or after preliminary SEM examination, or particles with possible genetic relationships to other particles are noted here.

****IMPORTANT NOTE:** With regard to EDS spectra, copper x-radiation is emitted from some of the SEM internal parts as a consequence of bombardment by stray electrons. The peaks labelled "CU" may, therefore, represent a contribution from both sample and instrument. The instrument is being modified to remove the machine artifact.

5. ANALYSES OF REFERENCE MATERIALS

The usefulness of the SEM images and EDS spectra provided for particles in this catalog is enhanced by comparison with similar data products obtained for comparably sized particles of known composition. Accordingly, the next several pages summarize data acquired by SEM examination of reference particles under the same conditions used in the preliminary examination of particles from the stratospheric dust collections. Each reference particle represents material which has proven useful as a reference (which may be distinct from an analytical standard) in SEM and/or electron microprobe work at JSC or elsewhere. Included in this group are several members of the excellent series of microprobe standards prepared by Eugene Jarosewich (Smithsonian Institution) and identified by their USNM numbers. Other materials will be added to our reference suite in future catalogs. However, those included here provide a sampling of minerals common in meteorites (olivine, pyroxene, ilmenite) or their ablation products (magnetite). In addition, reasonable analogs of stratospheric volcanic ash (rhyolite glass, sodic plagioclase) are included.

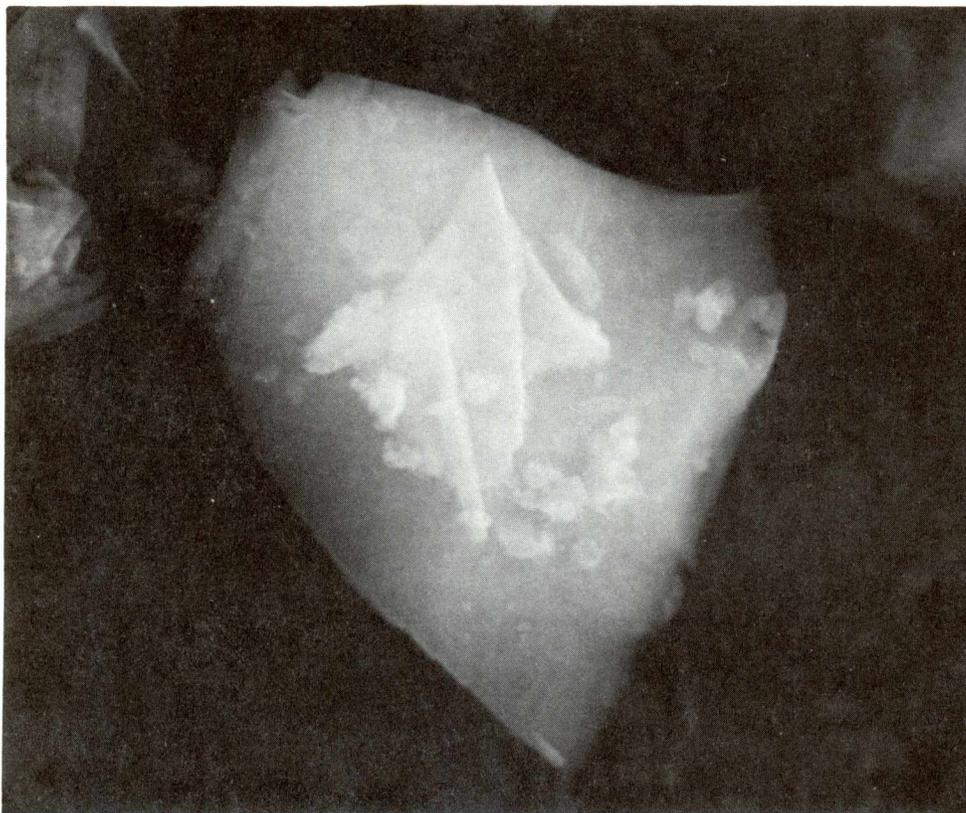
For completeness, the currently accepted bulk composition (expressed as oxide weight percent) of each reference particle is also provided. The EDS spectra included in this catalog are of quality equal to that which is routinely obtained in other state-of-the-art SEM laboratories. However, well-known geometrical and differential matrix effects prevent these raw spectra from being interpreted as quantitative analyses. Hence, we have avoided the use of peak-height ratios as diagnostic compositional indicators. Further work on comparison of reference particle spectra with sample particle spectra may later permit semi-quantitative compositional information to be inferred for the sample particles. (The Cu artifact peaks noted in the

"CATALOG FORMAT" section above also appear in the reference particle spectra.)

Future catalogs will extend our presentation of SEM reference material images and EDS spectra and their applicability in problems related to identification of particles in the cosmic dust collections. EDS spectra of polished grain mounts of reference minerals will be added to facilitate more quantitative inter-laboratory comparison of our EDS analyses with those of other investigators for the same or similar minerals.

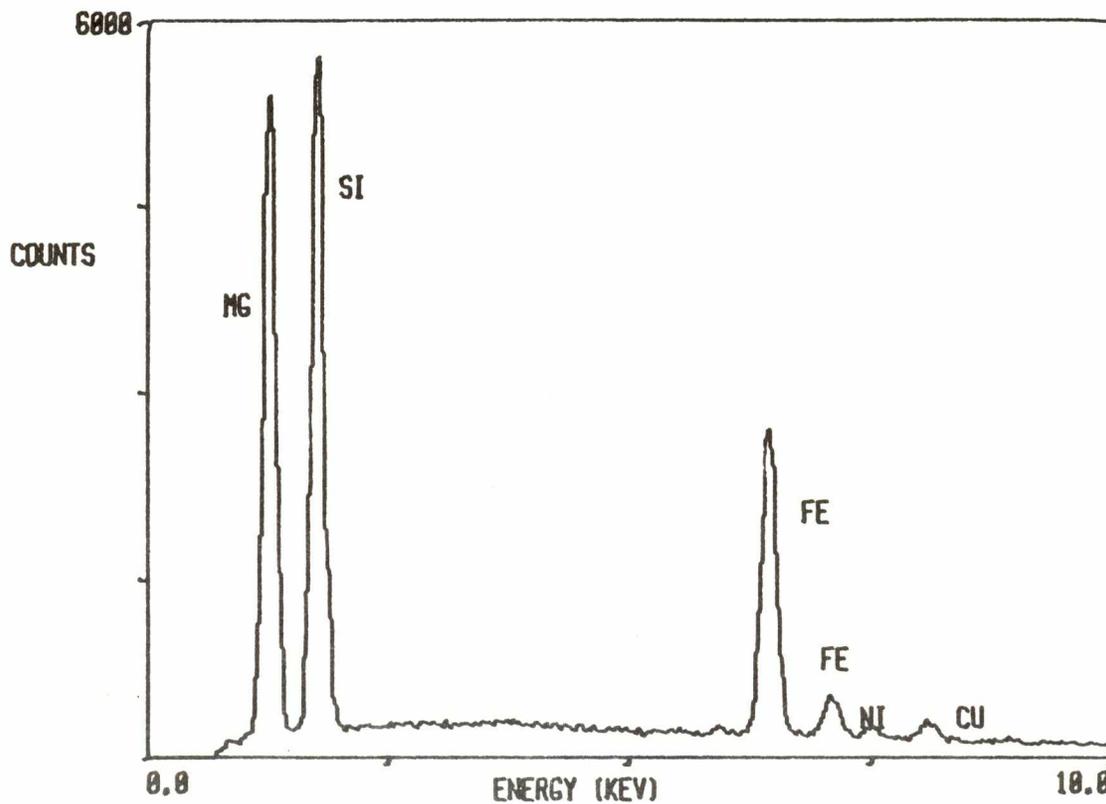
OLIVINE
JLC-129-63

S-82-25746



| WEIGHT % | | | | | | | | | | | | |
|-------------|-------------|--------------|--------------|--------------|------------|------------|------------|------------|------------|-------------|------------|--------------|
| <u>SiO2</u> | <u>TiO2</u> | <u>Al2O3</u> | <u>Cr2O3</u> | <u>Fe2O3</u> | <u>FeO</u> | <u>NiO</u> | <u>MnO</u> | <u>MgO</u> | <u>CaO</u> | <u>Na2O</u> | <u>K2O</u> | <u>TOTAL</u> |
| 40.94 | 0.01 | 0.07 | 0.01 | - | 8.74 | 0.35 | 0.12 | 49.64 | 0.10 | - | - | 99.98 |

OL-P1



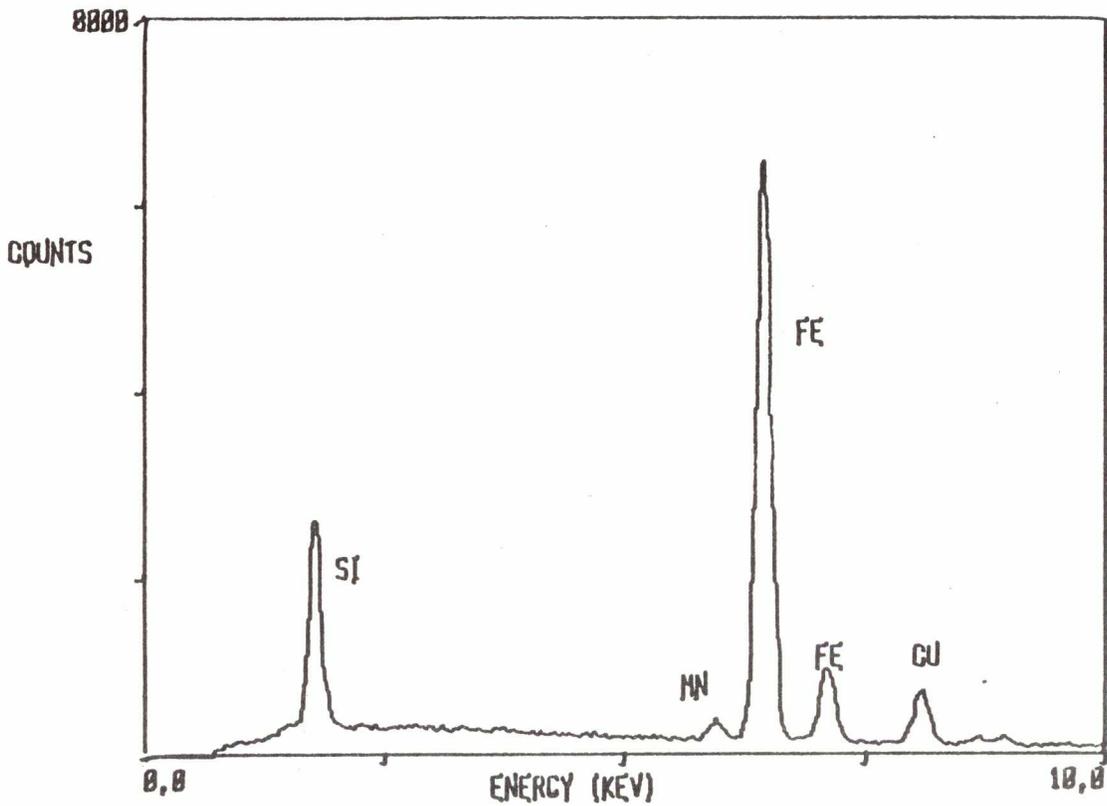
ROCKPORT FAYALITE
(USNM 85276)

S-82-25741



| <u>SiO2</u> | <u>TiO2</u> | <u>Al2O3</u> | <u>Cr2O3</u> | <u>Fe2O3</u> | <u>FeO</u> | WEIGHT % | | <u>MgO</u> | <u>CaO</u> | <u>Na2O</u> | <u>K2O</u> | <u>TOTAL</u> |
|-------------|-------------|--------------|--------------|--------------|------------|------------|------------|------------|------------|-------------|------------|--------------|
| | | | | | | <u>NiO</u> | <u>MnO</u> | | | | | |
| 29.22 | 0.04 | - | - | 1.32 | 66.36 | - | 2.14 | - | - | - | - | 99.08 |

FAY-P1



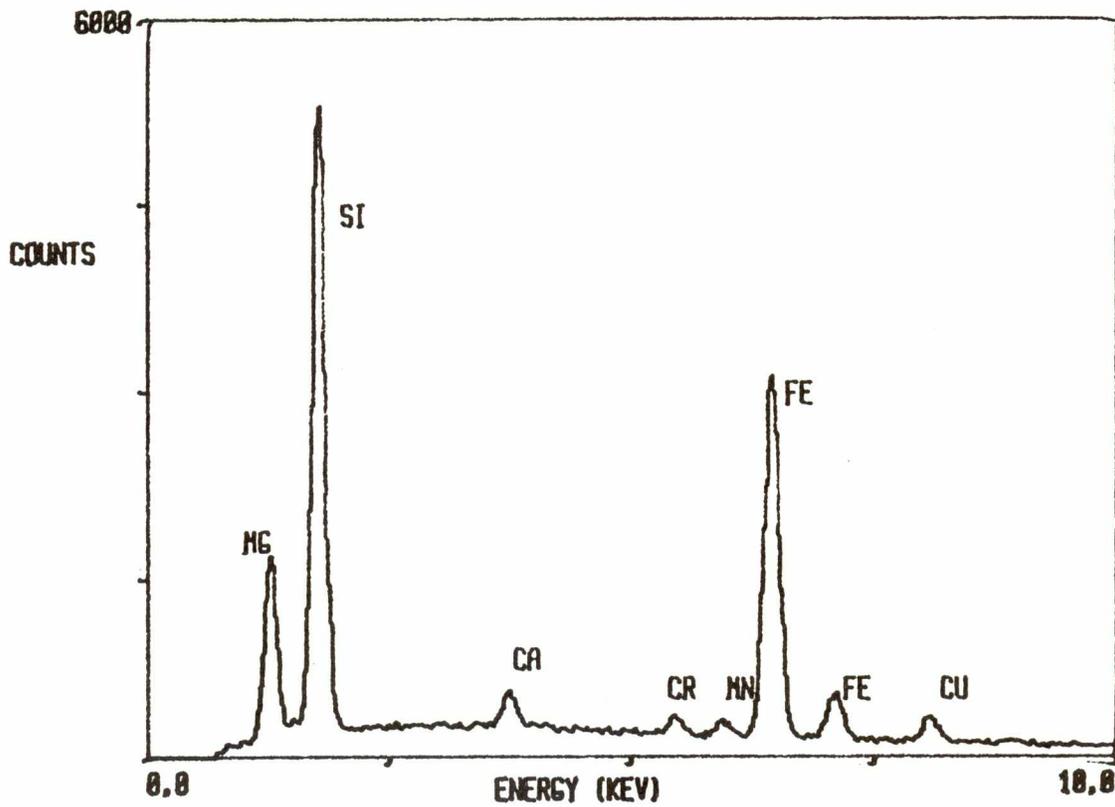
JOHNSTOWN HYPERSTHENE
(USNM 746)



S-82-25742

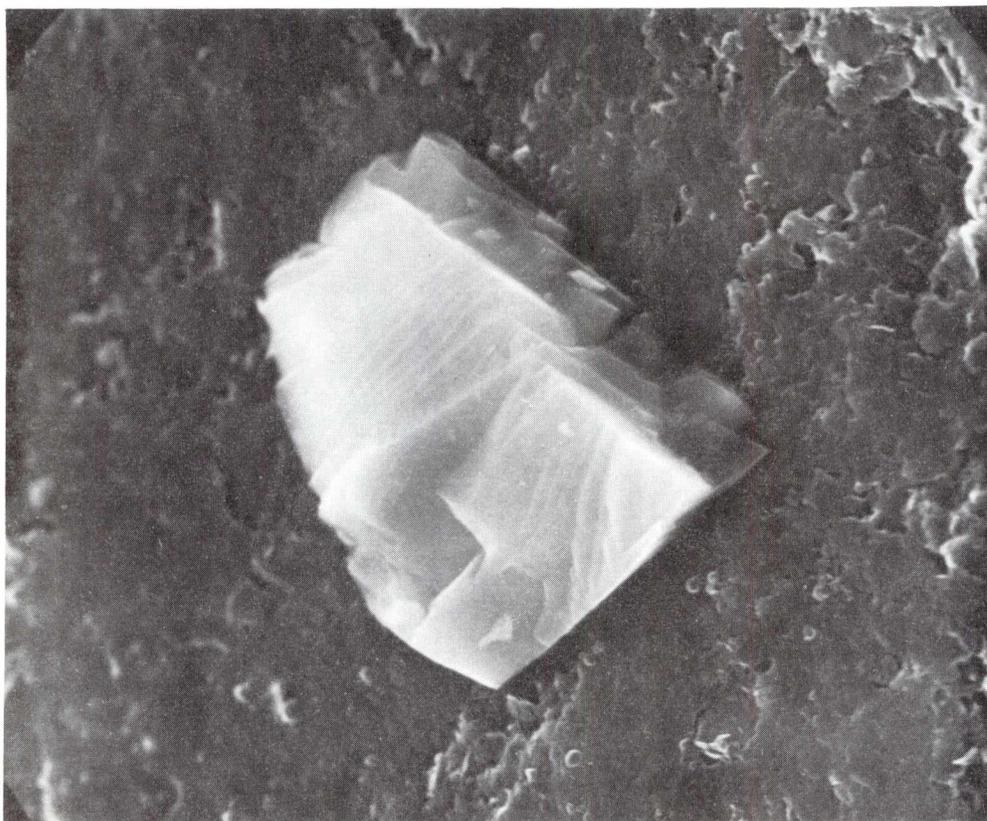
| <u>SiO2</u> | <u>TiO2</u> | <u>Al2O3</u> | <u>Cr2O3</u> | <u>Fe2O3</u> | WEIGHT % | | | | | | | | <u>TOTAL</u> |
|-------------|-------------|--------------|--------------|--------------|------------|------------|------------|------------|------------|-------------|------------|--------|--------------|
| | | | | | <u>FeO</u> | <u>NiO</u> | <u>MnO</u> | <u>MgO</u> | <u>CaO</u> | <u>Na2O</u> | <u>K2O</u> | | |
| 54.09 | 0.16 | 1.23 | 0.75 | - | 15.22 | - | 0.49 | 26.79 | 1.52 | <0.05 | <0.05 | 100.25 | |

HYP-P4



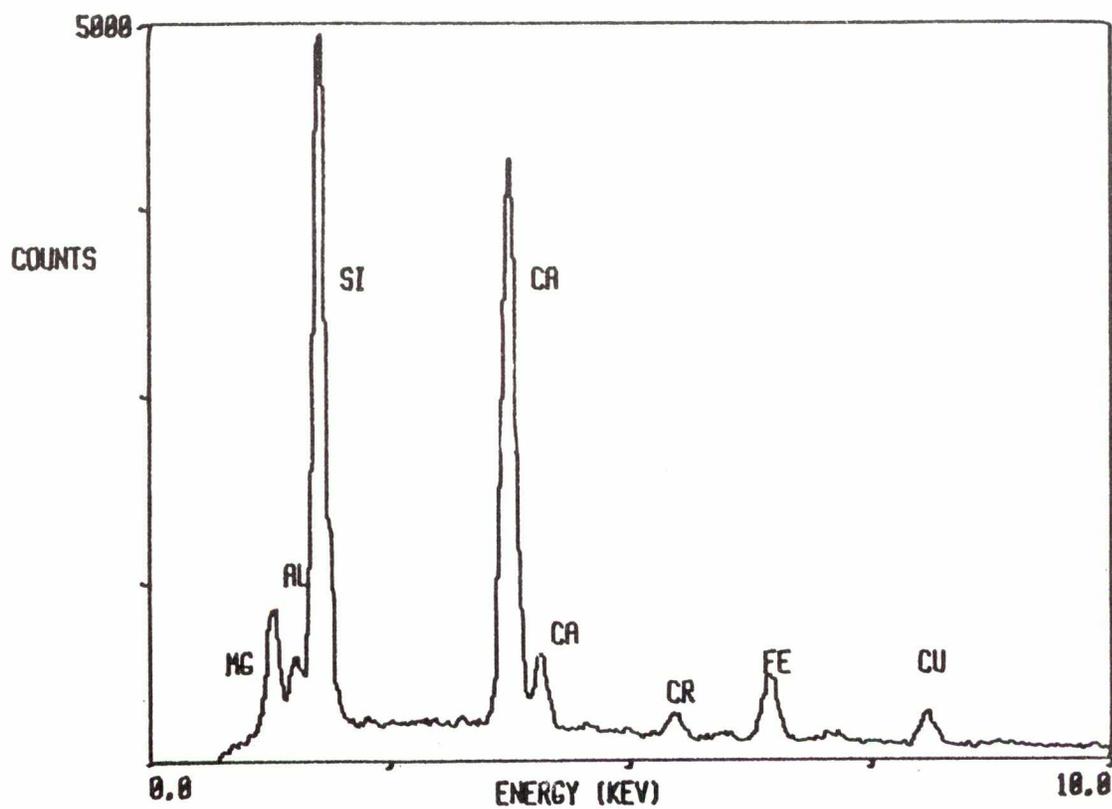
DIOPSIDE
JLC-99-63

S-82-25744

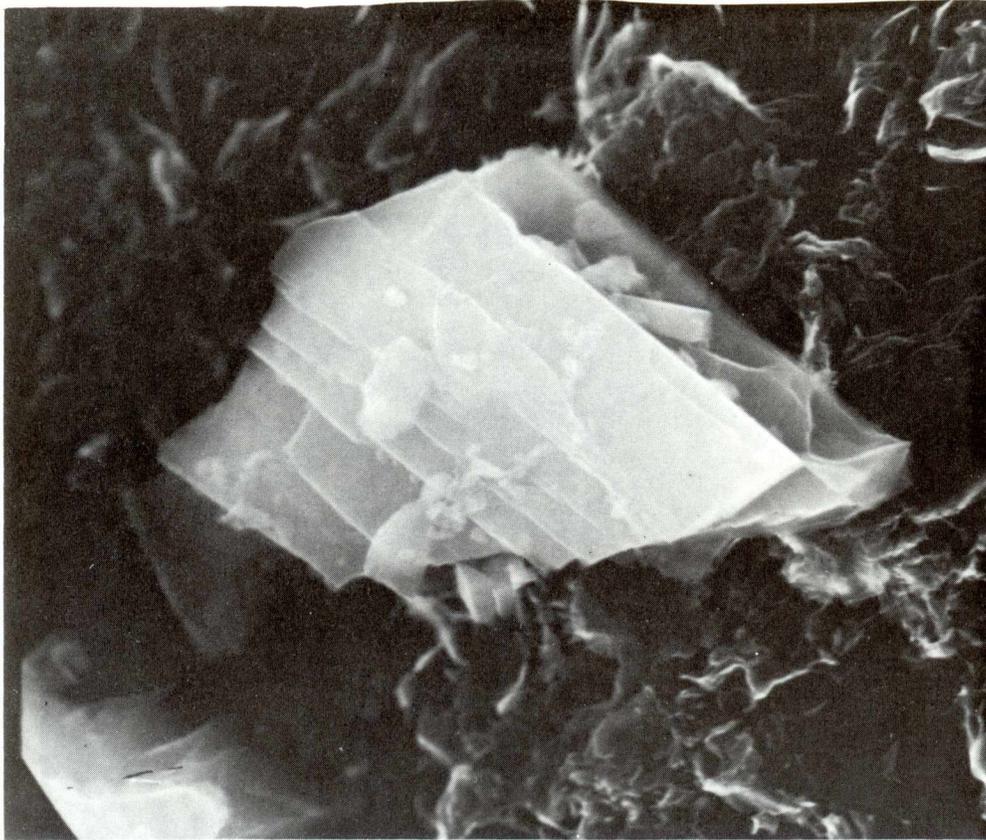


| WEIGHT % | | | | | | | | | | | | |
|------------------|------------------|--------------------------------|--------------------------------|--------------------------------|------|------|------|-------|-------|-------------------|------------------|-------|
| SiO ₂ | TiO ₂ | Al ₂ O ₃ | Cr ₂ O ₃ | Fe ₂ O ₃ | FeO | NiO | MnO | MgO | CaO | Na ₂ O | K ₂ O | TOTAL |
| 51.93 | 0.46 | 6.31 | 0.96 | 1.80 | 2.34 | 0.04 | 0.07 | 16.05 | 18.64 | 1.39 | - | 99.99 |

DI-P4

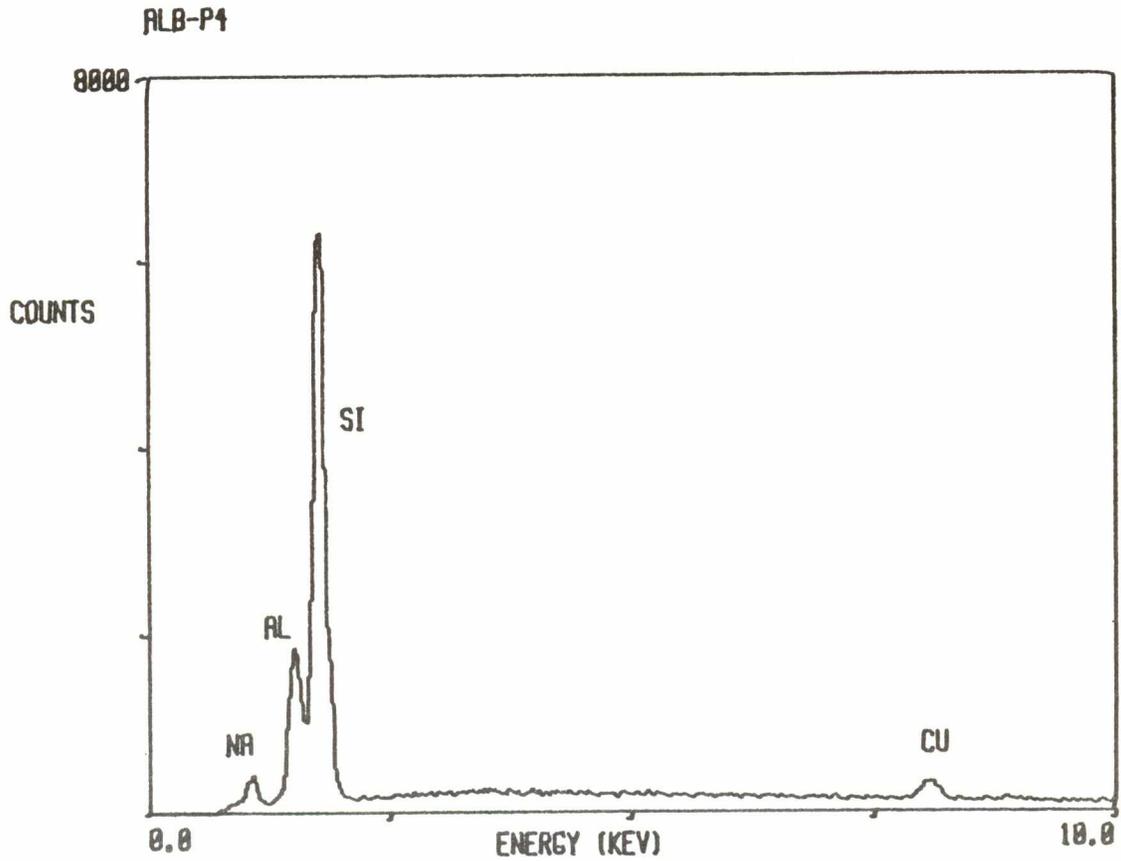


TIBURON ALBITE



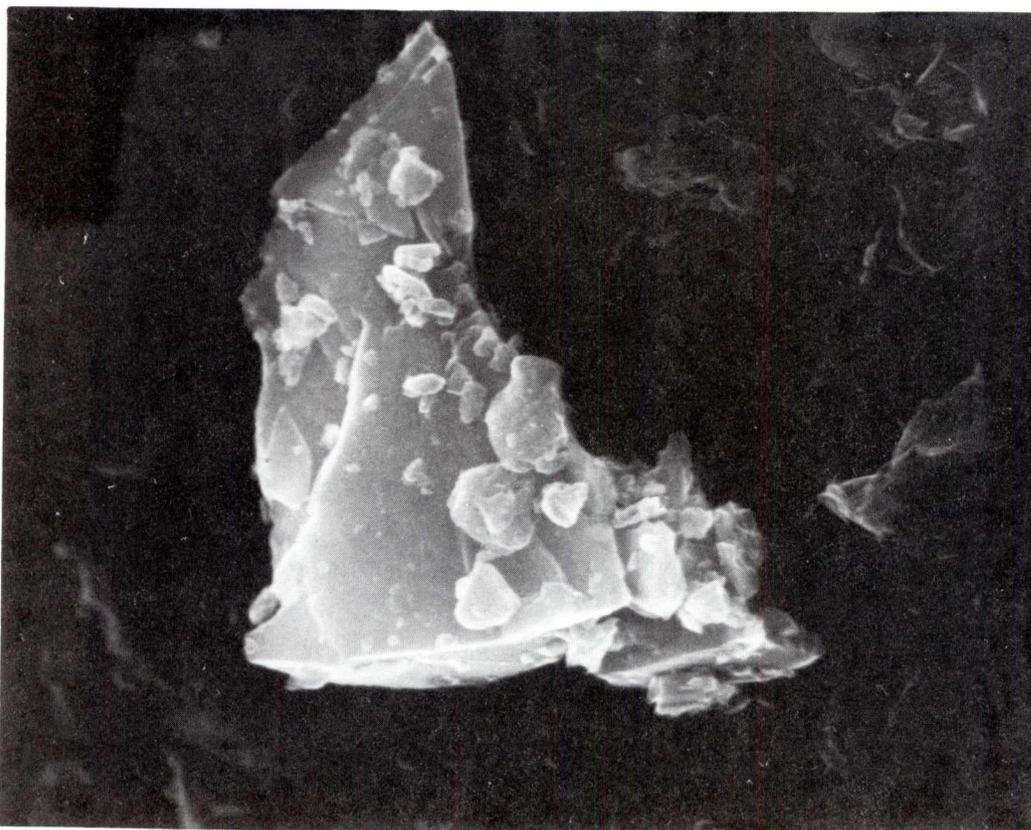
S-82-25750

| <u>SiO2</u> | <u>TiO2</u> | <u>Al2O3</u> | <u>Cr2O3</u> | <u>Fe2O3</u> | <u>WEIGHT %</u> | | | <u>MgO</u> | <u>CaO</u> | <u>Na2O</u> | <u>K2O</u> | <u>TOTAL</u> |
|-------------|-------------|--------------|--------------|--------------|-----------------|------------|------------|------------|------------|-------------|------------|--------------|
| | | | | | <u>FeO</u> | <u>NiO</u> | <u>MnO</u> | | | | | |
| 68.22 | - | 19.90 | - | 0.06 | - | - | - | - | 0.00 | 11.65 | 0.03 | 99.86 |



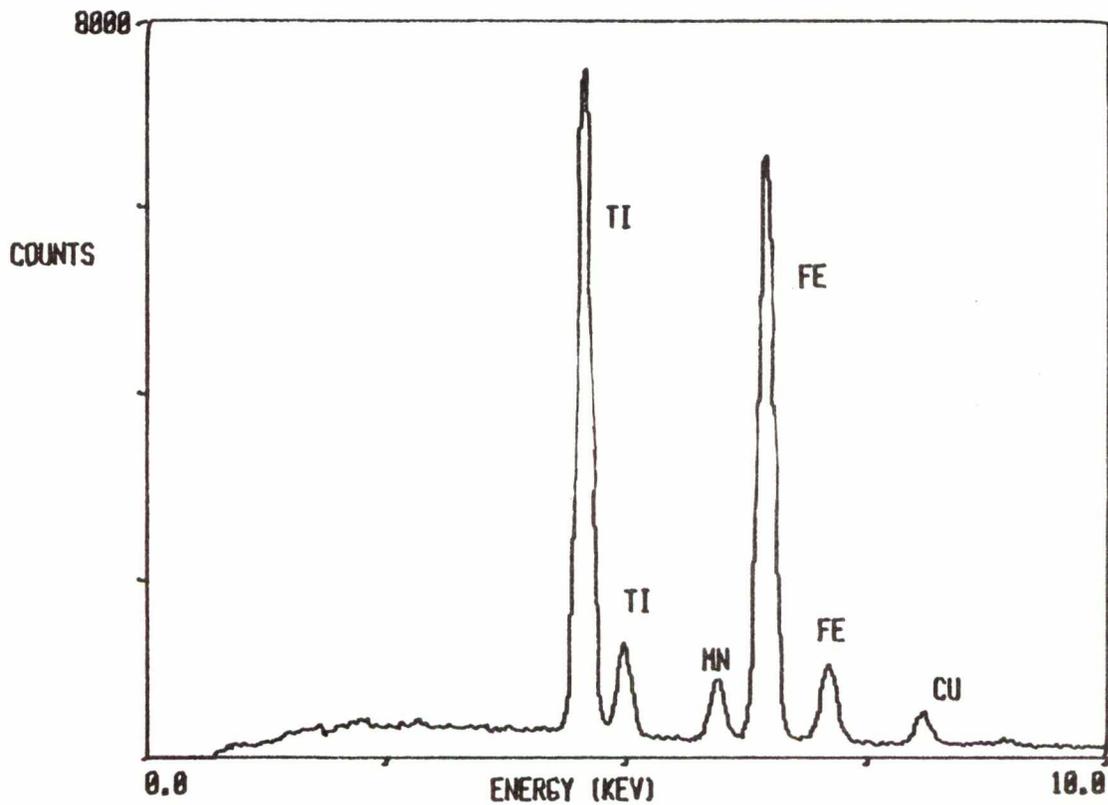
ILMENITE
(USNM 96189)

S-82-25749



| WEIGHT % | | | | | | | | | | | | |
|-------------|-------------|--------------|--------------|--------------|------------|------------|------------|------------|------------|-------------|------------|--------------|
| <u>SiO2</u> | <u>TiO2</u> | <u>Al2O3</u> | <u>Cr2O3</u> | <u>Fe2O3</u> | <u>FeO</u> | <u>NiO</u> | <u>MnO</u> | <u>MgO</u> | <u>CaO</u> | <u>Na2O</u> | <u>K2O</u> | <u>TOTAL</u> |
| - | 45.70 | - | - | 11.60 | 36.10 | - | 4.77 | 0.31 | - | - | - | 98.48 |

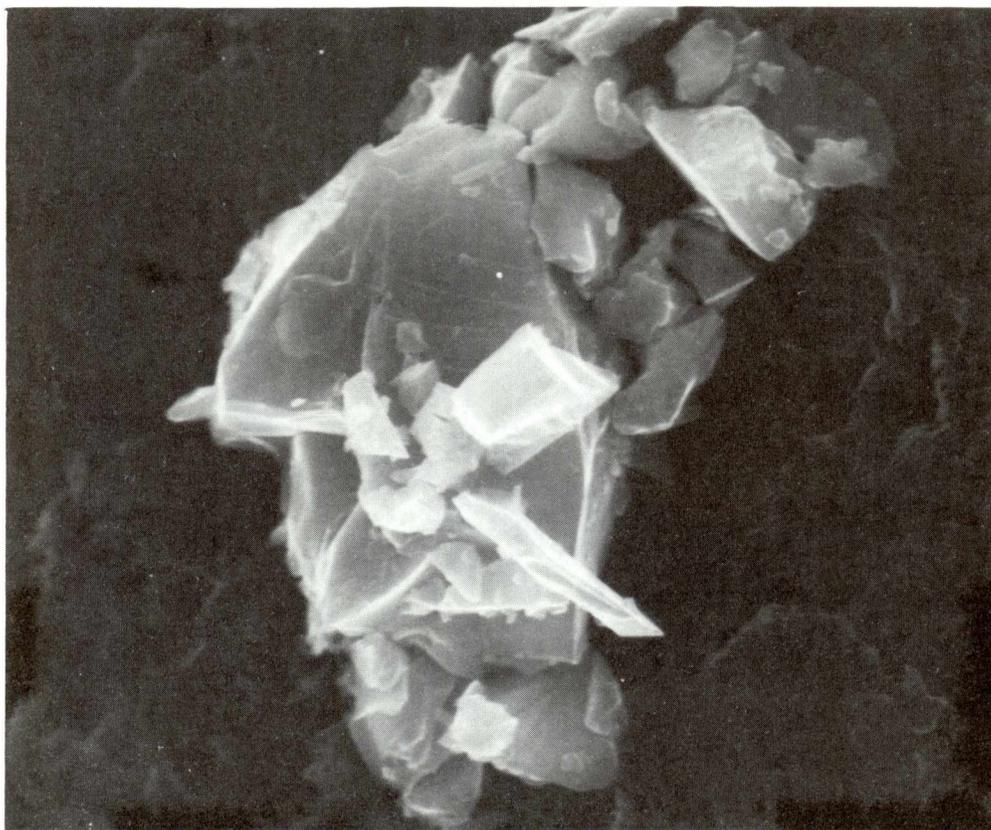
ILM-P4



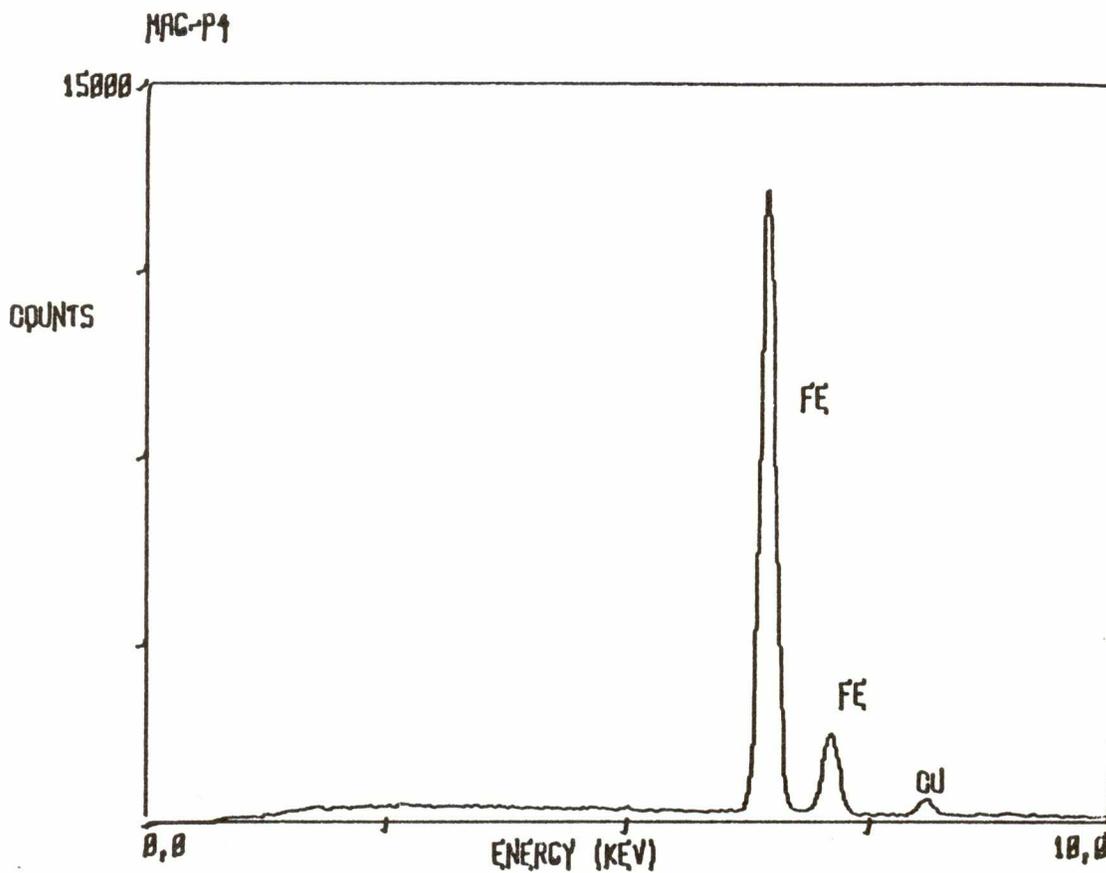
XX

MINAS GERAIS MAGNETITE
(USNM 114887)

S-82-25743

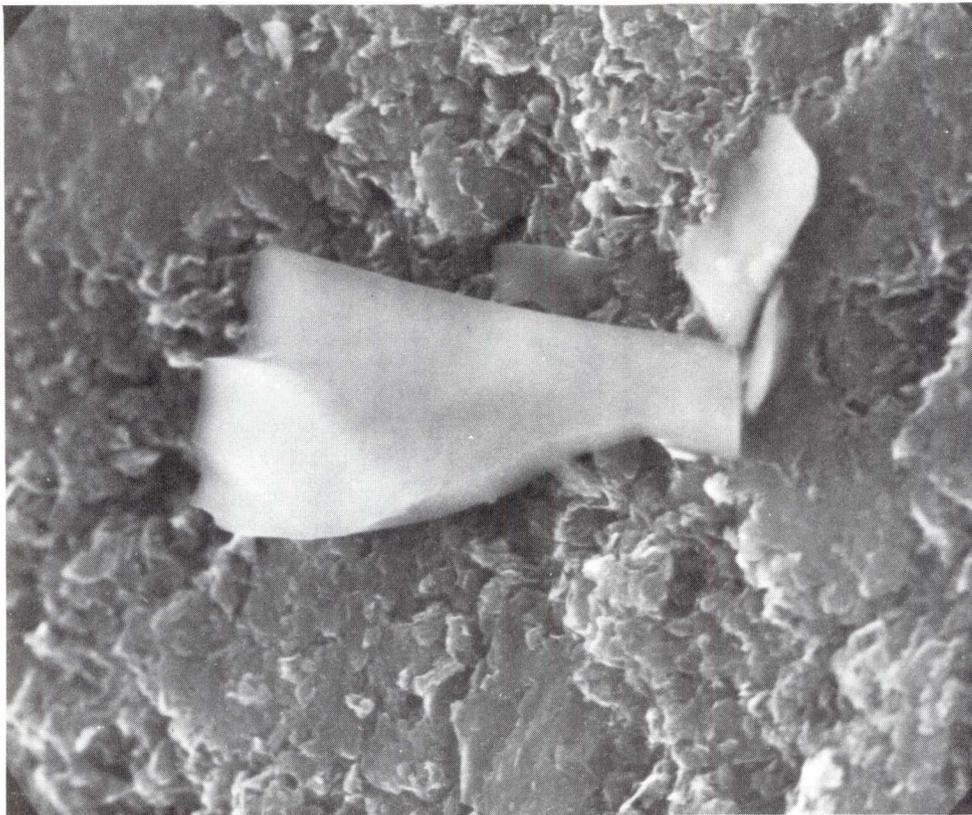


| | | | | | | | | | | | | | WEIGHT % | | |
|-------------|-------------|--------------|--------------|--------------|------------|------------|------------|------------|------------|-------------|------------|--------------|----------|--|--|
| <u>SiO2</u> | <u>TiO2</u> | <u>Al2O3</u> | <u>Cr2O3</u> | <u>Fe2O3</u> | <u>FeO</u> | <u>NiO</u> | <u>MnO</u> | <u>MgO</u> | <u>CaO</u> | <u>Na2O</u> | <u>K2O</u> | <u>TOTAL</u> | | | |
| - | - | - | - | 67.50 | 30.20 | - | - | - | - | - | - | - | 97.70 | | |



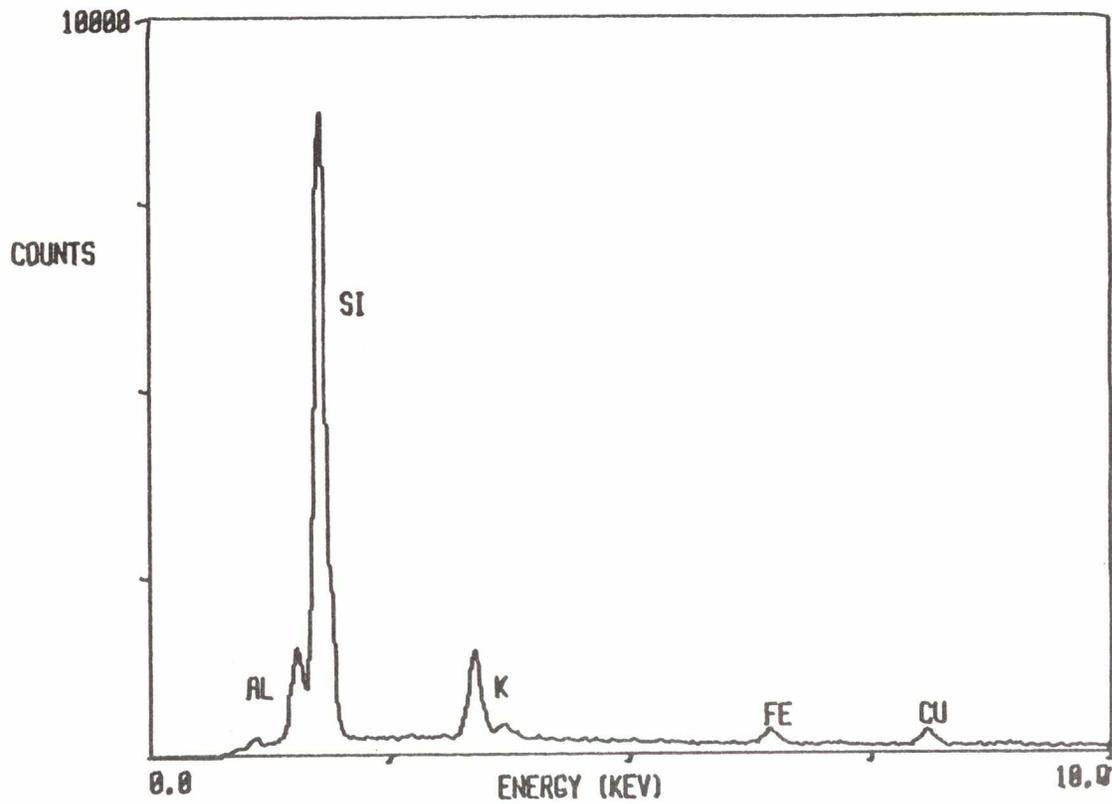
RHYOLITE GLASS
(USNM 72854 VG-568)

S-82-25748



| <u>SiO₂</u> | <u>TiO₂</u> | <u>Al₂O₃</u> | <u>Cr₂O₃</u> | <u>Fe₂O₃</u> | <u>FeO</u> | <u>WEIGHT %</u> | | | <u>CaO</u> | <u>Na₂O</u> | <u>K₂O</u> | <u>TOTAL</u> |
|------------------------|------------------------|------------------------------------|------------------------------------|------------------------------------|------------|-----------------|------------|------------|------------|------------------------|-----------------------|--------------|
| | | | | | | <u>NiO</u> | <u>MnO</u> | <u>MgO</u> | | | | |
| 76.71 | 0.12 | 12.06 | - | 0.48 | 0.80 | - | 0.03 | <0.10 | 0.50 | 3.75 | 4.89 | 99.34 |

RHY-P4



6. SAMPLE REQUESTS

Scientists desiring to perform detailed research on particles described in this catalog should apply in writing to:

Curator/Cosmic Dust Telephone: (713) 483-3274
Code SN2
NASA/Johnson Space Center
Houston, Texas 77058
U.S.A.

Sample requests should refer to specific particle identification numbers and should describe the research being proposed as well as the qualifications and facilities of the investigator making the request. Additionally, requests for particles not yet passed through preliminary examination will be considered if the requester can demonstrate a strong need for them. NASA will arrange for a review of the scientific merits of each request and will inform the requester of the results. Approval of a sample request does not imply or include funding for the proposed research. Questions about NASA funding should be directed to:

Discipline Scientist, Planetary Materials
Code EL-4
NASA Headquarters
Washington, D.C. 20546

Although foreign scientists are welcome to request samples, NASA cannot provide funds to be spent outside the U.S.A. by citizens of other countries.

It should be noted that particles labelled W7029C have already been allocated for research and, thus, are not available from the inventory summarized in this catalog. Again, preliminary examination data for this allocated mount are included for completeness.

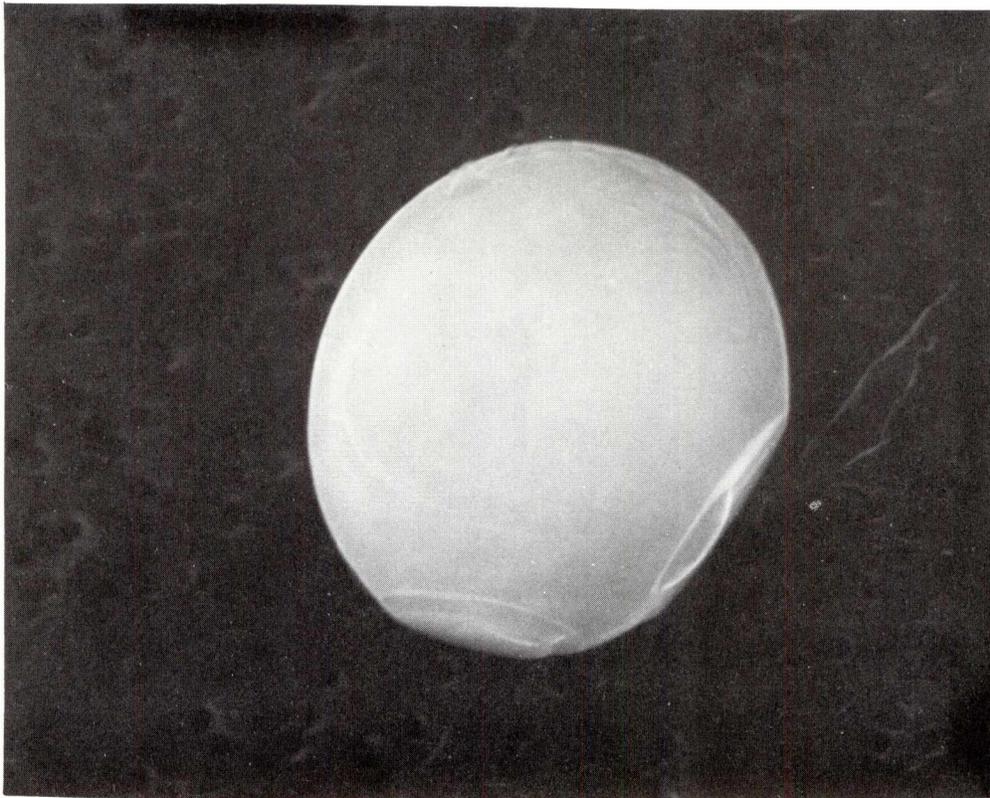
7. ACKNOWLEDGEMENTS

Dr. Donald E. Brownlee (University of Washington, Seattle) generously provided information, advice, and material cooperation which contributed greatly to the successful start of the JSC Cosmic Dust Program. Dr. Robert M. Walker and Dr. Philip B. Fraundorf (Washington University, St. Louis) provided informative discussions on particle identification problems. Eugene Jarosewich (Smithsonian Institution, Washington, D.C.) kindly provided several mineral standards.

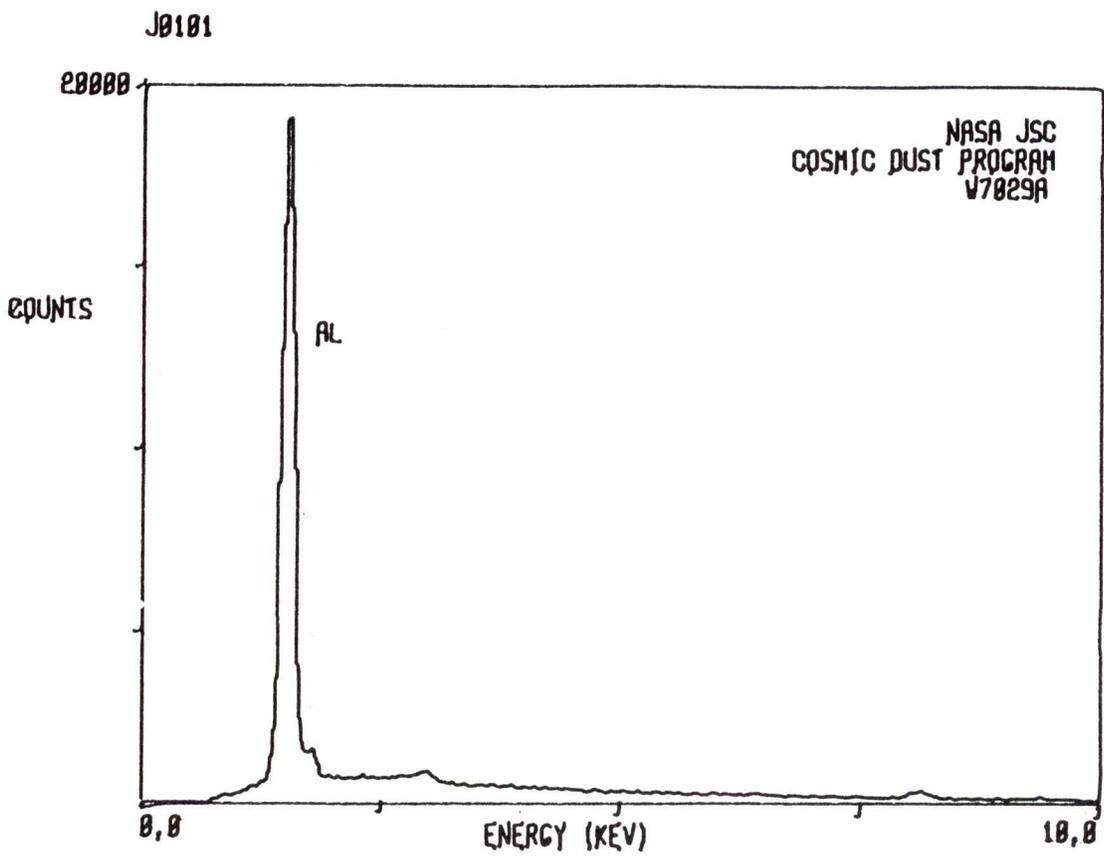
MOUNT W7029A

W7029A1

S-82-27562

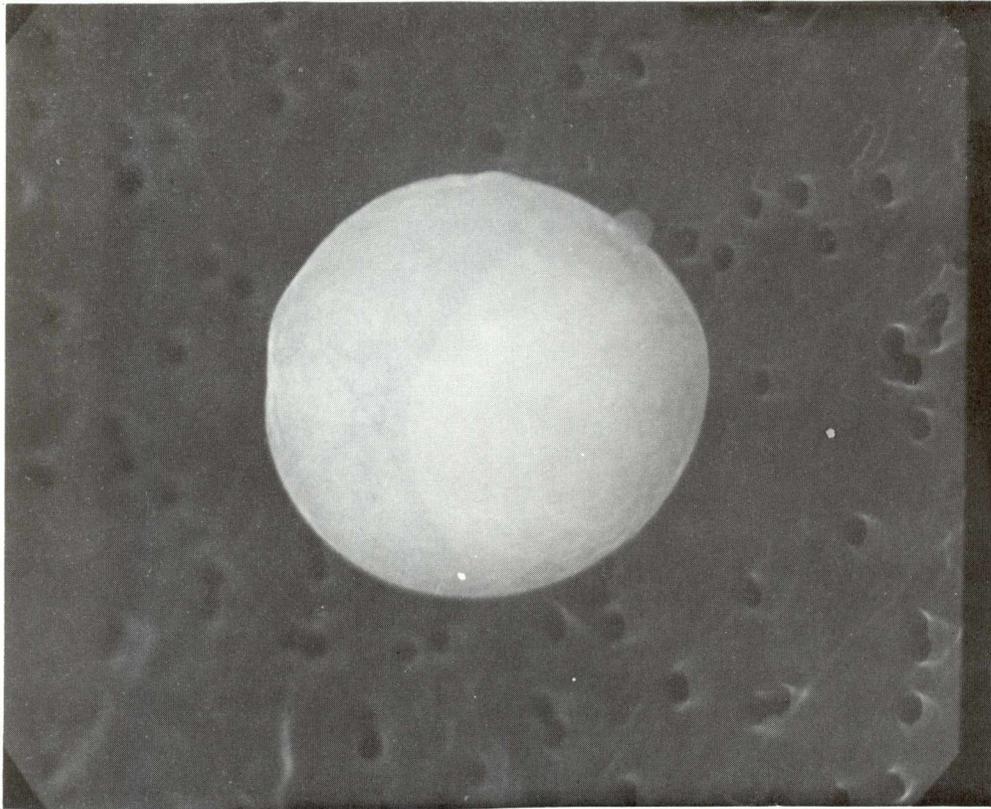


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 6 | S | T | CL/Pale Yellow | V | AOS | |

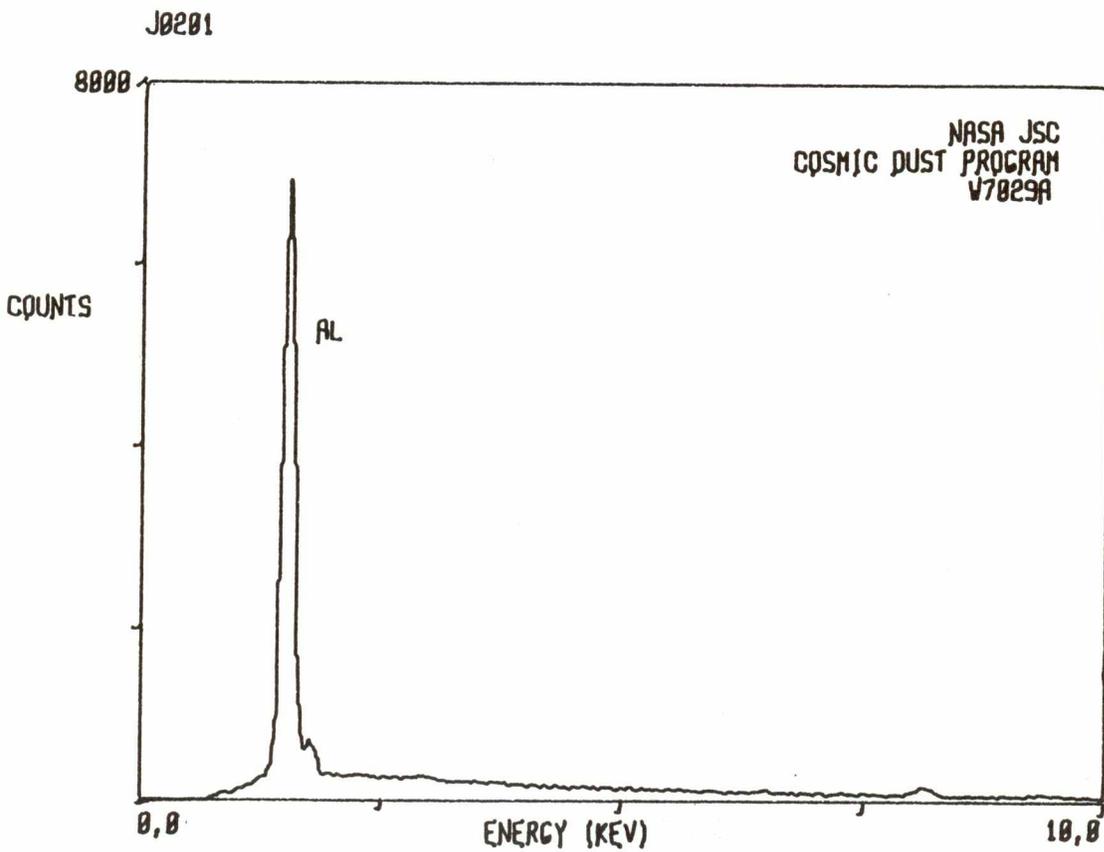


W7029A2

S-82-27556

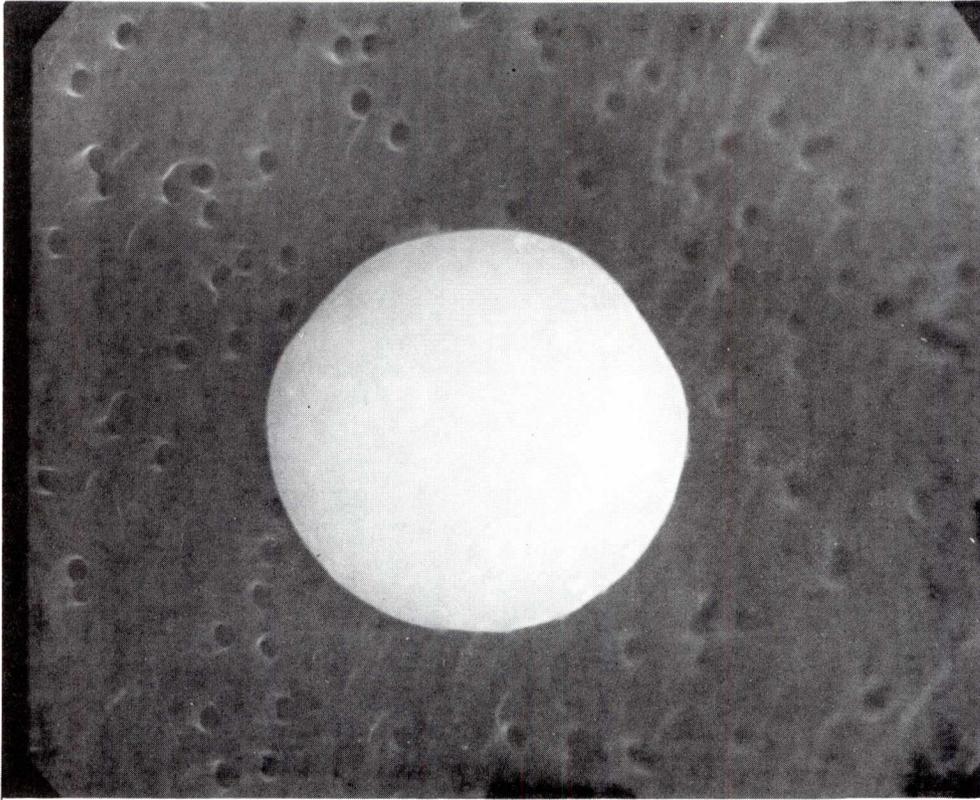


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 4 | S | T | CL/Pale Yellow | V | AOS | |

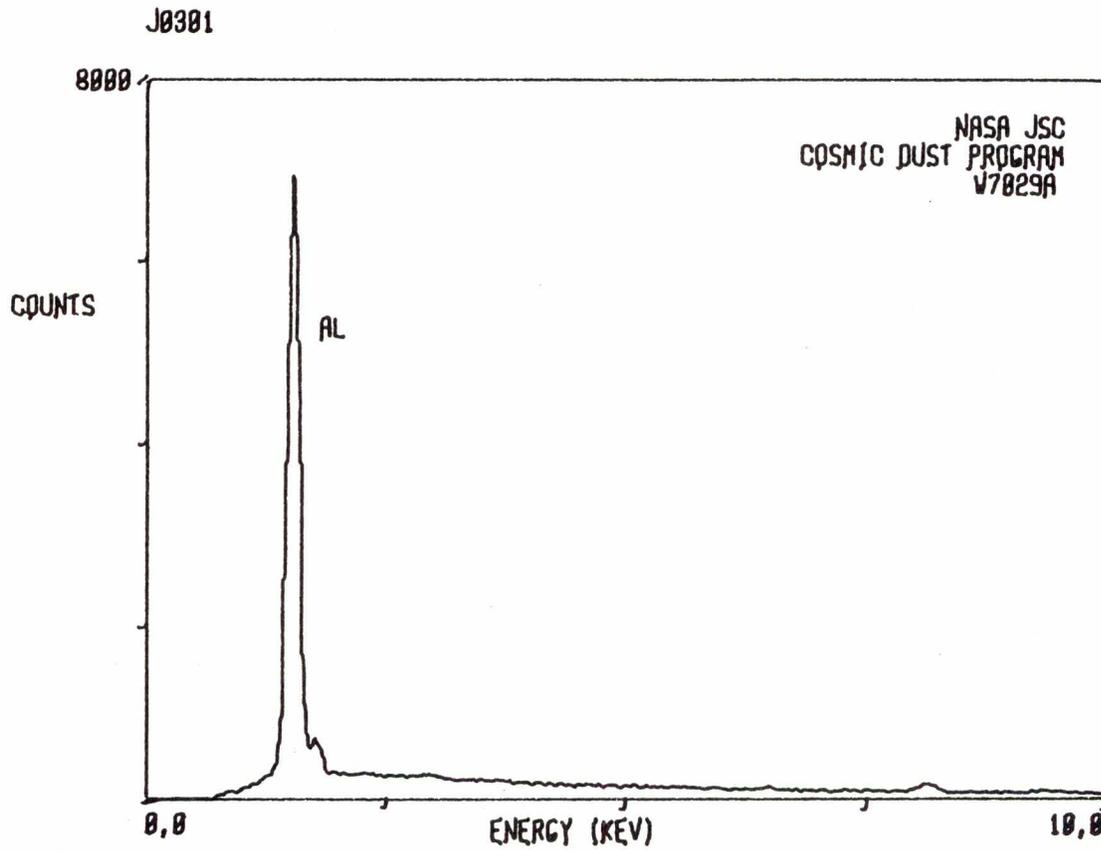


W7029A3

S-82-27557

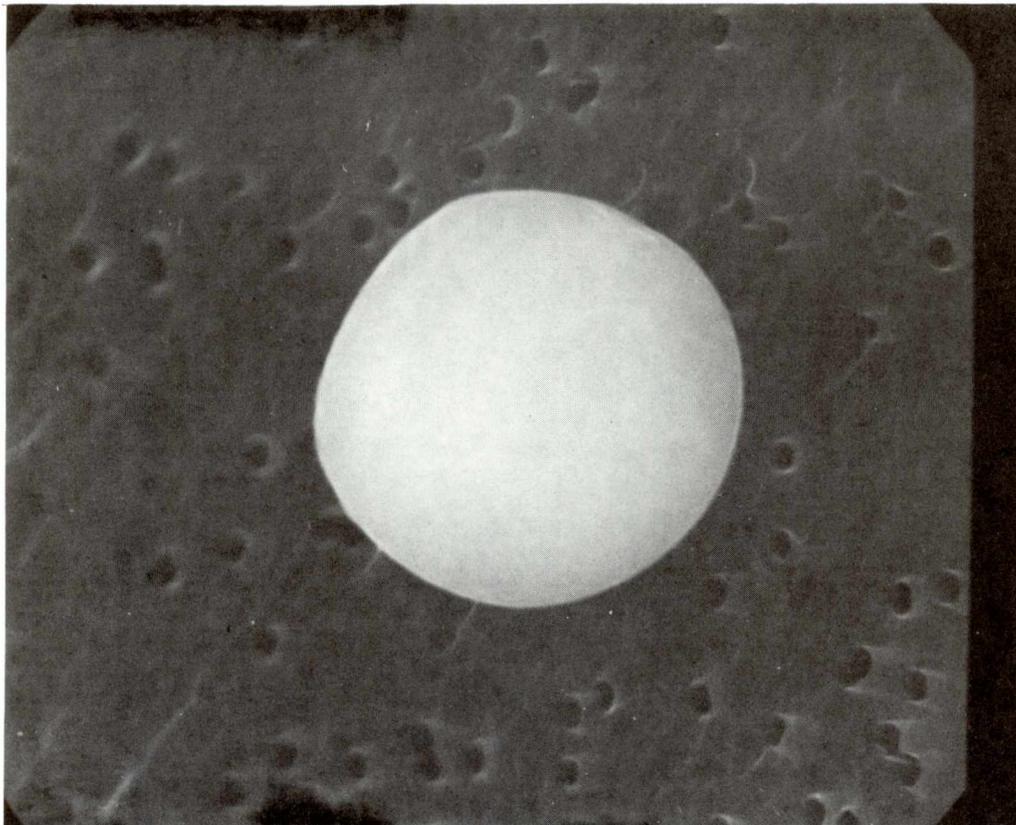


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 5 | S | T | CL/Pale Yellow | V | AOS | |

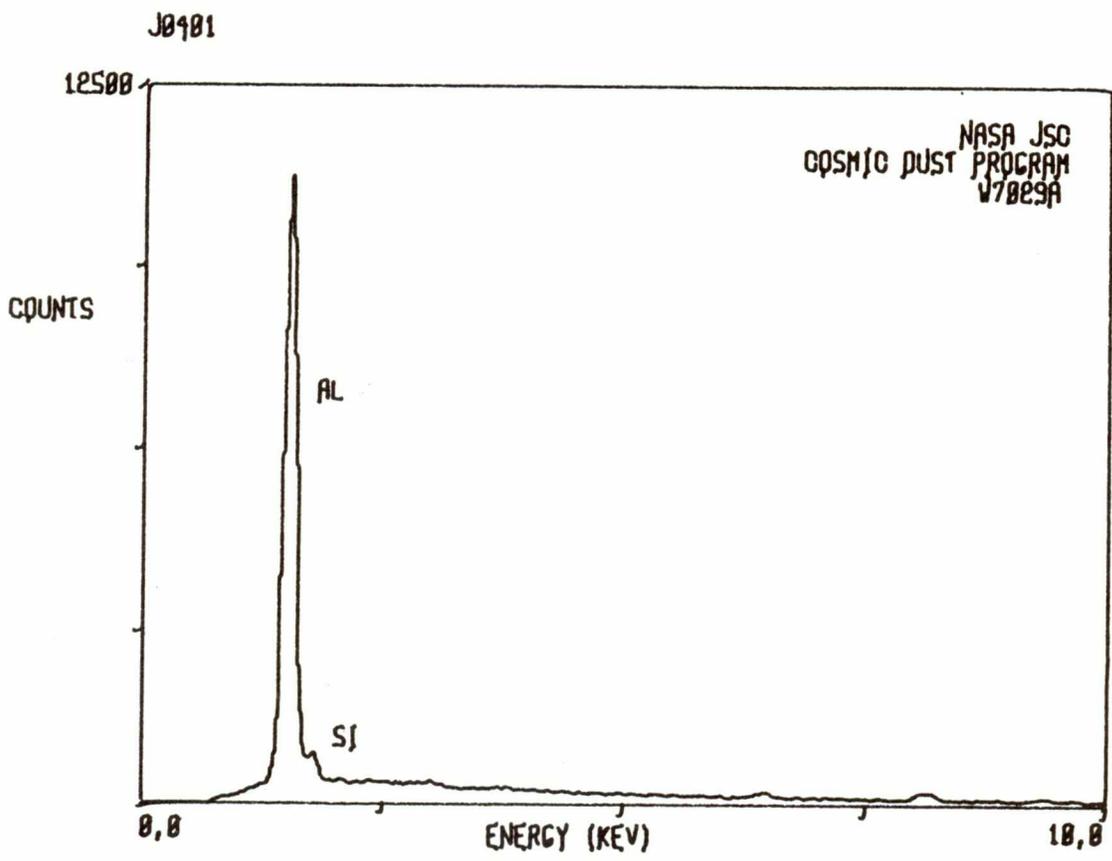


W7029A4

S-82-27558

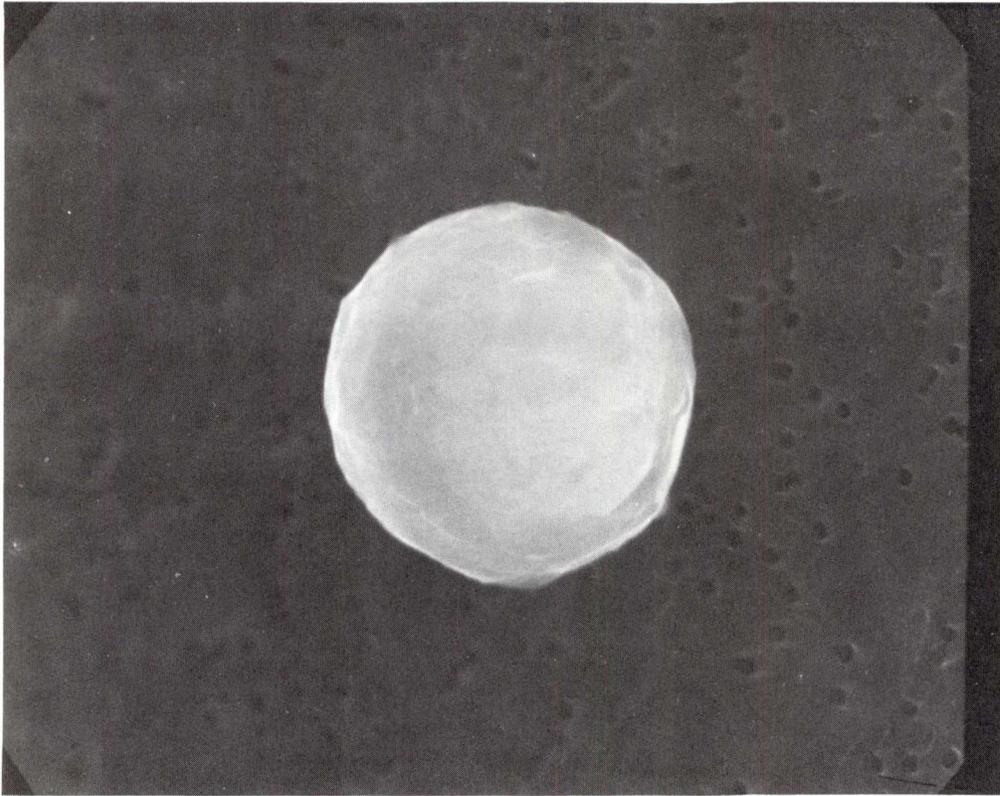


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 4 | S | T | CL/Pale Yellow | V | AOS | |

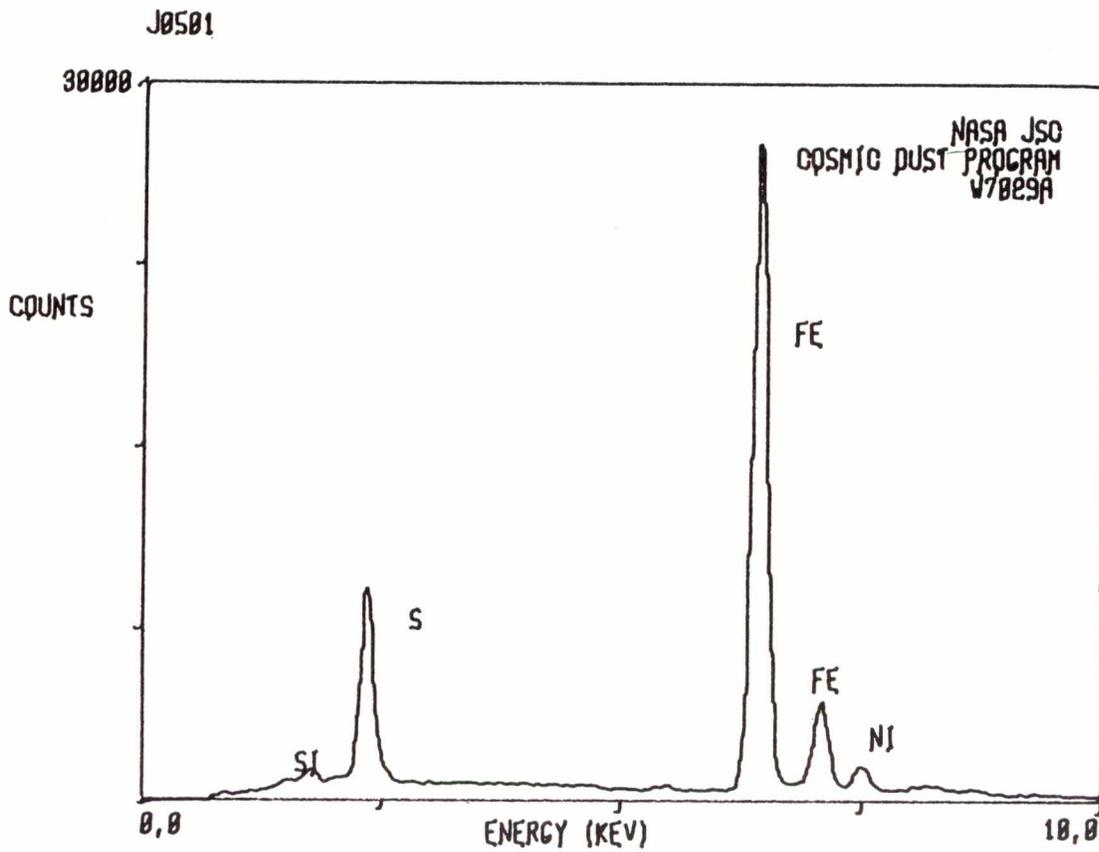


W7029A5

S-82-27559

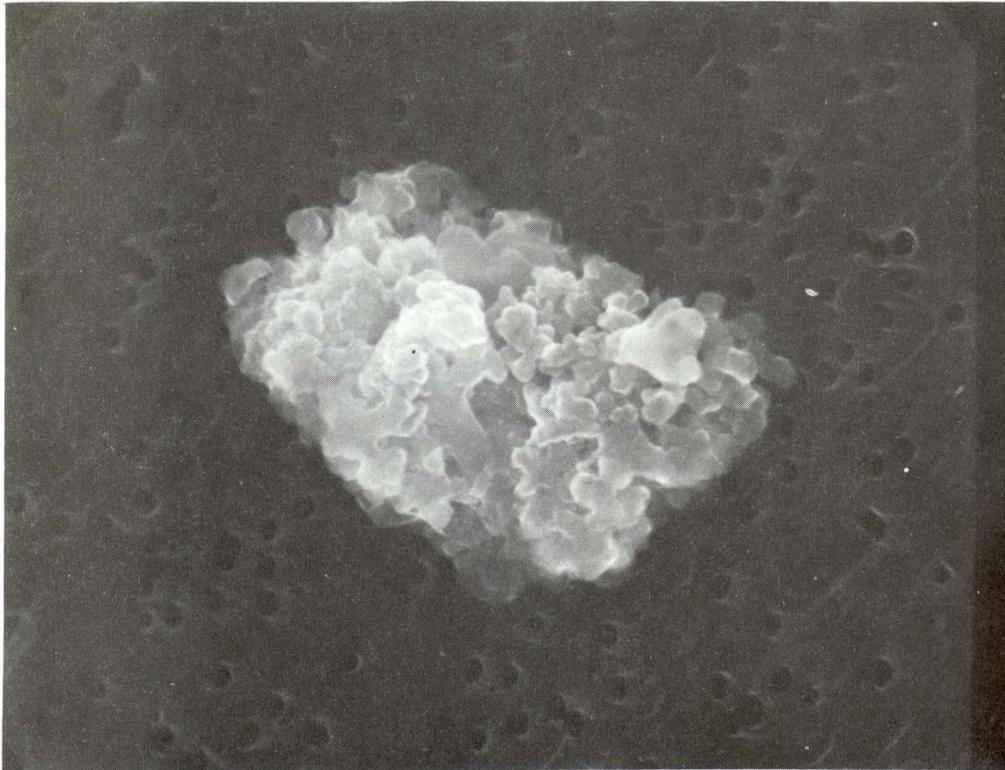


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 6 | S | 0 | Black | M | C | |

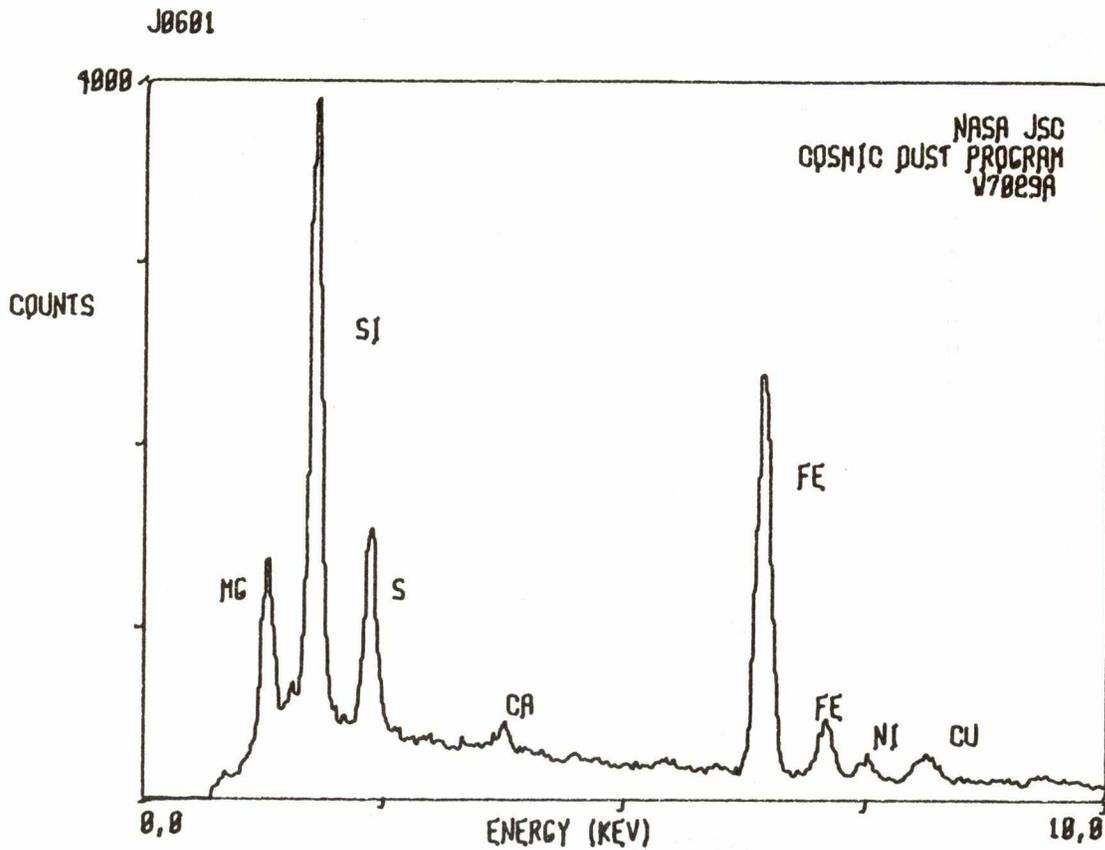


W7029A6

S82-27560

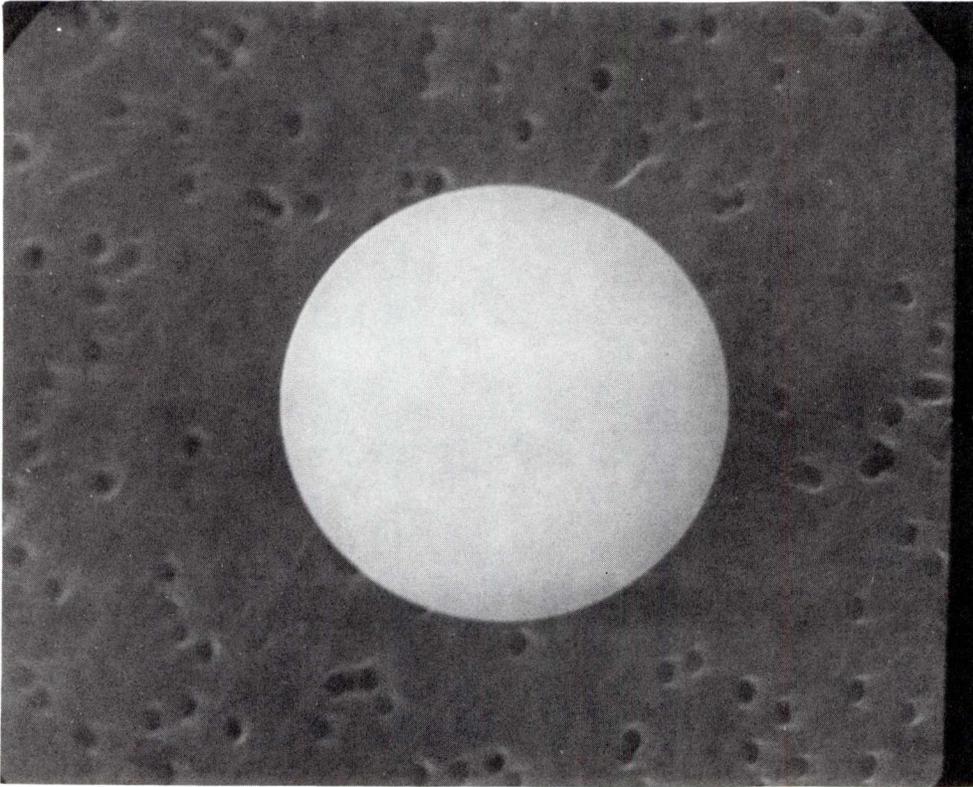


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|-----------------|---------------|-------------|-----------------|
| 5x7 | I | O | Dk. Brown/Black | SM | C | |

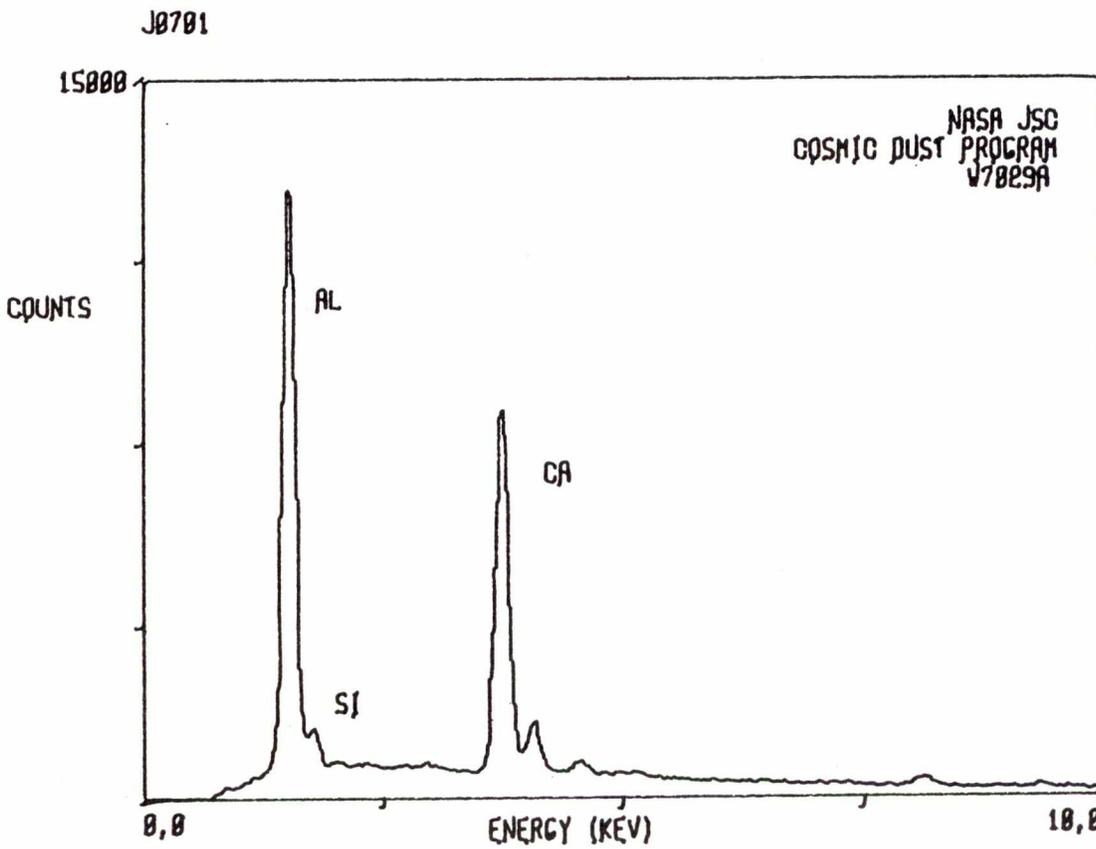


W7029A7

S-82-27561

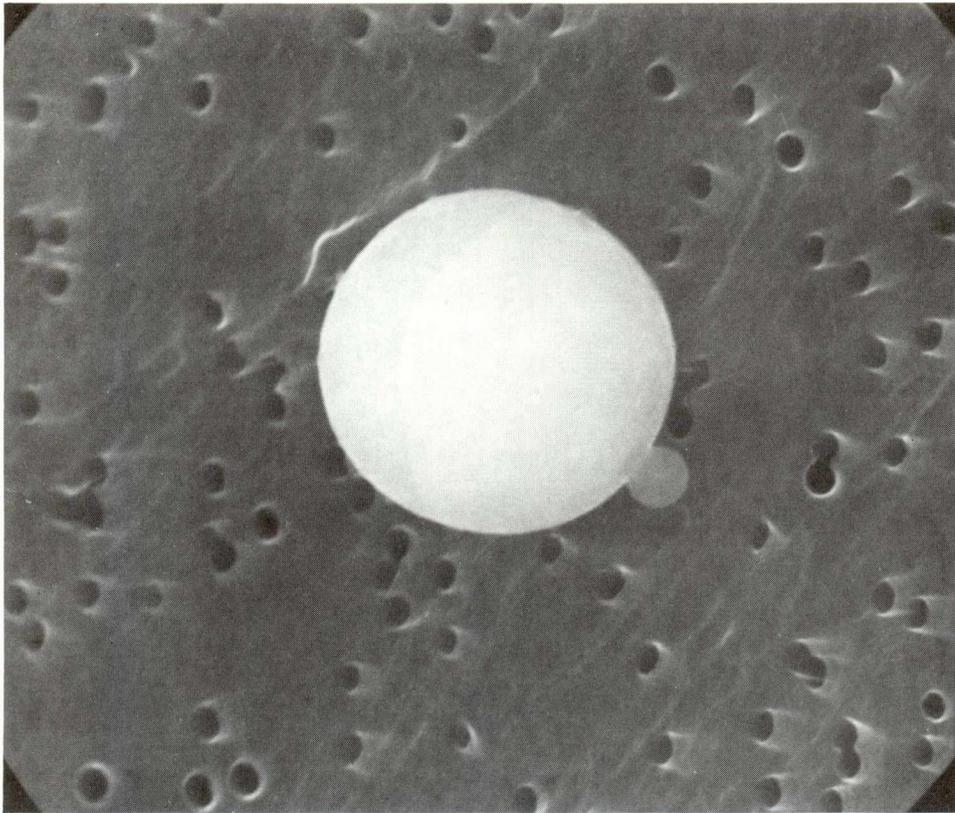


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 6 | S | T | CL/Pale Yellow | V | ? | |

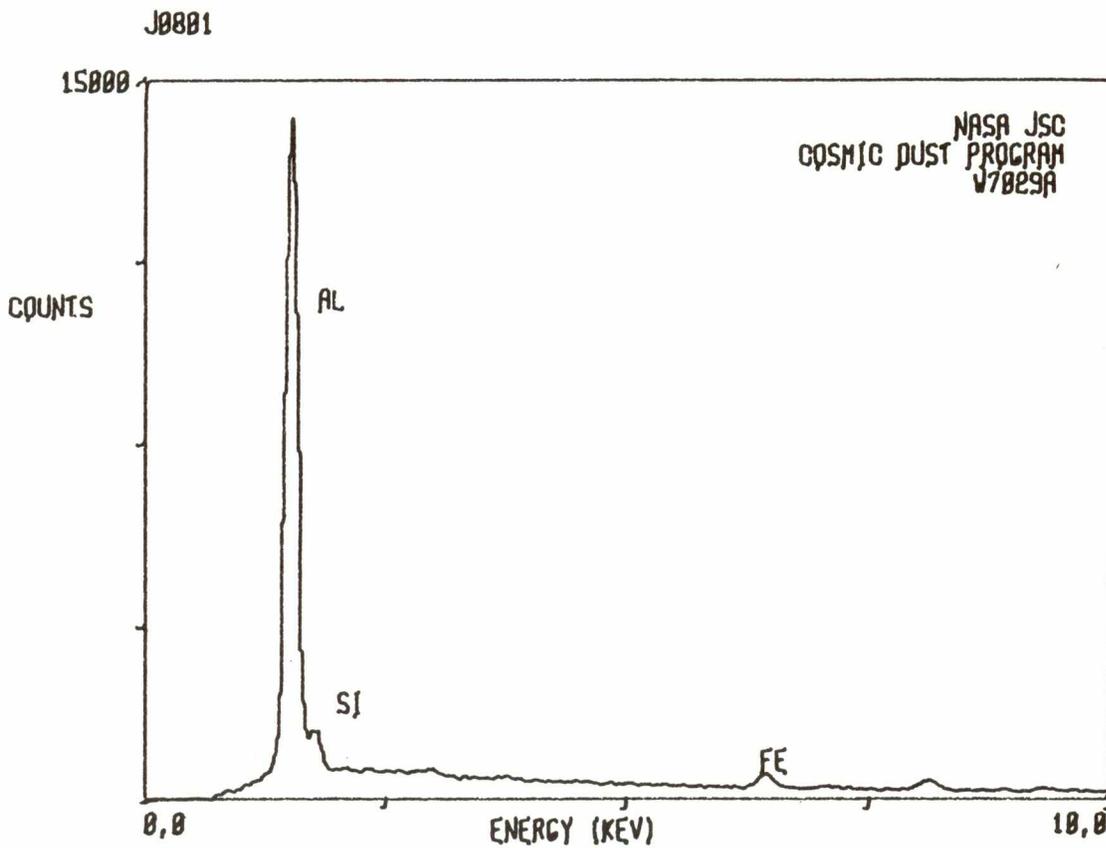


W7029A8

S-82-27550

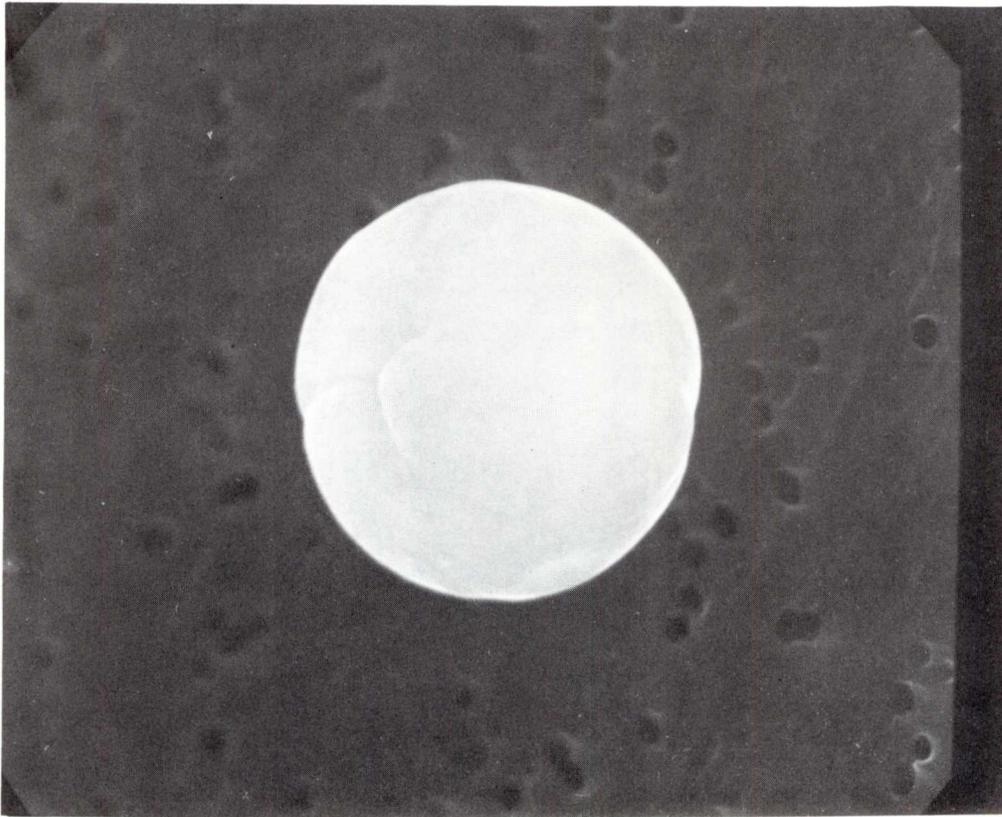


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 3 | S | T | CL/Pale Yellow | V | AOS | |

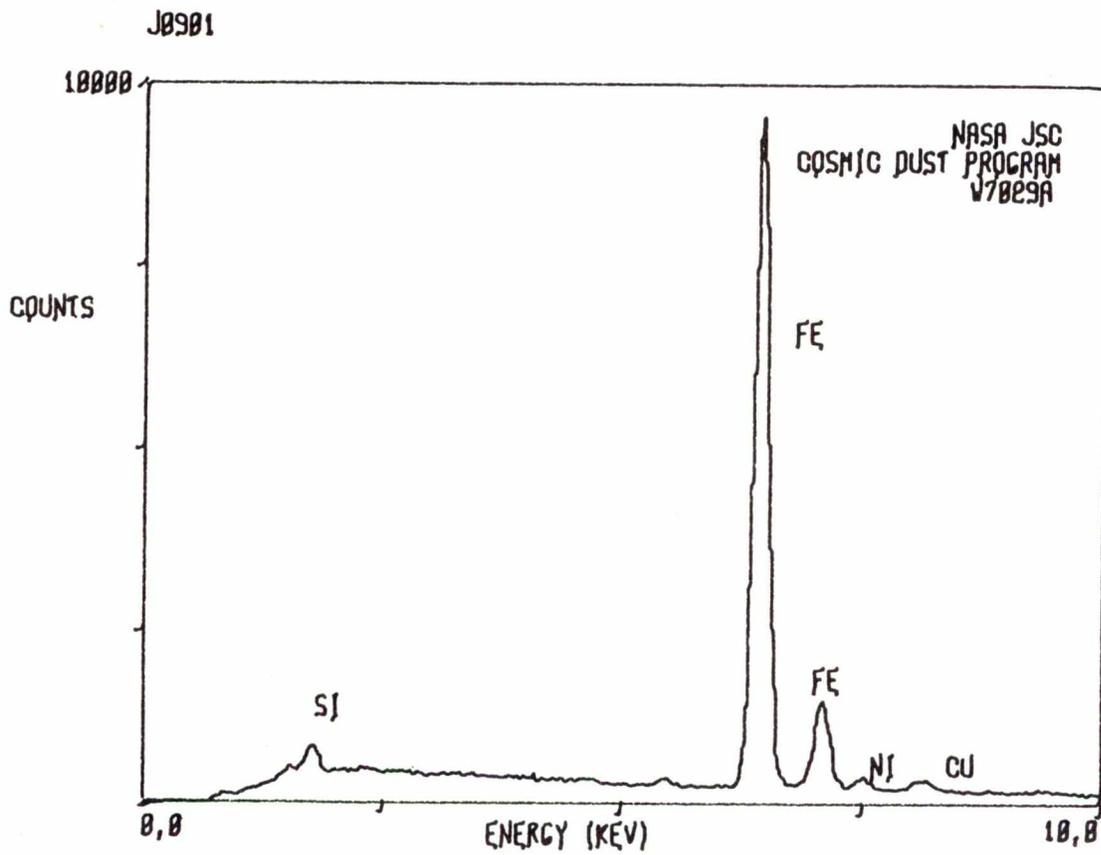


W7029A9

S-82-27551

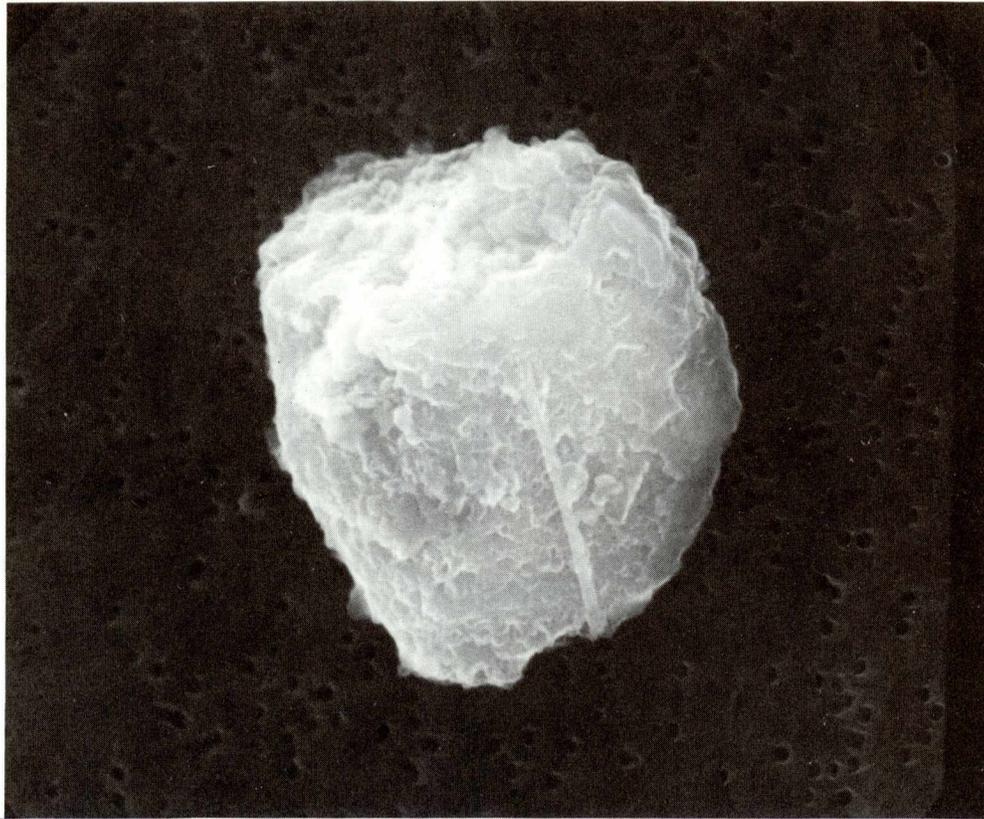


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 4 | S | 0 | Black | M | C? | |

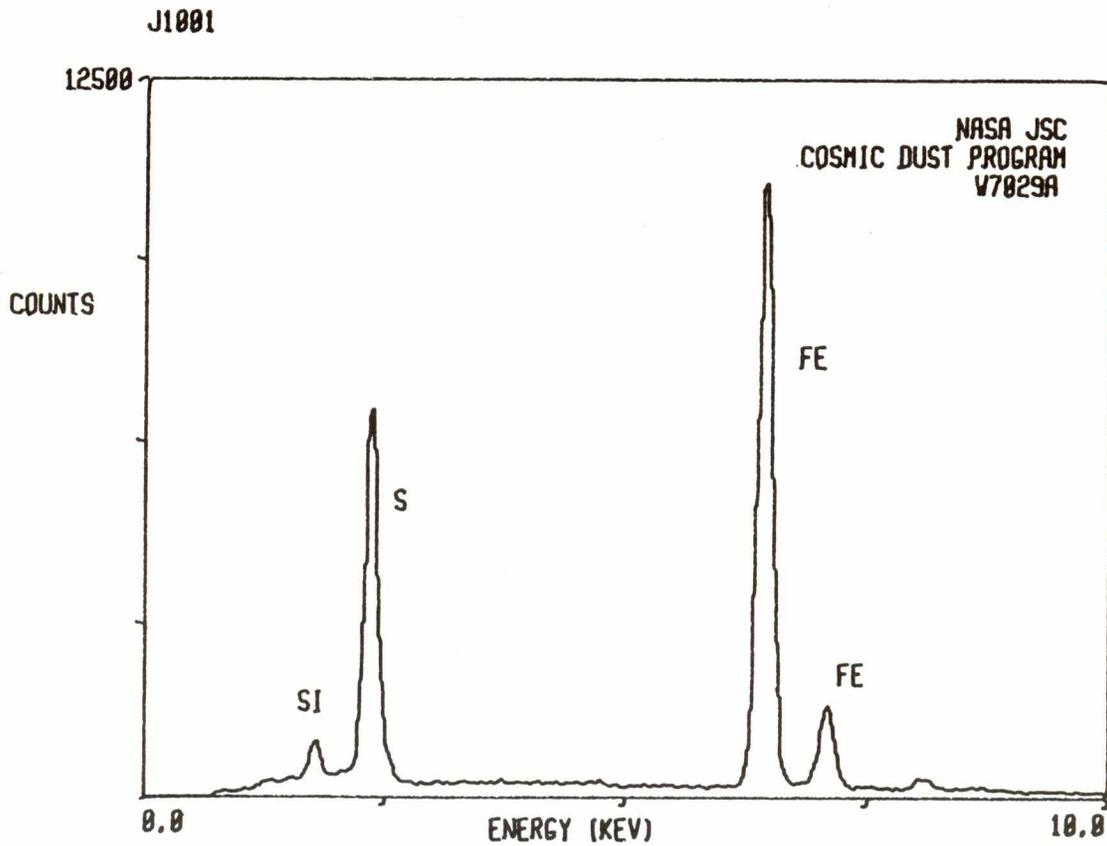


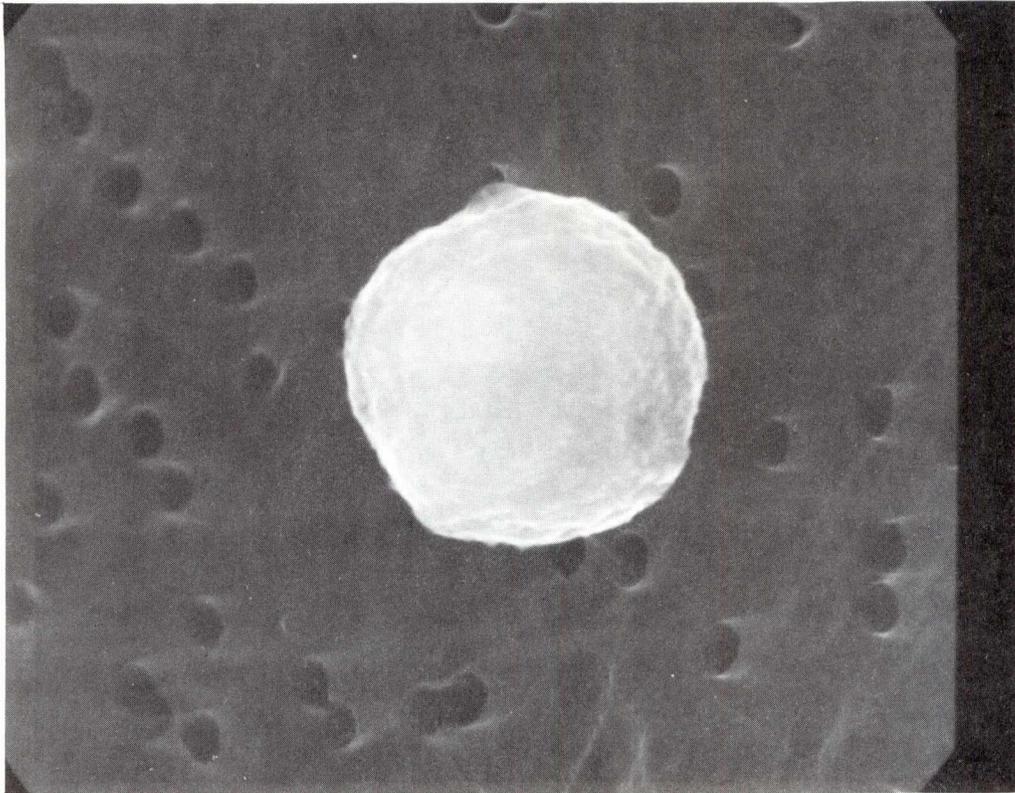
W7029A 10

S-82-27552

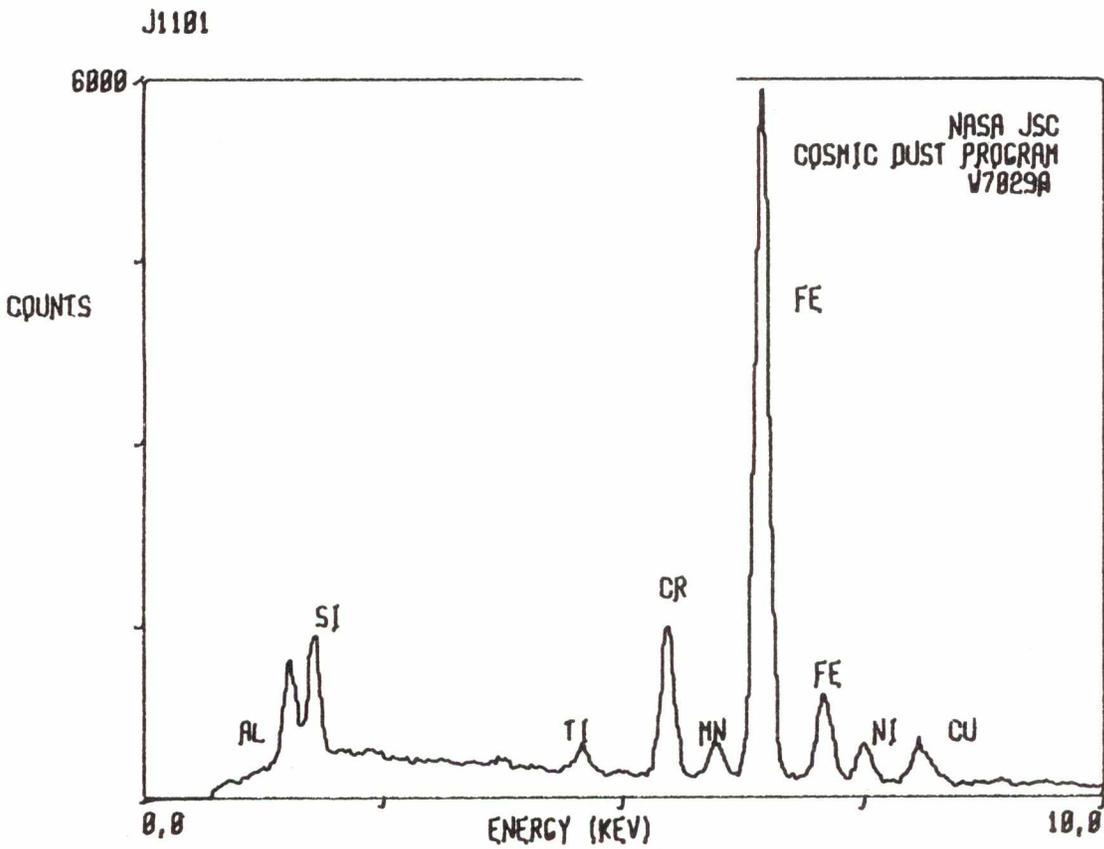


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|------------------------|
| 9x11 | I | 0 | Black | SM | C | TL material on surface |



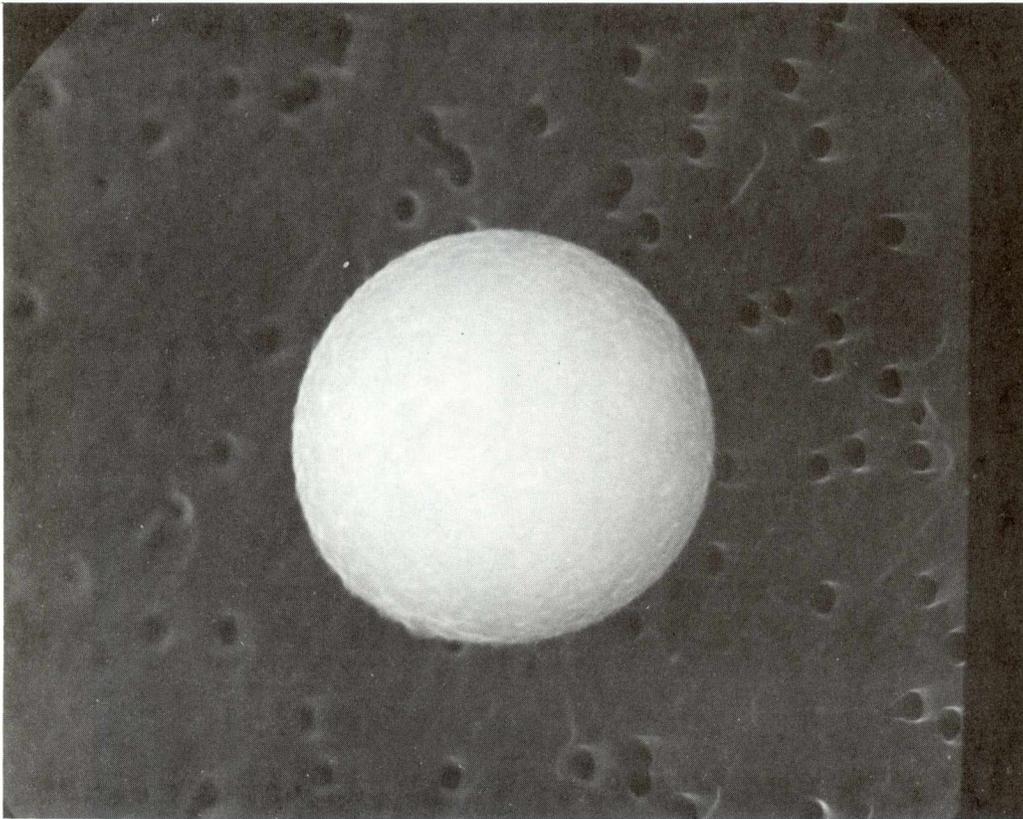


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 2 | S | 0 | Black | D/SM | ? | |

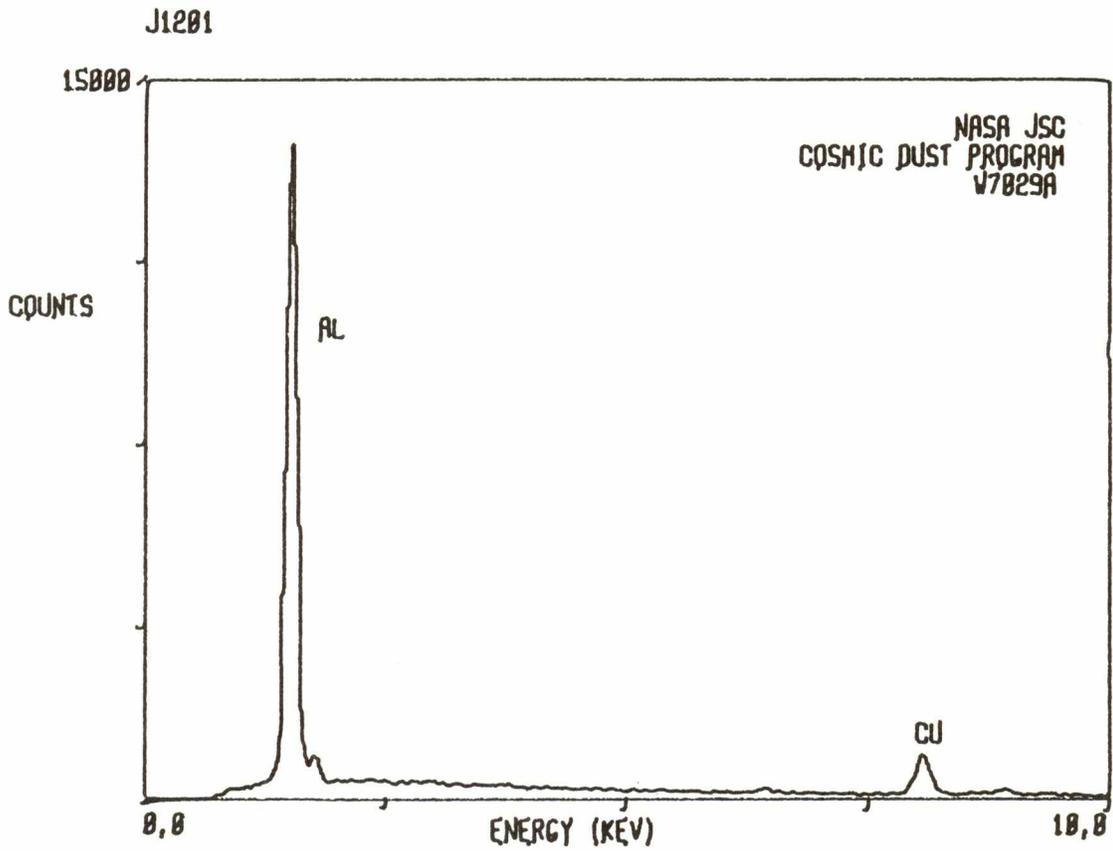


W7029A12

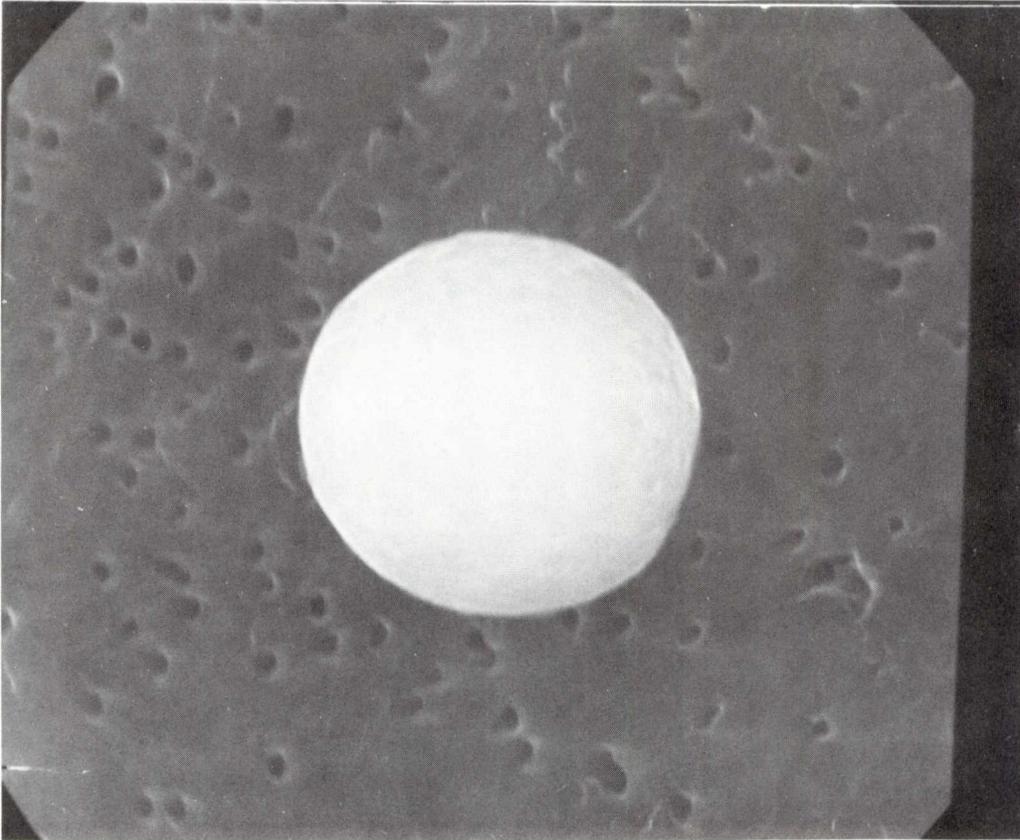
S-82-27554



| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 4 | S | T | CL/Pale Yellow | V | AOS | |



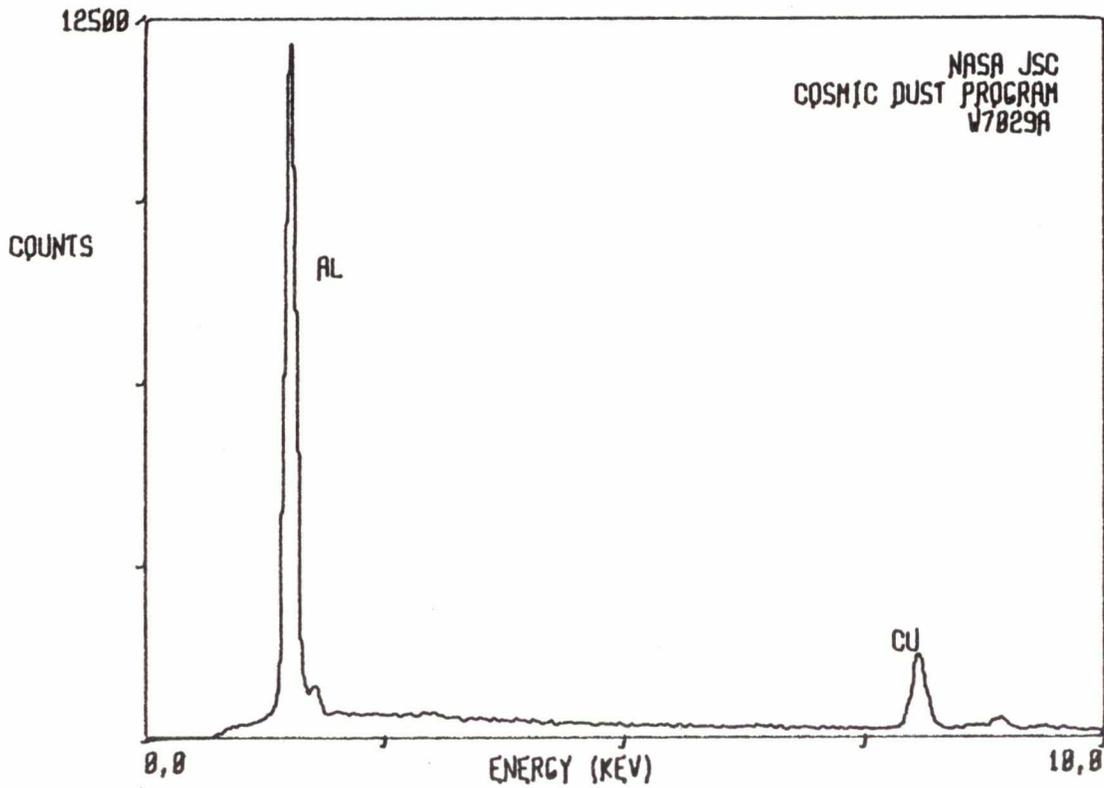
W7029A13



S-82-27555

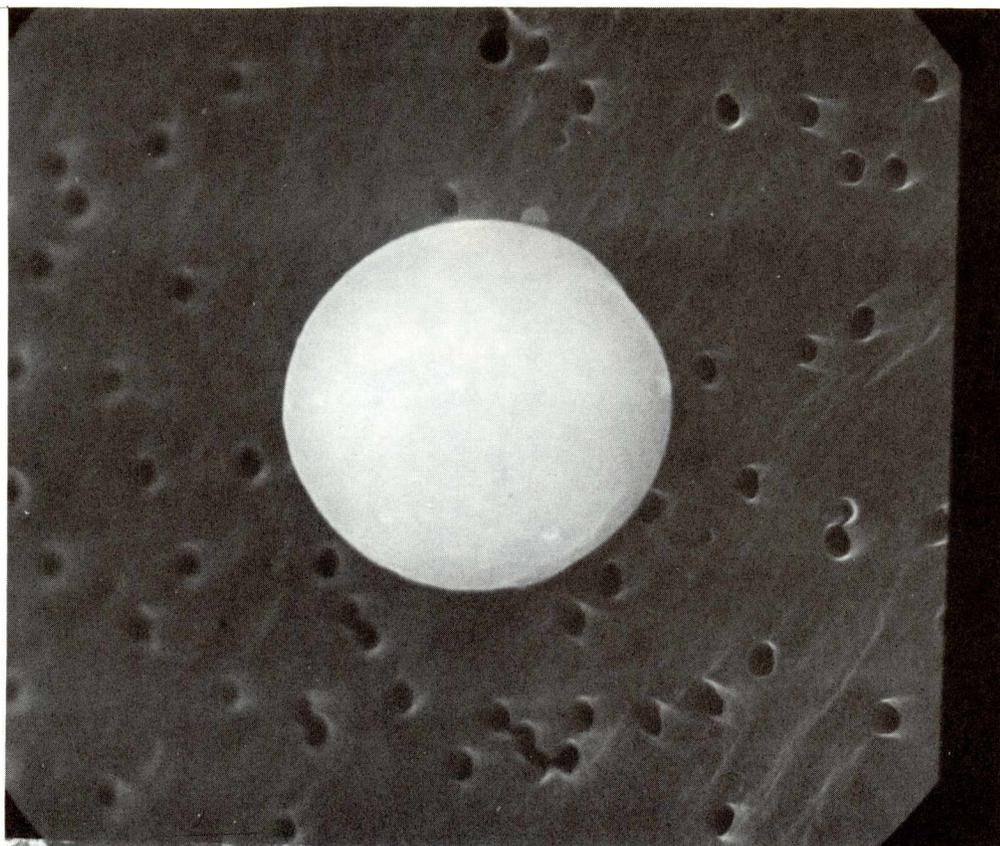
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 5 | S | T | CL/Pale Yellow | V | AOS | |

J1301

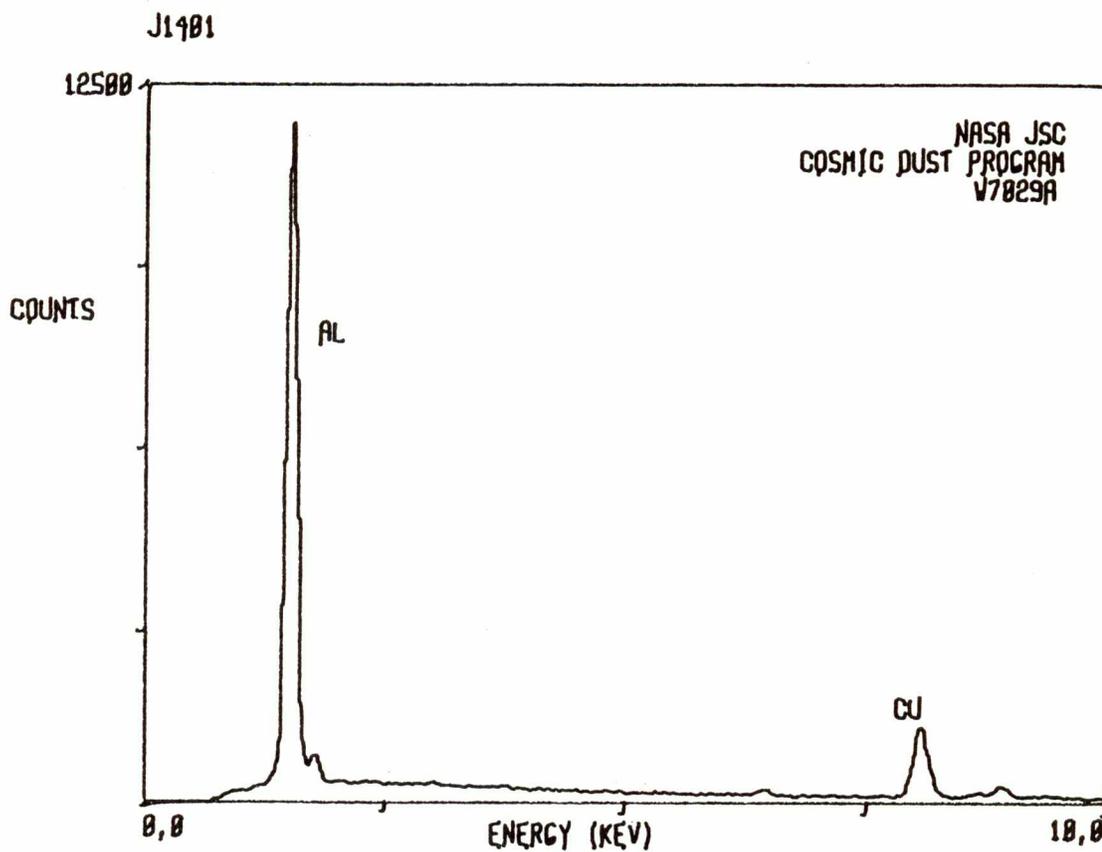


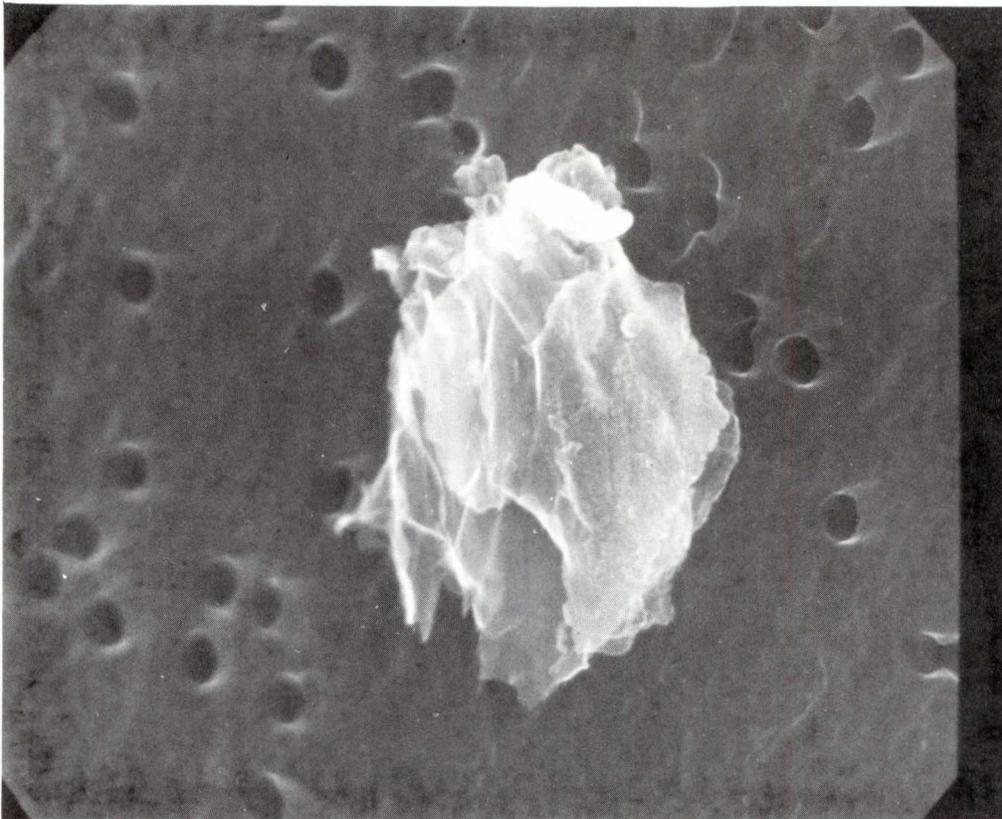
W7029A14

S-82-27544



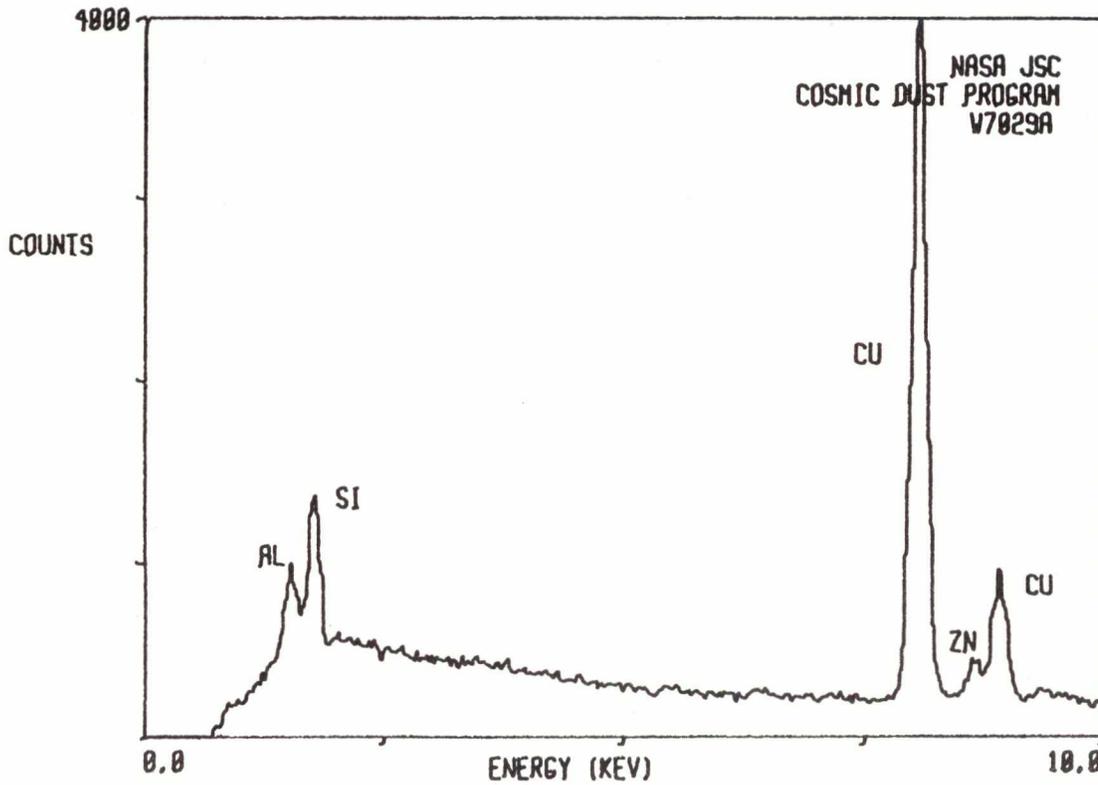
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 4 | S | T | CL/Pale Yellow | V | AOS | |





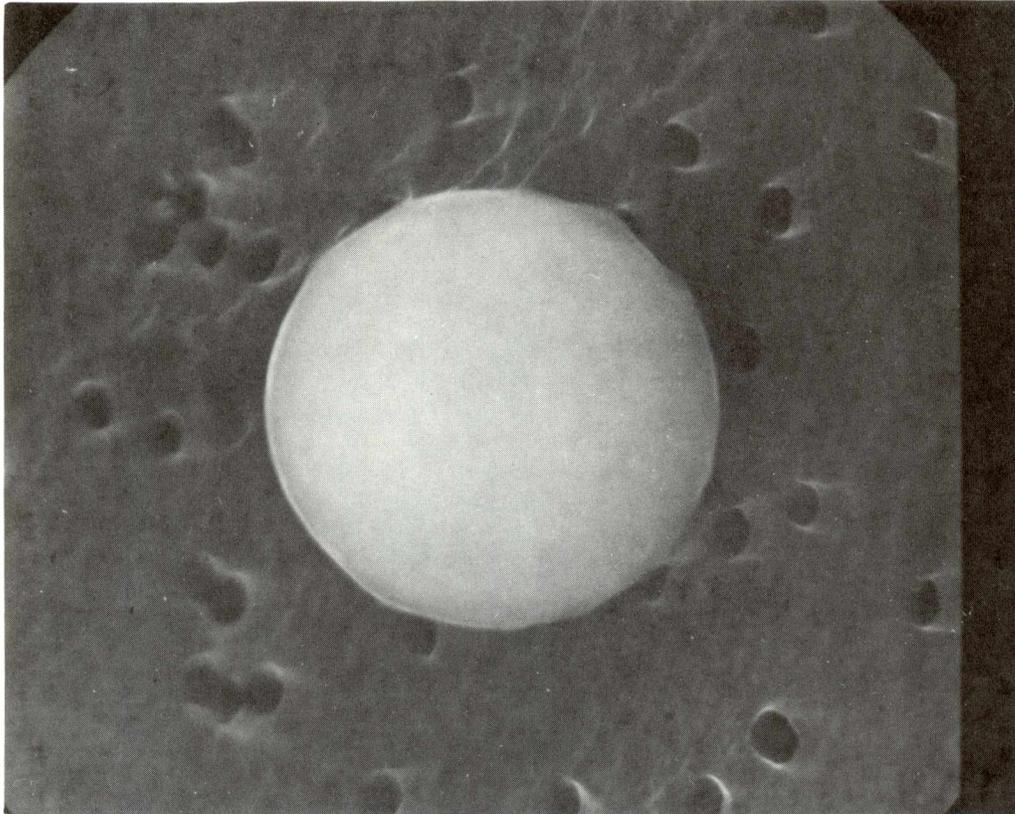
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 2x4 | I | 0 | Black | SM | TCA? | |

J1501

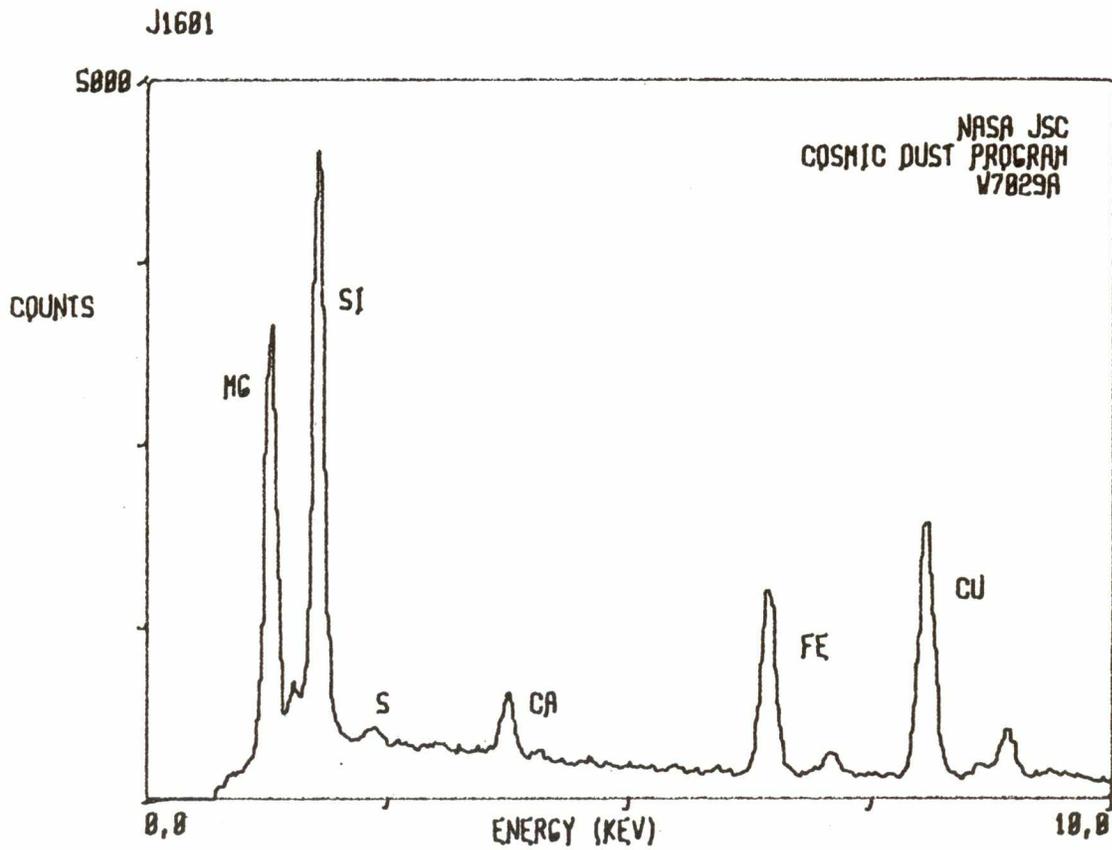


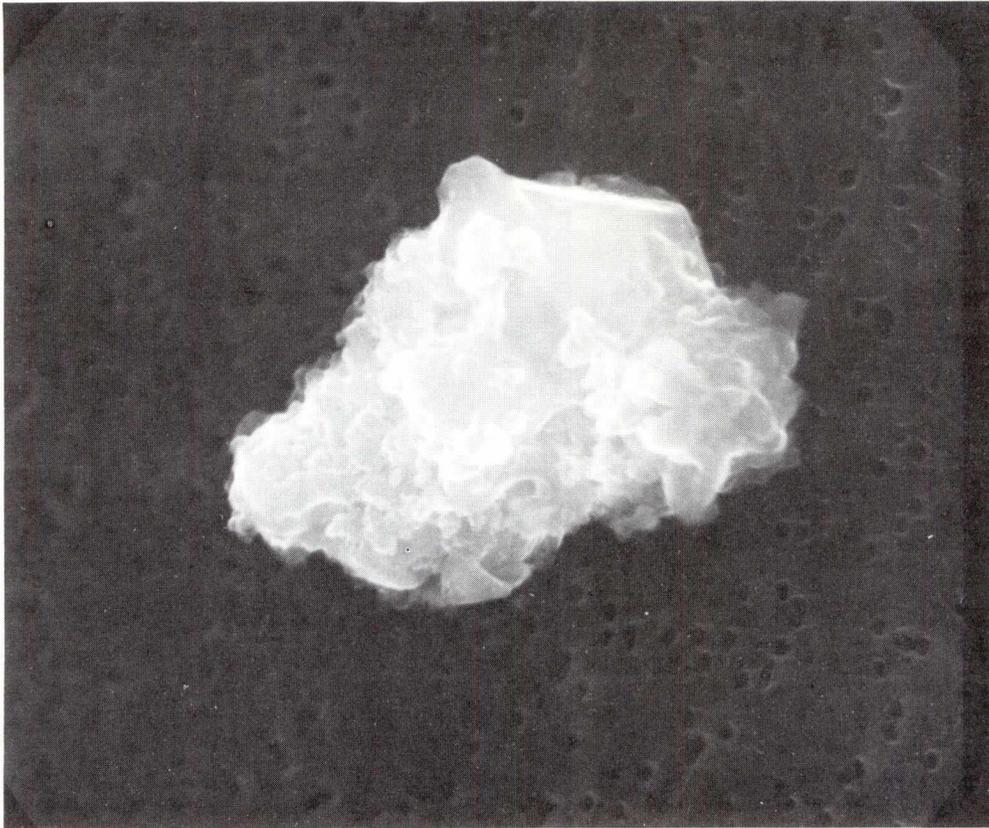
W7029A16

S-82-27546

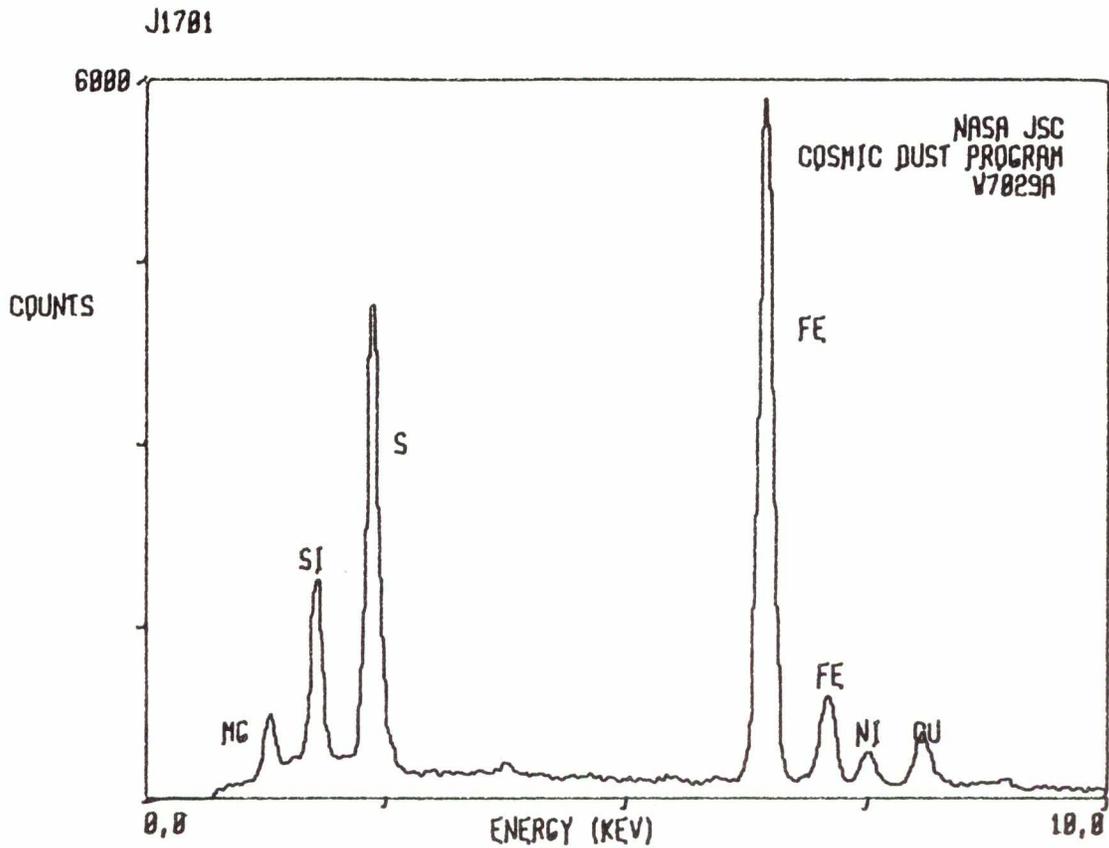


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 3 | S | T | CL/Pale Yellow | V | C? | |



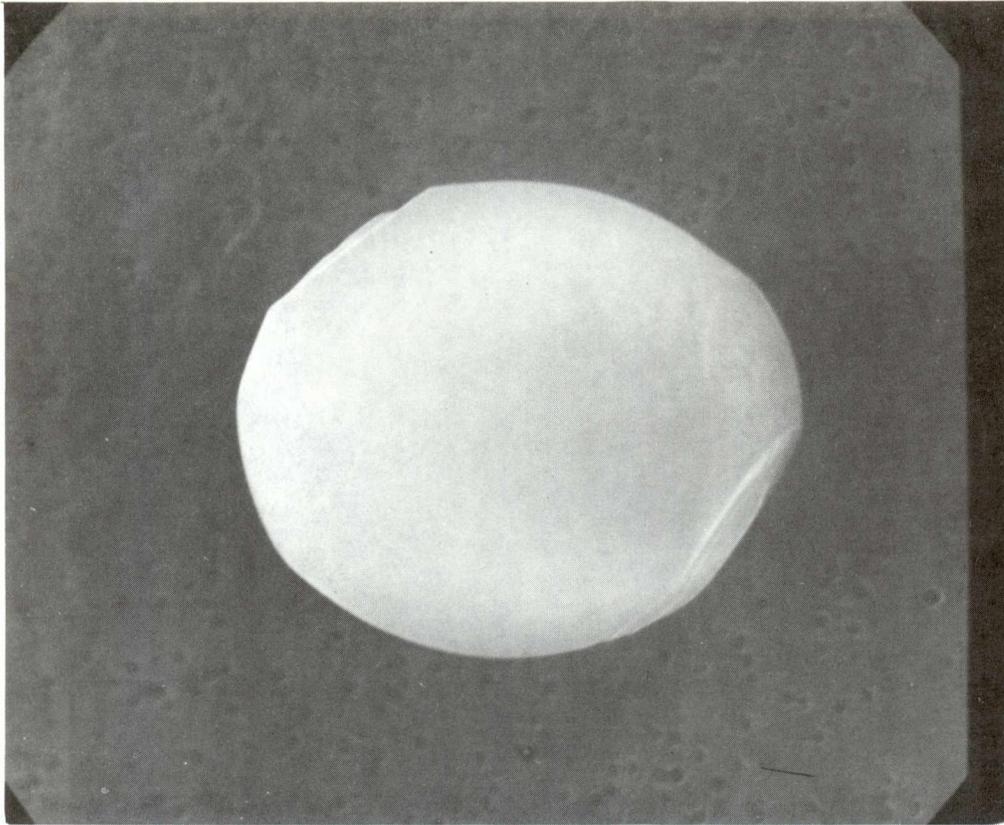


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|------------------------|
| 7x10 | I | 0 | Black | D/SM | C | TL material on surface |

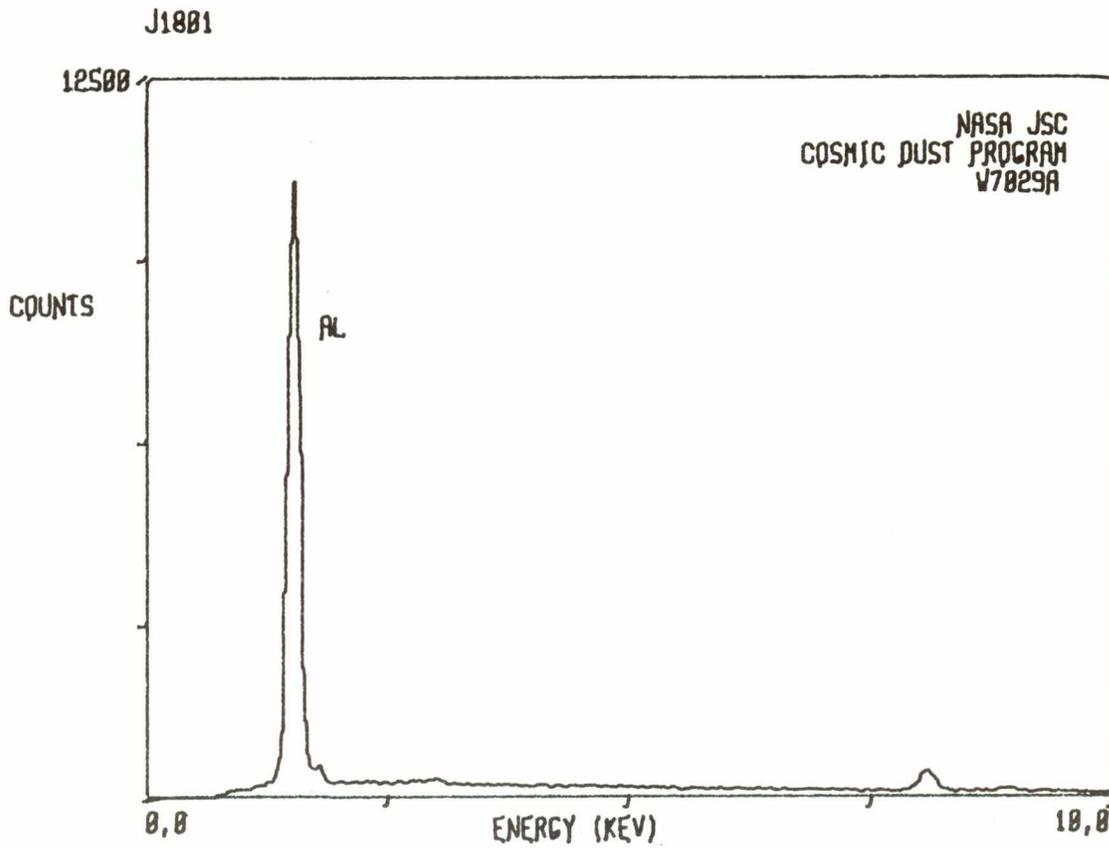


W7029A18

S-82-27548

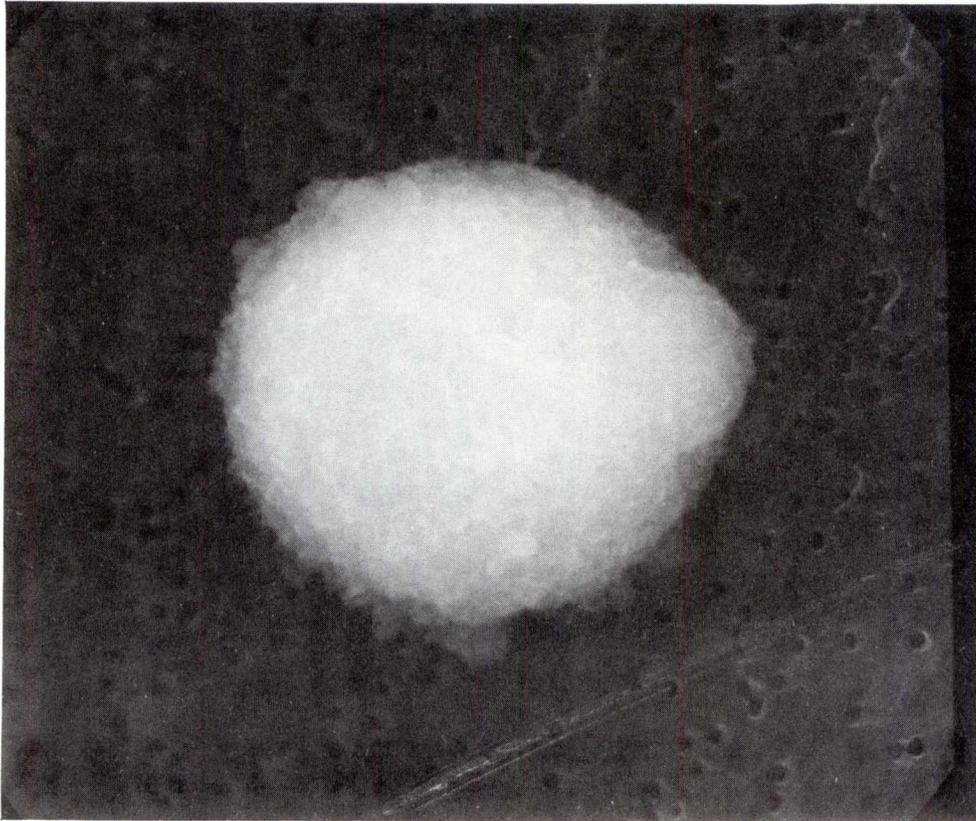


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 10x11 | S | T | CL/Pale Yellow | V | AOS | Ellipsoid |



W7029A19

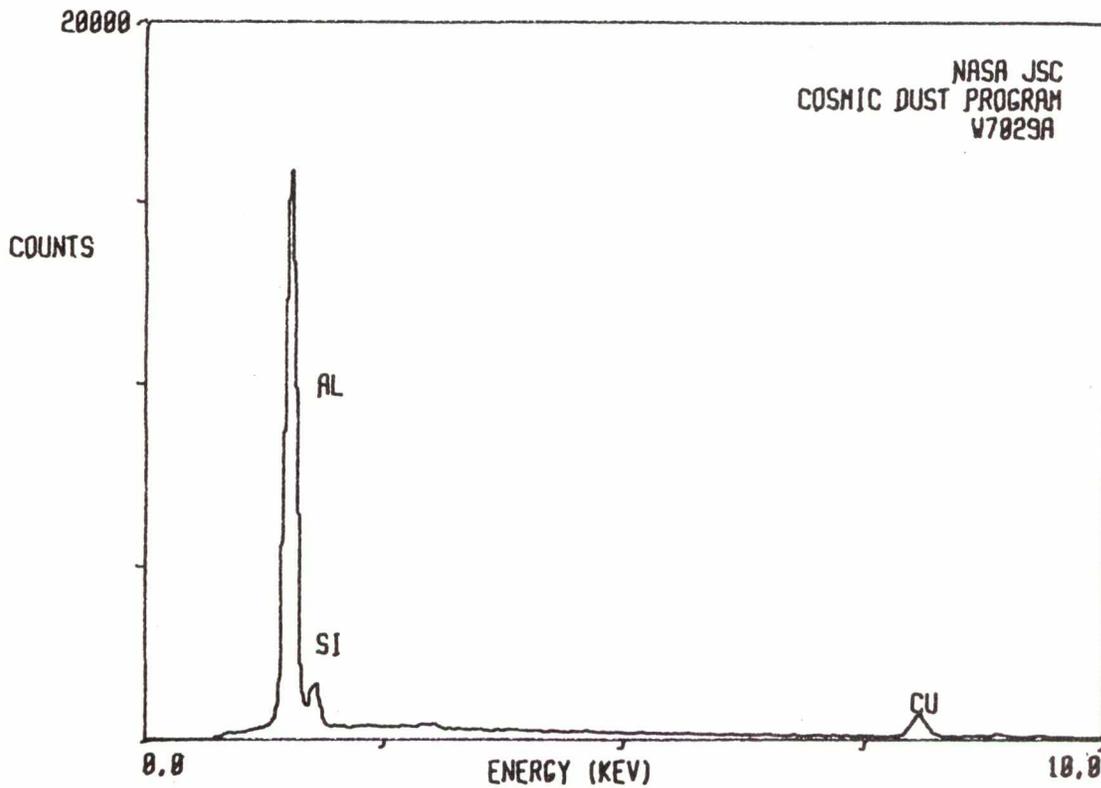
S-82-27549



| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 8 | S/E | TL | Smoky Yellow | SV | AOS | |

Al'

J1901





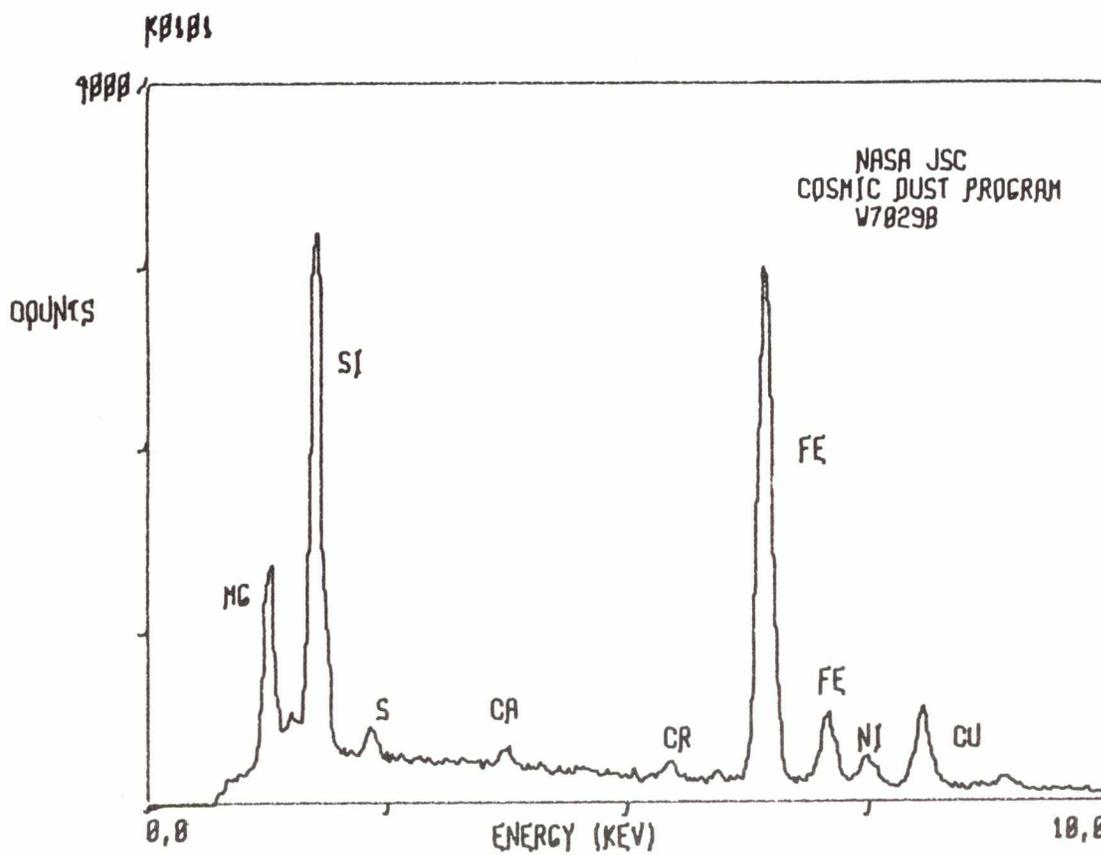
MOUNT W7029B

W7029B1

S-82-27564



| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 16x20 | I | 0 | Dk. Brown-gray | D/SM | C | |

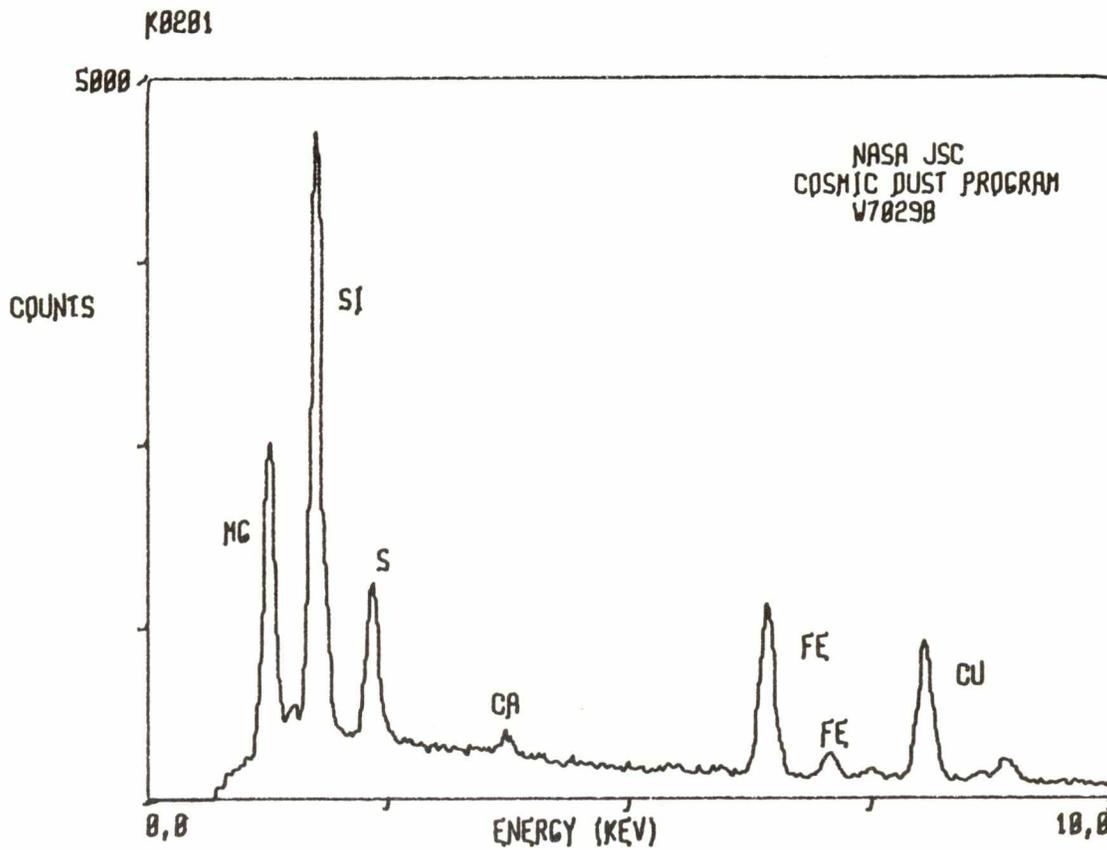


W7029B2

S-82-27563



| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|---------------|---------------|-------------|-----------------|
| 10 | E | O | Gray to Black | D/SM | C | |

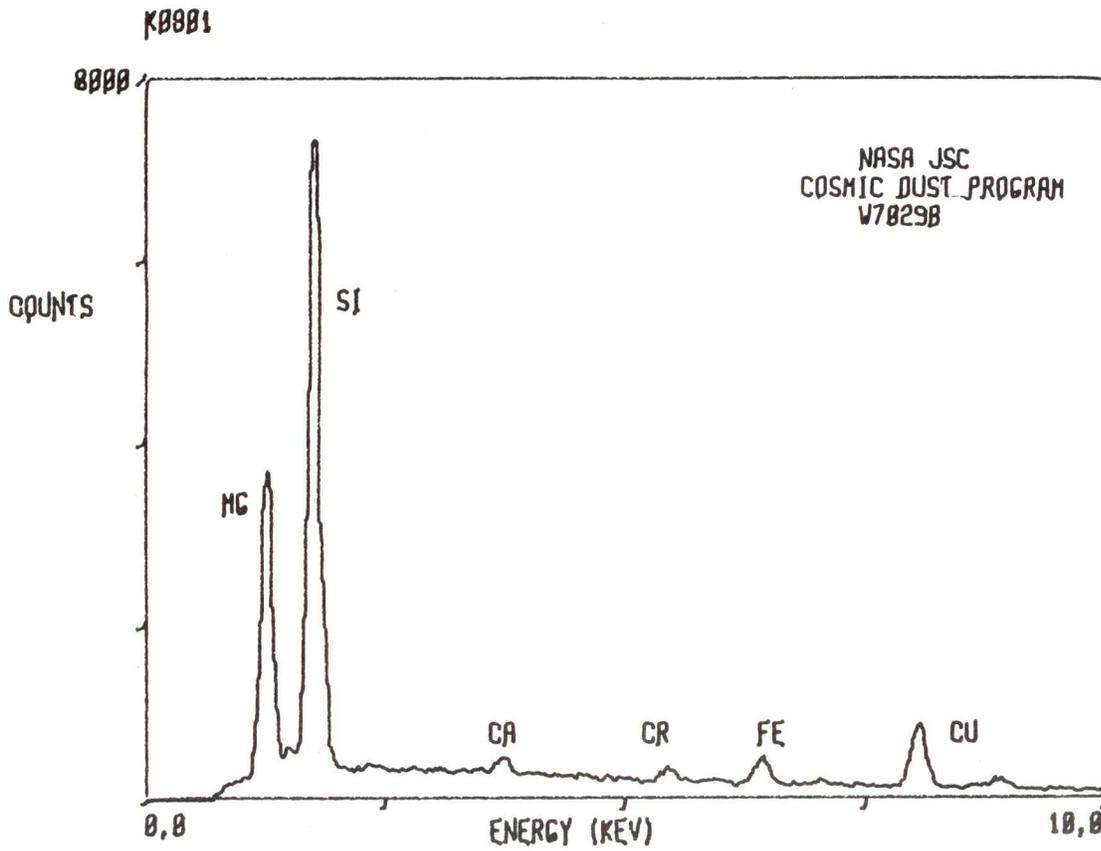


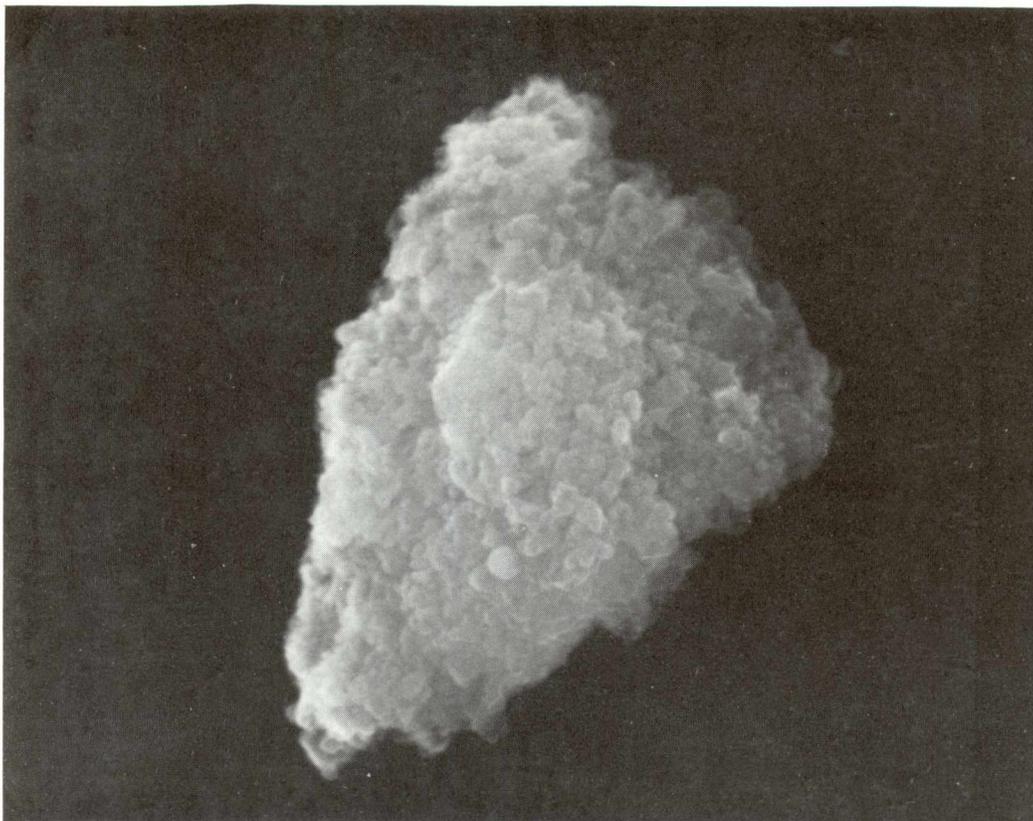
W7029B3

S-82-27565

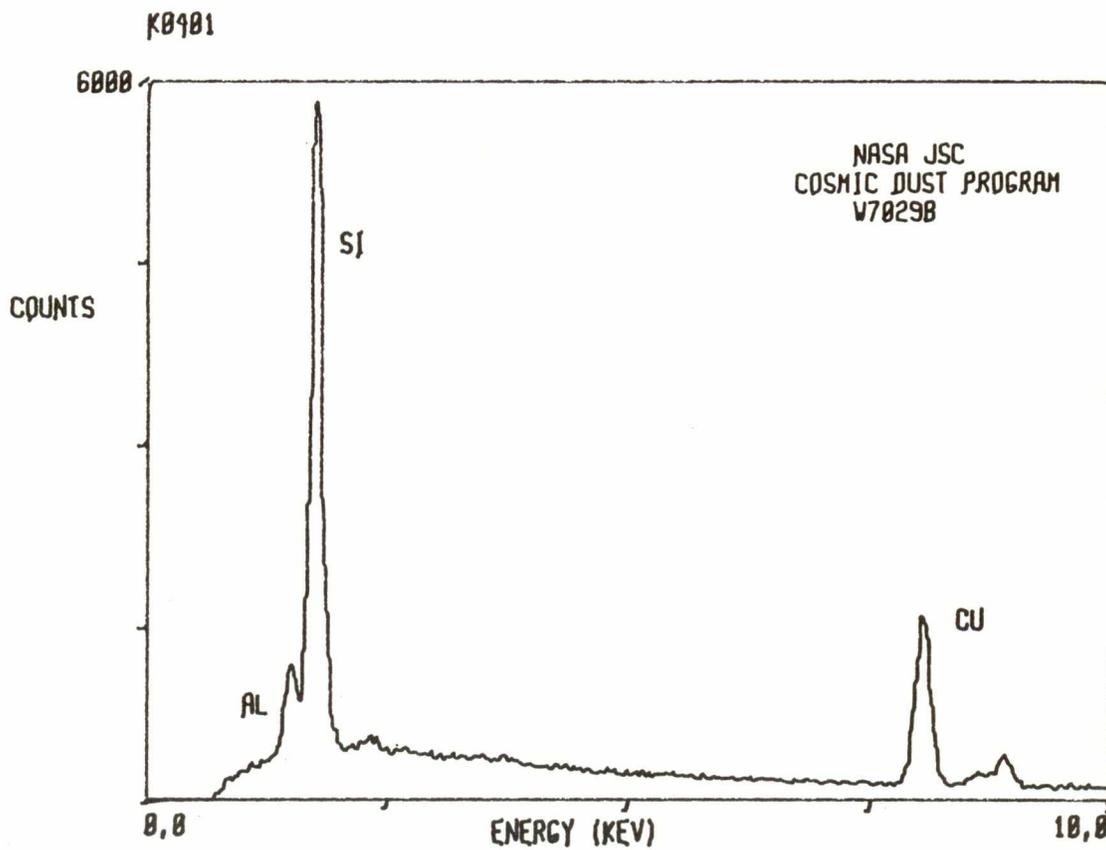


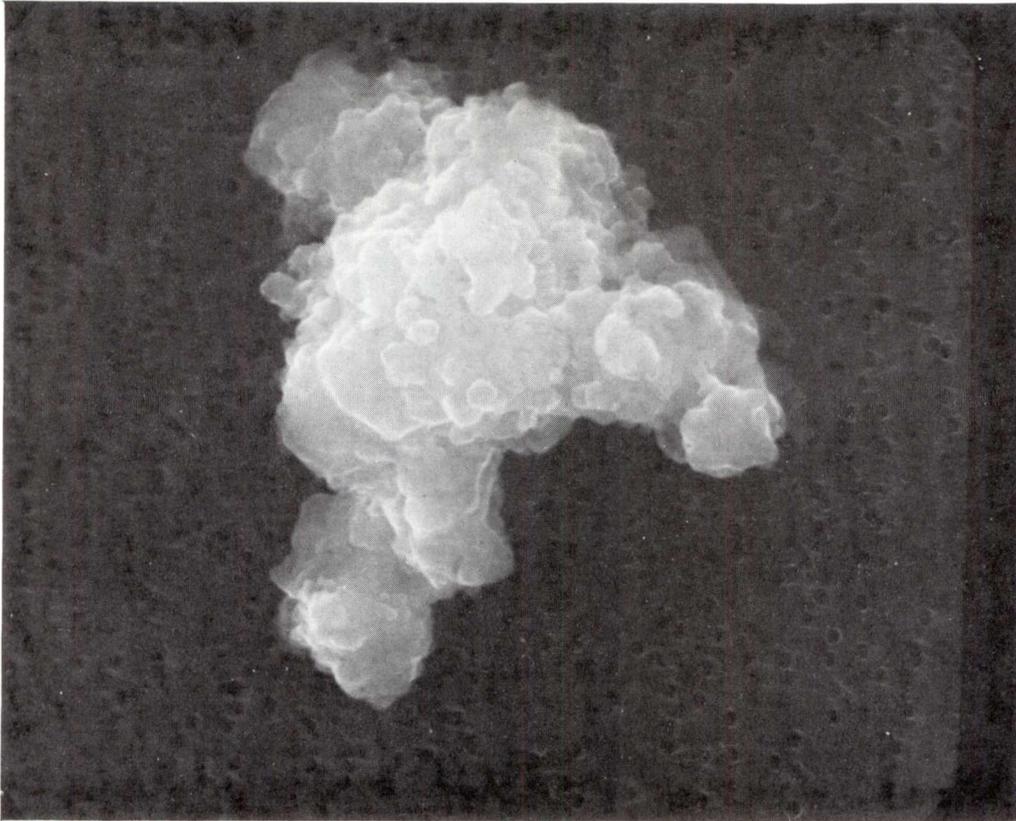
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|-------------------|---------------|-------------|-----------------|
| 14x18 | I | TL | Pale Yellow-brown | SV | C? | |



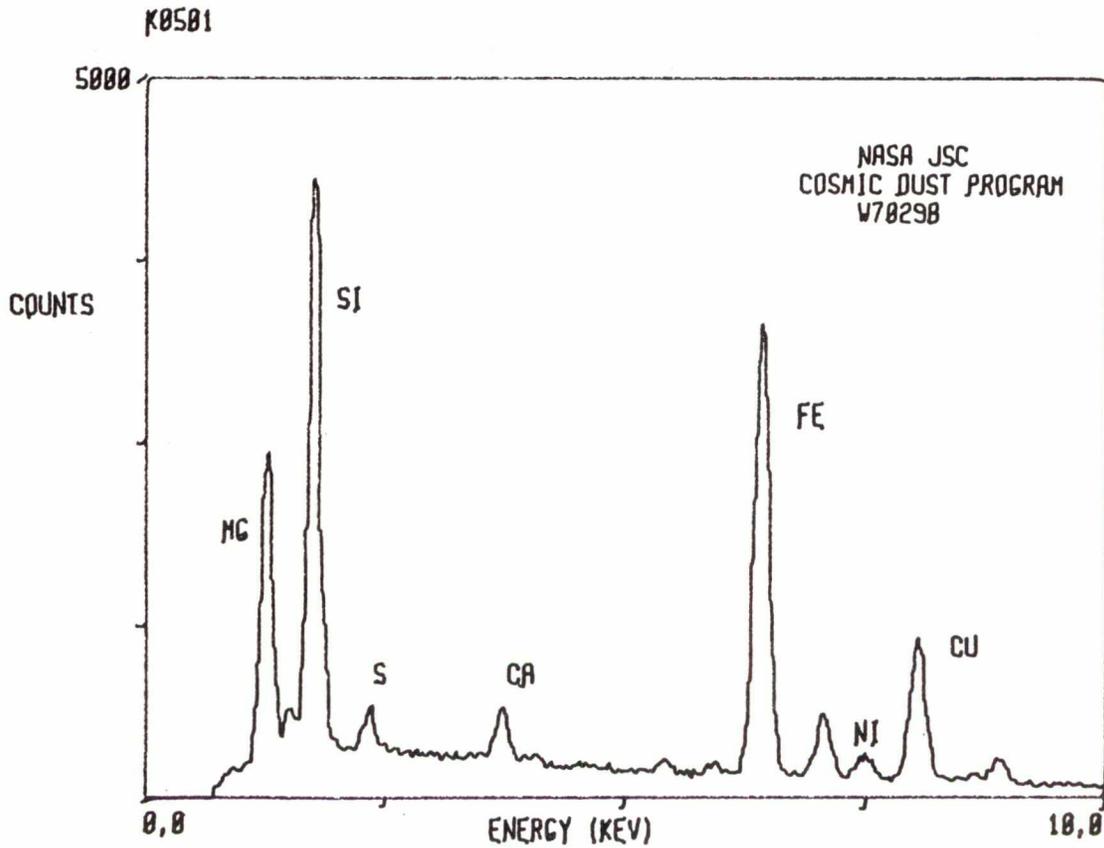


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 15x22 | I | 0 | Dk. Brown | D/SM | ? | |



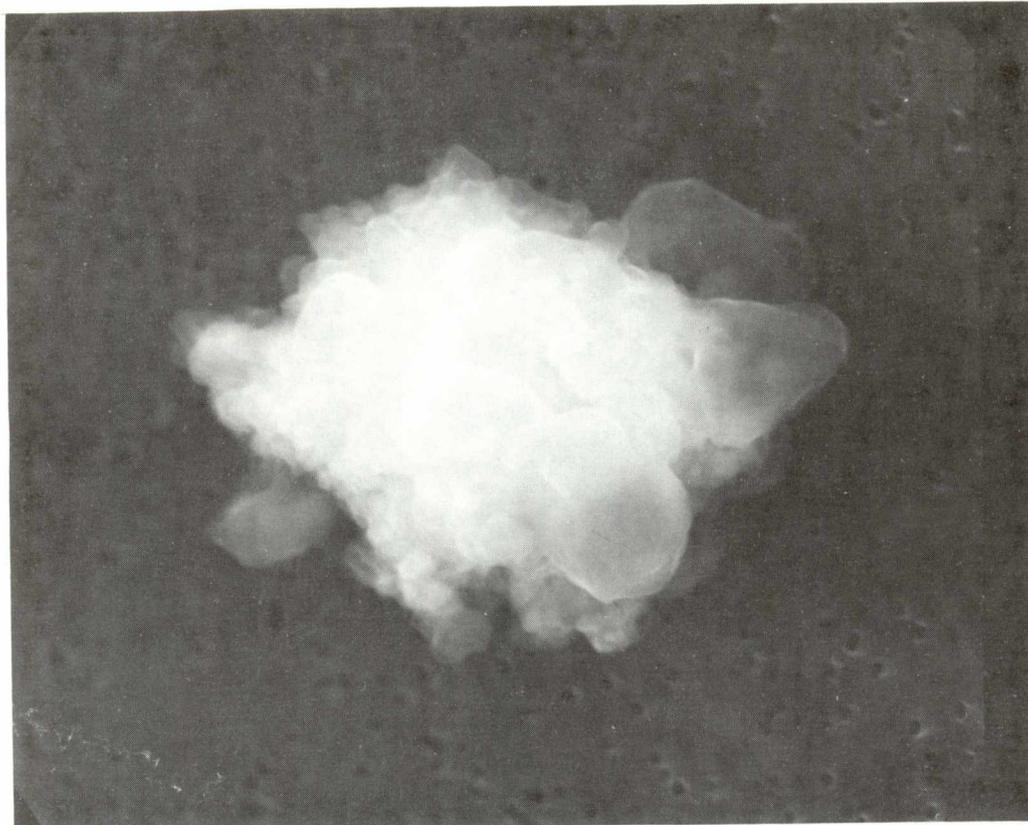


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|-------------------------|---------------|-------------|-----------------|
| 12x12 | I | 0 | Red-brown to Steel Gray | SM/M | C | |

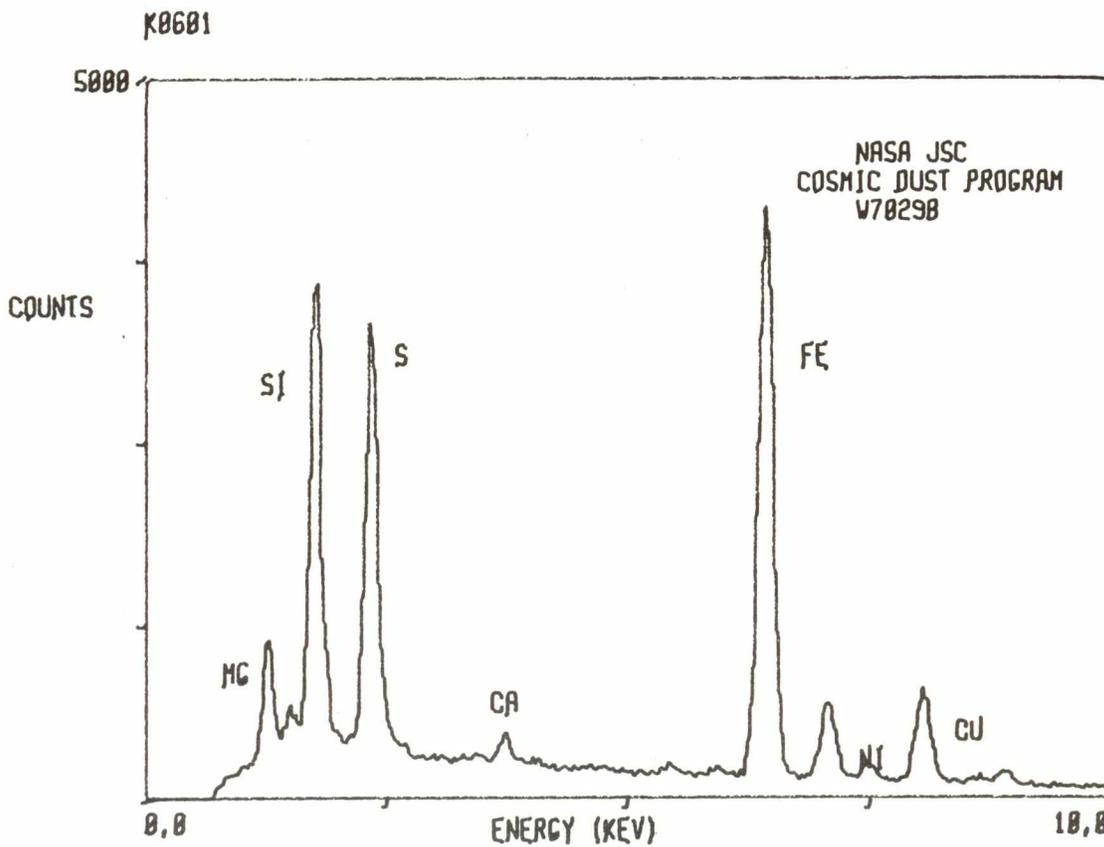


W7029B6

S-82-27568

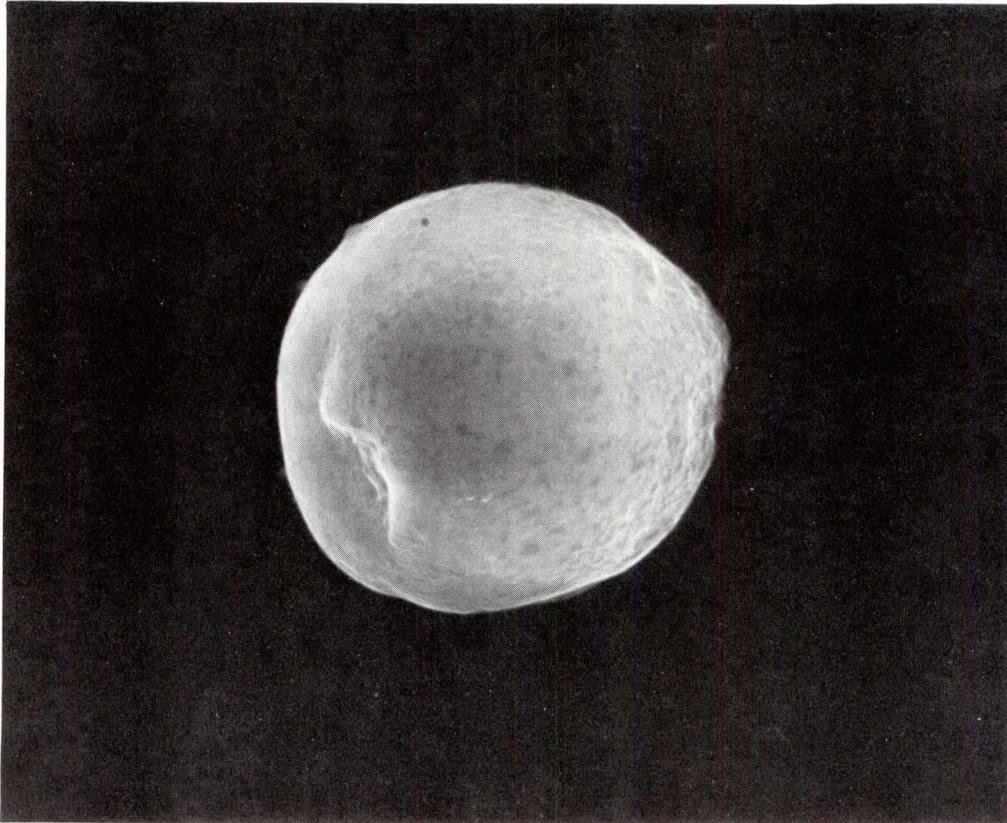


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|---------------|---------------|-------------|-----------------|
| 10x13 | I | TL/O | Gray to Black | D/SV | C | |

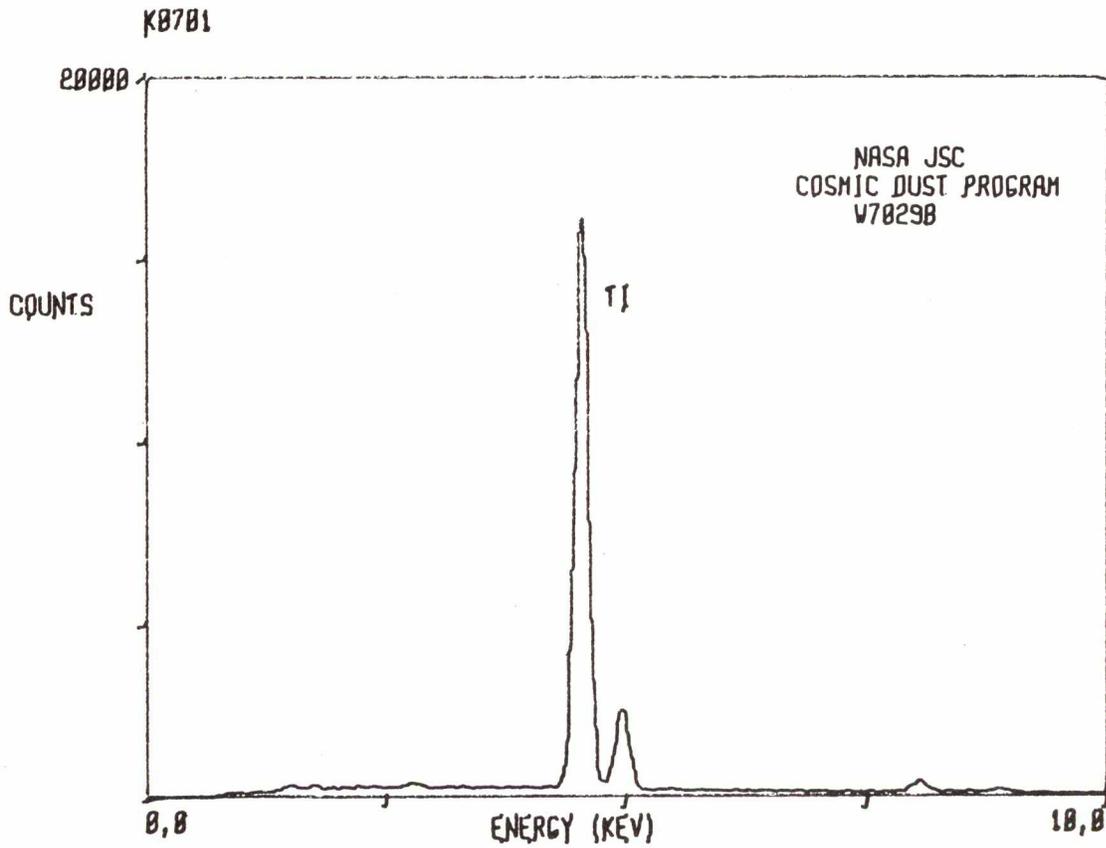


W7029B7

S-82-27569

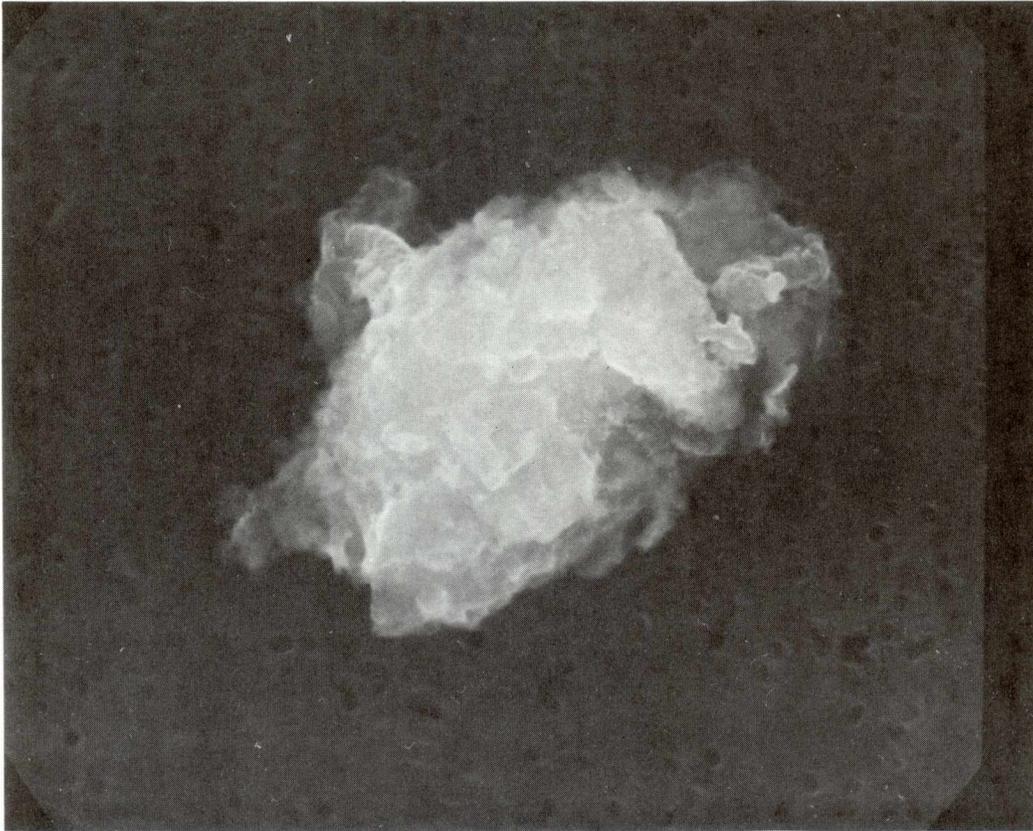


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 11 | S | 0 | Black | M | ? | |

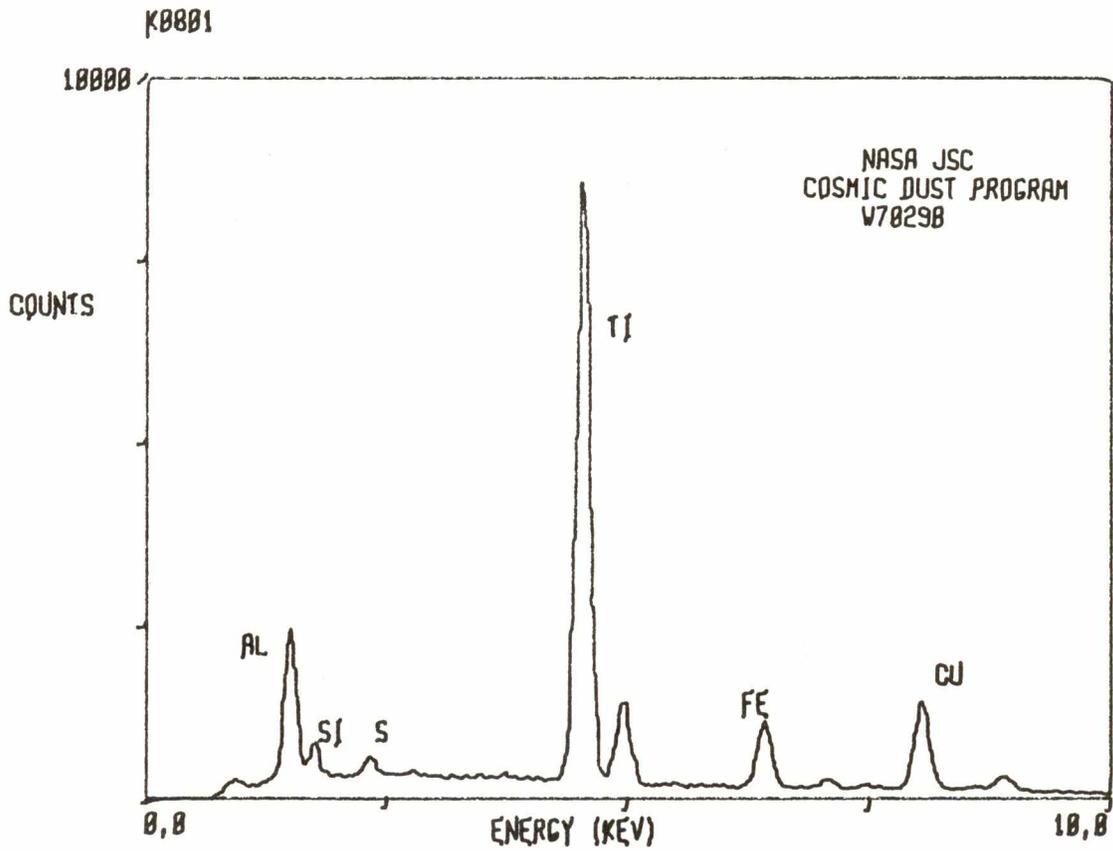


W7029B8

S-82-27570

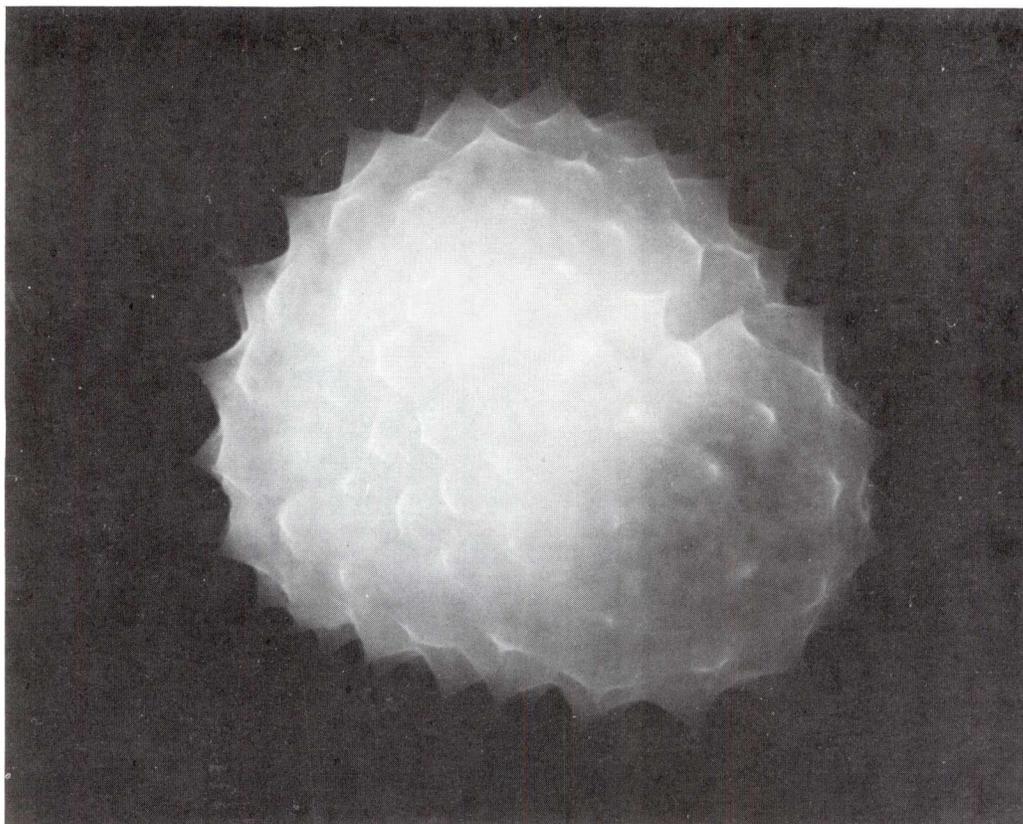


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|---------------|---------------|-------------|-----------------|
| 7x11 | I | O | Dk. Red-brown | SM | ? | |

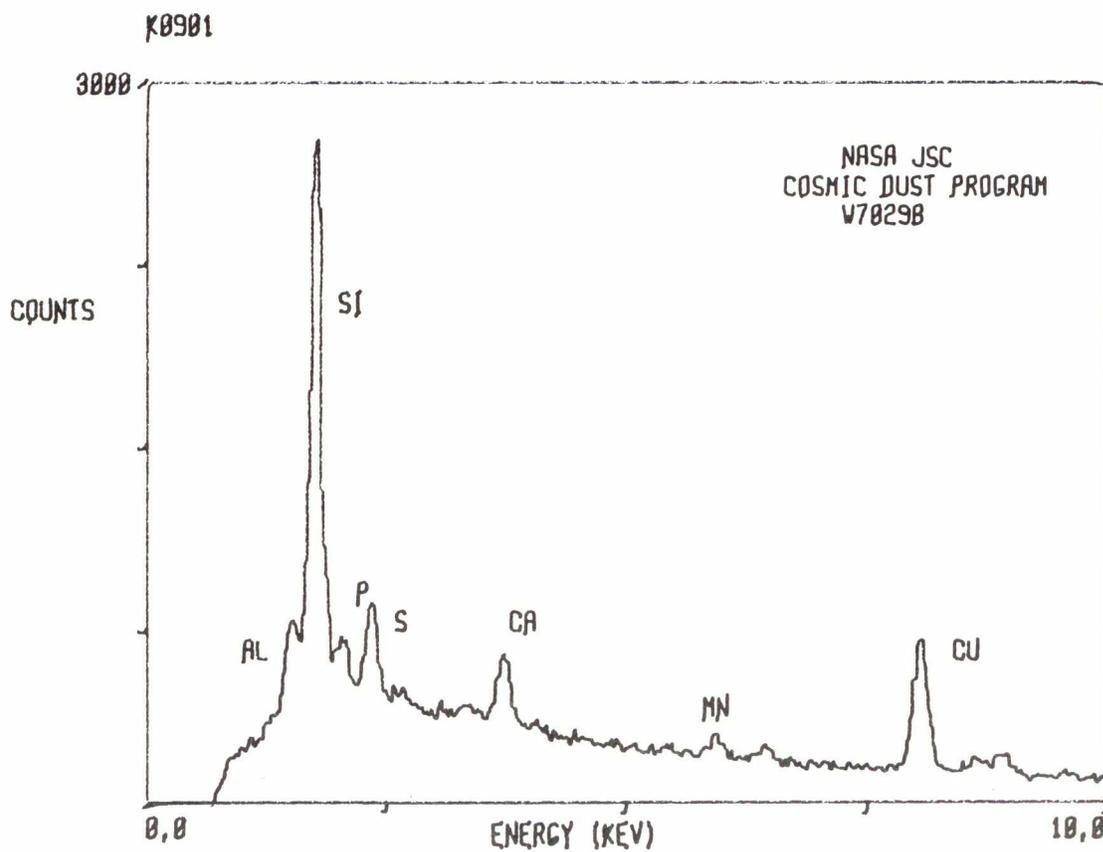


W7029B9

S-82-27571

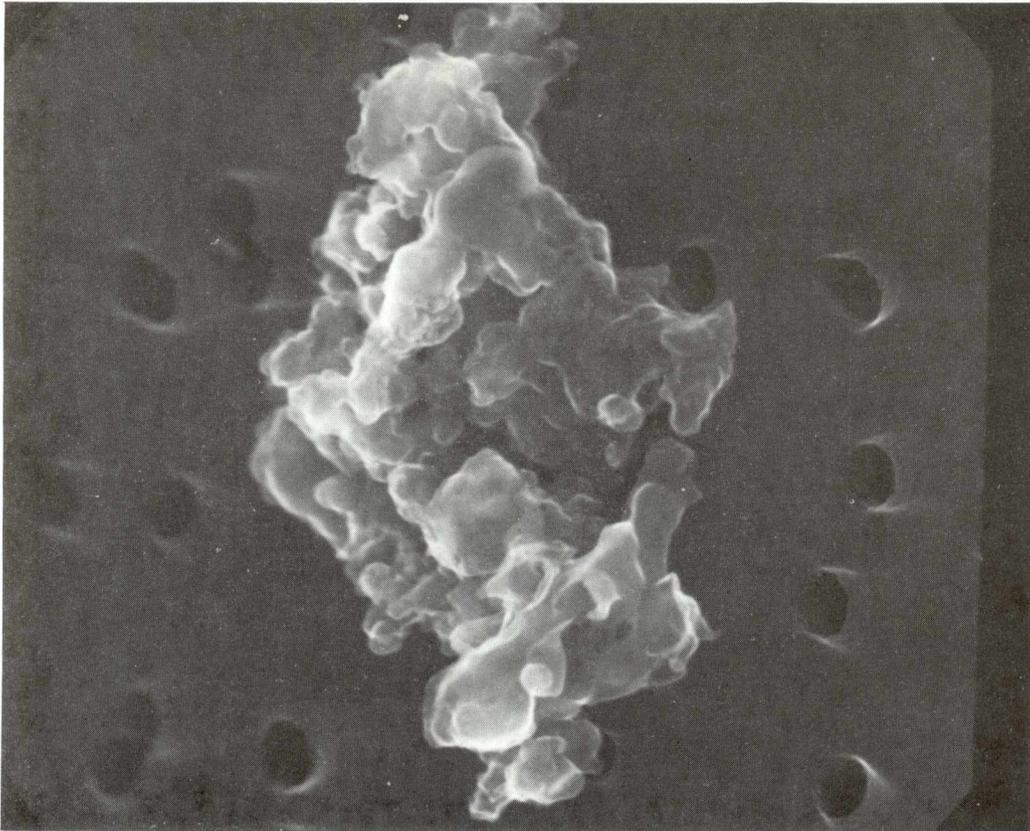


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 20x22 | E | TL | Lt. Yellow | SV | ? | |

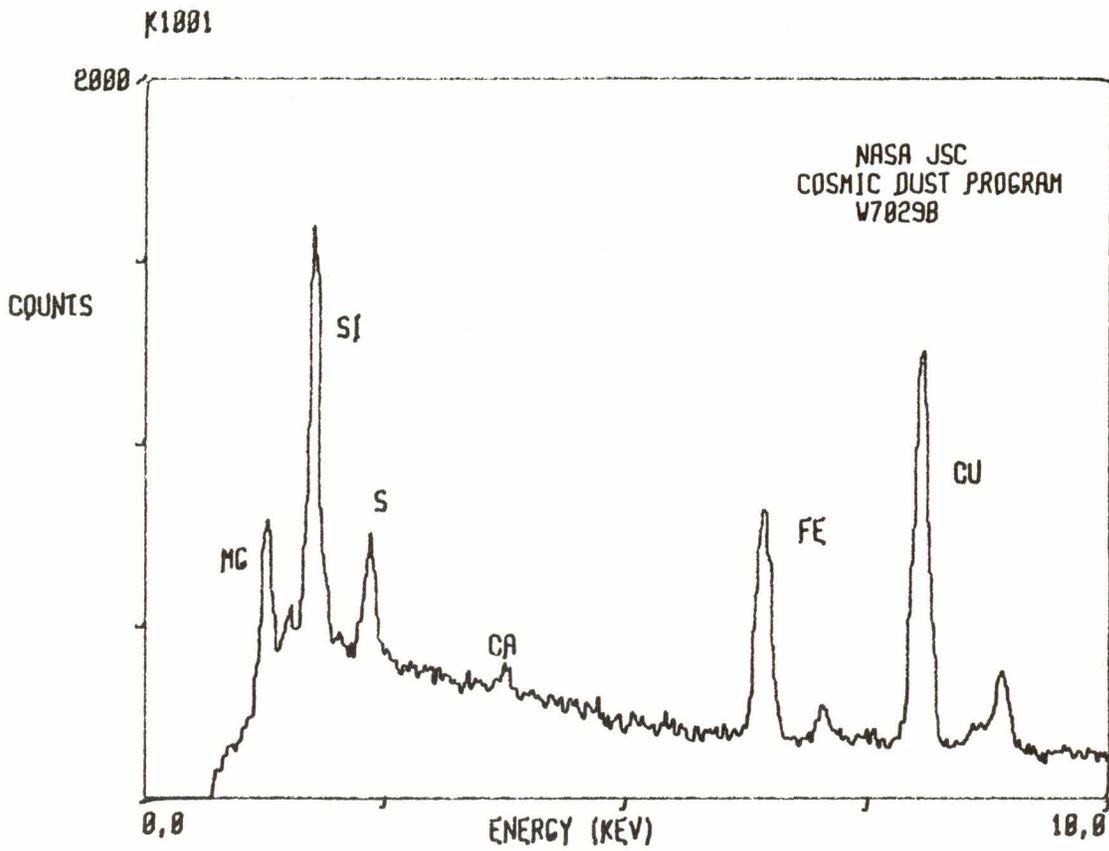


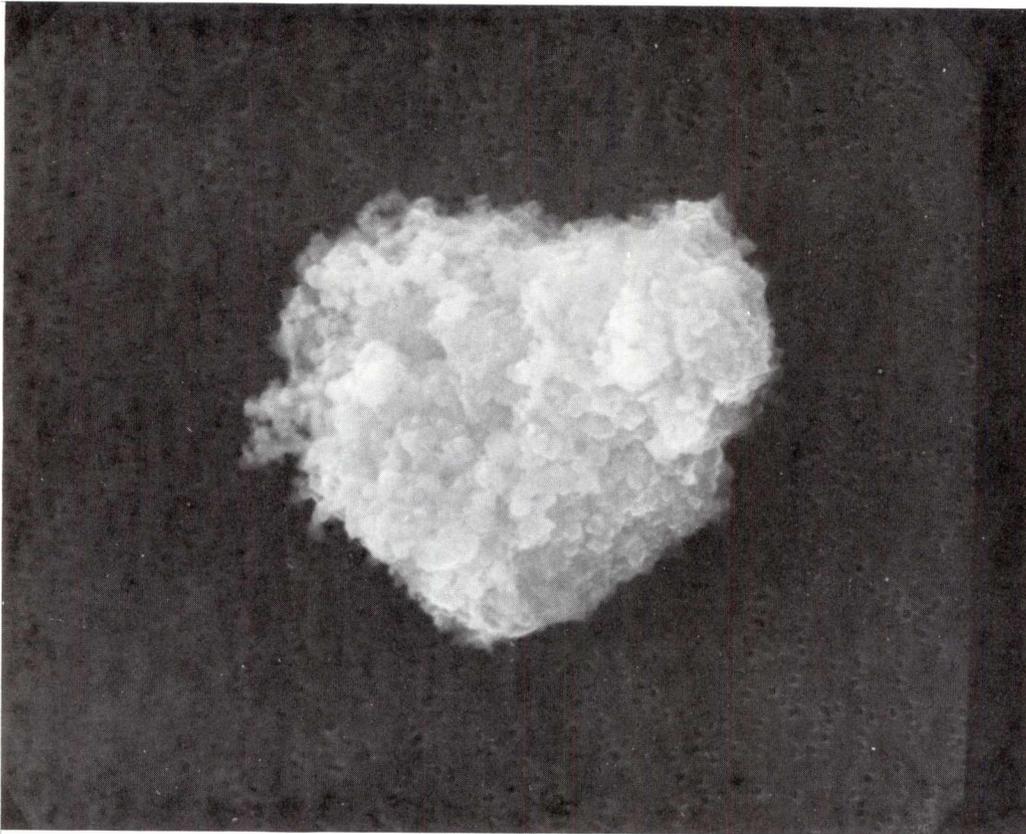
W7029B10

S-82-27572

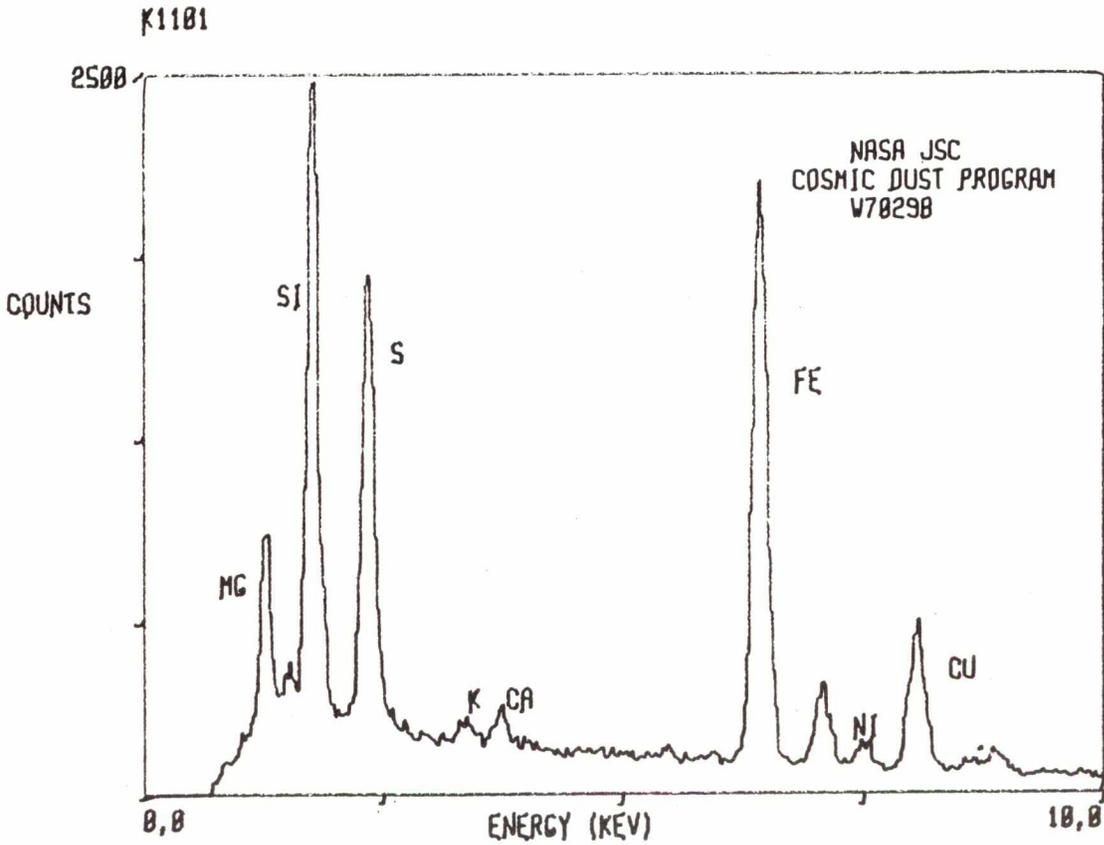


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 3x4 | I | TL | Yellow | SV/V | C? | |



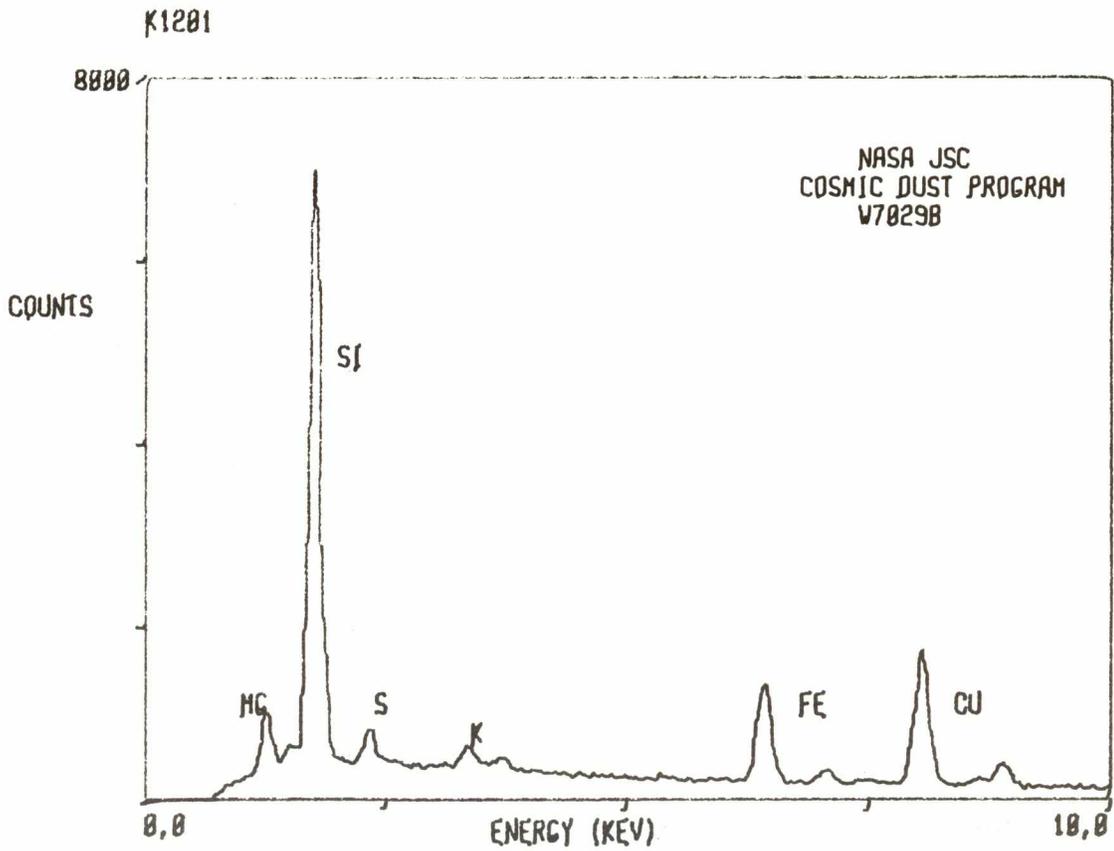


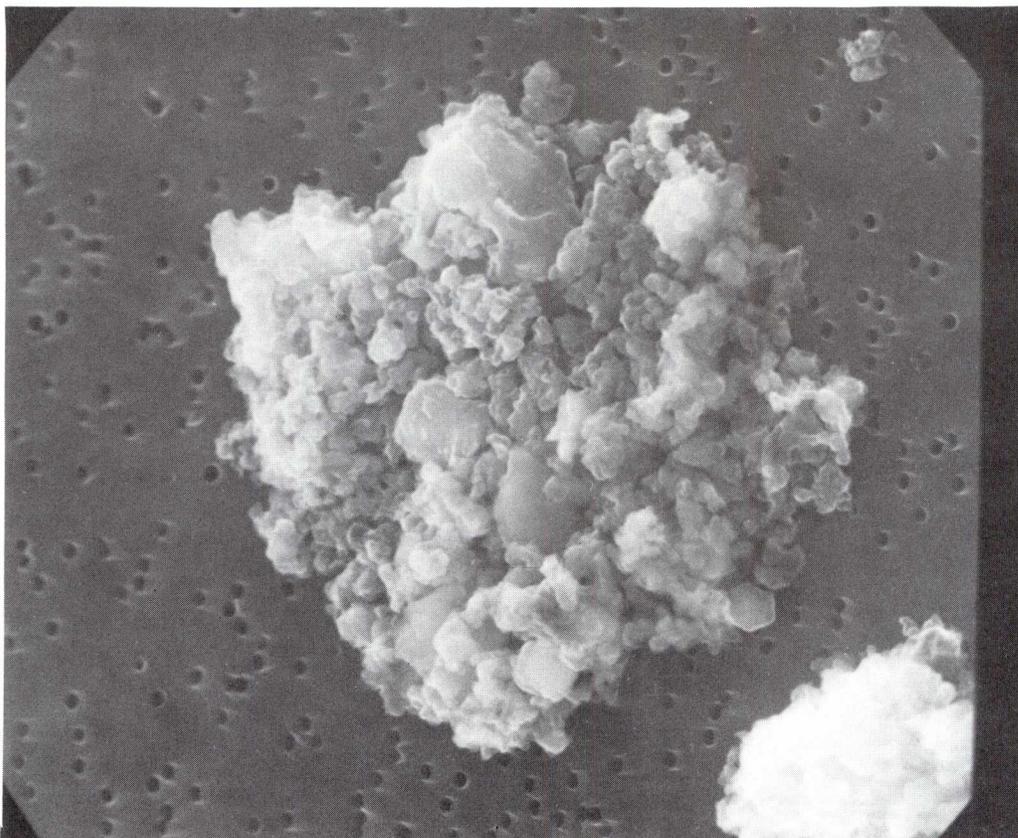
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|---------------|---------------|-------------|-----------------|
| 14x17 | I | 0 | Gray to Black | SV | C? | |



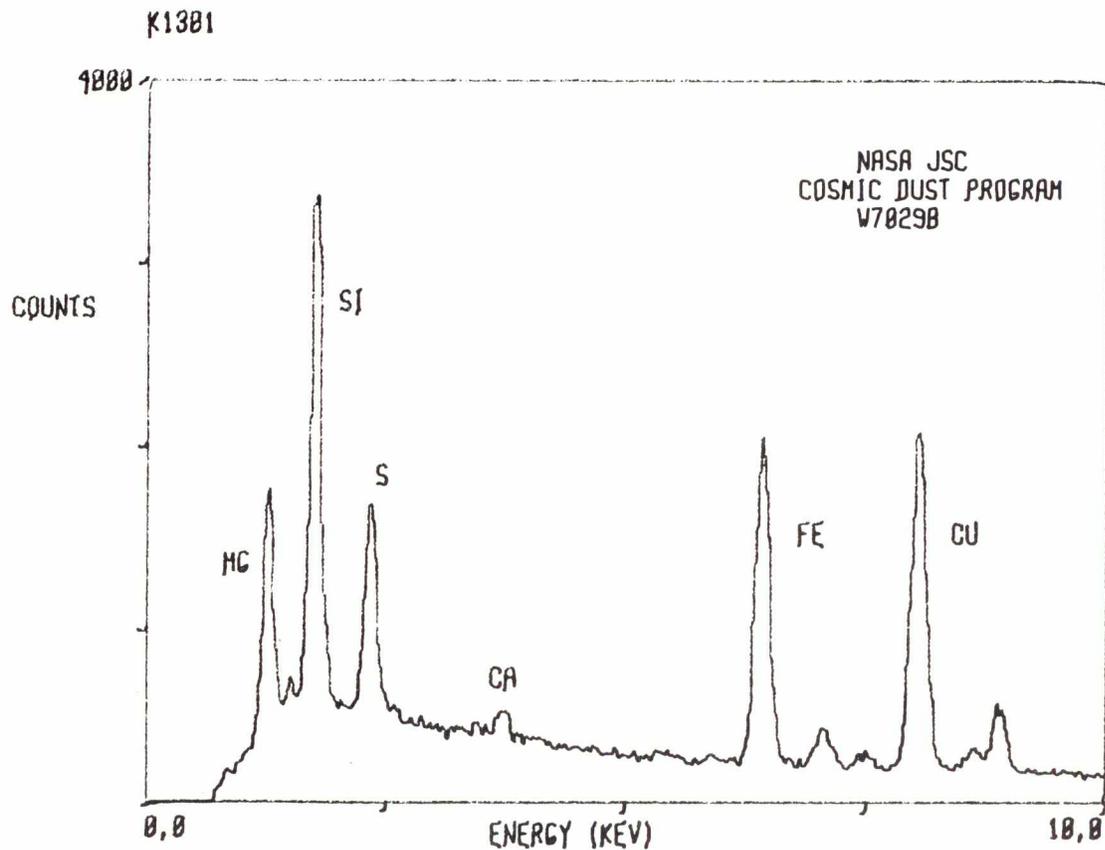


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|------------------------------|
| 7x11 | I | 0 | Black | D/SV | C? | Probably related to W7029B13 |



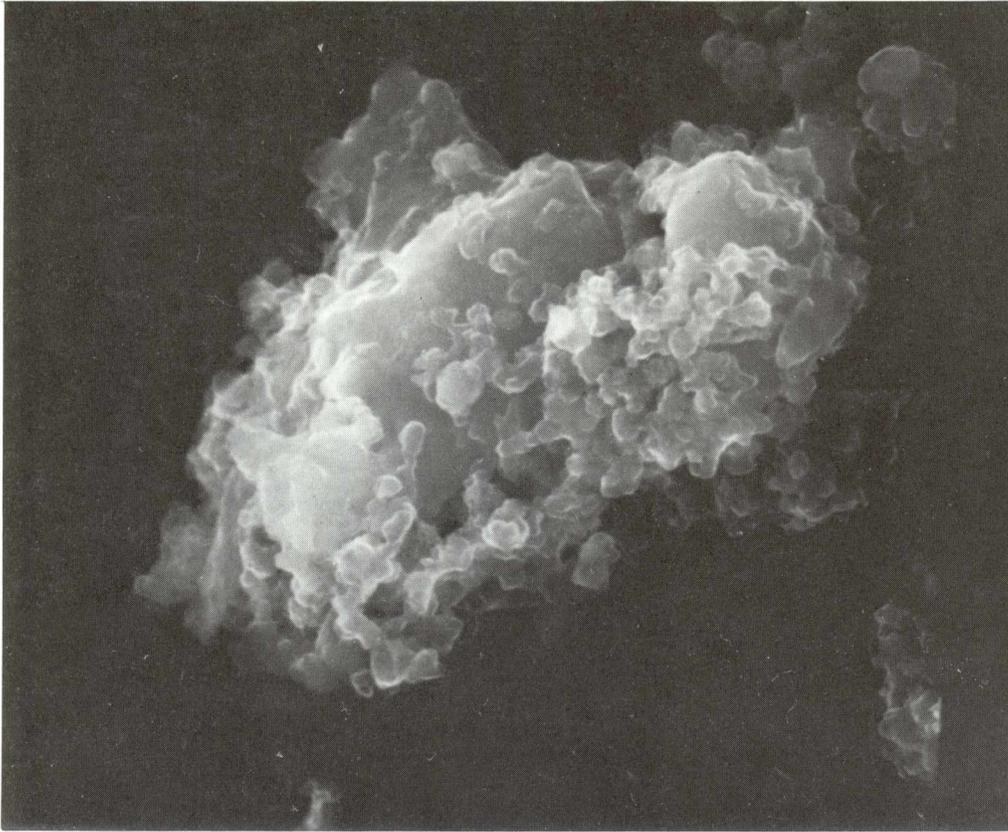


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|--|
| 13x14 | I | O | Black | D/SV | C | Fragment of large (60 micron) friable particle |

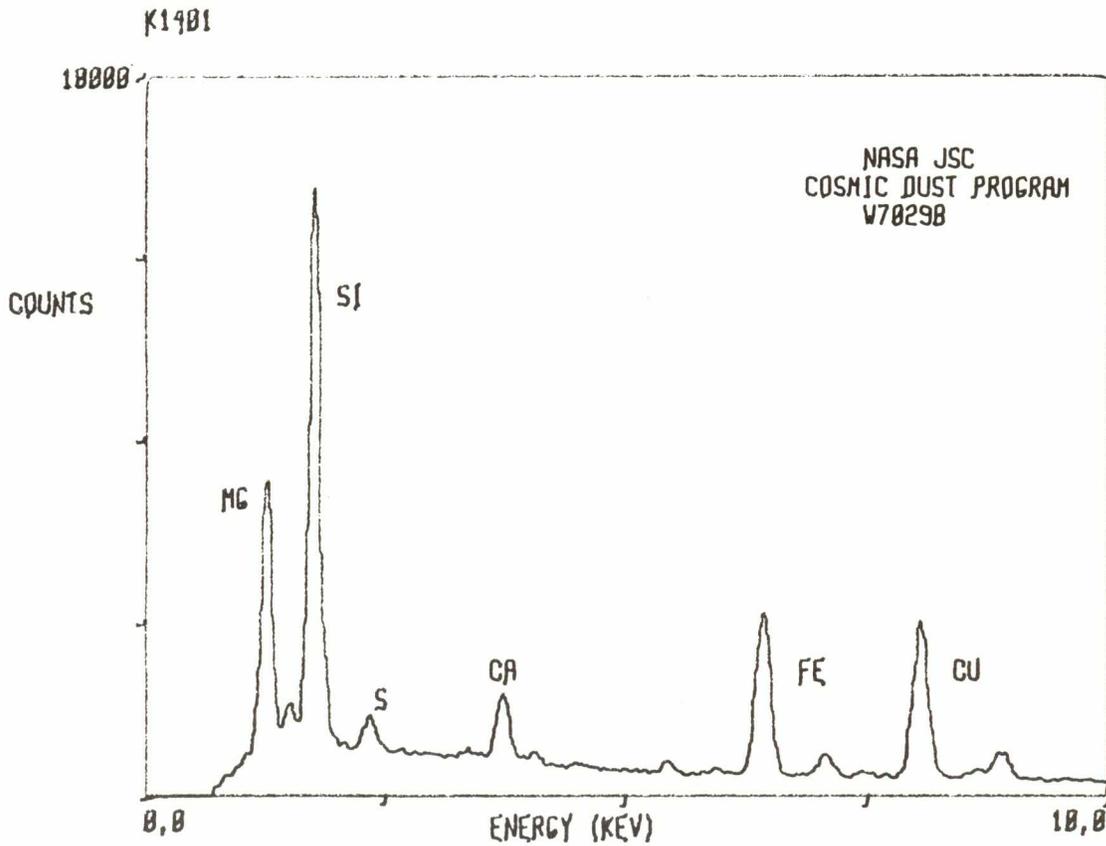


W7029B14

S-82-27576

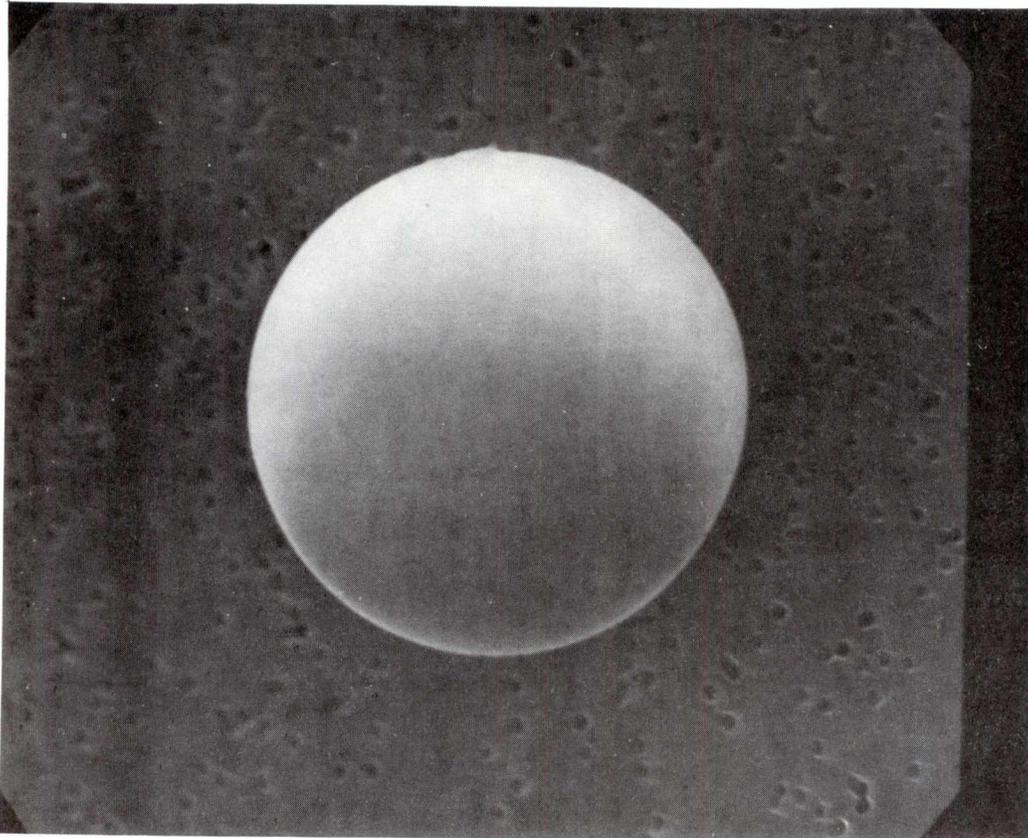


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 7x12 | I | TL | Gray-Green | D/SV | C | |

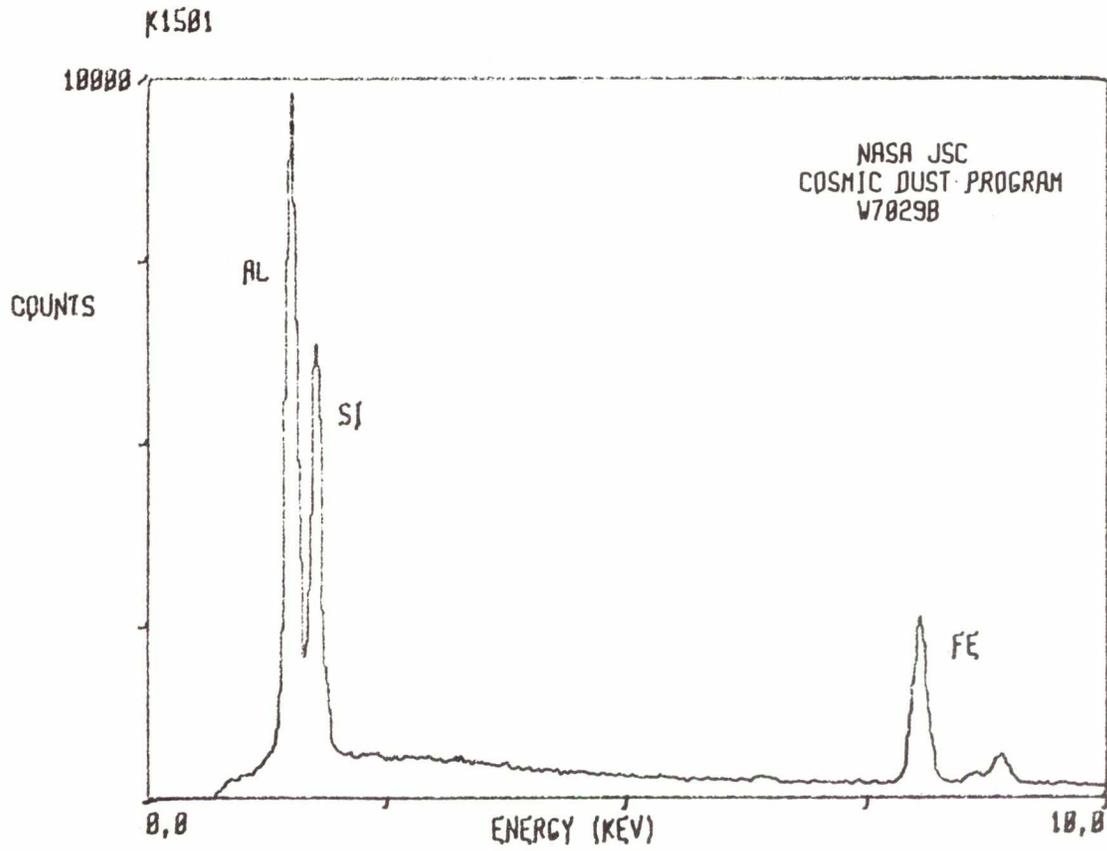


W7029B15

S-82-27577

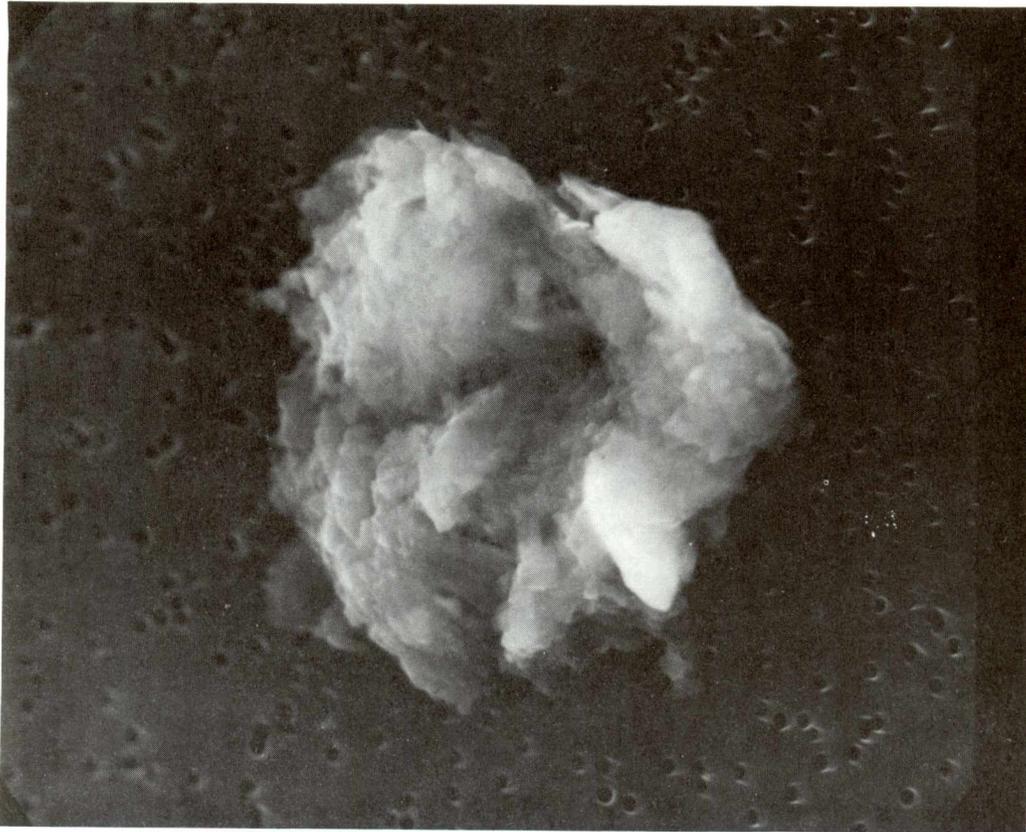


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 10 | S | T | CL/Pale Yellow | V | ? | |

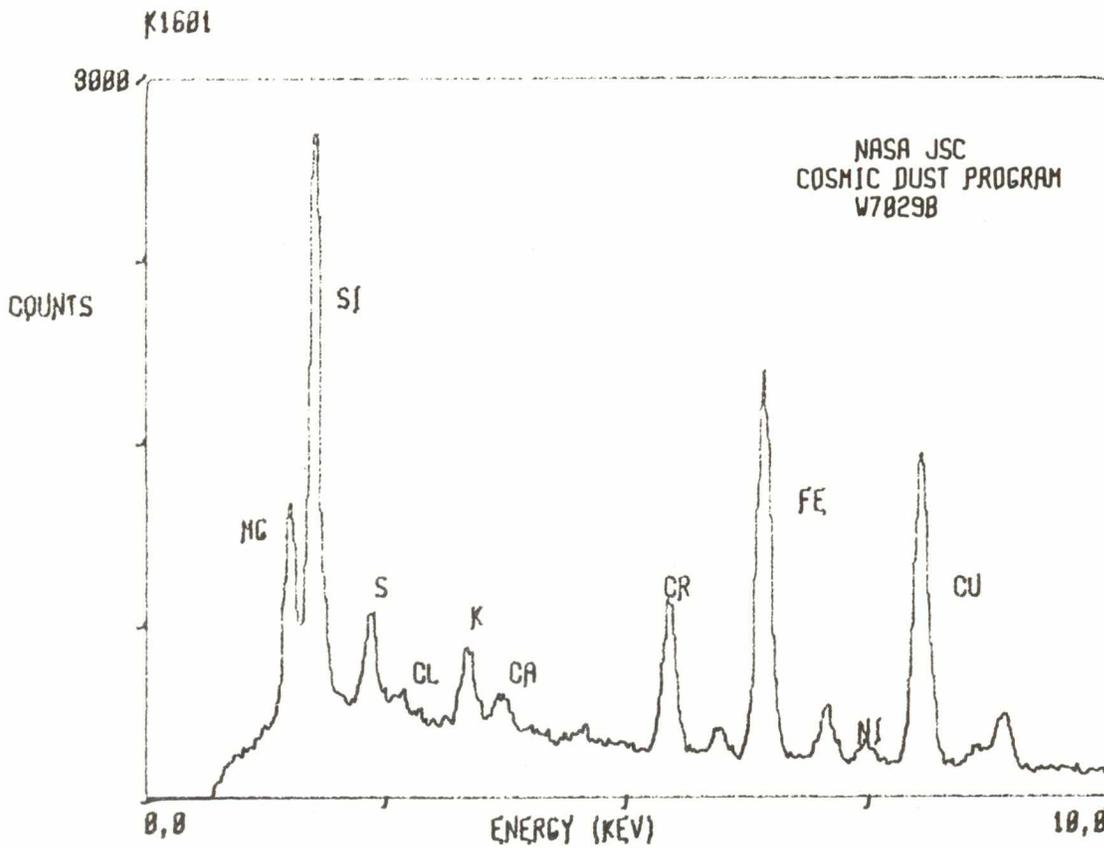


W7029B16

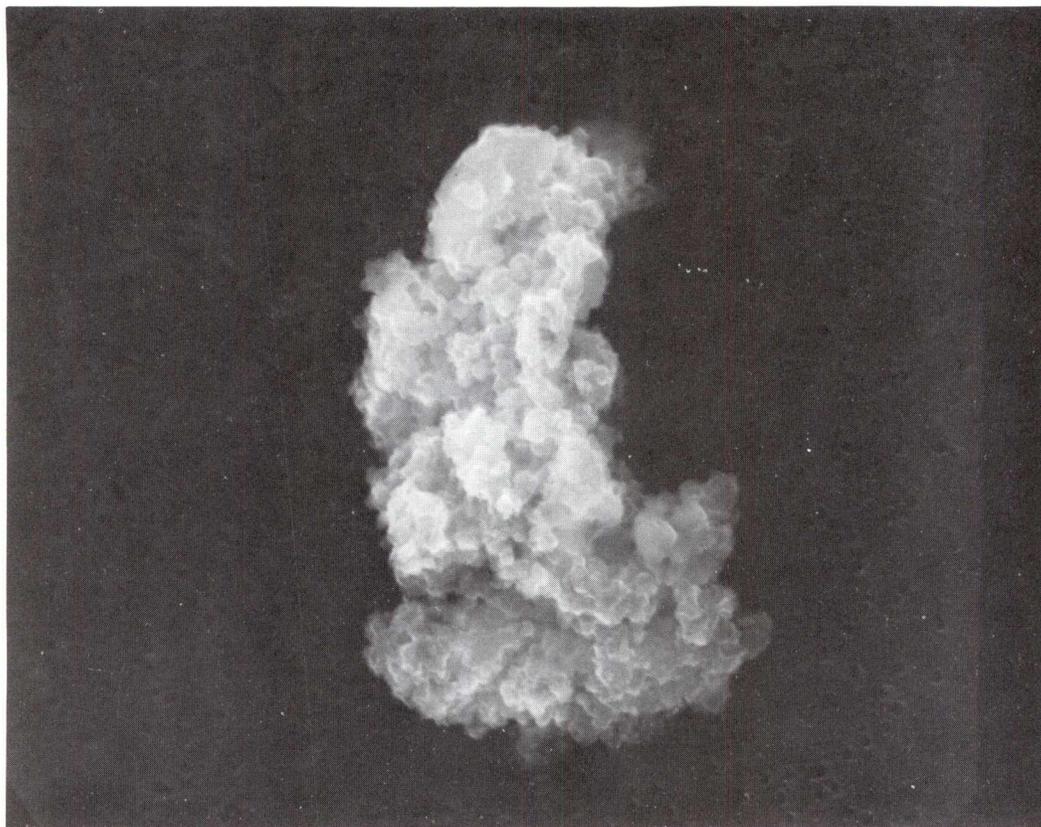
S-82-27578



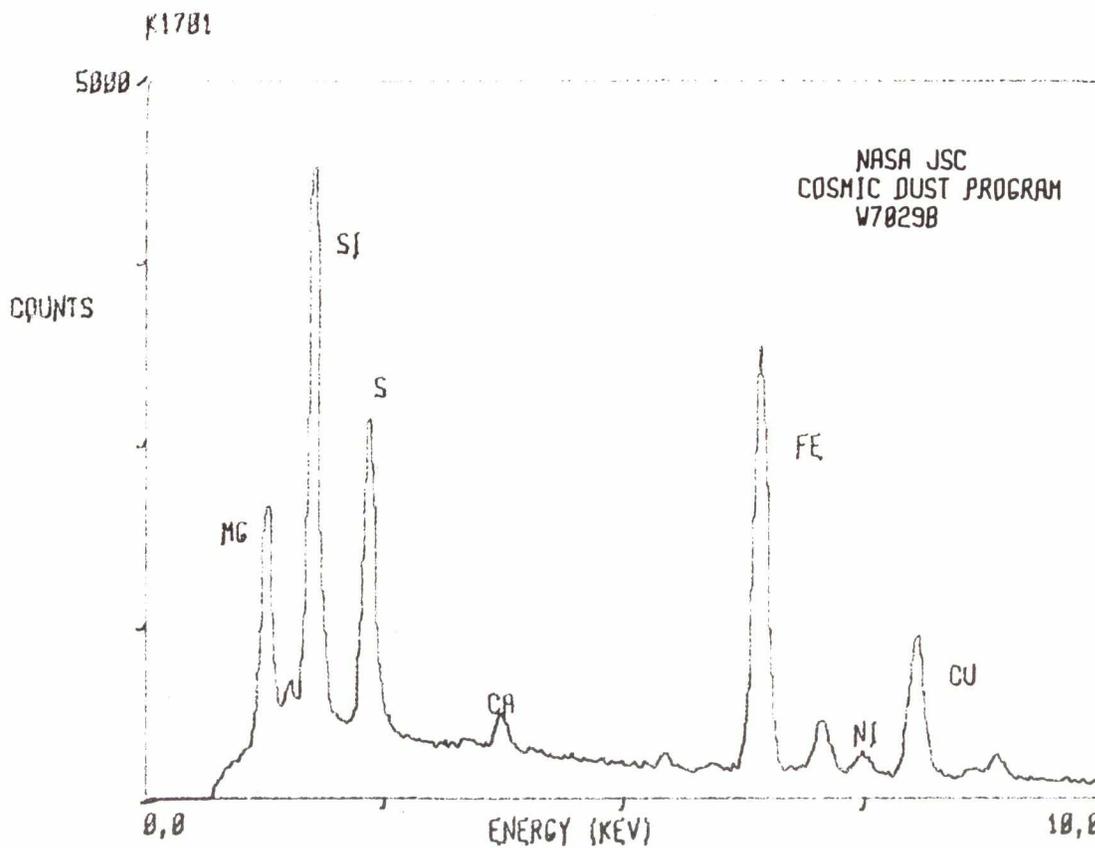
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 10x11 | I | O/TL | Red-gray | SV | ? | |



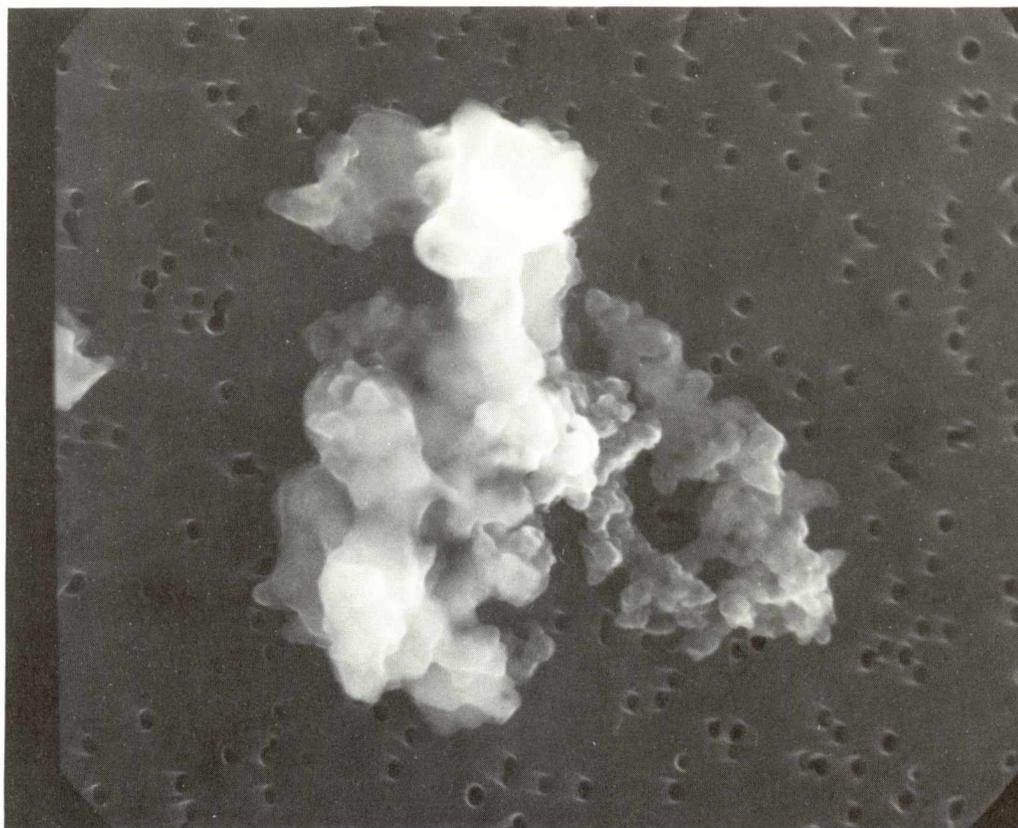
W7029B17



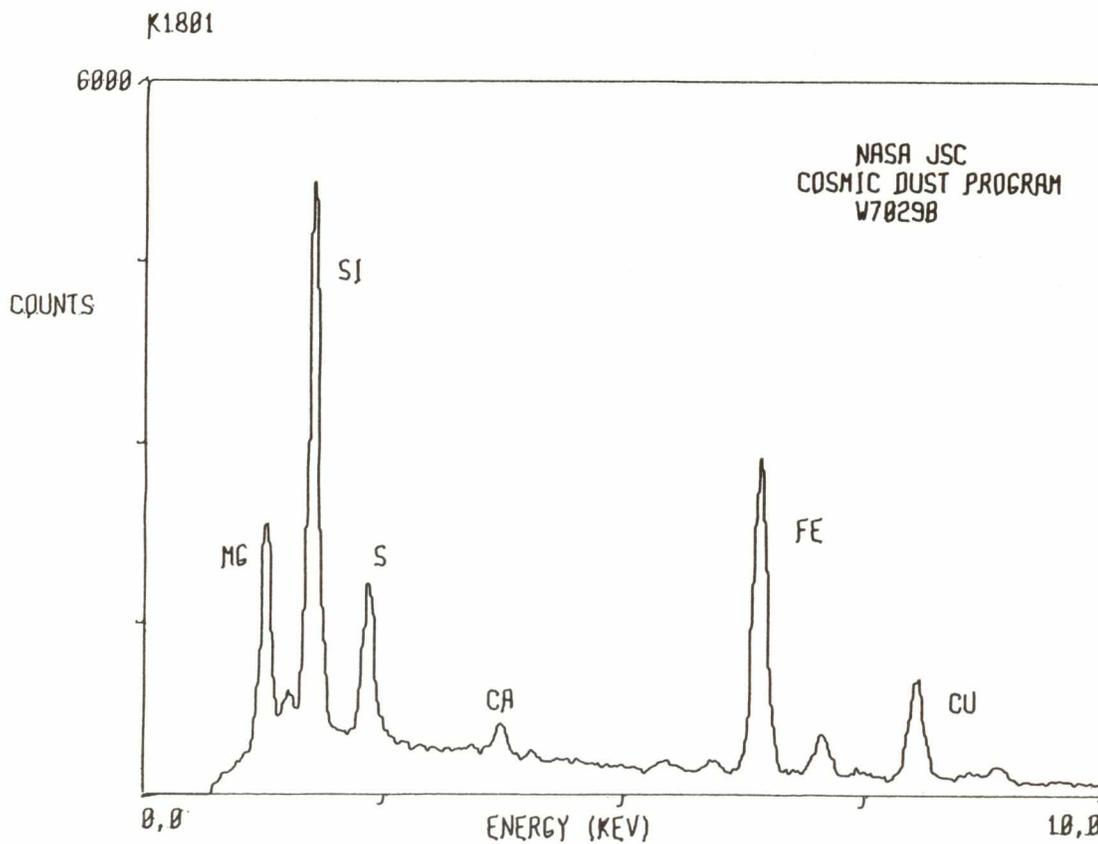
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 10x16 | I | 0 | Dk. Gray-black | D/SV | C | |



W7029B18

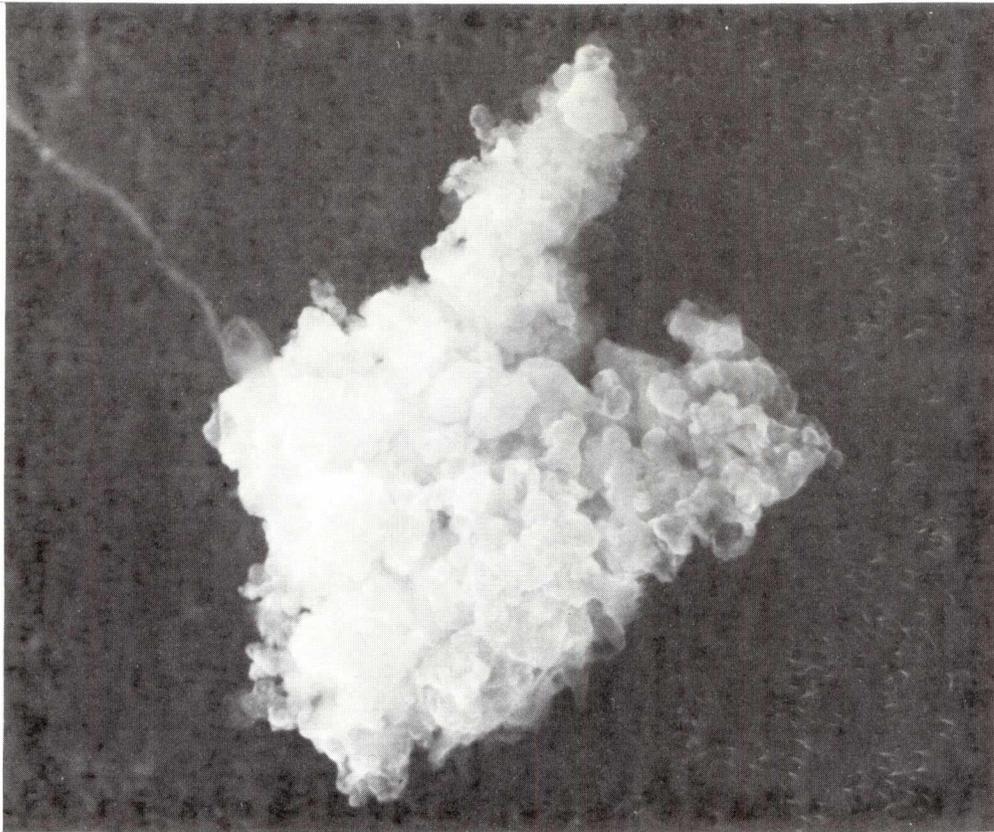


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------------------------|
| 9x10 | I | O/TL | Gray-black | SV | C | May be composite of two particles |



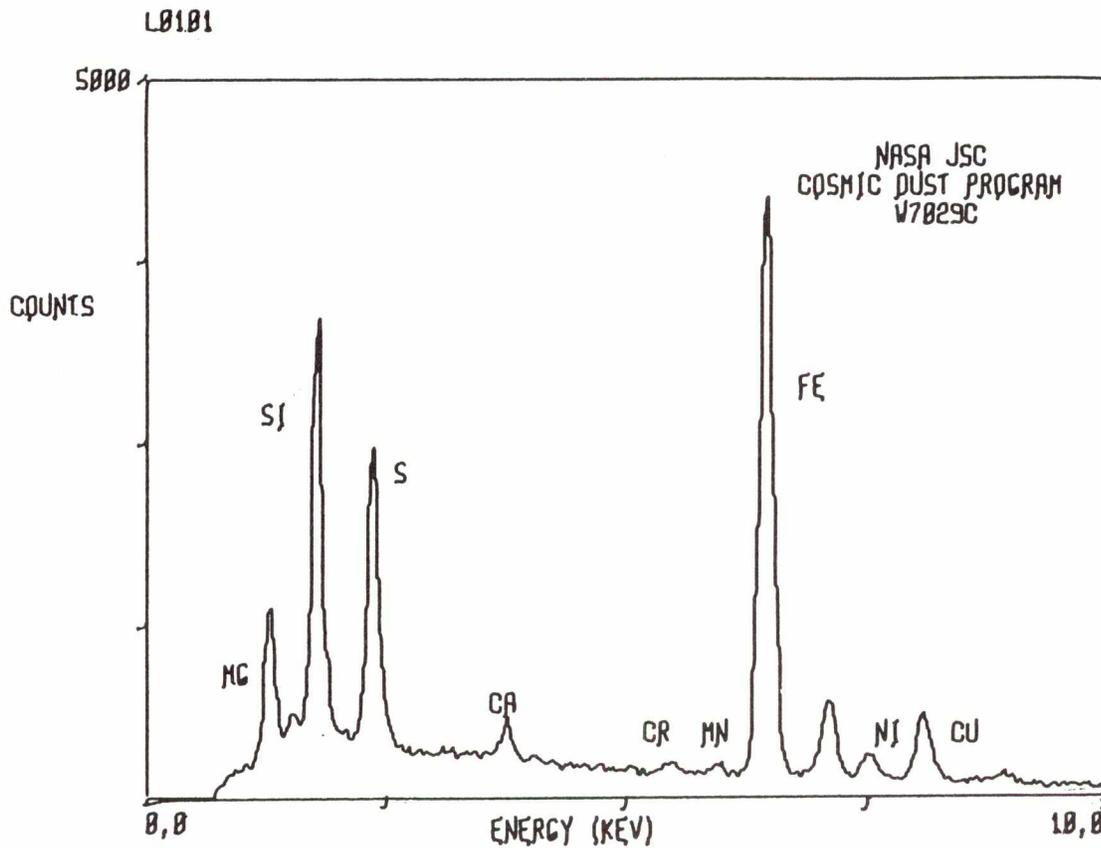
MOUNT W7029C

W7029C1



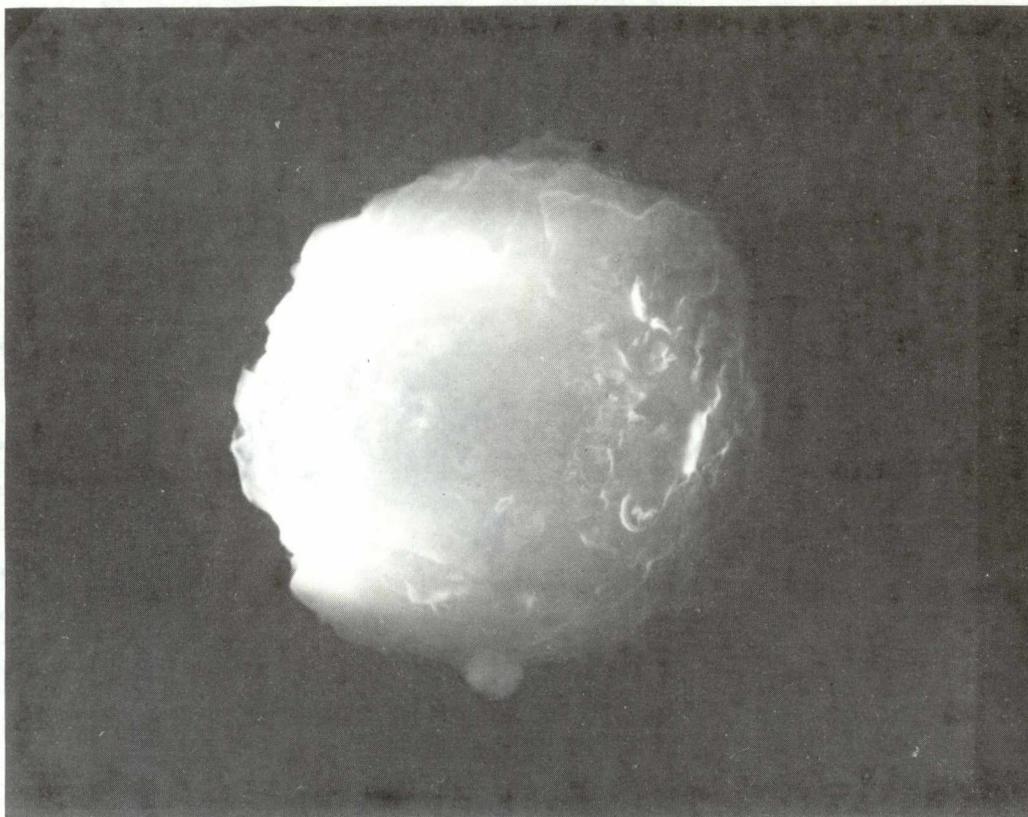
582-27592

| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|--|
| 12x15 | I | 0 | Dk. Gray-black | D/SM | C | Fragment of large (100 micron) cluster |

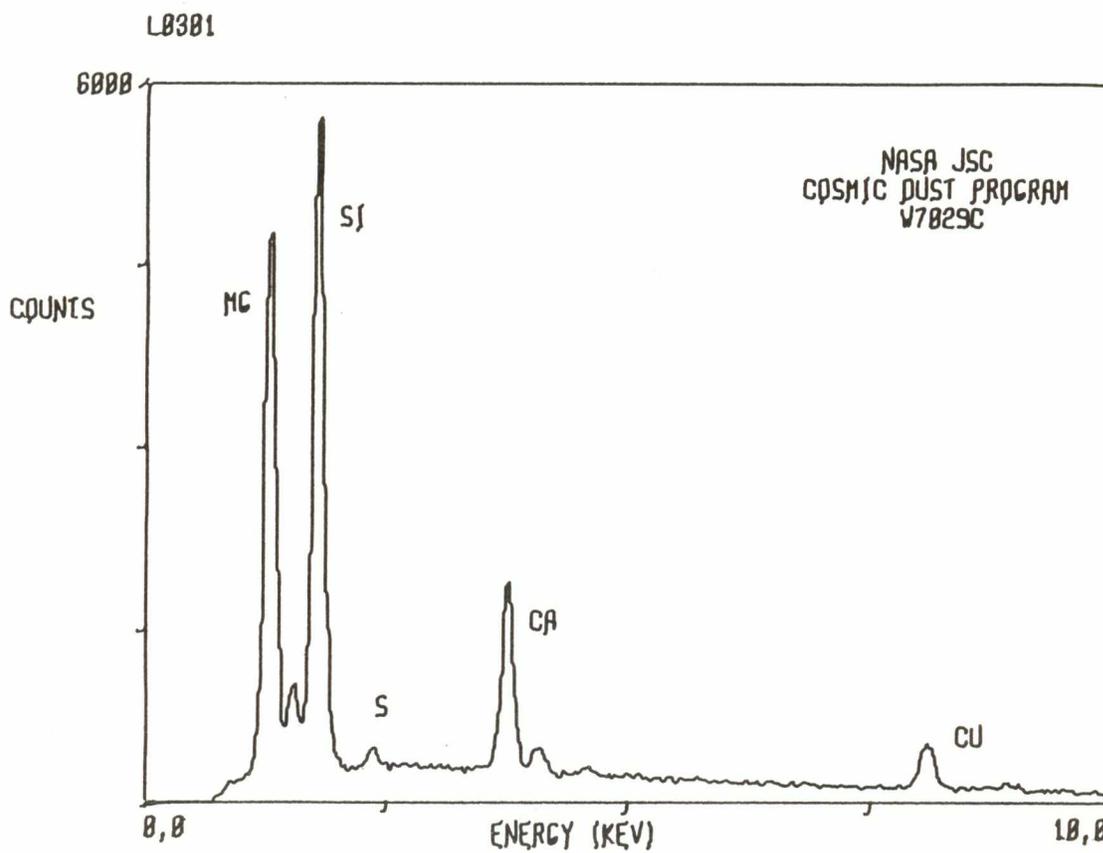


W7029C3

S-82-27591

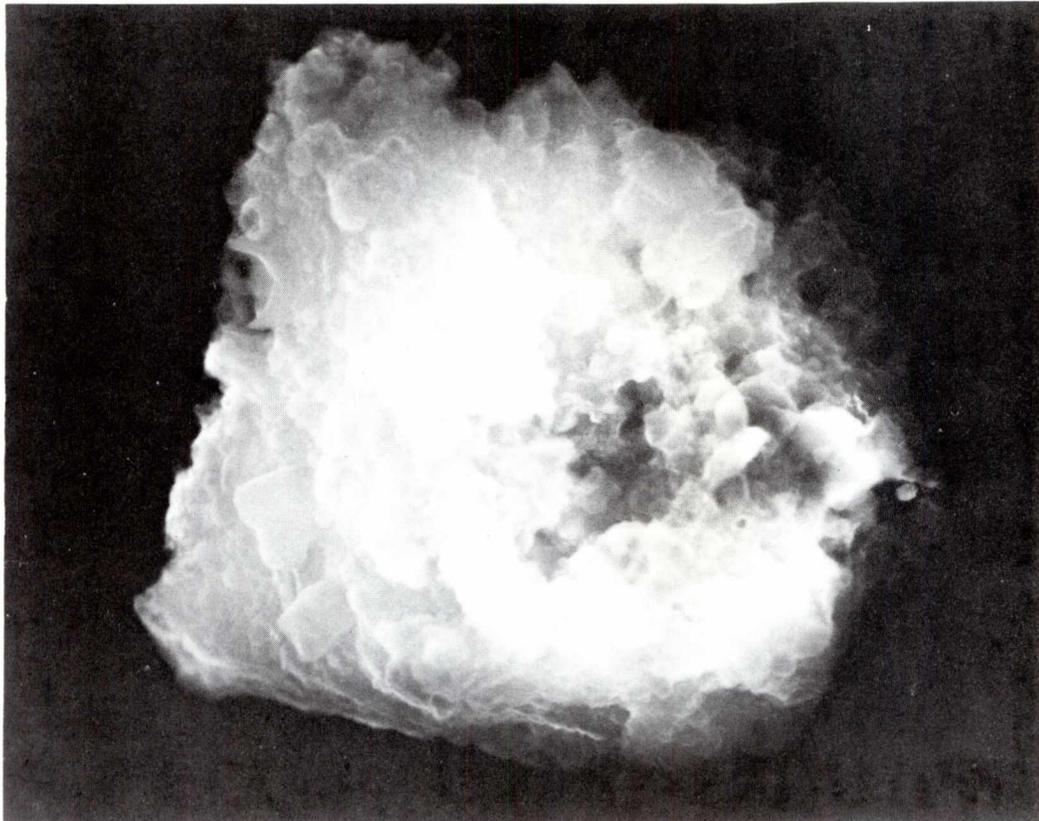


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|-----------------|---------------|-------------|-----------------|
| 16 | S/E | TL | Lt. Yellow-gray | SV | C | |

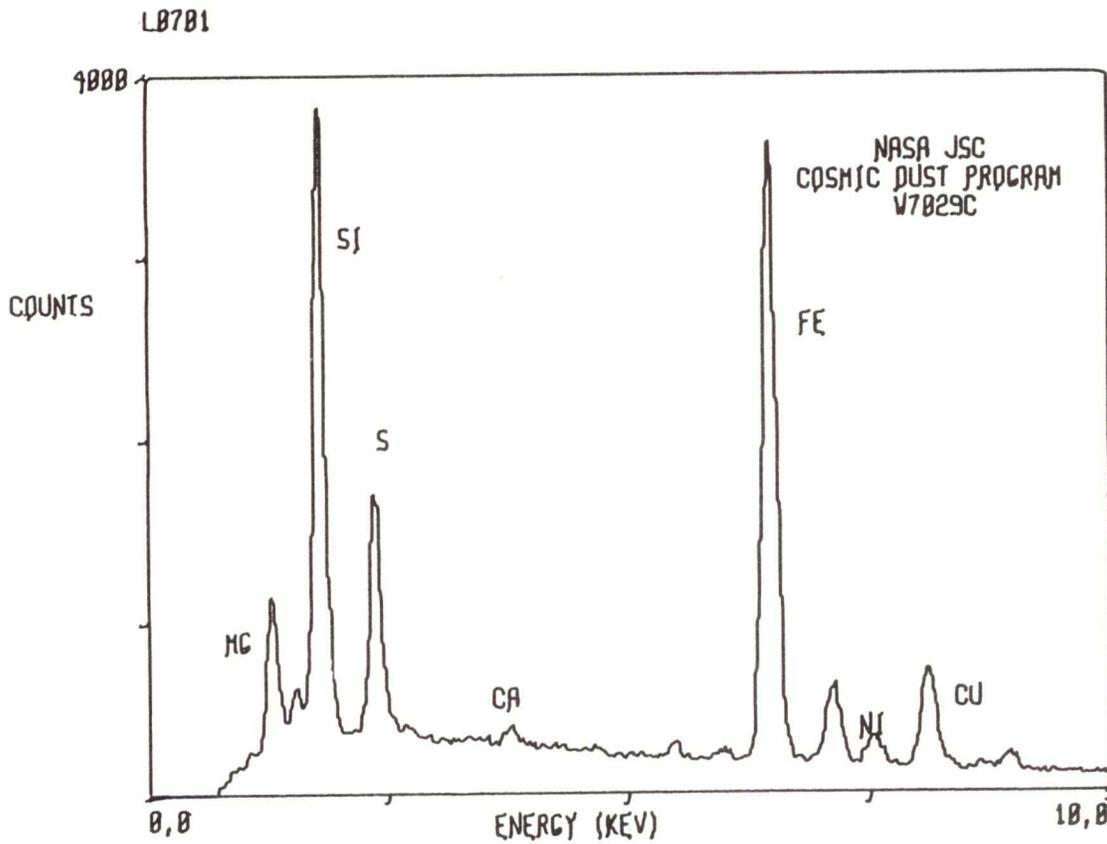


W7029C7

S-82-27590

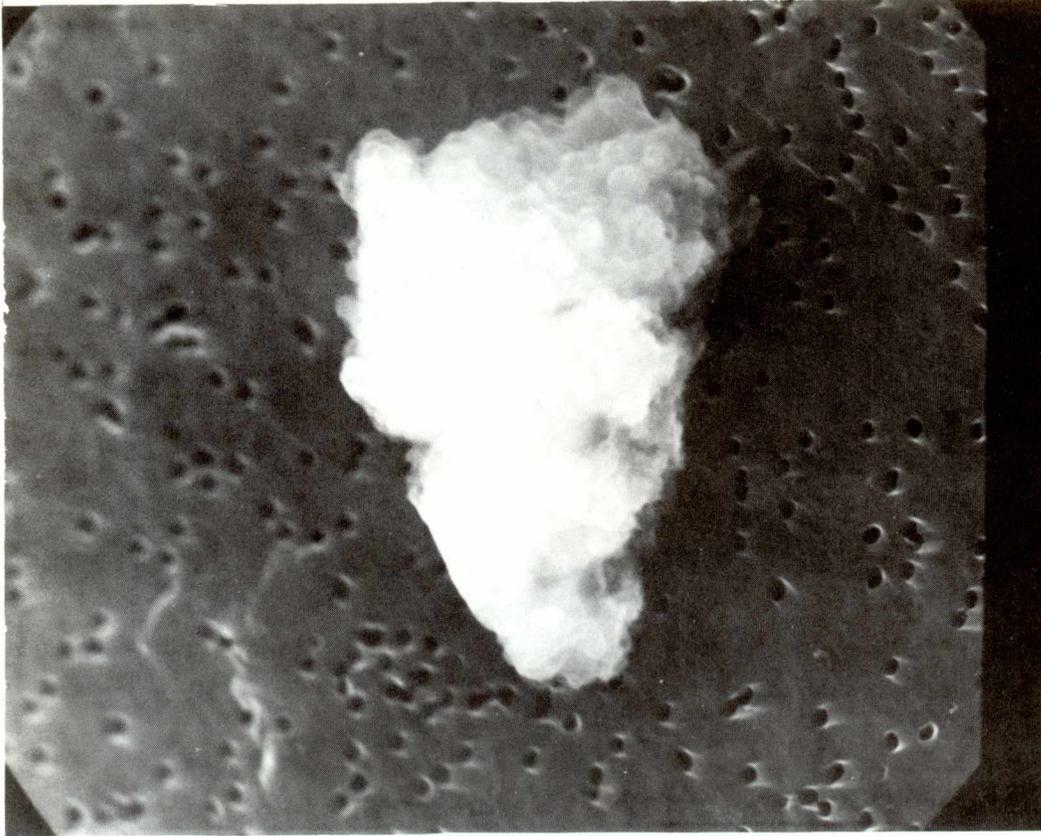


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 22x24 | I | 0 | Dk. Gray-black | D/SM | C | |

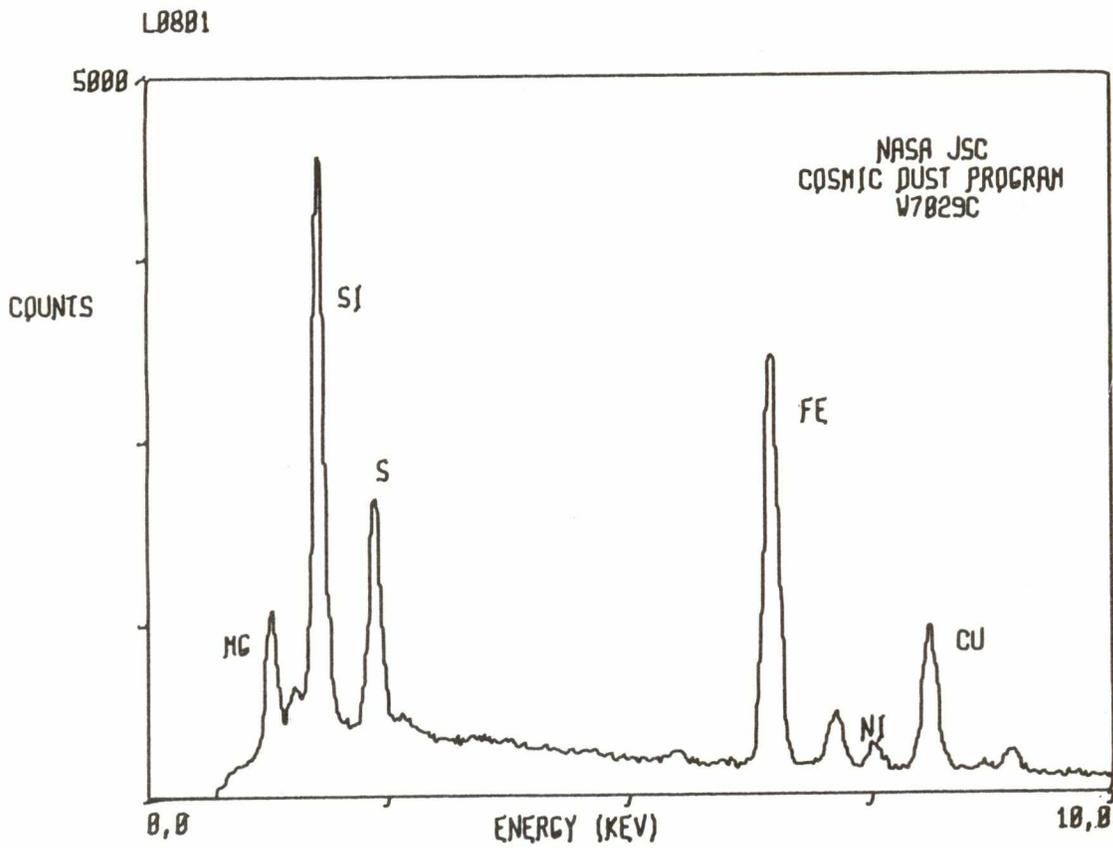


W7029C8

S-82-27589

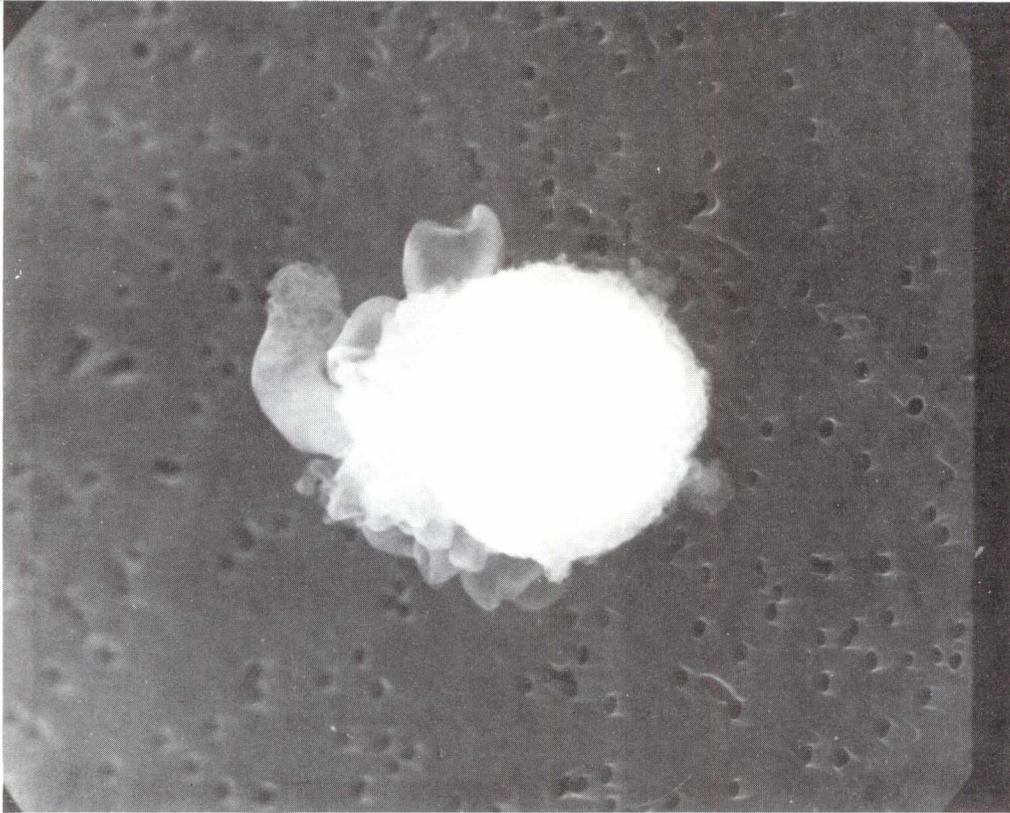


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 6x9 | I | 0 | Black | D/SM | C | |

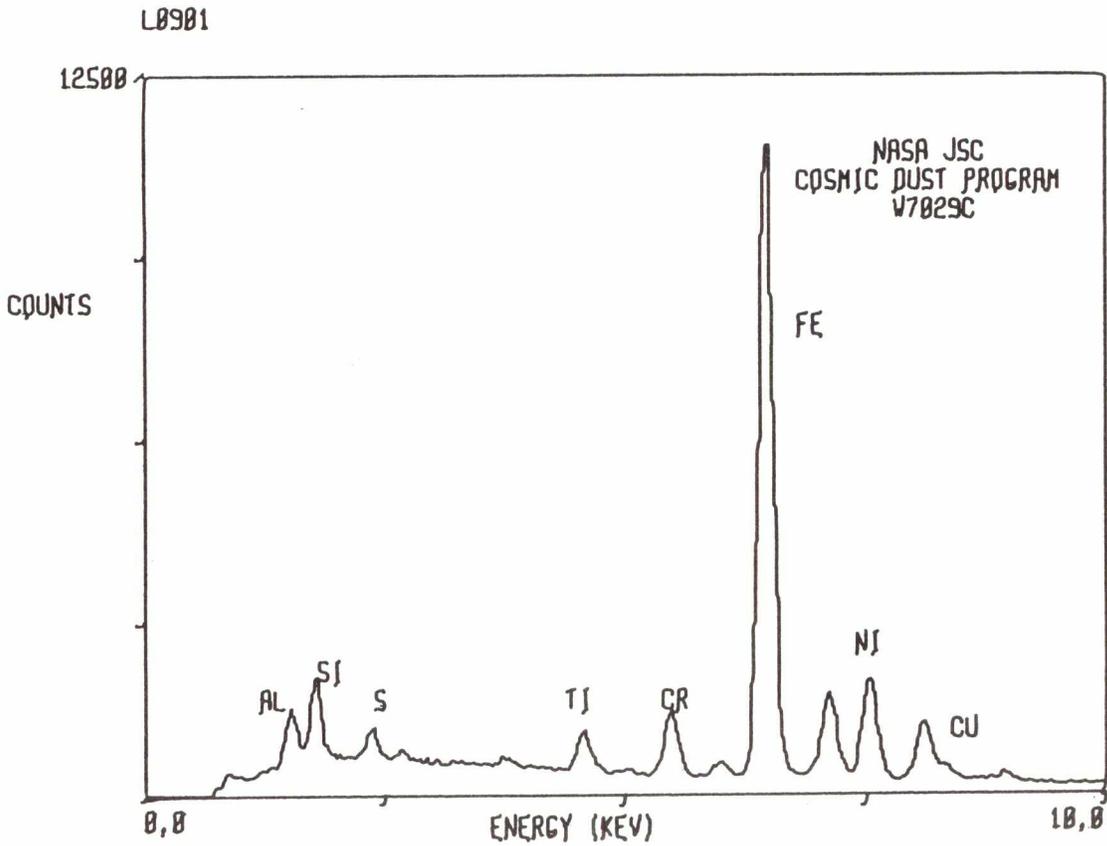


W7029C9

S82-27588

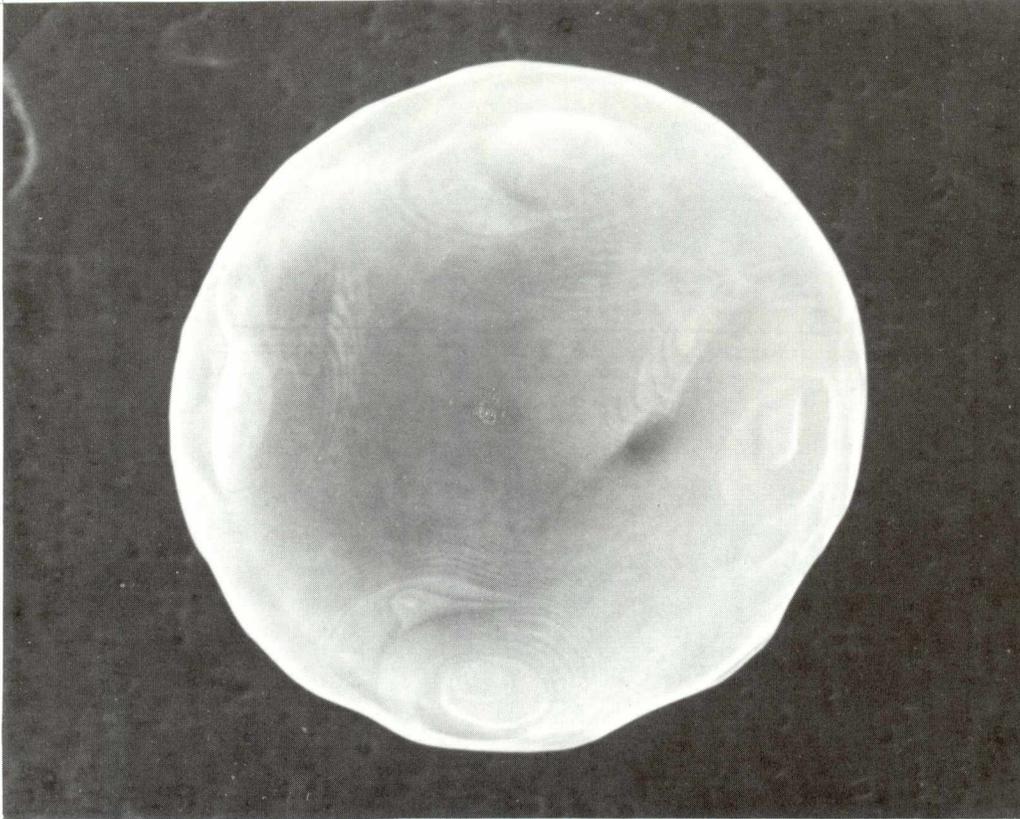


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------------------|---------------|-------------|--|
| 5x6 | S/E | O/TL | Black to Lt. Yellow-red | D/V | ? | O, black sphere with TL, Yellow- red attachments |



W7029C10

S-82-27587

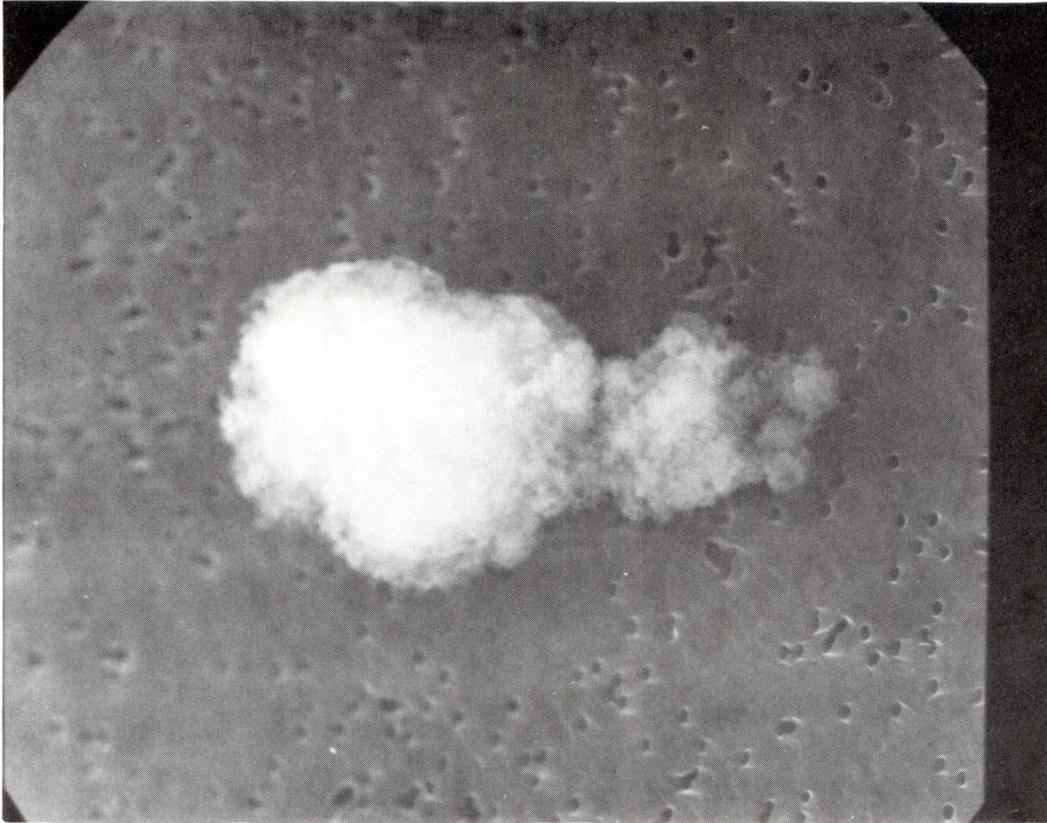


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 14 | S | O | Black | M | ? | Lost |

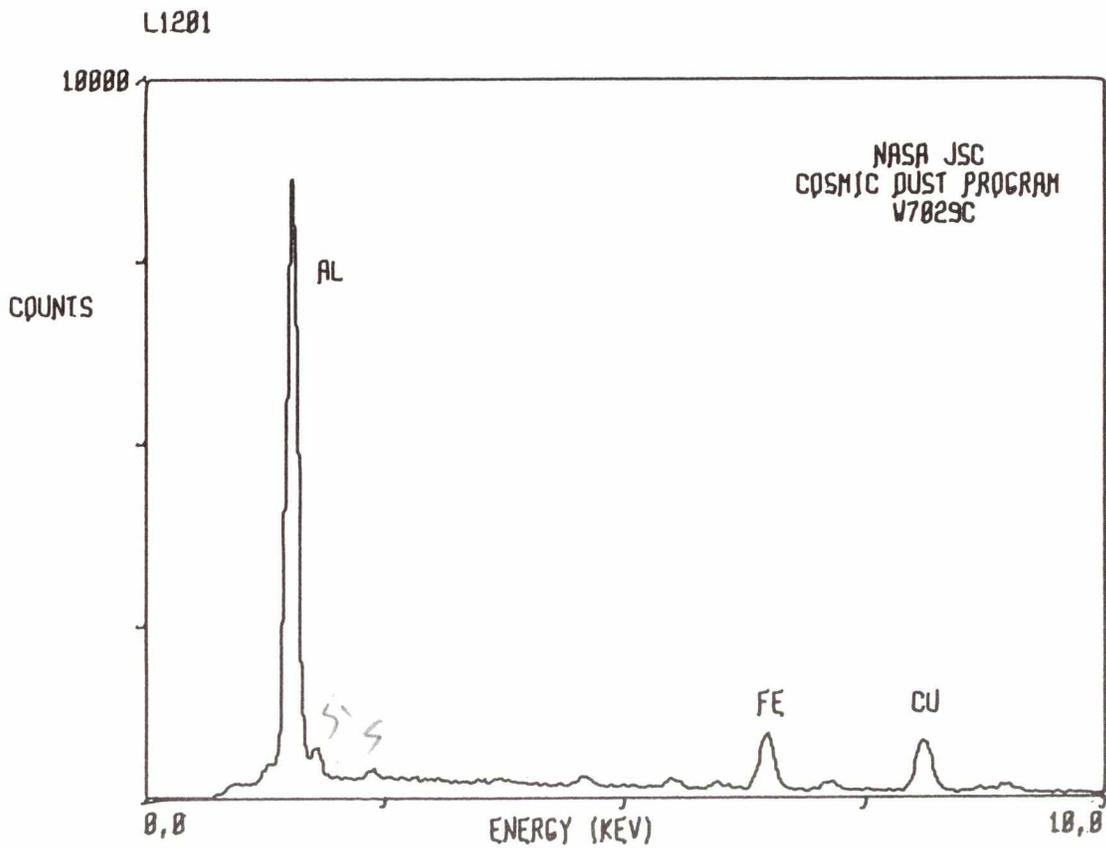
SAMPLE LOST PRIOR TO EDS

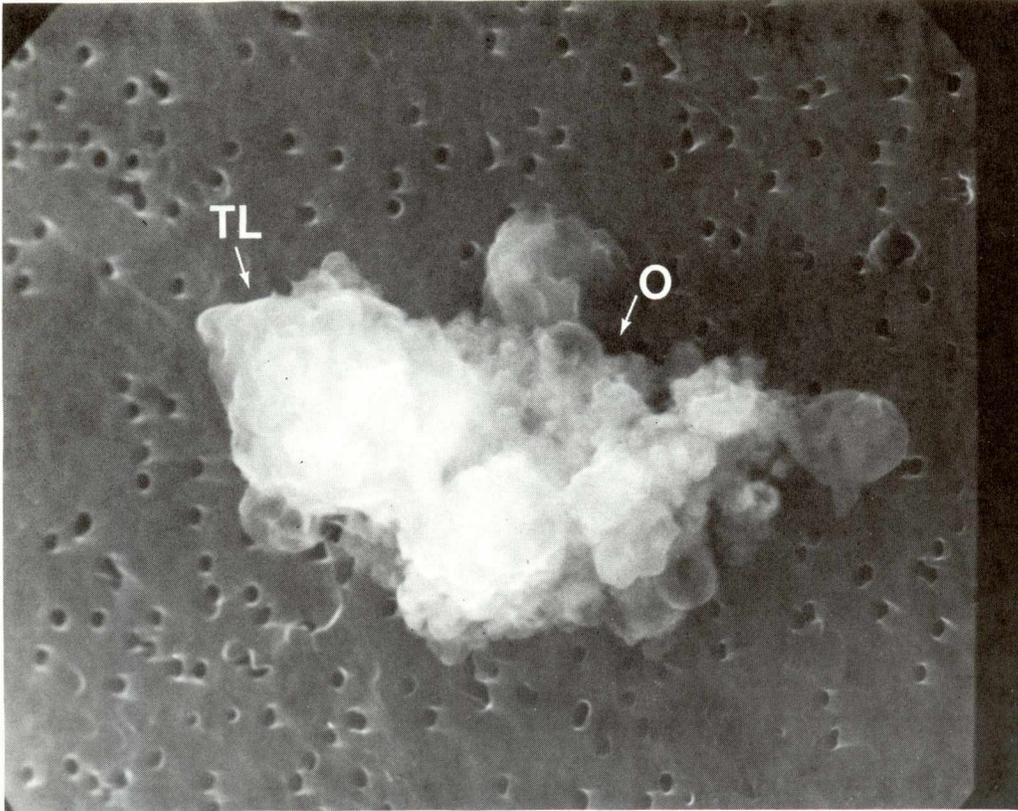
W7029C12

S-82-27586

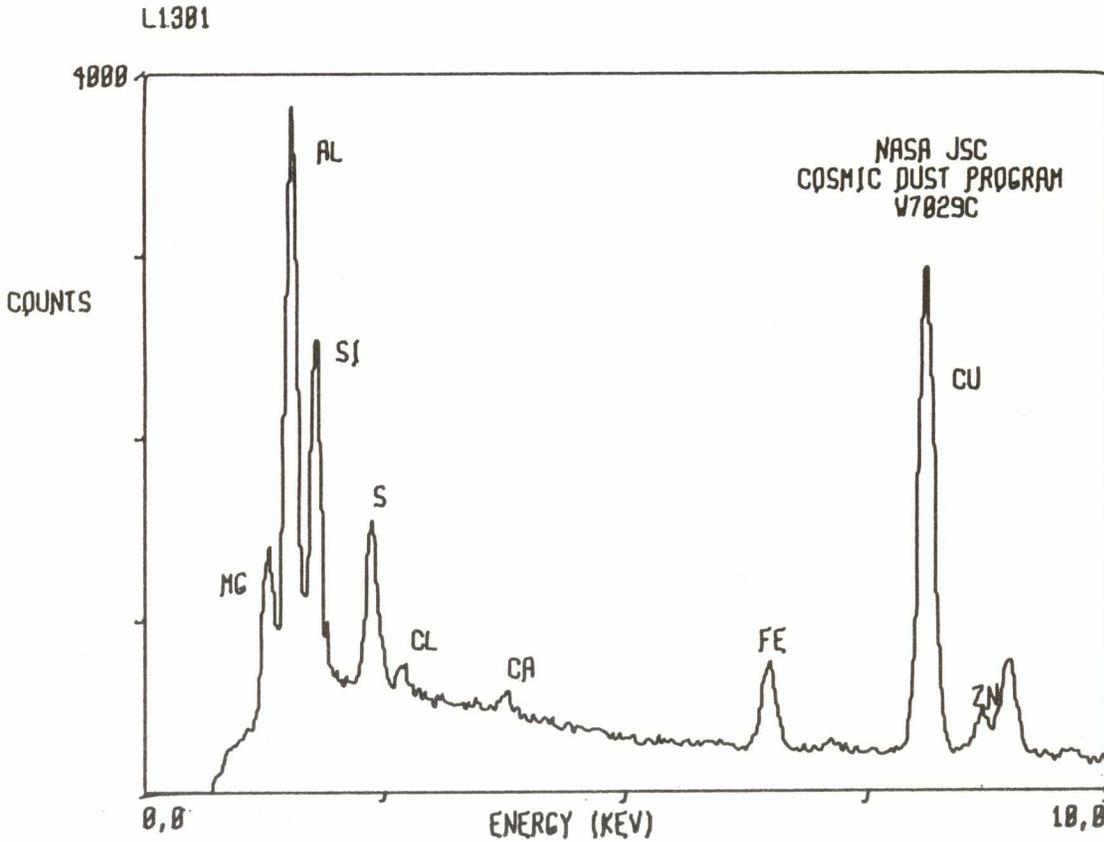


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 7x12 | I | TL | Pale Yellow | SV | ? | |



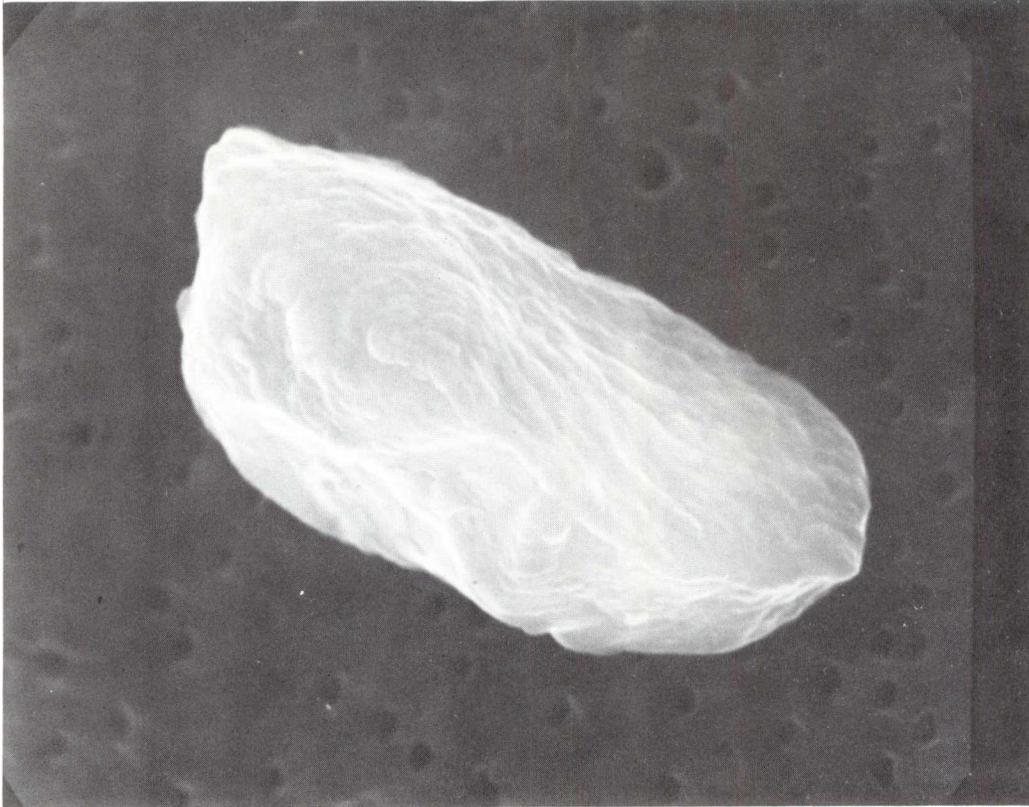


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------------------|---------------|-------------|--|
| 7x11 | I | O/TL | Black to Pale Yellow-green | D/SV | ? | O, Black and TL, Yellow-green areas shown on image |

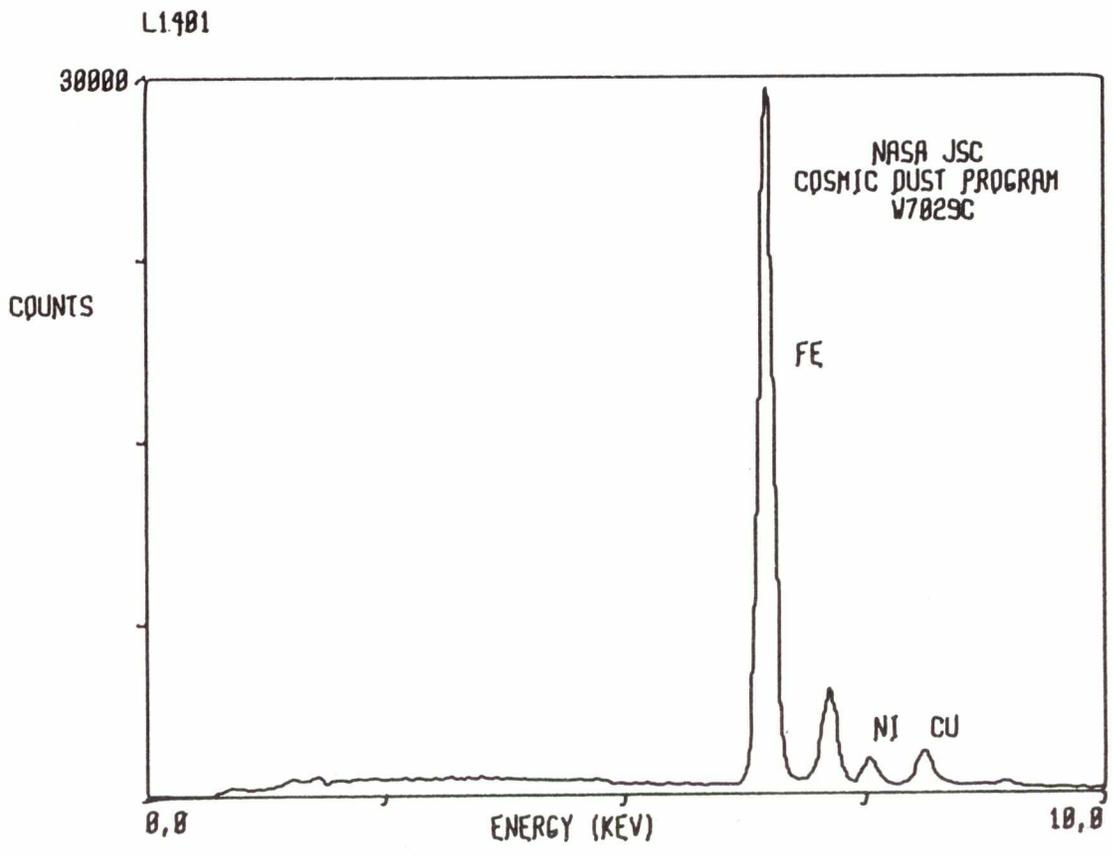


W7029C14

S-82-27584

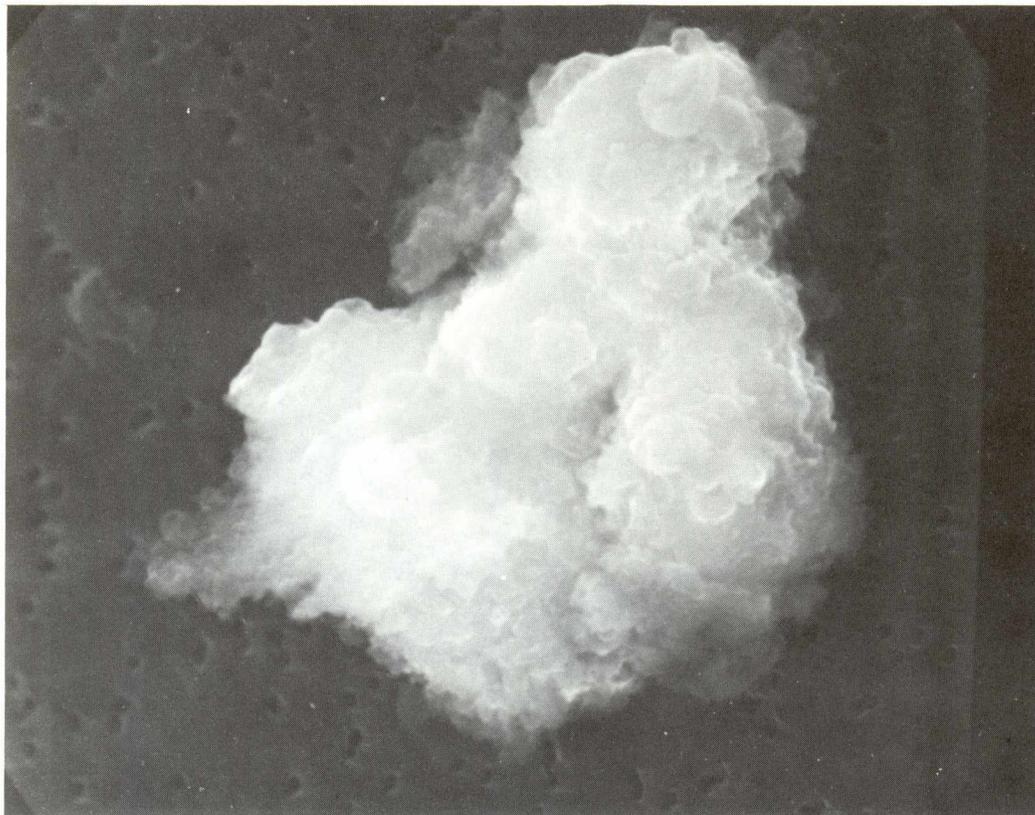


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 3x7 | I | 0 | Black | M | C? | |

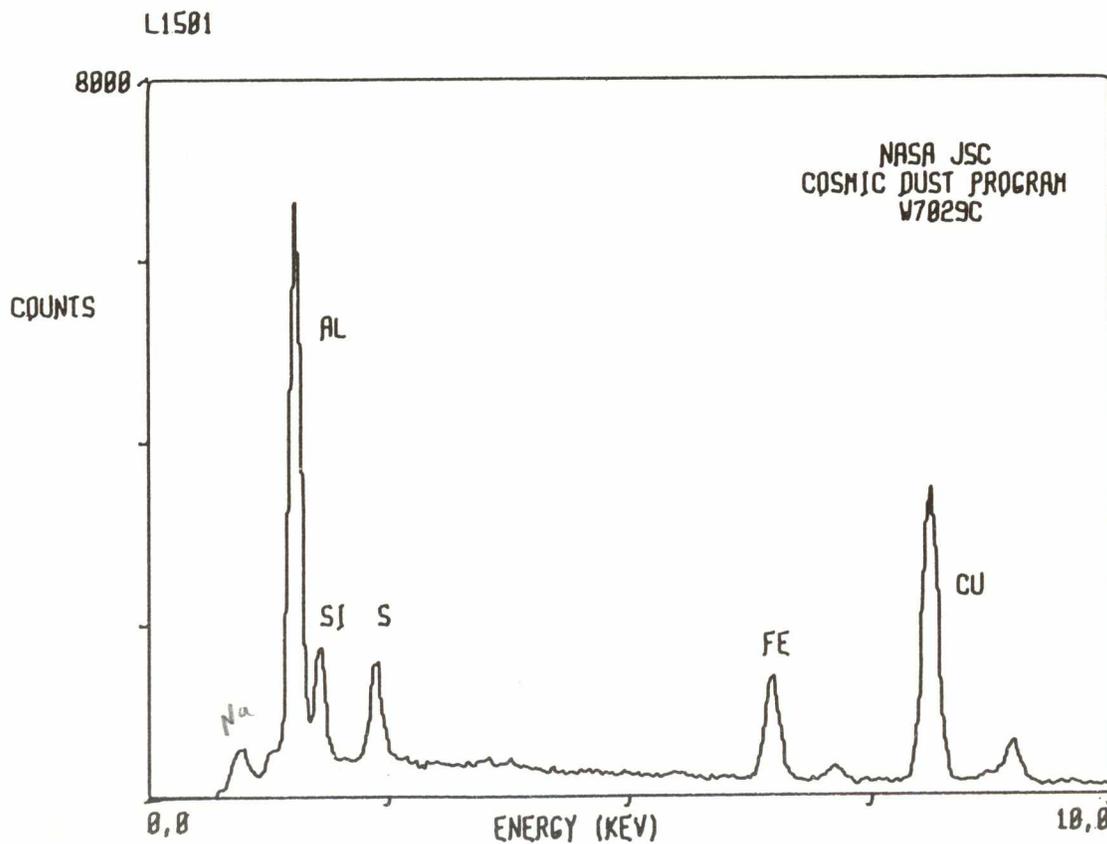


W7029C15

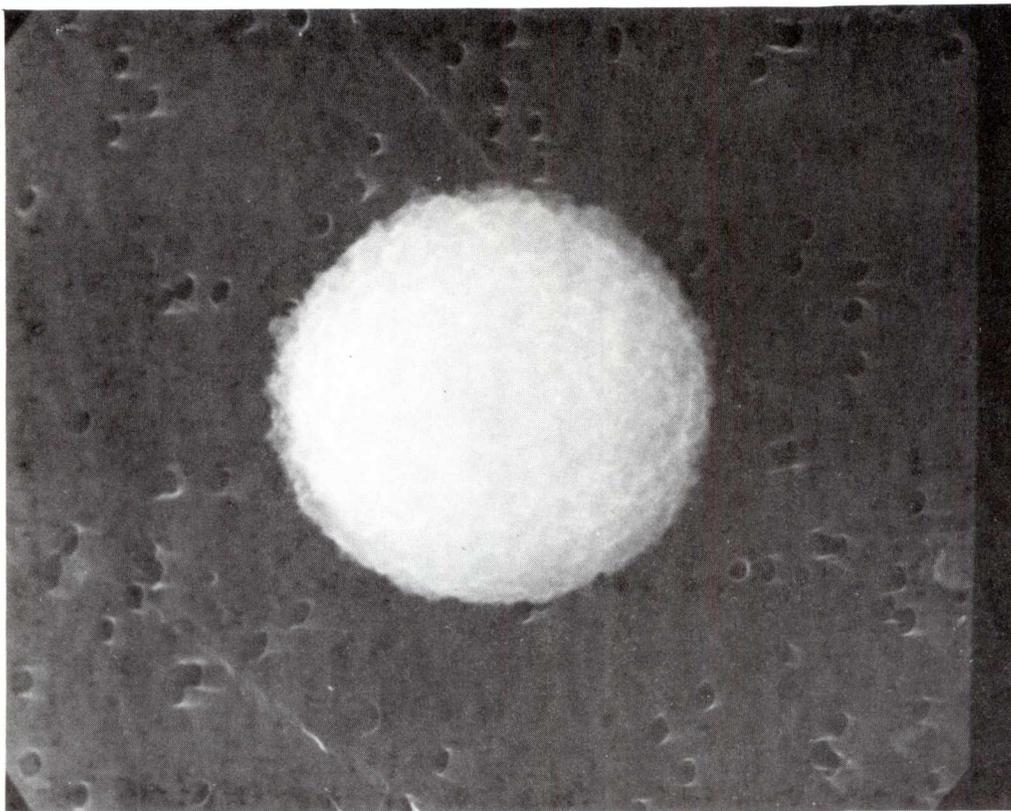
S-82-27583



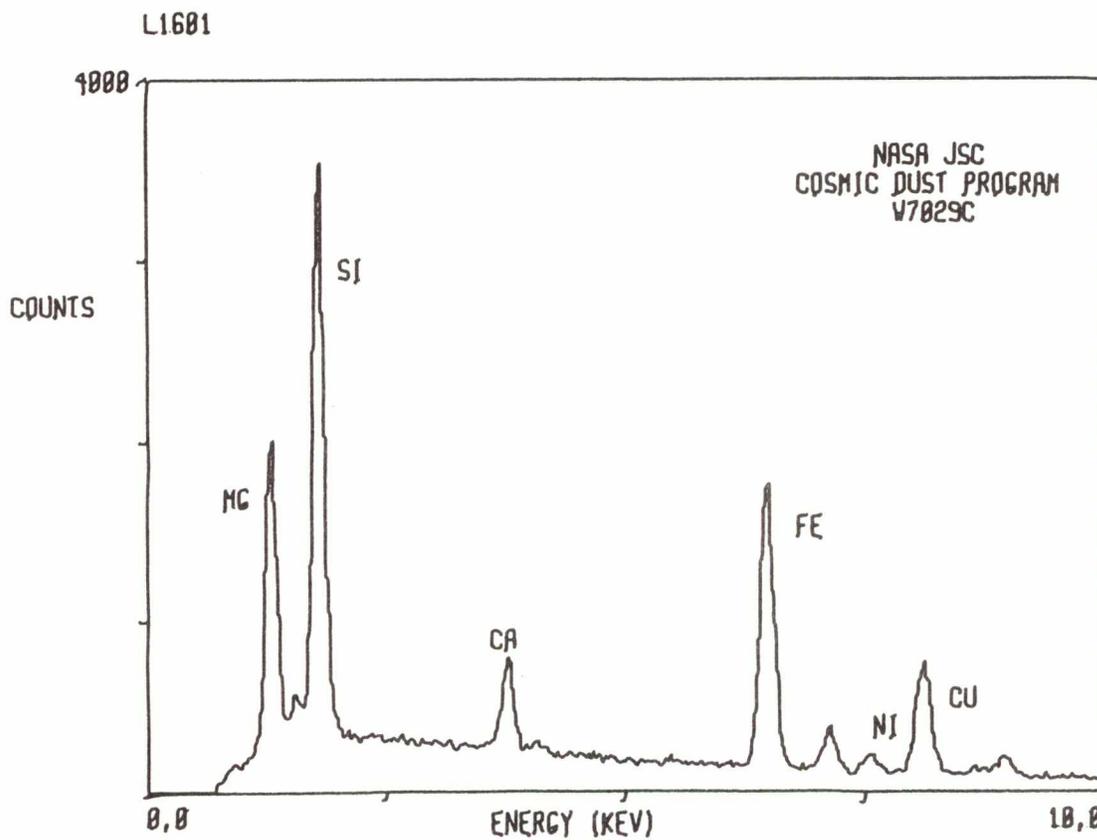
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 10x13 | I | 0 | Black | SM | ? | |



W7029C 16



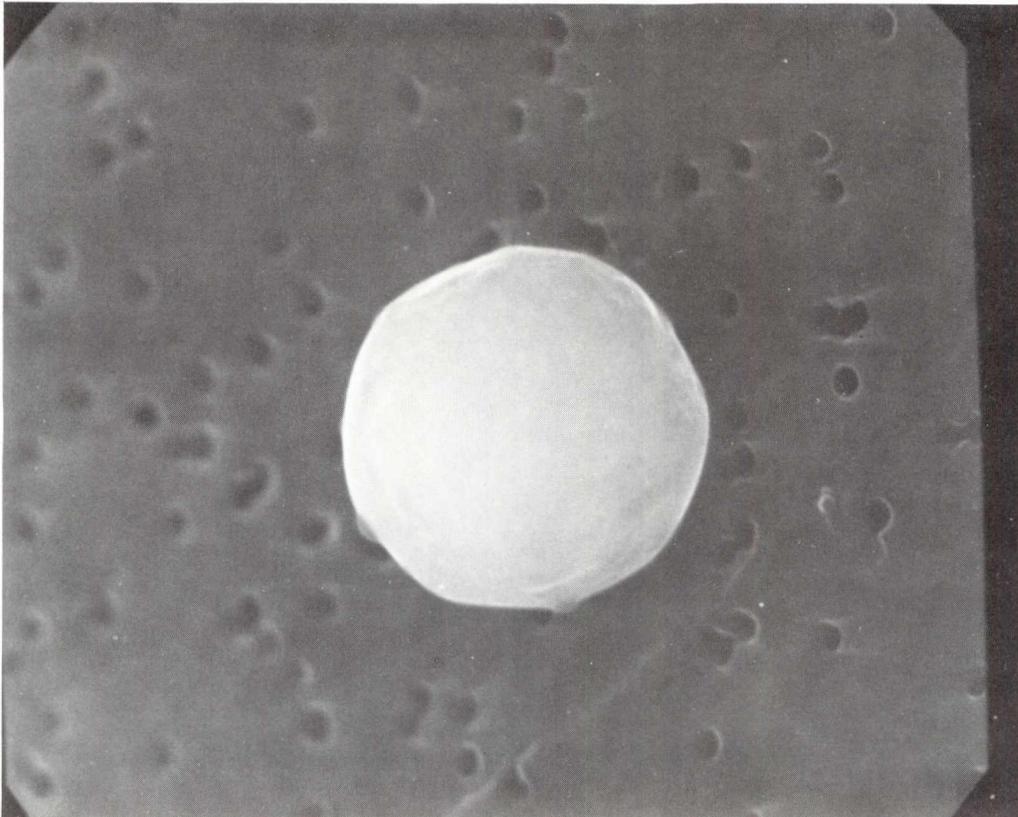
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|---------------|---------------|-------------|-----------------|
| 5 | S | TL | Dk. Red-brown | V | C? | |



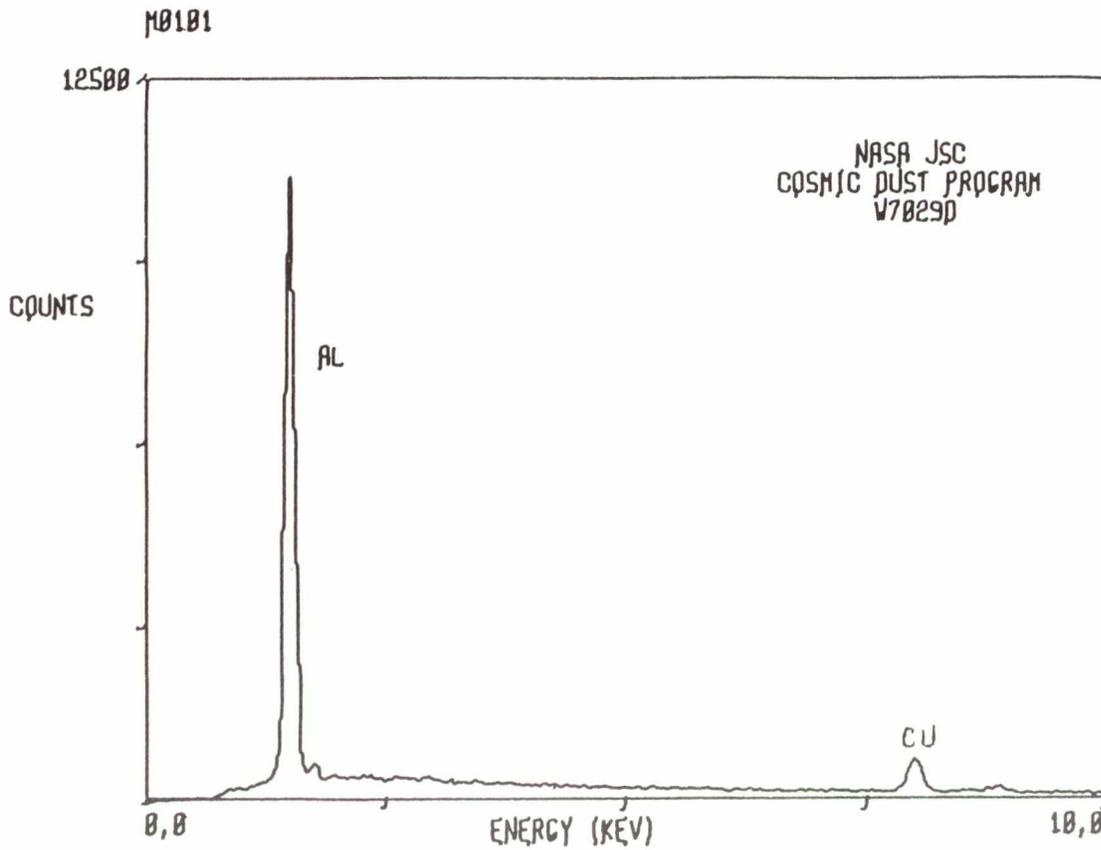
MOUNT W7029D

W7029D1

S-82-27788



| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 4 | S | T | CL/Pale Yellow | V | AOS | |

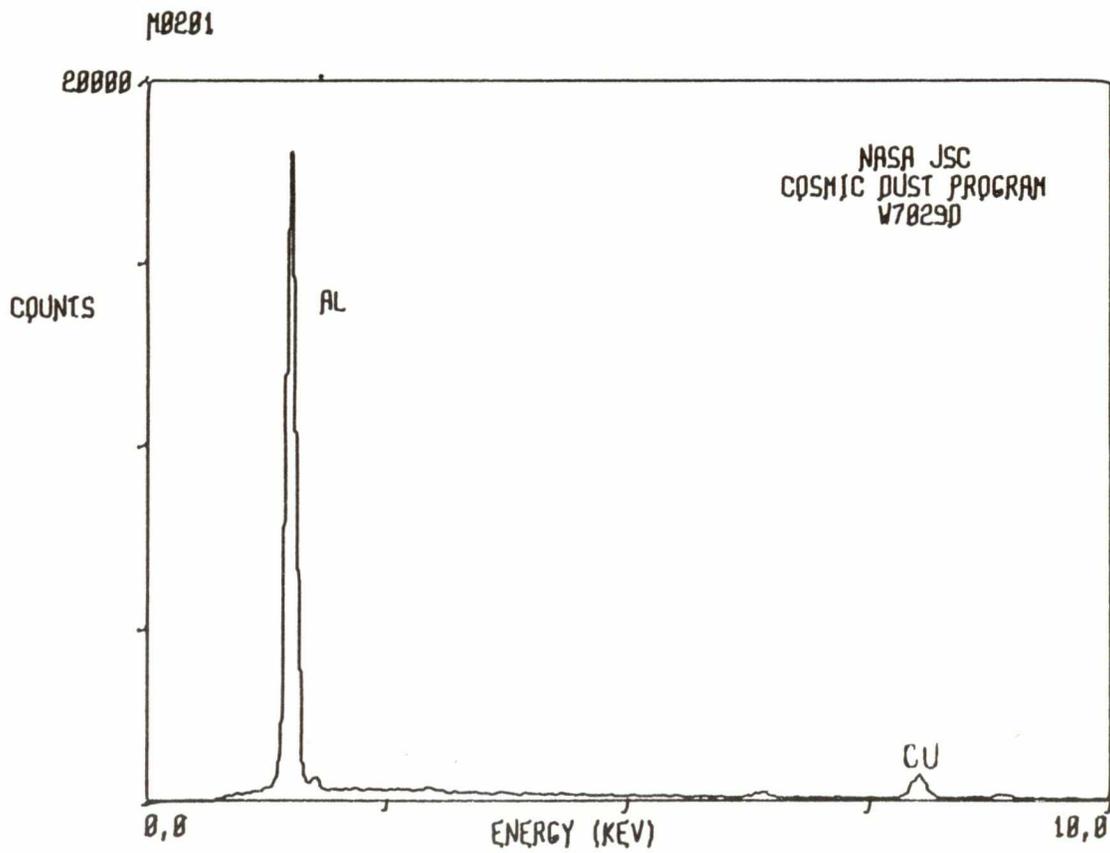


W7029D2

S-82-27789

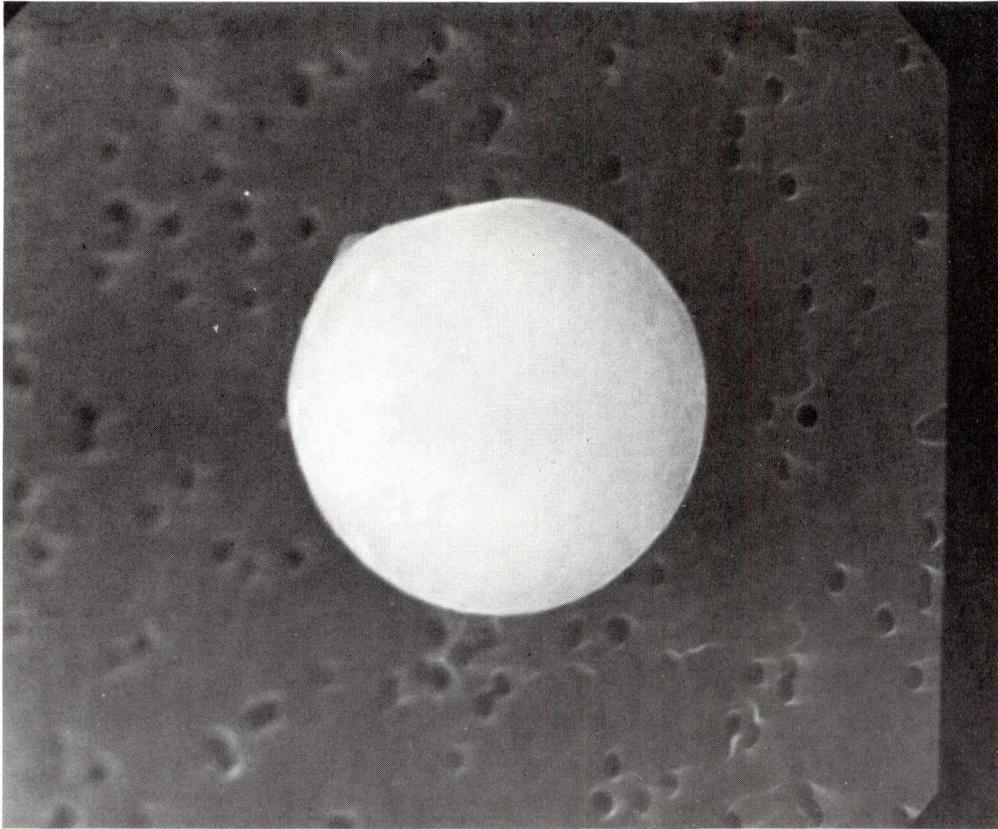


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 12x15 | I | 0 | Black | SM | TCA? | |

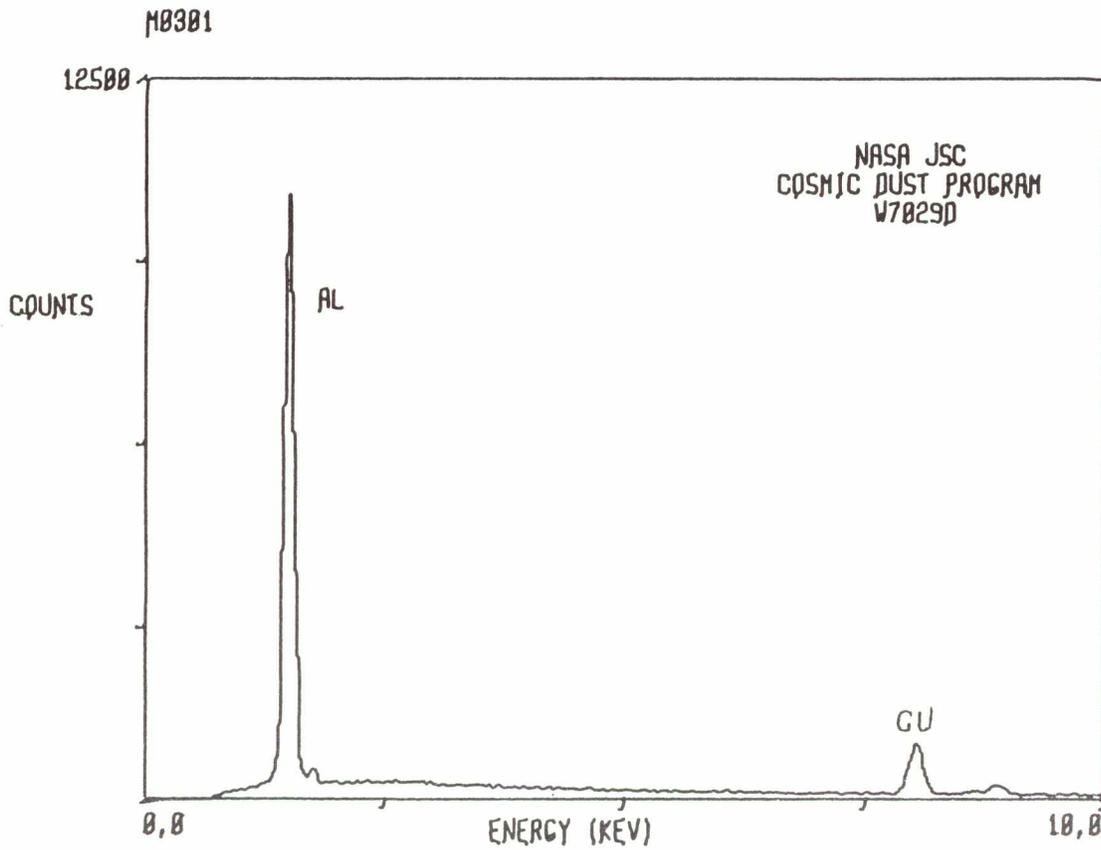


W7029D3

S-82-27790

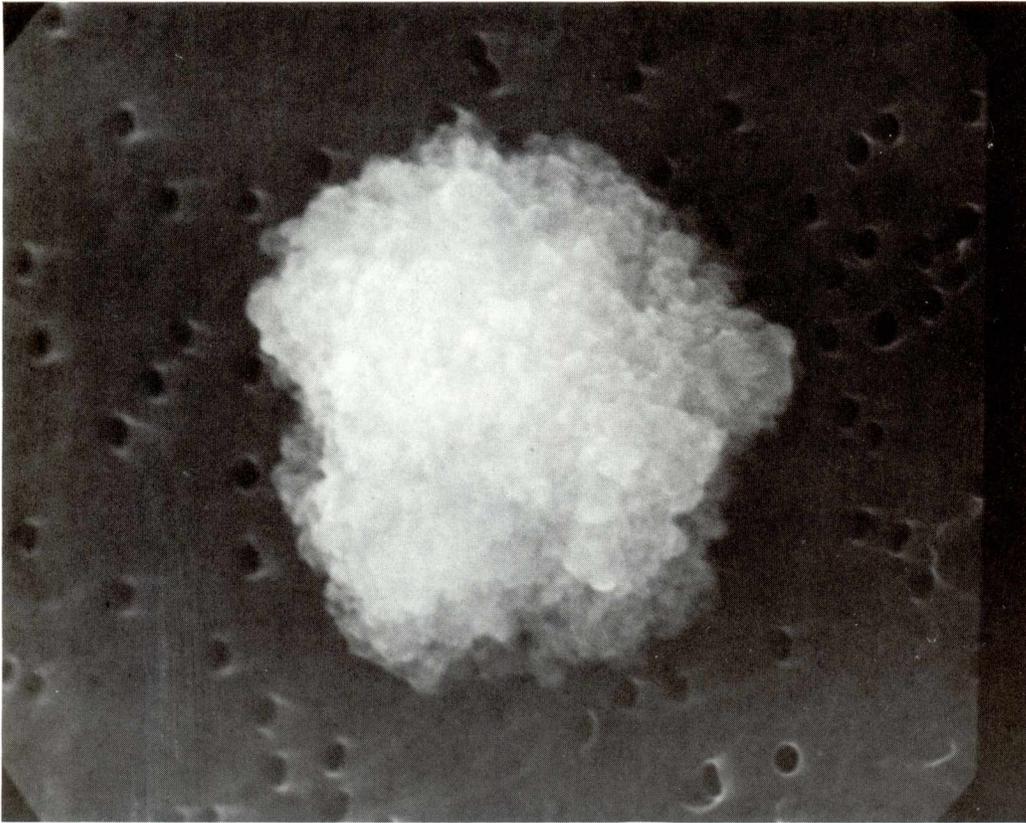


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 5 | S | T | CL/Pale Yellow | V | AOS | |

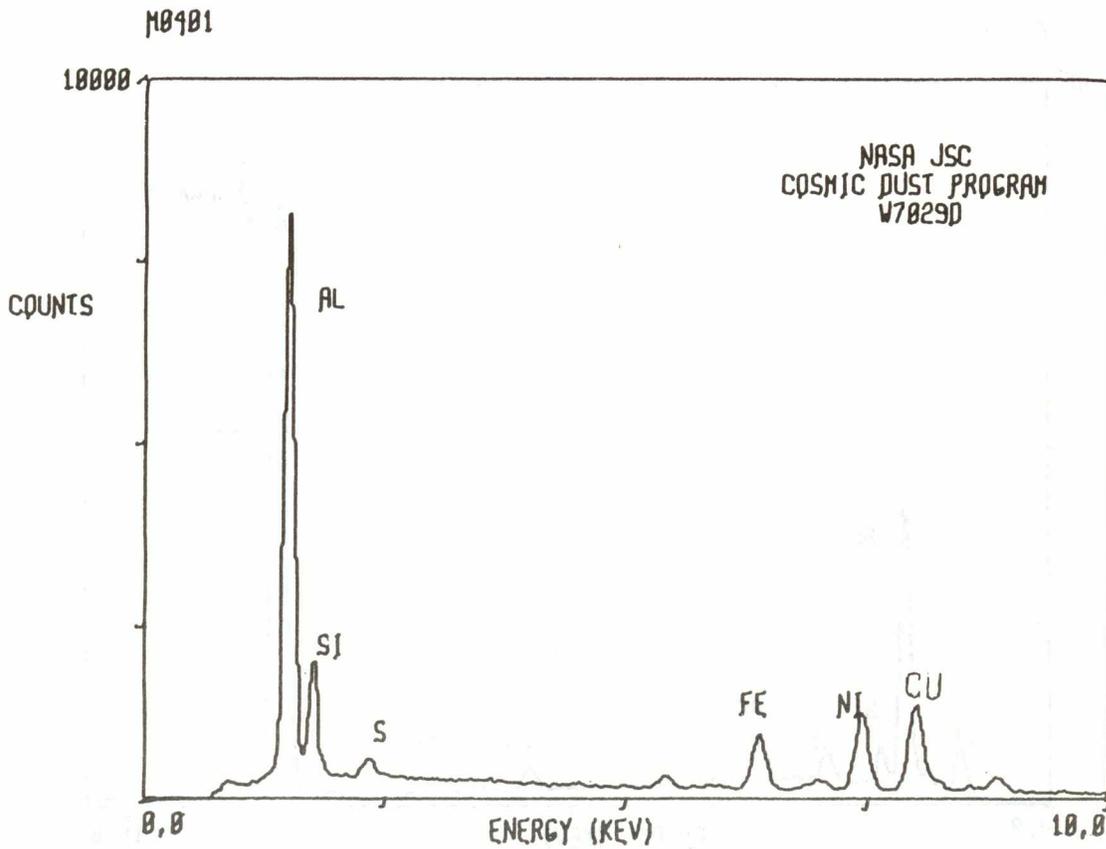


W7029D4

S-82-27802



| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 5x6 | I | 0 | Dk. Gray-black | D/SM | ? | |

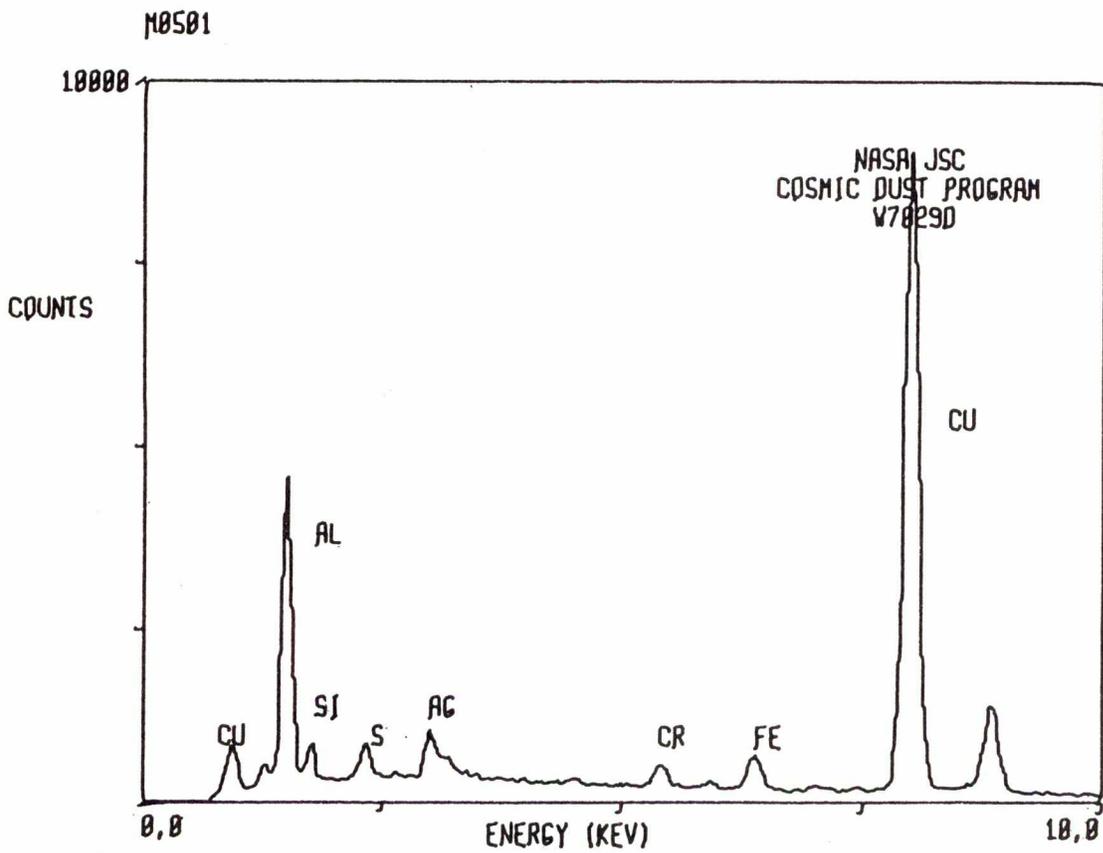


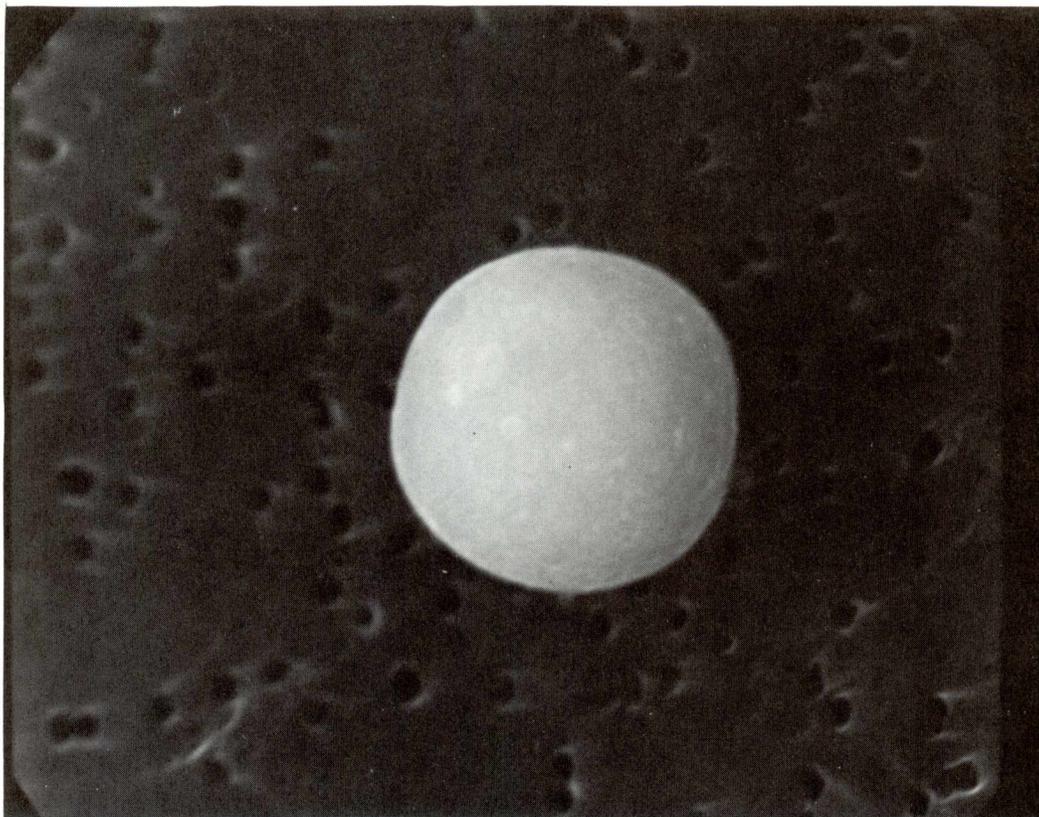
W7029D5

S-82-27791

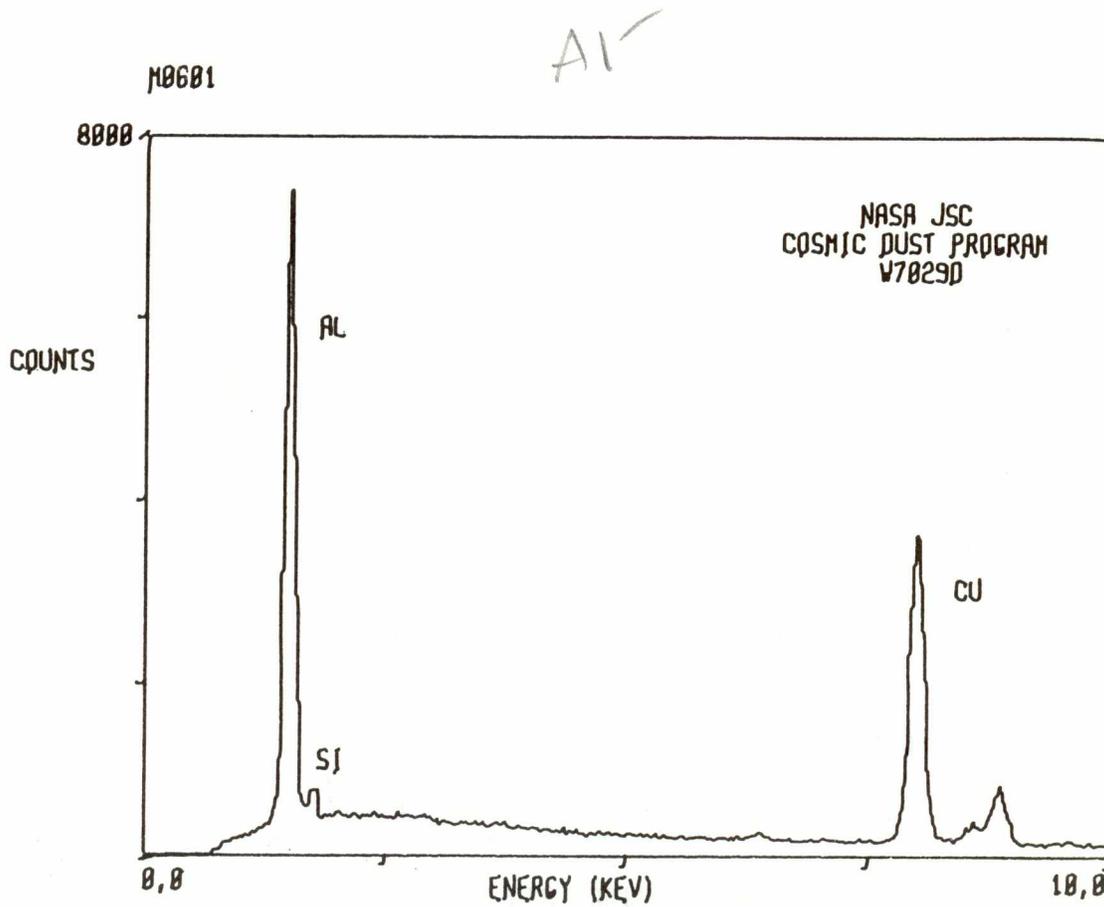


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 7 | I | O/TL | Black | SM | TCA? | |





| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 3 | S | T | CL/Pale Yellow | V | TCA? | |

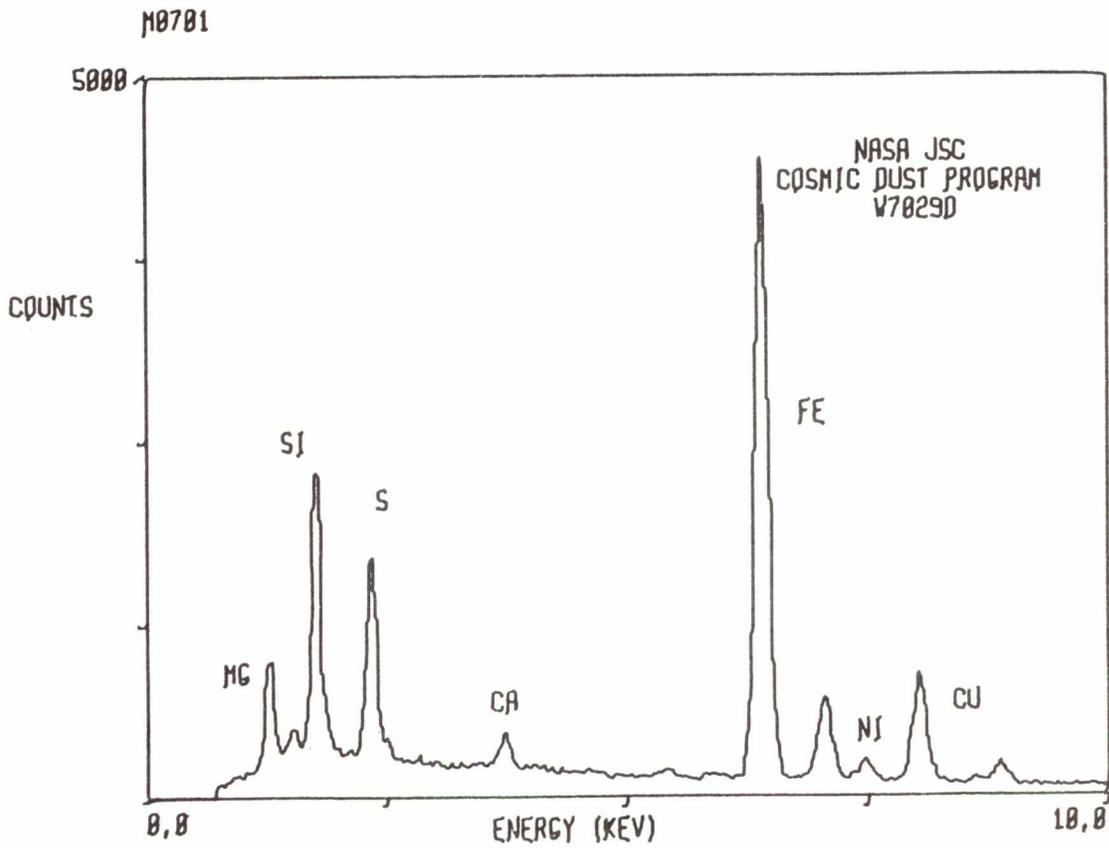


W7029D7

S-82-27793

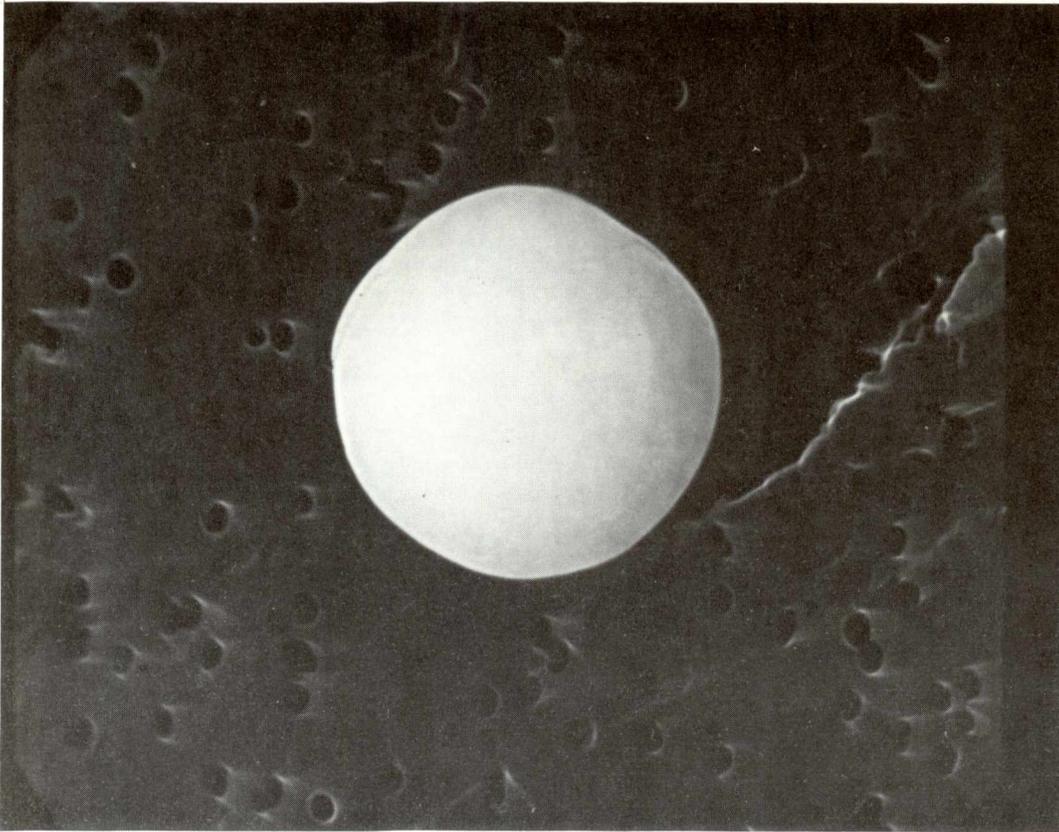


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|-----------------------|---------------|-------------|-----------------|
| 6x7 | I | 0 | Mottled Black to Gold | M | C | |

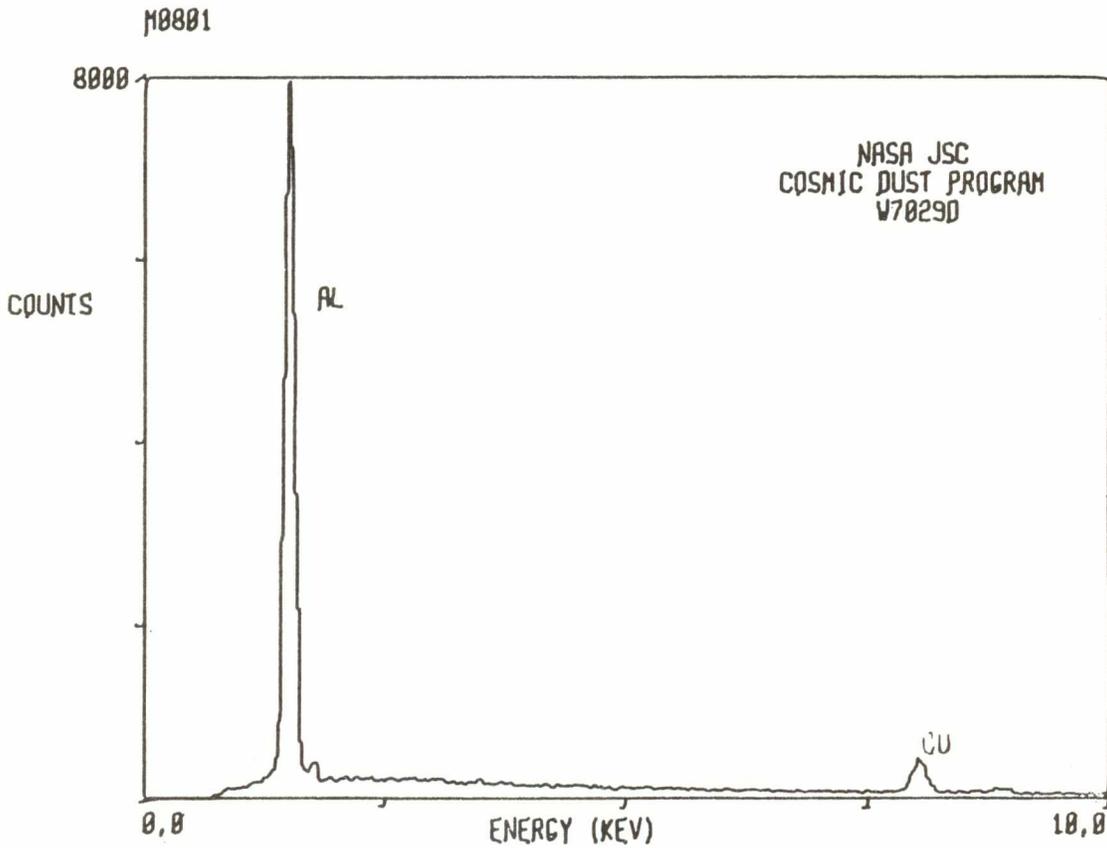


W7029D8

S-82-27794

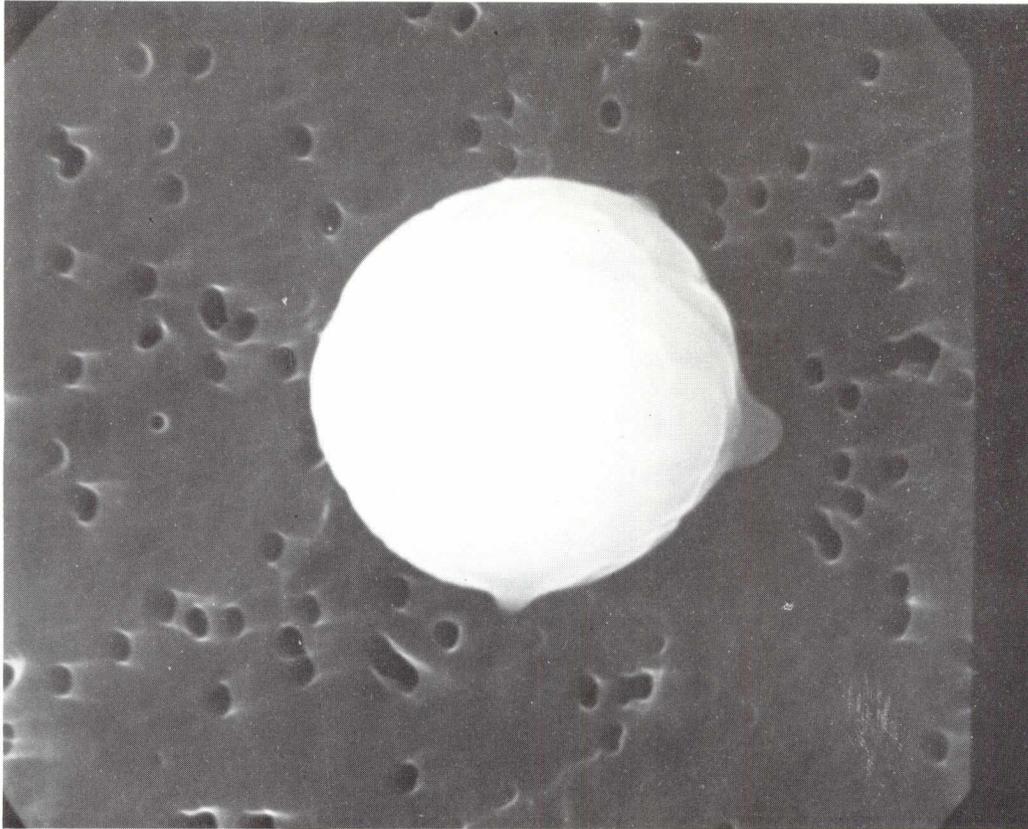


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 4 | S | T | CL/Pale Yellow | V | AOS | |

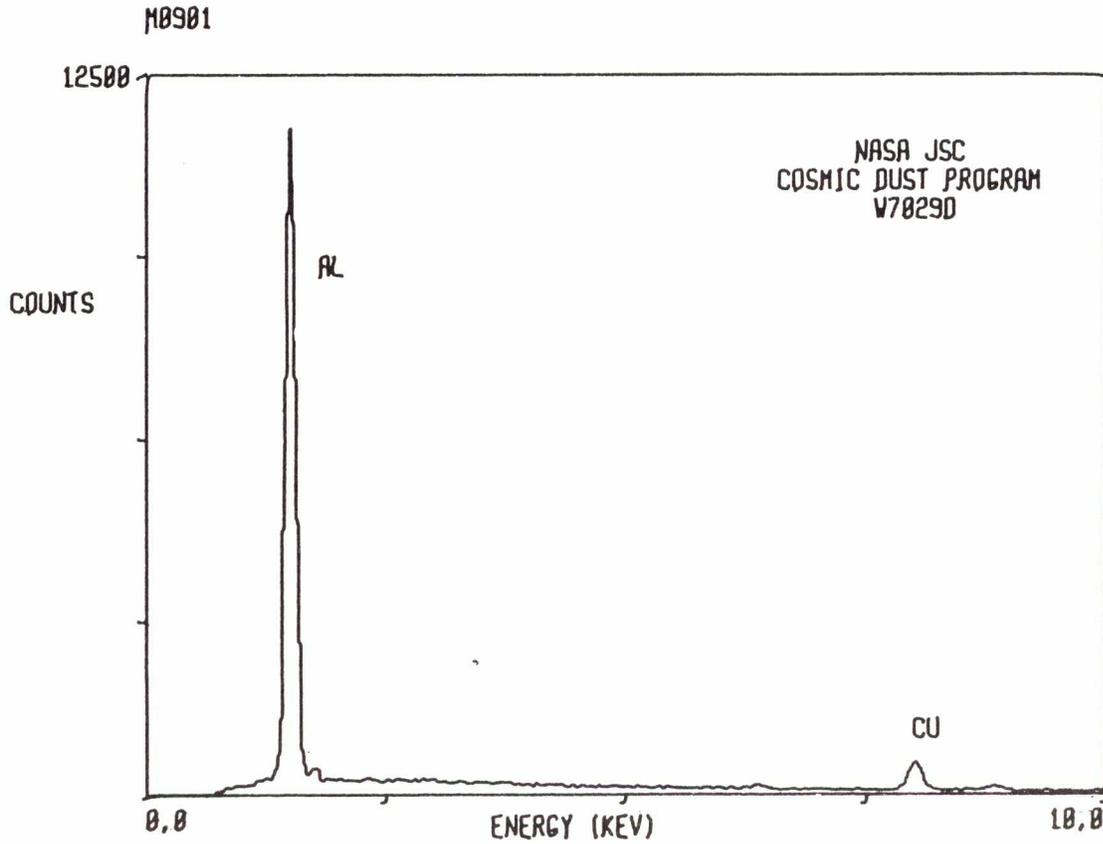


W7029D9

S-82-27795

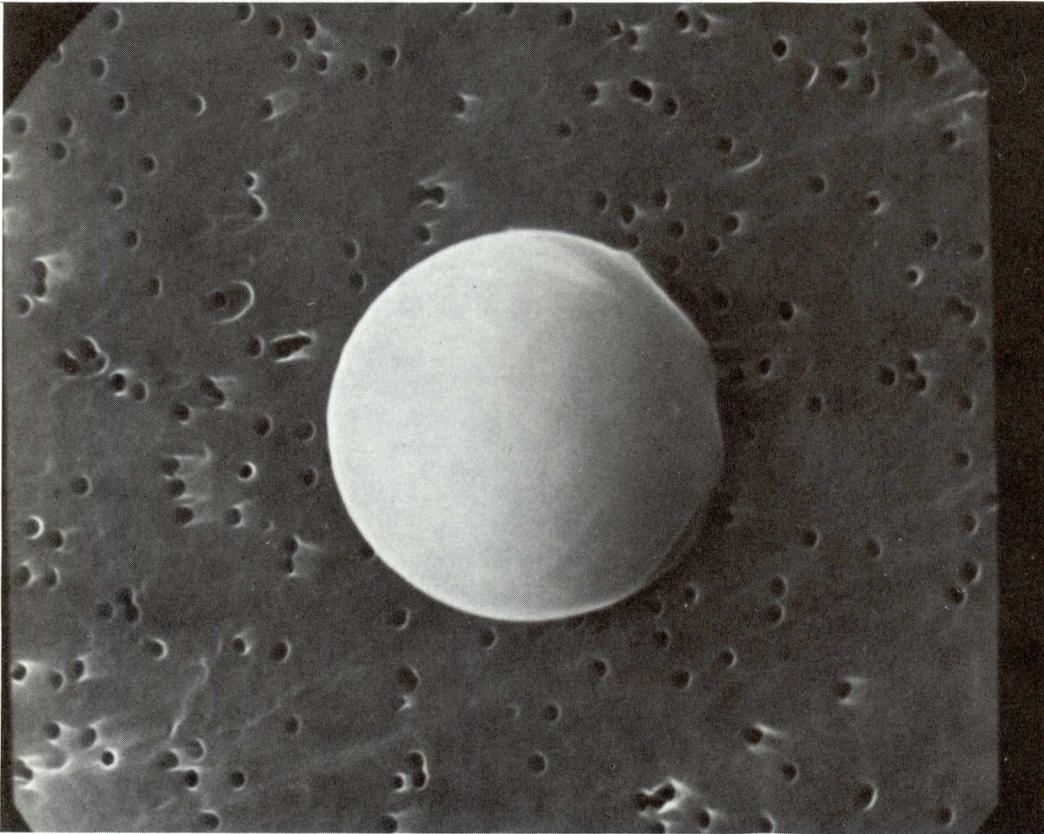


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 4 | S | T | CL/Pale Yellow | V | AOS | |

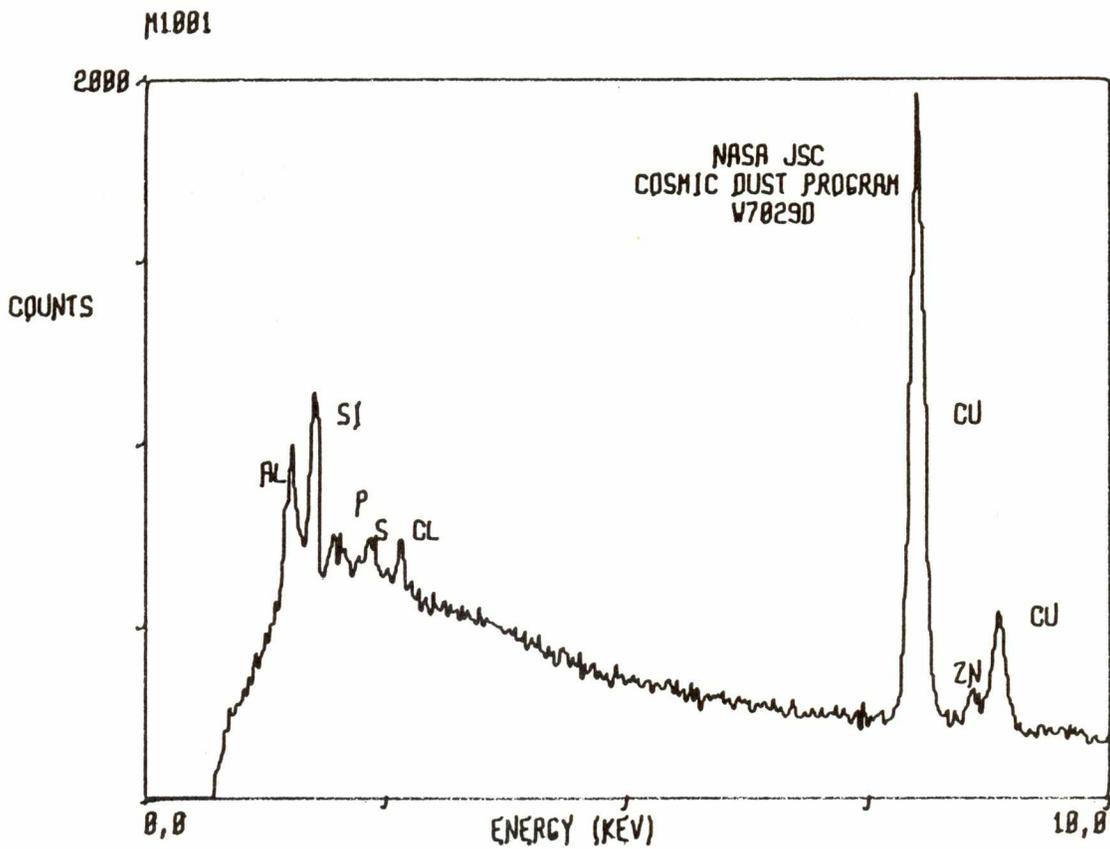


W7029D10

S-82-27796

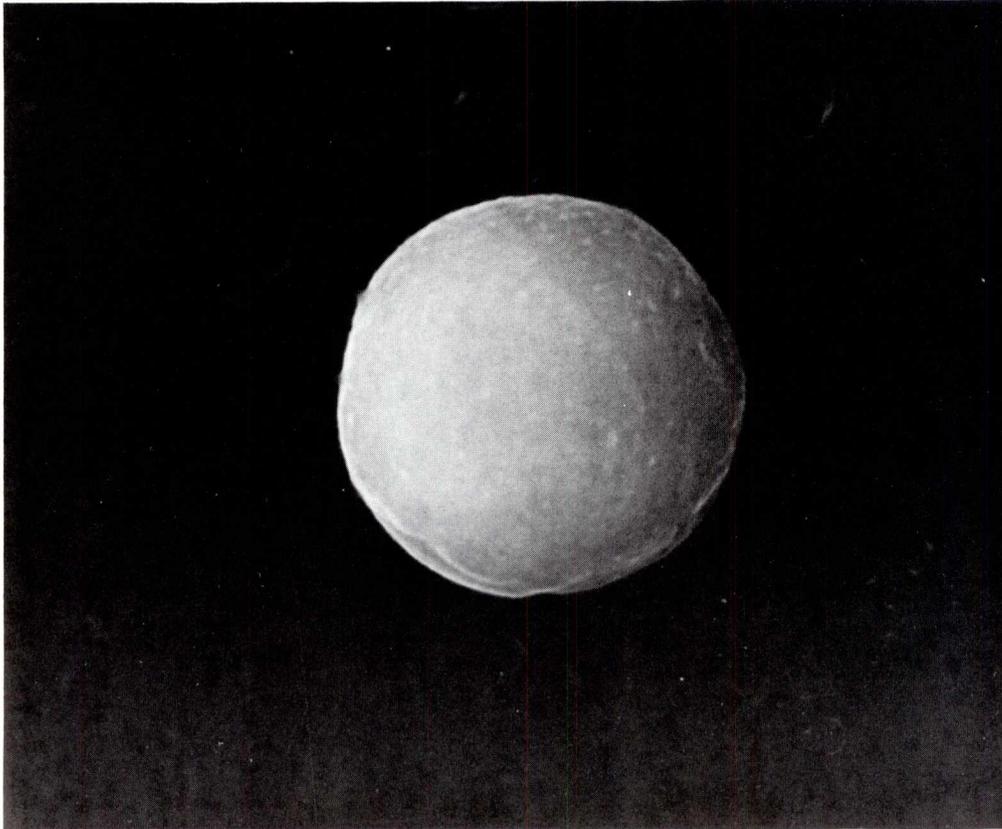


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|---------------|---------------|-------------|-----------------|
| 6 | S | T | Dk. Red-brown | V | TCA? | |

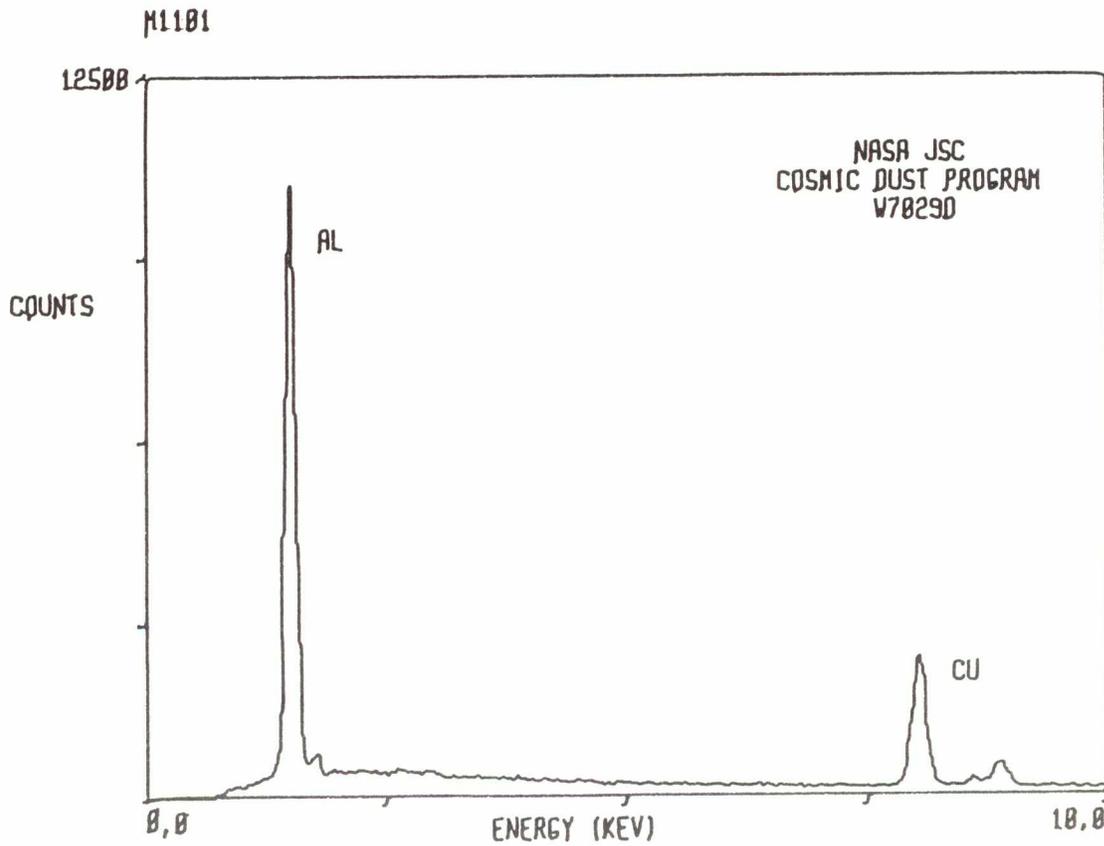


W7029D11

S-82-27797

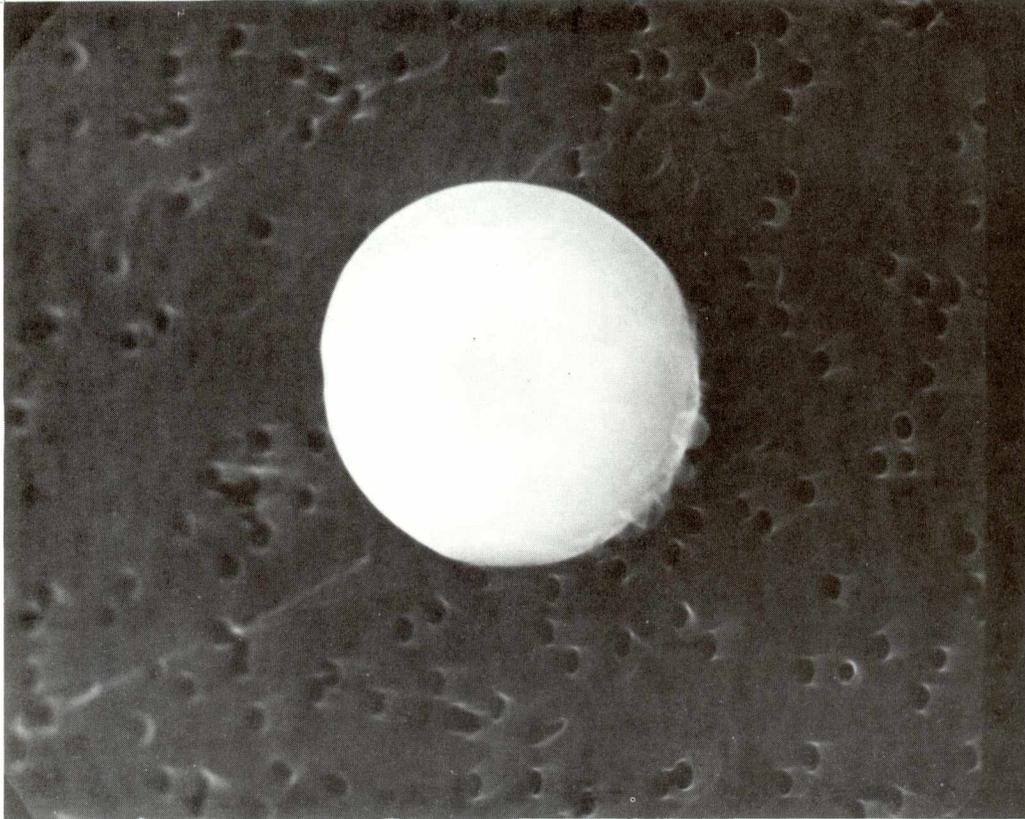


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 4 | S | T | CL/Pale Yellow | V | AOS | |

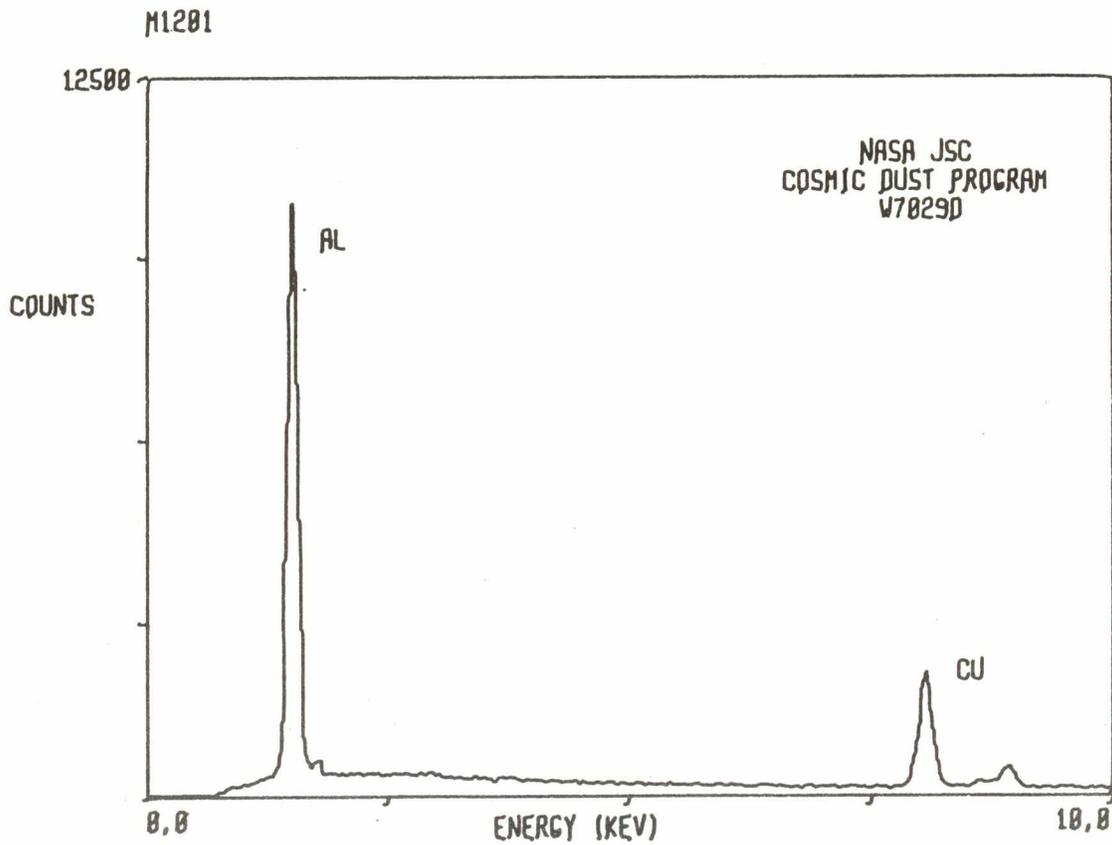


W7029D12

S-82-27798

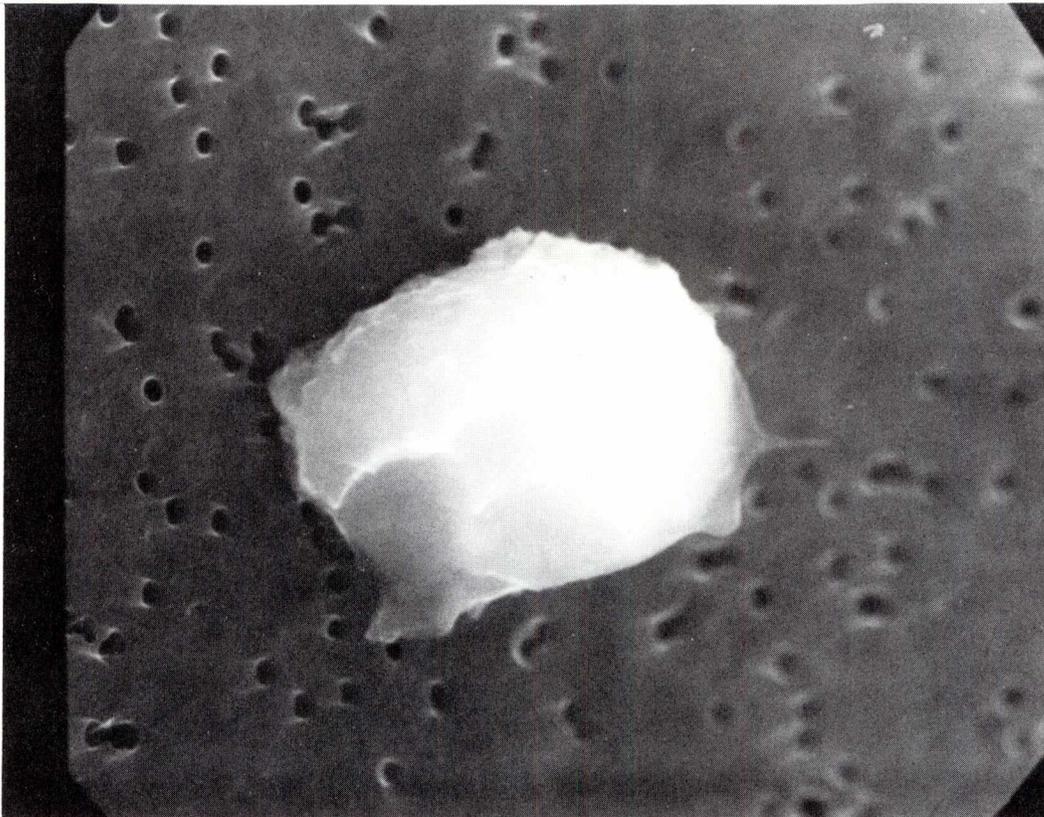


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 5 | S | T | CL/Pale Yellow | V | AOS | |

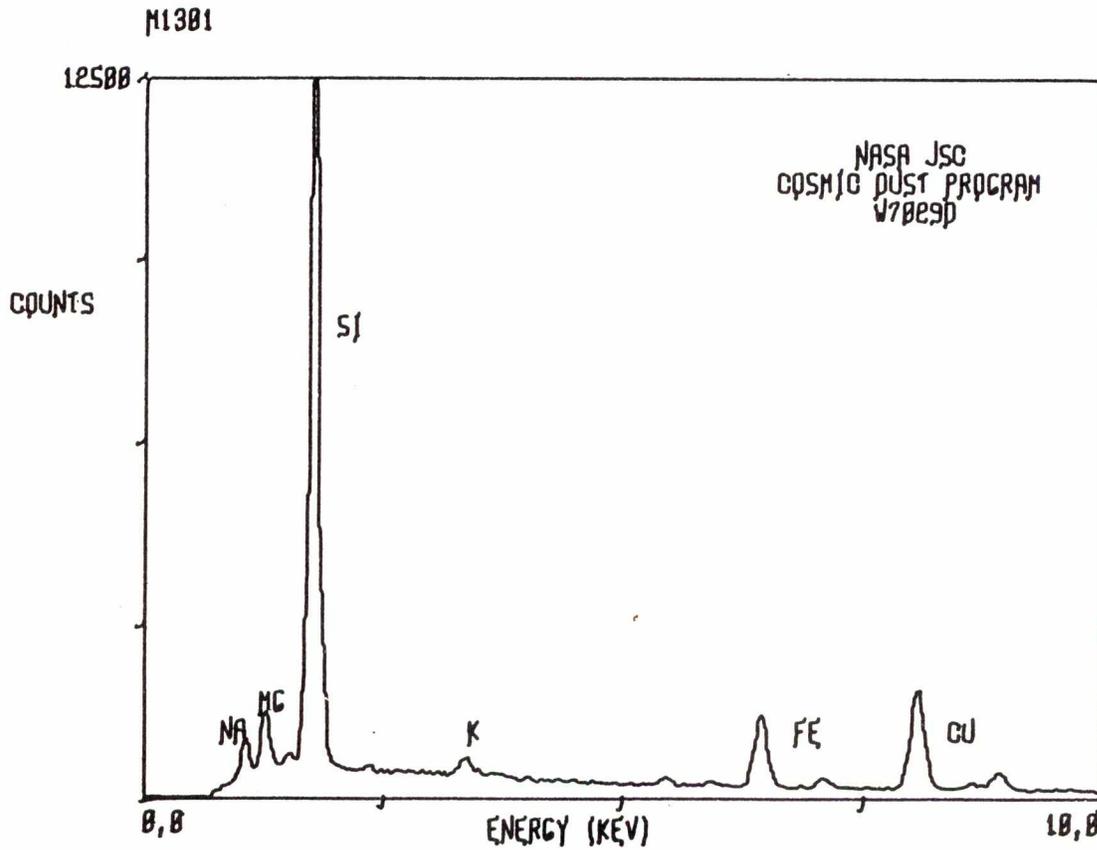


W7029D13

S-82-27799

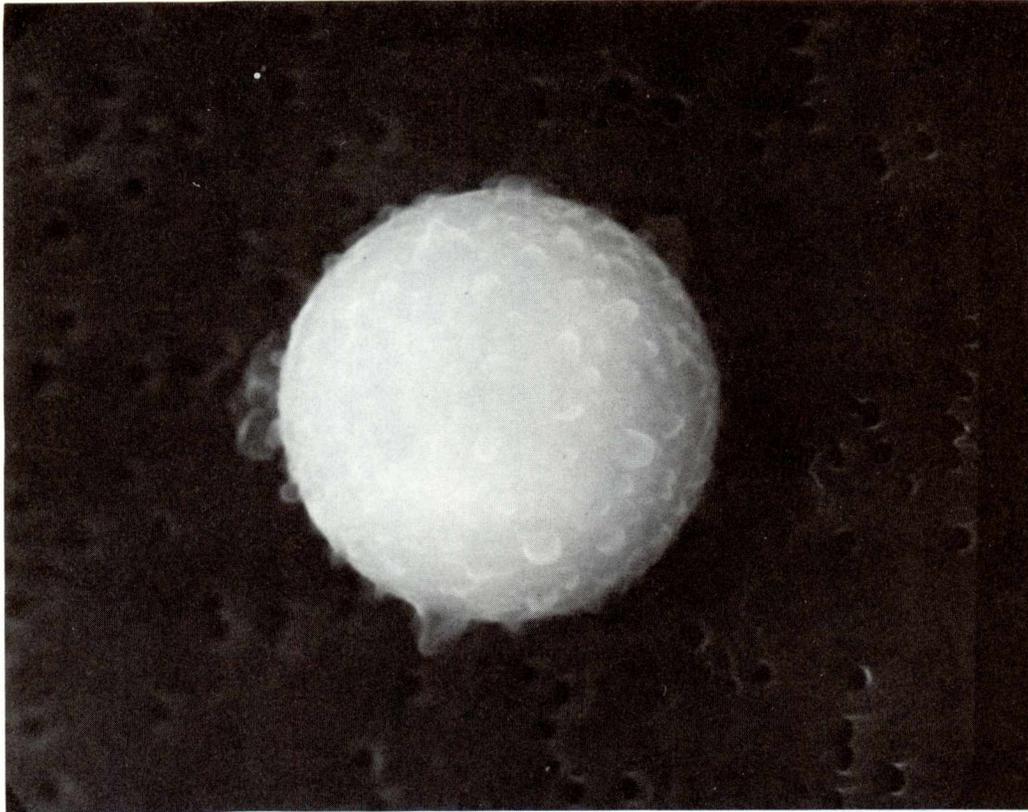


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 4x6 | I | TL | Pale Yellow | V | TCN? | |

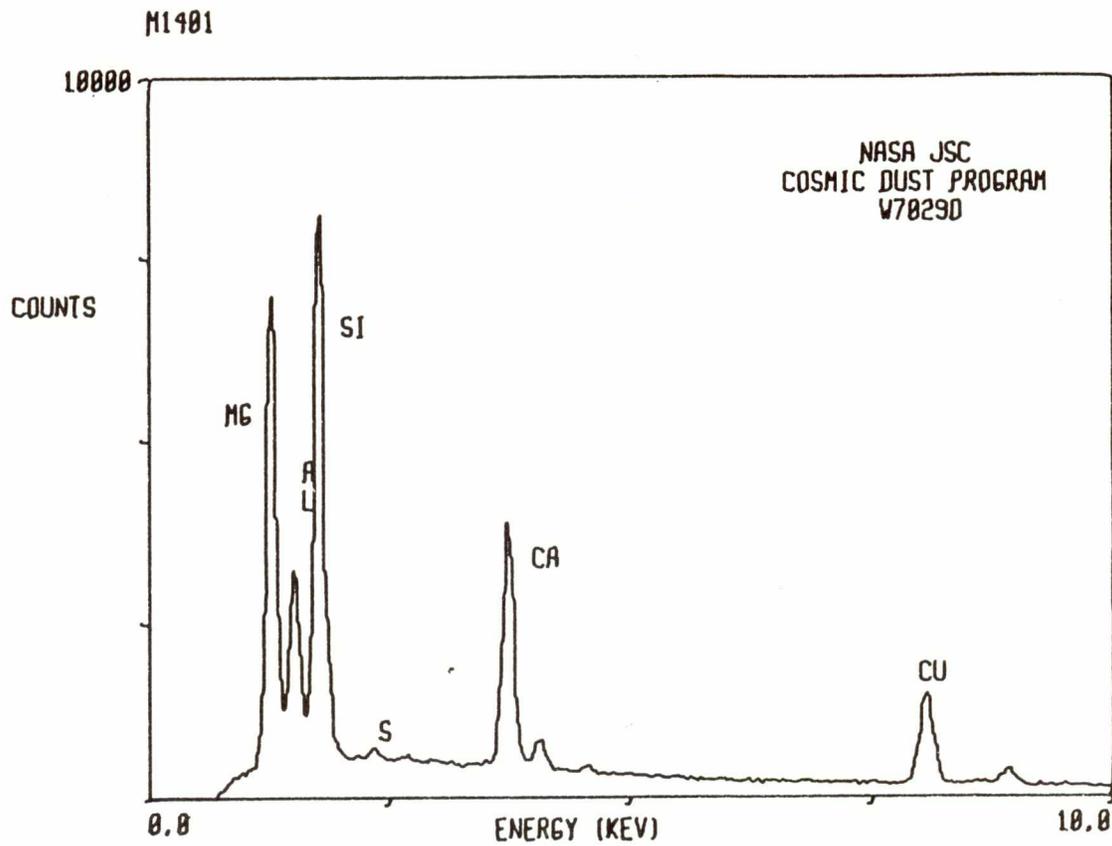


W7029D14

S-82-27800

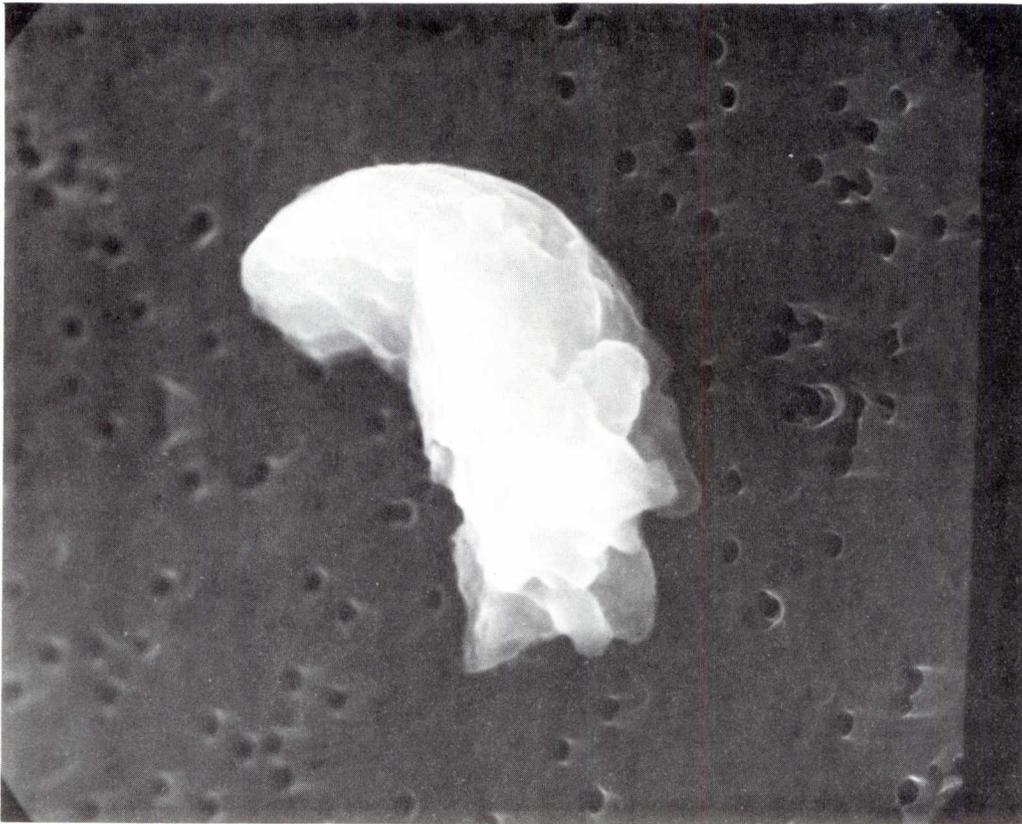


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 5 | S | TL | Pale Yellow | SV | C? | |

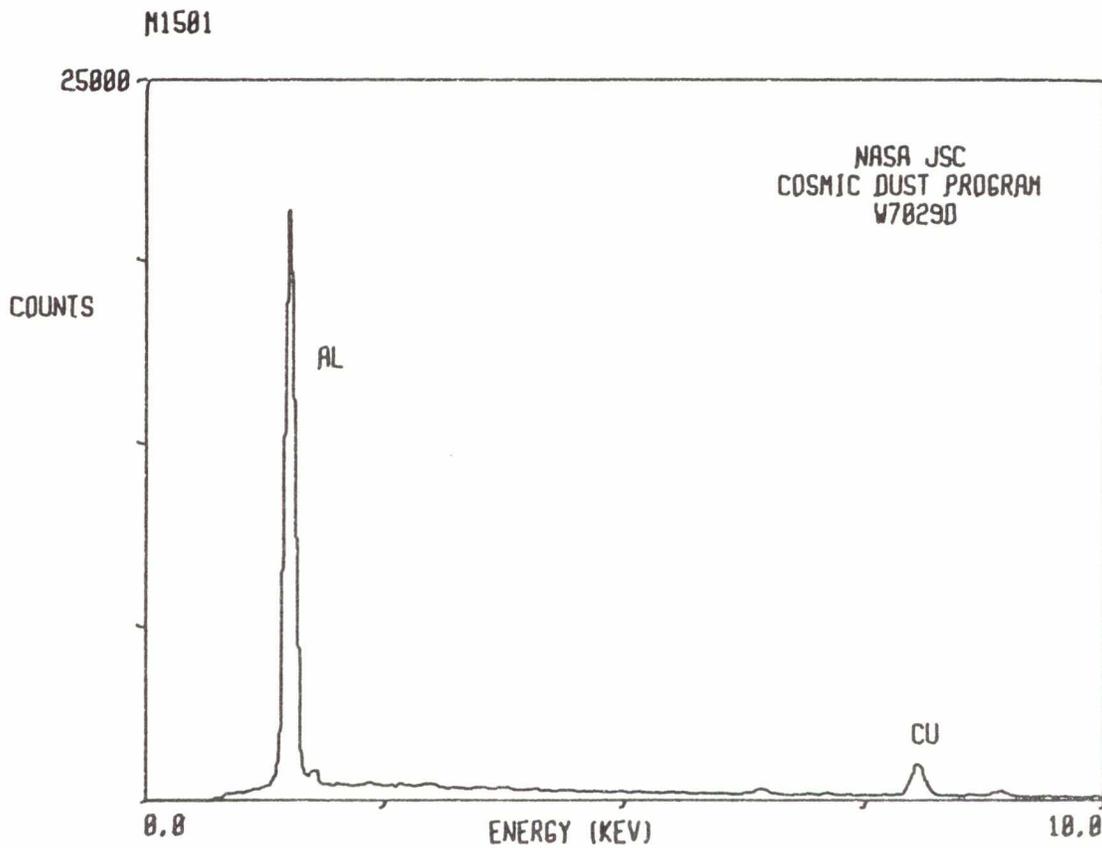


W7029D15

S-82-27801

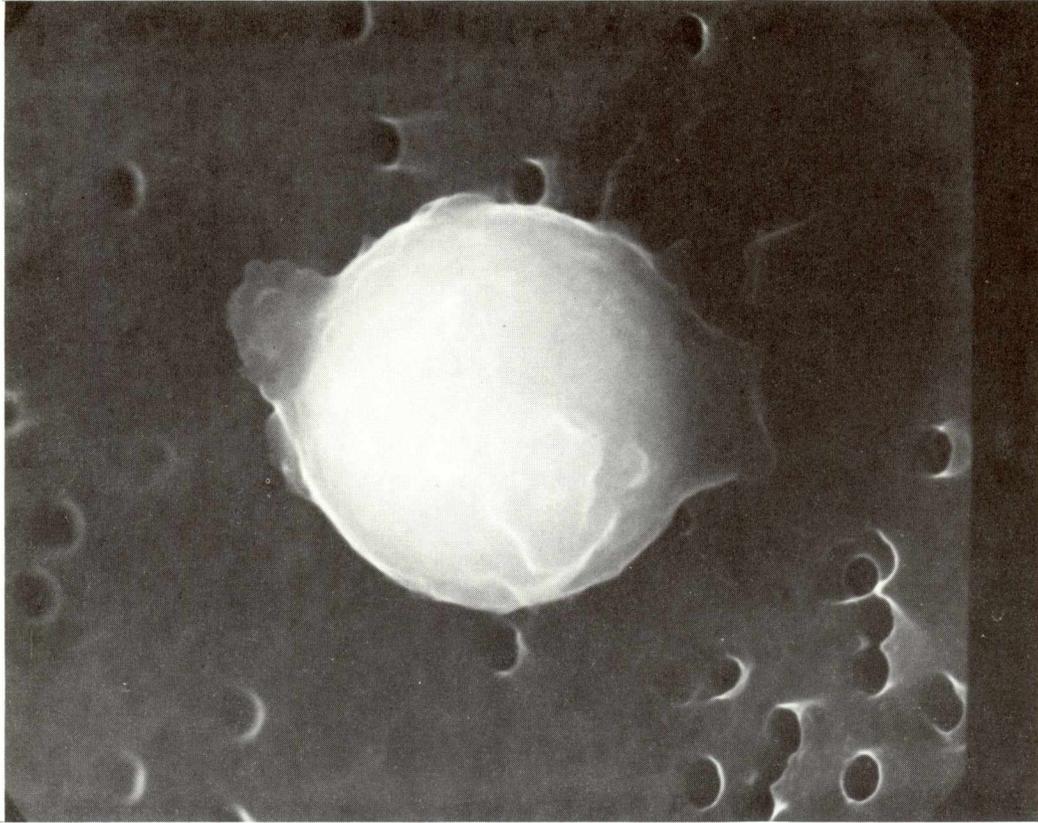


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 4x7 | I | TL | Pale Yellow | SV | AOS | |

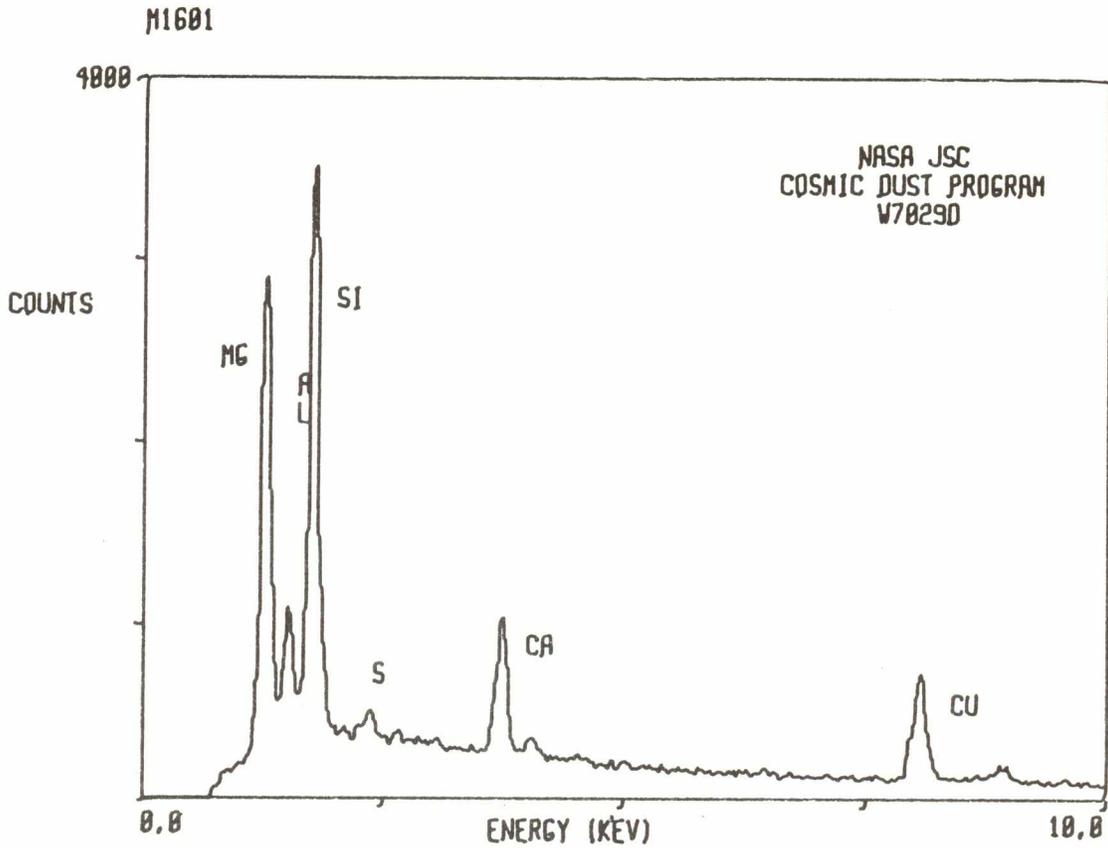


W7029D16

S-82-27803



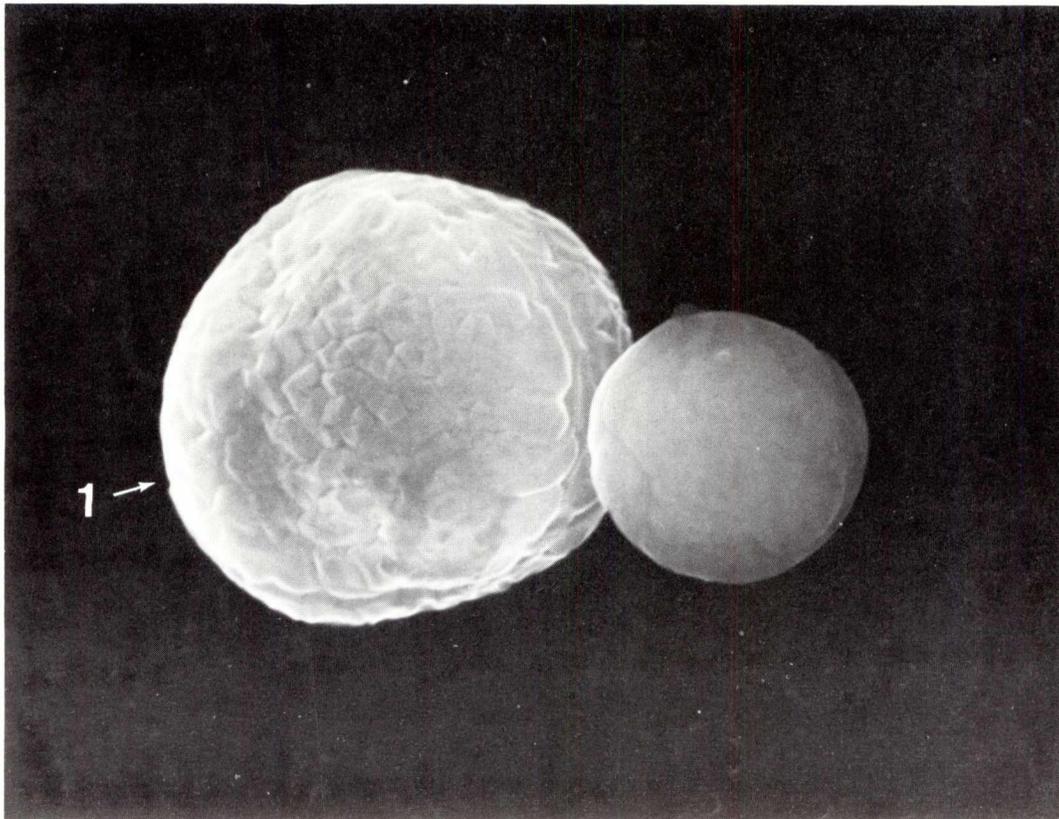
| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 3 | S/E | TL | Pale Yellow | SV | C? | |



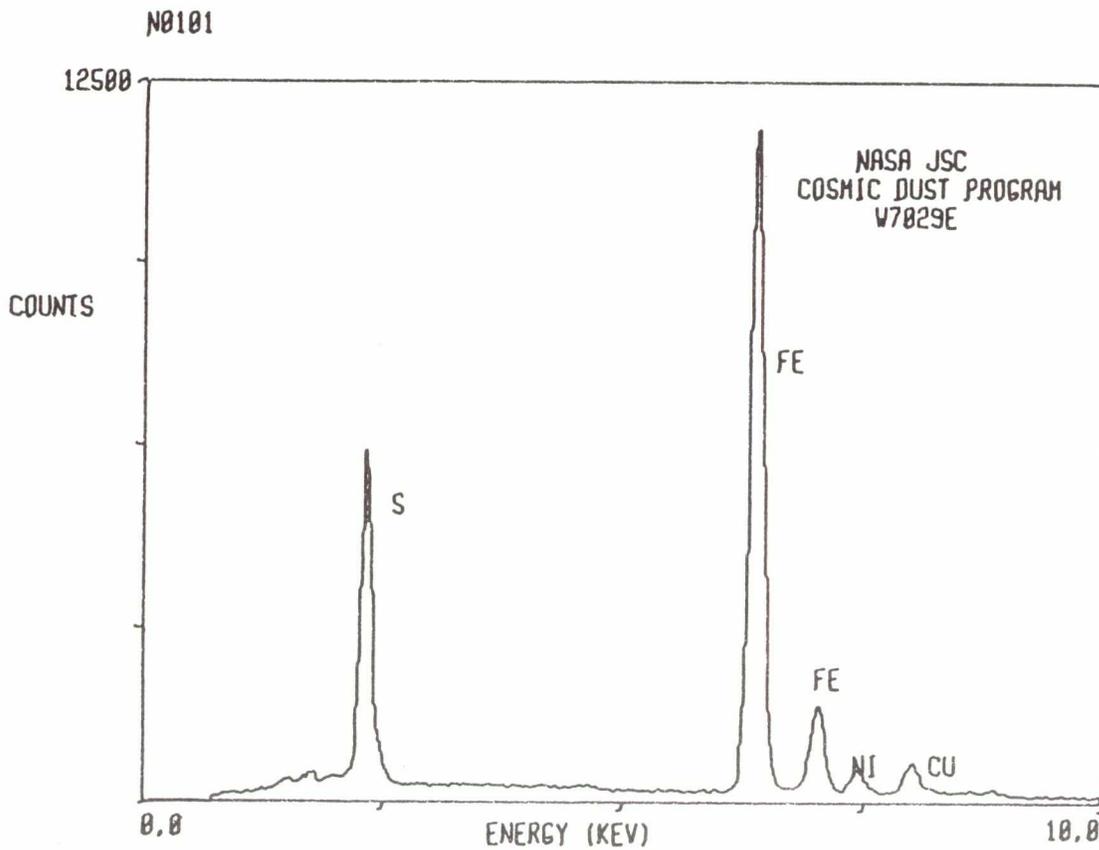
MOUNT W7029E

W7029E1

S-82-28020

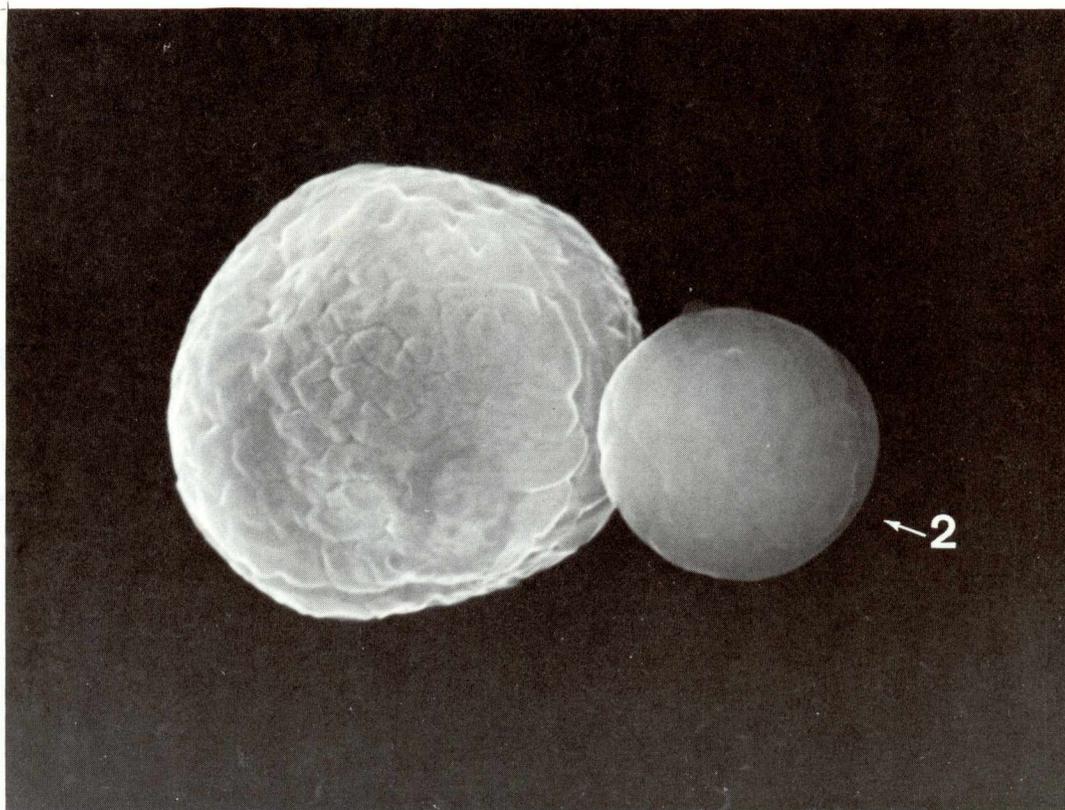


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|--------------------------|
| 9 | S/E | 0 | Gray-black | M | C | Marked by arrow on photo |



W7029E2

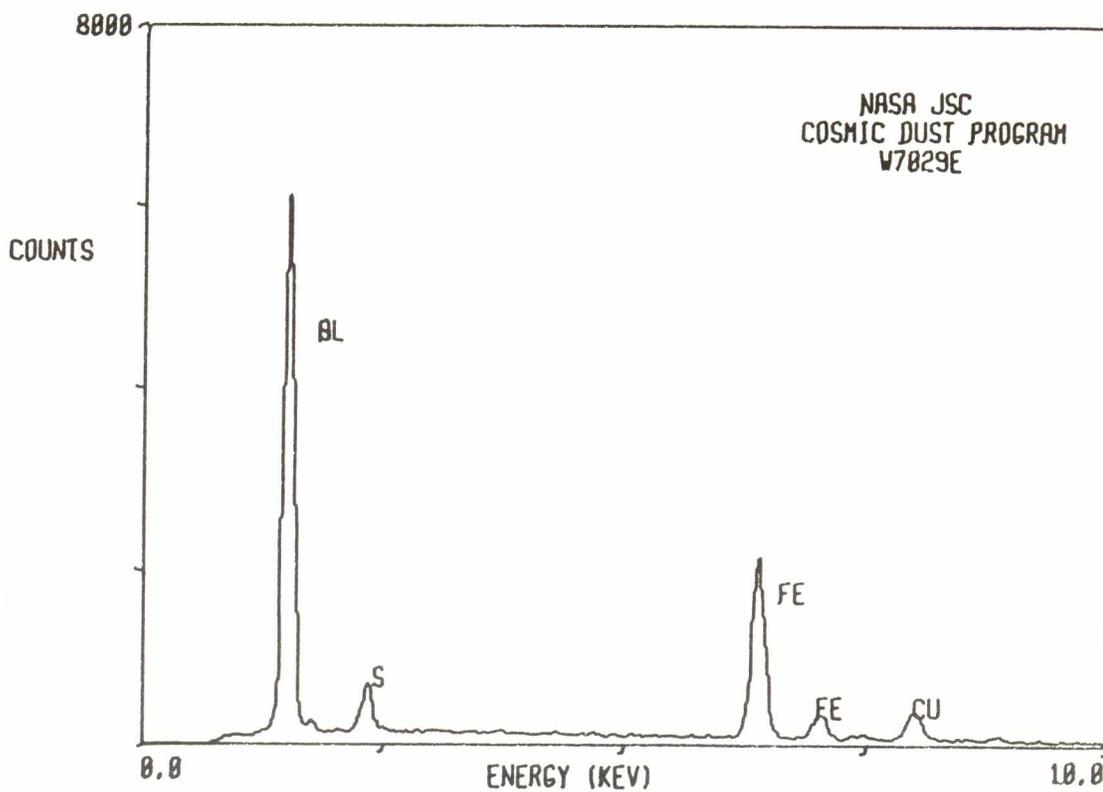
S-82-28020



| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|--|
| 5 | S | T | CL/Pale Yellow | V | AOS? | Marked by arrow on photo. Fe, S x-ray emission probably from particle W7029D1. |

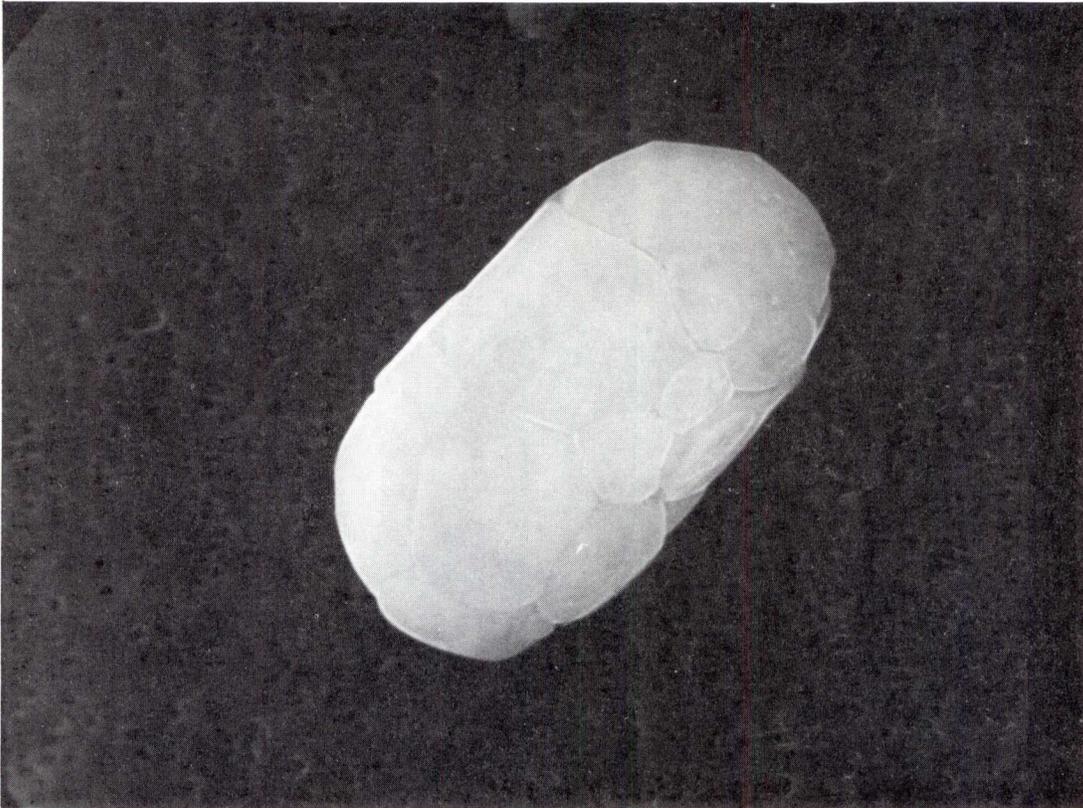
W7029E1

N8201

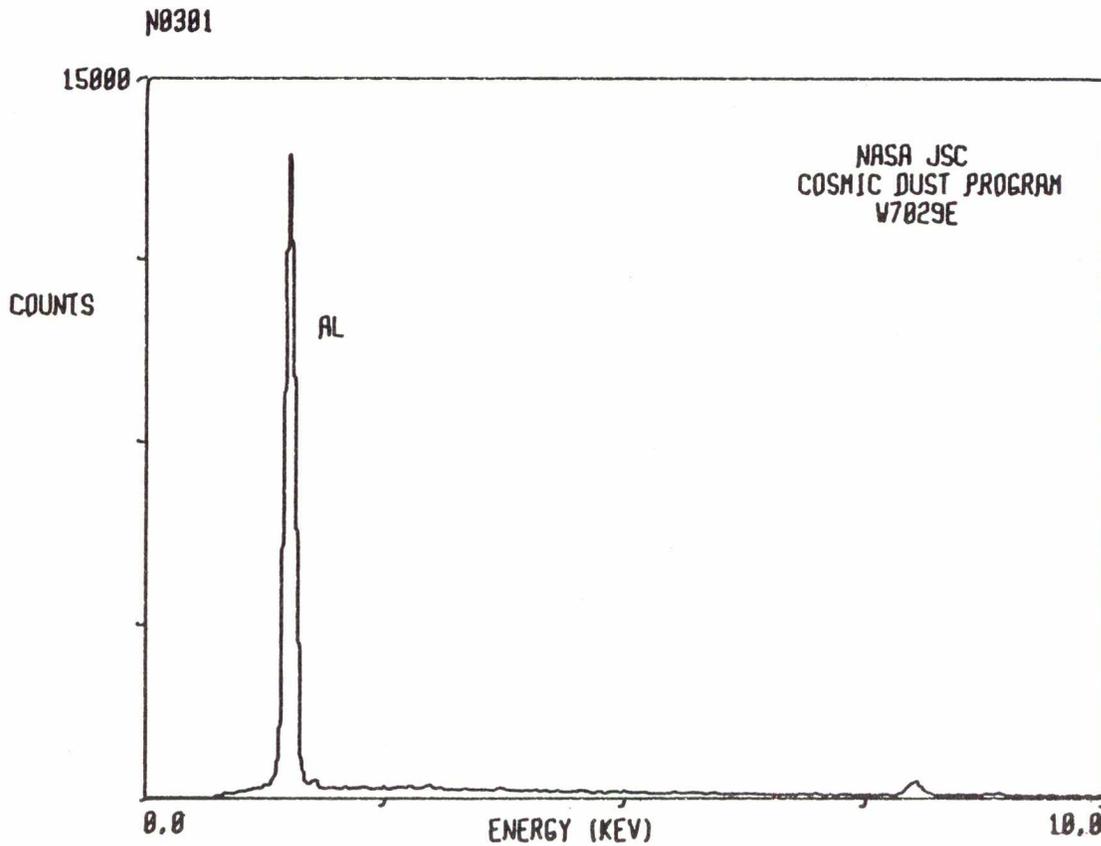


W7029E3

S-82-28021

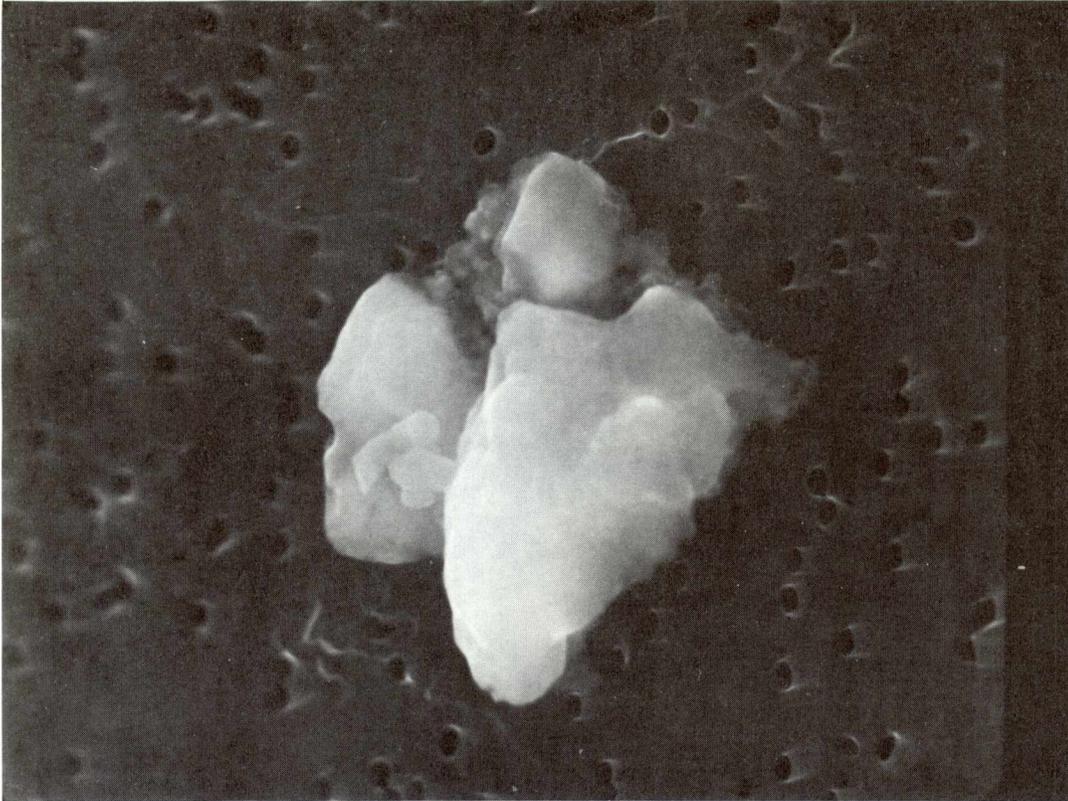


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 8x14 | I | TL | CL/Pale Yellow | V | AOS | |

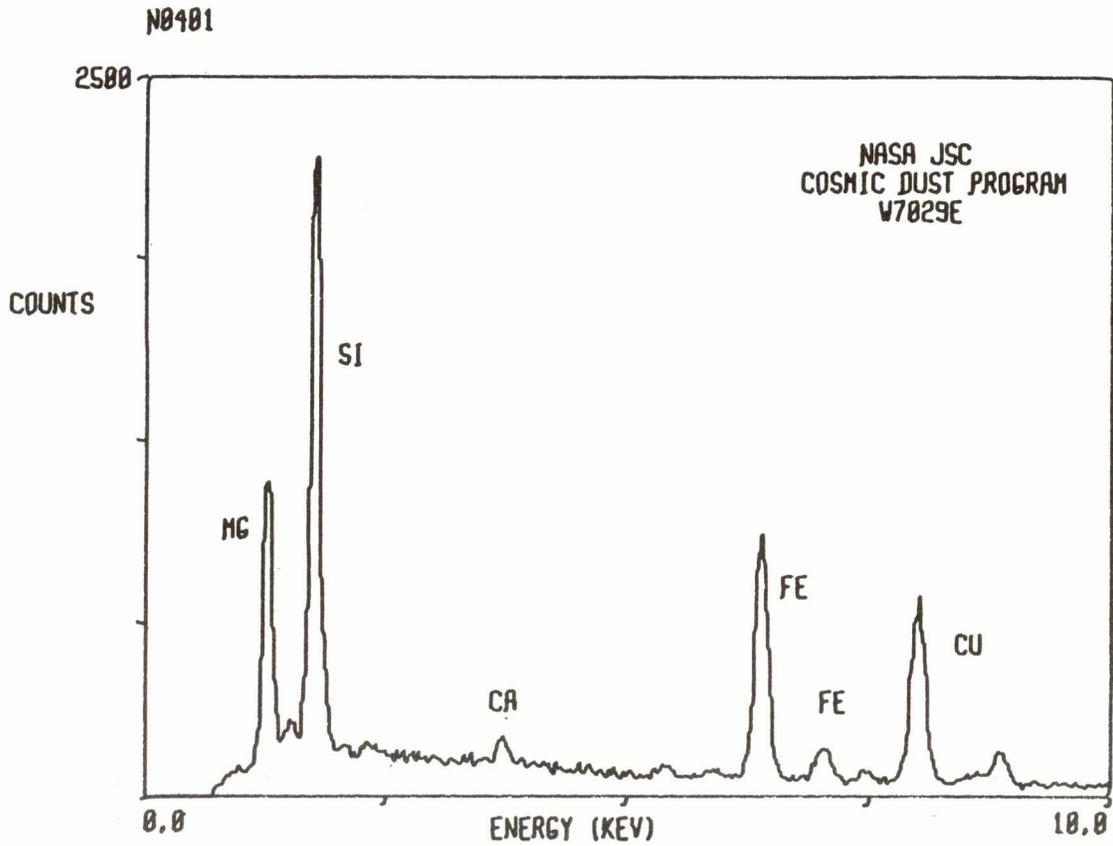


W7029E4

S-82-28022

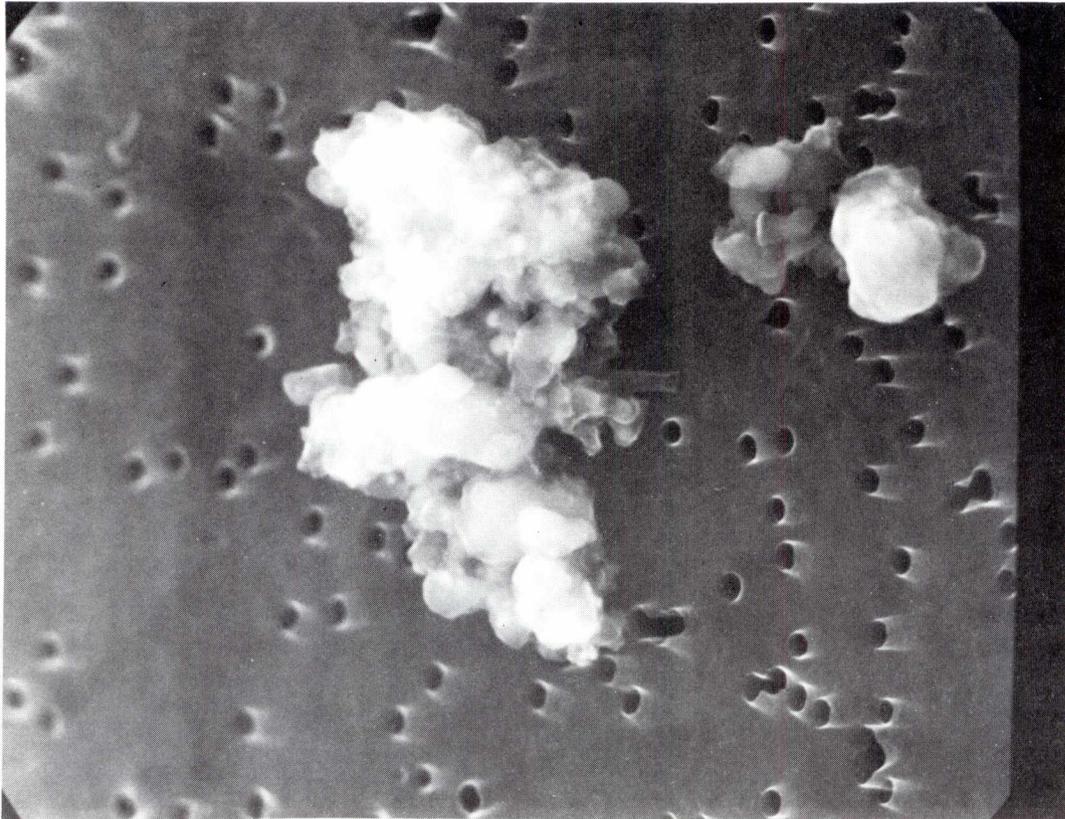


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------------------|
| 5x6 | I | 0 | Dk. Gray-black | D | C | Probably related to W7029E5 |

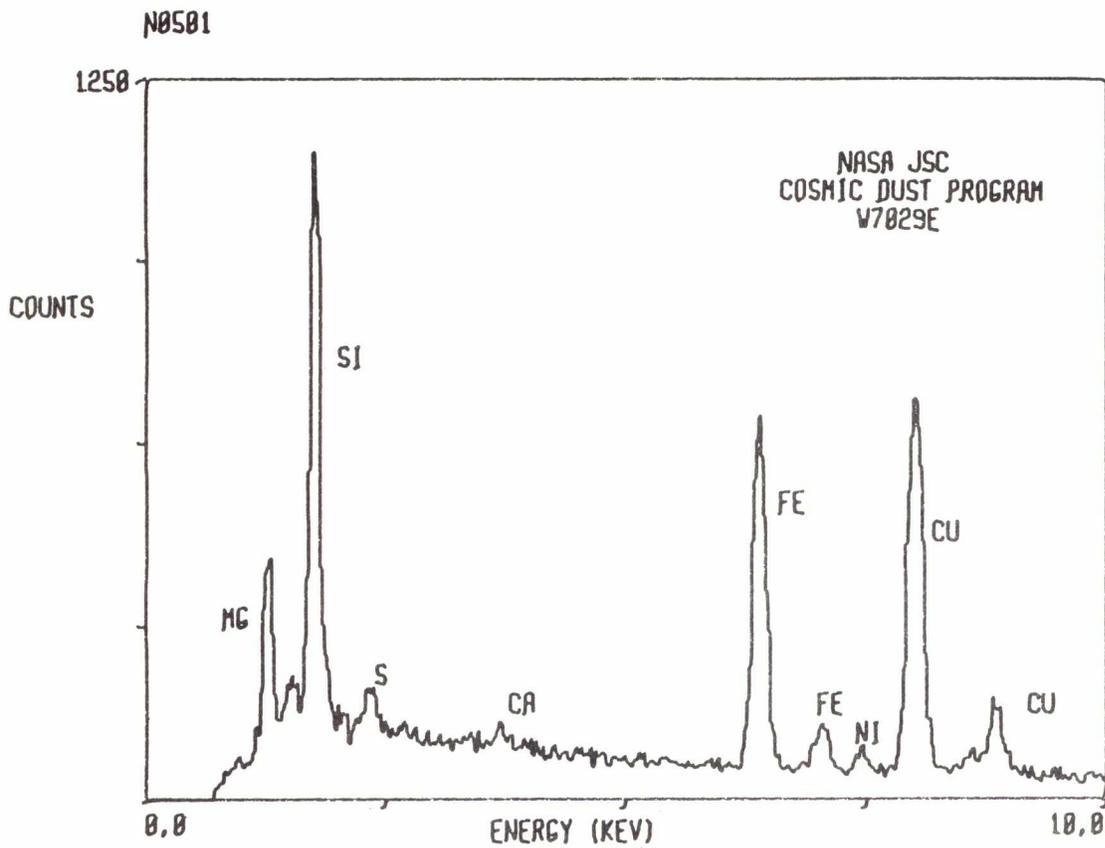


W7029E5

S-82-28023

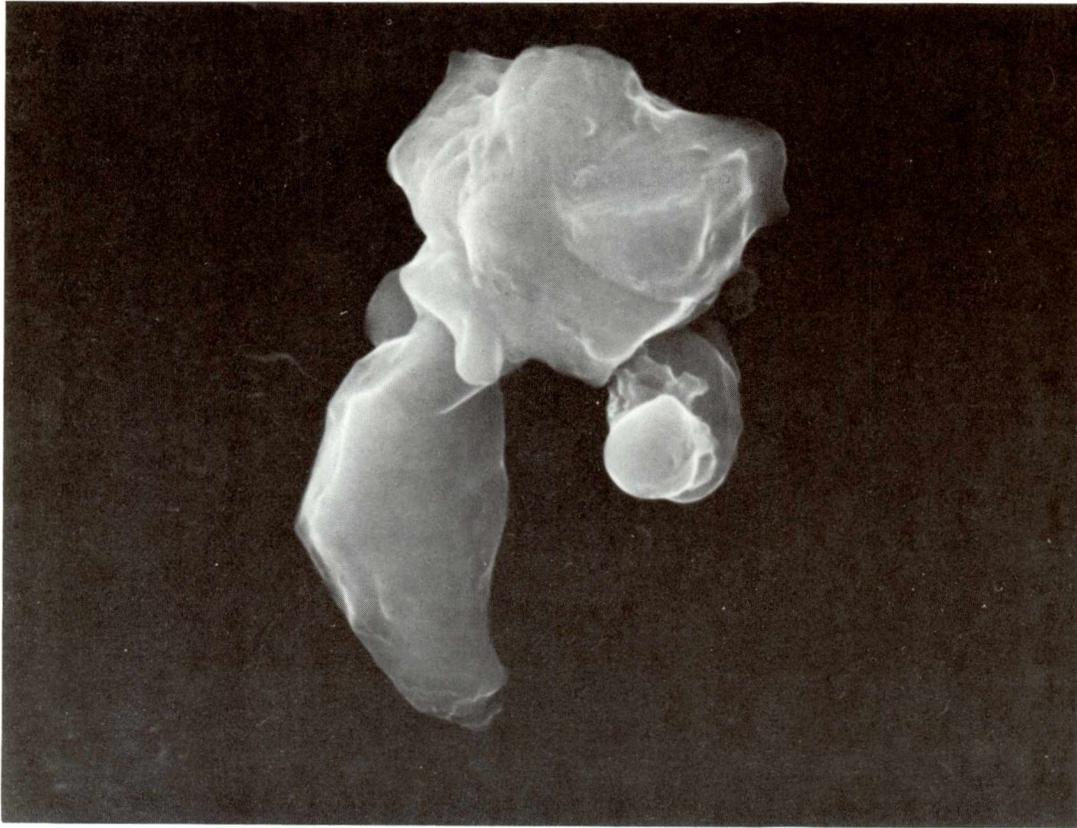


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------------------|
| 4x7 | I | O | Dk. Gray-black | D | C | Probably related to W7029E4 |

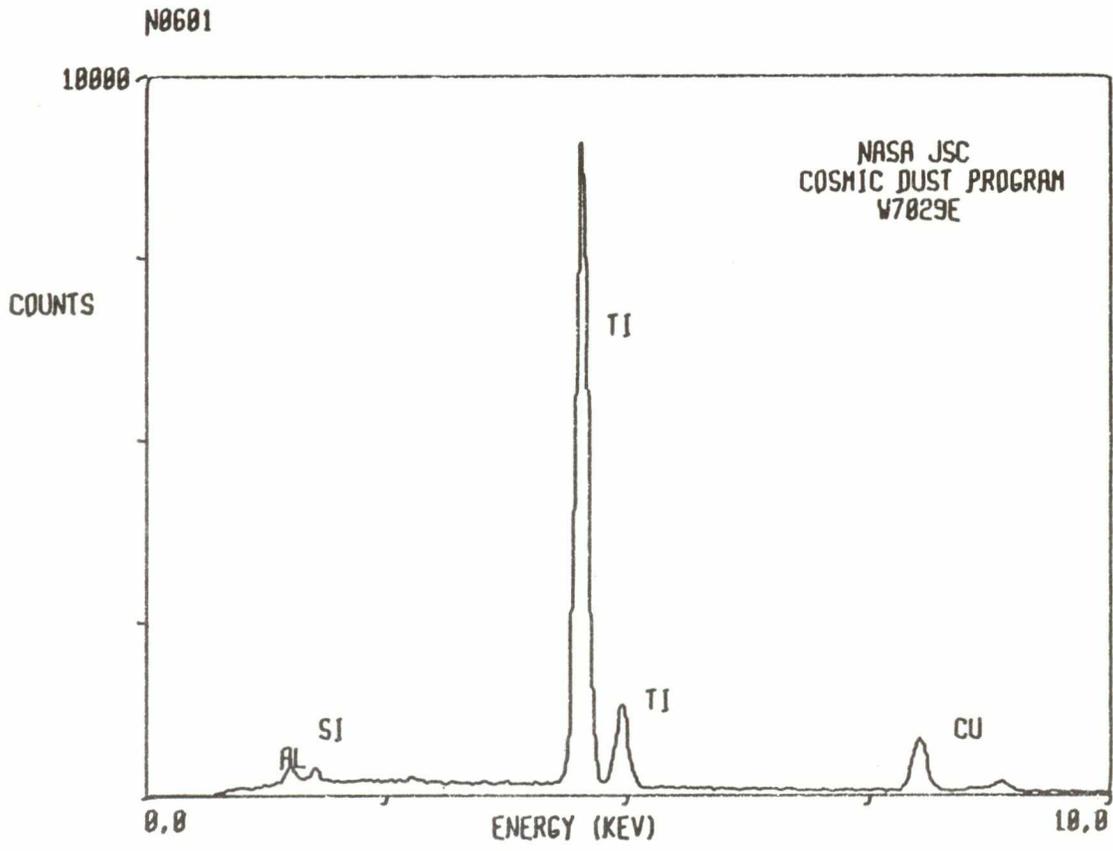


W7029E6

S-82-28024

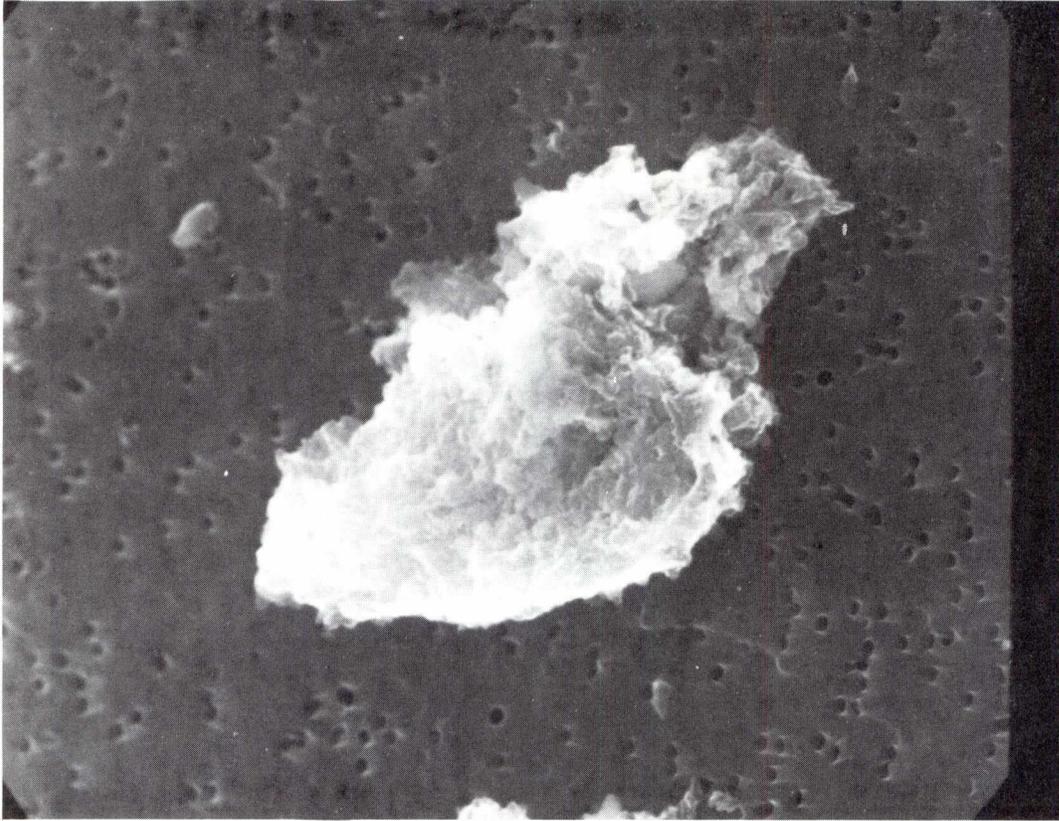


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 10x12 | I | 0 | Black | SV/SM | TCA? | |

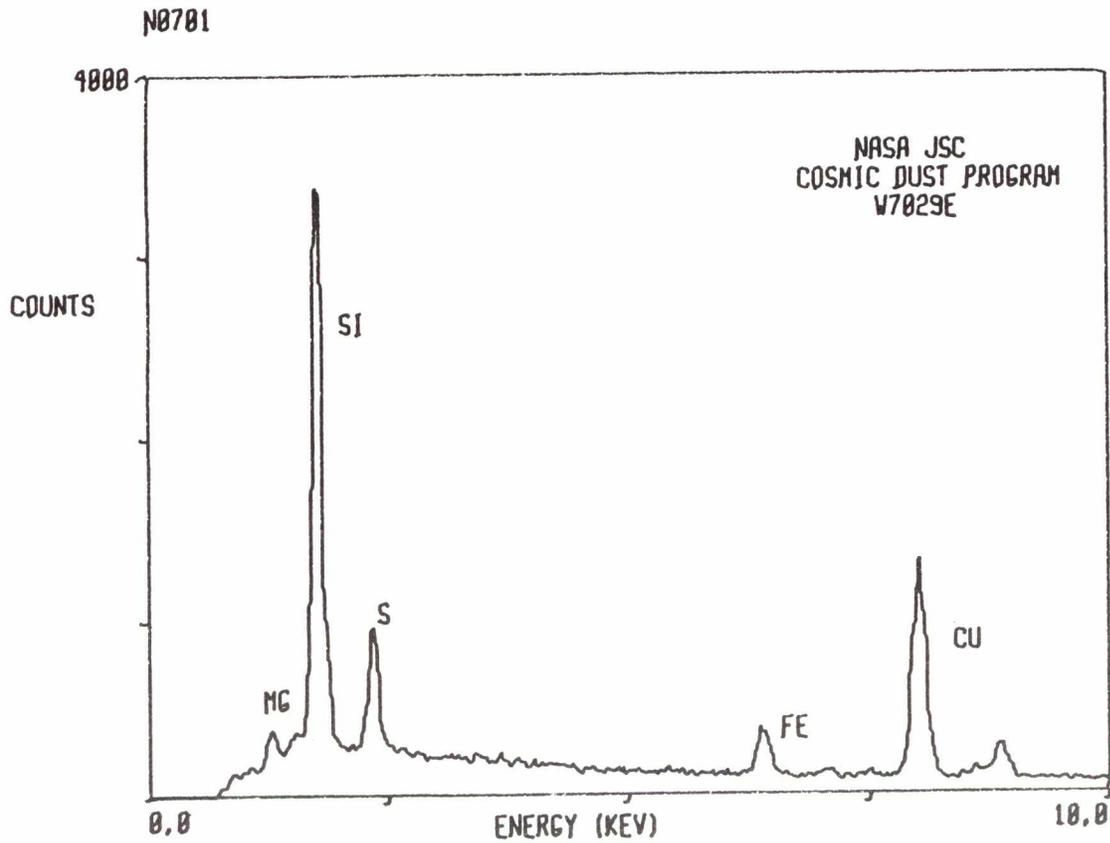


W7029E7

S-82-28025

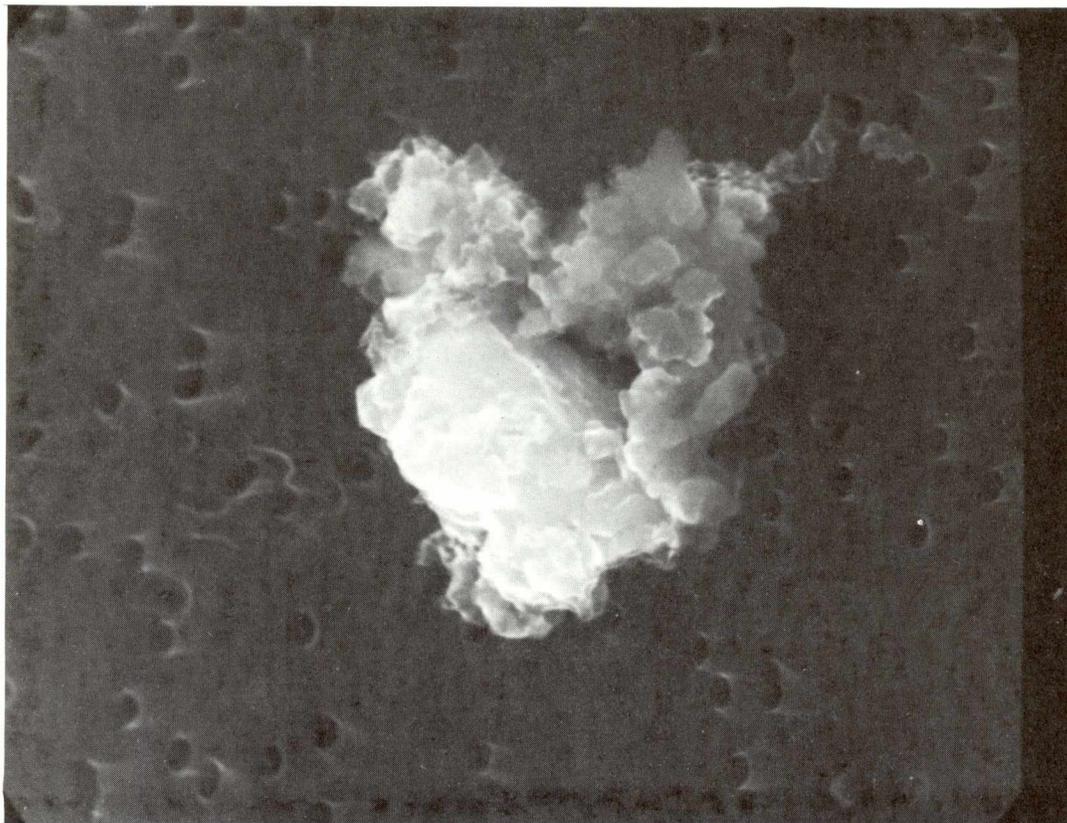


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-------------------------|
| 6x13 | I | 0 | Black | D/SV | ? | Associated with W7029E8 |

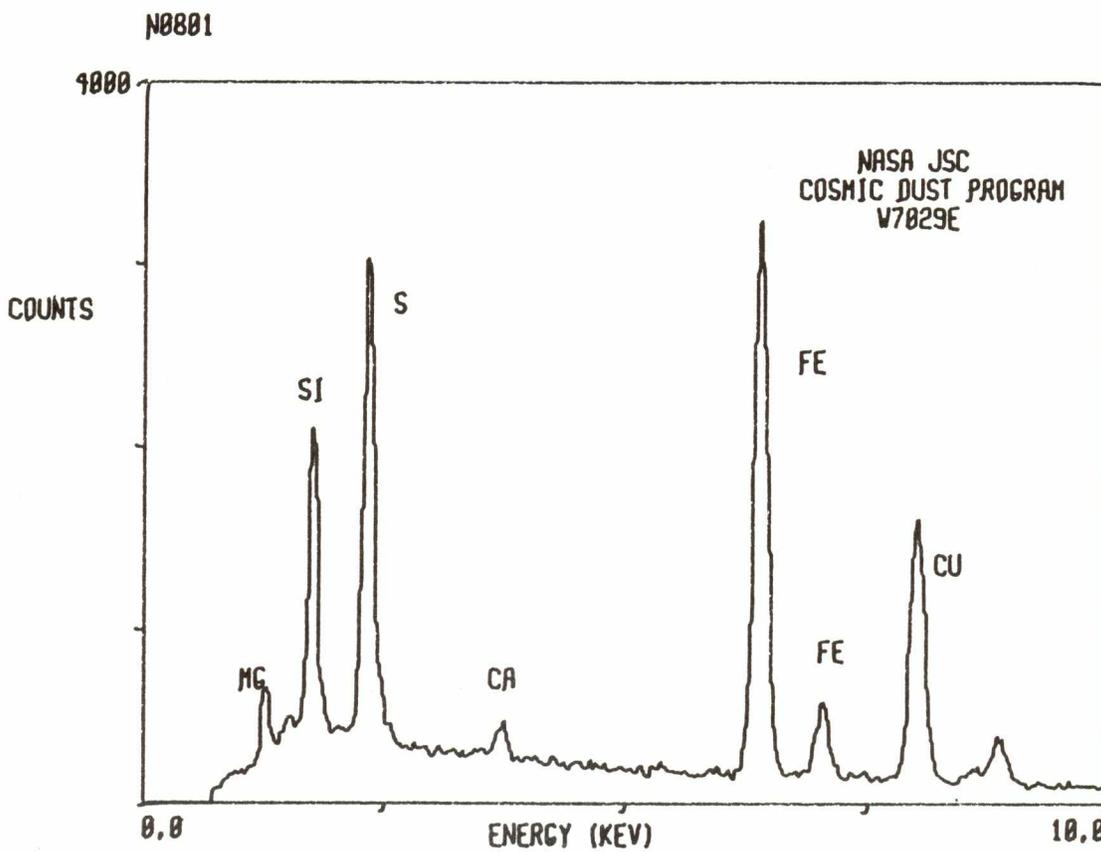


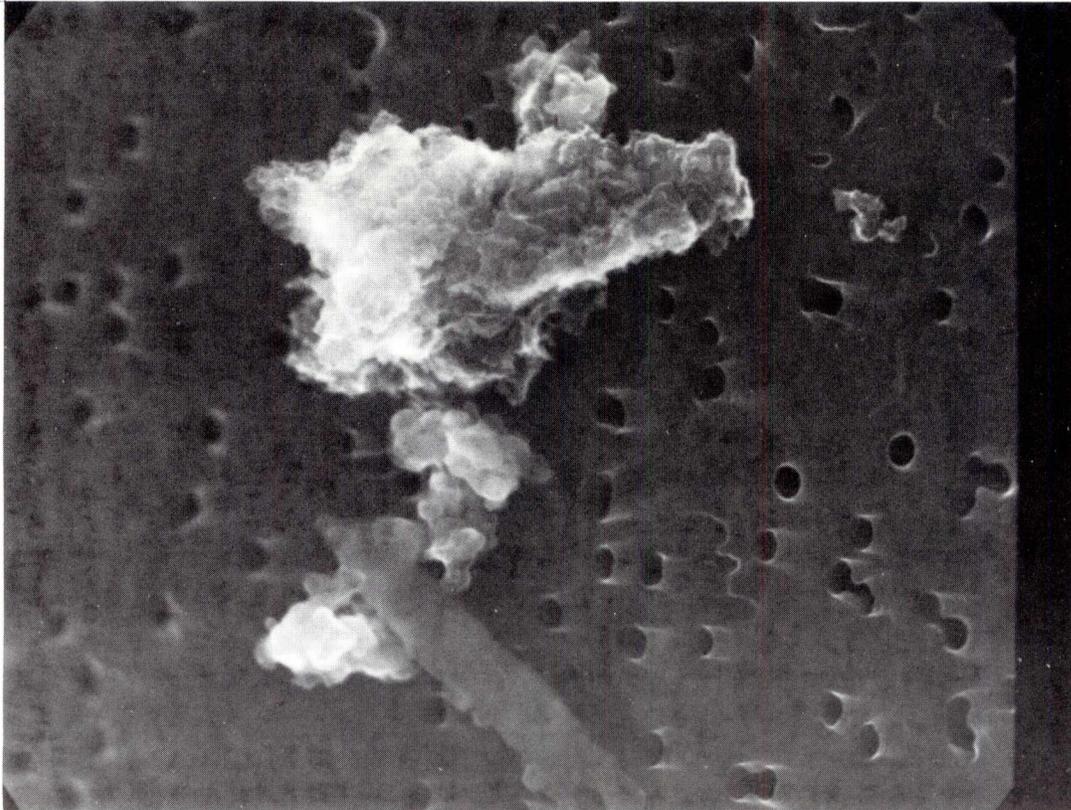
W7029E8

S-82-28026

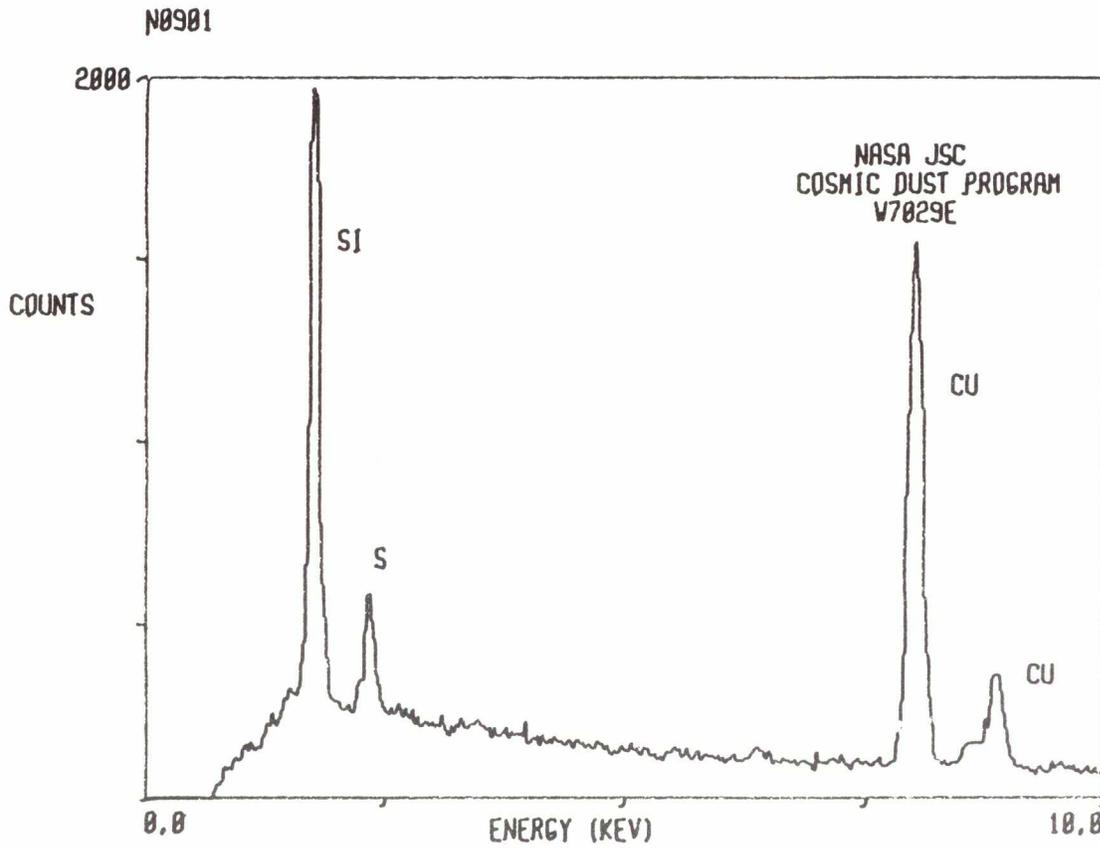


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 4x5 | I | 0 | Black | D/SV | C? | |



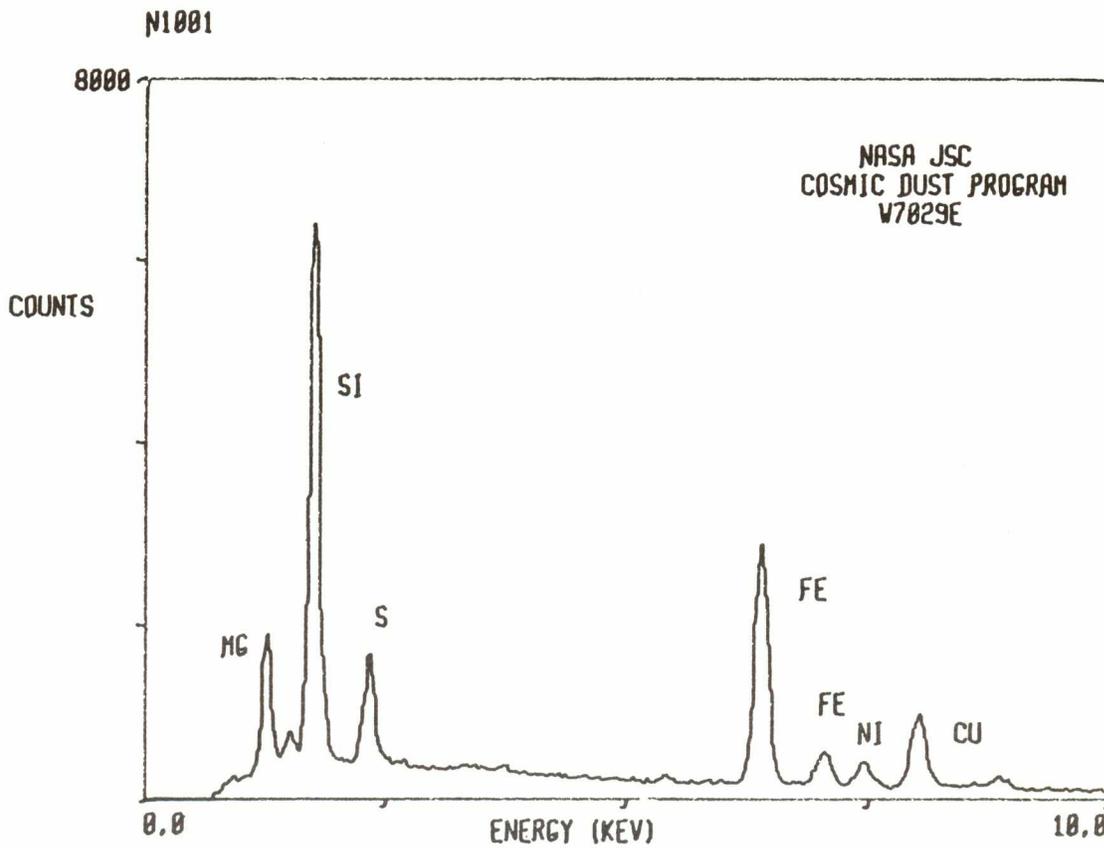


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-------------------------|
| 3x5 | I | 0 | Black | D/SV | ? | Associated with W7029E8 |



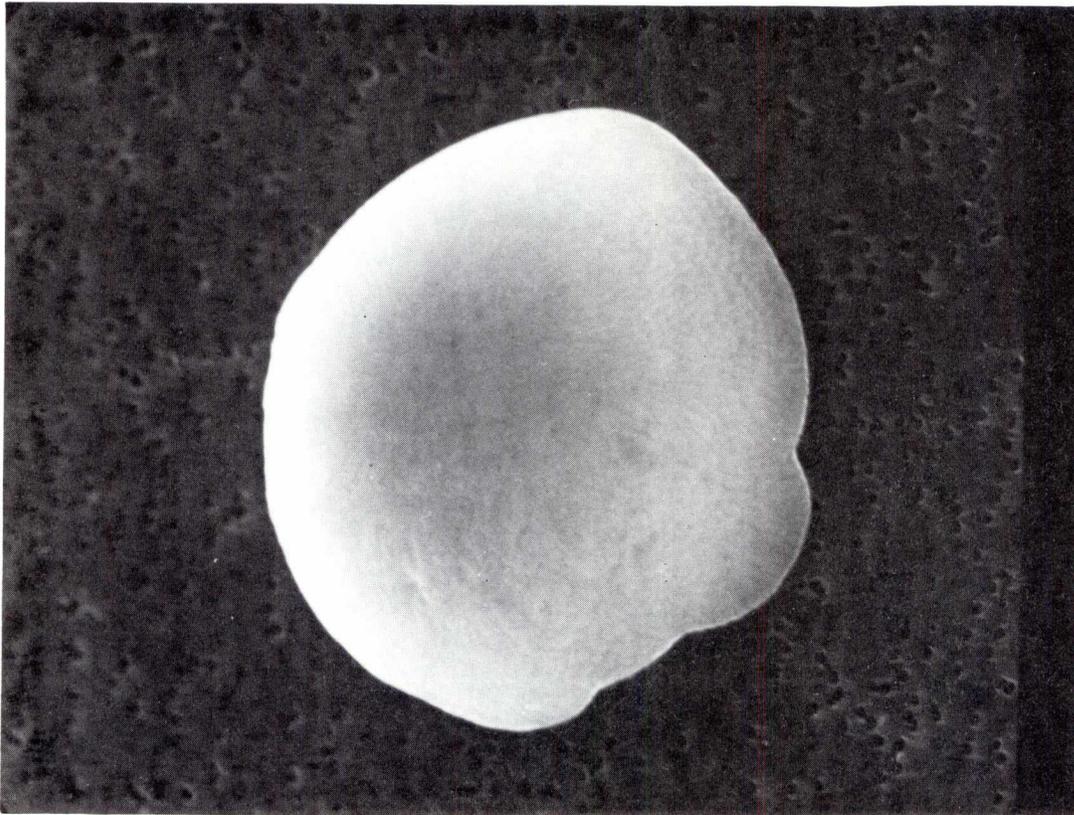


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-------------------|
| 12x13 | I | 0 | Black | D/SV | C? | TL areas on edges |

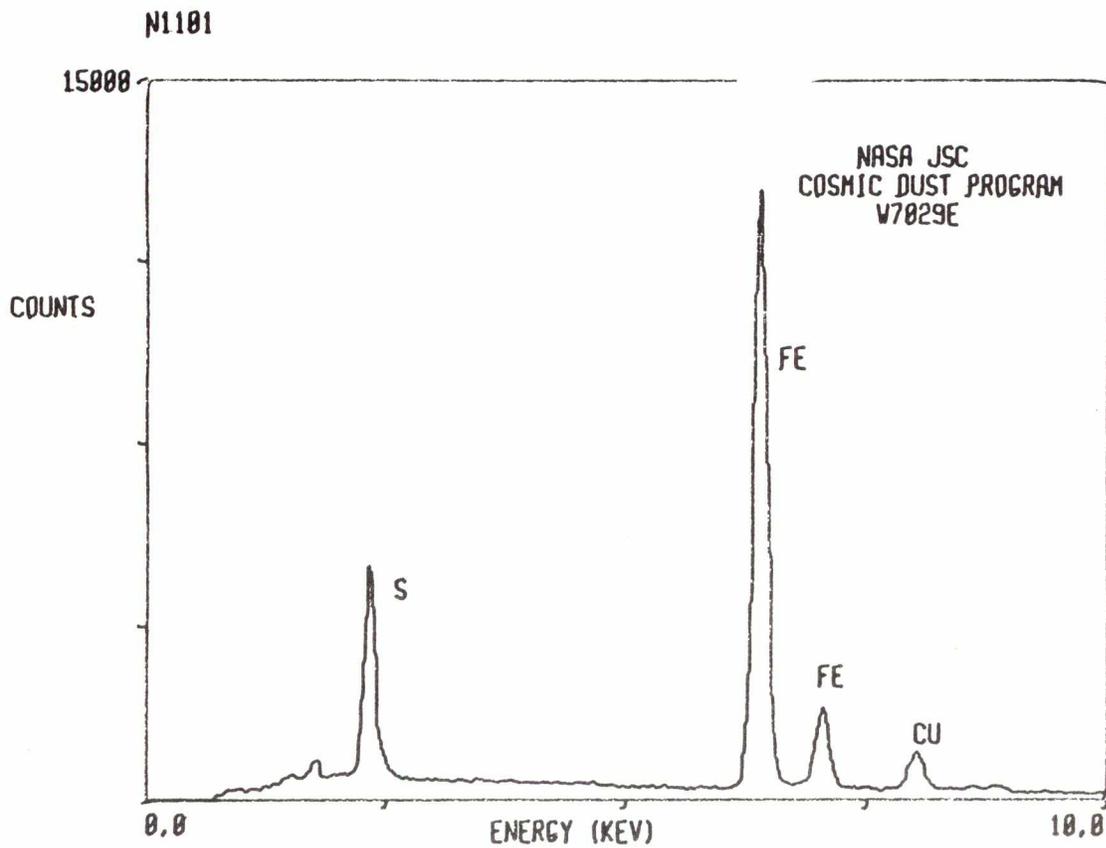


W7029E11

S-82-28029

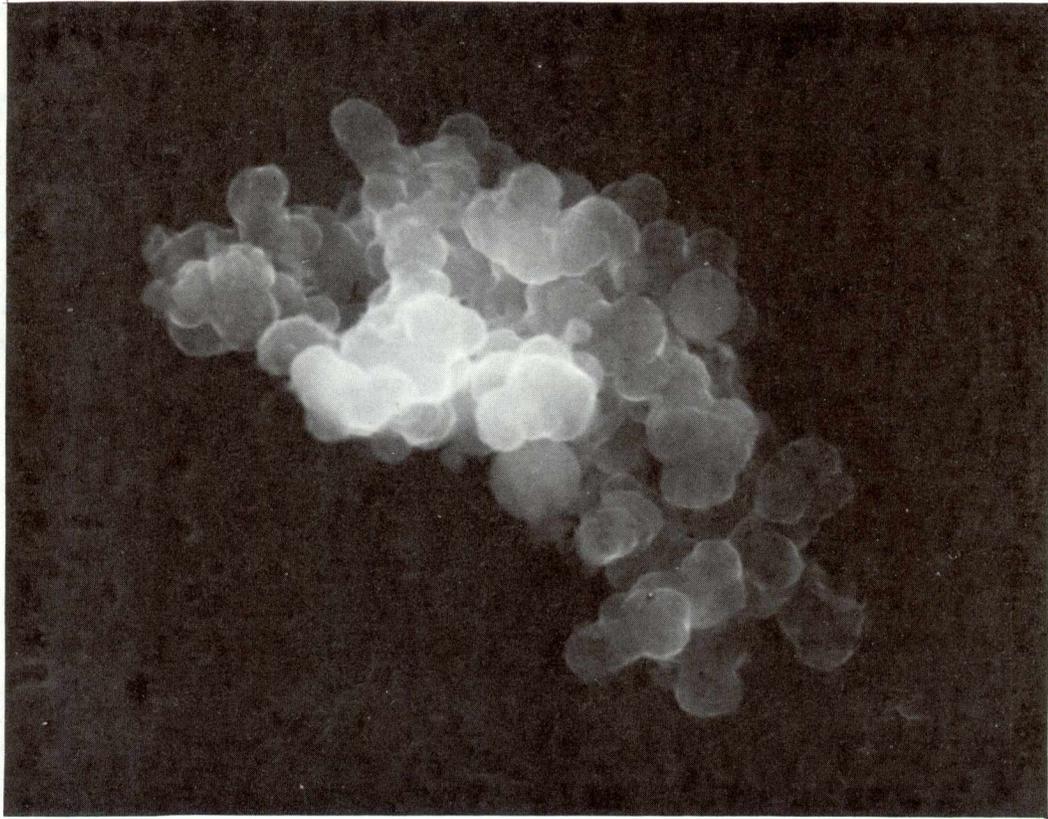


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|-----------------|---------------|-------------|-----------------|
| 13x15 | S/E | 0 | Dk. Brown-black | M | C? | Broken sphere? |

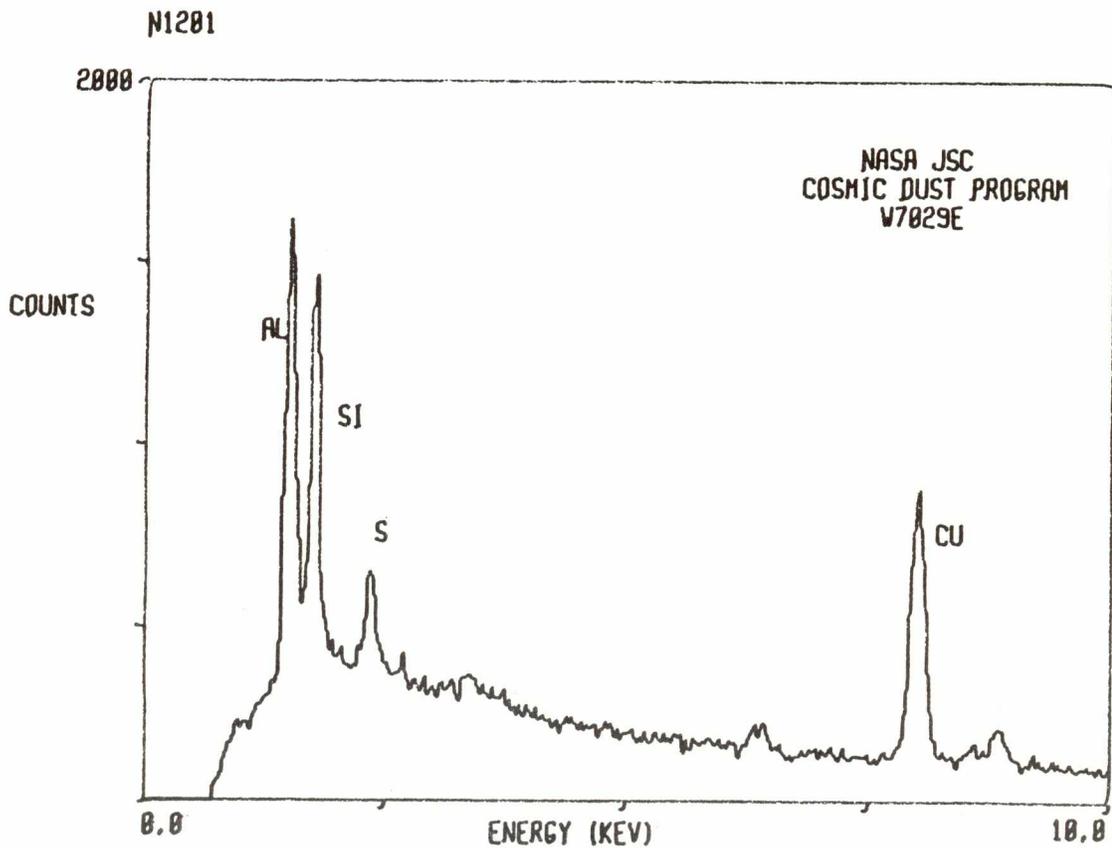


W7029E12

S-82-28034

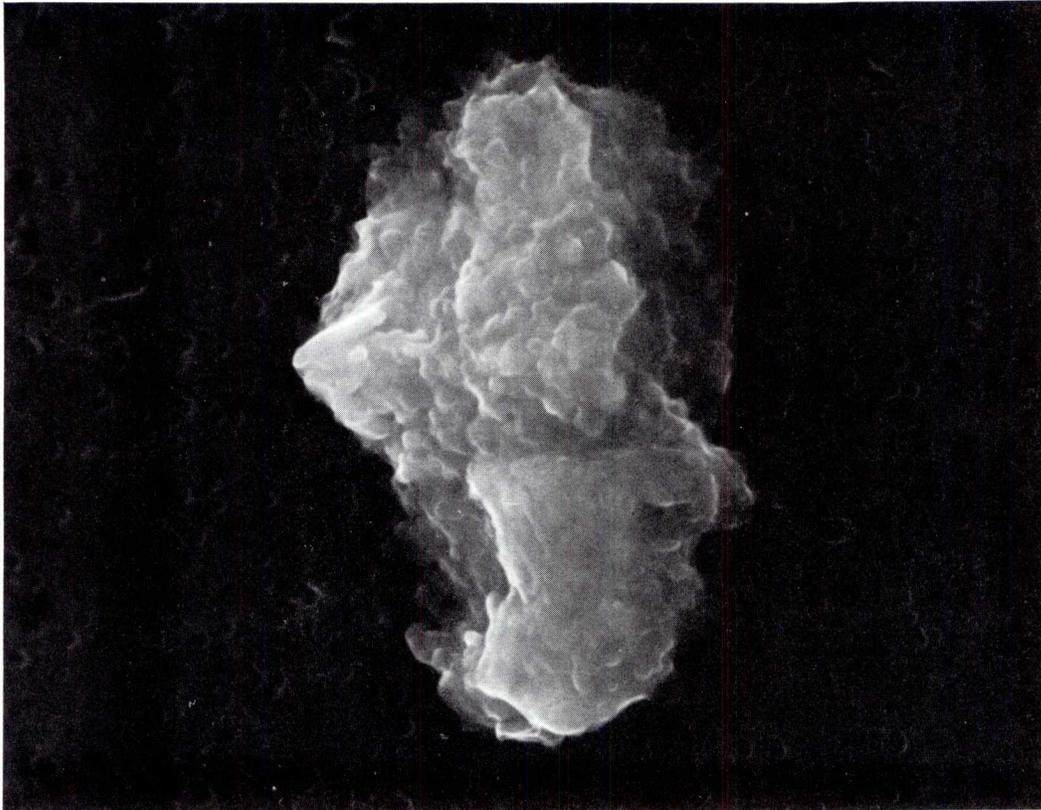


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------|---------------|-------------|-----------------|
| 6x12 | I | 0 | Dk. Gray-black | SV/SM | ? | |

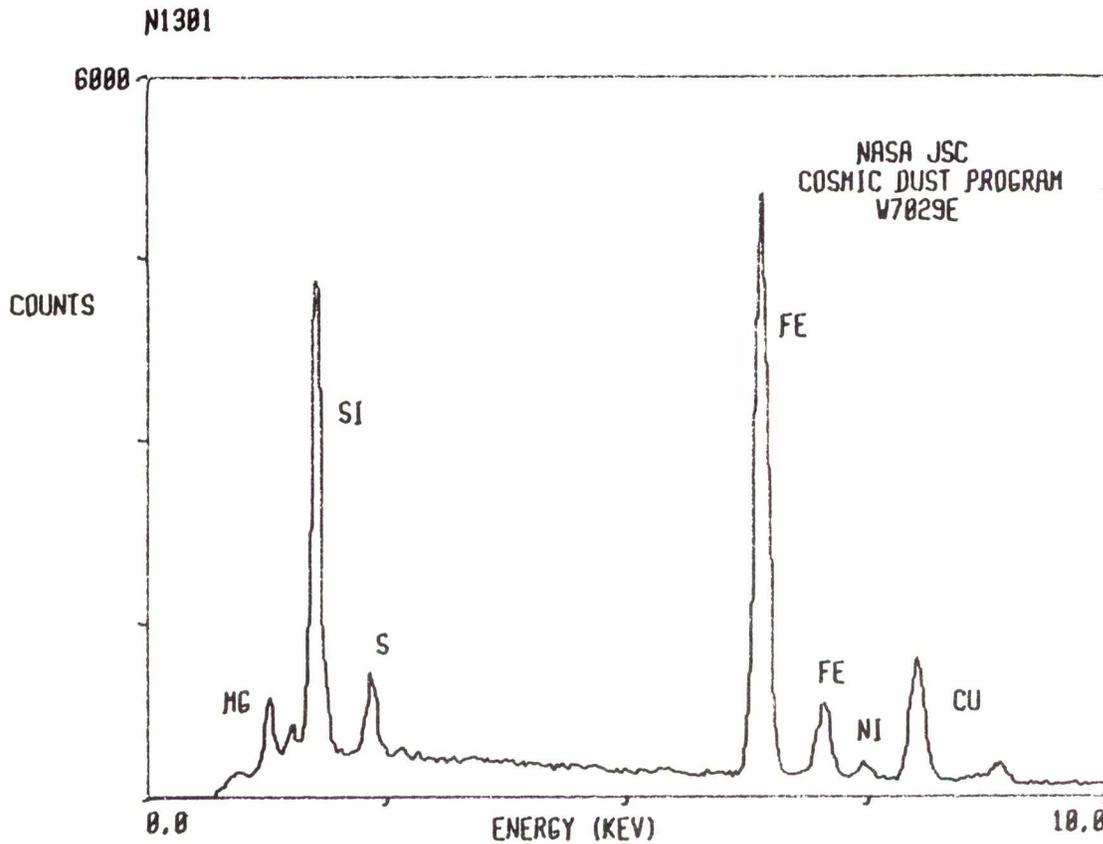


W7029E13

S-82-28033

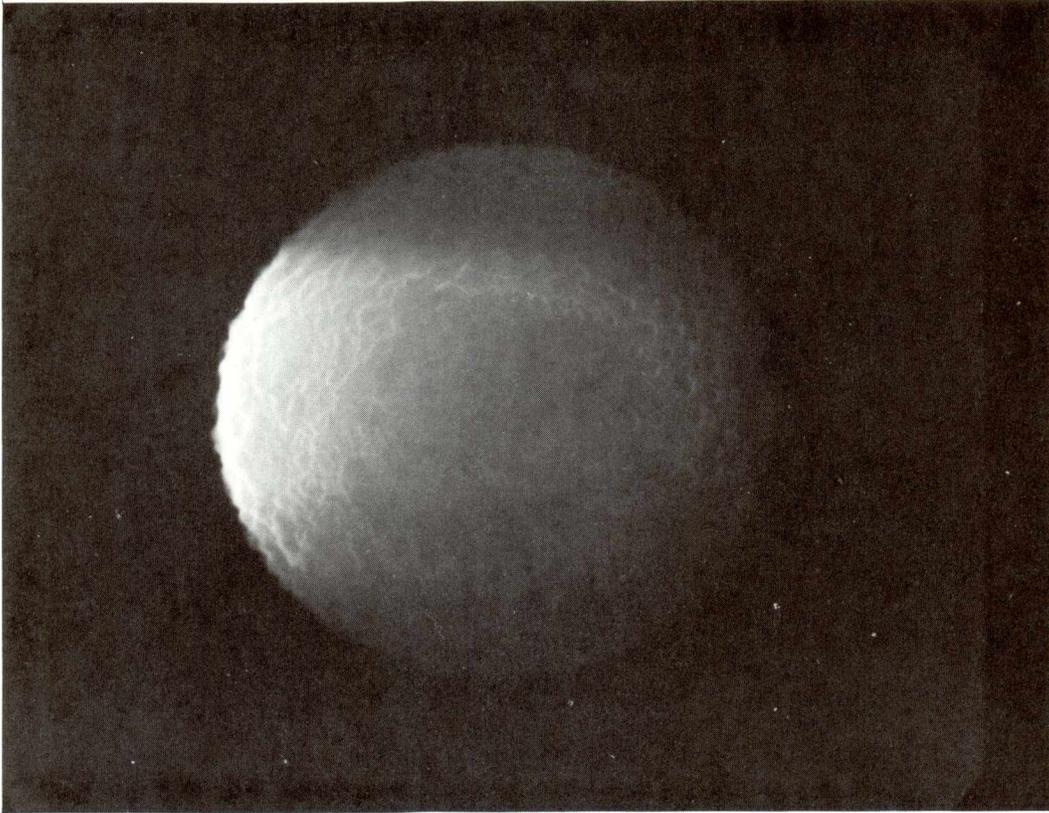


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 8x13 | I | 0 | Black | SV/SM | C | |

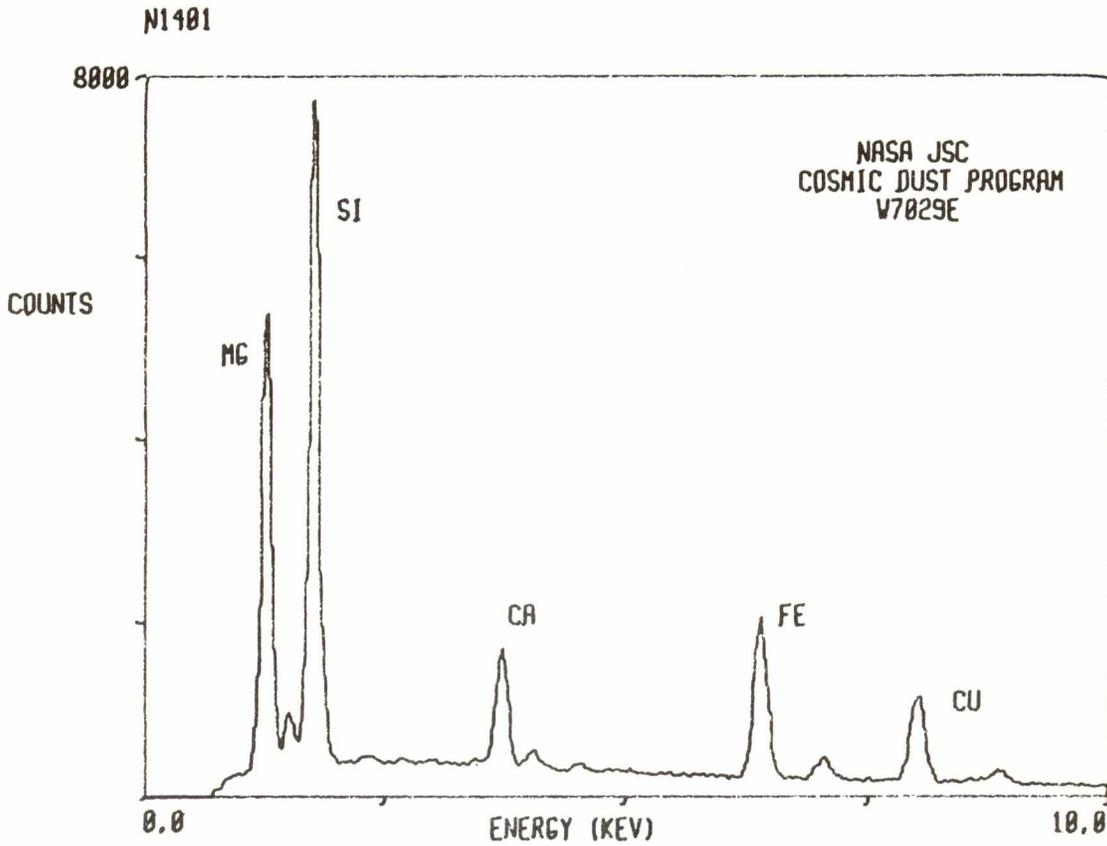


W7029E14

S-82-28032

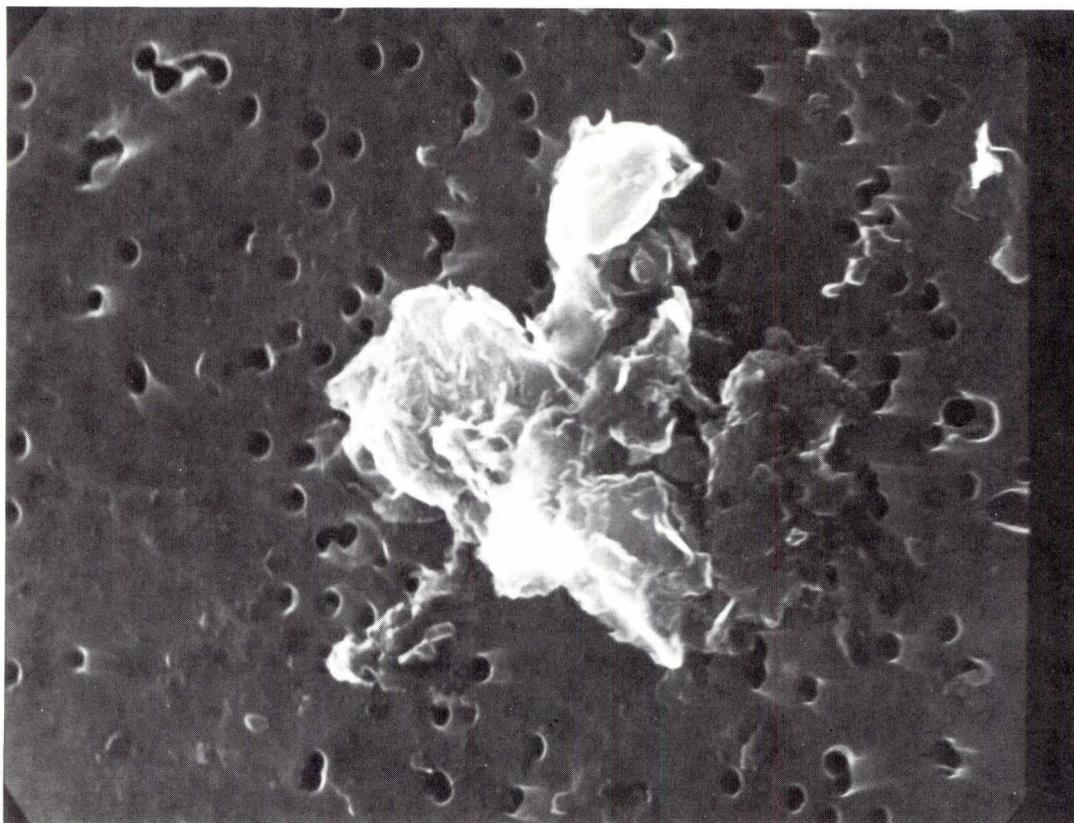


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|---------------------|---------------|-------------|-----------------|
| 13 | S | TL | CL/Pale Yellow-gray | SV | C | |

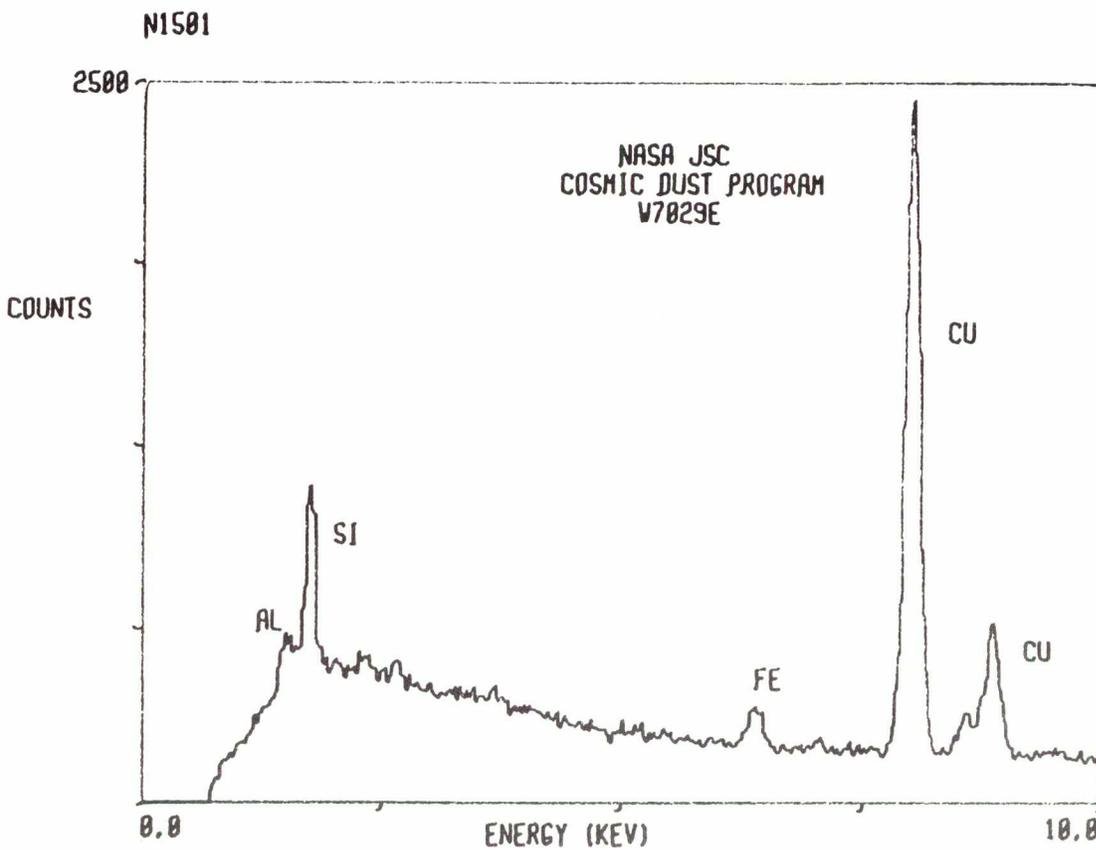


W7029E15

S-82-28031

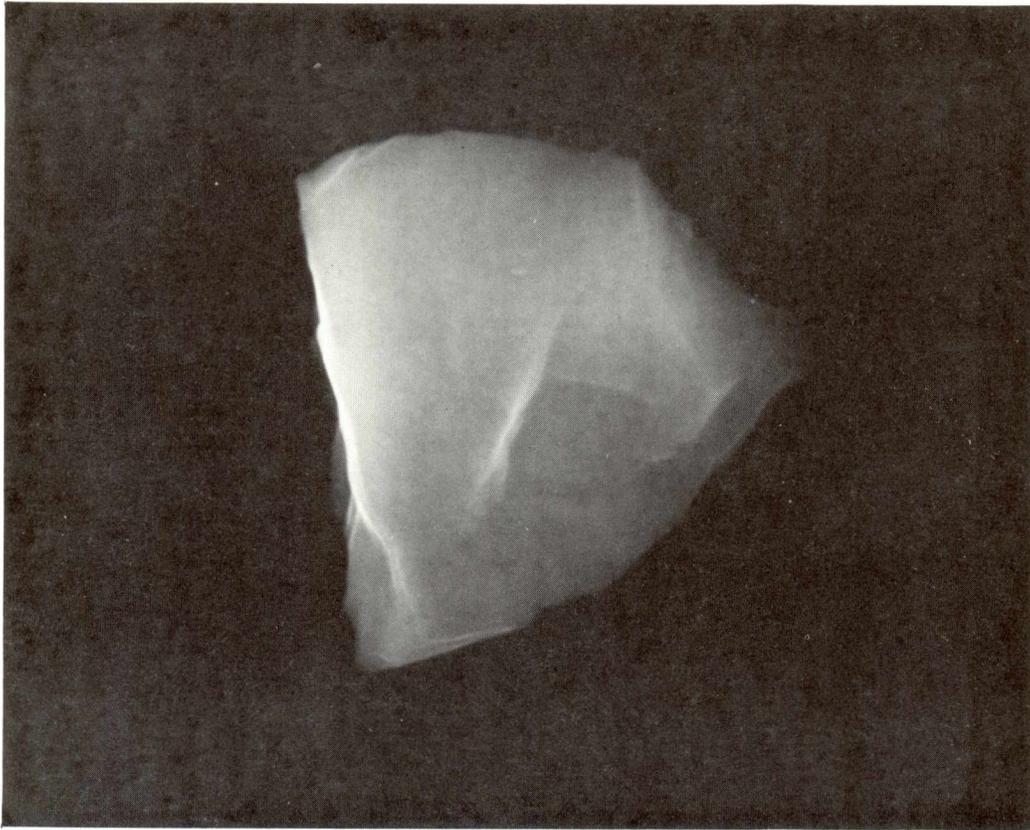


| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|--------------|---------------|-------------|-----------------|
| 6x6 | I | 0 | Black | D/SV | TCA? | |



W7029E16

S-82-28030



| <u>SIZE</u> | <u>SHAPE</u> | <u>TRANS.</u> | <u>COLOR</u> | <u>LUSTER</u> | <u>TYPE</u> | <u>COMMENTS</u> |
|-------------|--------------|---------------|----------------------|---------------|-------------|-----------------|
| 11x12 | I | TL | CL/Pale Yellow-green | SV | C | |

