

HUGHES

Subsidiary of GM Hughes Electronics

FCC MAIL SECTION

JUL 19 11 57 AM '91

July 15, 1991

RECEIVED BY

Ms. Donna R. Searcy, Secretary
Office of the Secretary
Federal Communications Commission
Room 222
1919 M Street, N. W.
Washington, D. C. 20554

Attention: Secretary

Re: File No. 12-DSS-P-91(2)

Dear Secretary:

Enclosed please find the Reply Comments of Hughes Aircraft Company in support of the Application of LEOSAT Corporation. If you have any questions please call the undersigned.

Sincerely,

James W. Lewis
James W. Lewis,
1L-82-10

Enclosures (1)

cc: Joseph Roldan
LEOSAT, Corporation

RECEIVED
JUL 23 1991
DOMESTIC FACILITIES DIVISION
SATELLITE RADIO BRANCH

Systems Division; 1901 W. Malvern
Bldg. 618 M/S P-325, P.O. Box 3310
Fullerton, CA 92634
714 732-8242

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

FCC MAIL SECTION

JUL 19 11 58 AM '91

RECEIVED BY

PUBLIC NOTICE)
LEOSAT CORPORATION)
LOW EARTH ORBIT SATELLITE)
APPLICATION ACCEPTABLE FOR FILING)

File No. 12-DSS-P-91(2)

REPLY COMMENTS OF HUGHES AIRCRAFT COMPANY
IN SUPPORT OF
LEOSAT CORPORATION

HUGHES AIRCRAFT COMPANY, a subsidiary of General Motors Hughes Electronics, is participating with General Motors Research Laboratories in the development of TravTek. TravTek is a joint Public Sector/Private Sector project to develop and evaluate advanced concepts for an Intelligent Vehicle Highway System (IVHS), consisting of specially equipped vehicles and an infrastructure for collecting and disseminating traffic information. TravTek has been under development since 1989 and will be field tested in 1992. HUGHES AIRCRAFT COMPANY has prime responsibility for specifying the data communications system between the infrastructure and the vehicles. Therefore, HUGHES AIRCRAFT COMPANY merits the qualifications to comment on the Public Notice of LEOSAT Corporation's proposal for a low earth orbit mobile satellite service targeting the Intelligent Vehicle Highway Systems market.

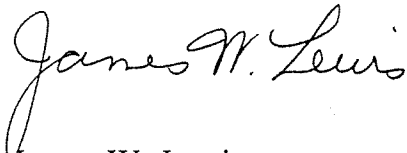
TravTek consists of a fleet of specially equipped vehicles that will use real-time traffic data from the infrastructure to aid the driver in finding the quickest route to a destination. TravTek requires two way communications between the vehicle and the infrastructure since the vehicles also report on the traffic conditions they are experiencing. We expect this type of system to become available to the public in the near future. In solving the data communications problem for TravTek, we found no available com-

munications product that could meet our requirements for coverage area, data rate, and reasonable cost. We were forced to adopt a communications approach which was practical for our small fleet but cost prohibitive for large scale use. The system being proposed by LEOSAT shows promise of being the type of system we were looking for. We feel it is important to foster the development of competitive systems to ensure that the vital link between the vehicle and the highway infrastructure, upon which IVHS rests, will be an economically viable reality.

Therefore, we urge the FCC to approve the FCC Application by LEOSAT Corporation.

Sincerely,

HUGHES AIRCRAFT COMPANY



James W. Lewis,
TravTek Project Manager
for HUGHES AIRCRAFT COMPANY

Date: July 15, 1991

RECEIVED

MAR 11 1996

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

MAR 13 1996

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

| | | |
|---|---|------------------------|
| In re Application of |) | |
| |) | |
| MOBILE COMMUNICATIONS |) | File Nos. 11-DSS-P-91; |
| HOLDINGS, INC. |) | 18-DSS-P-91; |
| |) | 11-SAT-LA-95; |
| |) | 12-SAT-AMEND-95 |
| For Authority to Construct, Launch, and Operate |) | |
| a Low Earth Orbit Satellite System in the |) | |
| 1610-1626.5 MHz/2483.5-2500 MHz Bands |) | |

Office of Public Branch
Telecommunications

**REPLY OF MCHI TO COMMENTS OF TRW INC.
AND MOTOROLA SATELLITE COMMUNICATIONS, INC.**

Mobile Communications Holdings, Inc. ("MCHI"), by its attorneys, respectfully submits this reply to the separate comments filed by TRW Inc. ("TRW") and by Motorola Satellite Communications, Inc. ("Motorola") on February 28, 1996 and February 29, 1996, respectively, concerning the Notice of Supplemental Authorities filed by MCHI on February 15, 1996. The purpose of the Notice was to call the Commission's attention to a reaffirmation of relevant national policy in the recently-enacted Telecommunications Act of 1996, which put the Commission on a pro-active course to eliminate "market entry barriers for entrepreneurs and other small businesses in the provision and ownership of telecommunications services."¹

The critical responses of TRW and Motorola, two giants in telecommunications, to our Notice, are not surprising -- after all, a smaller entrepreneurial enterprise is their competitor and

¹ Pub.L.No. 104-104, § 257(a), 110 Stat. 56, 77 (signed Feb. 8, 1996) (hereinafter the "1996 Act").

one which will deliver better service at lower cost to the consumer. The TRW and Motorola comments are, however, extraordinary in their reliance on strawmen and mischaracterizations to reiterate their fundamental opposition to MCHI's application to provide "Big LEO service."² We reply briefly to these comments in order to call the Commission's attention to these mischaracterizations (and their underlying motivations.)

1. A common theme in the TRW and Motorola comments is that the Commission's review of the Bureau's January 1995 decision with respect to MCHI's financial qualifications is somehow pointless or a waste of resources. *See* TRW Comment at 5 (chastising MCHI for "continuing to importune the Commission" by pursuing our Application for Review). As the Commission is aware, MCHI has previously submitted evidence of financial support for its system, from such companies as Westinghouse Electric Corporation and Israel Aircraft Industries together with a series of external commitments and vendor financing. Although the International Bureau may have concluded that these companies, and others supporting MCHI's application, had not demonstrated sufficient commitment to the project, MCHI does not accept the Bureau's determination as final (which it is not) and continues to believe that its prior financial showing reflected serious and credible business commitments (contrary to TRW's harsh, gratuitous and inaccurate characterization of this showing as "blue smoke and mirrors.")

Contrary to the implications of TRW and Motorola, MCHI and its investors are fully entitled under the Communications Act and agency rules to seek Commission review of the

² "Big LEO service" refers to low-Earth orbit mobile-satellite systems operating in the 1610-1626.5 and 2483.5-2500 MHz frequency bands.

Bureau's decision.³² MCHI sought this review by the timely filing of an Application for Review on March 2, 1995 -- more than one year ago. Commission review and clarification of the Bureau's decision is critical given the fact that financial rights and obligations (of MCHI and its investors) depend upon the Commission's ruling; business arrangements and corporate restructurings may be required in light of that ruling. Far from being a speculative applicant, MCHI and its partners have spent millions of dollars over the past five years to develop the ELLIPSO™ system which has been recognized by objective analysts, including Mitre Corporation and Draper Laboratory (a federal laboratory associated with MIT), as a superior design from both a technical and market standpoint.³³

2. Both TRW and Motorola somewhat frantically try to create the impression that the unmistakable congressional policy direction to the Commission that it eliminate "market entry barriers for entrepreneurs and other small businesses in the provision and ownership of telecommunications services"³⁴ must be at war with the "sound application of a strict financial standard to the Big LEO Service." TRW Comment at 4. *See also* Motorola Comment at 2 (arguing that the Telecommunications Act of 1996 does not "alter" the Commission's "reasoning

³² See 47 U.S.C. § 155(c)(4). The filing of an application for review is a condition precedent to judicial review of the Bureau's decision. 47 U.S.C. § 155(c)(7). As a practical matter, the Commission's year-long delay in acting on MCHI's pending application for review has effectively prevented MCHI from obtaining judicial review of the Bureau's decision over the past year while MCHI's competitors have been allowed to move forward in the marketplace.

³³ See L.M. Gaffney, N.D. Hulkower, L. Klein and D.N. Lam, The Mitre Corporation, *A Reevaluation of Selected Mobile Satellite Communications Systems: Ellipso, Globalstar, IRIDIUM and Odyssey* (May 1994). See also March 5, 1996 letter from the Charles Stark Draper Laboratory, Inc. indicating that the "innovative ELLIPSO™ proposal for Mobile Satellite Communications Service has intrigued the Astronautical research community at MIT and the Charles Stark Draper Laboratory." (Exhibit A hereto)

³⁴ 1996 Act at § 257(a) (emphasis added).

for establishing strict financial qualification requirements for Big LEO applicants"). Through this device, TRW and Motorola suggest that "strict financial qualifications" are inherently at odds with the capabilities of entrepreneurs or small businesses, with the implicit corollary that where "strict financial qualifications" are warranted in licensing some telecommunications service only giant corporations like TRW and Motorola can possibly fit the bill. Given the cost of much cutting-edge technology in telecommunications, TRW and Motorola apparently advance this argument in order to simply define their most vigorous competition out of the regulated marketplace.

Of course strict financial qualifications and smaller telecommunications enterprises are not inherently at odds. It takes no "relaxation" of standards for entrepreneurs to be fully qualified to deliver the services regulated by the Commission. Just as rapid developments in technology have expanded the telecommunications available to consumers, so investors and other sources of capital have a variety of mechanisms by which new ideas and new enterprises might be financed. To be sure, many of these mechanisms are not used by large corporations like TRW or Motorola, but that does not make financial arrangements relying on such devices any less reliable for purposes of the financial standards being applied in this proceeding.

The flaw in the International Bureau's decision that our Notice was designed to highlight was the need to apply the Commission's financial standards with an eye toward the kinds of financing arrangements on which enterprises smaller than TRW and Motorola must rely. The key question is whether any particular licensee can bring to bear sufficient financial resources to make

Big LEO service a reality. Giants like TRW and Motorola might be able to rely on their balance sheets — even though they suffer no penalty if in the end they fail to draw on that balance sheet — while smaller enterprises might have to rely on a variety of commitments from investors to demonstrate the resources they have at their disposal and which in financial fact may amount to a stronger legal commitment. At bottom, though, this kind of analysis is an example of, not a constraint on, the kind of "wide discretion" Motorola notes the Commission has in the exercise of its licensing authority. Motorola Comment at 2-3. We have simply pointed out one important congressional policy, recently and clearly stated, that must inform that regulatory discretion because it serves to authoritatively define the public interest.

3. TRW -- which thus far has failed to announce any substantial outside financing for its Odyssey system -- wrongly attempts to drum Congress into service to aid their effort to create this false dichotomy between financial qualifications to establish Big LEO service and the capabilities of entrepreneurs and small business. TRW says: "As Congress itself has recognized, some services are so inherently capital intensive that they are ill-suited to entry by small business," citing a House report on the "Licensing Improvement Act of 1993" as support. TRW Comment at 4-5. Yet that report does not refer to financial capability at all, but says: "The Committee recognizes that the characteristics of some services are inherently national in scope, and are therefore ill-suited for small business."⁶

Not only is TRW's characterization of this sentence a stretch in light of what that sentence actually says, but it becomes even more unsupportable when one sees that this single cited

⁶ H. Rep. No. 111, 103d Cong., 1st Sess. 254 (1993).

sentence appears in a several paragraph discussion of the House Energy and Commerce Committee's broad direction to the Commission to expand the opportunities in telecommunications for entrepreneurs and small businesses. As the Committee articulated the policy that the Commission is to follow:

[T]he Commission's regulations must promote economic opportunity and competition, and ensure that new and innovative technologies are readily accessible to the American people. The Commission will realize these goals by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses.⁷¹

4. TRW similarly tries to conscript Congress as an ally with its footnoted observation that if Congress really wanted the Commission to abandon its strict financial standards for Big LEO licensing -- as TRW suggests MCHI would wish it to do -- Congress could have compelled the Commission to do so but did not. Here again, these proceedings do not constitute an attack on the Big LEO financial standards but an effort to seek Commission review of the International Bureau's *application* of those standards in a particular case. Not only does TRW muddle this fairly obvious distinction, but it seems to wrongly equate action by the Bureau with that of the full Commission.

5. TRW's and Motorola's concerns are fundamentally anti-competitive in nature. For example, TRW professes a fear that, if authorizations are handed out like "lottery tickets," a "crisis of confidence" will be caused among the investor community. (See TRW Comment at 6-7). This is nonsensical. The marketplace determines which systems are funded and investors do not typically rely on the FCC's determination of financial viability in making such judgments. On

⁷¹ *Id.*

the other hand, award of an FCC license can skew marketplace forces by giving certain companies a competitive advantage in raising funds, in the current case further hobbling small business competitors.

TRW's second concern -- that intersystem coordination will be "needlessly" complicated if other systems are licensed --- is equally transparent and self-serving. Although the Commission has concluded for the time being that four CDMA systems can be accommodated in the allocated spectrum, this conclusion is not compelled by the laws of physics. It is, in large part, a business decision based on the capacity (i.e., traffic load) each system requires to make a profit. As the number of operating systems in the band increases, the capacity of each system will be reduced because of the need to reduce power in order to coordinate with other systems (i.e., reduce noise to an acceptable level.) Thus, in reality, TRW's concern is not with the complications of coordination per se, but the fact that each additional CDMA system potentially diminishes the market share of licensed systems such as TRW.

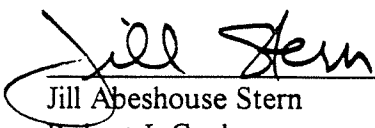
6. Finally, Motorola charges that by taking into account Congress' instructions regarding small business, the FCC will allow the "warehousing" of spectrum. To this we reply that the application of the financial standards, or even a waiver of those standards here, can hardly result in warehousing. The FCC sought to safeguard against warehousing by establishing strict construction and launch milestones to which all licensees would be subject including MCHI whether it is found to qualify under the strict financial standard or is granted a waiver. While we do not believe that prevention of warehousing and encouragement of small business and

entrepreneurship constitute competing interests, certainly in the context and circumstances of this proceeding, the national policy articulated by Congress -- to eliminate market entry barriers for entrepreneurs -- should be the overriding public interest informing the Commission's decision.

Respectfully submitted,

MOBILE COMMUNICATIONS
HOLDINGS, INC.

By:



Jill Abeshouse Stern
Robert J. Cynkar
Edmund D. Daniels

Shaw, Pittman, Potts & Trowbridge
2300 N Street, N.W.
Washington, D.C. 20037-1128
(202) 663-8380

Its Attorneys

March 11, 1996

EXHIBIT A



The Charles Stark Draper Laboratory, Inc.

555 Technology Square, Cambridge, Massachusetts 02139
Mail Station 88

Telephone (617) 258 - 1787

E50-96-110

5 March 1996

Mr. John E. Draim
Advisor, Constellation Design
Mobile Communications Holdings, Inc.
1120 19th Street, N.W., Suite 460
Washington, D.C. 20036

Subject: Impact of ELLIPSO™ on Astronautical Research

Dear John:

During 1994 and 1995, the innovative ELLIPSO™ proposal for Mobile Satellite Communications Service has intrigued the Astronautical research community at MIT and the Charles Stark Draper Laboratory. This has resulted in significant analytical contributions as follows:

1. Sabol, C. A., Application of Sun-Synchronous, Critically Inclined Orbits to Global Personal Communications Systems, Masters Thesis submitted to the Dept. of Aeronautics and Astronautics, MIT, November 1994.
2. Sabol, C. A., Cefola, P. J., and Metzinger, R.W., "Application of Sun-Synchronous, Critically Inclined Orbits to Global Personal Communications Systems," AAS/AIAA Pre-Print 95-222 presented to the AAS/AIAA Spaceflight Mechanics Conference, Albuquerque NM, February 1995 (also published in the Conference Proceedings)
3. Sabol, C. A., Draim, J. E., and Cefola, P. J., "Refinement of a Sun-Synchronous, Critically Inclined Orbits for the ELLIPSO™ Global Personal Communications Systems," AAS/AIAA Astrodynamics Conference, Halifax, Nova Scotia, August, 1995 (also published in the Conference Proceedings). [this work has also been submitted to the Journal of Astronautical Sciences for publication]
4. Draim, J. E., Sabol, C. A., and Cefola, P. J., "Optimal Orbit Transfer To A Sun-Synchronous, Critically Inclined Orbit For The Ellipse™ Personal Communication System", paper proposed for the AIAA/AAS Astrodynamics Conference, San Diego CA, July 1996.

This work provided an outstanding developmental opportunity for Mr. Chris Sabol who was a graduate student in the MIT Department of Aeronautics and Astronautics doing his thesis research at the Charles Stark Draper Laboratory with my supervision under the joint MIT/Draper Laboratory Education Program. This joint education

program provides the opportunity to take course work at MIT and to complete thesis research in a working laboratory; the program is an outgrowth of the time when the Draper Laboratory was part of the MIT Aeronautics Department. Chris Sabol was (and is) being supported by the USAF Phillips Laboratory Palace Knight educational program; his research activity at MIT provided him with directly relevant engineering experience for his USAF work tour at the Phillips Laboratory from December 1994 to August 1995. Chris is currently a Ph.D. student at the University of Colorado, Boulder; he will return to USAF employment after he completes his studies.

Quality interactions promote innovation and MCHI (the developers of the ELLIPSO™ system) has provided several opportunities for such interaction:

- John Draim visited the Draper Laboratory in July 94 for technical discussions of the research
- Chris Sabol and I traveled to MCHI in Washington DC to brief the results of the research to several MCHI staff members in November 1994
- John Draim was able to attend the Astrodynamics Conference in Halifax in August 1995

More recently, another MIT graduate student, Naresh Shah, has initiated studies of the Concordia portion of the ELLIPSO™ system. Naresh Shah is a 1995 graduate of US Air Force Academy and is participating in the MIT/Draper Laboratory Educational Program. Naresh's thesis objective is to develop and demonstrate satellite constellation design techniques based on the synthesis of:

- modern theories for the long term motion of satellites including the Semianalytical Theory employed by Chris Sabol [this theory was developed at Draper Lab and MIT and is evolving into an industry standard]
- distributed processing techniques including the combination of Semianalytical Theory and the Parallel Virtual Machine (PVM) paradigm [this was investigated by Scott Wallace at Draper/MIT]
- Genetic Algorithm-based search techniques that are particularly advantageous with parallel processing

There is other research in the MIT Aeronautics and Astronautics Department under the direction of Professor Dan Hastings that is directly relevant:

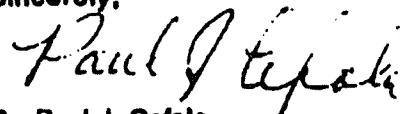
1. Violet, M., The Development and Application of a Cost per Minute Metric for the Evaluation of Mobile Satellite Systems in a Limited-Growth Voice Communications Market, Masters Thesis submitted to the Dept. of Aeronautics and Astronautics, MIT, September 1995.
2. Gumbert, C. G., Assessing Future Growth Potential of Mobile Satellite Systems Using a Cost per Billable Minute Metric, Masters Thesis submitted to the Dept. of Aeronautics and Astronautics, MIT, September 1995.
3. Gumbert, C., Violet, M., Hastings, D., Hollister, W., and Lovell, R., "Assessing Mobile Satellite Systems Using a Cost Per Billable Minute Metric," AIAA-96-1171-CP presented at the 16th International Communications Satellite System Conference, Washington DC, February 1996.

Capt. Mike Violet is currently assigned to the USAF 2nd Space Operation Squadron at Falcon AFB, Colorado Springs and Cary Gumbert is technical staff at the Hughes Space and Communications Group. MCHI is currently working with Mike Violet and Cary Gumbert to provide the data necessary for the inclusion of ELLIPSO™ into the Mobile Satellite System Cost Model prior to the archival publication of this research.

Other research is in progress at MIT, Draper, and the Arizona State University at Tempe regarding the application of GPSR onboard Navigation Solutions to Satellite Navigation.

Overall, the innovative aspects of the ELLIPSO™ design have intrigued the research community. Together with MCHI's open attitude regarding the analysis of their concept, this has led to challenging research opportunities for the Astronautical community. We are hopeful that the development of the ELLIPSO™ system will continue in the US and that these research opportunities will exist for future students.

Sincerely,



Dr. Paul J. Celola

Program Manager,
Astrodynamics Applications
Draper Laboratory

Lecturer in Aeronautics and
Astronautics, MIT

CERTIFICATE OF SERVICE

I, **Felecia G. DeLoatch**, do hereby certify that a true and correct copy of the foregoing document was sent by first-class mail, postage prepaid, or hand-delivered, on this 11th day of March, 1996, to the following persons:

- * Chairman Reed E. Hundt
Federal Communications Commission
1919 M Street, N.W., Room 814
Washington, D.C. 20554
- * Commissioner James H. Quello
Federal Communications Commission
1919 M Street, N.W., Room 802
Washington, D.C. 20554
- * Commissioner Andrew C. Barrett
Federal Communications Commission
1919 M Street, N.W., Room 826
Washington, D.C. 20554
- * Commissioner Rachelle B. Chong
Federal Communications Commission
1919 M Street, N.W., Room 844
Washington, D.C. 20554
- * Commissioner Susan Ness
Federal Communications Commission
1919 M Street, N.W., Room 832
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- * Julius Genachowski, Esq.
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Office of the Chairman
Federal Communications Commission
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- * William E. Kennard, Esq.
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- * Scott Blake Harris
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- * Mark Grannis, Senior Legal Advisor
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- * Rudy L. Baca, Legal Advisor
Office of Commissioner James H. Quello
Federal Communications Commission
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- * Brian J. Carter, Legal Advisor
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Lon C. Levin, Vice President
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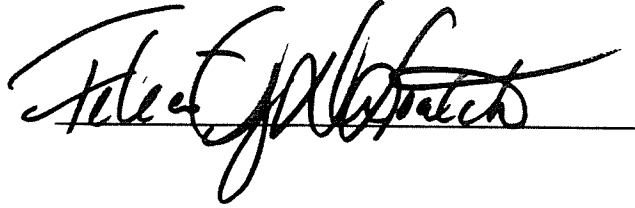
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* Hand Delivered

278245-02 / DOCSDC1

CERTIFICATE OF SERVICE

I, Christopher A. Robles, hereby certify that a true and correct copy of the foregoing "Consolidated Response" was mailed, first-class postage prepaid, this 7th day of March, 1996 to the following:

- * Chairman Reed Hundt
Federal Communications Commission
1919 M Street, N.W., Room 814
Washington, D.C. 20554

- * Commissioner James H. Quello
Federal Communications Commission
1919 M Street, N.W., Room 802
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- * Commissioner Andrew C. Barrett
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- * Commissioner Susan Ness
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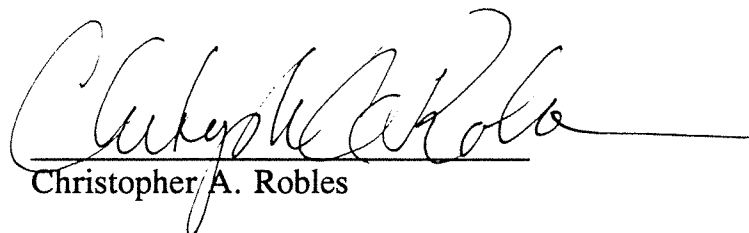
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Christopher A. Robles