

Results of Just-In-Time Browsing for Digital Microfilm

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Residential Internet Access

End of 2001:

- 498 million people with Internet Access at home
- About 40% of them in the U.S.

September 2001:

- Broadband: 11% of U.S. Households (increasing)
- Dial-up service: 80% of U.S. households

Sources:

"Report: Half Billion People Have Home Net Access" March 7, 2002 (Reuters)

"A Nation Online: How Americans Are Expanding Their Use of the Internet" Feb. 2002,
(U.S. Department of Commerce)

Is Microfilm Practical with a Modem?

The image displays four Utah State Certificates of Death, each with a red box highlighting specific fields. The certificates are for the following individuals:

- Top Left:** **James James Coffey**, born 1891, died February 10, 1940. Cause of death: **Heart disease**. Hospital: **Holy Cross Hospital**. Length of stay: **1 year**.
- Top Right:** **William Adolbert Calkins**, born 1891, died February 10, 1940. Cause of death: **Heart disease**. Hospital: **Holy Cross Hospital**. Length of stay: **1 year**.
- Bottom Left:** **Archie Edwin Hardy**, born 1891, died February 10, 1940. Cause of death: **Heart disease**. Hospital: **Holy Cross Hospital**. Length of stay: **1 year**.
- Bottom Right:** **Harriet George**, born 1891, died February 10, 1940. Cause of death: **Heart disease**. Hospital: **Holy Cross Hospital**. Length of stay: **1 year**.

The red box highlights the following fields on each certificate:

- (c) Name of hospital or institution: **Holy Cross Hospital**
- (d) Length of stay: In hospital or institution: **1 year**
- In this community: **Life**

2200 x 1816 pixels (287,231 Bytes JPEG compressed)

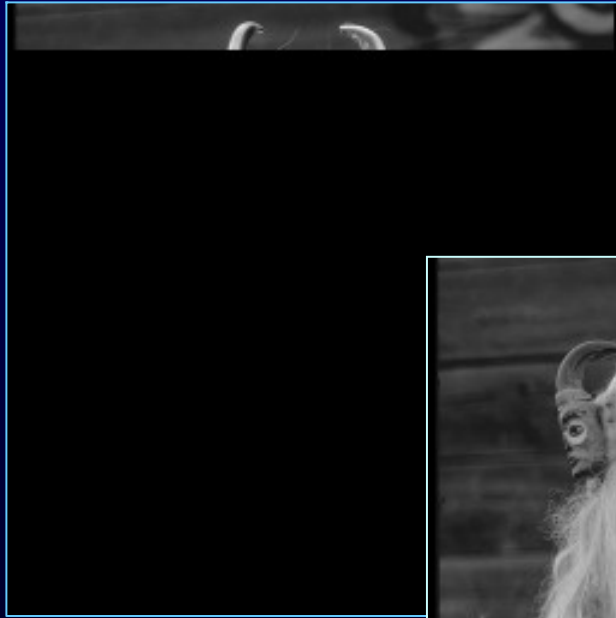
more than 600 frames on this film

“Browsing” is “Getting to the Good Stuff”

STATE		COUNTY		TOWNSHIP		NAME OF INSTITUTION		NAME OF INCORPORATED PLACE		WARD OF CITY		SUPERVISOR'S DISTRICT NO.		ENUMERATION DISTRICT NO.		SHEET NO.	
1		2		3		4		5		6		7		8		9	
10		11		12		13		14		15		16		17		18	
19		20		21		22		23		24		25		26		27	
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64		65		66		67		68		69		70		71		72	
73		74		75		76		77		78		79		80		81	
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118		119		120		121		122		123		124		125		126	
127		128		129		130		131		132		133		134		135	
136		137		138		139		140		141		142		143		144	
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847		848		849		850		851		852		853		854		855	
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1009		1010		1011		1012		1013		1014		1015		1016		1017	
1018		1019		1020		1021		1022		1023		1024		1025		1026	
1027		1028		1029		1030		1031		1032		1033		1034		1035	
1036		1037		1038		1039		1040		1041		1042		1043		1044	
1045		1046		1047		1048		1049		1050		1051		1052		1053	
1054		1055		1056		1057		1058		1059		1060		1061		1062	
1063		1064		1065		1066		1067		1068		106					

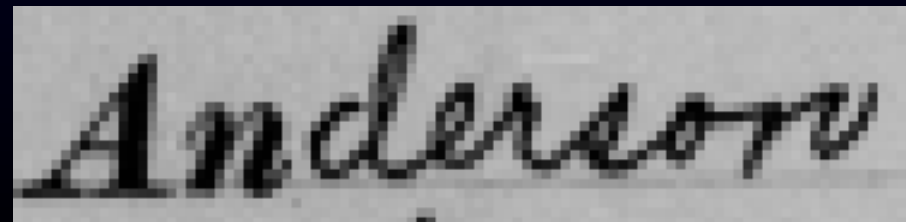
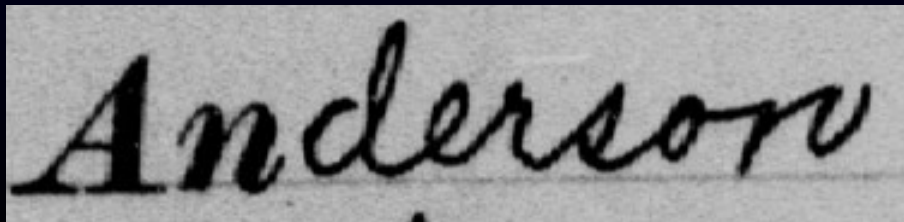
Progressive Resolution

Sequential Transmission

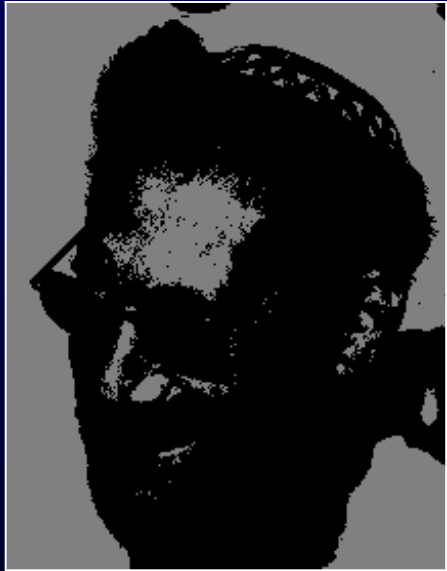


} 7.81 %

Progressive Transmission



Progressive Grayscale (Bitplane Method)



1 Bitplane

(2 levels of gray)



2 Bitplanes

(4 levels of gray)



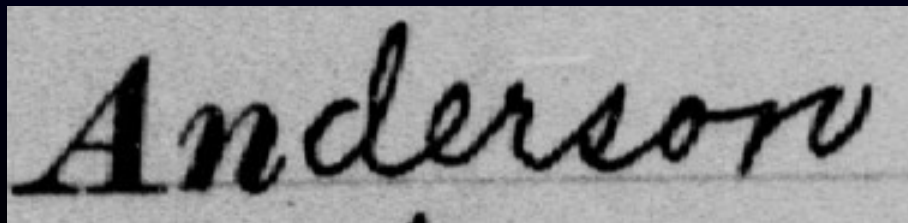
3 Bitplanes

(8 levels of gray)



4 Bitplanes

(16 levels of gray)



JITB Digital Microfilm Browser

The screenshot displays the JITB Digital Microfilm Browser interface. The main window shows a list of death records with columns for Surname, Given Name, and Pages. A red box highlights a specific record, which is then shown in a larger, zoomed-in view on the right. The zoomed-in view shows the following data:

SURNAME	GIVEN NAME	PAGES
Armstrong	Mary Louie	3
Arapakis	Peter	415
Arthur	Mildred O.	627
Archer	Mable M.	777
Archuleta	Mary J.	832
Arnold	Vilate S.	874
Arbuckle	George	1209
Arnold	Infant	1283
Archibald	Sarah L.	1809
Arnoldus	Zina D.	2076
Ananaki	Annie	2090

The interface also includes a menu bar (File, Edit, View, Bookmarks, Help) and a status bar at the bottom showing "Salt Lake City Death Records".

What is Just-In-Time Browsing?

- Progressive Image Transmission:
 - Hierarchical Spatial Resolution
 - Progressive Bitplane Encoding
- JBIG Compressed Bitplanes
(other compressors also supported)
- Prioritized Regions of Interest
- User Interaction for Immediate Response
- “On-the-fly” reordering of data

Data Organization for Retrieval



Each image in the resolution hierarchy is split into a grid of tiles, each of which is then bitplane encoded. Each bitplane is compressed and stored in a file, along with image meta-information and an index to the compressed data segments.

Example Data File For Image

Header, Meta Info (w, h, cols, rows, bits, etc.)

Data Offset for $\langle 0,0,0,0 \rangle$

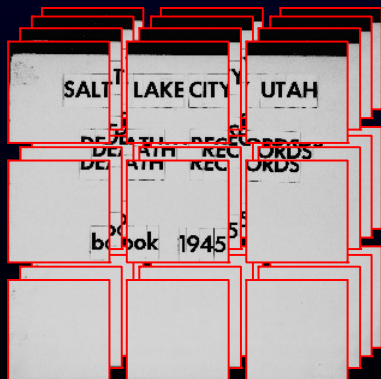
Data Offset for $\langle 1,0,0,0 \rangle$

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Compressed Data for $\langle 0,0,0,0 \rangle$

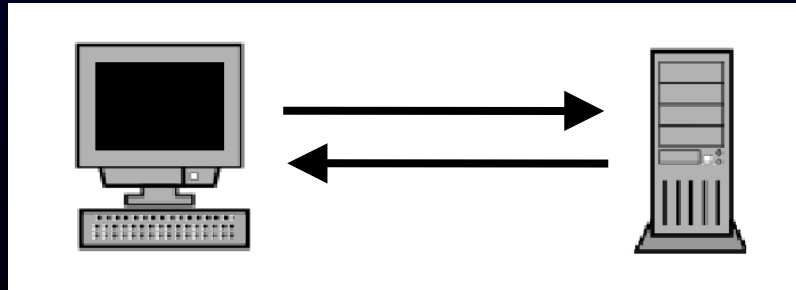
Compressed Data for $\langle 1,0,0,0 \rangle$

...



Some Actions Considered During Browser-Server Communication

- Postpone Data
- Cancel Data that has been Requested
- Change Priority
- Limit Responses to Bandwidth



Microfilm Browser Demo

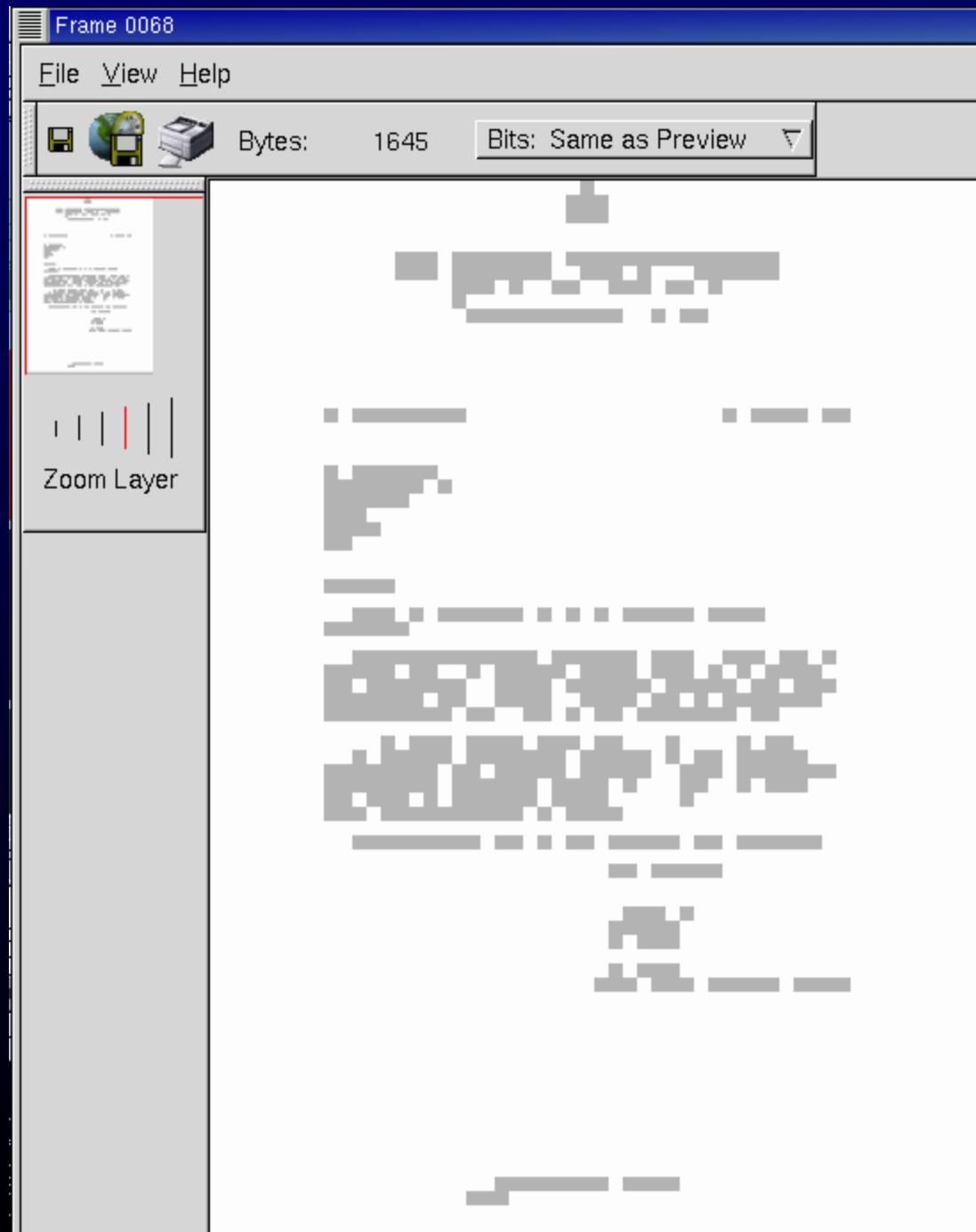
The screenshot displays the Microfilm Browser application interface. The main window shows a list of records with columns for Surname, Given Name, and Pages. A red box highlights a specific record, which is then shown in a larger, detailed view on the right. The detailed view shows the following data:

SURNAME	GIVEN NAME	PAGES
Armstrong	Mary Louie	3
Arapakis	Peter	415
Arthur	Mildred O.	627
Archer	Mable M.	777
Archuleta	Mary J.	832
Arnold	Vilate S.	874
Arbuckle	George	1209
Arnold	Infant	1283
Archibald	Sarah L.	1809
Arnoldus	Zina D.	2076
Arnakis	Arina	2090

The application also includes a menu bar (File, Edit, View, Bookmarks, Help) and a status bar at the bottom showing "Salt Lake City Death Records".

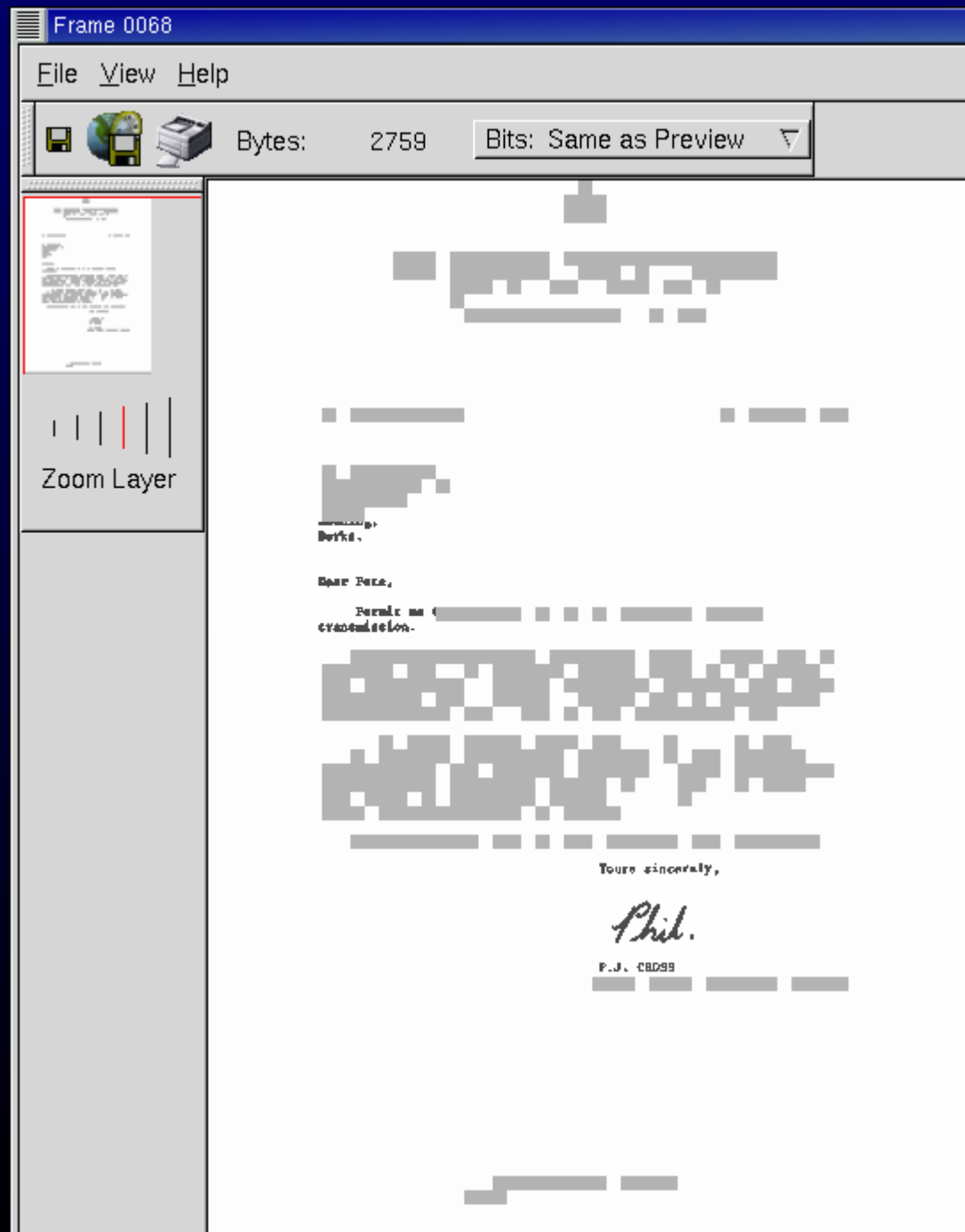
JITB Results

1,645 Bytes



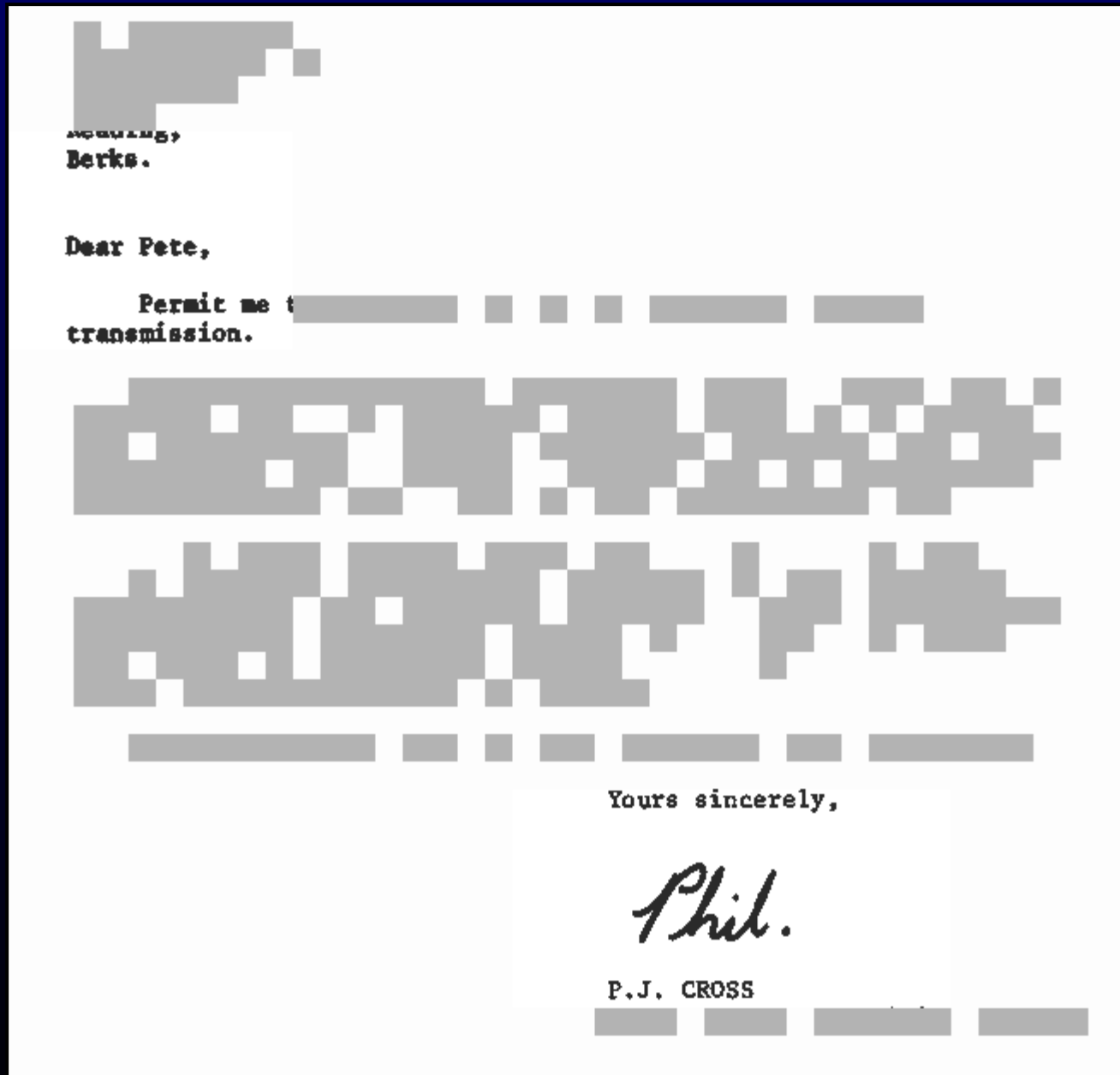
JITB Results

2,759 Bytes

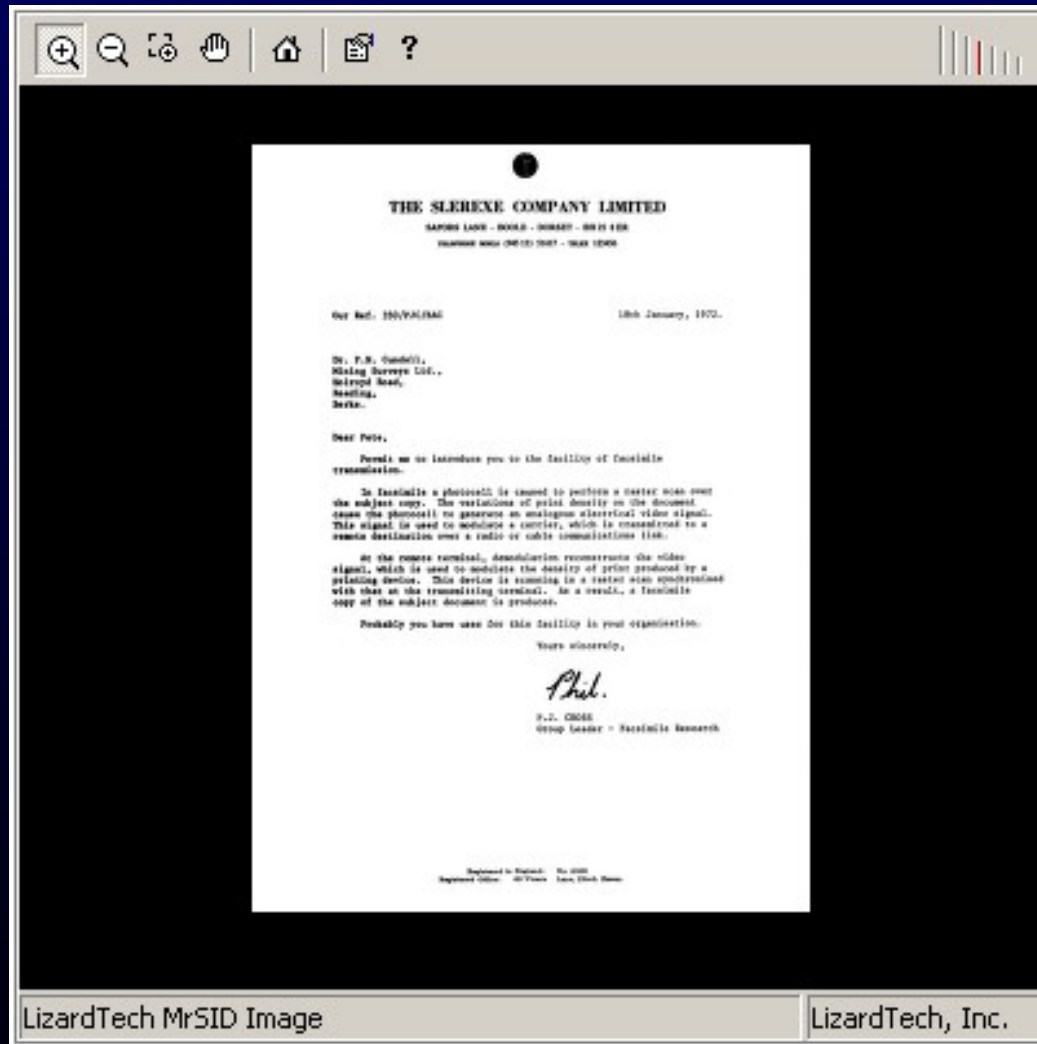


JITB Results

3,888 Bytes

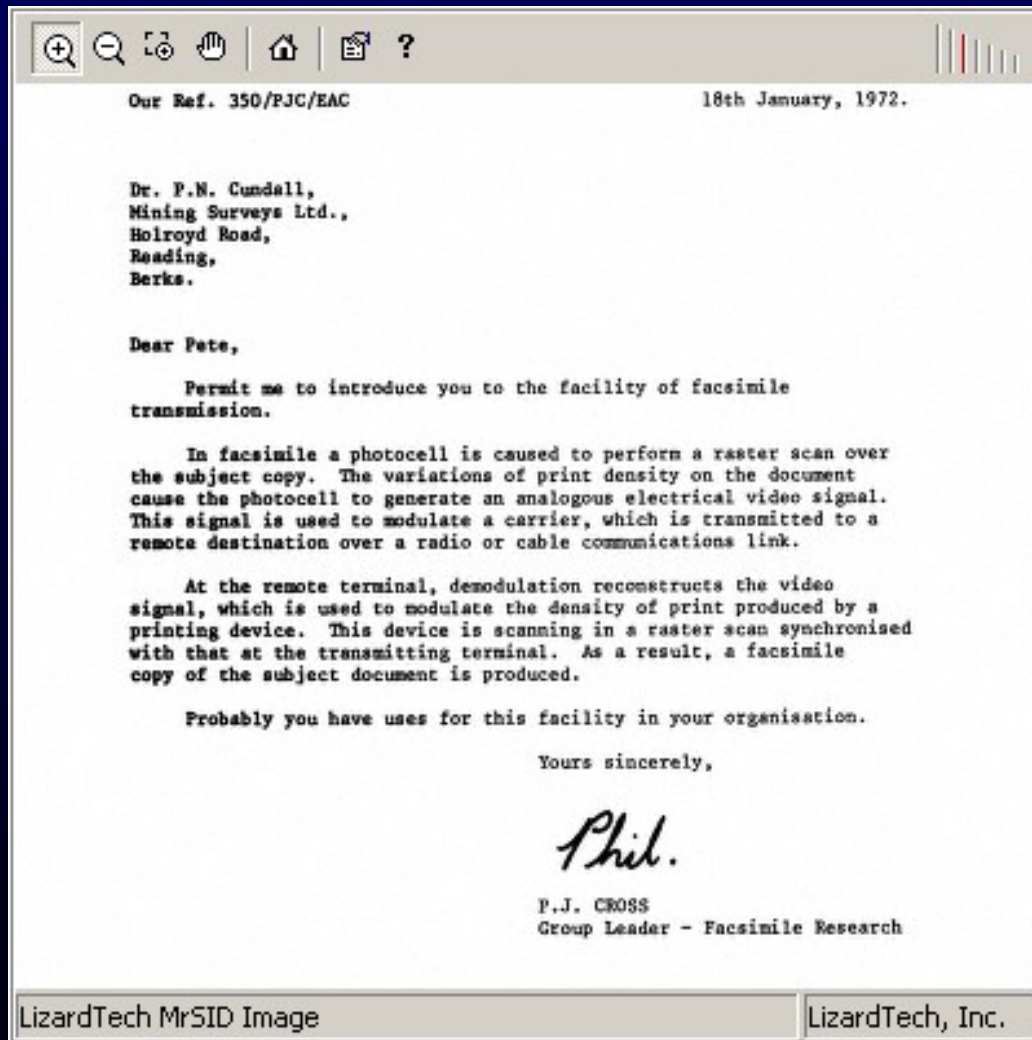


Compare with MrSID



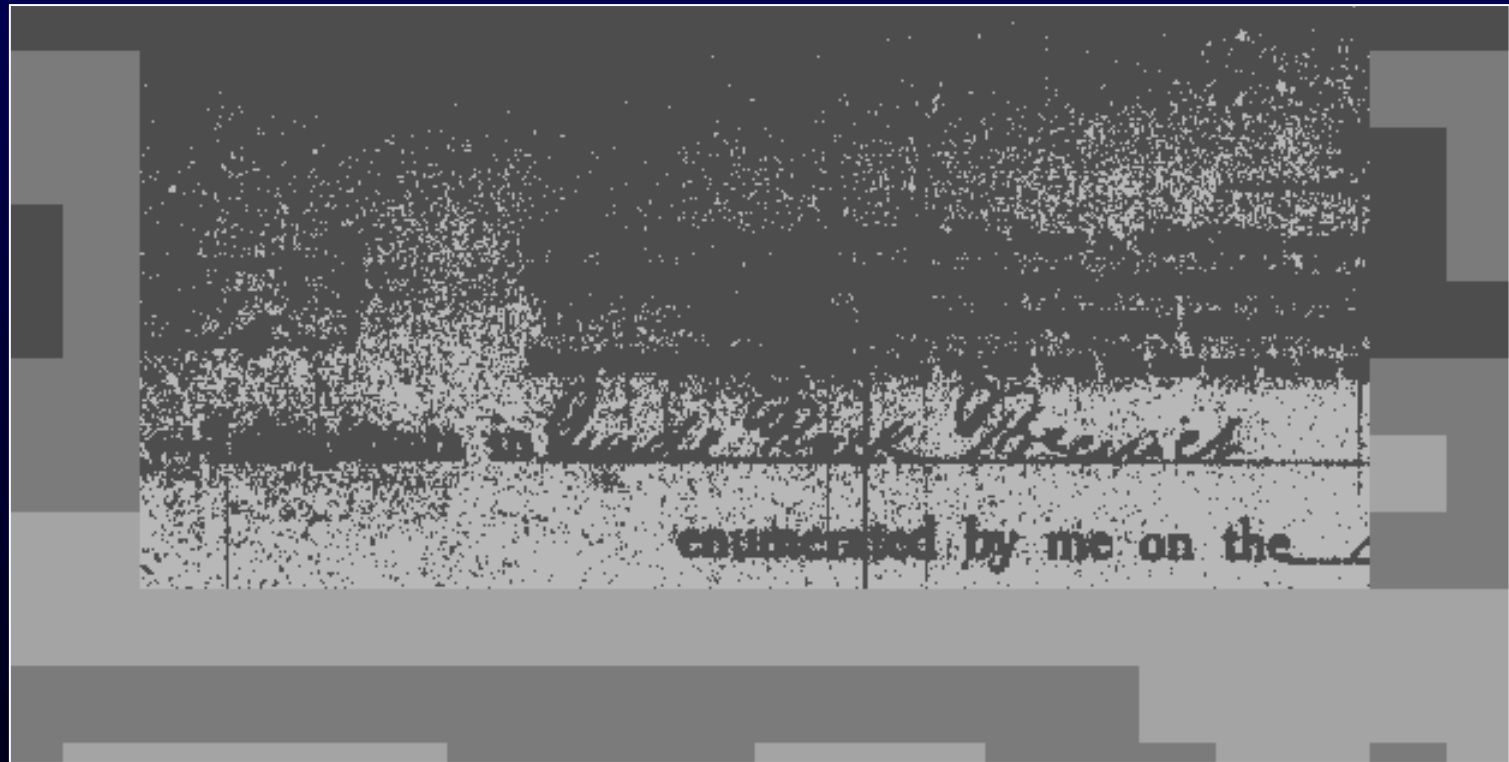
21,998 bytes received

Compare with MrSID



37,798 bytes received

JITB Results



10,985 Bytes

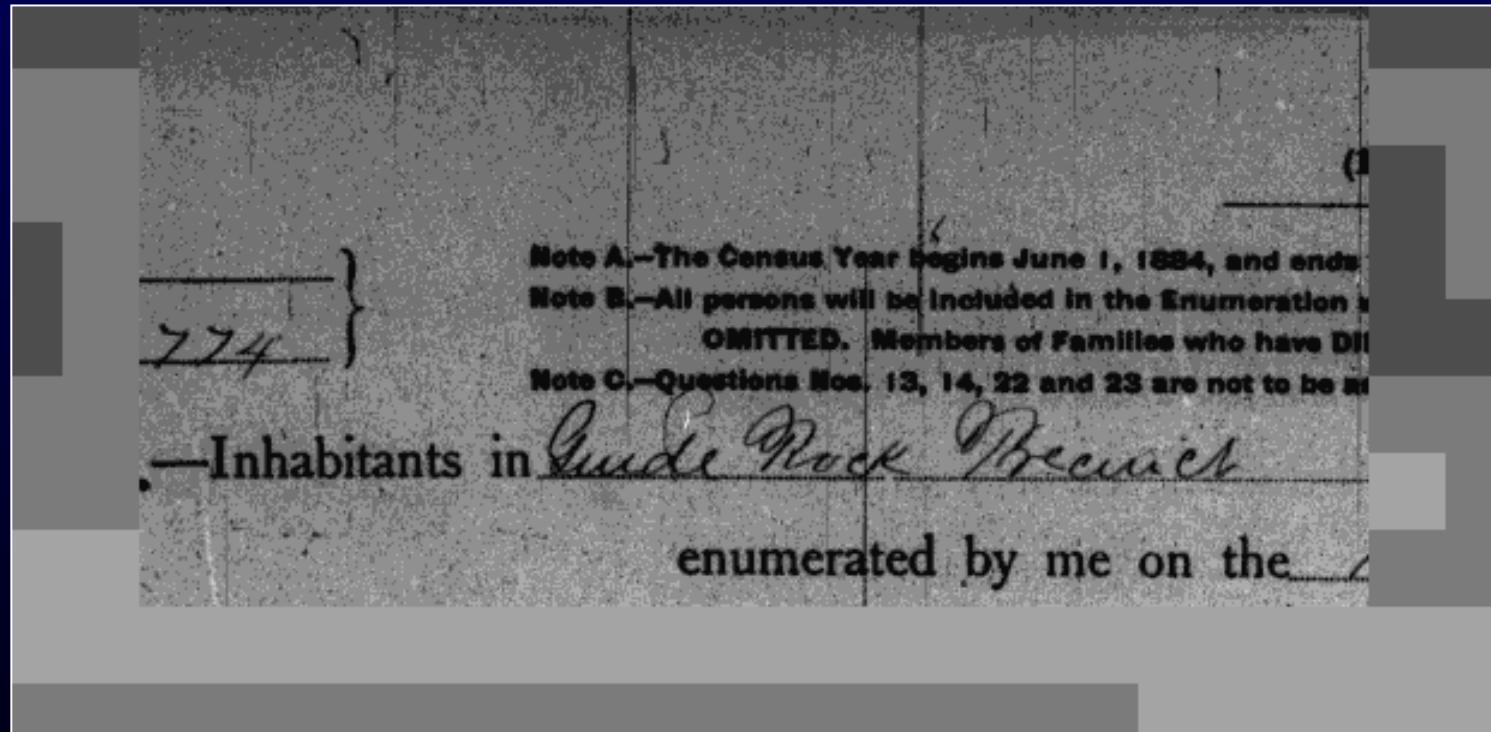
JITB Results

774

Note A.—The Census Year begins June 1, 1924, and ends
Note B.—All persons will be included in the Enumeration
OMITTED. Members of Families who have De
Note C.—Questions Nos. 13, 14, 22 and 23 are not to be an
—Inhabitants in Quade Rock Beach
enumerated by me on the _____

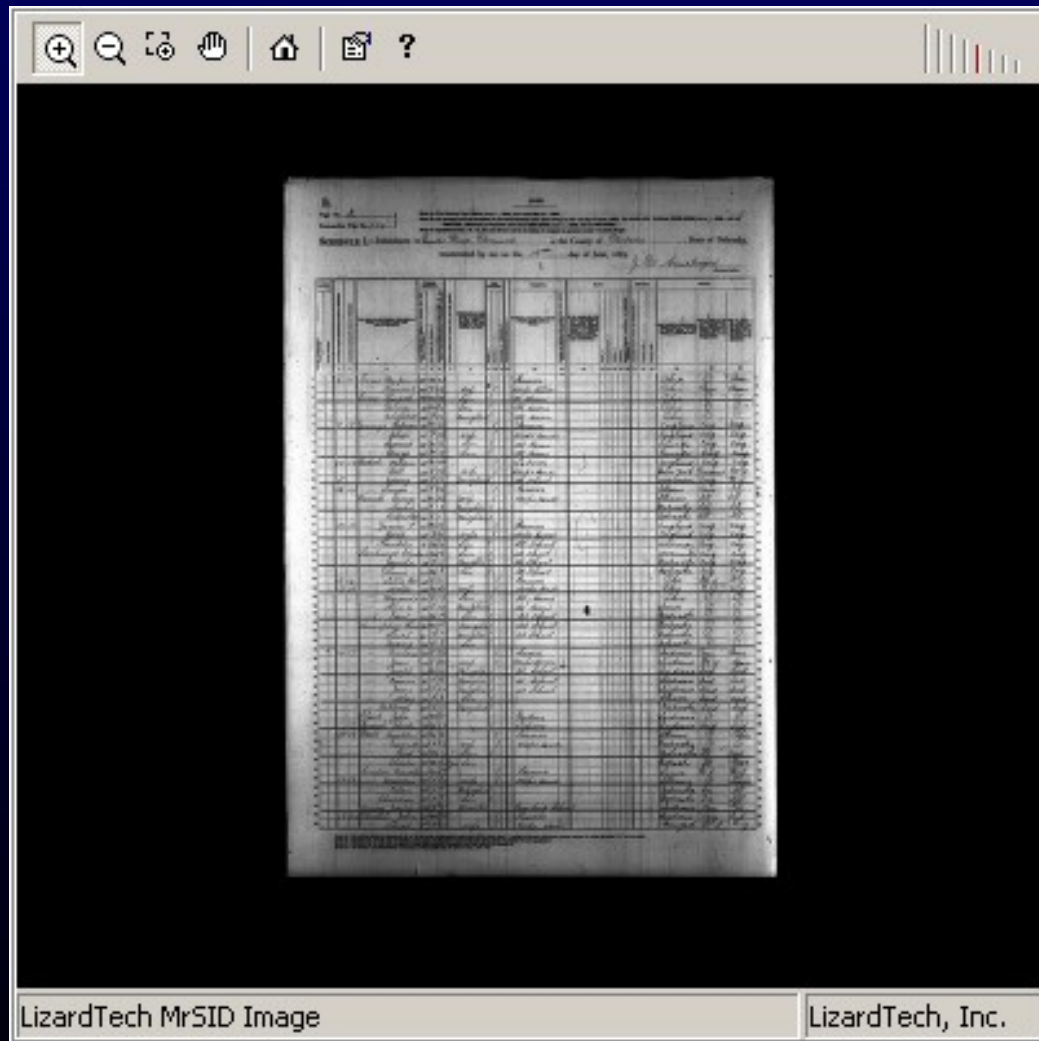
20,313 Bytes

JITB Results



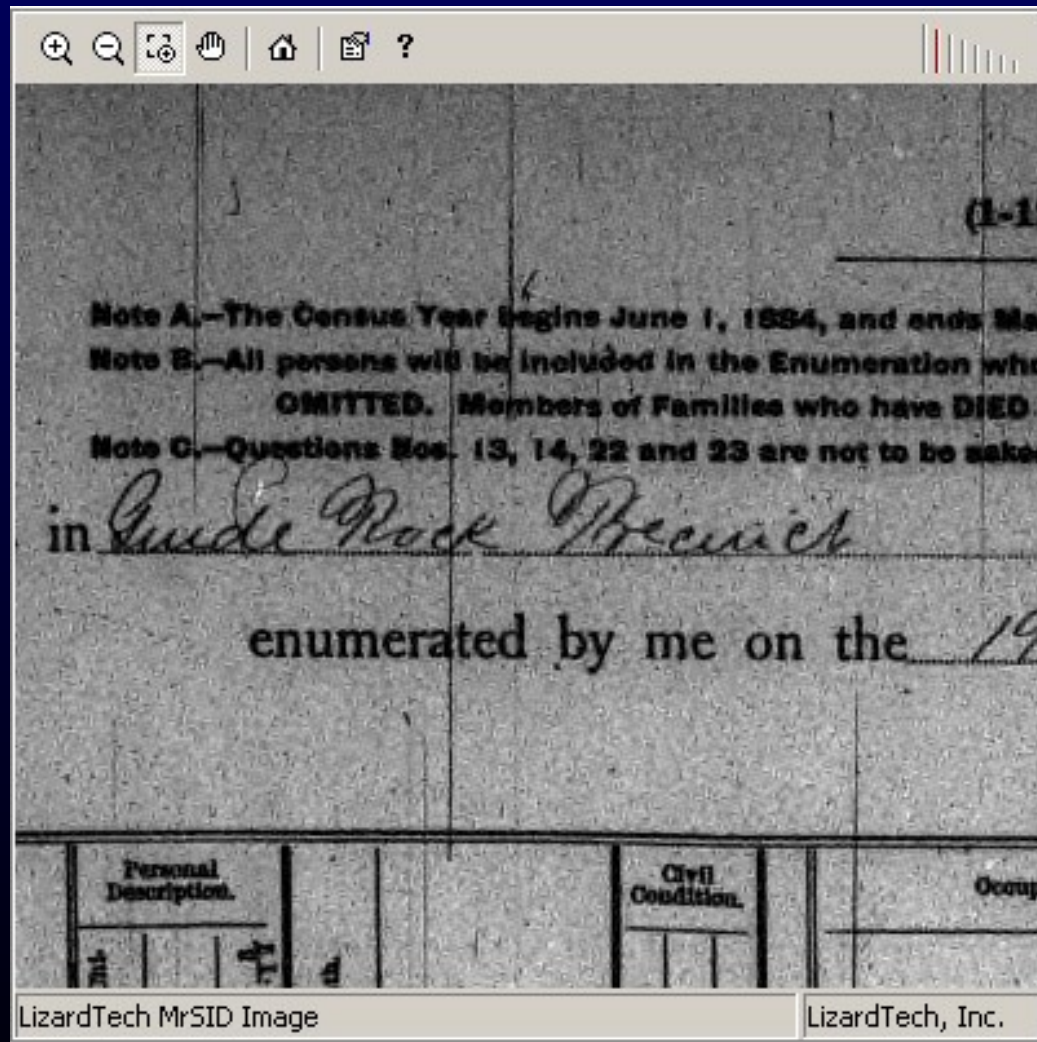
34,238 Bytes

Compare with MrSID



53,827 bytes received

Compare with MrSID



87,366 bytes received

Compare JITB Speed with MrSID

Distinguishing between “Guide Rock Precinct” and “Guide Creek Precinct” for 10 frames was about three or four times faster using Just-In-Time Browsing than using MrSID.

Questions?

For more information:

<http://rivit.cs.byu.edu/~kennard/jitb>